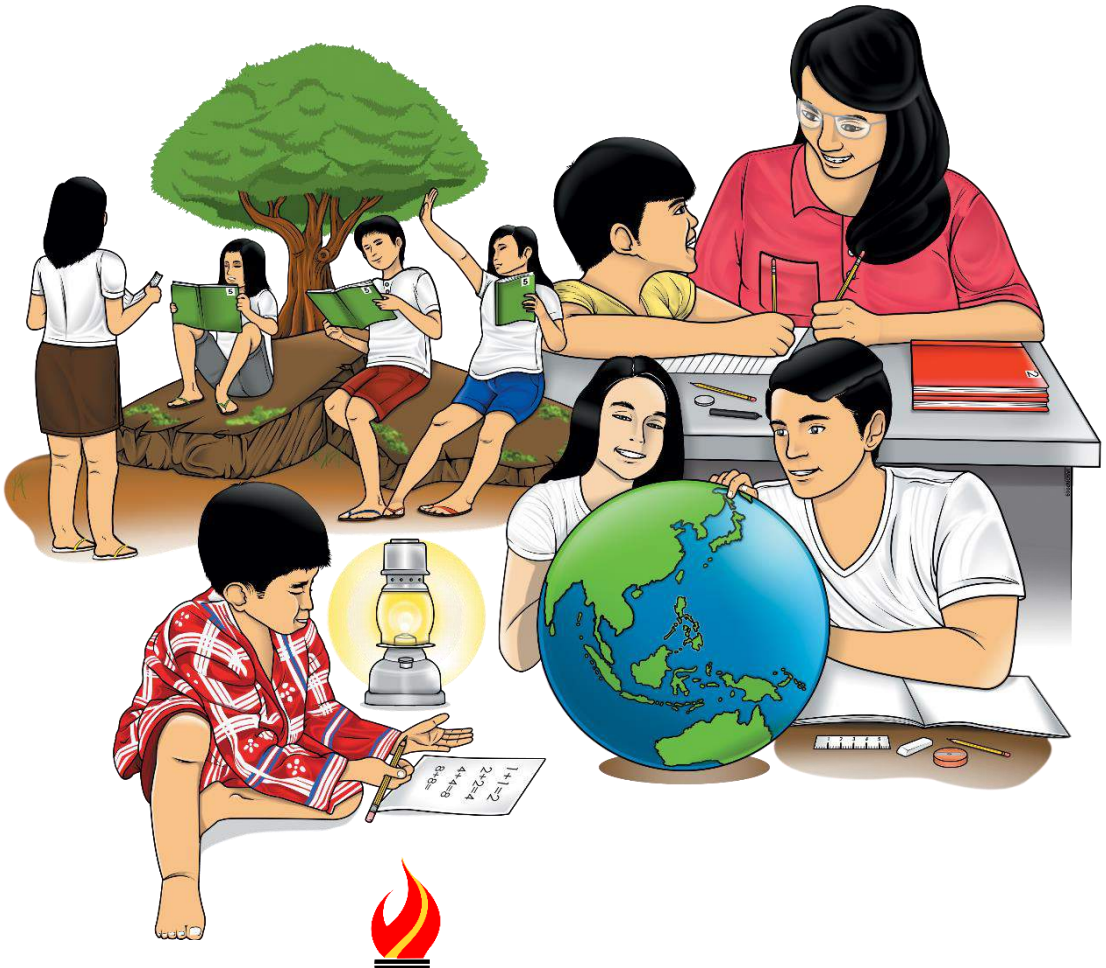
5

DepED
DEPARTMENT OF EDUCATION

Mathematics

Quarter 3 – Module 1:
Visualizing Percent



ALTERNATIVE DELIVERY MODE
ADM

GOVERNMENT PROPERTY
NOT FOR SALE

Mathematics – Grade 5
Alternative Delivery Mode
Quarter 3 – Module 1: Visualizing Percent
First Edition, 2020

Republic Act 8293, section 176 states that: No copyright shall subsist in any work of the Government of the Philippines. However, prior approval of the government agency or office wherein the work is created shall be necessary for exploitation of such work for profit. Such agency or office may, among other things, impose as a condition the payment of royalties.

Borrowed materials (i.e., songs, stories, poems, pictures, photos, brand names, trademarks, etc.) included in this module are owned by their respective copyright holders. Every effort has been exerted to locate and seek permission to use these materials from their respective copyright owners. The publisher and authors do not represent nor claim ownership over them.

Published by the Department of Education
Secretary: Leonor Magtolis Briones
Undersecretary: Diosdado M. San Antonio

Development Team of the Module

Writers: Nikolai S. Aralar, Nian L. Atis

Editors: Christopher D. Salino

Reviewers: Renato S. Cagomoc, Rolando Lacbo, Joshua Sherwin T. Lim

Illustrator: Louie Mercader

Layout Artist: Razle L. Jabelo, Jaycee B. Barcelona

Management Team: Ma. Gemma M. Ledesma, Arnulfo R. Balane, Rosemarie M. Guino
Joy B. Bihag, Ryan R. Tiu, Sarah S. Cabaluna,
Thelma Cabadsan-Quitalig, Elena S. De Luna,
Renato S. Cagomoc, Noel E. Sagayap, Geraldine P. Sumbise
Joshua Sherwin T. Lim

Printed in the Philippines by _____

Department of Education – Region VIII

Office Address: DepEd Regional Office No. 8
Candahug, Palo, Leyte
Telefax: (053)-832- 2997
E-mail Address: region8@deped.gpv.ph

5

Mathematics

Quarter 3 – Module 1:
Vizualizing Percent

DepED
DEPARTMENT OF EDUCATION

Introductory Message

This Self-Learning Module (SLM) is prepared so that you, our dear learners, can continue your studies and learn while at home. Activities, questions, directions, exercises, and discussions are carefully stated for you to understand each lesson.

Each SLM is composed of different parts. Each part shall guide you step-by-step as you discover and understand the lesson prepared for you.

Pre-tests are provided to measure your prior knowledge on lessons in each SLM. This will tell you if you need to proceed on completing this module or if you need to ask your facilitator or your teacher's assistance for better understanding of the lesson. At the end of each module, you need to answer the post-test to self-check your learning. Answer keys are provided for each activity and test. We trust that you will be honest in using these.

In addition to the material in the main text, Notes to the Teacher are also provided to our facilitators and parents for strategies and reminders on how they can best help you on your home-based learning.

Please use this module with care. Do not put unnecessary marks on any part of this SLM. Use a separate sheet of paper in answering the exercises and tests. And read the instructions carefully before performing each task.

If you have any questions in using this SLM or any difficulty in answering the tasks in this module, do not hesitate to consult your teacher or facilitator.

Thank you.

What I Need to Know

Hi, Mathletes! In this module, you will gain an understanding of percent and its relationship to fractions, ratios, and decimal numbers using models. In forming a fraction using a model, remember that the shaded part is the numerator, and the total number of equal parts is the denominator. A fraction can be also written in colon form to make it a ratio.

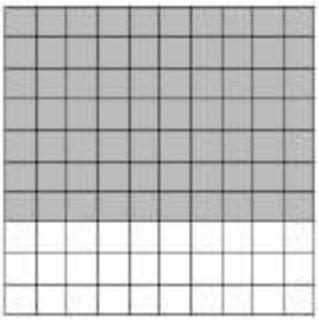
At the end of this module, you are expected to:

1. visualize percent and its relationship to fractions, ratios, and decimal numbers using models;
2. write percent in decimal numbers, ratios, and fractions; and
3. appreciate the relationship of percent to decimal, ratio, and fractions.

What I Know

Directions: Choose the letter of the correct answer. Write your answers on a separate answer sheet.

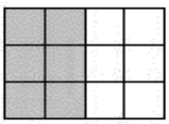
1) What percent is the shaded portion?

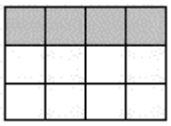


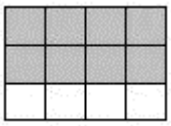
   A. 30%
   B. 60%
   C. 70%
   D. 80%

2) Which is the correct illustration for $\frac{8}{12}$?

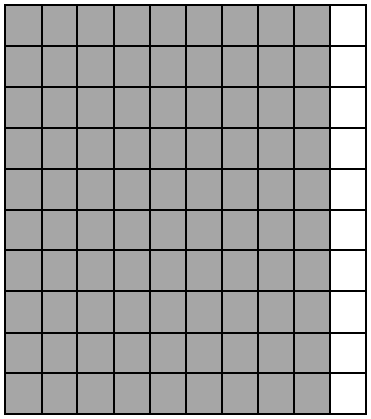
A.

B. 

C. 

D. 

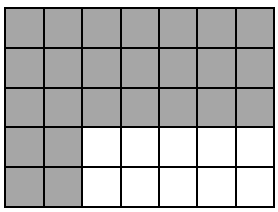
3) Which decimal represents the shaded part?



   A. 0.01
   B. 0.10
   C. 0.90
   D. 00.09

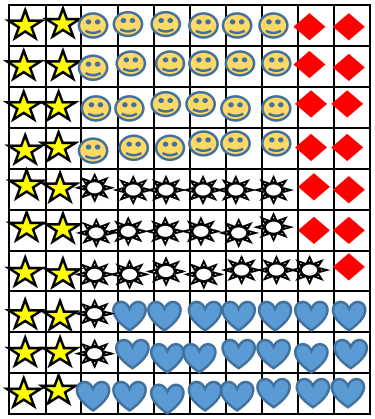
4) What percent is shaded in the figure in number 3?
   A. 9% C. 90%
   B. 10% D.100%

5) What fraction is the shaded portion?



   A. $\frac{25}{35}$ C. $\frac{20}{35}$
   B. $\frac{25}{40}$ D. $\frac{20}{40}$

Use the given figure to answer numbers 6 to 10.



6) What fraction is represented by the stars (★)?

A. $\frac{1}{3}$ C. $\frac{20}{100}$

B. $\frac{2}{3}$ D. $\frac{20}{20}$

7) If smileys (☺) has a fraction of $\frac{24}{100}$, what is its equivalent in decimal form?

A. 0.12 C. 0.25
B. 0.24 D. 0.48

8) What fraction is being illustrated by the sun (☼)?

A. $\frac{20}{100}$ C. $\frac{22}{100}$

B. $\frac{21}{100}$ D. $\frac{25}{100}$

9) What percent is the diamond (◆) in the figure?

A. 13% B. 15% C. 20% D. 25%

10) What fraction is equivalent for the blue hearts (💙)?

A. $\frac{2}{10}$ B. $\frac{20}{100}$ C. $\frac{22}{100}$ D. $\frac{78}{100}$

Please check your answers against the answer key on page 14.

Lesson 1 Visualizing Percent

In this module, you will learn how to visualize percent and its relationship to fractions, ratios and decimals using models. So, let's get started.

A **percent** is a number or ratio that represents a fraction of 100. It is often denoted by the symbol "%". For example, 35% is equivalent to the decimal 0.35, or the fraction $\frac{35}{100}$.

What's In

In the previous module, you have learned about two quantities in direct proportion.

A proportion is a statement that two ratios are equal. Proportion can be expressed through colon **(:)** and fraction. The first and the fourth terms are called **extremes**, and the second and third terms, are called the **means.**

means

a : b = c : d

extremes

Recall the Fundamental Law of Proportion.

In a proportion, the product of the extremes is equal to the product of the means.

a : b = c : d, ad = bc.

This is equivalent to cross multiplication of equivalent fractions as shown below.

$\frac{a}{b} \times \frac{c}{d} \iff ad = bc$

Example 1:

The ratio of ground pork in ounces to number of empanadas in its original recipe is **10:5.** As the amount of ground pork increases, the number of empanadas also increases.

Suppose that the given ratio of ground pork to the number of empanadas is **20 : 8.**

Let's check if the two quantities are in proportion. Using cross multiplication,

10 x 8 = 80	$\frac{10}{5} \times \frac{20}{8}$	5 x 20 = 100

Since the products are not the same, the two quantities are **not** in proportion.

Let's make it a proportion.

First, calculate how much ground pork is needed for 1 serving.	10 ÷ 5 = 2
1 serving needs 2 ounces. For 8 servings, multiply it by 8.	2 x 8 = 16
Form the proportion.	10: 5 = 16:8

To check if the answer is correct, use cross multiplication method or get the products of the means and extremes.

- Product of the means:
  5 x 16 = 80
- Product of the extremes:
  10 x 8 = 80
- The product of the means is equal to the product of the extremes. The two ratios are in proportion.

You should use 16 ounces of ground pork for 8 empanadas. Therefore, 10 : 5 and 16 : 8 is a proportion.

Answer the problem below. Show your solution.

Example 2:

For every 5 classes in the intermediate grades, there are 7 teachers. How many teachers are there for 20 classes?

What's New

You will visualize percent and its relationships to fractions, ratios-and decimals.

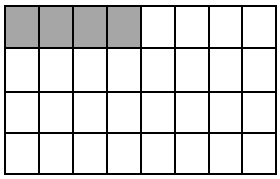
Percent is a ratio of a number to 100. A ratio can be written as a fraction, and a fraction can be written as a decimal. So, visualizing percent using models and decimals would be very easy for you.

What is It

Let us solve the given problem.

Example #1:

Arthur travelled 32 km in 4 hours. What is the ratio of his travel time in hours to the distance in kilometers?



The ratio of time to distance can be written as 4:32 or $\frac{4}{32}$.

This is illustrated in the given figure. There are 4 shaded squares out of 32 squares.

Note that the fraction form of 4:32 is $\frac{4}{32}$ or 1:8.

To find the ratio of time to distance:
4:32 = 1:8 ⟶ meaning for every hour, Arthur travels 8 km.

To find the ratio of distance to time:

32:4 or 8:1 ⟶ meaning Arthur travels 8 km every hour.

Example #2:

Renan took the entrance exam at Calbayog City National High School for the STEM Curriculum. He scored 89 out of a 100-item test in Math. What percent of the test did he answer correctly?

Form the ratio 89:100

or the fraction $\frac{89}{100}$

Note that 89/100 = 89 per hundred = 32% by definition of percent.

Change it to decimal: divide numerator by the denominator.

$$89 \div 100 = 0.89$$

Change it to percent: multiply by 100 or move the decimal point two places to the right and attach the % sign.

$$0.89 = 89\%$$

Therefore, Renan answered 89% of the math test correctly.

What's More

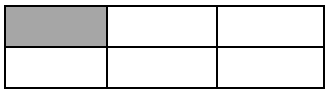
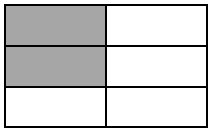
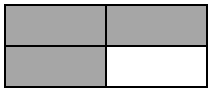
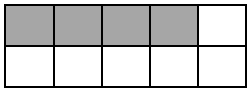
Activity 1: Equate Me!

Directions: Write each fraction in decimal form and in percent. Round off the decimals to the nearest hundredth.

	Fraction	Decimal	Percent
1.	$\frac{3}{8}$		
2.	$\frac{8}{12}$		
3.	$\frac{5}{15}$		
4.	$\frac{2}{8}$		
5.	$\frac{4}{20}$		

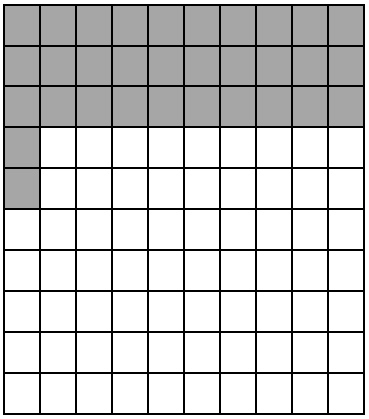
Activity 2: Express Me In!

Directions: Write the shaded part in each illustration as a ratio and a fraction.

		Ratio	Fraction
1)		_____	_____
2)		_____	_____
3)		_____	_____
4)		_____	_____
5)		_____	_____

Activity 3: A Part of Me!

Directions: Write the shaded part in each model as a ratio, fraction, decimal, and percent.

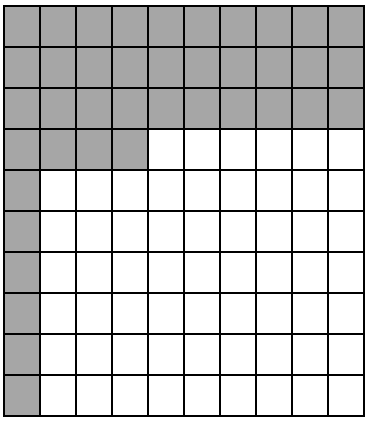
1. 

Ratio: _____

Fraction: —

Decimal: _____

Percent: _____

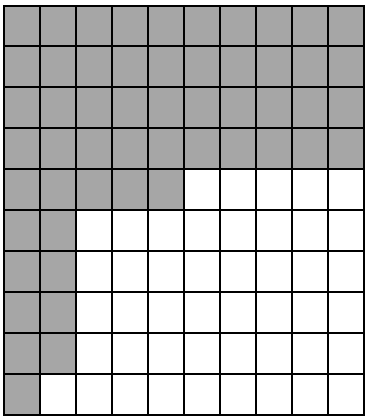
2. 

Ratio: _____

Fraction: —

Decimal: _____

Percent: _____

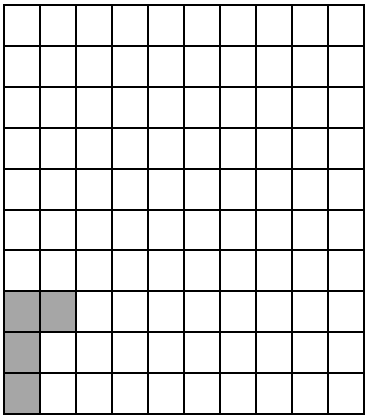
3. 

Ratio: _____

Fraction: —

Decimal: _____

Percent: _____

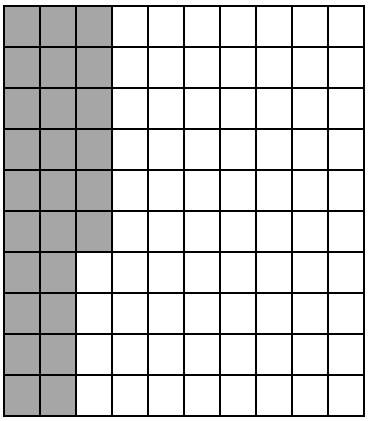
4. 

Ratio: _____

Fraction: ___

Decimal: _____

Percent: _____

5. 

Ratio: _____

Fraction: ___

Decimal: _____

Percent: _____

What I Have Learned

Fill in the blanks.

- To change the _____ to fraction, use the first quantity as the _____ and the _____ quantity as denominator.
- To change a fraction to _____, divide the numerator by the _____.
- To convert decimal to a _____, simply move the decimal point two places to the right and add the % sign. Or, _____ the decimal by _____ and add a percent sign.
- To write n% as a _____, use the ratio $\frac{n}{100}$. Then, reduce it_____ term if needed.

Good job! You are almost done with this module.

What I Can Do

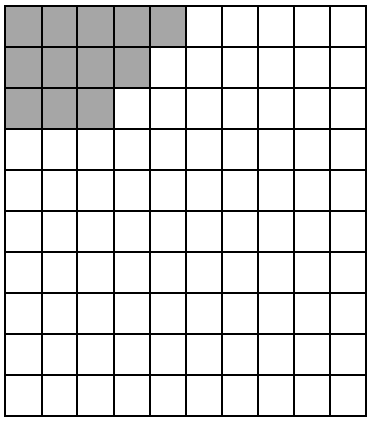
Directions: Solve the word problem. Write your answer in ratio, fraction, decimal and percent. Show your answer using models.

A class of sixty (60) students is comprised of thirty-six (36) females and twenty-four (24) males. We can see that thirty-six out of sixty $\left(\frac{36}{60}\right)$ students are females and twenty-four out of sixty $\left(\frac{24}{60}\right)$ are males. The two fractions can be read as thirty-six sixtieths and twenty-four sixtieths. Represent this part-whole concept in a model with ratio, percent, decimal, and fraction.

Assessment

Directions: Choose the letter of the correct answer.

1) What fraction is the shaded portion?



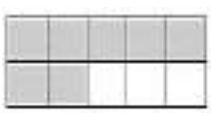
A. $\frac{12}{100}$

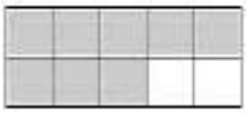
B. $\frac{10}{25}$

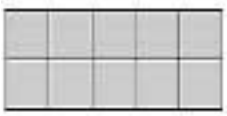
C. $\frac{12}{12}$

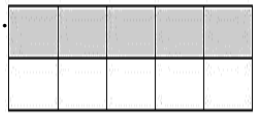
D. $\frac{10}{10}$

2) Which is the correct illustration for $\frac{7}{10}$?

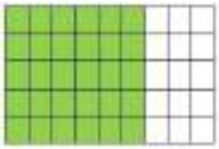
A. 

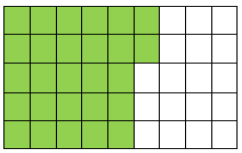
B. 

C. 

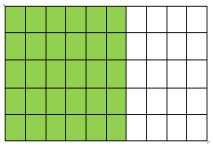
D. 

3) Which illustration shows $\frac{27}{50}$?

A. 

B. 

C.

D. 

4) Which is fraction shows the shaded portion of the illustration?

A. $\frac{6}{6}$

B. $\frac{6}{24}$

C. $\frac{6}{20}$

D. $\frac{24}{6}$

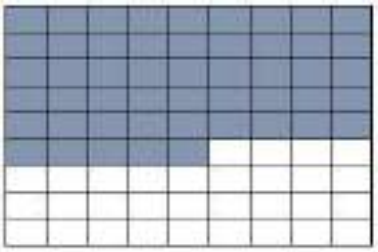
5) What fraction is the shaded portion?

A. $\frac{81}{50}$

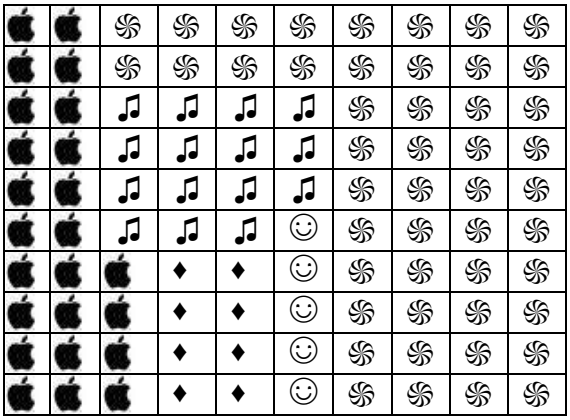
B. $\frac{81}{31}$

C. $\frac{31}{81}$

D. $\frac{50}{81}$



For numbers 6 to 10, use the figure below.



6) What is the equivalent of $\frac{48}{100}$ in decimal form?

A. 0.48 C. 0.408
B. 0.048 D. 00.048

7) What fraction is illustrated by the iphone logo ( )?

A. $\frac{24}{100}$ B. $\frac{24}{24}$ C. $\frac{48}{14}$ D. $\frac{24}{10}$

8) What fraction is illustrated by the musical notes (♫)?

A. $\frac{15}{15}$ B. $\frac{16}{100}$ C. $\frac{15}{100}$ D. $\frac{14}{100}$

9) What fraction ~~is~~ represented by the smileys (☺)?

A. $\frac{5}{5}$ B. $\frac{95}{100}$ C. $\frac{5}{10}$ D. $\frac{5}{100}$

10) What percent is the diamond (♦) in the figure?

A. 12% B. 11% C. 10% D. 8%

Please check your answers with the ANSWER KEY on page 14.

Got a score of 8-10? CONGRATULATIONS! Job well done. See you in the next module. If below 8, you may have to go over the lessons and the exercises again.

Additional Activities

Directions: Find the missing quantities. Round off decimals to the nearest hundredth.

	Ratio	Fraction	Decimal	Percent
1.		$\frac{2}{5}$		
2.			0.08	
3.				78%
4.	4:7			
5.		$\frac{1}{6}$		

Answer Key

What I Know

1. C
2. D
3. C
4. C
5. A
6. C
7. B
8. B
9. A
10. C

What's In

$\frac{5}{7} = \frac{20}{n}$

$5 \times n = 7 \times 20$

$\frac{5n}{5} = \frac{140}{5}$

$n = 28$

$5 : 7 = 20 : 28$

What's More

Activity 1

	Decimal	Percent
1.	0.38	38%
2.	0.67	67%
3.	0.33	33%
4.	0.25	25%
5.	0.20	20%

What's More

Activity 2

	Ratio	Fraction
1.	1 : 6	1/6
2.	2 : 6	2/6
3.	3 : 4	3/4
4.	4 : 5	4/5
5.	4 : 10	4/10

What's More

Activity 3

	Ratio	Fraction	Decimal	Percent
1.	32:100	32/100	0.32	32%
2.	40:100	40/100	0.40	40%
3.	54:100	54/100	0.54	54%
4.	4:100	4/100	0.04	4%
5.	26:100	26/100	0.26	26%

What's I Have Learned

1. ratio
2. numerator
3. second
4. decimal
5. denominator
6. percentage
7. multiply
8. 100
9. fraction
10. lowest

What's I Can Do

	ratio	fraction	decimal	percent
Females	32:60	32/60 or 3/5	0.6	60%
Male	24:60	24/60 or 2/5	0.4	40%

Assessment

1. A
2. A
3. C
4. B
5. D
6. A
7. A
8. C
9. D
10. D

Additional Activity

	Ratio	Fraction	Decimal	Percent
1.	2:5	2/5	0.4	40%
2.	8:100	8/100	0.08	8%
3.	78:100	78/100	0.78	78%
4.	4:7	4/7	0.57	57%
5.	1:6	1/6	0.17	17%

References

Burgos, Jaime R., Markjoseph H. Perez and Donnel P. Placer. 2016. *21st Century Mathletes.* Quezon City, Viral Group Inc.

Coronel, Carmelita C. and Nelia D. Bamba. 2010. *Mathematics for a Better Life Textbook.* Quezon City, SD Publication, Inc.,

For inquiries or feedback, please write or call:

Department of Education - Bureau of Learning Resources (DepEd-BLR)

Ground Floor, Bonifacio Bldg., DepEd Complex
Meralco Avenue, Pasig City, Philippines 1600

Telefax: (632) 8634-1072; 8634-1054; 8631-4985

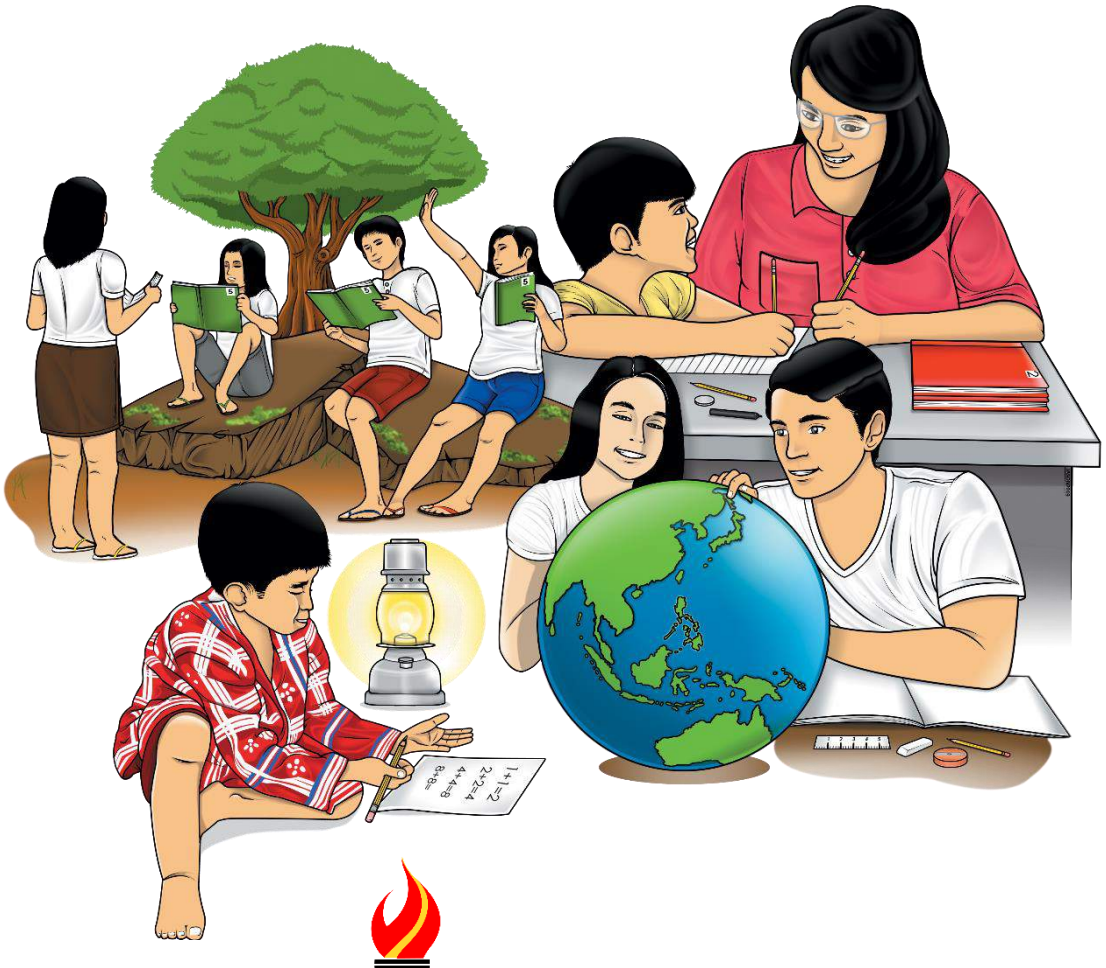
Email Address: blr.lrqad@deped.gov.ph * blr.lrpd@deped.gov.ph

5

DepED
DEPARTMENT OF EDUCATION

Mathematics

Quarter 3 – Module 2:
Defining Percentage, Rate and Base



ALTERNATIVE DELIVERY MODE
ADM

GOVERNMENT PROPERTY
NOT FOR SALE

Mathematics – Grade 5
Alternative Delivery Mode
Quarter 3 – Module 2: Defining Percentage, Rate and Base
First Edition, 2020

Republic Act 8293, section 176 states that: No copyright shall subsist in any work of the Government of the Philippines. However, prior approval of the government agency or office wherein the work is created shall be necessary for exploitation of such work for profit. Such agency or office may, among other things, impose as a condition the payment of royalties.

Borrowed materials (i.e., songs, stories, poems, pictures, photos, brand names, trademarks, etc.) included in this module are owned by their respective copyright holders. Every effort has been exerted to locate and seek permission to use these materials from their respective copyright owners. The publisher and authors do not represent nor claim ownership over them.

Published by the Department of Education
Secretary: Leonor Magtolis Briones
Undersecretary: Diosdado M. San Antonio

Development Team of the Module

Writers: Nikolai S. Aralar, Maria Niann L. Atis

Editors: Virginia A. Millares, Elizabeth Mandreza

Reviewers: Renato S. Cagomoc, Rolando Lacbo, Joshua Sherwin T. Lim

Illustrator: Rose Ann M. Nzareno, Salvacion Sarmiento

Layout Artist: Razle L. Jabelo, Jaycee B. Barcelona

Management Team: Ma. Gemma M. Ledesma, Arnulfo R. Balane, Rosemarie M. Guino
Joy B. Bihag, Ryan R. Tiu, Sarah S. Cabaluna,
Thelma Cabadsan-Quitalig, Elena S. De Luna,
Renato S. Cagomoc, Noel E. Sagayap, Geraldine P. Sumbise
Joshua Sherwin T. Lim

Printed in the Philippines by _____

Department of Education – Region VIII

Office Address: DepEd Regional Office No. 8
Candahug, Palo, Leyte
Telefax: (053)-832-2997
E-mail Address: region8@deped.gpv.ph

5

Mathematics

Quarter 3 – Module 2:
Defining Percentage, Rate and Base

DepED
DEPARTMENT OF EDUCATION

Introductory Message

This Self-Learning Module (SLM) is prepared so that you, our dear learners, can continue your studies and learn while at home. Activities, questions, directions, exercises, and discussions are carefully stated for you to understand each lesson.

Each SLM is composed of different parts. Each part shall guide you step-by-step as you discover and understand the lesson prepared for you.

Pre-tests are provided to measure your prior knowledge on lessons in each SLM. This will tell you if you need to proceed on completing this module or if you need to ask your facilitator or your teacher's assistance for better understanding of the lesson. At the end of each module, you need to answer the post-test to self-check your learning. Answer keys are provided for each activity and test. We trust that you will be honest in using these.

In addition to the material in the main text, Notes to the Teacher are also provided to our facilitators and parents for strategies and reminders on how they can best help you on your home-based learning.

Please use this module with care. Do not put unnecessary marks on any part of this SLM. Use a separate sheet of paper in answering the exercises and tests. And read the instructions carefully before performing each task.

If you have any questions in using this SLM or any difficulty in answering the tasks in this module, do not hesitate to consult your teacher or facilitator.

Thank you.

What I Need to Know

Hi, Mathletes! In this module, you will gain understanding about percentage, rate or percent and base. These terms are commonly used everywhere, such as in food shops, grocery stores, internet, and advertisements. Understanding these terms will help you identify them in a given problem. To understand percentage, rate and base, you need to use your knowledge of fractions, ratios and decimals. Also, understanding proportional relationships is needed in this lesson.

After going through this module, you are expected to:

1. define percentage, rate, and base.

Are you ready to begin? Let us check what you know about percentage, rate and base.

What I Know

Directions: Write the letter that corresponds to the correct answer.

1) Which represents rate in the statement *25 is 25% of 100*?
   A. 25 C. 100
   B. 25% D. 250

2) What do you call 60 in the statement *15 is 25% of 60*?
   A. base C. percent
   B. rate D. percentage

3) In the phrase *20% of 90*, what is 20%?
   A. base C. percent
   B. rate D. percentage

4) Is the statement *30% of 150 is 20* **TRUE**?
   A. Possible C. Maybe
   B. Yes D. No

5) What is 250 in the statement *24% of 250 is 60*?
   A. base C. percent
   B. rate D. percentage

6) What term refers to the comparison of the percentage to the base expressed in percent?
   A. base C. percent
   B. rate D. percentage

7) What do you call the quantity that represents the whole?
   A. base C. percent
   B. rate D. percentage

8) Which term is described as the quantity that is part of the base?
   A. base C. percent
   B. rate D. percentage

9) Which represents base in *30% of 300 is 90*?
   A. 30 C. 300
   B. 90 D. 30%

10) Which statement is **TRUE**?
   A. Percentage is part of a whole. C. Base is part of a portion.
   B. Percentage is part of portion. D. Base is part of a whole.

Please check your answers against the answer key on page 13.

Lesson 1 Defining Percentage, Rate and Base

In this module, you will learn how to define percentage, rate and base. Are you excited to learn? Let's go ahead and discover.

What's In

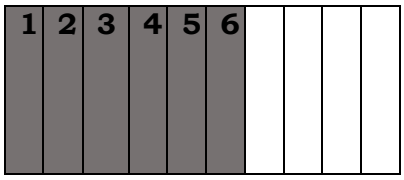
Can you still recall the steps in visualizing percent and its relationship to fractions, ratios and decimals using models?

We have known in the previous lessons that percent is a part of a hundred. It came from the Latin phrase per centum, which means per hundred. In Mathematics, we can easily spot percent because it uses the symbol %.
Consider the sample situation below:

Example 1:

A furniture maker cut a big chunk of wood and divided it equally into 10 pieces. Six of them were painted gray and 4 were left in its original color. What part of the whole wood are painted pieces? Represent this part in fraction, decimal, ratio, and percent.

This illustration shows that the shaded rectangles represent the painted pieces of wood and the non-shaded rectangles represent the unpainted parts. Let us represent the ratio of the shaded part to the whole or total number of parts.



Represent this figure in fraction: $\frac{6}{10} \div \frac{2}{2} = \frac{3}{5}$

Represent this figure in decimal:

$$\frac{6}{10} = \mathbf{0.6}$$

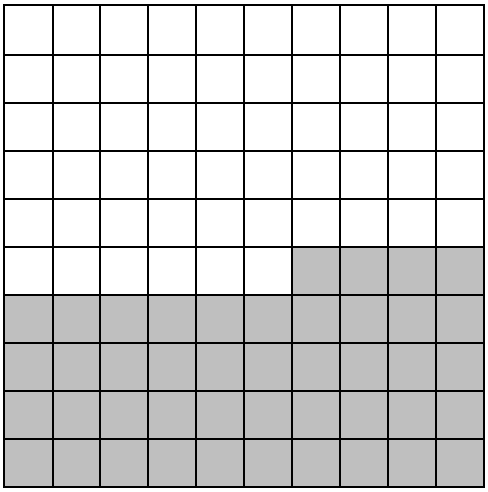
Represent this figure in ratio: **6:10**
Represent this figure in percent:

$$\frac{6}{10} = \frac{60}{100} = \mathbf{60\%}$$

Therefore, 60% of the 10 pieces of wood are painted.

Example 2:

A square swimming pool has a 10 x 10 grid of tiles artistically arranged on its floor area. The grid is composed of blue and white tiles. The shaded squares represent the blue tiles and the non-shaded squares represent the white tiles. Express the shaded area as a fraction, a decimal, and a percent of the whole. Express the fraction in lowest terms.



Fraction: $\frac{44}{100} \div \frac{4}{4} = \frac{11}{25}$

Decimal: $\frac{44}{100} = 0.44$

Ratio: 44:100

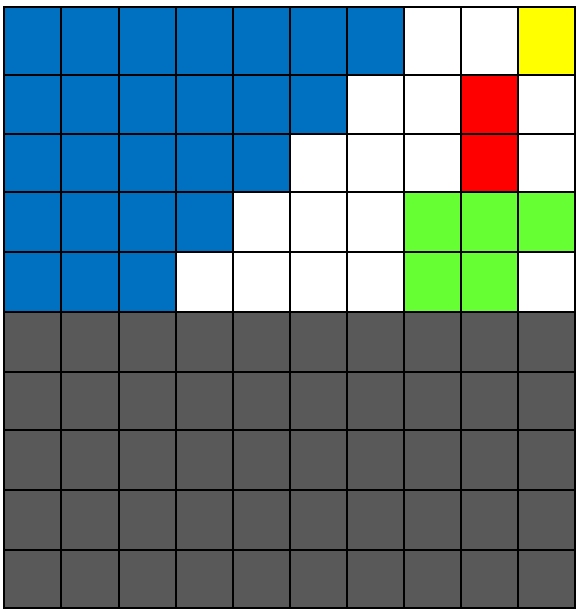
Percent: $\frac{44}{100} = 44\%$

Therefore, 44% of the 10 x 10 grid of tiles are colored blue.

Try the activity below.

The grid below has 100 cells.

- Each cell or square is equal to 1% of the whole (the yellow cell is 1%).
- Two cells are equal to 2% (the red cells).
- Five cells are equal to 5% (the green cells).
- Twenty-five cells (blue cells) are equal to 25% of the whole or one quarter $\left(\frac{1}{4}\right)$.
- Fifty cells (gray cells) are equal to 50% of the whole or half $\left(\frac{1}{2}\right)$.



Observe closely. How many unshaded cells are there? What is the percentage of unshaded cells?

There are two ways:

1. Simply count the unshaded cells.
2. Count all the shaded cells, and subtract the sum number from 100.

1 yellow, 2 red, 5 green, 25 blue and 50 gray. That is a total of 83.

So, **100 – 83 = 17**. Therefore, out of 100 cells, **17** are unshaded. Each cell represents 1%, and so, **17%** of the whole is unshaded.

What's New

In this module, you will learn how to define percentage, rate and base.

Consider the problem below

A fruit stand is selling the best variety of fruits in Calbayog City. It sells carabao mangoes for only 12 pesos each. It offers a 30% discount on the total price of the first 30 pieces if you will buy 50 piece or more. How much will you pay for 50 mangoes?

What is It

We often encounter percentage, rate and base in daily life. We see percentages as discounts in prices of clothes, shoes, meat products, grocery items and even in fruits.

Percentages are like fractions and decimals. They are ways to describe what proportion of a whole is represented by a number. **Percentage** is a term from Latin, meaning "out of one hundred". We can consider a "whole" broken up into 100 equal parts, each part is a single percent. Percentage represents a part of the base.

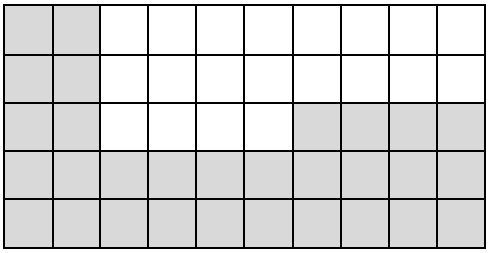
The base is the number that represents the whole or the 100 percent. The rate defines what part the percentage is of the base.

Example 1:

Let's discuss the problem from the previous part.

A fruit stand is selling the best variety of fruits in Calbayog City. It sells carabao mangoes for only 12 pesos each. It offers a 30% discount on the total price of the first 30 pieces if you will buy 50 piece or more. How much will you pay for 50 mangoes?

Let the shaded parts represent the number of Carabao mangoes with 30% discount. The unshaded parts represent the number of Carabao mangoes with fixed price of 12 pesos.



Note that the price of the Carabao mangoes is now 30% less than the original price for the first 30 pieces bought. This means that 30% of the original price is the savings that you will get.

First, get the "30%" of the total price for the first 30 pieces of mangoes you bought, which is

$$12 \times 30 = 360$$
$$30\% \text{ of } 360 = N$$

30% is 30 out of 100 and it is N out of ₱360.

Write the corresponding mathematical sentence to this, then find the value of the missing terms.

$$N \text{ out of } 360 = 30 \text{ out of } 100$$
$$N:360 = 30:100$$

By the cross-product rule (or Fundamental Law of Proportion):

$$100 \times N = 360 \times 30$$
$$100N = 10800$$
$$\frac{100N}{100} = \frac{10800}{100}$$

$$N = 108$$

The original price of the first 30 pieces of Carabao mangoes is 360. Therefore, ₱108.00 will be deducted from 360, and it is the amount that you will save.

$$360 - 108 = 252$$

The discounted price of the first 30 pieces of Carabao mangoes is 252.

Since you bought 50 Carabao mangoes and the remaining 20 pieces will cost ₱12.00 each., then the price of the remaining 20 pieces of mangoes is 240.

$$12 \times 20 = 240$$

Then add 252 + 240 = 492. Therefore, the total amount to pay for 50 Carabao mangoes is ₱492.00.

The given problem is an example of a problem on Percentage.

Percentage is a part of a whole. That whole or total is base, while the number with percent (%) symbol is the rate.

From the problem, we have learned that 30% of ₱360.00 is ₱108.00.
30% is the Rate (the expression with the % symbol)
₱108.00 is the Percentage (part of the whole; part of ₱360.00)
₱360.00 is the Base (whole or total)

Example 2:

Alegre Guitars gave out coupons to their valued customers as part of their anniversary celebration. The coupons offer 15% off of any purchase of ₱3,500.00 or more.

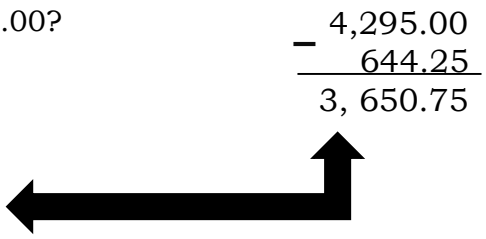
Jason wants to buy a guitar that has a price tag of ₱4,295.00. How much will Jason and his mother save from the regular price of the guitar if they use the coupon? How much will they pay for the guitar?

Remember that problems involving percentage have three quantities **percentage**, **rate** and **base**. In the problem above, 15% is the discount rate or *percent off* the purchase price. The base is the original price of the guitar which is ₱4,295.00.

The percentage is the amount that relates to the rate. It is always part of the whole. Since the rate is the *percent off*, the percentage is the *amount off* of the price. In the problem above, the percentage is unknown.

How much is 15% of ₱4,295.00?
Rate: 15%
Base: 4,295.00
Percentage: N

15% x 4,295.00 = *N*
0.15 x 4,295.00 = 644.25



Therefore,15% of ₱4,295.00 is ₱644.25 and this is the amount Jason and his mother will save from the guitar's original price using the discount coupon.

15% is the Rate (the expression with the % symbol)
₱644.25 is the Percentage (part of the whole; part of ₱4,295.00)
₱4,295.00 is the Base (whole or total)

So, if we deduct 644.25 from the original price ₱4,295.00, they are only going to pay ₱3,650.75 for the guitar.

What's More

Let's try the activities below.

Activity 1: Fill Me Out!

Directions: Copy the table below on your answer sheet. Identify the rate, base, and percentage in each statement. Place them in the correct columns to complete the table.

	Rate	**Base**	**Percentage**
1) 25 is 25% of 100			
2) 15 is 25% of 60			
3) 18 is 20% of 90			
4) 18 is 30% of 60			
5) 20% of 150 is 30			

Activity 2: Pick Me Right!

Directions: Identify whether what is asked in each problem is **base**, **percentage** or **rate**. Write **A** if you are asked to find the ***base***, **B** for ***percentage*** and **C** for ***rate*** .

Example:

In an examination of 75 items, Richard got 60% correct answers. How many correct answers did Richard get?

Answer: B

1) A farmer harvested 250 cavans of yellow corn. He sold 85% of his harvest. How many cavans of yellow corn did he sell?
2) Singapore's population of about 3 million is 15% of the population in Malaysia. What is the population of Malaysia?
3) Mika, a grade five pupil, has 30 sheets of art paper for her project in Math. If 6 sheets of art paper were used by Mika, what percent of the sheets of art paper did she use?
4) A vendor had 200 balloons for sale. If he sold 125 of them, what percent remains unsold?
5) In a certain voting precinct, there were 300 voters who voted during the last election. This was 75% of the registered voters. How many registered voters are there?

Activity 3: You Complete Me!

Directions: Complete the table by supplying the missing number. Express fraction in lowest terms.

	Percent	Fraction	Decimal
1)	23%		
2)		1/2	
3)			0.36
4)		3/2	
5)	300%		

What I Have Learned

Fill in the blanks with the correct answers from the box below.

The 1) _____is the quantity which is a part of the whole. The number with % symbol beside it is called the 2)_____. Rate is the percentage divided by the base and 3) _____ by 100. The 4)_____ or the whole is percentage divided by rate. Change the rate to 5)_____ form, before computing.

whole	**Decimal**		**Base**	**Rate**
	Percentage	**multiplied**		

What I Can Do

Congratulations for having reached this far! Let's try some real-life situations involving percentage, rate and base.

Again, the base is the whole or the total. The percentage is the part of the whole. The rate is represented by a percent.

Directions: Solve the word problem.

Mario bought a box of avocados. He found that 12% of the avocados were rotten and 66 were in good condition. Find the total number of avocados in the box.

Assessment

Directions: Write the letter of the correct answer.

1) In the statement *24% of 250 is 60*, which represents base?
   A. 0.24 C. 60
   B. 24% D. 250

2) If 30% of 300 is 90, what do you call 90?
   A. base C. portion
   B. rate D. percentage

3) In the statement "18 is 20% of 90" statement what is 20%?
   A. base C. portion
   B. rate D. percentage

4) What do you call the comparison of the percentage to the base expressed in percent?
   A. N C. rate
   B. base D. percentage

5) Which of the following statement is **TRUE**?
   A. 20% of 150 is 30 C. 150 is 20% of 30
   B. 30% of 150 is 20 D. 150 is 30% of 20

6) What quantity is part of the base?
   A. N C. rate
   B. base D. percentage

7) Which represents rate in *25 is 25% of 100*?
   A. 25 C. 100
   B. 25% D. 250

8) What do you call the quantity that represents the whole?
   A. N C. rate
   B. base D. percentage

9) What do you call 60 in *15 is 25% of 60*?
   A. N C. rate
   B. base D. percentage

10) Which statement is **TRUE**?
   A. Percentage is part of a whole. C. Base is part of a portion
   B. Percentage is part of portion. D. Base is part of a whole.

Please check your answers with the ANSWER KEY on page 13.

Got a score of 8-10? CONGRATULATIONS! Job well done. See you in the next module. If below 8, you may have to go over the lessons and the exercises again.

Additional Activities

Directions: Using the problems in ***Activity 2: Pick Me Right***", solve each problem.

1) A farmer harvested 250 cavans of yellow corn. He sold 85% of his harvest. How many cavans of yellow corn did he sell?

2) Singapore's population of about 3 million is 15% of the population in Malaysia. What is the population of Malaysia?

3) Mika, a grade five pupil, has 30 sheets of art paper for her project in Math. If 6 sheets of art paper were used by Mika, what percent of the sheets of art paper did she use?

4) A vendor had 200 balloons for sale. If he sold 125 of them, what percent remains unsold?

5) In a certain voting precinct, there were 300 voters, who voted during the last election. This was 75% of the registered voters. How many registered voters are there?

Answer Key

What I Know

1. B
2. A
3. B
4. D
5. A
6. B
7. A
8. D
9. C
10. A

What's In

No. of unshaded cells = 17

Percentage of unshaded cells = 17

What's More

Activity 1: Fill Me Out

	Rate	Base	Percentage
1.	25%	100	25
2.	25%	60	15
3.	20%	90	18
4.	30%	60	18
5.	20%	150	30

What's More

Activity 2: Pick Me Right

1. B
2. A
3. C
4. C
5. A

What's More

Activity 3: You Complete Me

	Percent	Fraction	Decimal
1.	23%	23/100	0.23
2.	50%	1/2	0.5
3.	36%	9/25	0.36
4.	150%	3/2	1.5
5.	300%	3	3.0

What's I Have Learned

1. Percentage
2. Rate
3. Multiplied
4. Base
5. Decimal

What I Can Do

Solution:

Let the total number of avocados in the basket be ***n***.

12% of the avocados are rotten, and avocados in good condition are 66 which is 100% - 12% = 88% of the total. Therefore, according to the question,

88% of n = 66
88/100 x n = 66
n = (66 x 100)/88
n = 3 x 25
n = 75

Therefore, the total number of avocados in the basket is 75.

Assessment

1. D
2. D
3. B
4. C
5. A
6. D
7. B
8. B
9. B
10. A

Additional Activities

1. 212.5
2. 20 million
3. 20%
4. 37.5%
5. 400

References

Castro, Isabel V., Carmelita C. Coronel, Luz O. Gallardo. 1999. *Mathematics for Everyday Use.* Quezon City. Dane Publishing House Inc.

Del Fiero, Jong. Power in Numbers. 1999. Sta. Cruz, Manila, Saint Mary's Publishing Corporation

Bandejas, Joemarie A., dolores E. Reyes, Enerio L. Sagusay, Ed.D., Eduardo O. Dela Cruz Jr., Ed.D. 2016. *Phoenix Math for the 21st Century Learners*.Phoenix Publishing House

Burgos, Jaime R., Angelina P. Lumbre, Donnel P. Placer, Reynaldo A. Sy, Jr., Alvin C. Ursua. 2016. *21st Century Mathematics Textbook*.Vibal Group, Inc.

Eduplace.com. 2020. *Grade 5: Fractions, Ratios, Rates, and Percents: Tips and Tricks*. [online] Available at: <https://www.eduplace.com/math/mw/background/5/11/te_5_11_fractions_tips.html> [Accessed 11 August 2020].

Skillsyouneed.com. n.d. *Percentages - An Introduction | Skillsyouneed*. [online] Available at: <https://www.skillsyouneed.com/num/percentages.html> [Accessed 11 August 2020].

Khan Academy. n.d. *Fraction, Decimal, And Percent from Visual Model (Video) | Khan Academy*. [online] Available at: <https://www.khanacademy.org/math/pre-algebra/pre-algebra-ratios-rates/pre-algebra-intro-percents/v/fraction-decimal-and-percent-from-visual-model> [Accessed 11 August 2020].

Khan Academy. n.d. *Khan Academy | Free Online Courses, Lessons & Practice*. [online] Available at: <https://www.khanacademy.org/> [Accessed 11 August 2020].

For inquiries or feedback, please write or call:

Department of Education - Bureau of Learning Resources (DepEd-BLR)

Ground Floor, Bonifacio Bldg., DepEd Complex
Meralco Avenue, Pasig City, Philippines 1600

Telefax: (632) 8634-1072; 8634-1054; 8631-4985

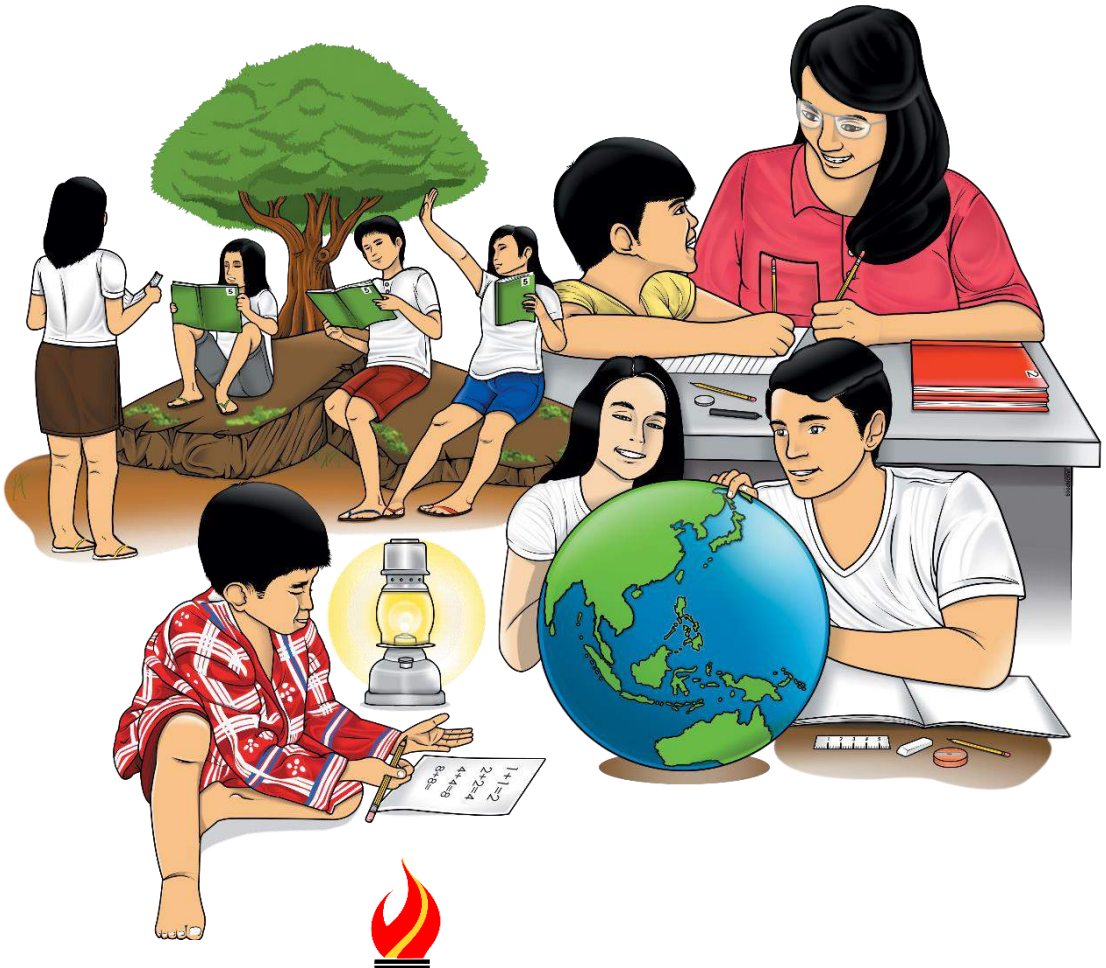
Email Address: blr.lrqad@deped.gov.ph * blr.lrpd@deped.gov.ph

5

DepED
DEPARTMENT OF EDUCATION

Mathematics

Quarter 3 – Module 3:
Identifying the Base, Percentage and Rate in a Problem



ALTERNATIVE DELIVERY MODE
ADM

GOVERNMENT PROPERTY
NOT FOR SALE

Mathematics – Grade 5
Alternative Delivery Mode
Quarter 3 – Module 3: Identifying the Base, Percentage and Rate in a Problem
First Edition, 2020

Republic Act 8293, section 176 states that: No copyright shall subsist in any work of the Government of the Philippines. However, prior approval of the government agency or office wherein the work is created shall be necessary for exploitation of such work for profit. Such agency or office may, among other things, impose as a condition the payment of royalties.

Borrowed materials (i.e., songs, stories, poems, pictures, photos, brand names, trademarks, etc.) included in this module are owned by their respective copyright holders. Every effort has been exerted to locate and seek permission to use these materials from their respective copyright owners. The publisher and authors do not represent nor claim ownership over them.

Published by the Department of Education
Secretary: Leonor Magtolis Briones
Undersecretary: Diosdado M. San Antonio

Development Team of the Module

Writers: Frederick S. Cruz

Editors: Nian L. Atis, Veronica Afable

Reviewers: Renato S. Cagomoc, Rolando Lacbo, Joshua Sherwin T. Lim,
Langie Boy C. Enriquez

Illustrator: Salvacion Sarmiento

Layout Artist: Razle L. Jabelo, Maelyne L. Yambao

Management Team: Ma. Gemma M. Ledesma
Arnulfo B. Balane
Rosemarie M. Guino
Joy B. Bihag
Ryan R. Tiu
Sarah S. Cabaluna
Thelma Cabadasan-Quitalig
Elena S. De Luna
Renato S. Cagomoc
Noel E. Sagayap
Geraldine P. Sumbise, Joshua Sherwin T. Lim

Printed in the Philippines by _____

Department of Education – Region VIII

Office Address: Deped Regional Office No. 8
Candahug, Palo, Leyte
Telefax: (053)-832-2997
E-mail Address: region8@deped.gov.ph

5

Mathematics

Quarter 3 – Module 3:
Identifying the Base, Percentage and Rate in a Problem

DepED
DEPARTMENT OF EDUCATION

Introductory Message

This Self-Learning Module (SLM) is prepared so that you, our dear learners, can continue your studies and learn while at home. Activities, questions, directions, exercises, and discussions are carefully stated for you to understand each lesson.

Each SLM is composed of different parts. Each part shall guide you step-by-step as you discover and understand the lesson prepared for you.

Pre-tests are provided to measure your prior knowledge on lessons in each SLM. This will tell you if you need to proceed on completing this module or if you need to ask your facilitator or your teacher's assistance for better understanding of the lesson. At the end of each module, you need to answer the post-test to self-check your learning. Answer keys are provided for each activity and test. We trust that you will be honest in using these.

In addition to the material in the main text, Notes to the Teacher are also provided to our facilitators and parents for strategies and reminders on how they can best help you on your home-based learning.

Please use this module with care. Do not put unnecessary marks on any part of this SLM. Use a separate sheet of paper in answering the exercises and tests. And read the instructions carefully before performing each task.

If you have any questions in using this SLM or any difficulty in answering the tasks in this module, do not hesitate to consult your teacher or facilitator.

Thank you.

What I Need to Know

Hello, Mathletes! In this module, you will be able to gain understanding and test your ability in identifying and solving for the base, percentage and rate in a problem.

As mentioned in the previous module, percentages can be seen almost everywhere - in food shops, grocery stores, and even in advertisements. Mastery to identify the base, percentage and rate in a problem is a skill that will help us in daily situations. In this module, you will be taught on the step-by-step process in identifying and solving percentage, rate or percent and base in a word problem. Challenging activities are provided in this module for you to strengthen your understanding of the lesson.

After going through this module, you are expected to:

- identify the base, percentage, and rate in word problems;
- value base, percentage and rate to understand daily life experiences; and
- solve for the base, percentage and rate.

Are you ready to learn? Wait up! Let us check first what you know about percentage, rate or percent and base.

What I Know

Directions: Read and understand the given. Choose the letter that corresponds to the correct answer. Write your answer and show your solutions on a separate sheet of paper.

1. Asyong makes a monthly donation of P1 000.00 for the calamity victims through a reputable charity organization. If his donation is 5% of his monthly salary, how much of his salary? *Which of the following is asked in the problem?*
    a. Base
    b. Rate
    c. Percentage
    d. Proportion

2. A farmer harvested 130 sacks of corn. He sold 85% of his harvest. How many sacks of corn did he sell? *Which of the following is asked in the problem?*
    a. Base
    b. Rate
    c. Percentage
    d. Proportion

3. Princess, a grade five pupil, had a notebook with 30 pages. If she used 10 pages, what percent of the pages of the notebook did she use? *Which of the following is asked in the problem?*
    a. Base
    b. Rate
    c. Percentage
    d. Proportion

4. Which of the following can be done in solving for the percentage?
    a. Add the rate and the base
    b. Multiply the rate and the base
    c. Divide the rate by the base
    d. Subtract the rate from the base

Lesson 1 Identifying the Base, Percentage and Rate in a Problem

In order to identify the base, percentage and rate in a problem, you need to master the skills on defining percentage, rate or percent and base. Moreover, comprehension in reading word problems is a must needed skill that will help you understand the lesson. Let us continue our journey to identify the base, percentage and rate in a problem.

Are you eager to learn? Let's tune up our brains and get started.

What's In

Can you still remember the steps in defining percentage, rate and base?

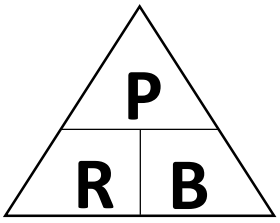
Percentages are like fractions and decimals. They can be used to describe the proportion of a whole and its parts. Percentage is a term from a Latin word which means "out of one hundred". We may therefore consider percentage as part of a whole. That whole or total is the base. The number with the percent (%) symbol is the rate.

Let us first review your last lesson about the definition of rate, base, and percentage using the Techan's Triangle shown below. The percentage (P) is on the top of the triangle. The rate (R) and the base (B) are in the bottom.

The P is on top because it represents the idea that it should be divided by either R or B, depending on what are given. The B and R are at the bottom to suggest that both can be multiplied.

Thus,

P = R multiplied by B
R = P divided by B
B = P divided by R.



Consider the sample situation that follows.

Example 1

Emmie is excited to go to the supermarket with her mother. Their shopping list includes condensed milk, full-cream milk, Graham crackers and mangoes. The Graham crackers costs P 60.00 per pack, but is being sold at 10% discount! How much will she save per pack if she buys the Graham crackers?

Note that the price of the Graham crackers is now 10% less than the original price. This means that 10% of the original price is the savings that Emmie will get. Therefore, we need to get "10% of P 60.00." It is the percentage.

P = R ×B Rate = 10% Base = P60

Percentage = 10% ×P 60.00

$= \frac{10}{100} \times 60 = \frac{600}{100} = P6$

From the problem above, we have learned that 10% of P60 is P6. Note that 10% is the *rate* (the expression with the % symbol). The *percentag*e (part of the whole or part of P60.00) is P6. The *base* (whole or total) is P 60.

Alternatively, we may write a proportion and solve for the unknown (n).

n out of 60 = 10 out of 100

n:60 = 10:100

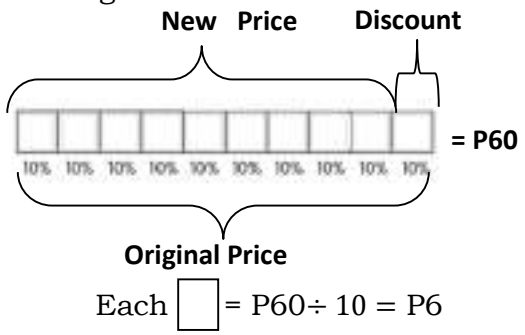
By the cross-product rule, we have the following.

$100 \times n = 60 \times 10$

$100n = 600$

$\frac{100n}{100} = \frac{600}{100}$

$n = 6$



Each □ = P60÷ 10 = P6

Therefore, P 6 will be deducted from the original price of the Graham crackers. It will also be the amount that Emmie will save. Using proportion or bar model above is also useful in solving the problem.

The given problem is an example of solving for the percentage.

Try the problem below.

Directions: Read and understand the problem carefully. Write your answers on a separate sheet of paper.

Teacher Joel gave each group 30 sheets of colored paper for their activity in Arts. If one of the groups used 6 sheets of colored paper, what percent of the sheets of colored paper did they use?

1) Which of the following is asked in the problem?
   A. Percentage B. Rate C. Base D. Proportion
2) Identify the base, rate and percentage.

What's New

From the previous lesson, you were taught how to define percentage, rate or percent and base. This time, this module is going to teach you how to identify the rate, percentage and base in a problem.

Recall that the base can be considered as the whole or total. The percentage is the part of the whole. The rate or percent is represented by a percent sign (%).

Read carefully the problem below.

Jessy's family received a package from her elder sister in Canada. The box contains bags of candies and chocolates in different flavors. Jessy opened a bag and picked one chocolate bar in purple packaging. She ate 4 parts of the chocolate bar. This means she ate 80% of the chocolate bar. How many parts are there in the chocolate bar?

Can you identify the base, percentage and rate in the problem? Are there missing information? What are those, if any?

Go to the next page for you to solve the problem above. You are doing well. Keep going!

What is It

Now, let's discuss the earlier word problem.

Example 1

Jessy ate 4 parts of a chocolate bar. This means she ate 80% of the chocolate bar. How many parts are there in the chocolate bar?

First Step: What are given in the problem?

The given are 4 parts of the chocolate bar, which represents 80% of chocolate bar.

Second Step: What do we need to find out?

We need to find out the total part of the whole chocolate bar which is the *base*.

Third Step: What does 4 represent?

It represents the *percentage* (or part of the whole).

Fifth Step: What does 80% represent?

It represents the rate (80 out of 100).

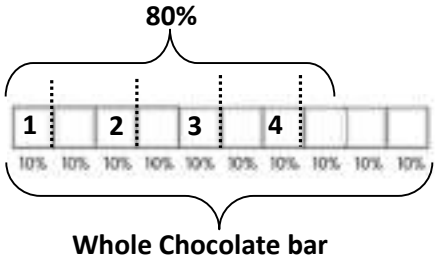
Now, let the whole part of chocolate bar be n.

So, we write $B = P$ divided by R.

Base = Percentage divided by Rate

$n = 4 \div 80\%$

$n = 4 \div \frac{80}{100} = 4 \times \frac{100}{80} = \frac{4 \times 100}{80} = 5$

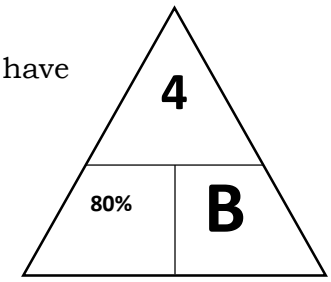


Therefore, the chocolate bar has 5 parts, in which 4 parts have been eaten by Emmie. The bar model is also helpful in solving the problem.

Using the Techan's Triangle

We have the given:
Rate = 80%
Percentage =4
Base = ?

Thus, we have



So, from the Techan's Triangle, the base is unknown. We can find the base by dividing the percentage by the rate. Hence:

$$B = \frac{4}{80\%}$$
$$= \frac{4}{0.80}$$
$$= 5$$

Example 2

One day, shirts at Ganda Department Store were marked with 20% off labels. Noel bought a sweat shirt with an original price of P2 750. How much did he save after the discount was applied? How much did he pay to the cashier?

First Step: What are given in the problem?

The original price of the shirt was P2 750. It was on sale at 20% off.

Second Step: What do we need to find out?

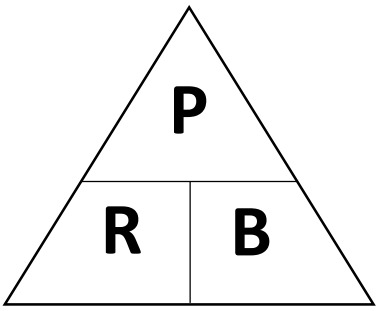
We need to find out the amount of discount *(percentage)* and the amount he had to pay to the cashier.

Third Step: What does P2 750 represent?

It represents the base (or the whole).

Fifth Step: What does 20% represent?

It represents the rate (20 out of 100).



We are now ready to solve the problem.

Let the amount saved from the 20% discount be *n* (percentage).

So, we write

Percentage = rate × base.

n = 20% of 2 750

$= \frac{20}{100} \times 2\,750$

= 55 000 ÷ 100

= 550

= P2 750

Each ☐ = P2 750 ÷ 5 = P 550

Thus, Noel saved an amount of P550.00 after the 20% discount was applied to the original price. The bar model can also be used to answer the problem.

Now, to determine the amount to pay to the cashier, the following is done.

P2750.00 – P550.00 = P2200.00

Original Price — Discount — New price or the amount to be paid to the cashier

Therefore, the discount is P 550. The amount to pay to the cashier is P 2 200.

Example 3

What is 20% of 30?

Solution: The base is 30. The rate is 20%. The unknown is the percentage.

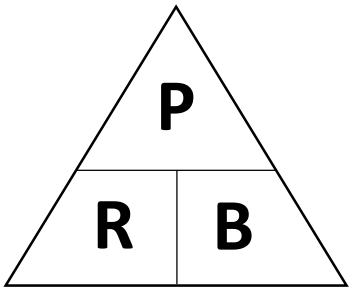
P = R × B

Percentage = Rate × base

$= 20\% \times 30$

$= \frac{20}{100} \times 30 = \frac{600}{100} = 6$

Hence, the 20% of 30 is 6.



Example 4

If 14 is 5% of a certain number, what is the number?

Solution: The percentage is 14. The rate is 5%. The unknown is the base.

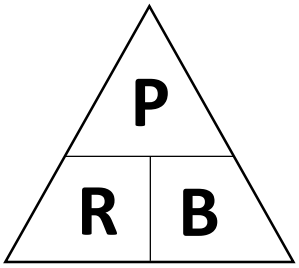
B = P divided by R

Base = Percentage divided by the Rate

$= 14 \div 5\%$

$= 14 \div \frac{5}{100}$

$= 14 \times \frac{100}{5} = \frac{1400}{5} = 280$



Therefore, the number is 280. It can be checked that 5% of 280 is 14.

Example 5

What percent of 120 is 30??

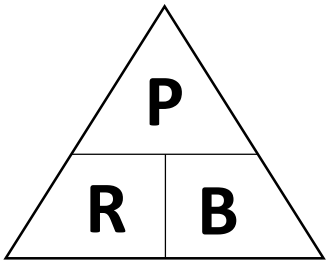
Solution: The base is 120. The percentage is 30. The unknown is the rate.

R = P divided by B

Rate = Percentage divided the Base

$= 30 \div 120$

$= \frac{30}{120} = \frac{1}{4} = \frac{1 \times 25}{4 \times 25} = \frac{25}{100} = 25\%$



Thus, the rate is 25%. It is true that 25% of 120 is 30.

Congratulations! You are doing a good job and you've reached this far. Now, try to do the independent activities that follow.

What's More

Activity 1 Rate Me One More Time!

Directions: On your answer sheet, copy and complete the table below. Identify the base, rate and percentage. One is done for you.

Given	Base	Rate	Percentage
1) 75% of 40 is 30.	40	75%	30
2) 20% of 80 is 16.			
3) 60% of 50 is 30.			
4) 27 is 45% of 60.			
5) 17 is 85% of 20.			
6) 13% of 300 is 39.			

Activity 2 Find Me in Words!

Directions: On your answer sheet, copy and complete the table below. Identify the base, rate and percentage in the given. One is done for you.

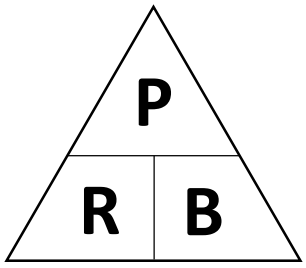
Given	Base	Rate	Percentage
1)	200	Unknown	16
2)			
3)			
4)			
5)			
6)			

1) Sixteen is what percent of two hundred?
2) Find one hundred fifty percent of ninety-eight.
3) A cellphone casing is on sale for 85 percent off the regular price. If its original price is forty pesos, how much is the new sale price?
4) The Calbayog City basketball team won eight percent of their games. If they played twenty-five games, how many games did they win?
5) Eighty is what percent of four hundred?
6) What is 63% of 100?

Activity 3 What are Missing on Me!

Directions: On your answer sheet, copy and complete the table below. Show your solutions. You may use the Techan's Triangle as your guide.

Problem	Base	Rate	Percentage
1	500	25%	
2	P1500	5%	
3	P50		P5.00
4		6%	P300.00
5	P4 000		P 1 000
6	P 100		P5.00



The solution for Problem 1 is given below.

Percentage = Rate × Base

25% of P 500 = 25/100× P 500 = P 125.

Hence, 125 must be placed in percentage column in Problem 1.

What I Have Learned

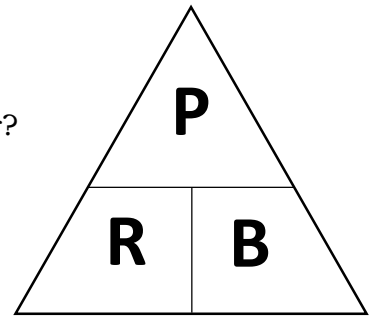
A. In your own words, how are you going to identify the base, percentage and rate in a word problem? Consider the given below for your explanation.

The 50% of 300 is 150.

Identify the base, rate and percentage.

B. Using your words, discuss on how to solve the percentage, rate or base in a given problem. Solve the following. You may use the Techan's Triangle as your guide.

1. What is 50% of 400?
2. Twenty is what percent of 100?
3. If 10 is 25% of a number, what is the number?



Excellent! You are almost done. Keep going!

What I Can Do

You have reached this far. Good job! Now let us try some real-life situations where you can apply what you have learned in identifying the base, percentage and rate in a problem.

Remember that **percentage** can be viewed as a *part of a whole*. That *whole or total* is the **base.** The number with *percent (%) symbol* is the **rate**.

A. Read carefully the word problem below. Identify the percentage, base and rate. Write your answers on a separate sheet of paper.

Mrs. Gomez opens an account in East West Bank. She puts a principal amount of P15 000 that will earn an interest of P150 after a month at a rate of 1% monthly.

a. What are the given data in the problem?

b. Which of the data is the base? Rate? Percentage?

B. Collect examples of base, rate or percentages from food packages, advertisements, newspapers, bank notices and others. Identify the base, rate or percentage from what you have collected.

Assessment

Directions: Read and understand the given. Choose the letter that corresponds to the correct answer. Write your answers on a separate sheet of paper.

1. Seven of the 35 boys in the class wear eyeglasses. What percent of the boys wear eyeglasses? Which of the following is asked in the problem?
   a. Base
   b. Rate
   c. Percentage
   d. Proportion

2. Aling Claring has 100 sacks of rice. She sold 90% of the rice. How many sacks of rice did she sell? *Which of the following is asked in the problem?*
   a. Base
   b. Rate
   c. Percentage
   d. Proportion

3. Two percent of tomatoes in the basket are rotten. If there are 25 rotten tomatoes, how many tomatoes are there in the basket? *Which of the following is asked in the problem?*
    a. Base
    b. Rate
    c. Percentage
    d. Proportion

4. Which of the following can be done in solving for the rate?
    a. Add the percentage and the base.
    b. Divide the percentage by the base.
    c. Multiply the percentage and the base
    d. Subtract the percentage from the base

5. A pair of shoes, with a tag price of P595, is being sold at 20% discount. How much is the new sale price? *Which of the following can be done to determine the actual payment?*
    a. Multiply P595 by 20%. The product is subtracted from P 595. The difference is the answer.
    b. Divide P595 by 20%. The quotient is subtracted from P 595. The difference is the answer.
    c. Multiply P595 by 20%. The product is added to P 595. The sum is the answer.
    d. Divide P595 by 20%. The quotient is added to P 595. The sum is the answer.

6. What is of 40% of 40?
    a. 12
    b. 14
    c. 15
    d. 16

7. Marlon is to buy a pair of pants with an original price of P1 000. It is marked down with 20% off. How much will he pay to the cashier?
    a. P200
    b. P800
    c. P980
    d. P1200

8. If 20 is 50% of a number, what is the number?
    a. 10
    b. 30
    c. 40
    d. 70

9. If 20 is 20% of a certain number, which of the following is the number?
    a. 10
    b. 40
    c. 80
    d. 100

10. What percent of 50 is 10?
    a. 1%
    b. 20%
    c. 40%
    d. 60%

You are almost done with this lesson. There is only one activity left. Keep going!

Additional Activities

Directions: Copy the following on your answer sheet. Show your solution. One is done for you.

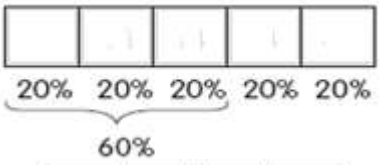
1. What is 40% of 300?

= 300

Since there are ten ☐s, each ☐ = 300 ÷ 10 = 30

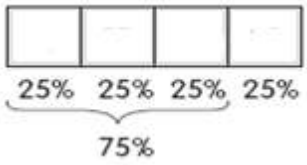
Thus, 40% of 300 is 4 × 30 = 120. It can also be $\frac{40}{100} \times 300 = 120$,

2. What 60% of 200?



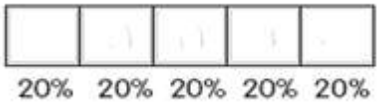
= 200

3. What is 75% of 600?



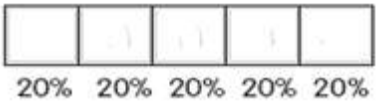
= 600

4. What is 20% of P 350?



= P 350

5. What is 80% of P 48?



= P48

6. What is 50% of P 24.50?

= P 24.50

Answer Key

What I Know

1. A	6. C
2. C	7. B
3. B	8. C
4. B	9. D
5. A	10. C

What's In

1) B. Rate 2) Percentage: 6
Base: 30
Rate: 20%

What's More

Activity 1 Rate me One More Time!

Given	Base	Rate	Percentage
1) 75% of 40 is 30.	**40**	**75%**	**30**
2) 20% of 80 is 16	**80**	**20%**	**16**
3) 60% of 50 is 30	**50**	**60%**	**30**
4) 27 is 45% of 60	**60**	**45%**	**27**
5)17 is 85% of 20	**20**	**85%**	**17**
6) 13% of 300 is 39	**300**	**13%**	**39**

Activity 2 Find Me in Words!

Base	Rate	Percentage
200	**8%**	**16**
98	**150%**	**147**
40	**85%**	**34**
25	**80%**	**20**
400	**20%**	**80**
100	**63%%**	**63**

Activity 3 What are Missing On Me!

Problem	Base	Rate	Percentage
1	500	25%	**125**
2	P1500	5%	**P75**
3	P50	**10%**	P5.00
4	**P 5 000**	6%	P300.00
5	P4 000	**25%**	P 1 000
6	P 100	**5%**	P5.00

What I Have Learned

a. The base is the whole (300).
The rate is with the percent symbol (50%). The percentage is the part of the whole (150).

b. P = B x R
B = P/R R =P/B

1. 200 2. 20% 3. 40

What I Can Do

a. Given data:
Principal amount of P15,000.00
Interest of P150 a month
Rate of 1% monthly

b. Base = P15 000
Rate = 1%
Percentage = P150

Assessment

1. B
2. C
3. A
4. B
5. A
6. D
7. B
8. C
9. C
10. D

Additional Activities

1. This is already answered.
2. 120
3. 450
4. P70
5. P 38.40
6. P 12.25

References

Mathematics 5 Teacher's Guide

Ursua, Alvin C. and Angeline P. Lumbre. 2016. *21st Century MATHletes Textbook*, Quezon City: Vibal Group Inc.

Villamayor, Adela C., Amelia D. Celeridad-Wright and Eden C. de Joya. 2017. *Math for Life Worktext in Mathematics*, Quezon City: Rex Book Store Inc.

n.d. [online] Available at: <https://khanacademy.org> [Accessed 11 August 2020].

https://khanacademy.org

www.onlinemathlearning.com. n.d. *Finding The Base Number In A Percent Problem Worksheet (Solutions)*. [online] Available at: <https://www.onlinemathlearning.com/percentage-base.html> [Accessed 11 August 2020].

https://www.onlinemathlearning.com/percentage-base.html

n.d. [online] Available at: <https://education.seattlepi.com/math-games-teach-percentages-fractions-6712.html> [Accessed 11 August 2020].

https://education.seattlepi.com/math-games-teach-percentages-fractions-6712.html

Camarillo, n.d. *Rate Base Percentage*. [online] Slideshare.net. Available at: <https://www.slideshare.net/JunindMaeCamarillo/rate-base-percentage-80134206> [Accessed 11 August 2020].

https://www.slideshare.net/JunindMaeCamarillo/rate-base-percentage-80134206

For inquiries or feedback, please write or call:

Department of Education - Bureau of Learning Resources (DepEd-BLR)

Ground Floor, Bonifacio Bldg., DepEd Complex
Meralco Avenue, Pasig City, Philippines 1600

Telefax: (632) 8634-1072; 8634-1054; 8631-4985

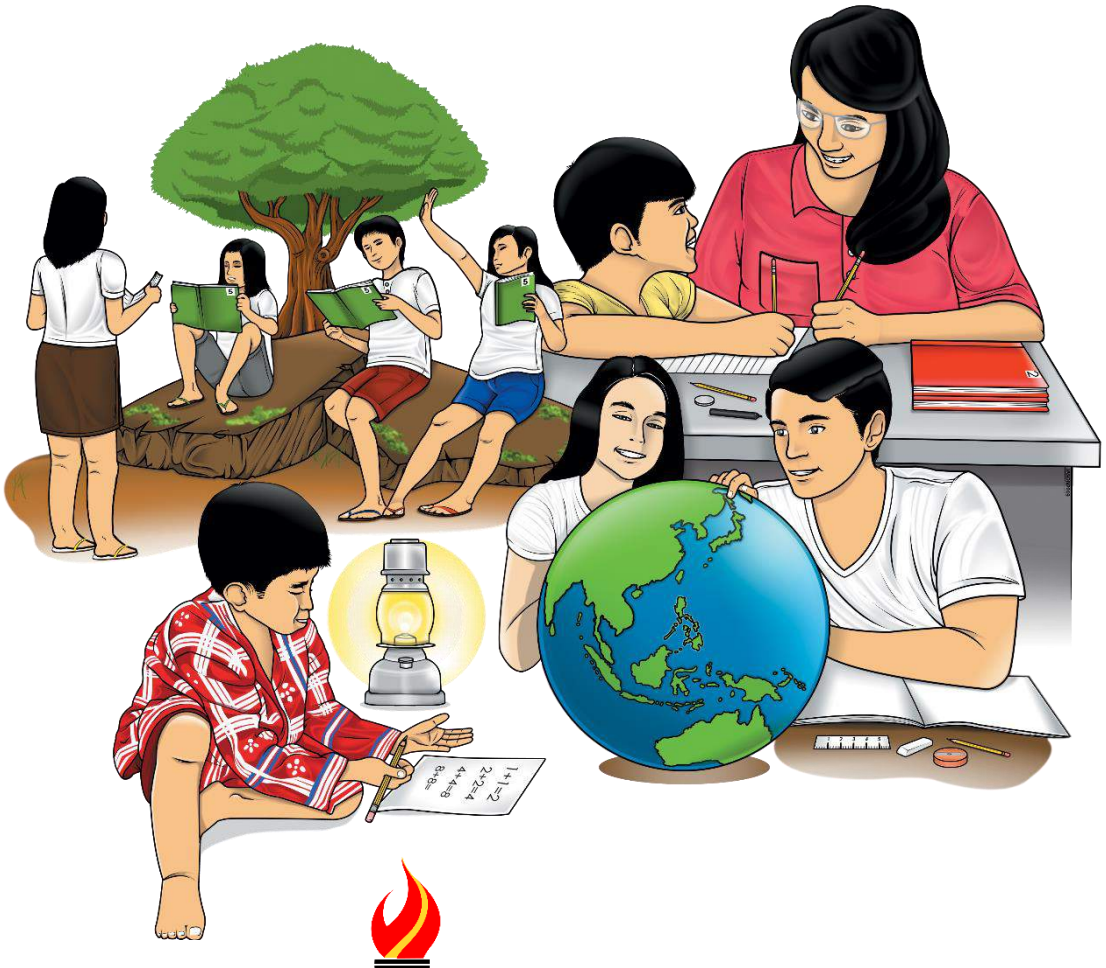
Email Address: blr.lrqad@deped.gov.ph * blr.lrpd@deped.gov.ph

5

DepED
DEPARTMENT OF EDUCATION

Mathematics

Quarter 3 – Module 4:
Finding the Percentage of a Number



ALTERNATIVE DELIVERY MODE
ADM

GOVERNMENT PROPERTY
NOT FOR SALE

Mathematics – Grade 5
Alternative Delivery Mode
Quarter 3 – Module 4: Finding the Percentage of a Number
First Edition, 2020

Republic Act 8293, section 176 states that: No copyright shall subsist in any work of the Government of the Philippines. However, prior approval of the government agency or office wherein the work is created shall be necessary for exploitation of such work for profit. Such agency or office may, among other things, impose as a condition the payment of royalties.

Borrowed materials (i.e., songs, stories, poems, pictures, photos, brand names, trademarks, etc.) included in this module are owned by their respective copyright holders. Every effort has been exerted to locate and seek permission to use these materials from their respective copyright owners. The publisher and authors do not represent nor claim ownership over them.

Published by the Department of Education
Secretary: Leonor Magtolis Briones
Undersecretary: Diosdado M. San Antonio

Development Team of the Module

Writers: Frederick S. Cruz

Editors: Niann L. Atis

Reviewers: Renato S. Cagomoc, Rolando M. Lacbo, Joshua Sherwin T. Lim, Danilo S.Jadulco

Illustrator: Razle L. Jabelo

Layout Artist: Razle L. Jabelo, Maelyne L. Yambao

Management Team: Ma. Gemma M. Ledesma
Arnulfo B. Balane
Rosemarie M. Guino
Joy B. Bihag
Ryan R. Tiu
Sarah S. Cabaluna
Thelma Cabadasan-Quitalig
Elena S. De Luna
Renato S. Cagomoc
Noel E. Sagayap
Geraldine P. Sumbise, Joshua Sherwin T. Lim

Printed in the Philippines by _____

Department of Education – Region VIII

Office Address: Deped Regional Office No. 8
Candahug, Palo, Leyte
Telefax: (053)-832-2997
E-mail Address: region8@deped.gov.ph

5

Mathematics

Quarter 3 – Module 4:
Finding the Percentage of a Number

DepED
DEPARTMENT OF EDUCATION

Introductory Message

This Self-Learning Module (SLM) is prepared so that you, our dear learners, can continue your studies and learn while at home. Activities, questions, directions, exercises, and discussions are carefully stated for you to understand each lesson.

Each SLM is composed of different parts. Each part shall guide you step-by-step as you discover and understand the lesson prepared for you.

Pre-tests are provided to measure your prior knowledge on lessons in each SLM. This will tell you if you need to proceed on completing this module or if you need to ask your facilitator or your teacher's assistance for better understanding of the lesson. At the end of each module, you need to answer the post-test to self-check your learning. Answer keys are provided for each activity and test. We trust that you will be honest in using these.

In addition to the material in the main text, Notes to the Teacher are also provided to our facilitators and parents for strategies and reminders on how they can best help you on your home-based learning.

Please use this module with care. Do not put unnecessary marks on any part of this SLM. Use a separate sheet of paper in answering the exercises and tests. And read the instructions carefully before performing each task.

If you have any questions in using this SLM or any difficulty in answering the tasks in this module, do not hesitate to consult your teacher or facilitator.

Thank you.

What I Need to Know

Good day, Mathletes! In this module, you are going to learn how to find the percentage of a number. This lesson will enrich your knowledge and skills in doing the basic operations with numbers and in changing percent to decimal or fraction and vice-versa. These skills will help you solve real-life concerns such as budgeting your daily expenses and managing your money efficiently. Challenging activities are also provided to strengthen your understanding of the lesson.

At the end of this module, you are expected to:

- find the percentage of a given problem;
- solve problems using real life situation involving percentage of a number; and
- appreciate the idea of using percentage of a number in solving word problems.

Are you ready to explore the lesson? Let us check what you know about finding the percentage of a number

What I Know

Directions: Read and understand the given. Choose the letter that corresponds to the correct answer. Write your answers and show your solutions on a separate sheet of paper.

1) What is 10% of 150?
   a. 10
   b. 15
   c. 25
   d. 50

2) Which of the following is equal to 50% of P200?
   a. 20
   b. P 50
   c. P 100
   d. P 250

3) Which of the following is the 20% of 120?
   a. 2.4
   b. 20
   c. 24
   d. 140

4) Reymar bought P2000 worth of tinapa, which was sold at 10% discount. How much did he pay?
   a. P 200
   b. P 1800
   c. P 1980
   d. P 2200

5) The Math Division Competition for Grade 5 had 150 participants. The top 10% of the participants qualified for the regional level. How many qualified for the regional level?
   a. 26
   b. 20
   c. 16
   d. 10

6) If 75% of the pupils in a class of 40 passed the math quiz, how many of them failed?
   a. 10
   b. 15
   c. 20
   d. 30

7) Metro Central in Calbayog City gives a special promo discount on selected items. Jayson buys a shirt with a tag price of P350. It is offered with 40% discount. Which of the following is the new price of the shirt?
   a. P 140
   b. P 210
   c. P 310
   d. P 390

8) A school canteen is selling special lunch for P50 with 10% discount for students. If Ann, Kc, Angel, Shamcey and Enrique each get the offer, how much is the total cost of their lunch?
   a. P 150
   b. P 180
   c. P 200
   d. P 225

9) Alfred delivers turon to the canteen every day. The canteen sells each turon for Php 10. The canteen gives him 10% of the sales as commission. How much will his commission be on a day when the canteen sells 50 turons?
   a. P 30
   b. P 40
   c. P 50
   d. P 60

10) Forty-five percent of 40 pupils were boys. Suppose 50% of the girls left, what was the new ratio of the number of girls to the number of boys?
   a. 22:18
   b. 18:11
   c. 18:22
   d. 11:18

Compare your answers with the Answer Key at the end of this module. If you got 100% correct answers, you may go to the next module. Otherwise, go to the next page to gain more understanding about rate, base and percentage! Let's go!

Lesson 1 Finding the Percentage of a Number

To find the percentage of a number, you need to define and identify the base, percentage and rate in a problem. You also need to comprehend the information given in the problem and identify what is being asked. In this module, you will learn how to find the percentage of a number. Are you ready now? So, let's proceed.

What's In

Let us go back a little bit and refresh your memory. Can you still remember the steps in identifying the base, percentage and rate in a problem?

Percentages are like fractions and decimals. They can be used to describe what proportion of a whole is represented by a number. Percentage is a term from a Latin word which means "out of one hundred". We can consider percentage is a part of a whole. That whole or total is the base. The number with the percent (%) symbol is the rate. For example,

25% of 500 is 125.

Rate Base Percentage

Now, consider the word problem that follows. Identify the rate, percentage, and base.

What's New

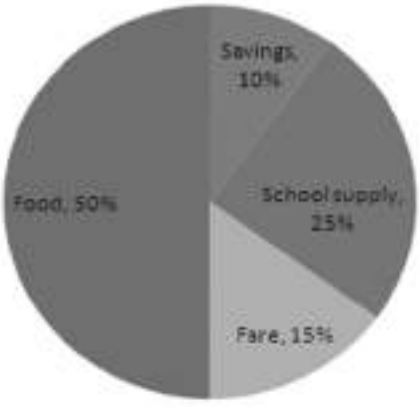
From the previous lesson, you were taught how to identify the percentage, rate and base in a problem. In this module you will learn how to find the percentage of a number.

Recall that **percentage** can be viewed as part of a whole. It can be used as a proportion or share of a bigger amount or in relation to a whole. The whole is the **base**. The **percent or rate** is a rating in which one number is compared to 100. It means per hundred. It usually comes with a percent sign (%) in a problem. It can easily be changed to decimal by dividing the number by 100 or by simply moving the decimal point two places to the left.

Consider the problem below:

The Gomez Family has 5 members. Mrs. Gomez prepares a weekly budget to make sure that there is money for their needs and expenses. The pie graph below shows the family's weekly budget. How much of the family's P 2 000 weekly income goes to food? School supplies? Savings? Fare?

Family Budget for P 2 000



What is It

Percentage is widely used in many different aspects in our lives every day. It is important for understanding the financial matters in our everyday life. Thus, it is important for you to master the skills in finding percentages of a number.

Remember that **percentage** can be viewed as *part of a whole*. That *whole or total* is the **base.** The number with *percent (%) symbol* is the **rate**.

Let's consider the earlier problem.

To compute for the actual amounts, we list down the different items and their corresponding allotment of budget. Let us now solve for the percentage of each item in the pie graph

Budget	Percentage	Amount
Food	50% of P 2 000 =	?
School Supplies	25% of P 2 000 =	?
Fare	15% of P 2 000 =	?
Savings	10% of P 2 000 =	?

Solution:

You may rename the rate as a decimal or as a fraction to compute for the actual amounts.

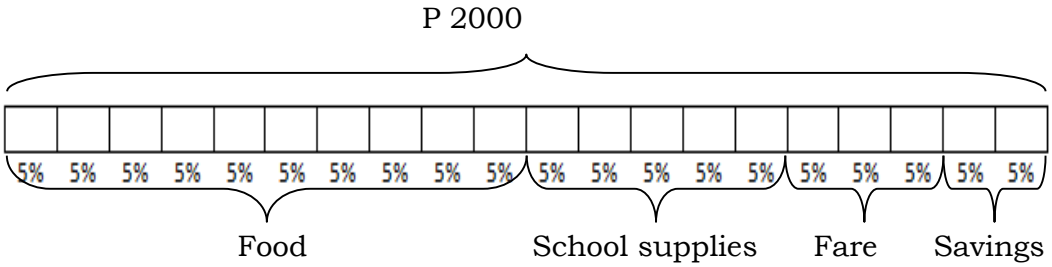
a. 0.50 x 2000 = or $\frac{50}{100} \times \frac{2000}{1}$ = 1 000

b. 0.25 x 2000 = or $\frac{25}{100} \times \frac{2000}{1}$ = 500

c. 0.15 x 2000 = or $\frac{15}{100} \times \frac{2000}{1}$ = 300

d. 0.10 x 2000 = or $\frac{10}{100} \times \frac{2000}{1}$ = 200

The problem can also be solved by using a bar model as shown below.



Each ☐ = P 100 since there are twenty ☐s.

We see that the following values are correct as computed earlier.

Budget	**Percentage**	**Amount**
Food	50% of 2000 =	P1 000
School Supplies	25 % of 2000 =	P 500
Fare	15% of 2000 =	P 300
Savings	10% of 2000 =	P 200

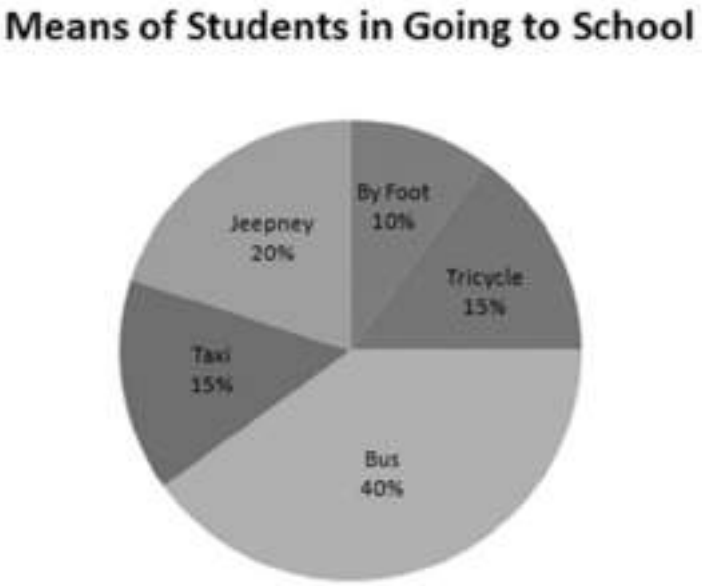
Therefore, the following is the allocation for the Php 2 000: Php1 000 is for food. Php 500 is for school supplies, Php 300 is for fare; and Php 200 is for savings.

Notice that the family is saving money for future use.

Do you also save money for rainy days? Why or why not?

Let us now proceed to another example.

Example 2



The pie chart shows the different means of students to go to school. If there were 2,500 students surveyed, how many pupils took the bus? the tricycle? the taxi? the jeepney? How many students walk to school?

Solution: (those who took the bus)

To find 40% of 2500, change the percent to a fraction or to a decimal, then multiply it by the number.

Method 1 Let us express percent as a fraction,

$$40\% = \frac{40}{100} = \frac{2}{5} \text{ then,}$$

$$\frac{2}{5} \times \frac{2500}{1} = 1000$$

Method 2 $40\% = \frac{40}{100} = 0.4$

$0.4 \times 2500 = 1\,000$

Therefore, 40% of 2500 is 1000. This represents the number of pupils who took the bus when going to school.

Can you do the same for the other questions in the given problem above?

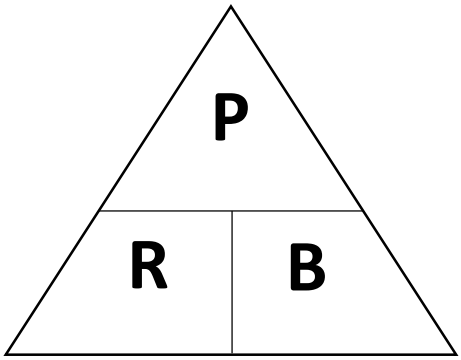
In general, in solving for percentage, we apply the formula below.

Percentage or Percent of a Number = Rate × Base

In symbols, P = R × B, where P is the percentage, R is the rate, and B is the base.

The rate can be expressed as a percent, decimal or fraction. The base is bigger than the percentage if the rate is less than 100%. On the other hand, if the rate is more than 100%, the base is lesser than the percentage.

You may also use the **Techan's triangle**, a strategy to remember the formula, in solving problems involving percent



Try to do the following.

Compute the number of students who took the tricycle, taxi and jeepney when going to school. How many students walk to school?

Use an extra sheet of paper for your solutions.

Congratulations for reaching this far. You are doing well. Now, try to answer the activities that follow.

What's More

Activity 1 Problem Solving Fun!

Directions: Read and understand the following problems. Write you answers and your solutions on a separate sheet of paper.

1. Mang Kano harvested 200 sacks of corn. He sold 80% of his harvest. How many sacks of corn did he sell?

2. A pair of shoes, with a tag price of P495, is being sold at 10% discount. How much is the discount?

3. Two percent of tomatoes in the basket are rotten. If there are 300 tomatoes, how many tomatoes are rotten?

4. What is one hundred fifty percent of ninety-eight?

5. A cellphone casing is on sale for 85 percent off the regular price. If its original price is forty pesos, how much is the new sale price?

6. The Calbayog City basketball team won eight percent of their games. If they played twenty-five games, how many games did they win?

Activity 2 Greater, Lesser or Equal!

Directions: Compare the pairs of equations and use >, <, or = in the space provided in each item. You may use a calculator. Write your answers on a separate answer sheet. The first one is done for you.

1) 70% of 200 _____ 60% of 240
$\frac{70}{100} \times 200 = 140$ $\frac{60}{100} \times 240 = 144$

The answer is **<** since 140 **<** 144.

2) 15% of 80 _____ 20% of 65
3) 5% of 500 _____ 50% 0f 50
4) $\frac{3}{4}$ of 1000 _____ 75% of 1000
5) 25% of 300 _____ 20% of 400
6) 12% of 140 _____ 14% of 120
7) 5% of 110 _____ 11% of 50
8) 18% of 500 _____ 20% of 450
9) 30% of 75 _____ 35% of 60
10) 120% of 800 _____ 30% of 700

Activity 3 Decode Me!

Directions: Find the percentage of each number. Express your answers in decimals. Write the letter of each item above the correct answer in the code below to answer the question "*What sea bird is called a gooney bird"?* You may use a calculator. Write your answers on a separate answer sheet.

Note that $1\frac{1}{2}\% = 1.5\% = \frac{1.5}{100} = 0.015$

1) 20% of P93.60 _____ T
2) 65% of 450 _____ H
3) $\frac{1}{2}\%$ of 430 _____ R
4) $\frac{3}{4}\%$ of P2,600 _____O
5) $5\frac{1}{4}\%$ of P6500 _____B
6) 65% of 800 _____ A
7) 40% of P4650 _____ E
8) 35% of 285 _____ T
9) $33\frac{1}{3}\%$ of 825 _____ A
10) 4.5% of 210 _____S
11) $9\frac{1}{2}\%$ of P6000 _____L
12) 150% of 62 _____S

CODE:

____	____	____	____	____	____	____	____	____	____	____	____
99.75	292.5	P1860	520	570	341.25	275	P18.72	2.15	P19.50	93	9.45

What I Have Learned

Directions: Read the following carefully. Do what is asked. Write your answer on your answer sheet.

A. Explain how to find the percentage of a given problem. Consider the given below for your explanation.

> Daisy invited 200 kids to her birthday party. Only 10% of the kids did not show up. How many kids came to the party?

B. In your own words, how are you going to solve problems involving percentage? Consider the given below for your explanation.

> In a class of 40 students, 60% are boys. How many are girls in the class?

You reached this far. Are you not proud of yourself? Just keep going!

What I Can Do

Now, you will need what you learned from this lesson to solve the next problem. Use an extra sheet of paper for your solutions.

Sonya is a member of a dance group. She needs a shirt for their dance presentation. She visits the two stores in the city to check on the price of a shirt. Store A offers 10% discount for the shirt marked at P 340 while Store B offers 15% discount for the same brand of shirt marked at P360. If you were Sonya, from which store will you buy? Explain your answer.

Assessment

Direction: Read and understand the given. Choose the letter that corresponds to the correct answer. Write your answers and show your solutions on a separate sheet of paper.

1. What is $5\frac{1}{2}\%$ of 1000?
   a. 5.5
   b. 55
   c. 550
   d. 5 500

2. The original price of a dress is P350.00. It is on sale for 30% off.
   Which of the following is the new price of the dress?
   a. P105
   b. P245
   c. P380
   d. P455

3. Daniel invited 300 kids to his birthday party. Only 15% of the kids did not show up. How many kids came to the party?
   a. 45
   b. 155
   c. 255
   d. 315

4. There were 50 pupils in Grade V. If 28% of the pupils were absent, how many pupils were present?
   a. 34
   b. 35
   c. 36
   d. 37

5. John got 20% of an 80-item test incorrectly. How many items did he get correctly?
   a. 64
   b. 62
   c. 18
   d. 16

6. Suman is made anywhere in Calbayog City. It is one of the city's native delicacies. It is sold for P5 per piece. Aling Liza ordered 200 pieces for the fiesta. She asked for a 10% discount from the total amount. If her request would be granted, how much would she pay for the ordered suman?
   a. P 100
   b. P 200
   c. P 500
   d. P 900

7. The Arielle's monthly salary is P20 000.00. If she will be given an increase of 15%, how much will be her new salary?
    a. P 20 300
    b. P 21 500
    c. P 20 300
    d. P 23 000

8. Brgy. Matobato is known for making tinapa (smoked fish) in Calbayog City. If 15% will be discounted for every P500 you buy, how much should you pay if you buy tinapa worth P3 500 originally?
    a. P 2 550
    b. P 2 875
    c. P 2 975
    d. P 3 000

9. Poultry industry is too weak during rainy season. Mang Kanor, a poultry owner, offers a 10% discount for every kilogram of chicken. The price of chicken is P140 per kilogram. How much was his total revenue for the sale of 50 kilograms of chicken?
    a. P 5 250
    b. P 6 300
    c. P 6 600
    d. P 7 000

10. Bibingka is one of the native delicacies in Calbayog City that is sold in Brgy. Matobato or even in other remote barangays. One box is sold for P60. One of the stores offered 8% discount per box for every 10 boxes bought. If I buy 30 boxes for "pasalubong
    a. P 1 656
    b. P 1 680
    c. P 1 800
    d. P 1 840

There is only one more activity to do. You are doing well. Keep going!

Additional Activities

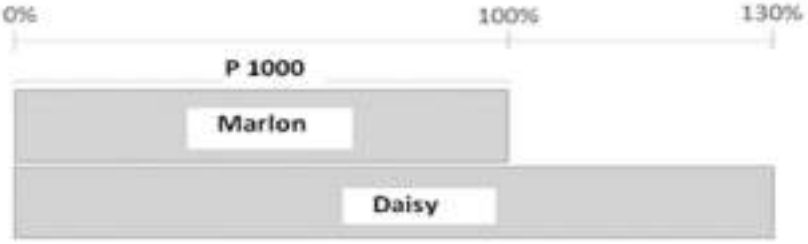
A. Directions: Copy and complete the table below on a separate sheet of paper. One is done for you.

The **50%** of a number is half of the number. **(Divide by 2)**
The **25%** of a number is half and another half of the number. **(Divide by 2 and divide again by 2)**
The **10%** of a number is a tenth of the number. **(Divide by 10)**

Number	50%	25%	10%
1) 148	148÷ 2 = 74	148÷ 2 ÷ 2 = 37	148÷ 10 = 14.8
2) 100			
3) 200			
4) 80			
5) 4 000			
6) 128			

B. Directions: Copy the following on your answer sheet. Read, understand and solve the problems. Write your answers and your solutions on your answer sheet.

1. Marlon has P 1000. Daisy has 30% more of that money. How much money does Daisy have?



2. Sixty percent (60%) of the passengers on the bus are girls. If there are 24 girls on the bus, how many passengers are there in all?

C. Visit a grocery store, bank or online store. Collect examples of base, rates and percentage. Check if you can mentally solve the percentage of a given number. For instance, if an item is marked with 30% off label, can you mentally compute for the new price? Note that the 30% of a number is a tenth of the number times 3.

Answer Key

What's More

Activity 1

You Complete Me

1. 160
2. P 49.50
3. 60
4. 147
5. P 6
6. 2

Activity 2: Greater, Lesser or Equal!

2. <
3. =
4. =
5. <
6. =
7. =
8. =
9. >
10. >

Activity 3: Decode Me!

1. 18.72 T
2. 292.5 H
3. 2.15 R
4. P19.50 O
5. 341.25 B
6. 520 A
7. 1860 E
8. 99.75 T
9. 275 A
10. P9.45 S
11. 570 L
12. 93 S

Code:

THE ALBATROSS

What I Know

1. B	6. A
2. C	7. B
3. C	8. D
4. B	9. A
5. C	10. D

What's In

a. Given data:

Rate of Discount =15%

Amount of Discount = P150.00

Tag Price = P1000.00

b. Base = P1,000.00

Rate = 15%

What is It

Example 2:

(those who took the tricycle)

13% = 13/100 = 0.13
0.13 x 2500 = 325

(those who took the taxi)

12% = 12/100 = 0.12
0.12 x 2500 = 300

(those who took the jeepney)

20% = 20/100 = 0.20
0.20 x 2500 = 500

(those who walked)

10% = 10/100 = 0.10
0.10 x 2500 = 250

What I Have Learned

A. Explanations vary.
The answer is 180
kids.

B. Explanations vary.
The answer is 16

What I Can Do

Solution

Store A:

10% x P 340 = 0.10 x P 340

(Discount)

= P 34

Selling Price= P 340 – P 34

= P 306

Store B:

15% x P 360 = 0.15 x P 360

(Discount)

= P 54

Selling Price = P 360 – P54

= P 306

Explanation vary

Assessment

1. B
2. B
3. C
4. C
5. A
6. D
7. D
8. C
9. B
10. A

Additional Activities

A.

Number	**50%**	**25%**	**10%**
1) 148	174	37	14.8
2) 100	50	25	10
3) 200	100	50	20
4) 80	40	20	8
5) 4 000	2 000	1 000	400
6) 128	64	32	12.8

B. 1. P 1 300

2. 40

C. Answers vary.

References

Alvin C. Ursua. and Angeline P. Lumbre. *21st Century Mathletes Textbook*. Quezon City: Vibal Group Inc., 2016.

Lesson Guides in Elem. Math, Grade 5

Manuel T. Kota , et al. *Soaring 21ST Century Mathematics.* Phoenix Publishing House, Grade 5, 2005. pp. 298-320

Todays Math, Grade 5, Third Edition

For inquiries or feedback, please write or call:

Department of Education - Bureau of Learning Resources (DepEd-BLR)

Ground Floor, Bonifacio Bldg., DepEd Complex
Meralco Avenue, Pasig City, Philippines 1600

Telefax: (632) 8634-1072; 8634-1054; 8631-4985

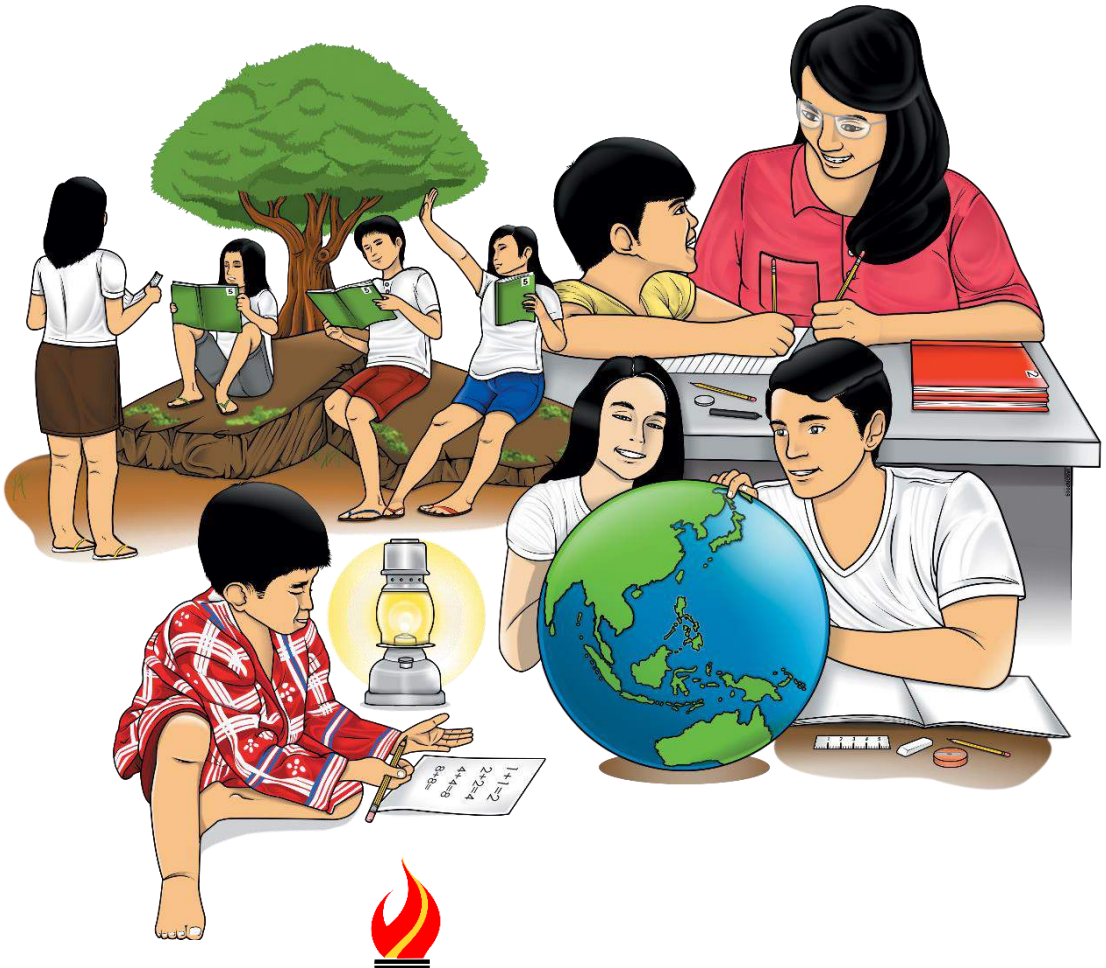
Email Address: blr.lrqad@deped.gov.ph * blr.lrpd@deped.gov.ph

5

DepED
DEPARTMENT OF EDUCATION

Mathematics

Quarter 3 – Module 5:
Solving Routine and Non-Routine Problems Involving Percentage



ALTERNATIVE DELIVERY MODE
ADM

GOVERNMENT PROPERTY
NOT FOR SALE

Mathematics – Grade 5
Alternative Delivery Mode
Quarter 3 – Module 5: Solving Routine and Non-Routine Problems Involving Percentage
First Edition, 2020

Republic Act 8293, section 176 states that: No copyright shall subsist in any work of the Government of the Philippines. However, prior approval of the government agency or office wherein the work is created shall be necessary for exploitation of such work for profit. Such agency or office may, among other things, impose as a condition the payment of royalties.

Borrowed materials (i.e., songs, stories, poems, pictures, photos, brand names, trademarks, etc.) included in this module are owned by their respective copyright holders. Every effort has been exerted to locate and seek permission to use these materials from their respective copyright owners. The publisher and authors do not represent nor claim ownership over them.

Published by the Department of Education
Secretary: Leonor Magtolis Briones
Undersecretary: Diosdado M. San Antonio

Development Team of the Module

Writers: Frederick Cruz

Editors: Nian L. Atis

Reviewers: Rolando Lacbo, Emelie O. Tarrayo

Illustrator: Salvacion Sarmiento

Layout Artist: Razle L. Jabelo, Jaycee B. Barcelona

Management Team: Ma. Gemma M. Ledesma, Arnulfo R. Balane, Rosemarie M. Guino
Joy B. Bihag, Ryan R. Tiu, Sarah S. Cabaluna,
Thelma Cabadsan-Quitalig, Elena S. De Luna,
Renato S. Cagomoc, Noel E. Sagayap, Geraldine P. Sumbise
Joshua Sherwin T. Lim

Printed in the Philippines by _____

Department of Education – Region VIII

Office Address: DepEd Regional Office No. 8
Candahug, Palo, Leyte
Telefax: (053)-832-2997
E-mail Address: region8@deped.gpv.ph

5

Mathematics

Quarter 3 – Module 5:
Solving Routine and Non-Routine Problems Involving Percentage

DepED
DEPARTMENT OF EDUCATION

Introductory Message

This Self-Learning Module (SLM) is prepared so that you, our dear learners, can continue your studies and learn while at home. Activities, questions, directions, exercises, and discussions are carefully stated for you to understand each lesson.

Each SLM is composed of different parts. Each part shall guide you step-by-step as you discover and understand the lesson prepared for you.

Pre-tests are provided to measure your prior knowledge on lessons in each SLM. This will tell you if you need to proceed on completing this module or if you need to ask your facilitator or your teacher's assistance for better understanding of the lesson. At the end of each module, you need to answer the post-test to self-check your learning. Answer keys are provided for each activity and test. We trust that you will be honest in using these.

In addition to the material in the main text, Notes to the Teacher are also provided to our facilitators and parents for strategies and reminders on how they can best help you on your home-based learning.

Please use this module with care. Do not put unnecessary marks on any part of this SLM. Use a separate sheet of paper in answering the exercises and tests. And read the instructions carefully before performing each task.

If you have any questions in using this SLM or any difficulty in answering the tasks in this module, do not hesitate to consult your teacher or facilitator.

Thank you.

What I Need to Know

Good day Mathletes! In this module, you are going to learn how to solve routine and non-routine problems involving percentage, with reasonable answer. Mastery of the skills in this concept will help you deal with your daily life experiences that involve money and other activities with percentage computations. Fun and challenging activities are also provided to strengthen your understanding of the lesson.

When you finish up this module, you will be able to:

1. solve routine and non-routine problems involving percentage using appropriate strategies and tools.

Before you go ahead with the lesson, let us check first your prior knowledge on solving routine and non-routine problems involving percentage.

What I Know

Directions: Read and understand the problem. Encircle the letter of your answer. You may use a separate sheet of paper for your solutions.

1) Fifty-five percent of people in a survey said that they do exercise on a fairly regular basis. If 12,000 people were surveyed, how many of them exercised on a fairly regular basis?
   A. 5000 B. 5500 C. 6000 D. 6600

2) The price of canned sardines decreased by 18%. If a can of sardines was sold at P 22.50 before the decrease, how much was the decrease?
   A. P4.00 B. P4.05 C. P5.00 D. 5.50

3) In a certain city, about 8% of the people between the ages of 50 and 65 years old are infected with COVID-19. If the city population between the ages of 50 and 65 is 1 550, about how many of them are infected?
   A. 167 B. 145 C. 132 D. 124

4) The Gonzalez family planned to save at least 25% of their monthly income of P 25 000. At least how much did they plan to save monthly?
   A. 6250 B. 6265 C. 6280 D. 6295

5) Jason, a basketball player, usually makes 55% of his field shots. If he attempted 40 field shots during a game, how many field shots did he most likely make in that game?

A. 22 B. 27 C. 32 D. 37

6) Alicia works as an assistant baker at a fancy cake shop. She saves at least 15% of her monthly salary of P15500. At least how much does she save per month?

A. P2300 B. 2325 C. P2350 D. P2375

7) Andrew saves 15% from his P400.00 weekly allowance while Myra saves 22% from his P350.00 weekly allowance. Who saves more, Andrew or Myra, and by how much?

A. Andrew, by P60
B. Myra, by P77.
C. Andrew, by P77.
D. Myra, by P17.

8) Alvin is a volleyball player. He usually scores 60% of all the points his team scores in a game. If the team scored 90 points in a particular game, around how many points did he score in that game?

A. 45 B. 54 C. 63 D. 72

9) Leo had some money in his pocket. He gave 40% of this to his mother and 25% to his three younger sisters. He now just has P700.00 left in his pocket. How much money did Leo have in his pocket at first?

A. P2000 B. P2500 C. P3050 D. P3500

10) A department store signage says, “For every 10 points in your reward card, you are entitled to a 5% discount on your total bill”. You have 22 points in your reward card. If the total bill for your groceries is P700.00, how much discount are you entitled to?

A. 100 B. 85 C. 70 D. 55

Lesson 1 Solving Routine and Non-Routine Problems Involving Percentage

In order to solve routine and non-routine problems involving percentage, you need to master the skill of finding the percentage of a number. You also need to master identifying the base, percentage and rate in a problem to help you understand the lesson in this module. Here, you will learn how to solve routine and non-routine problems involving percentage. Are you ready to explore the lesson? Let's get started then.

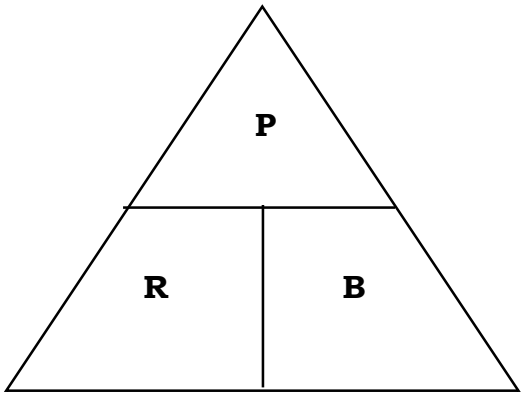
What's In

Before we proceed, let us recall our previous lesson. Can you still remember the steps in finding the percentage of a number?

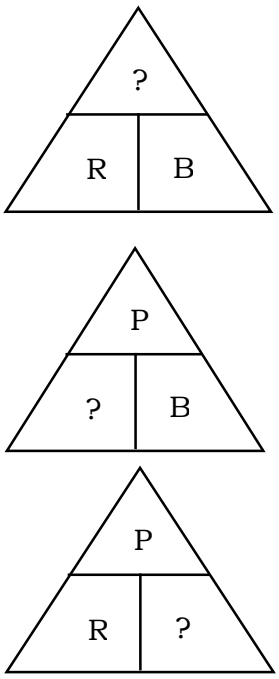
Remember that **percentage** is a *part of a whole*. The *whole or total* of which the percentage is just a part is what we refer to as the **base**; while the number which is usually expressed in *percent* or has the percent sign *(%)* is the **rate**.

In situations where we are trying to find the percentage of a number, we use the formula: **Percentage = Rate x Base** or **P = R x B**. R is usually expressed in percent, or as a decimal or a fraction. Usually too, P is less than B, but only if R is less than 100%. But if R is greater than 100%, B would be less than P.

You may also use Techans triangle which is shown below. It is a mnemonic device or a memory device to help us remember the formula in solving problems involving percent.



To use Techans triangle, we cover that part which has the letter that represents what we are trying to find in a particular problem. P, for percentage; R for rate; and B for base.



So, if we are trying to find the percentage P, we cover P. What remain are R and B which are side by side. This means we need to multiply R and B to get P.

On the other hand, if we are trying to find the rate R, we cover R. What remain are P and B, with P above B, just like a fraction with P as the numerator and B, the denominator. This means we need to divide P by B to find R.

We do similarly if we are trying to find B.

Let us now consider the following examples.

1) Identify the base, rate and the percentage in the number sentence, 50% of 72 is 36.

   Answer: The **base is 72** because it is the whole or the total. The **rate or percent is 50%** because it has the percent sign. And the **percentage is 36** because it is that part of 72 which corresponds to 50%.

2) In a survey involving 6,000 TV viewers, 10% said that they love to watch TV 5. From this data, identify the following:
   1.) Base
   2.) Rate
   3.) Percentage

   Answers:
   1. The base is 6,000
   2. The rate is 10%
   3. The percentage is 600.

What's New

Read and analyze the problem below:

Carla is a transferee from Manila. Due to Covid-19, her family decided to move back to the province. She is an incoming Grade 5 pupil at Calbayog Pilot Central School and took the entrance examinations last week. In the 80-item Math test, Carla answered 90% of the items correctly. How many items did she answer correctly?

What is It

Everyday, we encounter percentages in many different forms. Thus, knowing how to identify and compute percentages is very important in our daily lives.

Remember that in solving routine problems involving percentage, there are only 4 easy steps to follow:

Step 1: **Understand**	Know what is asked. Know the given facts. Determine hidden questions, if there are any.
Step 2: **Plan**	Determine the operation/s to be used Write the number sentence
Step 3: **Solve**	Solve the number sentence.
Step 4: **Check and Look back**	Write the correct answer

On the other hand, non-routine problems typically do not have an immediately apparent strategy for solving them, it can be done in multiple ways and with a variety of strategies. Here are some of the different strategies used in solving non-routine word problems.

- Look for a pattern
- Guess and check
- Work backward
- Make a model/ visualize the problem
- Break up the problem into smaller parts and solve each part

Note that, in answering routine word problems, you may answer them using a known or immediate strategy such as the 4-step process or using a unique strategy such as illustrations and drawings. While the non-routine problems are any complex problem that requires some degree of creativity or originality to solve and are not answerable using the 4-step process.

Let's consider the problem from the previous part of this module as our first example. Study the solution below.

Example 1:

Carla is a transferee from Manila. Due to Covid-19, her family decided to move back to the province. She is an incoming Grade 5 pupil at Calbayog Pilot Central School and took the entrance examinations last week. In the 80-item Math test, Carla answered 90% of the items correctly. How many items did she answer correctly?

Step 1: Understand

- What is asked: The number of items Carla answered correctly
- Given facts: 80-item test: 90% of the items answered correctly

Step 2: Plan

- Determine the operation to be used: **Multiplication**
- Write the number sentence: n = 0.90 x 80;

Step 3: Solve

- Solution: P = R x B; R = 90% or 0.90; B = 80;

Multiply:

0.90	-	no. of items Carla answered correctly as a percentage of total no. of items
x 80	-	total no. of items
72	-	no. of items Carla answered correctly

Step 4: Check

- Check and look back
- See if your answer makes sense

Multiply:

0.10	-	no. of items Carla failed to answer correctly as a percentage of total no. of items
x 80	-	total no. of items
8	-	no. of items Carla failed to answer correctly

Add:

72 - no. of items Carla answered correctly
+ 8 - no. of items Carla failed to answer correctly
80 - total no. of items

- State the complete answer

Answer: Carla got 72 correct answers in the 80-item test.

But we can also answer this problem in a non-routine way using another strategy. See the diagrams below.

50% x (80 items) = 40 items	50% x (80 items) = 40 items

Consider the table as the whole 80-item test. We are looking for what is 90% of 80 items. We have 50% + 40% = 90% but we have no idea yet what 40% of 80 is.

50% x (80 items) = 40 items	40% x (80 items) = ? items

Solving for n, we have,

$$n = 40\% \times 80$$
$$n = 32$$

We thus have,

$$90\% \times 80 = (50\% \times 80) + (40\% \times 80)$$
$$= 40 + 32$$
$$= 72$$

Completing the table, we have

50% (80 items) = 40 items	40% (80 items) = 32 items

Therefore, Carla got 72 correct items in an 80-item test and had 8 mistakes.

Example 2:

Romeo celebrated his 11th birthday. He counted the people who attended his party and found out that 40% of the 200 attendees were his classmates. How many attendees were his classmates?

Step 1: Understand

- What is asked: The number of attendees who were Romeo's classmates
- Given facts: 200 attendees: 40% of the attendees were Romeo's classmates

Step 2: Plan

- Determine the operation to be used: **Multiplication**
- Write the number sentence: P = R x B = 0.40 x 200 = n; 200 – n = no. of attendees who were not Romeo's classmates

Step 3: Solve
Solution

Multiply:	0.40	No. of attendees who were Romeo's classmates as a percentage of the total no. of attendees
	x 200	Total no. of attendees
	80	No. of attendees who were Romeo's classmates

Step 4: Check

Add:	120	No. of attendees who were not Romeo's classmates
	+ 80	No. of attendees who were Romeo's classmates
	200	Total No. of attendees

- State the complete answer
  Therefore, 80 of the attendees were Romeo's classmates.

You can also solve the problem by making an illustration first**.**

The problem says 40% of the 200 attendees were Romeo's classmates. The figure below consisting of a box representing the 200 attendees. The box is divided into 10 smaller boxes each representing 20 attendees.

Forty percent may also be expressed as 4/10. We therefore get 4 of the 10 smaller boxes and this is shown by the shaded boxes. Four 20s is 80. Therefore, our answer is, 80 attendees in Romeo's party were his classmates.

As we have seen in the two examples above, we can make use of illustrations to help us visualize and solve problems much more easily.

Example 3:

There are 45 questions in a summative examinations. For every correct answer, 5 points is scored. For every incorrect answer, 3 points are deducted. Shiela scored 185 points. How many correct answers did she have? What percent is this of 45?

Assume that Shiela scored perfectly in the summative exam. She would then have a score of 45 x 5 or 225. If she had 1 incorrect answer, she would have scored (44 x 5) – (1 x 3) or 217.

Observe that from the highest possible score of 225, 8 points is deducted for every incorrect answer. This is because 5 points is lost for failing to give the correct answer and 3 points is lost because of the deduction. This is summarized in the table below.

No. of correct answers (c)	Points Scored c x 5	No. of incorrect answers (i)	Points deducted (i x 3)	Total points	
45	225	0	0	225	} 225 – 217 = 8
44	220	1	3	217	
…	…	…	…	…	
40	200	5	15	185	

Since, Shiela got 185 points, we need to find how many correct answers she had.

Points lost by Shiela = 225 – **185** = 40. Refer to the last row.
No. of incorrect answers = 40 ÷ 8 = **5**

For the next question, what percent of the 45 total number of items did Shiela answer correctly, we have,

$P = R \times B,$
$R = P/B$ (using Techan's Triangle)
$= 40/45 \times 100\%$
$= 0.\overline{8} \times 100\% = 88.89\%$

Therefore, Shiela's 40 correct answers is is 88.89% of the 45 total no. of items.

Congratulations for reaching this far. Now try to answer the activities below.

What's More

Activity 1: Start Moving!

Directions**:** Read and understand the following word problems and answer the questions that follow.

> Of the 50 members of the Clean and Green Movement, 90% voted for the new president. How many did not vote for the new president?

1. What is asked in the problem?
2. What are the given facts?

> Of the 10 on-going projects of the DPWH, 60% are fully implemented. How many projects were fully implemented?

3. Is there a hidden question? What is it?
4. What is the operation to be used?

> Among 60 women in a slums area, 40% earn a living peddling plants. The rest earn their living as live-out domestic helpers. How many are live-out domestic helpers?

5. What is the number sentence?

Activity 2: Get Moving!

Directions: Read and understand the word problem using the 4-step process of solving routine problems.

> Ava's family went to a resort which charges an entrance fee of P80.00 per person. They are a family of 10 with 7 adults and 3 kids. The cashier told them that the entrance fee for a child was only P50.00. They were given a receipt for P710.00 instead of what they thought was P800.00.What percent of the P800 supposed total entrance fee for 10 people did Ava's family not have to pay because 3 members of their family were children?

Activity 3: Keep Moving!

Directions: Read and understand the word problem inside the box. Then, supply the missing information using the 4-step plan.

> Marie is a working student of Mrs. Gomez. Every week, she receives P750.00 as allowance. If she saves 15%, how much is her weekly savings?

Understand:

What is asked? _____

Given facts. _____

Hidden questions. _____

Plan:

Operation to be used: _____

Number sentence: _____

Solve:

Solution. _____

Check and Look back: _____

Now, that you already know the flow of process in solving routine word problems as well as you have the idea of figuring out how to answer non-routine word problems, let's summarize what you had learned.

What I Have Learned

Directions: Fill in the blanks with the correct word or group of words to make the statement complete.

1) To solve routine problems involving percentage, we follow the _____.
2) Before solving the problem, you should _____.
3) Part of understanding the problem is to determine if there is a _____.
4) Once the problem is understood, you need to determine the _____ to be used.
5) If the operation is already identified, write the _____.
6) After solving, to make sure if your answer is correct, you need to _____.
7) Non-routine problems typically do not have an immediately apparent strategy for solving them, it can be done in _____.
8) One of the different strategies used in solving non-routine word problems is looking for a _____.
9) Making a model is one of the multiple ways in solving _____.
10) Non-routine problems are any complex problem that requires some degree of _____ to solve.

Nice work! Let's practice some more.

What I Can Do

Now, apply what you have learned about solving routine and non-routine problems involving percentage. Read and understand the sample real-life situation presented below. Feel free to use an extra sheet of paper for your solutions.

Arnold is finally going home to Calbayog. He is one of the many locally stranded individuals (LSI) in Manila who had been wanting to go home to his hometown. He has spent all his money and had to ask his aunt for fare money. If his aunt gave him P3,000.00, of which he used P1,200.00 to buy his bus ticket, what percent of the money his aunt gave him does he have left?

Good job! You certainly did well today. You are almost done; just two more activities to go.

Assessment

Directions: Select the letter that corresponds to the reasonable answer. You may use an extra sheet of paper for your solutions.

1) Of the 40 members of the Mathematics Club, 35% are also members of the Science Club. How many members of the Mathematics Club are also members of the Science Club?
   A. 14 B. 16 C. 18 D. 20

2) The Brgy. Macatingog Council and Officials conducted a General Assembly., 180 people attended. Among them, 30% were female. How many were female attendees?
   A. 34 B. 44 C. 54 D. 64

3) A fish vendor was able to sell 65% of his 80 kilos of fish. How many kilos of his fish was he able to sell?
   A. 52 B. 42 C. 32 D. 22

4) Mang Cenon planted 68% of his farm with rice. What percent of his farm is not planted with rice?
   A. 22% B. 32% C. 42% D. 52%

5) Amanda correctly answered 75% of the items in her spelling test. How many percent of the items did she not answer correctly?
   A. 15% B. 10% C. 25% D. 20%

6) The Gonzales family planned to save at least 25% of their monthly income of P25 500. At least how much did they plan to save from their monthly income?
   A. P6 400 B. P6 375 C. P6 350 D. P6 325

7) Gerald saves 18% from his P300.00 weekly allowance while Mirasol saves 25% from his P250.00 weekly allowance. Who saves more per week, Gerald or Mirasol, and by how much?
   A. Gerald, by P8.00
   B. Mirasol, by P54.00
   C. Gerald, by P62.50
   D. Mirasol, by P8.50

8) Marvin, a basketball player, usually scores on 60% of his field shot attempts. If he attempted 30 field shots during a particular game, about how many of his field shot attempts did he score on in that game?
   A. 16 B. 18 C. 20 D. 22

9) Mark had some money in his pocket. He gave 25% of this to his mother and another 25% to his three younger sisters. He now just has P750.00 left in his pocket. How much money did Mark have in his pocket at first?

A. P1000 B. P1500 C. P2000 D. P2500

10) A department store signage says, "For every 10 points in your reward card, you are entitled to a 5% discount on your total bill". You have 32 points in your reward card. If the total bill for your groceries is P1,000.00, how much discount are you entitled to?

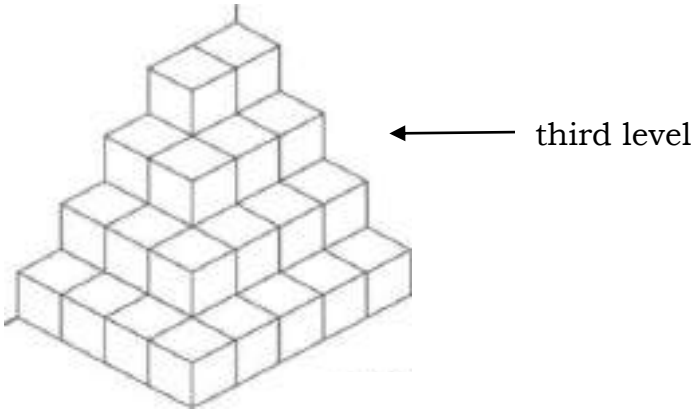
A. 50 B. 100 C. 150 D. 200

One more activity and you will be ready for the next module. Surely you can do it. Good luck!

Additional Activities

Directions: Answer the following routine and non-routine problems below. Use an extra sheet of paper for your solutions.

1) A test has 20 questions. If Peter answered 80% of the questions correctly, how many questions did Peter not answer correctly?
2) In a school, 25 % of the teachers teach basic math. If there are 50 teachers who teach basic math, how many teachers are there in the school?
3) What percent of the total number of piled boxes are those in the third level?



Answer Key

What's More

Activity 3: Keep Moving!

-Marie's weekly savings
-P750 weekly allowance and 15% savings
-The amount of Marie's expenses less than her savings
-Multiplication
– amount of Marie's weekly savings

P = R x B
R = Amount of Marie's weekly allowance that she saves as a percentage of her allowance
= 15%
B = Marie's weekly allowance = 750
P = 15% x 750 = 112.50

What I Have Learned

1. 4-Step
2. Plan
3. Non-routine
4. problems
5. picture
6. operation
7. number
8. sentence
9. check
10. given

What I Can Do

P = R x B
P = price of bus ticket = 1200
B = amount Arnold received from her aunt = 3000
Amount Arnold had left in his pocket = 3000 – 1200 = 1800
R = percent of amount from aunt that Arnold had left in his pocket = P/B = 1800/3000 x 100% = 60%

Assessment

1. A
2. C
3. A
4. B
5. C
6. B
7. D
8. B
9. B
10. C

Additional Activities

1. P = R x B
   B = no. of questions = 20
   R = percent of correct answers = 80%;
   P = no. of correct answers = 80% x 20 = 16
   no. of incorrect answers = 20 – 16 = 4.

2. P = R x B
   P = no. of basic math teachers = 50
   R = % of teachers who teach basic math = 25%
   B = total no. of teachers
   B = P/R = 50/25% = 50/(25/100) = 200

3. Multiply:

Level		# of boxes		
1	x	2	=	2
2	x	3	=	6 –3rd level
3	x	4	=	12
4	x	5	=	20

   P = R x B
   B = Total no. of boxes = 2 + 6 + 12 + 20 = 40
   P = No. of boxes in the 3rd level = 6
   R = % of total no. of boxes that are in the 3rd level
   R = P/B x 100% = 6/40 x 100% = 15%

What I Know

1. D
2. B
3. D
4. A
5. A
6. B
7. D
8. B
9. A
10. C

What's More

Activity 1: Start Moving!

1. How many of the 50 committee members did not vote for the president.
2. There are 50 committee members and 90% of them voted for the president
3. The number of projects that were not fully implemented.
4. Multiplication
5. P = R x B

no. of women who earn a living peddling plants = 0.40 x 60

no. of women who are live-out domestic helpers = 60 – (.04 x 60)

Activity 2: Get Moving!

Amount to pay if 10 adults = 10 x 80 = 800
Amount to pay for 7 adults and 3 kids =
(7 x 80) + (3 x 50) = 710
Additional amount to pay if 10 adults instead of 7 adults and 3 kids =
800 – 710 = 90
P = R x B; R = P/B
P = 90; B = 800

To compute for the amount they did not pay as a percentage of what they would have paid if 10 adults:

1. R = 90/800 x 100% = 11.25%. or
2. R = 100% - (710/800 x100%)
   100% - 88.75% = 11.25%

References

Math Only Math. n.d. *Word Problems On Percentage | Percent Problems | Real Life Problems*. [online] Available at: <https://www.math-only-math.com/word-problems-on-percentage.html> [Accessed 11 August 2020].

www.onlinemathlearning.com. n.d. *5Th Grade Word Problems (Worked Solutions, Examples)*. [online] Available at: <https://www.onlinemathlearning.com/5th-grade-math-word-problems.html> [Accessed 11 August 2020].

For inquiries or feedback, please write or call:

Department of Education - Bureau of Learning Resources (DepEd-BLR)

Ground Floor, Bonifacio Bldg., DepEd Complex
Meralco Avenue, Pasig City, Philippines 1600

Telefax: (632) 8634-1072; 8634-1054; 8631-4985

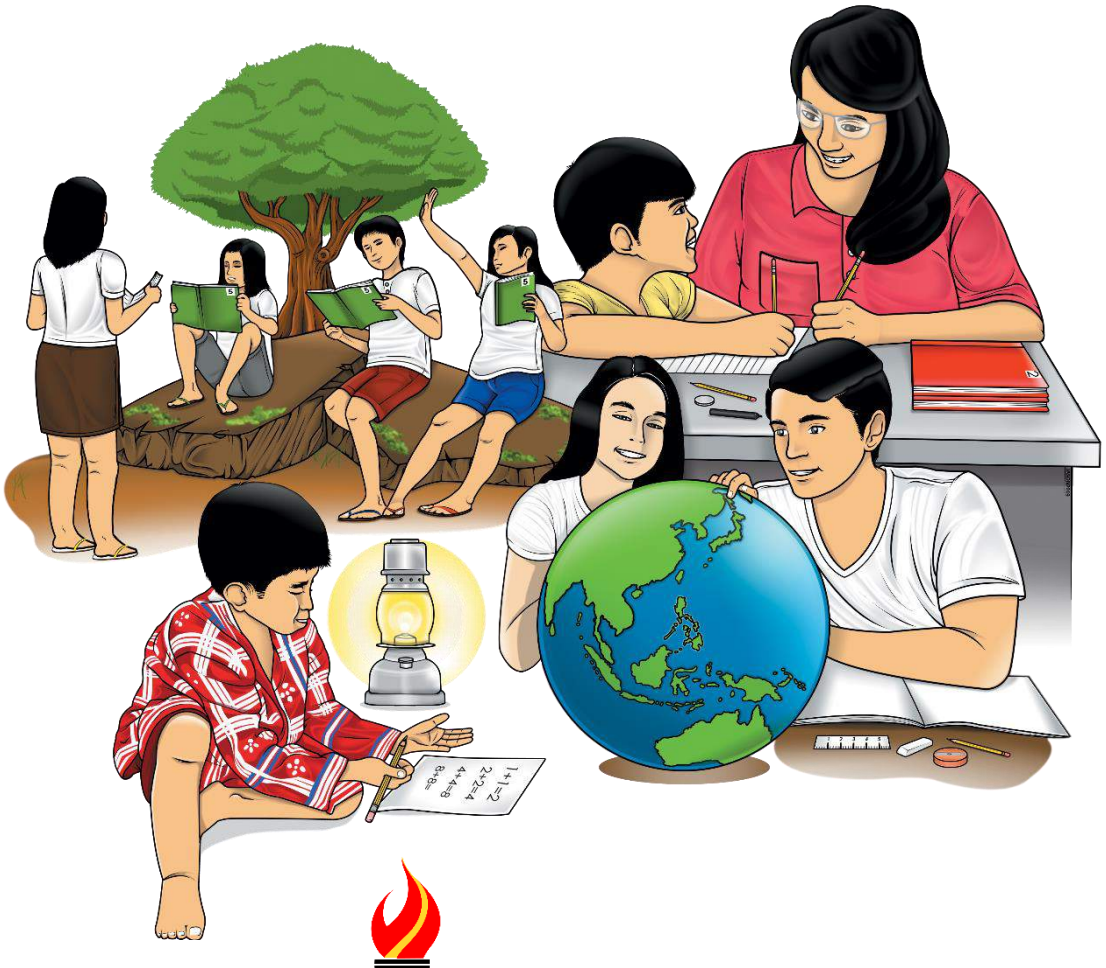
Email Address: blr.lrqad@deped.gov.ph * blr.lrpd@deped.gov.ph

5

DepED
DEPARTMENT OF EDUCATION

Mathematics

Quarter 3 – Module 6: Visualizing, Identifying and Describing Polygons with 5 or More Sides



ALTERNATIVE DELIVERY MODE
ADM

GOVERNMENT PROPERTY
NOT FOR SALE

Mathematics – Grade 5
Alternative Delivery Mode
Quarter 3 – Module 6: Visualizing, Identifying and Describing Polygons with 5 or More Sides
First Edition, 2020

Republic Act 8293, section 176 states that: No copyright shall subsist in any work of the Government of the Philippines. However, prior approval of the government agency or office wherein the work is created shall be necessary for exploitation of such work for profit. Such agency or office may, among other things, impose as a condition the payment of royalties.

Borrowed materials (i.e., songs, stories, poems, pictures, photos, brand names, trademarks, etc.) included in this module are owned by their respective copyright holders. Every effort has been exerted to locate and seek permission to use these materials from their respective copyright owners. The publisher and authors do not represent nor claim ownership over them.

Published by the Department of Education
Secretary: Leonor Magtolis Briones
Undersecretary: Diosdado M. San Antonio

Development Team of the Module

Writers: Egie B. Tamoyang

Editors: Nian L. Atis, Santiago Fabula, Jr.

Reviewers: Rolando Lacbo, Janet Pepito

Illustrator: - Noel E. Sagayap

Layout Artist: Razle L. Jabelo, Jaycee B. Barcelona

Management Team: Ma. Gemma M. Ledesma, Arnulfo R. Balane, Rosemarie M. Guino
Joy B. Bihag, Ryan R. Tiu, Sarah S. Cabaluna,
Thelma Cabadsan-Quitalig, Elena S. De Luna,
Renato S. Cagomoc, Noel E. Sagayap, Geraldine P. Sumbise
Joshua Sherwin T. Lim

Printed in the Philippines by _____

Department of Education – Region VIII

Office Address: DepEd Regional Office No. 8
Candahug, Palo, Leyte
Telefax: (053)-832- 2997
E-mail Address: region8@deped.gpv.ph

5

Mathematics

Quarter 3 – Module 6: Visualizing, Identifying and Describing Polygons with 5 or More Sides

DepED
DEPARTMENT OF EDUCATION

Introductory Message

This Self-Learning Module (SLM) is prepared so that you, our dear learners, can continue your studies and learn while at home. Activities, questions, directions, exercises, and discussions are carefully stated for you to understand each lesson.

Each SLM is composed of different parts. Each part shall guide you step-by-step as you discover and understand the lesson prepared for you.

Pre-tests are provided to measure your prior knowledge on lessons in each SLM. This will tell you if you need to proceed on completing this module or if you need to ask your facilitator or your teacher's assistance for better understanding of the lesson. At the end of each module, you need to answer the post-test to self-check your learning. Answer keys are provided for each activity and test. We trust that you will be honest in using these.

In addition to the material in the main text, Notes to the Teacher are also provided to our facilitators and parents for strategies and reminders on how they can best help you on your home-based learning.

Please use this module with care. Do not put unnecessary marks on any part of this SLM. Use a separate sheet of paper in answering the exercises and tests. And read the instructions carefully before performing each task.

If you have any questions in using this SLM or any difficulty in answering the tasks in this module, do not hesitate to consult your teacher or facilitator.

Thank you.

What I Need to Know

Good day Mathletes! In this module, you are going to gain an understanding on visualizing, identifying and describing polygons with 5 or more sides. You will also realize the importance of polygons in our day-to-day living. Moreover, you will surely enjoy the fun and challenging activities which are provided for you to strengthen your understanding of the lesson.

When you finish up this module, you will be able to:

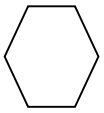
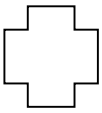
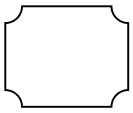
1. visualize polygons with five or more sides;
2. identify polygons with five or more sides; and
3. describe polygons with five or more sides.

Let us first check what you know about polygons.

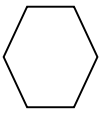
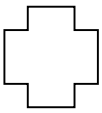
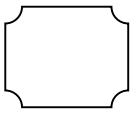
What I Know

Directions: Read and understand the given. Choose the letter that corresponds to the correct answer. Write the letters of your answers on a separate sheet of paper.

1) Which of the following illustrates a 12-sided polygon?

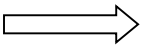
A.  B.  C.  D.

2) Which of the following illustrates a hexagon?

A.  B.  C.  D.

3) Which of the following is **not true** about polygons?
   A. Polygons have more than two (2) sides.
   B. Polygons are 2-dimensional geometric figures.
   C. Polygons are 3-dimensional geometric figures.
   D. Polygons can be classified by the number of their vertices.

4) What do you call a 5-sided polygon?
   A. a hexagon B. a pentagon C. a heptagon D. a nonagon

5) What polygon is illustrated by the figure on the right? 
   A. a hexagon B. a pentagon C. a heptagon D. a nonagon

6) Which of the following has exactly 5 angles?
   A. a hexagon B. a pentagon C. a heptagon D. a nonagon

7) What is the exact number of vertices of an octagon?
   A. five (5) B. six (6) C. eight (8) D. nine (9)

8) What is the exact number of line segments that are connected to each vertex of a pentagon?
   A. one (1) B. two (2) C. three (3) D. five (5)

9) Which of the following is a six-sided polygon?
   A. a hexagon B. a pentagon C. a heptagon D. a dodecagon

10) What do you call a ten-sided polygon?
   A. a hexagon B. a pentagon C. a heptagon D. a decagon

Please check your answers against the ANSWER KEY on page 14.

Lesson 1 Visualizing, identifying and describing polygons with 5 or more sides

Mastery on polygons is not only an important part of mathematics, but it is also an important part of daily living. It helps you become acquainted with the applications of polygons in science, engineering, art, design and social studies.

Are you ready to explore the lesson? So, let's proceed.

What's In

Let us review the previous lesson. Can you still recall the steps on solving routine problems and different methods/strategies on solving non-routine problems involving percentage?

Let us consider the next word problem. We solve it using the steps on solving routine problems.

Example 1

In a church organization with 100 members, each is required to donate 10% from their monthly salary or any form of income which can be 3,000.00 pesos and above. What is the maximum length of time it would take to save 1 500 000 pesos if all of the 100 members contributed monthly?

Solution:

Understand the problem.

- *Know what is asked.*
  We are asked to find the maximum length of time needed for the 100 church members to save 1.5M pesos.
- *Know the given facts.*
  There are 100 members.
  Each monthly salary/income of 3,000 pesos and above is with required donation of 10%.
  The target amount is 1.5 million pesos

Plan.

- *Determine the operations to be used.*
  Multiplication and division are the needed operations.
- *Write the number sentence.*
  0.10 x 3000 = N = percentage of the income

N x 100 = amount of donations per month

1,500,000 ÷ amount of donations per month = number of months to complete the needed amount

Show your solution.

$$\begin{array}{r} 0.10 \\ \times \quad 3000 \\ \hline 300.00 \end{array} \qquad \begin{array}{r} 300 \\ \times \quad 100 \\ \hline 30000 \end{array} \qquad \begin{array}{r} 50 \\ 30000\overline{)1\,500\,000} \\ 1\,500\,00 \\ \hline 0 \\ 0 \\ \hline 0 \end{array}$$

Check and look back.

- *Verify if your answer makes sense.*

$$\begin{array}{r} 30000 \\ \times \quad 50 \text{ (months)} \\ \hline 1\,500\,000 \end{array} \qquad \begin{array}{r} 4.1666\ldots \\ 12\overline{)50.0000} \\ 48 \\ \hline 20 \\ 12 \\ \hline 80 \\ 72 \\ \hline 80 \end{array}$$

1 year = 12 months

4 years = 48 months

50 months

= 48 months + 2 months

= 4 years and 2 months

State the complete answer.

If each of the 100 members donated monthly and the minimum income is 3 000 pesos, then it will take a maximum of 50 months or 4 years and 2 months to complete the 1.5 million pesos for the reconstruction of the church.

Try the next problem. Decide for yourself if you will use 2 or 3 strategies in solving non-routine problem.

Example 2

Eric hosted a children's party. He counted the persons who attended the event and found out that 60% of 200 visitors were female. How many visitors were female?

You can solve by drawing an illustration first.

In the given problem, 60% can also be represented in fractional form as $\frac{6}{10}$ Since there were 200 persons who attended the party, we simply divide it into 10 regions. So, each regions represents 20 persons. If one shaded region represents 20 persons, then 6 shaded regions represents 120 persons. It means that 120 female attended the children's party.

What's New

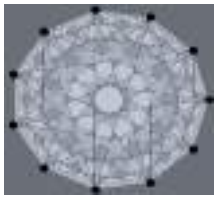
In the previous lessons, you were taught on how to solve routine and non-routine problems involving percentage. This module is going to teach and guide you on how to visualize, identify and describe polygons with 5 sides or more.

Always remember that polygons are closed plane figures that are formed by the line segments that meet only at their endpoints. The line segments are the *sides*. The endpoints where the sides meet are the *vertices*.

Polygons are classified according to the number of their sides, vertices and angles.

Example 3

Look at the images below. Let us consider them as representations of polygons. Count the number of their sides.



1)

2)

3)

4)

5)

6)

7)

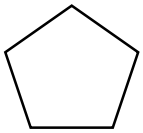
8)

What is It

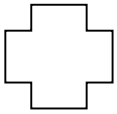
Everyday, we encounter representations of polygons in many different forms, colors and sizes, even in the streets or inside our homes. Thus, knowing and identifying shapes and angles are not enough. It is also important to master the skills in visualizing, naming and describing polygons with 5 sides or more, so that we can easily recognize them wherever we go, in whatever form and shape they are having.

Remember that a three-sided polygon is called a **triangle**. A four-sided polygon is called a **quadrilateral**. A five-sided polygon is called a **pentagon**. A six-sided polygon is called a **hexagon**. A seven-sided polygon is called a **heptagon**. An eight-sided polygon is called an **octagon**. A nine-sided polygon is called a **nonagon**. A ten-sided polygon is called a **decagon**. An eleven-sided polygon is called an **undecagon.** A twelve-sided polygon is called a **dodecagon**. An n-sided polygon can be called n-gon.

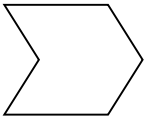
Let us consider the following polygons. Write your answers on a separate sheet of paper.



A



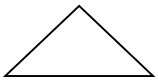
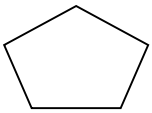
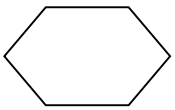
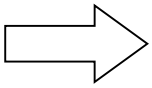
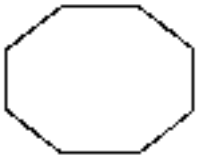
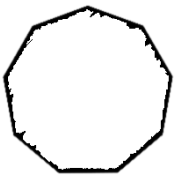
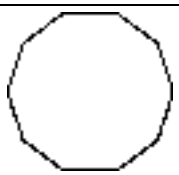
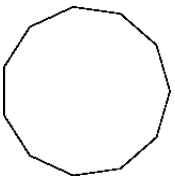
B



C

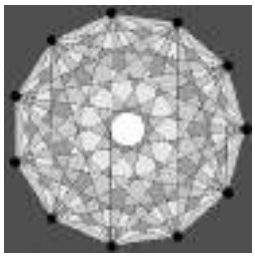
1) How many sides are there in each polygon?
2) How many angles are there in each polygon?
3) How many vertices are there in each polygon?
4) What can you say about the number of sides, angles and vertices of a polygon?
5) Are the polygons the same?
6) If there are any similarities, what are they?
7) If there are any differences, what are they?
8) How are polygons identified?
9) In each polygon, how how many sides are there in each vertex?
10) Using your own words, describe a polygon.

Consider the different polygons below and their identifications.

FIGURE	NAME	NUMBER OF SIDES
	Triangle	3
	Quadrilateral	4
	Pentagon	5
	Hexagon	6
	Heptagon	7
	Octagon	8
	Nonagon	9
	Decagon	10
	Undecagon	11
	Dodecagon	12

Let's consider the given objects from the previous part of this lesson.

Let's name what types of polygons they are.



11 sides
undecagon

1)

6 sides
hexagon

2)

7 sides
heptagon

3)

12 sides
dodecagon

4)

8 sides
octagon

5)

10 sides
decagon

6)

9 sides
nonagon

7)

5 sides
pentagon

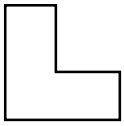
8)

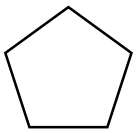
Congratulations you can now visualize, identify and describe the different types of polygons. Now try to answer the three activities that follow.

What's More

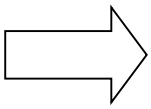
Activity 1: Can You Recognize Me!

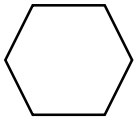
Directions**:** Name each polygon by the number of its sides. Write your answer on a separate sheet of paper. The first item is already answered for you as a guide.

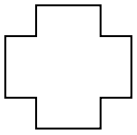
1) 

2) 

3)

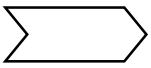
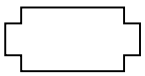
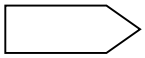
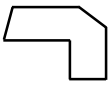
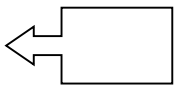
4) 

5) 

6) 

Activity 2: Remember My Name!

Directions: On a separate sheet of paper, copy the table below. Count the number of sides in each polygon. Name the polygon. The first item is already answered for you as a guide.

Figure	Number of Sides	Name of Polygon
1) 	6	Hexagon
2)		
3) 		
4) 		
5) 		
6) 		

Activity 3 Picture Me Out!

Directions: Think of objects that you see around you which represent polygons. Draw the given objects on a separate sheet of paper.

1) dodecagon	2) octagon	3) heptagon

4) pentagon	5) undecagon	6) hexagon

Now, you already have understood what polygons are. Let's try some more activities to strengthen what you have learned.

What I Have Learned

Directions: On a separate sheet of paper, match the terms in Column A with their definition or description in Column B. Write the letter of the correct answer on a separate answer sheet.

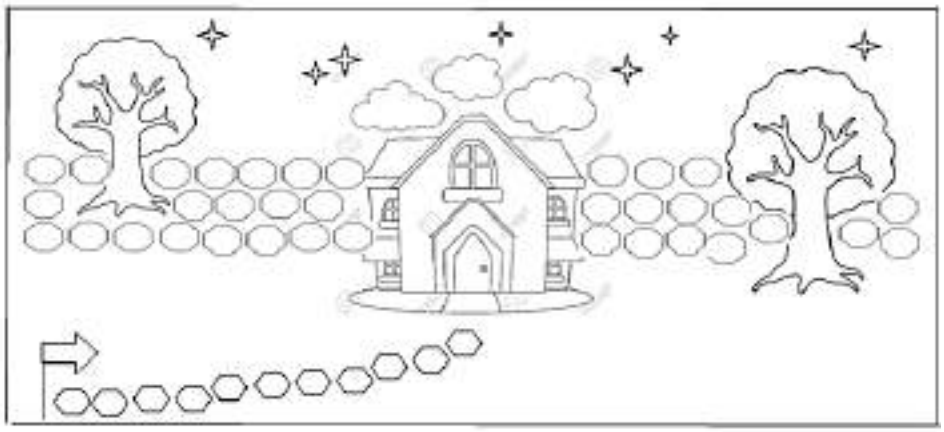
COLUMN A	**COLUMN B**
1. Vertex	a. a closed plane figure formed by line segments
2. Octagon	b. intersection of two sides of a polygon
3. Polygon	c. seven-sided polygon
4. Decagon	d. twelve-sided polygon
5. Heptagon	e. ten-sided polygon
6. Dodecagon	f. eight-sided polygon
	g. bounded by two angles of a polygon

Good job! You are almost done with this module. Just three more activities and you are done

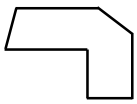
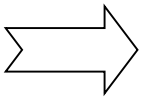
What I Can Do

Directions: A. Look at the picture on the right. It shows a "house facade". Create your own house facade on a separate sheet of paper. Use at least 5 different kinds of polygons. Color your work using the legend below.

octagon(s) = blue	triangle(s)= red
heptagon(s)= green	hexagon(s)= yellow
quadrilateral(s)= pink	pentagon(s) = brown



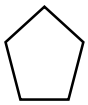
Directions: B. On a separate sheet of paper, copy and complete the table below.

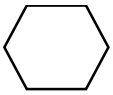
Figure	Number of Sides	Name of Polygon
1)	5	
2) 		
3)		hexagon
4) 		
5)	9	

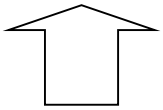
Perfect! What a nice work. Now, answer the activity below. Let's see if you remember what you have acquired today from this lesson.

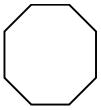
Assessment

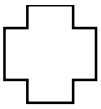
Directions: A. Identify the following geometric shapes. Choose the letter that corresponds to the correct answer. Write your answers on a separate sheet of paper.

1) 
A. heptagon
B. pentagon
C. hexagon
D. dodecagon

2) 
A. pentagon
B. nonagon
C. octagon
D. hexagon

3) 
A. nonagon
B. octagon
C. heptagon
D. dodecagon

4) 
A. pentagon
B. heptagon
C. octagon
D. hexagon

5) 
A. dodecagon
B. undecagon
C. nonagon
D. octagon

Directions: B. Read each item carefully. Choose the letter that corresponds to the correct answer. Write your answers on a separate sheet of paper.

6) Which of the following is the exact number of sides of a pentagon?
A. three (3) B. five (5) C. seven (7) D. nine (9)

7) Which of the following has exactly 7 angles?
A. A hexagon B. A pentagon C. A heptagon D. An octagon

8) Which of the following is an eight-sided polygon?
A. A triangle B. A heptagon C. An octagon D. A nonagon

9) Which of the following has exactly 12 angles?
A. A nonagon B. A decagon C. An undecagon D. A dodecagon

10) Which of the following is **not true** about polygons?
A. Polygons have more than two (2) angles.
B. Polygons are 2-dimensional geometric figures.
C. Polygons are 3-dimensional geometric figures.
D. Each vertex of a polygon has exactly two-line segments.

Please check your answers with the ANSWER KEY on page 14.

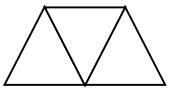
Got a score of 8-10? CONGRATULATIONS! Job well done. See you in the next module. If below 8, you may have to go over the lessons and the exercises again.

Additional Activities

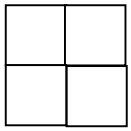
Directions: A. Read the following carefully. Do what is asked. Use a separate sheet of paper for your work.

A **polygon** with equal sides and equal angles is a **regular polygon**.

A **tessellation** is created when a shape is repeated over and over again covering a plane without any gaps or overlaps. Tiling is another word for a tessellation.



The three regular triangles form a tessellation.

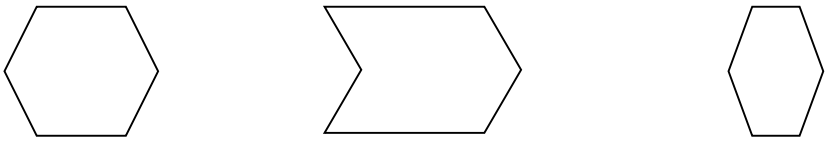


Squares form tessellation.

What are other polygons, with 5 or more sides, that can form tessellation? Illustrate your findings.

Directions: B. Read the following carefully. Do what is asked. Use a separate sheet of paper for your work.

Consider the following polygons.



A B C

1) What kind of polygons are they? How do you identify them?
2) How is A different from B?
3) How is B similar to A?
4) State the similarities of the three polygons, if any.
5) State the differences of the three polygons, If any.

Answer Key

What I Know

1. B
2. A
3. C
4. B
5. C
6. B
7. C
8. B
9. A
10. D

What's In

Example 1

The length of time needed for the 100 church members to save 1.5M pesos is 50 months or 4 years and 2 months

Example 2

there are 120 female attendees in the children's party

What is it

Example 1

For 1, 2 and 3,

A= 5 B = 12 C= 6

4. They are the same.
5. No.
6. They are all polygons.
7. They have different exact numbers of sides.
8. They are identified with the number of their sides, angles or vertices.
9. Two
10. Answers vary.

Example 2

There are 120 female attendees in the children's party

What's More

Activity 1:

1. Hexagon
2. Pentagon, 5 sided
3. Decagon, 10-sided
4. Heptagon, 7-sided
5. Hexagon, 6-sided
6. Dodecagon, 12 sided

Activity 2:

1. Hexagon, 6-sided
2. Octagon, 8-sided
3. Dodecagon, 12-sided
4. Pentagon ,5-sided
5. Heptagon, 7-sided
6. undecagon- 11-sided

Activity 3:

Answers vary per learner

What's I Have

Learned

1. B
2. F
3. A
4. E
5. C
6. D

What I Can Do

A. Answers vary

B. The figures may vary.

1. pentagon
2. 7 sides, heptagon
3. 6 sides, hexagon
4. 8 sides, octagon
5. nonagon

Assessment

1. B
2. D
3. C
4. C
5. A
6. B
7. C
8. C
9. D
10. C

Additional Activities

A. Answers vary.

B.

1) They are hexagons.
2) A is a regular polygon. B is not a regular polygon. Other differences can be pointed out.
3) Both are hexagons.
4) They are all hexagons.
5) They have different lengths of sides and different measures of angles.

References

Khan Academy. n.d. *Khan Academy | Free Online Courses, Lessons & Practice*. [online] Available at: <https://www.khanacademy.org/> [Accessed 11 August 2020].

Study.com. Accessed: August 4, 2020. https://study.com/academy/lesson/what-is-a-polygon-definition-shapes-angles.html.

"Identifying and Describing Polygons." math solutions, founded by marilyn burns, from houghton mifflin harcourt. Accessed: August 4, 2020. https://mathsolutions.com/ms_classroom_lessons/identifying-and-describing-polygons/.

K to 12 Grade 5 Curriculum Guide, p 61, Lesson Guide in Elementary Mathematics 5, p. 350-357

For inquiries or feedback, please write or call:

Department of Education - Bureau of Learning Resources (DepEd-BLR)

Ground Floor, Bonifacio Bldg., DepEd Complex
Meralco Avenue, Pasig City, Philippines 1600

Telefax: (632) 8634-1072; 8634-1054; 8631-4985

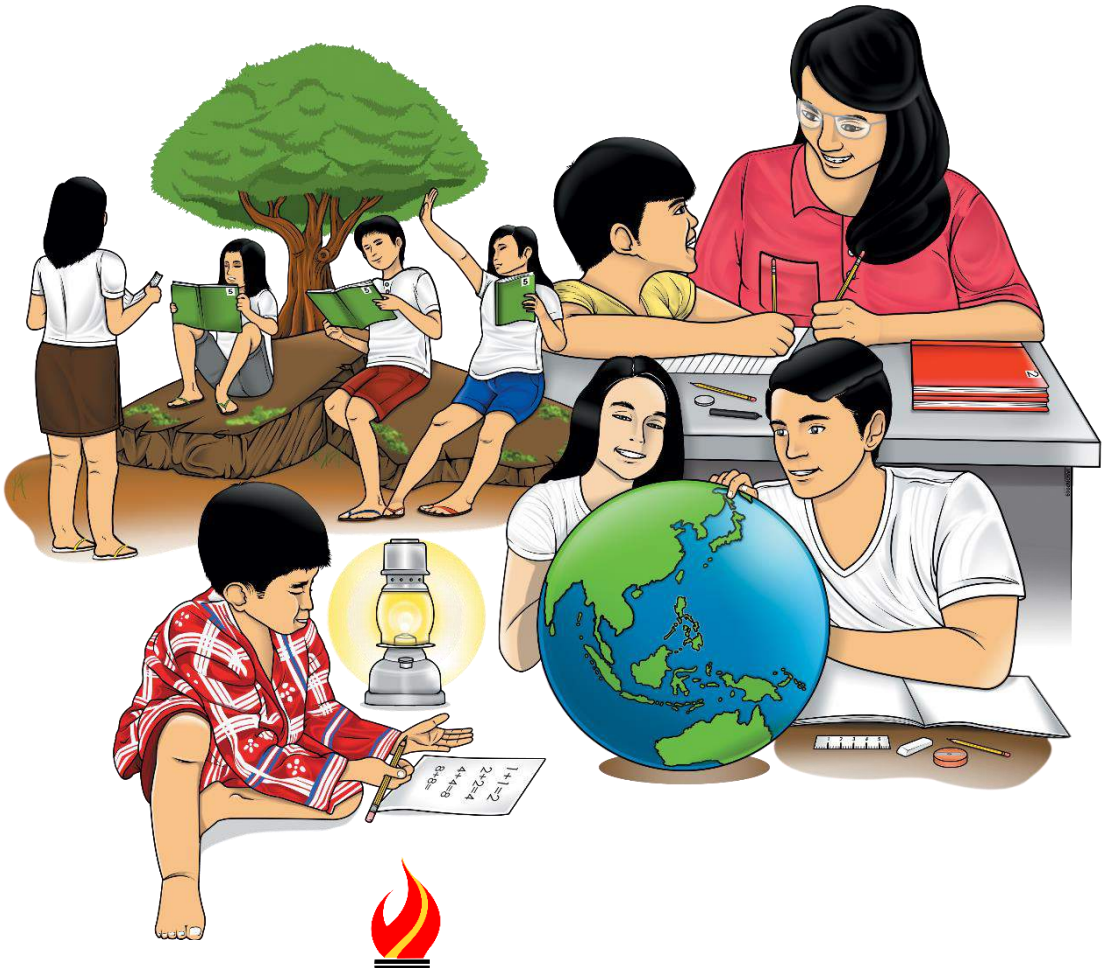
Email Address: blr.lrqad@deped.gov.ph * blr.lrpd@deped.gov.ph

5

DepED
DEPARTMENT OF EDUCATION

Mathematics

Quarter 3 – Module 7: Describing and Comparing Properties of Regular and Irregular Polygons



ALTERNATIVE DELIVERY MODE
ADM

GOVERNMENT PROPERTY
NOT FOR SALE

Mathematics – Grade 5
Alternative Delivery Mode
Quarter 3 – Module 7: Describing and Comparing Properties of Regular and Irregular Polygons
First Edition, 2020

Republic Act 8293, section 176 states that: No copyright shall subsist in any work of the Government of the Philippines. However, prior approval of the government agency or office wherein the work is created shall be necessary for exploitation of such work for profit. Such agency or office may, among other things, impose as a condition the payment of royalties.

Borrowed materials (i.e., songs, stories, poems, pictures, photos, brand names, trademarks, etc.) included in this module are owned by their respective copyright holders. Every effort has been exerted to locate and seek permission to use these materials from their respective copyright owners. The publisher and authors do not represent nor claim ownership over them.

Published by the Department of Education
Secretary: Leonor Magtolis Briones
Undersecretary: Diosdado M. San Antonio

Development Team of the Module

Writers: Egie B. Tamoyang

Editors: Niann L. Atis, Carlito Labine

Reviewers: Renato S. Cagomoc, Rolando M. Lacbo, Joshua Sherwin T. Lim, Pedro Montecillo

Layout Artist: Razle L. Jabelo, Maelyne L. Yambao

Management Team: Ma. Gemma M. Ledesma
Arnulfo B. Balane
Rosemarie M. Guino
Joy B. Bihag
Ryan R. Tiu
Sarah S. Cabaluna
Thelma Cabadasan-Quitalig
Elena S. De Luna
Renato S. Cagomoc
Noel E. Sagayap
Geraldine P. Sumbise,
Joshua Sherwin T. Lim

Printed in the Philippines by _____

Department of Education – Region VIII

Office Address: Deped Regional Office No. 8
Candahug, Palo, Leyte
Telefax: (053)-832-2997
E-mail Address: region8@deped.gov.ph

5

Mathematics

Quarter 3 – Module 7: Describing and Comparing Properties of Regular and Irregular Polygons

DepED
DEPARTMENT OF EDUCATION

Introductory Message

This Self-Learning Module (SLM) is prepared so that you, our dear learners, can continue your studies and learn while at home. Activities, questions, directions, exercises, and discussions are carefully stated for you to understand each lesson.

Each SLM is composed of different parts. Each part shall guide you step-by-step as you discover and understand the lesson prepared for you.

Pre-tests are provided to measure your prior knowledge on lessons in each SLM. This will tell you if you need to proceed on completing this module or if you need to ask your facilitator or your teacher's assistance for better understanding of the lesson. At the end of each module, you need to answer the post-test to self-check your learning. Answer keys are provided for each activity and test. We trust that you will be honest in using these.

In addition to the material in the main text, Notes to the Teacher are also provided to our facilitators and parents for strategies and reminders on how they can best help you on your home-based learning.

Please use this module with care. Do not put unnecessary marks on any part of this SLM. Use a separate sheet of paper in answering the exercises and tests. And read the instructions carefully before performing each task.

If you have any questions in using this SLM or any difficulty in answering the tasks in this module, do not hesitate to consult your teacher or facilitator.

Thank you.

What I Need to Know

Good day, Mathlete! In this module, you are going to learn about polygons by describing its parts and comparing the properties of regular and irregular polygons. Knowing these makes you appreciate the importance of polygons in our day-to-day living.

After going through this module, you are expected to:

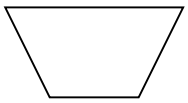
- Describe and compare properties of regular and irregular polygons.

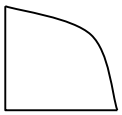
But first, let us check what you have learned so far about polygons.

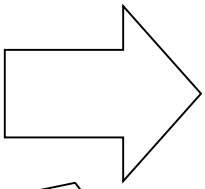
What I Know

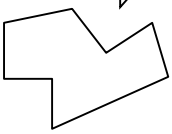
Directions: Read and understand the questions that follow. Choose the letter that corresponds to the correct answer. Write your answer on a separate sheet of paper.

1. Which of the following is **NOT** a polygon?

a. 

b. 

c. 

d. 

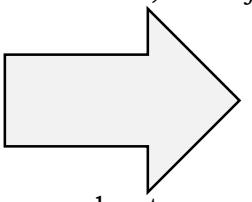
2. Which of the following is **TRUE** about a regular polygon?

I. The lengths of the sides of a regular polygon are equal.

II. The measures of the interior angles are equal.

a. I only
b. II only
c. I and II
d. Neither I nor II

For items 3 and 4, identify the given polygon and tell whether it is regular or irregular

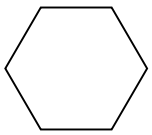
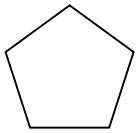
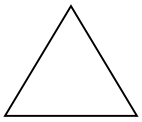
3. 

a. heptagon - irregular
b. hexagon - irregular
c. heptagon - regular
d. hexagon - regular

4.

a. pentagon - irregular
b. octagon - regular
c. heptagon - regular
d. decagon – irregular

5. Which of the following is an instrument used to draw a circle? Which of the following is **NOT** a regular polygon?

a.  b.  c.  d.

6. Which is a 4-sided regular polygon?
   a. Trapezoid b. Rectangle c. Parallelogram d. Square

For item no. 7, please refer to the situation below.

Rolly measured the angles of a pentagon. The table at the right shows the measures of the internal angles of the pentagon.

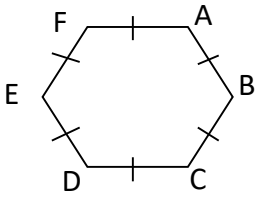
Angles	Measure
∠A	90°
∠B	110°
∠C	110°
∠D	150°
∠E	80°

7. What can be concluded about the pentagon?
   a. It is a regular polygon because it has a pair of congruent angles.
   b. It is a regular polygon because not all angles measure more than 75□.
   c. It is an irregular polygon because not all angles have the same measure.
   d. It is an irregular polygon because there are only two angles with equal measures.

8. A regular octagon has a perimeter of 40 cm. How long is its side?
   a. 5 cm b. 8 cm c. 10 cm d. 20 cm

For item no. 9 and 10, please consider the given below.

Given: ABCDEF is a regular polygon
The measure of $\overline{AB}$ is 2 cm
The measure of ∠C = 120°



9. Which could be the measure of line segment DE?
   a. 2 cm b. 4 cm c. 6 cm d. 12 cm
10. What is the possible measure of ∠E?
   a. 54° b. 100° c. 108° d. 120°

Lesson 1 Describing and Comparing Properties of Regular and Irregular Polygons

To fully understand this lesson, you should have already learned about visualizing, naming, and describing polygons. Understanding shapes is important in mathematics, but it also has many practical applications in real-life situations. Professionals such as engineers, architects, artists, real-estate agents, farmers and construction workers deal with shapes in their workplace.

So, are you ready to learn? Let's begin.

What's In

Before we describe and compare the properties of regular and irregular polygons, let us review how to visualize, name and describe polygons with 5 or more sides.

You learned in the previous lesson that a **polygon** is a closed plane figure that is formed by the line segments that meet only at their endpoints. The line segments are the sides and the endpoints where sides meet are the vertices. The two adjacent sides form an angle. Plane figures like circles or any other shape that includes a curve are not considered polygons.

Figures 1 and 2 below are examples of polygon.

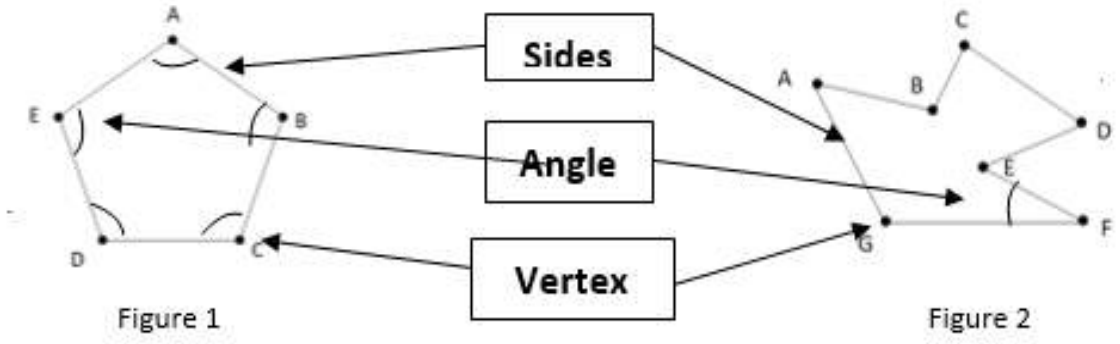
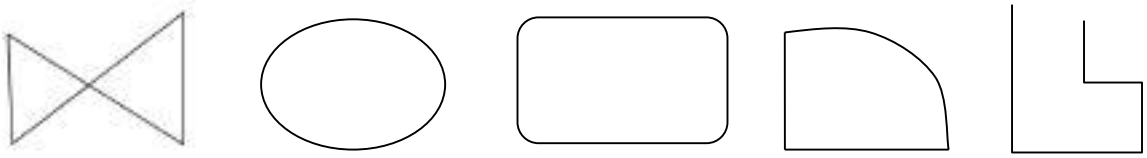


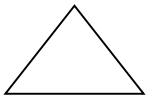
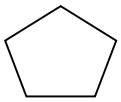
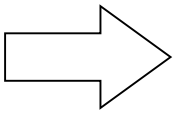
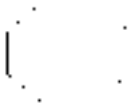
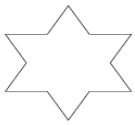
Figure 1 has five sides, five angles and five vertices. Its sides are $\overline{(AB)}$,$\overline{(BC)}$,$\overline{(CD)}$,$\overline{(DE)}$,$\overline{(EA)}$. Its angles are ∠A, ∠B, ∠C, ∠D, ∠E. Its vertices are A, B, C, D and E.

Can you name the sides, angles and vertices of figures 2?

The figures below are non-polygons. Can you tell why?



Polygons are identified according to the number of sides that they have. Here are the different polygons and their identification.

Polygons	Identification	Number of Sides
	**tri**angle	3
	quadrilateral	4
	**penta**gon	5
	hexagon	6
	**hepta**gon	7
	**octa**gon	8
	nonagon	9
	decagon	10
	undecagon	11
	**dode**cagon	12

Now, answer the exercise below and let's see how much you remember about the lesson from the previous module.

Example 1:

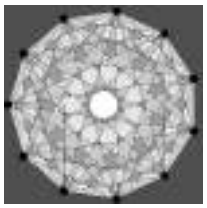
The objects listed below are all around us. Identify each polygon.

1)

2)

3)

4)

5) 

What's New

Polygons are all around us. A lot of polygons can be found in our homes and in the community where we live in.

For example, when you travel on streets, you see road signs. Most of these have the shape of a polygon. A polygon is any shape made up of line segments that can be drawn on a flat surface, like a piece of paper. Such shapes include squares, rectangles, triangles and pentagons.

The following figures are examples of polygons around us. Can you determine what these are and where you typically see them?

What Is It

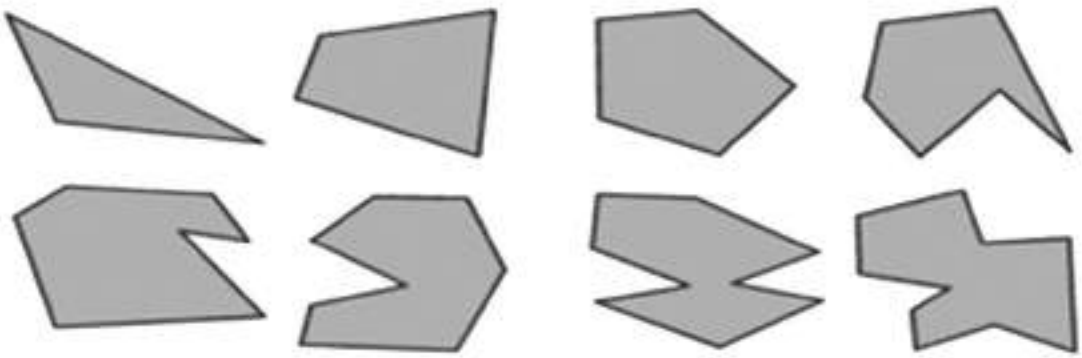
In the previous module, you were taught on how to visualize, name and describe polygons with 5 or more sides. This new lesson is going to teach you how to describe and compare properties of polygons that will help you classify them as either regular or irregular.

The pictures above show samples of regular and irregular polygons. Which of these are regular and which are irregular? For you to determine regular and irregular polygons, you need to look at the sides and angles.

When working with polygons the properties are **the number of sides** of the shape, the **angles** in the shape, and the **length** of the sides of the shape.

The following are examples of regular polygons:

The following are examples of irregular polygons:



Activity 1:

Materials: Ruler, protractor, pencil, paper

Procedure:

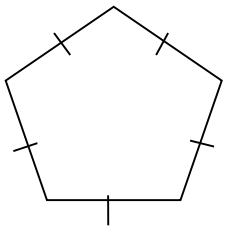
1. Using your ruler, measure the sides of the polygons given above. Write the measure of each side.

2. Using your protractor, measure the internal angles of the given polygons. Write the measure of each of the internal angles.

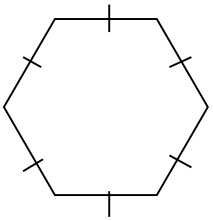
What did you find out?

A polygon which has all its sides of equal length and all its angles of equal measures is called a **regular polygon**.

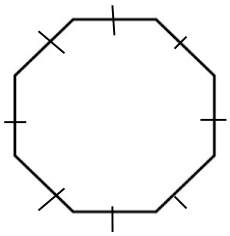
Here are the different shapes in regular forms:



Regular pentagon



Regular hexagon

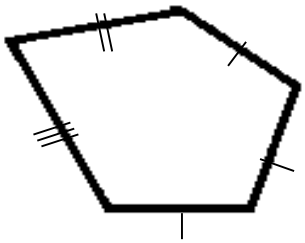


Regular octagon

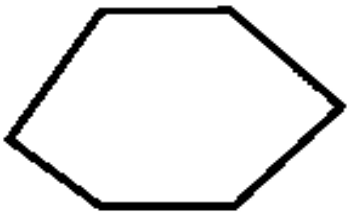
The marks on the sides of the polygons indicate equal length.

A polygon that is NOT a regular polygon is called an **irregular polygon**.

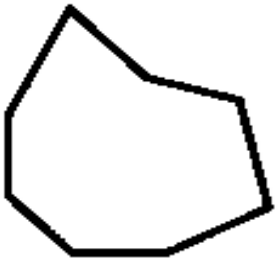
Here are the different shapes in irregular forms:



Irregular pentagon



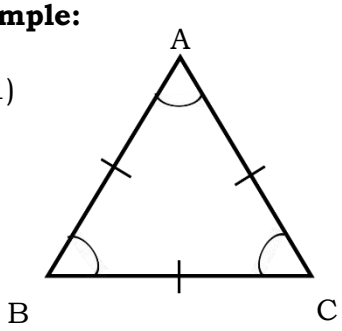
Irregular hexagon



Irregular octagon

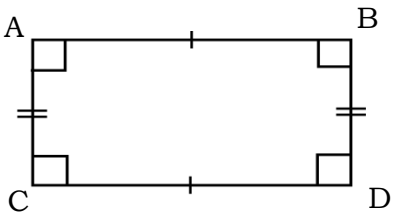
Example:

1)



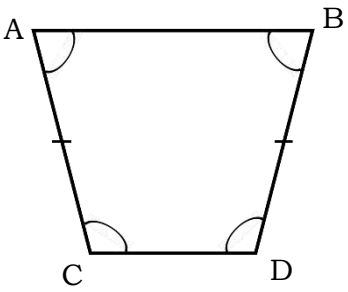
All sides of this triangle are in equal length, all angles are equal. Therefore, it is a regular polygon.

2)



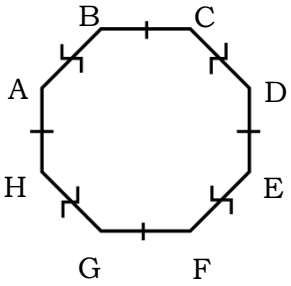
In the adjoining figure of a quadrilateral there are four sides, where the opposite sides are equal such as, AB = CD and AC = BD. AB is not equal to BD. Therefore, this is an irregular polygon.

3)



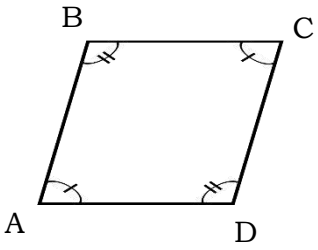
The measure of ∠A is equal to the measure of ∠B. The measure of ∠C is equal to the measure of ∠D, but not all four angles are congruent. Therefore, this is an irregular polygon.

4)



All eight sides of this polygon are equal in length. Similarly, all of its angles are equal. Therefore, this octagon is a regular polygon.

5)



All four sides are the same length, like a square that has been squashed sideways, but not all four angles are congruent. Therefore, this rhombus is an irregular polygon.

What's More

Activity 1 Know Me Well!

Directions: Identify the kind of polygon being described. Choose your answer from the box.

1) I am a 3-sided polygon with congruent sides.

2) I have one pair of parallel sides.

3) I am a six-sided polygon. All my sides are congruent.

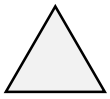
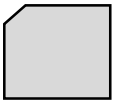
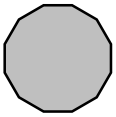
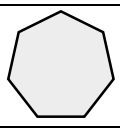
4) I am a 3-sided polygon with 2 congruent sides

5) My 4 sides are equal. All my sides form right angles.

equilateral triangle	rhombus	trapezoid
isosceles triangle	square	Regular Hexagon

Activity 2 Fill My Table!

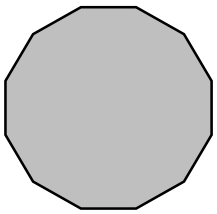
Directions: Read For each figure, count the number of sides, name the polygon and identify if it is regular or irregular.

Figure	Number of Sides	Name of Polygon	Regular or irregular?
1) 			
2) 			
3) 			
4.)			
5) 			

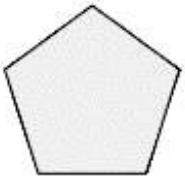
Activity 3 Pick a Tick!

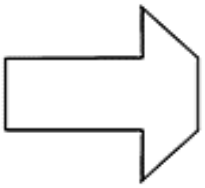
Directions: Name each polygon by the number of its sides. Tell whether it is regular or irregular.

1)

2) 

3)

.4) 

5) 

What I Have Learned

Directions: Fill in the blank with the correct word to make the statement true.

1. _____ are closed plane figures that are formed by straight line segments that meet only at their endpoints.
2. _____ are the sides of a polygon.
3. Polygons are classified according to the number of its _____.
4. _____ are quadrilaterals with 1 pair parallel sides.
5. _____ are polygons with all of its sides and angles equal.
6. _____ are quadrilaterals with 4 right angles & have all sides equal.
7. _____ is a five-sided polygon with equal sides and equal angles.
8. _____ are polygons that have non-congruent sides.
9. _____ is an eight-sided polygon with unequal sides.
10. _____ is a three-sided polygon with equal sides.

Excellent job! Let's try some more activities to strengthen what you have learned.

What I Can Do

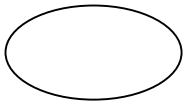
Directions: On a sheet of bond paper, draw at least 5 **regular polygons.** Color the polygons and make it your work of art. Be creative!

Let's check what you have learned. Answer the activity below.

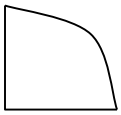
Assessment

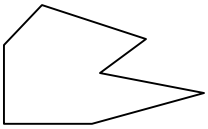
A. Directions: Read and understand the questions that follow. Choose the letter that corresponds to the correct answer. Write your answer on a separate sheet of paper.

1. Which of the following is a polygon?

a. 

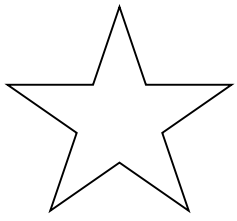
c.

b. 

d. 

2. Which of the following statements is **TRUE** about an irregular polygon?
   I. The lengths of the sides of an irregular polygon are not equal.
   II. The measures of all the interiors angles are equal.
   a. Statements I only
   b. Statements II only
   c. Both Statements I and II
   d. Neither I nor II

For items 3 and 4, identify the given polygon and tell whether it is regular or irregular

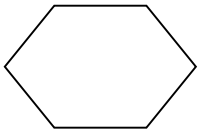
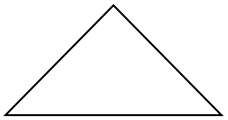
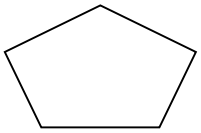
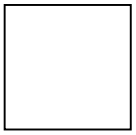
3. 

   a. octagon - irregular
   b. octagon - regular
   c. decagon - irregular
   d. decagon – regular

4.

a. octagon - regular
b. heptagon - regular
c. pentagon - irregular
d. decagon - irregular

5. Which of the following is a **REGULAR POLYGON?**

a. 
c. 
b. 
d. 

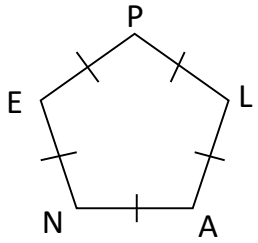
6. Which is a 3- sided regular polygon?
   a. scalene triangle
   b. isosceles triangle
   c. equilateral triangle
   d. obtuse triangle

For items 7 and 8, please consider the given below.

Given: PLANE is a regular polygon.

The measure of $\overline{PL}$ is 4 cm

The measure of $\angle N = 108°$



7. Which could be the measure of line segment PE?
   a. 2 cm b. 4 cm c. 6 cm d. 12 cm

8. What is the possible measure of $\angle L$?
   a. 54° b. 100° c. 108° d. 120°

For item 9, please refer to the situation below.

Eric measured the angles of a hexagon.
The table at the right shows the measures of the internal angles of the hexagon.
He also measured the sides of the hexagon and found them to be equal.

Angles	Measure
∠A	120°
∠B	120°
∠C	120°
∠D	120°
∠E	120°
∠F	120°

9. What can be concluded about the hexagon?
   a. It is a regular polygon because all angles are equal and all sides are equal.

   b. It is a regular polygon because it has a pair of congruent angles.

   c. It is an irregular polygon because all angles measure 120°.

   d. It is an irregular polygon because all angles measure less than 180°.

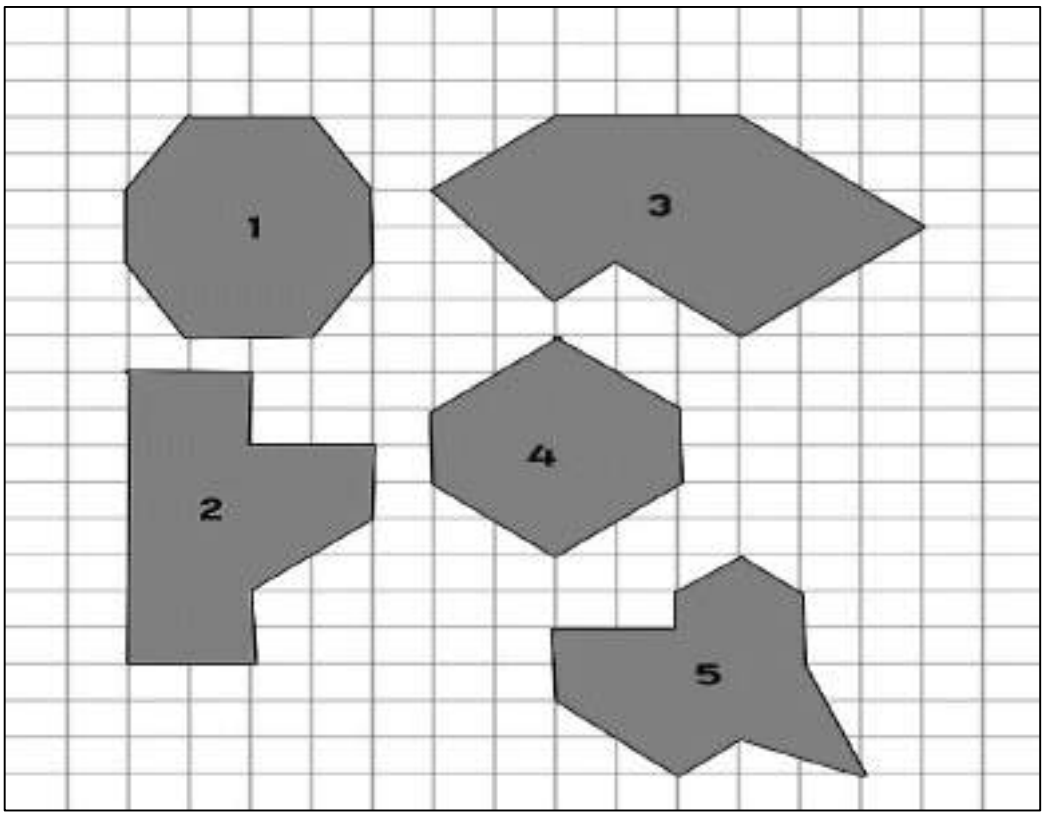
10. A regular hexagon has a perimeter of 42cm. How long is its side?
    a. 6 cm b. 7 cm c. 14 cm d. 21 cm

Congratulations! Just one more activity and you are done with this module.

Good luck!

Additional Activities

Directions: Name each polygon inside the grid paper. Tell whether it is a regular or an irregular polygon.



Answer Key

What I Know

6. B	6. D
7. C	7. C
8. A	8. A
9. B	9. A
10. D	10. D

What's In

6. Pentagon
7. Hexagon
8. Heptagon
9. Octagon
10. Undecagon

What's More

Activity 1:

1. Equilateral Triangle
2. Trapezoid
3. Regular Hexagon
4. Isosceles triangle
5. Square

Activity 2:

1. 3 sides – triangle – regular
2. 5 sides – pentagon – irregular
3. 12 sides – dodecagon – regular
4. 6 sides – hexagon – irregular
5. 7 sides – heptagon – regular

Activity 3:

1. Irregular hexagon
2. Regular dodecagon
3. Irregular octagon
4. Regular pentagon
5. Irregular octagon

What I Have Learned

1. Polygons
2. Line Segments
3. Sides
4. Trapezoids
5. Regular Polygons
6. Squares
7. Regular Pentagon
8. Irregular Polygons
9. Irregular Octagons
10. Equilateral Triangle

What I Can Do

Answers vary but the polygons must be regular polygon

Assessment

1. D	6. C
2. A	7. B
3. C	8. C
4. B	9. A
5. D	10. B

Additional Activities

1. Octagon - Irregular
2. Octagon - Irregular
3. Heptagon - Irregular
4. Hexagon - Irregular
5. Decagon - Irregular

References

K to 12 Grade 5 Curriculum Guide, p 61, Lesson Guide in Elementary Mathematics 5, p. 354-357

2011-2021, (., n.d. *Properties of Polygons | Skills You Need*. [online] Skillsyouneed.com. Available at: <https://www.skillsyouneed.com/num/polygons.html> [Accessed 4 March 2021].

The School Run. n.d. *What are regular and irregular shapes?* [online] Available at: <https://www.theschoolrun.com/what-are-regular-and-irregular-shapes> [Accessed 4 March 2021].

Math Only Math. n.d. *Regular and Irregular Polygon | Examples of Irregular and Regular Polygon*. [online] Available at: <https://www.math-only-math.com/regular-and-irregular-polygon.html> [Accessed 4 March 2021].

For inquiries or feedback, please write or call:

Department of Education - Bureau of Learning Resources (DepEd-BLR)

Ground Floor, Bonifacio Bldg., DepEd Complex
Meralco Avenue, Pasig City, Philippines 1600

Telefax: (632) 8634-1072; 8634-1054; 8631-4985

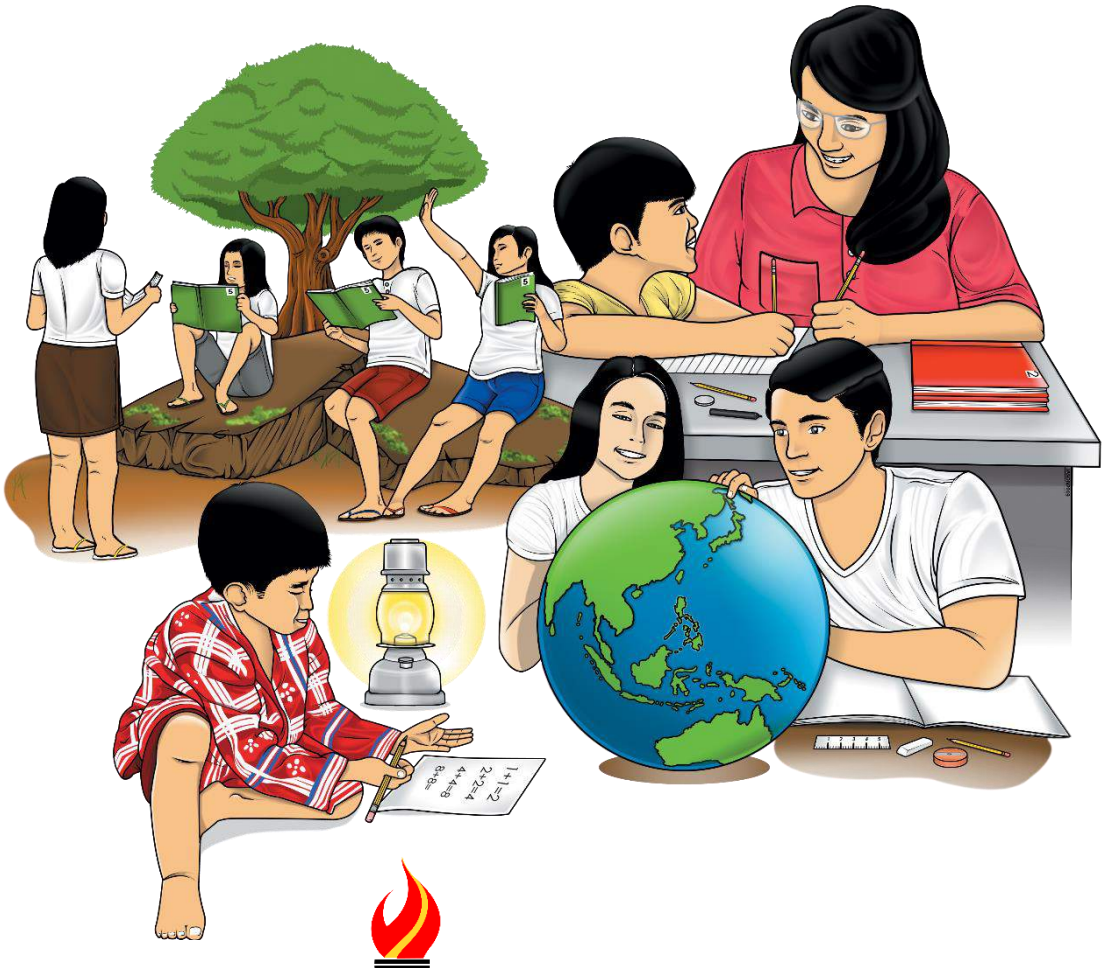
Email Address: blr.lrqad@deped.gov.ph * blr.lrpd@deped.gov.ph

5

DepED
DEPARTMENT OF EDUCATION

Mathematics

Quarter 3 – Module 8:
Visualizing Congruent Polygons



ALTERNATIVE DELIVERY MODE
ADM

GOVERNMENT PROPERTY
NOT FOR SALE

Mathematics – Grade 5
Alternative Delivery Mode
Quarter 3 – Module 8: Visualizing Congruent Polygons
First Edition, 2020

Republic Act 8293, section 176 states that: No copyright shall subsist in any work of the Government of the Philippines. However, prior approval of the government agency or office wherein the work is created shall be necessary for exploitation of such work for profit. Such agency or office may, among other things, impose as a condition the payment of royalties.

Borrowed materials (i.e., songs, stories, poems, pictures, photos, brand names, trademarks, etc.) included in this module are owned by their respective copyright holders. Every effort has been exerted to locate and seek permission to use these materials from their respective copyright owners. The publisher and authors do not represent nor claim ownership over them.

Published by the Department of Education
Secretary: Leonor Magtolis Briones
Undersecretary: Diosdado M. San Antonio

Development Team of the Module

Writers: Ma. Alma M. Galitan

Editors: Niann L. Atis

Reviewers: Renato S. Cagomoc, Rolando Lacbo, Joshua Sherwin T. Lim, Ramil A. Tan, Robert C. Guira

Illustrator: Noel E. Sagayap

Layout Artist: Razle L. Jabelo, Emmanuel S. Gimena Jr.

Management Team: Ma. Gemma M. Ledesma
Arnulfo R. Balane
Rosemarie M. Guino
Joy B. Bihag
Ryan R. Tiu
Sarah S. Cabaluna
Thelma Cabadsan-Quitalig
Elena S. De Luna
Renato S. Cagomoc
Noel E. Sagayap
Geraldine P. Sumbise
Joshua Sherwin T. Lim

Printed in the Philippines by _____

Department of Education – Region VIII

Office Address: DepEd Regional Office No. 8, Candahug, Palo, Leyte
Telefax: (053)-832- 2997
E-mail Address: region8@deped.gov.ph

5

Mathematics

Quarter 3 – Module 8:
Visualizing Congruent Polygons

DepED
DEPARTMENT OF EDUCATION

Introductory Message

This Self-Learning Module (SLM) is prepared so that you, our dear learners, can continue your studies and learn while at home. Activities, questions, directions, exercises, and discussions are carefully stated for you to understand each lesson.

Each SLM is composed of different parts. Each part shall guide you step-by-step as you discover and understand the lesson prepared for you.

Pre-tests are provided to measure your prior knowledge on lessons in each SLM. This will tell you if you need to proceed on completing this module or if you need to ask your facilitator or your teacher's assistance for better understanding of the lesson. At the end of each module, you need to answer the post-test to self-check your learning. Answer keys are provided for each activity and test. We trust that you will be honest in using these.

In addition to the material in the main text, Notes to the Teacher are also provided to our facilitators and parents for strategies and reminders on how they can best help you on your home-based learning.

Please use this module with care. Do not put unnecessary marks on any part of this SLM. Use a separate sheet of paper in answering the exercises and tests. And read the instructions carefully before performing each task.

If you have any questions in using this SLM or any difficulty in answering the tasks in this module, do not hesitate to consult your teacher or facilitator.

Thank you.

What I Need to Know

Good day Mathletes! The idea of equality in numbers is now extended to figures and this is referred to as congruence. You can see congruent figures all around us. Go to a grocery and what do you see? Packs of drinks are of uniform shapes and sizes. In this module, you are going to understand and visualize congruent polygons. You will learn what makes shapes or plane figures congruent.

After going through this module, you are expected to:

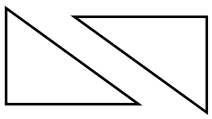
1. visualize congruent polygons.

Before you begin the lesson, first, let us check what you know about congruent polygons.

What I Know

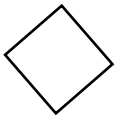
A. Directions: Write the letter of your choice of answer on a separate sheet of paper.

1. When are two figures congruent?
   A. They are both line segments.
   B. They have the same size.
   C. They have the same shape.
   D. They have the same size and shape.

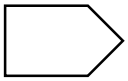
2.  Are these two triangles congruent?
   A. No
   B. Yes
   C. Maybe
   D. Never

3. In congruent figures, the corresponding sides are congruent, and the corresponding angles are _____.
   A. congruent
   B. complementary
   C. non-congruent
   D. supplementary

4. Among the figures below, which one is most likely to be congruent to ?

A. 

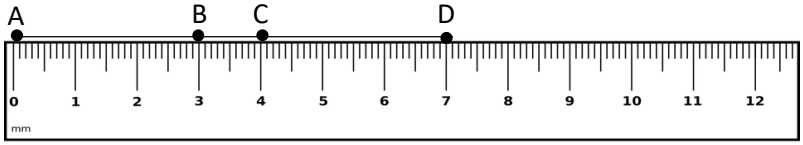
B.

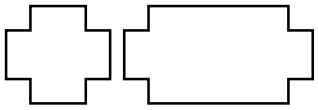
C. 

D.

5. Matching sides are called _____ sides.
   A. equal
   B. opposite
   C. congruent
   D. corresponding

6. Which two-line segments are congruent in the figure?
   A. $\overline{AB}$ and $\overline{BC}$
   B. $\overline{AB}$ and $\overline{AC}$
   C. $\overline{BC}$ and $\overline{BD}$
   D. $\overline{AC}$ and $\overline{BD}$



7.  Are these figures congruent?

A. No
B. Yes
C. Maybe
D. Never

8. How do you call this given pair of triangles?

A. congruent
B. corresponding
C. non-congruent
D. same triangle

9. Which of the following is **TRUE** for any two congruent polygons?

A. Their areas are equal.
B. Their perimeters are equal.
C. They can be made to fit together when superimposed.
D. All of the above

10. Which of the following is a pair of congruent polygons?

A. Any two right triangles
B. Any two isosceles triangles
C. Any two rectangles
D. None of these

Lesson 1 Visualizing Congruent Polygons

Two polygons are congruent if and only if their corresponding sides and angles are congruent. Thus, polygons that have the same size and shape are congruent. Success in completing this module shows that you have understood what polygons are, their types, their properties and when they are congruent. Learning about polygons does not just end in the identification of shapes, sizes and properties. Knowledge on visualizing congruent polygons has an important role in our daily living such as the awareness of its presence in nature, in art, in human-built structures and its other applications all around us.

Are you ready to learn? Let's explore the lesson.

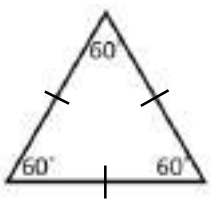
What's In

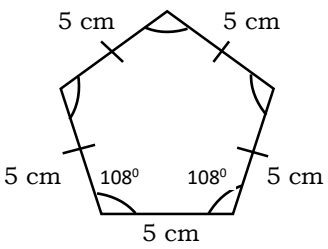
Before we go further on visualizing congruent polygons, let us review the previous lesson. Let's check if you can still remember how to describe and compare properties of regular and irregular polygons.

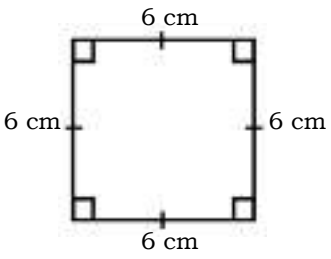
Regular Polygon

- It is a polygon that is both equilateral and equiangular. **Equilateral** means all sides have equal measures. **Equiangular** means all angles have equal measures.
- A **square** is a regular polygon because all of its angles are right angles and all of its sides have equal measures.

Examples of regular polygon

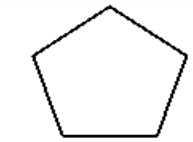




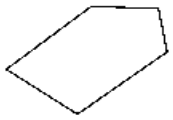


A "Regular Polygon" has:

- all **sides** equal and
- all **angles** equal.



Regular Pentagon



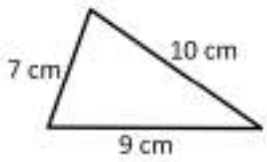
Irregular Pentagon

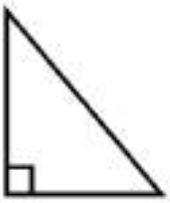
Otherwise, it is **irregular**.

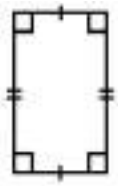
Irregular Polygon

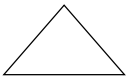
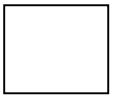
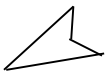
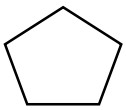
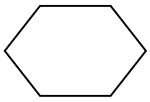
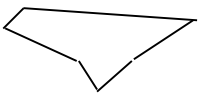
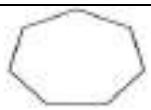
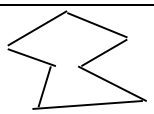
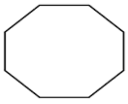
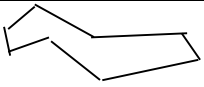
- It is a polygon that has sides with different measures and has angles with different measures.
- A rectangle is an irregular polygon because all of its angles are right angles, but not all of its sides have the same measures.

Examples of irregular polygon







Polygon/Shape	Regular	Irregular
Triangle		
Quadrilateral		
Pentagon		
Hexagon		
Heptagon		
Octagon		

What's New

In the previous module, you were taught how to describe and compare the properties of polygons (regular and irregular polygons). This module is going to teach and guide you how to visualize congruent polygons.

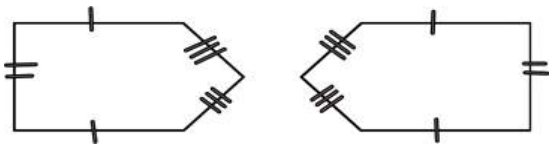
Always remember that the word "***congruent***" is defined as "identical in form; coinciding exactly when superimposed." The origin of the word "congruent" is from the Latin to "agree" or "to meet together".

Congruent polygons are exactly the same size and exactly the same shape. All of their sides have the same length and all of their angles have the same measure.

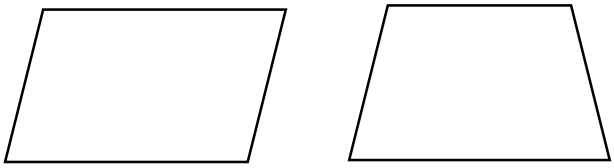
Example 1:

Study the following figures. What can you say about each set of figures?

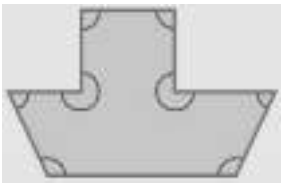
Set A:



Set B:



Set C:



Set D:

What is It

In our everyday encounter with objects, structures, shapes and figures, we can observe polygons in them in different forms, colors and sizes. Understanding how to visualize congruent polygons is easy when you have also mastered the skill on visualizing, naming and describing polygons with 5 sides or more as well as on describing and comparing properties of regular and irregular polygons.

Polygons are congruent if they are equal in all respects: same number of sides; all corresponding sides have the same length; and all corresponding interior angles have the same measure.

Intuitively, **congruent figures** are of the same size and shape. It is possible to **turn, flip and/or slide** one figure so it will fit exactly on the other figure. The **areas** of congruent figures are **equal**. The **perimeters** of congruent figures are **equal**. The **corresponding angles** of congruent figures are **equal in measure**. The **corresponding line segments** of congruent figures are **equal in length**.

Congruent Figures

- These are pairs of figures which have exactly the same size and shape.
- These figures have equal measures for all the sides and angles.

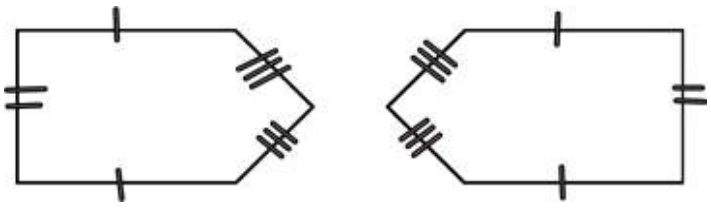
Congruent Polygons

- Two polygons are congruent if their corresponding sides and angles are congruent.

Let's consider the polygons shown above.

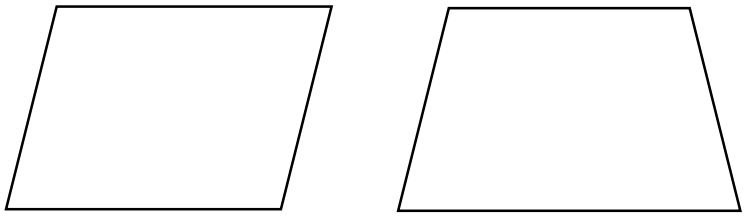
Congruent polygons

Set A:



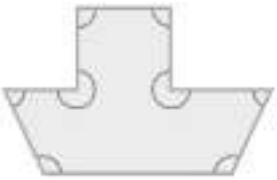
Not Congruent polygons

Set B:



Not Congruent polygons

Set C:

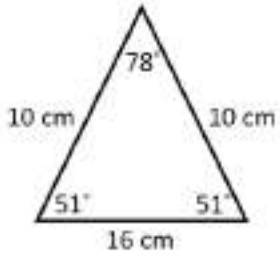


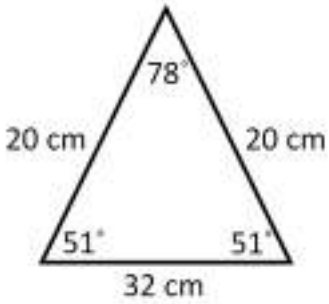
Not Congruent polygons

Set D:

Identify whether the following are congruent polygons.

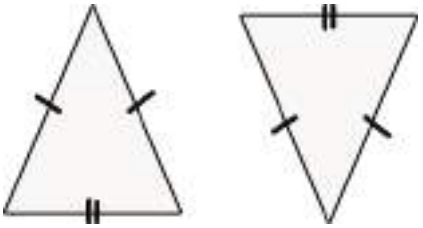
1.





The two triangles have equal measures of angles. However, notice that the measures of their sides are not equal. This means that the two triangles are not congruent.

2.



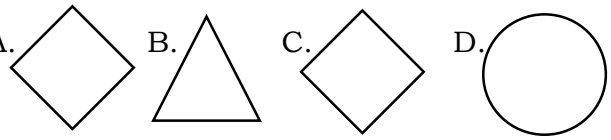
The tick marks indicate that the corresponding sides of the two triangles are congruent. The second triangle is just a rotated version of the first triangle. Therefore, the triangles are congruent

What's More

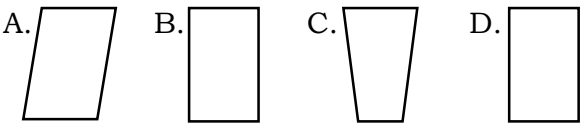
Activity 1: Find My Pair!

Directions: Identify the figures that appear to be congruent. Write your answer on a separate sheet of paper.

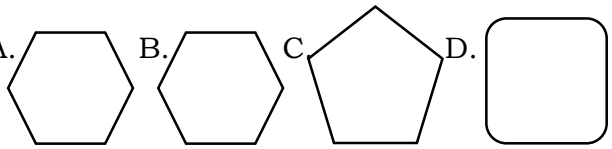
1. A. B. C. D.



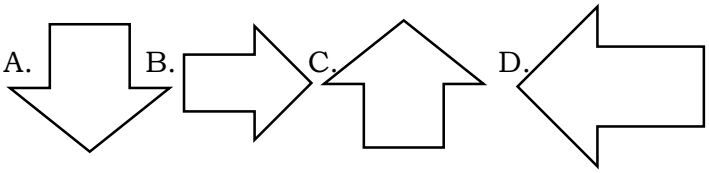
2. A. B. C. D.



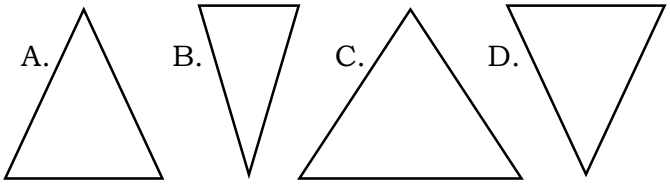
3. A. B. C D.



4. A. B. C. D.



5. A. B. C. D.



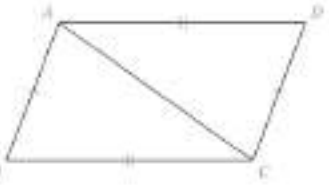
Activity 2: Be True to Me!

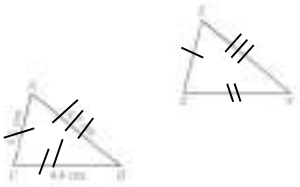
Directions: Identify whether the statement is True or False. Write your answer on a separate sheet of paper.

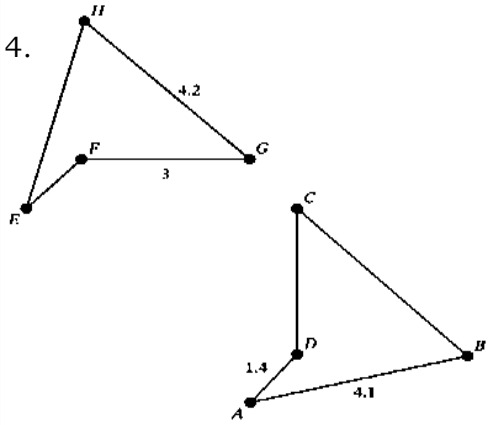
1. Congruent polygons have the same shape and size.
2. The shape and size are not considered in congruent polygons.
3. The two congruent polygons must fit on one another.
4. In congruent polygons, their corresponding angles and sides are congruent.
5. The color of the polygons is not considered in deciding whether two polygons are congruent.

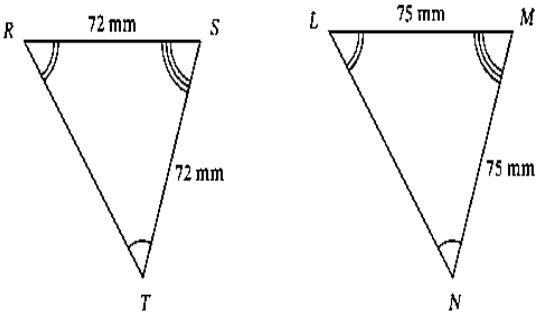
Activity 3: Yes or No!

Directions: For items 1 -4: Analyze the given polygons if they are congruent or not. Write Yes or No only for your answers. Write your answer on a separate sheet of paper.

1. 

2. 

4. 

3. 

5. Are two polygons congruent if their corresponding sides have the same length?

What I Have Learned

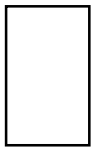
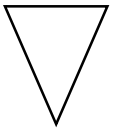
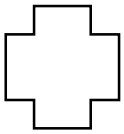
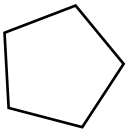
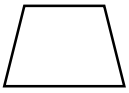
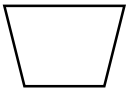
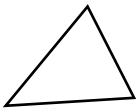
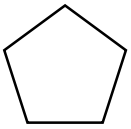
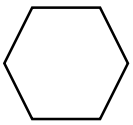
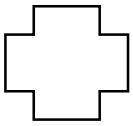
Directions: Fill in the blanks with the correct word or group of words to make the statement complete. Write your answer on a separate sheet of paper.

(1)_____ are congruent if, (2)_____ have the same (3)_____ and (4)_____. Tracing one perfectly (5)_____ the other, their corresponding (6)_____ and sides are (7)_____. All corresponding sides have the (8)_____ length; and all corresponding (9)_____ have the same (10)_____.

Good job! Just keep going.

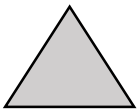
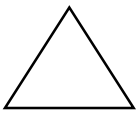
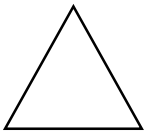
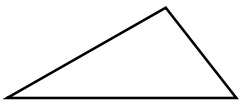
What I Can Do

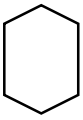
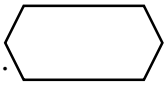
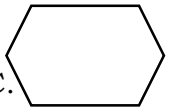
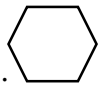
Directions: Match the polygons in both columns that are most likely to be congruent. Write your answer on a separate sheet of paper.

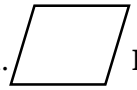
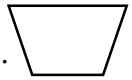
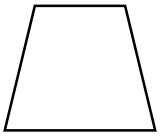
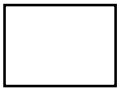
Column A	**Column B**
1. 	a. 
2. 	b. 
3. 	c. 
4. 	d.
5. 	e. 
	f. 

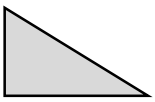
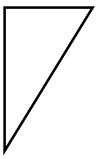
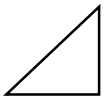
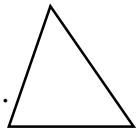
Assessment

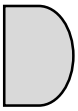
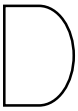
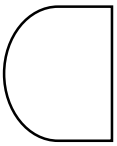
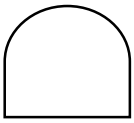
A. **Directions:** Choose the figure that is likely to be congruent to the given figure. Write your answer on a separate sheet of paper.

1.  A. B.  C.  D. 

2. A.  B.  C.  D. 

3. A.  B.  C.  D. 

4.  A.  B. C.  D. 

5.  A.  B.  C.  D.

B. **Directions:** Construct the pair of polygons being described. Write your answer on a separate sheet of paper.

1. equiangular triangles

2. rhombuses with 15-decimeter sides

3. right triangles with side lengths 6 cm, 8 cm, and 10 cm.

4. isosceles triangles - in each triangle, the congruent sides measure 12 cm each.

5. squares with 20-centimeter sides

Answer Key

What's More

Activity 2

6. True
7. False
8. True
9. True
10. True

Activity 1

1. A & C
2. B & D
3. A & B
4. A & C
5. A & D

What I Know

1. D
2. B
3. A
4. A
5. D
6. D
7. A
8. A
9. D
10. D

What I Can Do

1. D
2. F
3. C
4. A
5. B

What I Have Learned

1. Polygons
2. Both/They
3. Shape
4. Size
5. Fits
6. Angles
7. Congruent
8. Same
9. Interior
10. Measure

What's More

Activity 3

1. Yes
2. Yes
3. No
4. No
5. No

Assessment

A.

1. B
2. D
3. B
4. A
5. A

B.

1.

2.

3.

4.

5.

References

"Congruent Polygons: Definition & Examples." Study.com. Accessed March 3, 2021. https://study.com/academy/lesson/congruent-polygons-definition-examples.html.

Lumbre, U., Placer, B., & Sy, Jr., S. (2016). *21st Century Mathletes Textbook.* Vibal Group Inc. s

Donna Roberts and , Frederick Roberts. Concept of Congruence - MathBitsNotebook(Geo - CCSS Math). Accessed March 3, 2021. https://mathbitsnotebook.com/Geometry/CongruentTriangles/CTConcept.html.

Foundation, CK-12. "12 Foundation." CK. Accessed March 3, 2021. https://www.ck12.org/book/ck-12-middle-school-math-concepts-grade-8/section/6.10/.

For inquiries or feedback, please write or call:

Department of Education - Bureau of Learning Resources (DepEd-BLR)

Ground Floor, Bonifacio Bldg., DepEd Complex
Meralco Avenue, Pasig City, Philippines 1600

Telefax: (632) 8634-1072; 8634-1054; 8631-4985

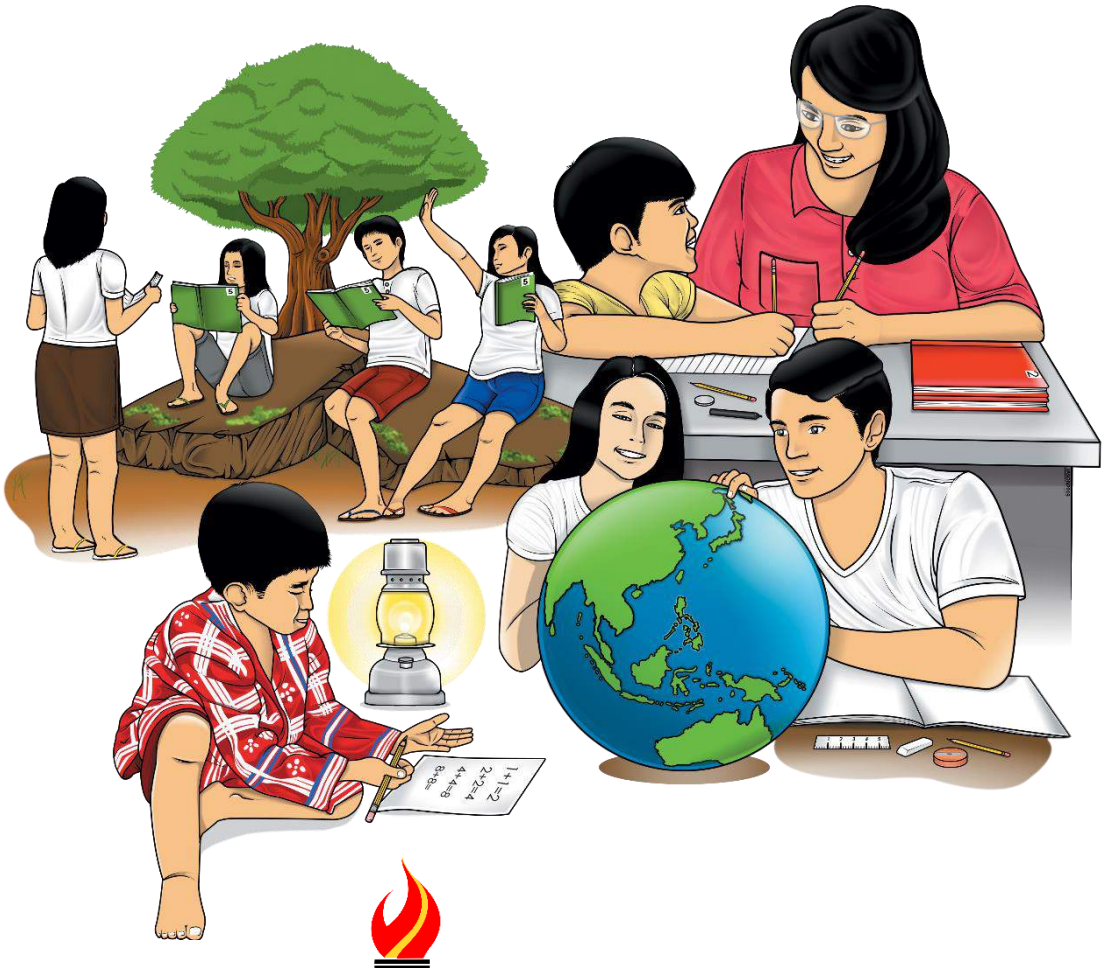
Email Address: blr.lrqad@deped.gov.ph * blr.lrpd@deped.gov.ph

5

DepED
DEPARTMENT OF EDUCATION

Mathematics

Quarter 3 – Module 9: Identify the Terms Related to a Circle



ALTERNATIVE DELIVERY MODE
ADM

GOVERNMENT PROPERTY
NOT FOR SALE

Mathematics – Grade 5
Alternative Delivery Mode
Quarter 3 – Module 9: Identify the Terms Related to a Circle
First Edition, 2020

Republic Act 8293, section 176 states that: No copyright shall subsist in any work of the Government of the Philippines. However, prior approval of the government agency or office wherein the work is created shall be necessary for exploitation of such work for profit. Such agency or office may, among other things, impose as a condition the payment of royalties.

Borrowed materials (i.e., songs, stories, poems, pictures, photos, brand names, trademarks, etc.) included in this module are owned by their respective copyright holders. Every effort has been exerted to locate and seek permission to use these materials from their respective copyright owners. The publisher and authors do not represent nor claim ownership over them.

Published by the Department of Education
Secretary: Leonor Magtolis Briones
Undersecretary: Diosdado M. San Antonio

Development Team of the Module

Writers: Ma. Alma Galitan and Danilo S. Jadulco

Editors: Norman E. Sagayap, Gina P. Diloy

Reviewers: Renato S. Cagomoc, Rolando Lacbo, Joshua Sherwin T. Lim

Layout Artist: Razle L. Jabelo, Maelyne L. Yambao

Management Team: Ma. Gemma M. Ledesma
Arnulfo B. Balane
Rosemarie M. Guino
Joy B. Bihag
Ryan R. Tiu
Sarah S. Cabaluna
Thelma Cabadasan-Quitalig
Elena S. De Luna
Renato S. Cagomoc
Noel E. Sagayap
Geraldine P. Sumbise,
Joshua Sherwin T. Lim

Printed in the Philippines by _____

Department of Education – Region VIII

Office Address: Deped Regional Office No. 8
Candahug, Palo, Leyte
Telefax: (053)-832-2997
E-mail Address: region8@deped.gov.ph

5

Mathematics

Quarter 3 – Module 9: Identify the Terms Related to a Circle

DepED
DEPARTMENT OF EDUCATION

Introductory Message

This Self-Learning Module (SLM) is prepared so that you, our dear learners, can continue your studies and learn while at home. Activities, questions, directions, exercises, and discussions are carefully stated for you to understand each lesson.

Each SLM is composed of different parts. Each part shall guide you step-by-step as you discover and understand the lesson prepared for you.

Pre-tests are provided to measure your prior knowledge on lessons in each SLM. This will tell you if you need to proceed on completing this module or if you need to ask your facilitator or your teacher's assistance for better understanding of the lesson. At the end of each module, you need to answer the post-test to self-check your learning. Answer keys are provided for each activity and test. We trust that you will be honest in using these.

In addition to the material in the main text, Notes to the Teacher are also provided to our facilitators and parents for strategies and reminders on how they can best help you on your home-based learning.

Please use this module with care. Do not put unnecessary marks on any part of this SLM. Use a separate sheet of paper in answering the exercises and tests. And read the instructions carefully before performing each task.

If you have any questions in using this SLM or any difficulty in answering the tasks in this module, do not hesitate to consult your teacher or facilitator.

Thank you.

What I Need to Know

A lot of objects around us are circular in shape such as coins, plates, and wheels. This module is essential for you to understand the terms related to a circle. These terms are easy to remember and very useful in our daily life.

After going through this module, you are expected to:

- Identify the terms related to a circle.

What I Know

Good day to you! This part of the module aims to find out how much you know about the contents of this module.

Multiple Choice

Directions: Read each item carefully. Choose the letter of the correct answer and write it on a separate answer sheet.

1. What is a line segment joining any two points on the circle?
   a. chord b. center c. diameter d. radius

2. Which of the following parts of a circle measures less than a semi-circle?
   a. minor arc b. major arc c. inscribed angle d. central angle

3. What do you call a chord that passes through the center of the circle?
   a. diameter b. circumference c. radius d. arc

4. Which refers to the distance around the circle?
   a. perimeter b. circumference c. diameter d. central angle

5. What is a line segment that connects the center and any point on the circle?
   a. arc b. chord c. radius d. diameter

6. What do you call two or more circles sharing the same center?
   a. equal b. congruent c. similar d. concentric

7. What is half of a circle?
   a. Arc b. semicircle c. central angle d. major arc

8. Which part of a circle measures more than 180 ^{o}?
   a. diameter b. semicircle c. minor arc d. major arc

9. What do you call the intersection of the circle and tangent line?
   a. diameter b. point of tangency c. radius d. center

10. Which line contains a chord of a circle?
   a. tangent line b. diameter c. secant line d. radius

Please check your answers against the ANSWER KEY on page 10.

CONGRATULATIONS! If you got a score of 9 or 10, you should not have any difficulty studying the lesson in this module. If you got a score of 8 or below, you may need to study the lesson more carefully and do all the given activities.

Lesson 1 Identify the Terms Related to a Circle

What's In

There are many circular objects around us. Can you identify them? An object's shape meets a specific purpose. Can you tell why the rim of a cup is a circle, why plugs and manhole covers are round or why the bottoms of pans are circular?

Directions: Identify circular objects in the real world by matching the object in column A to its name in column B. Writer the letter of your answer on a separate answer sheet.

A		B
1.		a. Php 10 coin
2.		b. plate
		c. cymbals
3.		d. wall clock
4.		e. frying pan
5.		f. wheel

What's New

A circle is one of the most familiar geometric figures. All around us are circular objects such as coins, wheels, watches, plates, balls and the like. A circle's symmetric properties make it a popular choice in architecture and design.

This module will focus on the different parts of the circle.

What is It

A **circle** is the set of all points that are the same distance from a fixed point on a plane called the center. A point is inside, on, or outside of a circle depending on whether its distance from the center is less than, equal to, or greater than the length of a radius, respectively.

Terms Related to a Circle

Point A is the **center** of the circle. A circle is named by its center. The circle in figure 1 is named circle A.

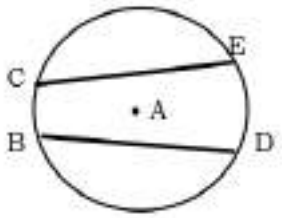


Figure 1

A line segment joining two points on the circle is called a **chord**. In Figure 1, $\overline{CE}$ and $\overline{BG}$ are chords.

A **diameter** of a circle is a chord that connects two points on the circle and passes through the center of the circle. Every diameter is a **chord.** In Figure 2**,** $\overline{BF}$ is a diameter.

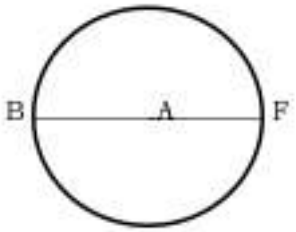
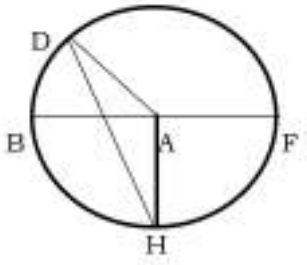


Figure 2



A **radius** is a line segment from the center of the circle to a point on the circle. A radius of the circle is one-half of the diameter. In Figure 3**,** $\overline{AF}$, $\overline{AB}$, $\overline{AH}$ and $\overline{AD}$ are ***radii*** (plural form of radius).

Figure 3

A **chord** is a line segment joining any two points on the circle. In figure 3, $\overline{DH}$ and $\overline{BF}$ are chords. A diameter is a chord.

A ***central angle*** is an angle formed by two radii. In figure 4, ∠BAD, ∠BAH, ∠HAF, and ∠DAF are central angles.

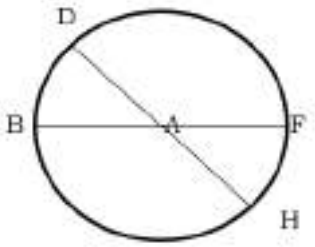


Figure 4

An ***inscribed angle*** is an angle whose vertex is on the circle. In figure 5,

∠FBG is an inscribed angle.

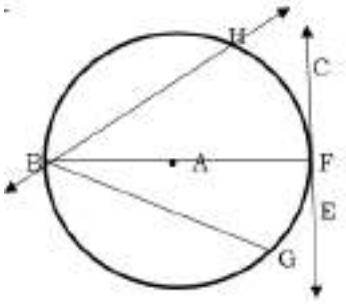


Figure 5

An **arc** is a part of the circle**.** In figure 5, you can find arc BG **(in symbol $\widehat{BG}$),** arc BF, arc FG, and arc BFG.

A **semicircle** is an arc which is half of the circle. In figure 5, $\widehat{BGF}$ is a semicircle.

A **minor arc** is an arc that is less than a semi-circle. In figure 5, $\widehat{FG}$ and , $\widehat{BG}$ are minor arcs.

A **major arc** is an arc that is more than a semi-circle. In figure 5, arc BFG and arc FBG are major arcs.

A **tangent line** is a line that intersects the circle at exactly one point. The point where the circle and tangent line intersect is called the **point of tangency**. In figure 5, line CE is a tangent line. Point F is the point of tangency.

A **secant line** is a line that intersects the circle at two points. In figure 5, line BH is a secant line.

Concentric circles are circles having the same center point. Figure 6 shows two concentric circles.

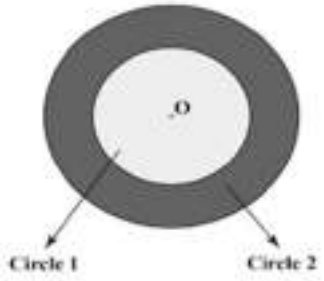


Figure 6

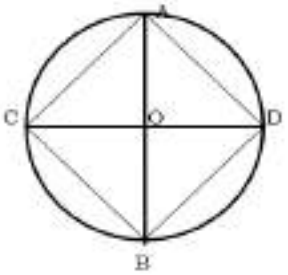
Did you understand now? Very good.

Now, you are ready to do the activity below

Activity 1: What's My Name

Directions: Read each question carefully. Name the following based on the figure at the right.

1) center
2) 4 radii
3) 2 diameters
4) 3 chords
5) 2 inscribed angles



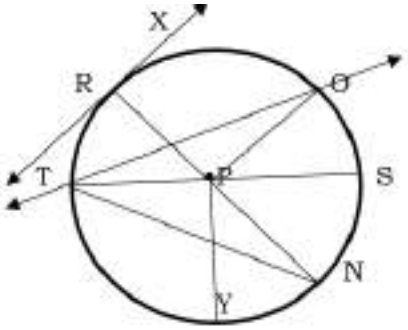
What's More

Let's enhance your understanding of the parts of the circle by doing the next activity.

Activity 2 Name Me

Directions: Name the following parts of circle P. Write your answer on a separate answer sheet.

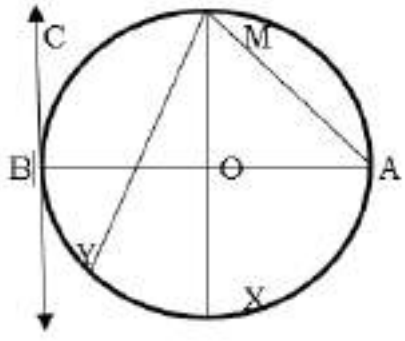
1) 3 radii
2) diameter
3) 3 chords
4) 2 central angles
5) tangent line
6) secant line
7) 2 inscribed angles



Activity 3 Identify Me

Directions: Identify the following parts of Circle O. Write your answer on a separate answer sheet.

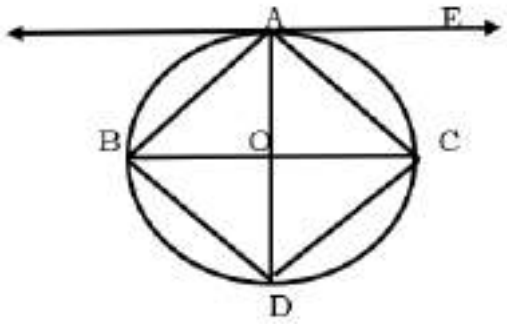
1) $\overline{OX}$
2) $\overleftrightarrow{BC}$
3) Pt. B
4) Pt. O
5) $\angle AMY$
6) $\angle MOA$
7) $\overline{AM}$



Activity 4 Match - Up

Directions: Refer to the figure shown. Match the parts of Circle O in Column A with the name of each part in Column B. Write your answer on a separate answer sheet.

Column A	Column B
1) Point A	a. center
2) $\overline{AD}$, $\overline{BC}$	b. radius
3) $\overline{AB}$, $\overline{AC}$, $\overline{BD}$, $\overline{CD}$	c. diameter
4) ∠ABD, ∠BAC, ∠ACD, ∠BDC	d. chord
5) ∠AOC, ∠COD, ∠BOD, ∠AOB	e. inscribed angle
6) $\overleftrightarrow{AE}$	f. point of tangency
7) $\overline{OB}$, $\overline{OC}$, $\overline{OA}$, $\overline{OD}$	g. central angle
	h. tangent line



What I Have Learned

Activity 5 Identify Me

Directions: Choose the correct answer from the words inside the box and write your answers on a separate sheet.

Circle	Radius	Diameter	Tangent line	Secant
Center	Inscribed angle	Chord	Central angle	

_____1) It is the set of all points in a plane with the same distance from a certain point.

_____2) It is a line segment joining two points on the circle.

_____3) It is a chord that connects two points on the circle and passes through the center of the circle.

_____4) It is a line segment from the center of the circle to any point on the circle.

_____5) It is an angle formed by two radii.

What I Can Do

Activity 6 Hunt Me

Directions: Copy the puzzle below on your answer sheet. Encircle the 10 words that are related to circle. The words may be written horizontally, vertically or diagonally. Find the words that are shown inside the box.

CIRCLE	RADII	INSCRIBED	CHORD	ANGLE
ARC	MINOR	MAJOR	POINT	DIAMETER

I	**A**	**A**	**R**	**A**	**D**	**I**	**I**	**S**	**V**	**A**	**R**	**C**
N	**L**	**N**	**M**	**N**	**A**	**B**	**C**	**D**	**R**	**X**	**Y**	**I**
S	**P**	**G**	**L**	**I**	**N**	**E**	**I**	**G**	**O**	**B**	**X**	**R**
C	**O**	**L**	**C**	**B**	**N**	**E**	**U**	**E**	**J**	**C**	**N**	**C**
R	**I**	**E**	**A**	**T**	**X**	**O**	**L**	**C**	**A**	**N**	**I**	**L**
I	**N**	**I**	**E**	**B**	**S**	**C**	**R**	**D**	**M**	**E**	**N**	**E**
B	**T**	**R**	**D**	**I**	**A**	**M**	**E**	**T**	**E**	**R**	**R**	**E**
E	**E**	**A**	**A**	**I**	**N**	**M**	**I**	**I**	**T**	**T**	**T**	**X**
D	**A**	**S**	**C**	**R**	**X**	**C**	**H**	**O**	**R**	**D**	**A**	**H**
E	**B**	**C**	**A**	**S**	**T**	**N**	**M**	**S**	**Y**	**X**	**I**	**N**

Assessment

Multiple Choice

Directions: Read each item carefully. Choose the letter of the correct answer and write it on a separate answer sheet.

1. What part of a circle measures more than half a circle?
   a. diameter b. major arc c. 3minor arch d. semicircle

2. What do you call the intersection of a circle and the tangent line?
   a. Center b. point of tangency c. radius d. arc

3. How many degrees are in a circle?
   a. 90° b. 180° c. 270° d. 360°

4. Which refers to the distance around the circle?
   a. central angle b. circumference c. diameter d. perimeter

5. Which do you call two or more circles sharing the same center?
   a. equal b. congruent c. similar d. concentric

6. What is a line segment that connects the center and any point on the circle?
   a. arc b. chord c. radius d. diameter

7. What is half of a circle?
   a. arc b. semicircle c. major arc d. central angle

8. What is a line segment that joints any two points on the circle?
   a. chord b. center c. diameter d. circumference

9. Which of the following measures less than a semicircle?
   a. center b. major arc c. minor arc d. tangent line

10. What do you call a chord that passes through the center of the circle?
    a. arc b. radius c. diameter d. circmference

Please check your answers with the ANSWER KEY on page 10.

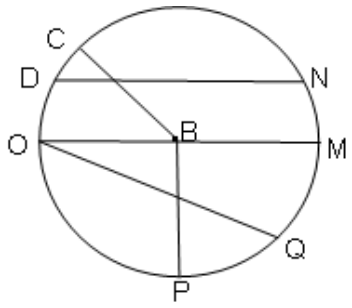
Got a score of 9-10? CONGRATULATIONS! Job well done.
See you in the next module. If you scored below 9, you may have to go over the lessons and the exercises again.

Additional Activities

Answer this activity as an additional exercise.

Directions: Identify the following parts of circle B answer and write it on a separate answer sheet.

a. center: _____
b. 4 radii: _____
c. diameter: _____
d. 4 central angles: _____
e. 3 chords: _____
f. 2 minor arcs
g. 2 major arcs



Answer Key

What I Know

6. A	6. D
7. A	7. B
8. A	8. D
9. C	9. B
10.C	10. C

What is It

Activity 1: What's My Name

1. Pt. O
2. $\overline{CO}$, $\overline{AO}$, $\overline{DO}$, $\overline{BO}$
3. $\overline{CD}$, $\overline{AB}$
4. $\overline{AC}$,$\overline{BC}$ $\overline{BD}$, $\overline{AD}$, $\overline{AB}$, $\overline{CD}$
5. $\angle$ACB, $\angle$CBD, $\angle$ BDA, $\angle$ ACD, $\angle$DCB, $\angle$ABD,$\angle$ ACB, $\angle$ CDA,

Activity 2: Name Me

1. $\overline{PY}$,$\overline{OP}$, $\overline{PR}$, $\overline{NP}$, $\overline{PT}$,$\overline{PS}$
2. $\overline{RN}$, $\overline{ST}$
3. $\overline{NT}$, $\overline{OT}$, $\overline{ST}$, $\overline{RN}$
4. $\angle$RPO, $\angle$OPN, $\angle$NPY, $\angle$OPN, $\angle$RPY, etc
5. $\overleftrightarrow{RX}$
6. $\overleftrightarrow{OT}$
7. $\angle$OTS , $\angle$OTN , $\angle$RNT, $\angle$STN

Activity 3: Identify Me

1. radius	5. Inscribed angle
2. tangent line	6. center
3. point of tangency	7. chords
4. center	

Activity 4: Match - Up

1. F	4. E	7. B
2. C	5. G	
3. D	6. H	

What I Have Learned

Activity 5: Identify Me

1. circle
2. chord
3. diameter
4. radius
5. central angle
6.

Activity 6: Hunt Me

Assessment

1. B	6. C
2. B	7. B
3. D	8. A
4. B	9. C
5. D	10. C

Additional Activities

a. Pt. B

b. $\overline{BC}$, $\overline{BM}$, $\overline{BP}$, $\overline{BO}$

c. $\overline{OM}$

d.. $\angle$CBO, $\angle$OBP, $\angle$CBP, $\angle$CBM, $\angle$MBP

e. $\overline{DN}$, $\overline{OQ}$,$\overline{OM}$

f. $\overline{CD}$, $\overline{DO}$, $\overline{OC}$, $\overline{OP}$, $\overline{PQ}$, $\overline{QM}$, $\overline{NM}$, $\overline{QN}$, $\overline{PN}$,

g. $\overline{OPN}$, $\overline{COQ}$, $\overline{DPQ}$, $\overline{OPC}$, $\overline{PMD}$, $\overline{PMO}$,

References

Lumbre, Angelina P., Ursua, Alvin. C., Placer, Donnel P., Burgos, Jaime R.(2016). *Circle*

and Its Parts.21st Century Matheletes. Vibal Group Inc. pp. 232-235.

For inquiries or feedback, please write or call:

Department of Education - Bureau of Learning Resources (DepEd-BLR)

Ground Floor, Bonifacio Bldg., DepEd Complex
Meralco Avenue, Pasig City, Philippines 1600

Telefax: (632) 8634-1072; 8634-1054; 8631-4985

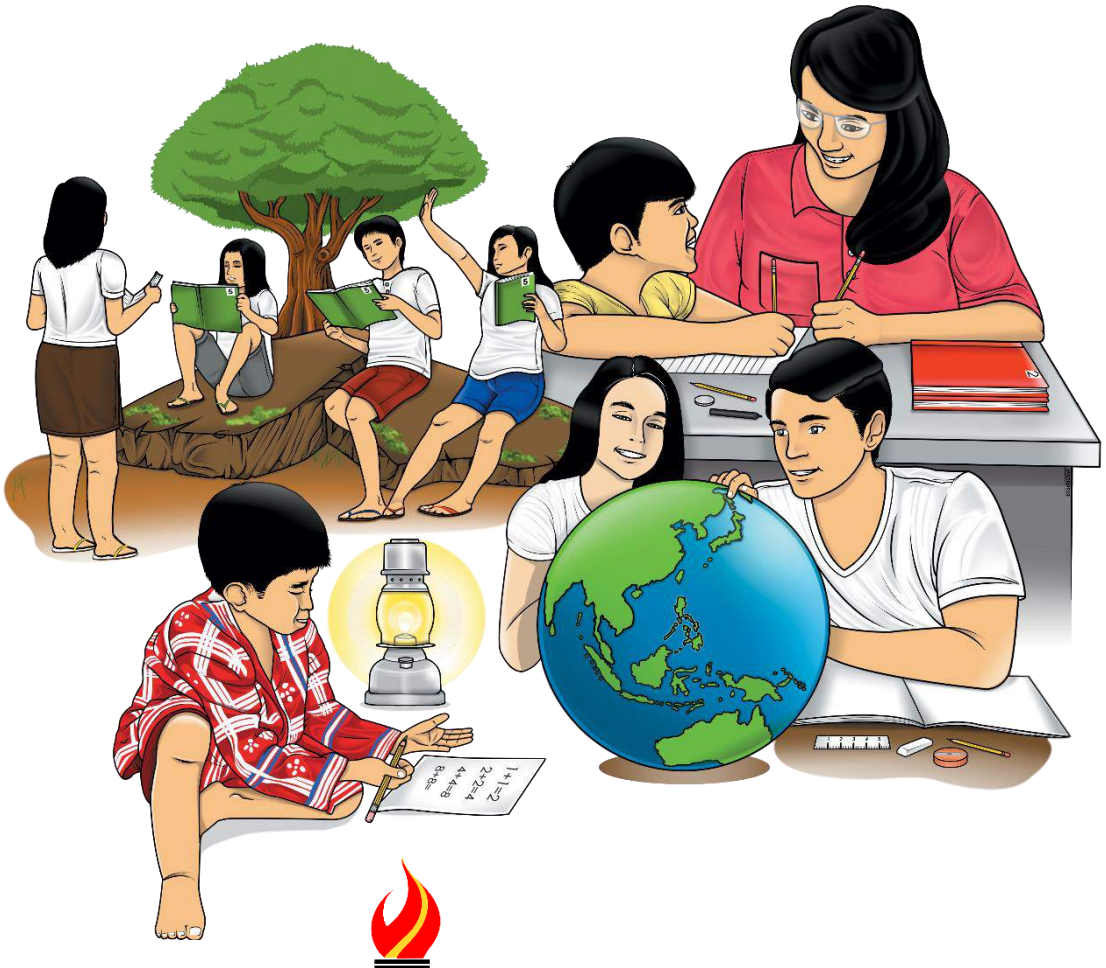
Email Address: blr.lrqad@deped.gov.ph * blr.lrpd@deped.gov.ph

5

DepED
DEPARTMENT OF EDUCATION

Mathematics

Quarter 3 – Module 10:
Drawing Circles with Different Radii Using a Compass



ALTERNATIVE DELIVERY MODE
ADM

GOVERNMENT PROPERTY
NOT FOR SALE

Mathematics – Grade 5
Alternative Delivery Mode
Quarter 3 – Module 10: Drawing Circles with Different Radii Using a Compass
First Edition, 2020

Republic Act 8293, section 176 states that: No copyright shall subsist in any work of the Government of the Philippines. However, prior approval of the government agency or office wherein the work is created shall be necessary for exploitation of such work for profit. Such agency or office may, among other things, impose as a condition the payment of royalties.

Borrowed materials (i.e., songs, stories, poems, pictures, photos, brand names, trademarks, etc.) included in this module are owned by their respective copyright holders. Every effort has been exerted to locate and seek permission to use these materials from their respective copyright owners. The publisher and authors do not represent nor claim ownership over them.

Published by the Department of Education
Secretary: Leonor Magtolis Briones
Undersecretary: Diosdado M. San Antonio

Development Team of the Module

Writers: Danilo S. Jadulco

Editors: Raymond C. Abelis

Reviewers: Renato S. Cagomoc, Rolando Lacbo, Joshua Sherwin T. Lim, Roel Tugas

Illustrator: Jaime E. Sagayap Jr.

Layout Artist: Razle L. Jabelo, Maelyne L. Yambao

Management Team: Ma. Gemma M. Ledesma
Arnulfo B. Balane
Rosemarie M. Guino
Joy B. Bihag
Ryan R. Tiu
Sarah S. Cabaluna
Thelma Cabadasan-Quitalig
Elena S. De Luna
Renato S. Cagomoc
Noel E. Sagayap
Geraldine P. Sumbise,
Joshua Sherwin T. Lim

Printed in the Philippines by _____

Department of Education – Region VIII

Office Address: Deped Regional Office No. 8
Candahug, Palo, Leyte
Telefax: (053)-832-2997
E-mail Address: region8@deped.gov.ph

5

Mathematics

Quarter 3 – Module 10: Drawing Circles with Different Radii Using a Compass

DepED
DEPARTMENT OF EDUCATION

Introductory Message

This Self-Learning Module (SLM) is prepared so that you, our dear learners, can continue your studies and learn while at home. Activities, questions, directions, exercises, and discussions are carefully stated for you to understand each lesson.

Each SLM is composed of different parts. Each part shall guide you step-by-step as you discover and understand the lesson prepared for you.

Pre-tests are provided to measure your prior knowledge on lessons in each SLM. This will tell you if you need to proceed on completing this module or if you need to ask your facilitator or your teacher's assistance for better understanding of the lesson. At the end of each module, you need to answer the post-test to self-check your learning. Answer keys are provided for each activity and test. We trust that you will be honest in using these.

In addition to the material in the main text, Notes to the Teacher are also provided to our facilitators and parents for strategies and reminders on how they can best help you on your home-based learning.

Please use this module with care. Do not put unnecessary marks on any part of this SLM. Use a separate sheet of paper in answering the exercises and tests. And read the instructions carefully before performing each task.

If you have any questions in using this SLM or any difficulty in answering the tasks in this module, do not hesitate to consult your teacher or facilitator.

Thank you.

What I Need to Know

Hello, Mathletes Have you tried drawing a circle on a piece of paper by freehand, meaning without any instrument such as a ruler or a compass? When we draw a circle by freehand, most likely the circle is not perfect. Would you like to draw a perfect circle? In this module, you are going to learn how to do that. You will learn how to draw circles with different radii using a ruler and a compass.

After going through this module, you are expected to:

- Draw circles with different radii using a compass.

What I Know

Good day, everyone! This pretest aims to find out how much you already know about the contents of this module.

A. Directions: Read each item carefully. Write the letter of the best answer on a separate answer sheet.

1. What is the radius of a circle whose diameter is 6 cm?
   a. 3 cm b. 3.5 cm c. 6 cm d. 12 cm

2. A circle's diameter is 10 cm. What is its radius?
   a. 2.5 b. 5 cm c. 10 cm d. 20 cm

3. The side length of a square paper is 40 cm. What is the diameter of the largest circle that can be drawn on the paper?
   a. 5 cm b. 10 cm c. 20 cm d. 40 cm

4. Which of these circles has a radius of 3 cm?
   a. d = 4 cm

   b. d = 5cm

   c. d = 6 cm

   b. d = 7 cm

5. Which of the following is an instrument used to draw a circle?
   a. compass b. protractor c. ruler d. straight edge

6. How many degrees are there when a compass makes a full circle?
   a. 45° b. 90° c. 180° d. 360°
7. In drawing a circle, what instrument can be used to ensure that its diameter is 10 cm?
   a. compass b. protractor c. ruler d. straight edge
8. What part of a circle is twice as long as a radius?
   a. chord b. circumference c. diameter d. secant
9. All of these are used in drawing a circle EXCEPT:
   a. compass b. pencil c. protractor d. ruler
10. Which of these tasks requires the use of a compass?
    a. measuring an angle
    b. drawing a 30° angle
    c. finding the diameter of a circle
    d. drawing concentric circles with 4, 5, and 6 cm radii

B. Directions: With a compass, draw a circle with the indicated radius.

1. 4 cm
2. 5 cm

Check your answers against the answer key on page 15.

CONGRATULATIONS!

If you got a score of 11 or 12, you should not have any difficulty studying the lesson in this module.

If you got a score of 10 or below, you need to study the lesson more carefully and do all the given activities.

Lesson 1 Drawing Circles with Different Radii Using a Compass

A circle can be easily drawn using a compass. A compass is usually made of metal metal or plastic material and consists of two parts connected by a hinge that can be adjusted to change the radius of the circle one wishes to draw.

What's In

In the previous module, you have learned some terms related to the circle.

Circle – Is the set of points in a plane that are equidistant from a given point. A circle is named by its center point, which is usually denoted by a capital letter.

Center – is the point equidistant from the points on the circle.

Radius – is the distance from the center of the circle to any point on the circle. All radii of a particular circle are congruent to each other.

Chord – is a line segment whose endpoints are on the circle.

Diameter – is a chord that passes through the center of the circle. It is also the longest chord of any circle. It is equivalent to two congruent or equal radii.

Secant – is a line that intersects a circle in two points. It is also a line that contains a chord.

Tangent – is a line that intersects the circle at exactly one point.

Point of Tangency – is the point where the tangent line intersects the circle.

Circumference – is the total distance around the circle.

Directions: Refer to the figure at the right. Identify the part of the circle shown.

1) Point A
2) $\overline{AH}$
3) $\overline{DG}$
4) $\overleftrightarrow{HJ}$
5) $\overline{HF}$
6) $\overline{AF}$
7) $\overleftrightarrow{BD}$
8) $\overline{CD}$
9) Point H
10) $\overleftrightarrow{JB}$

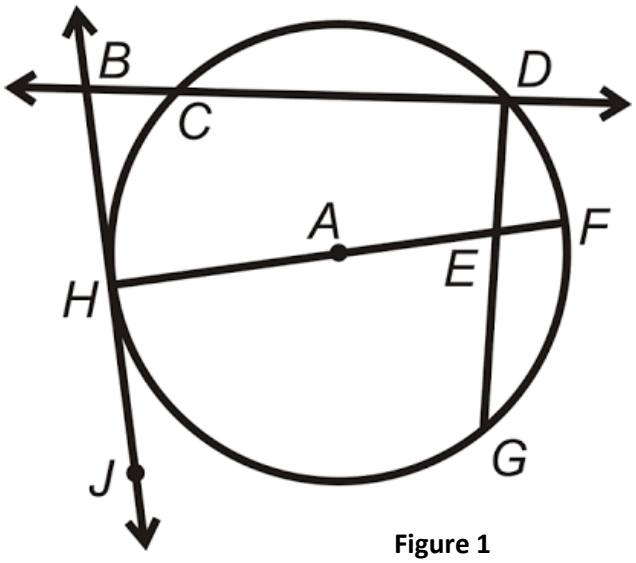


Figure 1

What's New

To begin our discussion, do the activity below in your own way. You may use any instrument to draw the circles or you may draw them by freehand.

Directions: Draw a circle with the given radius.

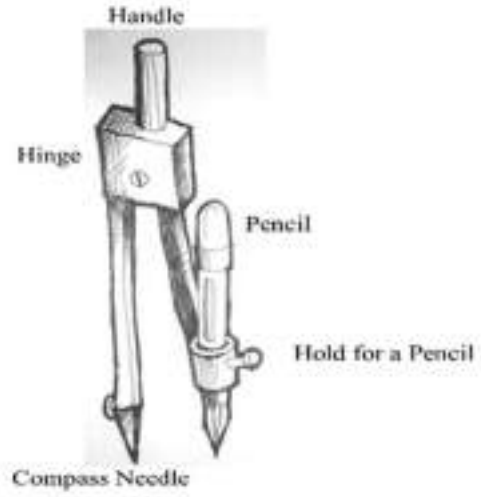
1) 6 cm
2) 7 cm
3) 8 cm
4) 9 cm

What is It

The compass is the most appropriate instrument to use to draw a circle or a part of a circle called an arc. It consists of two movable arms hinged together where one arm has a pointed end and the other arm holds a pencil. The compass is also called a pair of compasses.

Before we draw a circle using a compass, let us first study the parts of the compass.

Parts of the Compass



Handle – The handle is usually about half an inch long. Users can grip it between their pointer finger and thumb. The figure below shows the correct way of handling the handle of a compass.

Legs – There are two types of legs in a pair of compasses: the straight or the steady leg and the adjustable one. Each has a separate purpose. The steady leg serves as the basis or support for the needle point while the adjustable leg can be altered in order to draw different sizes of circles.

Hinge – The screw on the hinge holds the two legs in its position. The hinge can be adjusted depending on desired stiffness. The tighter the screw, the better the performance of the compass.

Needle Point (Compass Needle) – The needle point is located on the steady leg and serves as the center point of circles that have to be drawn.

Pencil Lead – The pencil lead draws the circle on a particular paper or material.

Adjusting Nut (Hold for a Pencil) – This holds the pencil lead or pen in place.

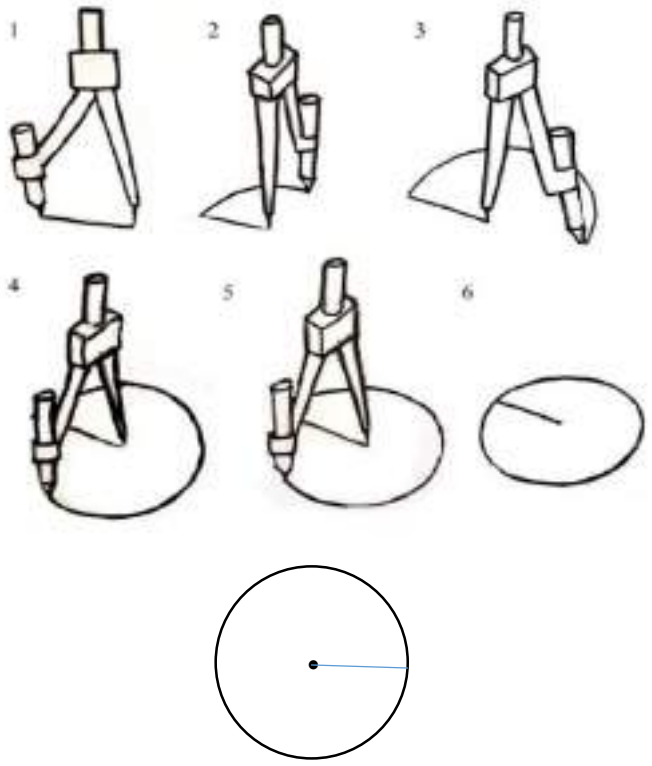
To draw a circle with a compass, consider the following tips:

1.) Make sure that the hinge at the top of the compass is tightened so that it does not slip.
2.) Tighten the hold for the pencil so it does not slip.
3.) Align the pencil lead with the needle of the compass.
4.) Press down the needle and turn the knob at the top of the compass to draw a circle or an arc.

Tasks:

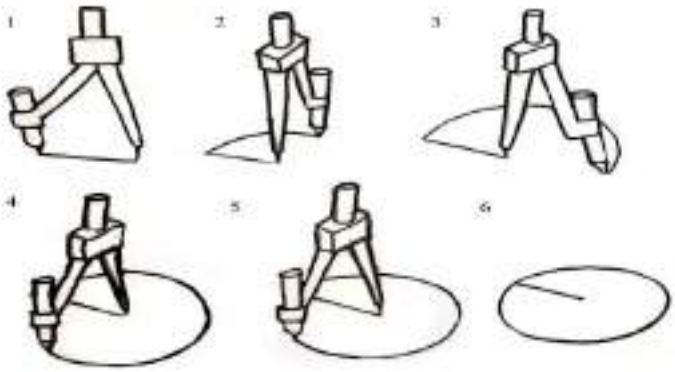
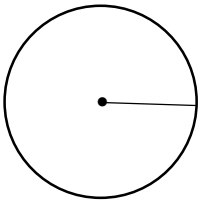
1.) Use a compass to draw a circle of radius 2.4 cm.

Step 1 Use a ruler to set the distance from the point of the compass to the pencil's lead at 2.4 cm.	
Step 2 Place the point of the compass at the center of the circle.	

Step 3 Draw the circle by turning the compass through 360°.	 A circle with a radius of 4

2.) Use a compass to draw a circle of radius 5 cm.

Step 1 Use a ruler to set the distance from the point of the compass to the pencil's lead at 5 cm.	

Step 2 Place the point of the compass at the center of the circle.	
Step 3 Draw the circle by turning the compass through 360°.	
	 R = 5 cm A circle with a radius of 5 cm

By this time, can you now draw a perfect circle?
Very well! Now, you are ready to do the next activity.

What's More

To further enhance your skill in drawing circles, do the following activities.

Activity 1 Draw Me

Directions: Read and analyze the problem carefully. Complete the table by identifying the radius of each clock and drawing the clock.

Problem:

Mother bought 5 new round alarm clocks with diameters 8 cm, 9 cm, 10 cm, 11 cm, and 12 cm, respectively. Find the radius of each alarm clock and draw each clock using a compass and a ruler. Use a separate sheet for your answers.

Diameter of the Alarm Clock	**Radius of the Alarm Clock**	**Drawing**
1) 8 cm		
2) 9 cm		
3) 10 cm		
4) 11 cm		
5) 12 cm		

Activity 2 Draw Me More

Directions: Read and analyze the problem carefully. Complete the table by identifying the diameter of each clock and drawing the clock.

Problem:

Father bought 5 new clocks with radius 5 cm, 6 cm, 7 cm, 8 cm and 9 cm, respectively. Find the diameter of each clock. Draw the clocks on a separate sheet using a compass and a ruler.

Radius of the Clock	Diameter of the Clock	Drawing
1) 5 cm		
2) 6 cm		
3) 7 cm		
4) 8 cm		
5) 9 cm		

Activity 3 Draw Me Most

Directions: Read and analyze the problem carefully. Do what is asked.

Problem:

Alfred wants to draw 3 concentric circles. The smallest circle is to have a radius of 3 cm. The radius of the second circle must be twice that of the first circle. The radius of the third circle must be thrice that of the first circle. Draw the figures on a separate sheet.

What I Have Learned

Directions: Choose the word in the box that is being described by each statement. Write your answers on a separate sheet.

steady leg	adjusting nut	adjustable leg
concentric circles	needle point	

_____1) What It is a part of the compass located at the center point of the circle drawn.
_____2) This is a part of the compass that holds the pencil lead or pen in place.
_____3) It is the compass leg that can be altered to draw circles with different sizes.
_____4) These are two or more circles having the same center point.
_____5) It is the compass leg that serves as the basis or support for the needle point.

What I Can Do

Directions: Draw concentric circles on a separate sheet following the conditions below. Concentric circles are two or more circle with a common center.

Name of the Circle	**Measures of the Radii**	**Drawing**
1. Circle A	$\overline{AD}$ = 3.5 cm AJ = 5.5 cm	
2. Circle O	$\overline{OA}$ = 2.5 cm $\overline{OB}$ = 4.5 cm $\overline{OC}$ = 6.5 cm	

Assessment

A. Directions: Read each item carefully. Choose the letter of your choice and write it on your separate answer sheet.

1. What is the radius of a circle having a diameter of 7 cm?
   a. 12 cm b. 3 cm c. 3.5 cm d. 6 cm

2. Aling Claring has All of these tasks require the use of a compass EXCEPT:
   a. Drawing a circle with a radius of 5 cm
   b. Copying a given angle on a piece of paper
   c. Computing the product of two or more numbers
   d. Drawing concentric circles with 4, 5, and 6 cm radii

3. Which of the following is an instrument used to draw a circle?
   a. compass b. protractor c. ruler d. straight edge

4. How many degrees are there when a compass makes a half circle?
   a. 45° b. 90° c. 180° d. 360°

5. In drawing a circle, what instrument is used to ensure that its radius is 6 cm?
   a. compass b. protractor c. ruler d. straight edge

6. A circle is drawn with a radius of 6 cm. What is its diameter?
   a. 18 cm b. 6 cm c. 14 cm d. 12 cm

7. The side length of a square paper is 30 cm. What is the diameter of the largest circle that can be drawn on the paper?
   a. 3 cm b. 10 cm c. 15 cm d. 30 cm

8. What part of a circle is half of a diameter?
   a. chord b. radius c. secant d. circumference

9. What part of a circle is half of a diameter?
   a. chord b. radius c. secant d. circumference

10. Which of these circles has a radius of 5 cm?

a.

r = 3.5 cm

b.

d = 8 cm

c.

d = 10 cm

d.

d = 12 cm

B. Directions: With a compass, draw 3 concentric circles with the following radii: 6 cm, 7 cm, and 8 cm.

Got a score of 11 - 13? CONGRATULATIONS! Job well done.

See you in the next module. If you score below 10, you may have to go over the lessons and the exercises again.

Congratulations… You made it!

Additional Activities

Now that you know the parts of a circle and how to draw a perfect circle using a compass, you are now ready to do this extra challenge.

Directions: Construct 3 non–concentric circles of the same size. The size of the circle is up to you. Then connect the centers of the circles.

Questions:

1) What figure is formed?
2) What kind of figure is it? Why?

Answer Key

What I Know

A.

1.	A	6.	D
2.	B	7.	C
3.	D	8.	C
4.	B	9.	C
5.	A	10.	D

B.

r = 4 cm

r = 5 cm

Note:

Circles are not drawn to scale.

What's In

1. center
2. radius
3. chord
4. tangent
5. diameter
6. radius
7. secant
8. chord
9. Point of tangency
10. Tangent line

What's New

1.

r = 6 cm

2.

r = 7 cm

3.

r = 6 cm

4.

r = 7 cm

What's More

Activity 1: Draw Me

(Note: Not Drawn To Scale)

Radius of the Alarm Clock	Drawing
1. 4 cm	
2. 4.5 cm	
3. 5 cm	
4. 5.5 cm	
5. 6 cm	

Activity 2: Draw Me More

(Note: Not Drawn To Scale)

Radius of the Alarm Clock	Drawing
1. 10 cm	
2. 12 cm	
3. 14 cm	
4. 16 cm	
5. 18 cm	

Activity 3: Draw Me Most

(Note: Not Drawn To Scale)

Blue = 3 cm radius
Red = 6 cm radius
Violet = 9 cm radius

What I Have Learned

1. needle point
2. adjusting nut
3. adjustable leg
4. concentric circles
5. steady leg

What I Can Do

(Note: Not Drawn To Scale)

Circles A	$\overline{AD}$ = 3.5 cm $\overline{AJ}$ = 5.5 cm	
Circle O	$\overline{OA}$ = 2.5 cm $\overline{OB}$ = 4.5 cm $\overline{OC}$ = 6.5 cm	

Assessment

1. C
2. C
3. B
4. C
5. C
6. D
7. D
8. B
9. B
10. C

Additional Activities

Note: Answer will vary.

1. The figure formed is a triangle.
2. Specifically, it is an equilateral triangle because the three sides are the radius of each circle connecting to one another. Therefore, the three sides are equal.

References

Lumbre, Angelina P., Ursua, Alvin. C., Placer, Donnel P., Burgos, Jaime R. (2016). Circle and Its Parts. *21st Century Matheletes*. Vibal Group Inc. pp. 232-235.

Kalin, Robert, & Corbit, Mary Kay.(1995). Circle, Segments and Congruency. *Geometry*.Anvil Publishing, Inc. pp.362-356.

For inquiries or feedback, please write or call:

Department of Education - Bureau of Learning Resources (DepEd-BLR)

Ground Floor, Bonifacio Bldg., DepEd Complex
Meralco Avenue, Pasig City, Philippines 1600

Telefax: (632) 8634-1072; 8634-1054; 8631-4985

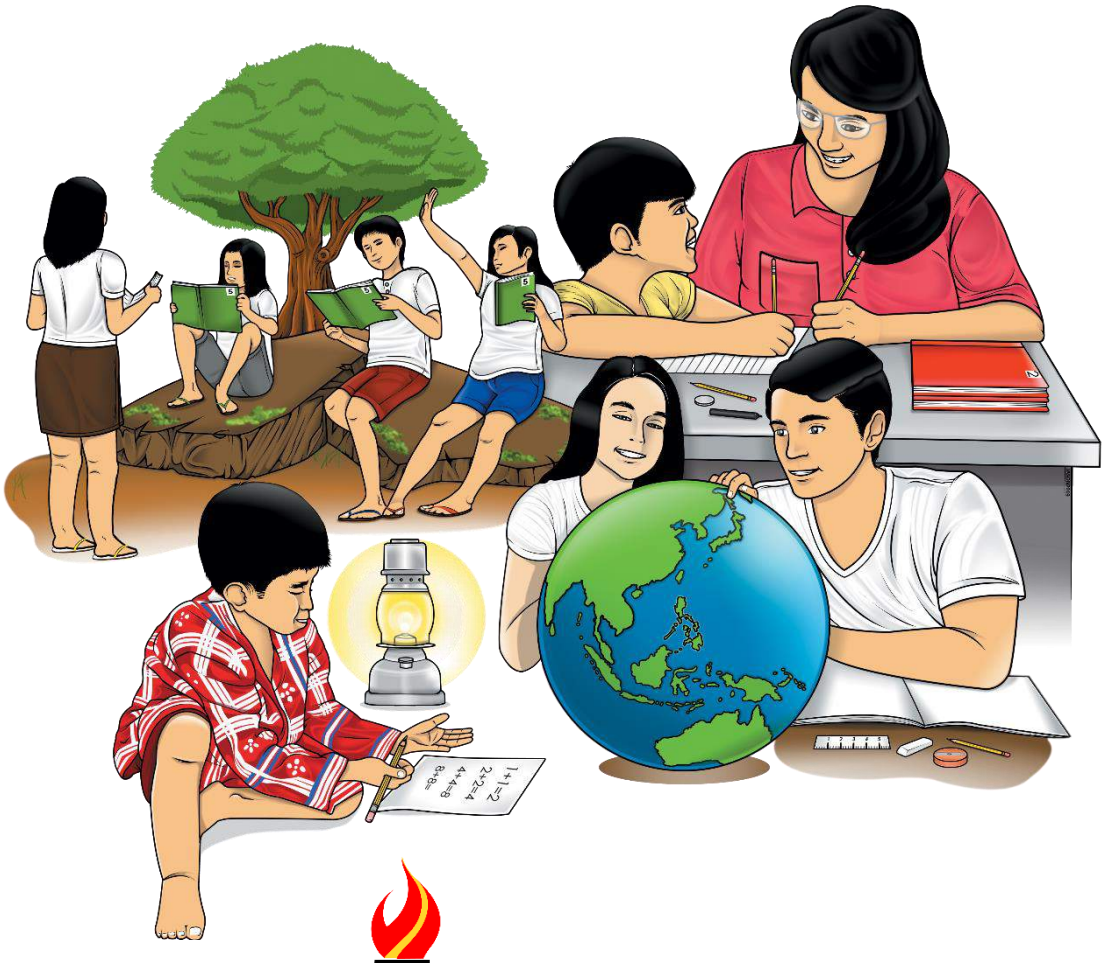
Email Address: blr.lrqad@deped.gov.ph * blr.lrpd@deped.gov.ph

5

DepED
DEPARTMENT OF EDUCATION

Mathematics

Quarter 3 – Module 11: Visualizing and Describing Solid Figures



ALTERNATIVE DELIVERY MODE
ADM

GOVERNMENT PROPERTY
NOT FOR SALE

Mathematics – Grade 5
Alternative Delivery Mode
Quarter 3 – Module 11: Visualizing and Describing Solid Figures
First Edition, 2020

Republic Act 8293, Section 176 states that: No copyright shall subsist in any work of the Government of the Philippines. However, prior approval of the government agency or office wherein the work is created shall be necessary for exploitation of such work for profit. Such agency or office may, among other things, impose as a condition the payment of royalties.

Borrowed materials (i.e., songs, stories, poems, pictures, photos, brand names, trademarks, etc.) included in this book are owned by their respective copyright holders. Every effort has been exerted to locate and seek permission to use these materials from their respective copyright owners. The publisher and authors do not represent nor claim ownership over them.

Published by the Department of Education
Secretary: Leonor Magtolis Briones
Undersecretary: Diosdado M. San Antonio

Development Team of the Module

Writer:	Ma. Alma M. Galitan
Editor:	Danilo Jadulco
Reviewers:	Renato S. Cagomoc, Rolando M. Lacbo, Joshua Sherwin T. Lim**,** Wilma L. Reyes
Illustrator:	Razle L. Jabelo
Layout Artist:	Razle L. Jabelo, Cherry Lou O. Calison
Management Team:	Ma. Gemma M. Ledesma, Arnulfo R. Balane, Rosemarie M. Guino, Joy B. Bihag, Ryan R. Tiu, Sarah S. Cabaluna, Thelma Cabadsan-Quitalig, Elena S. De Luna, Renato S. Cagomoc, Noel E. Sagayap, Geraldine P. Sumbise, Joshua Sherwin T. Lim

Printed in the Philippines by _____

Department of Education – Region VIII

Office Address : DepEd Regional Office No. 8 Candahug, Palo, Leyte
Telefax : (053)-832-2997
E-mail Address : region8@deped.gpv.ph

5

Mathematics

Quarter 3 – Module 11: Visualizing and Describing Solid Figures

DepED
DEPARTMENT OF EDUCATION

Introductory Message

This Self-Learning Module (SLM) is prepared so that you, our dear learners, can continue your studies and learn while at home. Activities, questions, directions, exercises, and discussions are carefully stated for you to understand each lesson.

Each SLM is composed of different parts. Each part shall guide you step-by-step as you discover and understand the lesson prepared for you.

Pre-tests are provided to measure your prior knowledge on lessons in each SLM. This will tell you if you need to proceed on completing this module or if you need to ask your facilitator or your teacher's assistance for better understanding of the lesson. At the end of each module, you need to answer the post-test to self-check your learning. Answer keys are provided for each activity and test. We trust that you will be honest in using these.

In addition to the material in the main text, Notes to the Teacher are also provided to our facilitators and parents for strategies and reminders on how they can best help you on your home-based learning.

Please use this module with care. Do not put unnecessary marks on any part of this SLM. Use a separate sheet of paper in answering the exercises and tests. And read the instructions carefully before performing each task.

If you have any questions in using this SLM or any difficulty in answering the tasks in this module, do not hesitate to consult your teacher or facilitator.

Thank you.

What I Need to Know

Hi, Mathletes! Our world is filled with solid figures such as balls, boxes, cans, ice cream cones, watermelons, and cabinets among others. In this module, you will be introduced to the various solid figures. You will also understand the similarities and differences among the different solid figures.

Upon studying this module, you will be able to:

- visualize and describe solid figures.

What I Know

Good day, everyone! In this section, we will try to find out how much you already know about the contents of this module.

Directions: Choose the letter that names the shape of the given figure. Write the letter on a separate answer sheet.

1)

A. Cone
B. Cylinder
C. Pyramid
D. Prism

2)

A. Cone
B. Cylinder
C. Prism
D. Sphere

3)

A. Cone
B. Cylinder
C. Prism
D. Sphere

4)

A. Cube
B. Rectangular prism
C. Rectangular pyramid
D. Sphere

5)

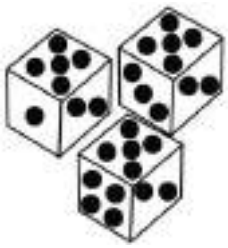
A. Triangle
B. Triangular cone
C. Triangular prism
D. Triangular pyramid

6)

A. Cone
B. Sphere
C. Prism
D. Pyramid

7)

A. Cone
B. Prism
C. Pyramid
D. Sphere

8) 

A. Cube
B. Rectangular prism
C. Rectangular pyramid
D. Square pyramid

9)

A. Cone
B. Cylinder
C. Prism
D. Sphere

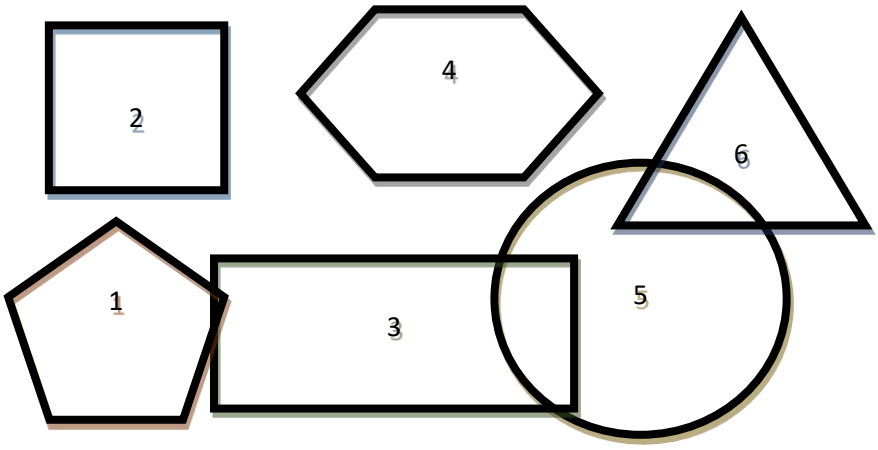
10)

A. Square prism
B. Square Pyramid
C. Rectangular Pyramid
D. Rectangular Prism

Lesson 1 Visualizing and Describing Solid Figures

What's In

To start our lesson for today, let us have a short review of shapes. In the illustration, identify the different plane figures shown.



1) _____ 3) _____ 5) _____
2) _____ 4) _____ 6) _____

Congratulations! Knowing the different plane figures will be helpful for our lesson.

What's New

Read the story below.

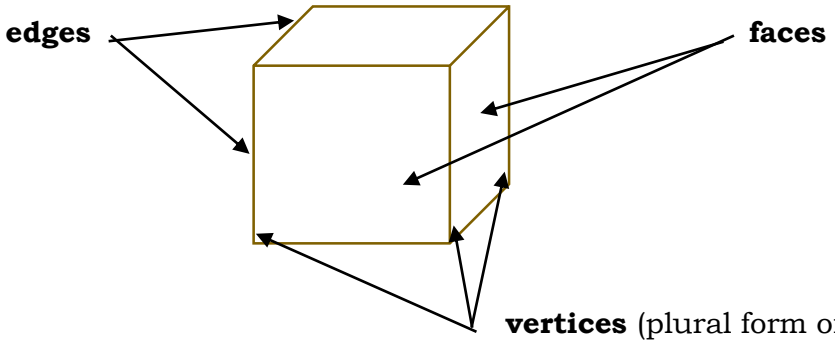
The Lim Family is having a birthday party in their vacation house in Tagaytay. Rico, the eldest son, bought a new soccer ball. His younger sister, Ashley, got a box of chocolate. Mrs. Dancey Lim bought 15 pieces of birthday hats while Mr. Fred Lim bought different groceries like cans of milk and toblerone.

Based on the story above, answer the questions below.

1) How many different solid figures can be identified from the items brought by the Lim Family?
2) What are those?

What Is It

Objects such as balls, boxes and cans are called **solid figures**. ***Solid figures*** are three-dimensional figures. A ***three-dimensional object*** has length, width, and height. They may also have **faces**, **edges** and **vertices**. A ***face*** is the flat surface of a solid figure. An **edge** is where two faces meet.

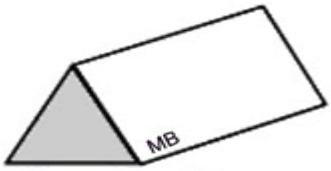


- **Solid figures** are either polyhedron or non-polyhedron.
- A solid is a **polyhedron** if all its faces are polygons, otherwise, it is a non-polyhedron.
- A **polyhedron** may be a prism, a pyramid or a platonic solid. In this module, we will only discuss prisms and pyramids.

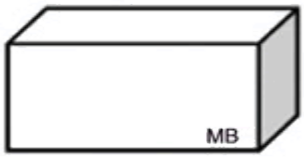
- A **prism** is made up of two parallel and congruent bases. The other faces are parallelograms. A prism is named after the shape of its base. If its base is a triangle, it is called a triangular prism. If its base is a pentagon, it is called a pentagonal prism.

- A **pyramid** has only one base, which can be any polygon. The other faces are triangles that meet at a common vertex. A pyramid is also named after the shape of its base. If the base is a square, it is called a square pyramid. If the base is a pentagon, we call it a pentagonal pyramid.

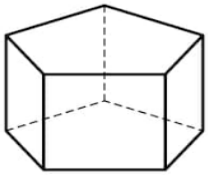
Examples of ***polyhedron***:



Triangular Prism



Rectangular Prism

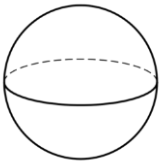


Pentagonal Prism

Examples of ***non-polyhedron***:

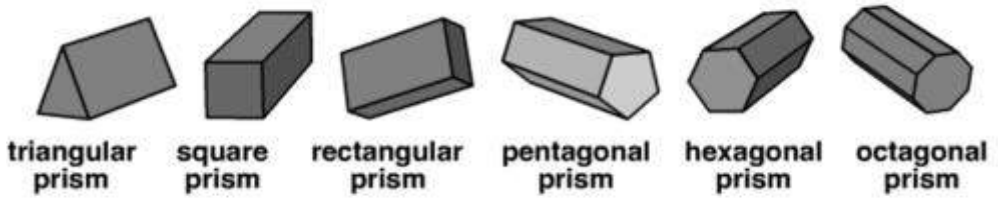
Cone

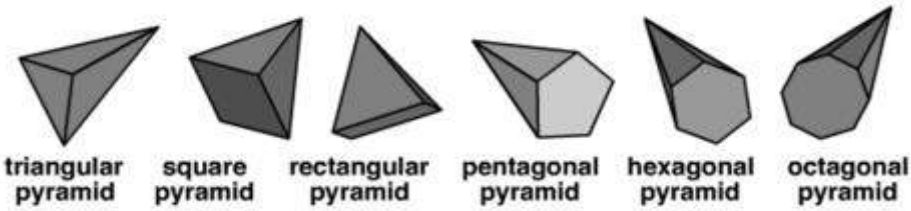
Cylinder



Sphere

Below are examples of prisms and pyramids. Notice how the prisms and pyramids are named after the shape of their bases.

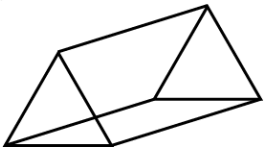
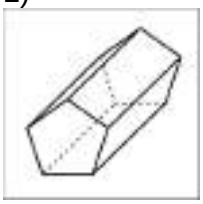
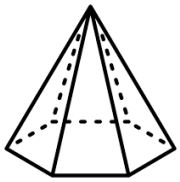
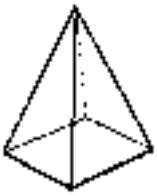




Did you understand the lesson now? If you are still confused, please read the definitions again to learn how the solid figures can be named and described.

Now you are going to answer the activity below in order to check if you are able to visualize the solid figures.

Directions: Fill in the table with the correct information.

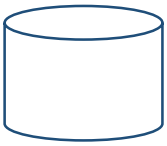
Solid Figures	**Number of**		
	Faces	**Edges**	**Vertices**
1) 			
2) 			
3)			
4) 			
5) 			

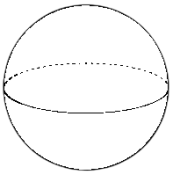
What's More

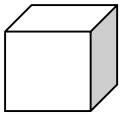
Activity 1: Who Am I

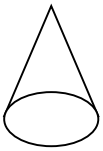
Directions: Identify the solid figure below. Write your answer on the space provided.

1) _____

2)  _____

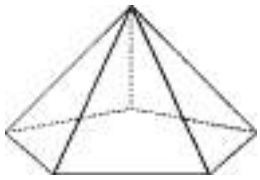
3)  _____

4)  _____

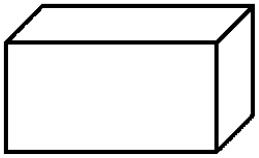
5)  _____

Activity 2: Describe Me

Directions: State whether the figure is a polyhedron or a non-polyhedron. Write the correct answer on the space provided in each item.

1)  _____

2) _____

3)  _____

4) _____

5) _____

Activity 3: Draw Me

Directions: Draw the following solid figures and complete the information needed. Write your answers on a separate answer sheet.

Solid Figure	Number of Edges	Number of Vertices	Number of Faces
1) Rectangular prism	_____	_____	_____
2) Cube	_____	_____	_____
3) Triangular pyramid	_____	_____	_____

What I Have Learned

Fill in the Blanks

Directions: Identify the word being described. Write your answer on a separate sheet of paper.

_____1) It refers to point of a solid figure where edges meet.
_____2) This is the flat surface of the solid figure.
_____3) These are three- dimensional figures.
_____4) This is formed when two faces of the solid figure meet.
_____5) It is a polyhedron with only one vertex.

What Can I Do

Multiple Choice

Directions: Read each statement carefully. Choose the best answer and write your answer on a separate answer sheet.

1) What is the shape of a regular shoebox?
   A. Rectangular pyramid C. Rectangular prism
   B. Prism D. Pyramid

2) What is the common shape of canned goods?
   A. Cone B. Cylinder C. Sphere D. Pyramid

3) What solid figure is the same shape as a birthday hat?
   A. Cone B. Cylinder C. Prism D. Pyramid

4) What is the shape of a regular die?
   A. Prism C. Cube
   B. Pyramid D. Square pyramid

5) What solid figure has the same shape as the balls used in basketball, volleyball, baseball, and sepak takraw?
   A. Circle B. Cylinder C. Pyramid D. Sphere

Assessment

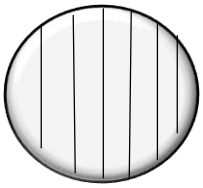
This activity will help you check whether you understood the lesson very well.

Directions: Choose the letter that names the shape of the given figure. Write the letter on a separate answer sheet.

1)

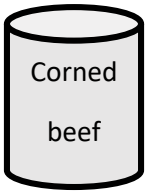
A. Cylinder
B. Cone
C. Prism
D. Pyramid

2)



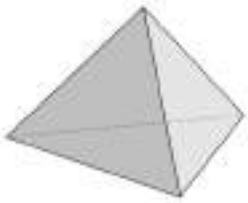
A. Sphere
B. Cylinder
C. Prism
D. Cone

3)



A. Prism
B. Cylinder
C. Cone
D. Sphere

4)

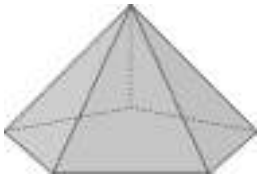


A. Cube
B. Triangular pyramid
C. Rectangular pyramid
D. Sphere

5)

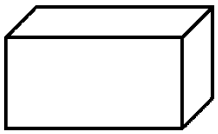
A. Cone
B. Rectangular Prism
C. Triangular Prism
D. Triangular Pyramid

6)



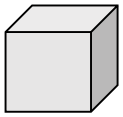
A. Cone
B. Rectangular Prism
C. Triangular Pyramid
D. Pentagonal Pyramid

7)

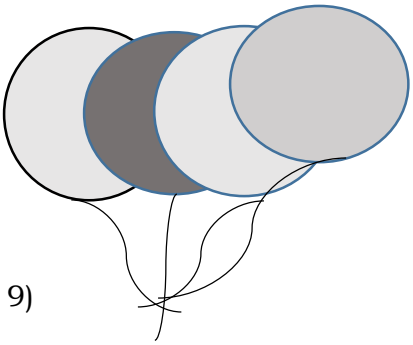


A. Sphere
B. Pyramid
C. Prism
D. Cone

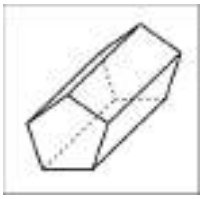
8)



A. Cube
B. Rectangular prism
C. Rectangular pyramid
D. Square pyramid

9) 

A. Cone
B. Cylinder
C. Prism
D. Sphere

10) 

A. Square prism
B. Square Pyramid
C. Pentagonal Pyramid
D. Pentagonal Prism

Additional Activities

Directions: Choose the correct answer inside the box that best names what is being described then write it in your answer sheet.

edge	face	vertex	solid figure	prism	net

1) It is a solid figure with two parallel and congruent bases.
2) It is a three-dimensional figure.
3) It is the flat surface of the solid figure
4) It is a line segment formed when two faces meet.
5) It is a point where edges meet.

Answer Key

What Can I Do

1. C
2. B
3. A
4. C
5. D

Assessment

1. B
2. A
3. B
4. B
5. C
6. D
7. C
8. A
9. D
10. D

Additional Activities

1. Prism
2. Solid Figure
3. Face
4. Edge
5. Vertex

What I Have Learned

1. Vertex
2. Face
3. Solid Figure
4. Edge
5. Pyramid

Activity 3 Draw Me

	Figure	Edge	Vertex	Face
1		12	8	6
2		12	8	6
3		6	4	4

What's In

1. Pentagon
2. Square
3. Rectangle
4. Hexagon
5. Circle
6. Triangle

What Is It

	Face	Edge	Vertex
1	5	9	6
2	7	15	10
3	6	12	8
4	7	12	7
5	5	8	5

What's New

1. There are 5 solid
2. Sphere, rectangular prism, cone, cylinder, triangular prism

What I Can Do

1. B
2. D
3. A
4. B
5. C
6. D
7. A
8. A
9. D
10. B

What's More

Activity 1: Who Am I

1. Rectangular prism
2. Cylinder
3. Sphere
4. Cube
5. Cone

Activity 2: Describe Me

1. Polyhedron
2. Non-polyhedron
3. Polyhedron
4. Non-polyhedron
5. Non-polyhedron

References

Lumbre, U., Burgos, P. & Sy, Jr., S. (2016). *21st Century Mathletes 5 Textbook*, Vibal Group Inc.

For inquiries or feedback, please write or call:

Department of Education - Bureau of Learning Resources (DepEd-BLR)

Ground Floor, Bonifacio Bldg., DepEd Complex
Meralco Avenue, Pasig City, Philippines 1600

Telefax: (632) 8634-1072; 8634-1054; 8631-4985

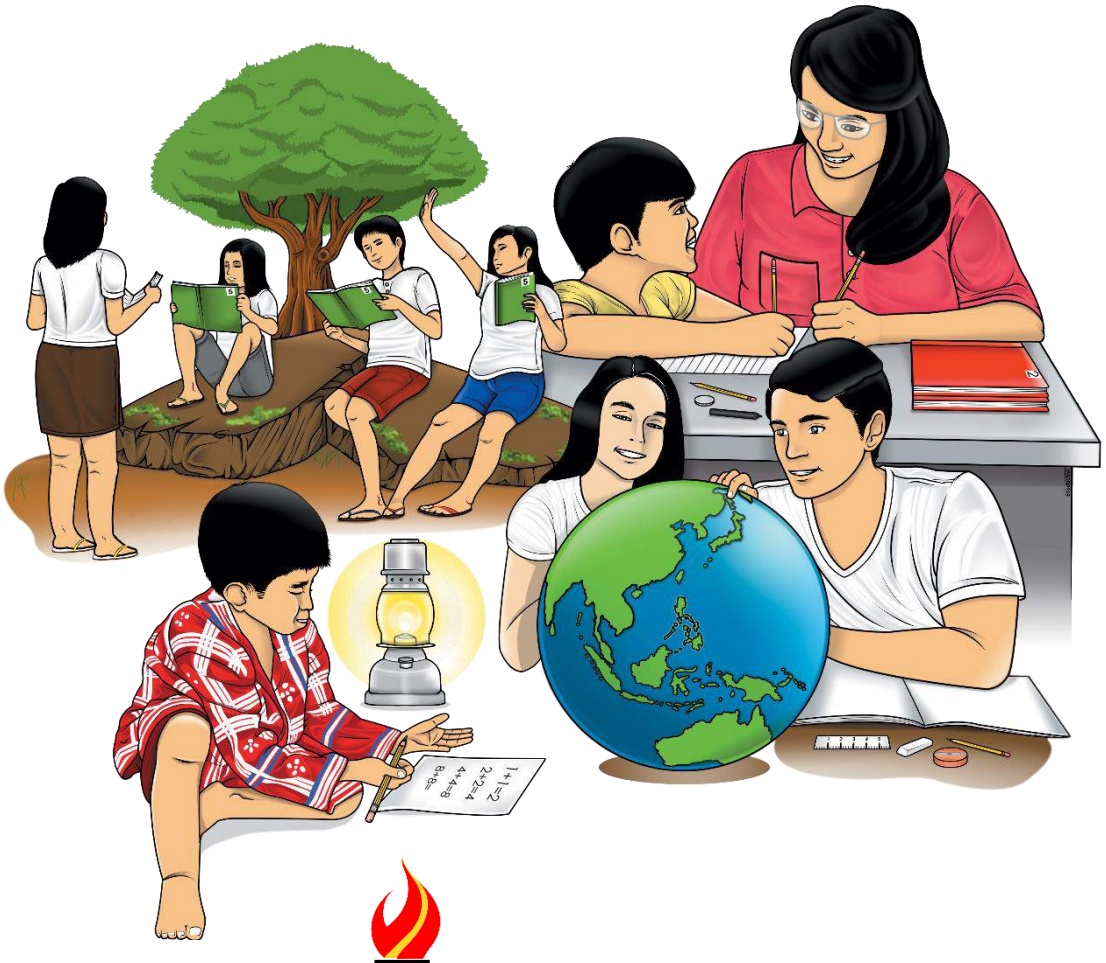
Email Address: blr.lrqad@deped.gov.ph * blr.lrpd@deped.gov.ph

5

DepED
DEPARTMENT OF EDUCATION

Mathematics

Quarter 3 – Module 12:
Making Models of Solid Figures



ALTERNATIVE DELIVERY MODE
ADM

GOVERNMENT PROPERTY
NOT FOR SALE

Mathematics – Grade 5
Alternative Delivery Mode
Quarter 3 – Module 12: Making Models of Solid Figures
First Edition, 2020

Republic Act 8293, Section 176 states that: No copyright shall subsist in any work of the Government of the Philippines. However, prior approval of the government agency or office wherein the work is created shall be necessary for exploitation of such work for profit. Such agency or office may, among other things, impose as a condition the payment of royalties.

Borrowed materials (i.e., songs, stories, poems, pictures, photos, brand names, trademarks, etc.) included in this book are owned by their respective copyright holders. Every effort has been exerted to locate and seek permission to use these materials from their respective copyright owners. The publisher and authors do not represent nor claim ownership over them.

Published by the Department of Education
Secretary: Leonor Magtolis Briones
Undersecretary: Diosdado M. San Antonio

Development Team of the Module

Writer	**:** Mary Meldred S. Normor
Editors	**:** Danilo S. Jadulco, Hazel Maravelis
Reviewers	**:** Renato S. Cagomoc, Rolando Lacbo, Joshua Sherwin T. Lim**,** Herminia S. Balanay
Illustrator	**:** Modesto Y. Sapinit
Layout Artist	**:** Joey Sustitudo, Joan T. Briz
Management Team:	Ma. Gemma M. Ledesma Arnulfo R. Balane Rosemarie M. Guino Joy B. Bihag Ryan R. Tiu Sarah S. Cabaluna Thelma Cabadsan-Quitalig Elena S. De Luna Renato S. Cagomoc Noel E. Sagayap Geraldine P. Sumbise Joshua Sherwin T. Lim

Printed in the Philippines by

Department of Education – Region VIII

Office Address: DepEd Regional Office No. 8, Candahug, Palo, Leyte
Telefax: (053)-832- 2997
E-mail Address: region8@deped.gov.ph

5

Mathematics

Quarter 3 – Module 12:
Making Models of Solid Figures

DepED
DEPARTMENT OF EDUCATION

Introductory Message

This Self-Learning Module (SLM) is prepared so that you, our dear learners, can continue your studies and learn while at home. Activities, questions, directions, exercises, and discussions are carefully stated for you to understand each lesson.

Each SLM is composed of different parts. Each part shall guide you step-by-step as you discover and understand the lesson prepared for you.

Pre-tests are provided to measure your prior knowledge on lessons in each SLM. This will tell you if you need to proceed on completing this module or if you need to ask your facilitator or your teacher's assistance for better understanding of the lesson. At the end of each module, you need to answer the post-test to self-check your learning. Answer keys are provided for each activity and test. We trust that you will be honest in using these.

In addition to the material in the main text, Notes to the Teacher are also provided to our facilitators and parents for strategies and reminders on how they can best help you on your home-based learning.

Please use this module with care. Do not put unnecessary marks on any part of this SLM. Use a separate sheet of paper in answering the exercises and tests. And read the instructions carefully before performing each task.

If you have any questions in using this SLM or any difficulty in answering the tasks in this module, do not hesitate to consult your teacher or facilitator.

Thank you.

What I Need to Know

Hi, mathletes! This module is designed to help you learn more about solid figures. Its various activities will help you understand how to make models of different solid figures such as cube, prism, pyramid, cylinder, and cone.

After going through this module, you are expected to:

1. make models of different solid figures such as cube, prism, pyramid, cylinder, and cone; and

2. determine the net that will form the given solid figure.

What I Know

Good day, everyone! In this section, we will try to find out how much you already know about the contents of this module.

Multiple Choice

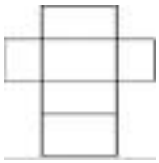
I. Directions: Match each real-life object in **Column A** to the solid figure in **Column B** that best describes its shape. Write the letter of the correct answer on your answer sheet.

A	**B**
_____1. Die	**A.** cone
_____2. Birthday hat	**B.** cube
_____3. Refrigerator	**C.** cylinder
_____4. Soda can	**D.** pyramid
_____5. Tent	**E.** rectangular prism
	F. sphere

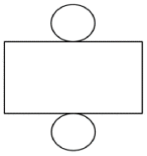
II. Directions: Identify the solid figure that will be formed by each net. Choose your answer from the choices inside the box. Write the letter of the correct answer.

A. cone	**B.** cube	**C.** cylinder	**D.** pyramid	**E.** rectangular prism

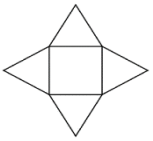
6) _____



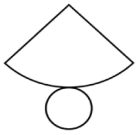
7) _____



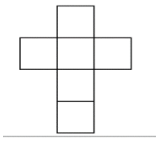
8) _____



9) _____



10) _____



Please check your answers against the answer key on page 12.

CONGRATULATIONS! If you got a score of 9 or 10, you should not have any difficulty studying the lesson in this module.

If you got a score of 8 or below, you may need to study the lesson more carefully and do all the given activities.

Lesson 1 Making Models of Solid Figures

What's In

Hi, mathletes! Can you still remember what a solid figure is and what the different kinds of solid figures are?

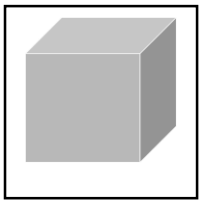
A **solid figure** is a three-dimensional figure. Some examples of solid figures are cubes, cylinders, cones, prisms, pyramids, spheres, and rectangular prisms.

Activity: Remember Me

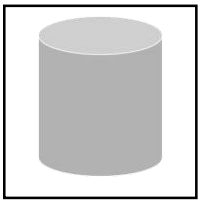
Directions: Identify the following solid figures. Choose the answer from the box and write the letter of the correct answer on your separate answer sheet.

A. cone	D. rectangular prism
B. cube	E. sphere
C. cylinder	

1) _____



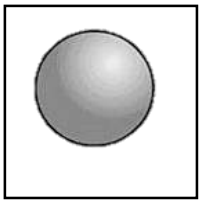
2) _____



3) _____

4) _____

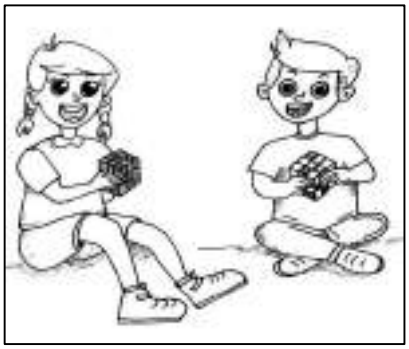
5) _____



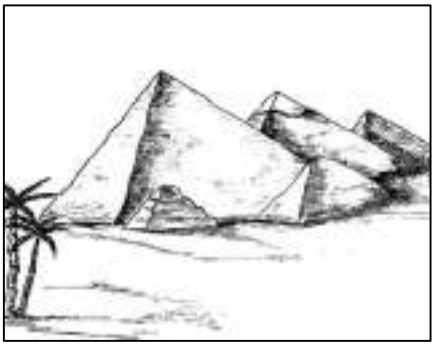
What's New

Solid figures can be seen all around us. We see solid figures when we play basketball or the Rubik's cube, when we open a can of milk or a box of cereals, and when we enjoy an ice cream in a cone. In the study of history, we also come across the pyramids of Egypt.

Ball

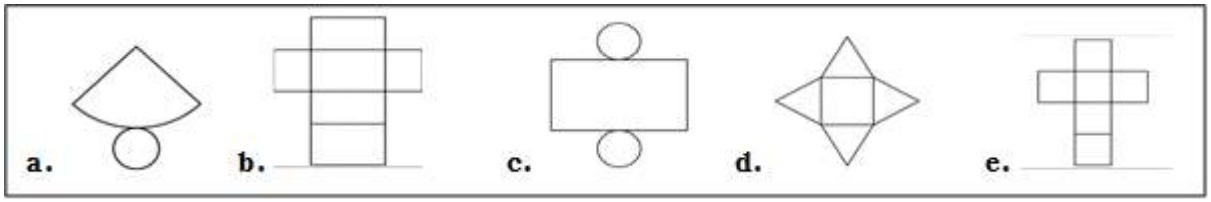


Rubik's cube



Pyramids

Are you excited about making models of different solid figures? I have here some examples of nets of solid figures. A **net** is a pattern made when the surface of a three-dimensional figure is laid out flat showing each face of the figure. Solid figures have different nets.



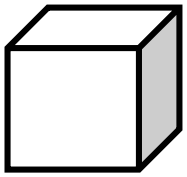
What do you think will happen if the nets above are folded? What types of solid figures will be formed?

The figures shown above are the nets of the following solid figures: (a) cone, (b) rectangular prism, (c) cylinder, (d) pyramid, and (e) cube.

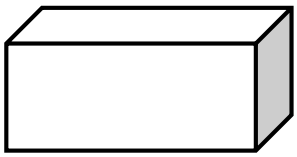
What Is It

Solid figures are three-dimensional objects. They have width, length, and height. A solid figure in which all faces are flat is called a **polyhedron** (plural: polyhedra). Some examples of polyhedra are shown below.

Pyramid

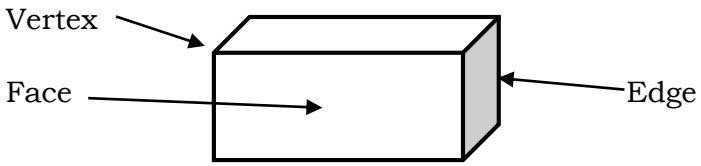


Cube



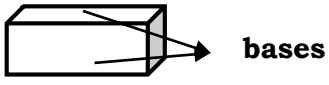
Rectangular Prism

The **face** is the surface of a solid figure. The **edge** is formed when any two faces of the solid meet together. The **vertex** is the point where 3 or more edges of the solid meets. The figure below illustrates the face, edge and the vertex of a solid.

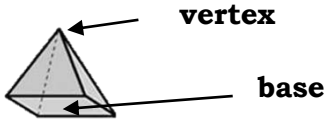


A **prism** is a polyhedron with two opposite faces that are identical. These faces are called its **bases**. The other faces are all quadrilaterals. If the bases of the prism are rectangles, then it is called a rectangular prism. If the bases of the prism are squares, then it is a square prism. If all six faces of the prism are congruent squares, then the prism is a cube.

Rectangular Prism



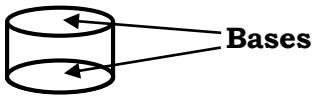
A **pyramid** is a polyhedron with one base. All other faces are triangular and meet at a vertex. The pyramid is named after the figure at its base. If the base is a triangle, then it is called a triangular pyramid. If it has a square base, then it is called a square pyramid.



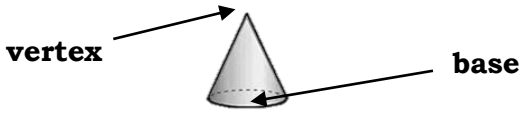
Square Pyramid

Solid figures with curved surfaces are called **non-polyhedra**. Both the cylinder and cone have flat and curved surfaces while the sphere has a curved surface only.

A **cylinder** has two identical and parallel circular bases.

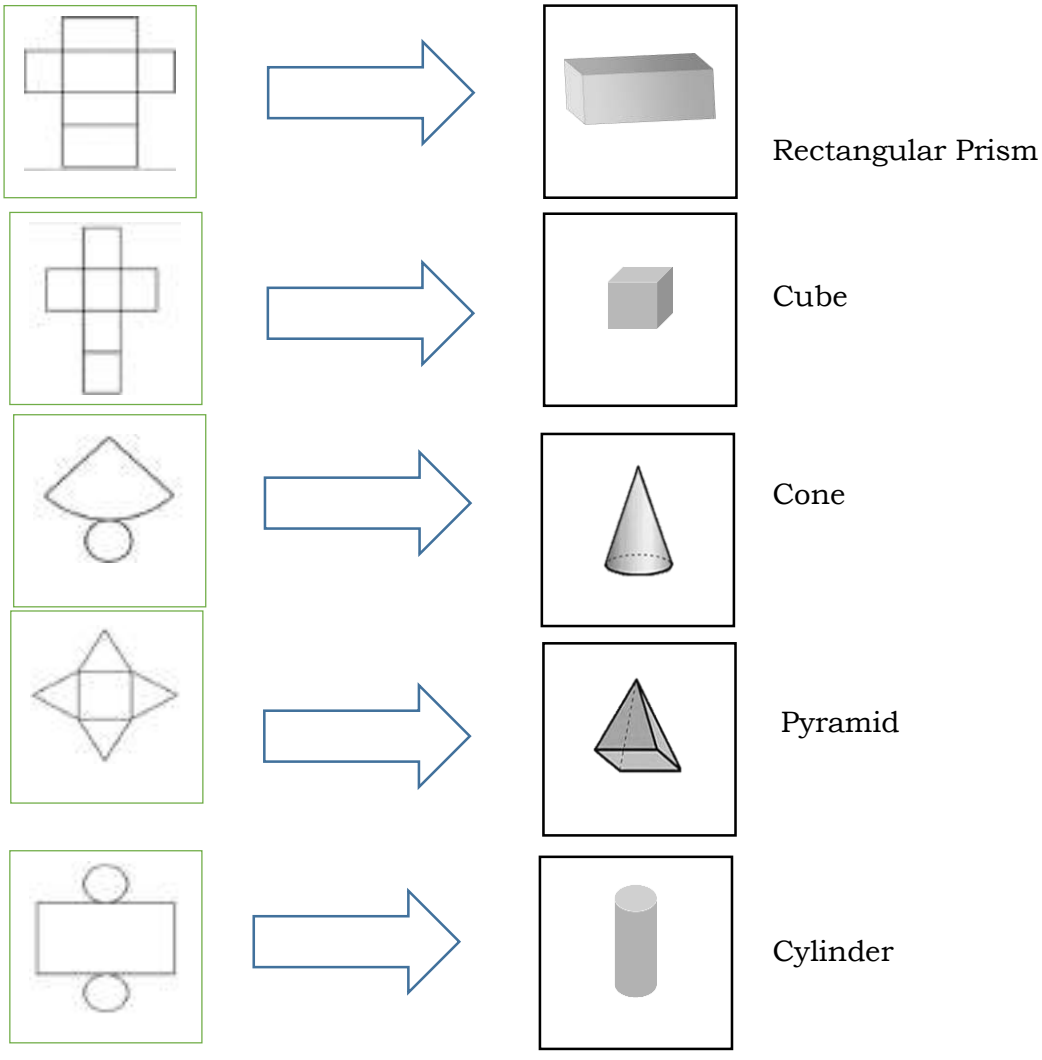


A **cone** has one circular base and one vertex.



A **sphere** is a set of all points in space lying at the same distance from a given point, called the center.

Every solid figure has a pattern or net. A **net** is a flat pattern that you can fold to make a solid figure. The net on the left forms the solid figure on the right.

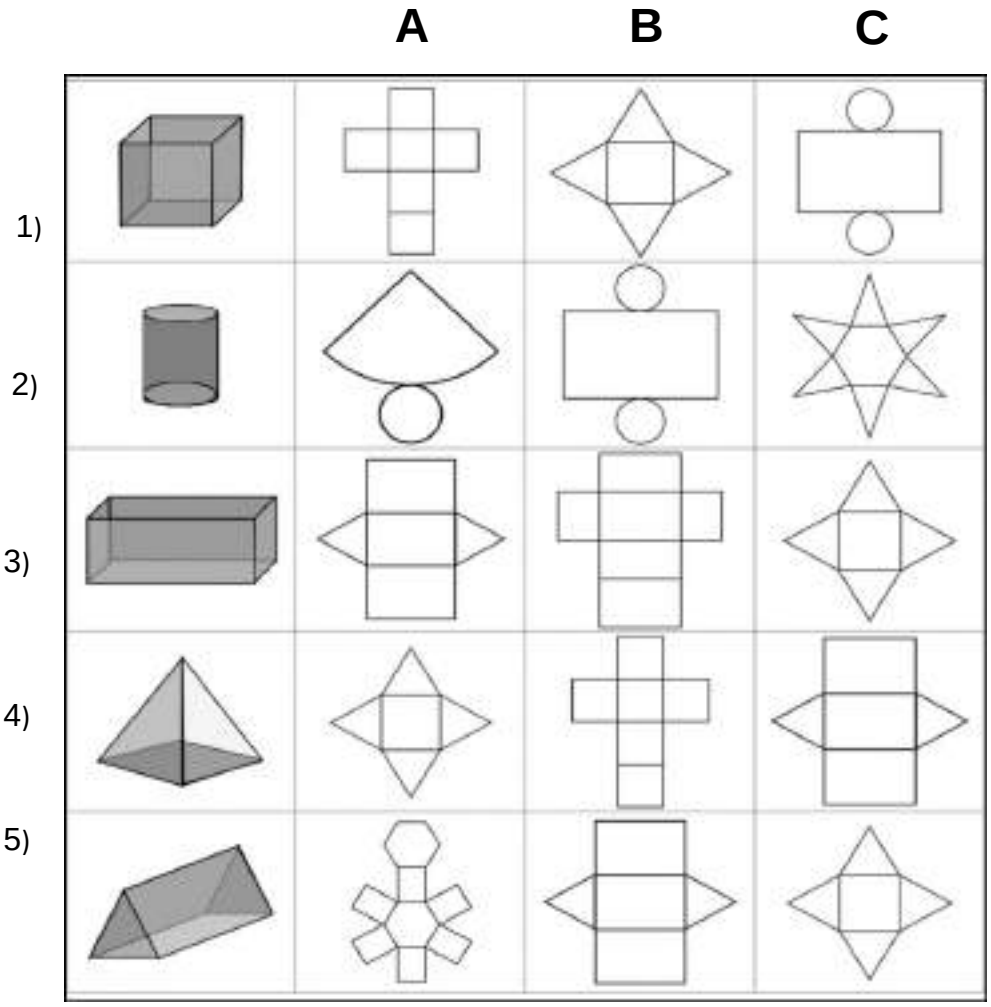


What's More

Hello there! So how did you find the lesson? To check if you really understood the lesson presented, answer the activities that follow.

Activity 1. Find Me

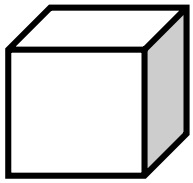
Directions: Choose the letter of the correct net pattern for the given solid figure. Write your answers on a separate answer sheet.



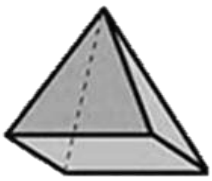
What I Have Learned

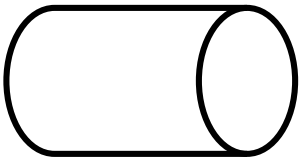
Activity 2: Know Me

Directions: Determine whether the figure is a polyhedron or non-polyhedron. Write your answer a separate answer sheet.

1)  _____

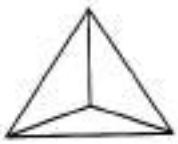
2) _____

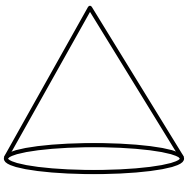
3)  _____

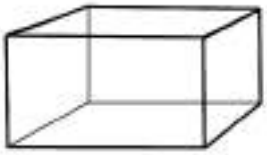
4)  _____

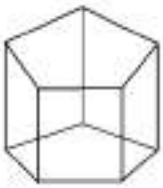
Activity 3: Identify Me

Directions: Identify what kind of figure is shown.

1.  _____

2.  _____

3.  _____

4.  _____

Check your answer against the answer key to find out if you fully understood the lesson. Then you may proceed to the next activity.

Activity: **Complete Me**

Directions: Answer the following questions. Write your answers on a separate sheet of paper.

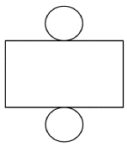
1) What do you call a solid figure with one circular base and one vertex?
2) How many circular bases does a cylinder have?
3) How many faces does a triangular pyramid have?
4) How many faces does a cube have?
5) What do you call the line segment formed by the intersection of two faces?

What I Can Do

To further deepen your understanding of the lesson, please do the activity below.

Activity: **Tell Me**

Directions: Tell the name of the solid figure that best describes each object. Then, draw the net pattern of each solid figure. Write your answer on a separate sheet of paper.

	Solid Figures	**Net Pattern**
Example: test tube	cylinder	
1) dice		
2) carrot		
3) sardines can		
4) tent with a square base		
5) shoe box		

Congratulations for making it this far! Continue by answering the next activity.

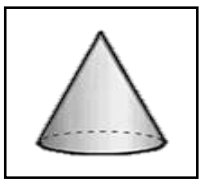
Assessment

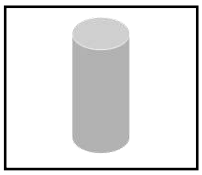
I. **Directions:** Draw the net patterns of the following solid figures.

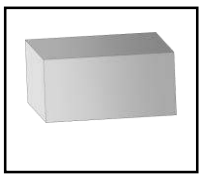
1. Cone
2. Cube
3. Cylinder
4. Square Pyramid
5. Rectangular Prism

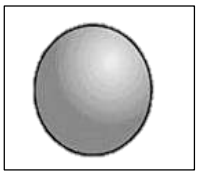
II. **Directions:** Choose the letter of the best answer. Write your answers on a separate sheet of paper.

6) What solid figure do you see in test tubes, tree stumps, poles, and milk cans?

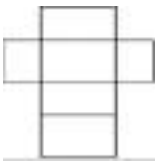
A. 

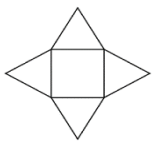
B. 

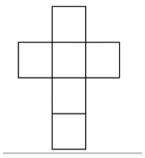
C. 

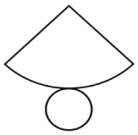
D. 

7) Which of the following is the net pattern of a standard die?

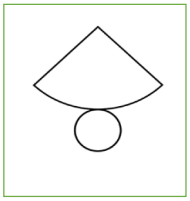
A. 

B. 

C. 

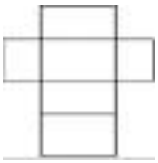
D. 

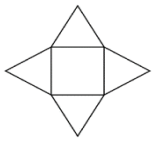
8) What solid figure can be formed by this net pattern?

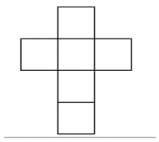


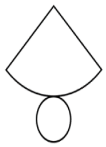
A. cone
B. cylinder
C. pyramid
D. triangle

9) Which of the following is the net pattern of a box of soap?

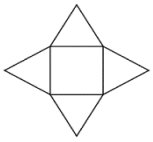
A. 

B. 

C. 

D. 

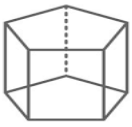
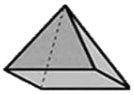
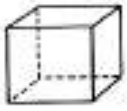
10) What type of solid figure can be formed by the net shown?



A. cone
B. cube
C. cylinder
D. square pyramid

Additional Activities

Find the number of faces, edges and vertices of the following prisms and pyramids. Write your answer on your answer sheet.

Figure	**Number of**		
	Faces	**Edges**	**Vertices**
1) Name:_____			
2)  Name:_____			
3) Name:_____			
4)  Name:_____			
5)  Name:_____			

Answer Key

What I Know

I.	II.
1. B	6. E
2. A	7. C
3. E	8. D
4. C	9. A
5. D	10. B

What's In

1. B
2. C
3. D
4. A
5. E

What's More

Find me Identify Me

1. A 1. Triangular pyramid
2. B 2. Cone
3. B 3. Rectangular prism
4. A 4. Pentagonal prism
5. B

Know Me

1. Polyhedron
2. Non-polyhedron
3. Polyhedron
4. Non-polyhedron

What I Can Do

Solid Figures	Net Pattern
1. cube	
2. cone	
3. cylinder	
4. pyramid	
5. rectangular prism	

What I Have Learned

1. cone
2. 2
3. 4
4. 6
5. edge

Assessment

I.	II.
1.	6. B
2.	7. C
3.	8. A
4.	9. A
5.	10. D

Additional Activities

Figure	Number of Faces	Edges	Vertices
1. rectangular prism	6	12	8
2. pentagonal prism	7	15	10
3. triangular pyramid	4	6	4
4. rectangular pyramid	5	8	5
5. cube	6	12	8

References

Kotah, Manuel T., Samper-Enriquez, Evelyn G. and Hipolito, Sanet S. (2005). *Soaring 21st Century Mathematics*. Phoenix Pulishing House, Inc. pp417-424.

Ursua, Alvin C. and Lumbre , Angeline P. (2016). *21st Century Mathletes Textbook.* Vibal Group Inc.

For inquiries or feedback, please write or call:

Department of Education - Bureau of Learning Resources (DepEd-BLR)

Ground Floor, Bonifacio Bldg., DepEd Complex
Meralco Avenue, Pasig City, Philippines 1600

Telefax: (632) 8634-1072; 8634-1054; 8631-4985

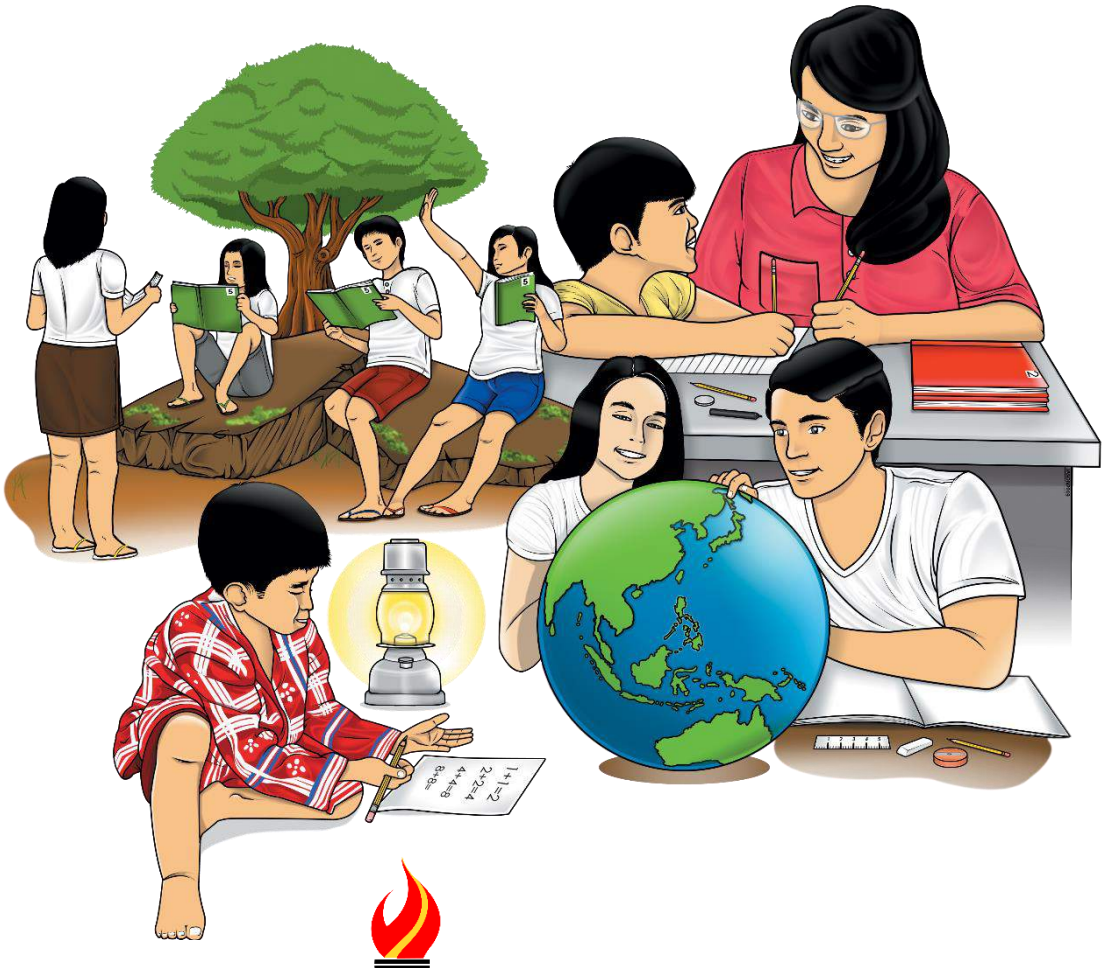
Email Address: blr.lrqad@deped.gov.ph * blr.lrpd@deped.gov.ph

5

DepED
DEPARTMENT OF EDUCATION

Mathematics

Quarter 3 – Module 13: Formulating the Rule in Finding the Next Term in a Sequence



ALTERNATIVE DELIVERY MODE
ADM

GOVERNMENT PROPERTY
NOT FOR SALE

Mathematics – Grade 5
Alternative Delivery Mode
Quarter 3 – Module 13: Formulating the Rule in Finding the Next Term in a Sequence
First Edition, 2020

Republic Act 8293, section 176 states that: No copyright shall subsist in any work of the Government of the Philippines. However, prior approval of the government agency or office wherein the work is created shall be necessary for exploitation of such work for profit. Such agency or office may, among other things, impose as a condition the payment of royalties.

Borrowed materials (i.e., songs, stories, poems, pictures, photos, brand names, trademarks, etc.) included in this module are owned by their respective copyright holders. Every effort has been exerted to locate and seek permission to use these materials from their respective copyright owners. The publisher and authors do not represent nor claim ownership over them.

Published by the Department of Education
Secretary: Leonor Magtolis Briones
Undersecretary: Diosdado M. San Antonio

Development Team of the Module

Writers: Teodora Coreal, Danilo S. Jadulco

Editors: Nicanor S. Montad Jr., Glendo Carido

Reviewers: Renato S. Cagomoc, Rolando Lacbo, Joshua Sherwin T. Lim

Illustrator: Manuel Y. Sapinit Jr.

Layout Artist: Joey Sustitudo, Emmanuel S. Gimena Jr.

Management Team: Ma. Gemma M. Ledesma
Arnulfo R. Balane
Rosemarie M. Guino
Joy B. Bihag
Ryan R. Tiu
Sarah S. Cabaluna
Thelma Cabadsan-Quitalig
Elena S. De Luna
Renato S. Cagomoc
Noel E. Sagayap
Geraldine P. Sumbise
Joshua Sherwin T. Lim

Printed in the Philippines by _____

Department of Education – Region VIII

Office Address: DepEd Regional Office No. 8, Candahug, Palo, Leyte
Telefax: (053)-832-2997
E-mail Address: region8@deped.gov.ph

5

Mathematics

Quarter 3 – Module 13: Formulating the Rule in Finding the Next Term in a Sequence

DepED
DEPARTMENT OF EDUCATION

Introductory Message

This Self-Learning Module (SLM) is prepared so that you, our dear learners, can continue your studies and learn while at home. Activities, questions, directions, exercises, and discussions are carefully stated for you to understand each lesson.

Each SLM is composed of different parts. Each part shall guide you step-by-step as you discover and understand the lesson prepared for you.

Pre-tests are provided to measure your prior knowledge on lessons in each SLM. This will tell you if you need to proceed on completing this module or if you need to ask your facilitator or your teacher's assistance for better understanding of the lesson. At the end of each module, you need to answer the post-test to self-check your learning. Answer keys are provided for each activity and test. We trust that you will be honest in using these.

In addition to the material in the main text, Notes to the Teacher are also provided to our facilitators and parents for strategies and reminders on how they can best help you on your home-based learning.

Please use this module with care. Do not put unnecessary marks on any part of this SLM. Use a separate sheet of paper in answering the exercises and tests. And read the instructions carefully before performing each task.

If you have any questions in using this SLM or any difficulty in answering the tasks in this module, do not hesitate to consult your teacher or facilitator.

Thank you.

What I Need to Know

This module was designed and written with you in mind. It is here to help you master the concepts on sequences. The lessons are arranged to follow the standard sequence of the course.

Hi, mathletes! In this module, you are going to test your ability to formulate the rule in finding the next term in a sequence. Knowledge and skills in patterns and sequences enable you to make predictions and create rules. You will also learn to use different problem-solving strategies to solve math problems easier.

After going through this module, you are expected to:

1) formulate the rule in finding the next term in a sequence.

What I Know

Hello, everyone! Patterns and sequences can be found in so many designs and objects in real life such as carpets, necklaces, table runners, floor tiles, and many others. Before proceeding to the next page, answer the test below to find out how well you know the topics to be discussed in this module.

Multiple Choice

Directions: Read each item carefully. Choose the letter of the best answer. Write your answers on a separate sheet of paper.

1) What is the next number in the sequence 2, 3, 4, 5, ...?
   A. 6 B. 7 C. 8 D. 9

2) Find the rule in the sequence 10, 20, 30, 40, 50.
   A. Add 2 B. Multiply by 2 C. Add 10 D. Multiply by 5

3) 3, 10, 17, 24, 31, 38,... what is the next number in the sequence?
   A. 43 B. 44 C. 45 D. 46

4) What is the missing value in this sequence: 2, 5, 8, 11, 14, ____?
   A. 15 B. 16 C. 17 D. 18

5) What is the next number in the sequence 2, 6, 18, 54...?
   A. 108 B. 152 C. 162 D. 216

6) What are the next two terms in the sequence 2, 10, 18, ____, ____?
   A. 20, 28 B. 22, 30 C. 24, 32 D. 26, 34

7) Which among the sequences has the pattern of squaring the natural numbers?
   A. 1, 2, 3, 4, 5 B. 2, 4, 6, 8, 10 C. 1, 6, 11, 16, 21 D. 1, 4, 9, 16, 25

8) What is the next number in the sequence 1, 4, 13, 40,..., if the rule for the sequence is "multiply the previous term by 3 and add 1".
   A. 131 B. 121 C. 111 D. 91

9) What are the missing numbers in the sequence 2, ____, 10, 14, ____?
   A. 4, 20 B. 6, 18 C. 5, 17 D. 8, 20

10) Five days before Valentine's Day, Arnel decided to give Maria flowers according to a certain pattern. On the first day, he sent one red rose; on the second day, three red roses; on the third day, 5 red roses and on so on. How many roses did Maria receive during the fifth day?
   A. 7 B. 8 C. 9 D. 10

Lesson 1 Sequences

What's In

A **sequence** is an ordered list of numbers. Each number in the sequence is called a **term**. The three dots (…) mean to continue forward in the pattern. To fill in the missing numbers or symbols in a given sequence, we need to find out the rule or pattern for generating the next term.

SEQUENCE:

3, 5, 7, 9, … → Three dots – this is read as "and so on"

4th term
3rd term
2nd term
1st term

RULE:

A sequence usually has a **rule**, which is a pattern or a way to find the value of each term.

Example:

{3, 5, 7, 9, …}
Starts at 3 and goes up 2 every time.

RULE: Add 2.

3 **+ 2** = 5
5 **+ 2** = 7
7 **+ 2** = 9

Let me see if you can identify the rule and find the next term in a sequence.

Directions: Find the next three terms in the sequence. Number 1 is done for you.

1) 10,15, 20,25, **30**, **35**, **40**
2) 3, 5, 7, 9, ____, ____, ____
3) 1, 3, 9, 27, ____, ____, ____
4) 2, 5, 8, 11, ____, ____, ____
5) 1, 8, 27, ____, ____, ____

What's New

Study the situation below.

For the first year, Mang Juan harvested 50 kilograms of lanzones. If every year, he harvested 5 more kilograms than the previous year, how many kilograms of lanzones did he harvest on the 8th year?

REMEMBER: In finding the next term in a sequence, we will look for a pattern. Let us construct a table to look at the pattern in the sequence of numbers and fill in the unknown parts of the table.

Sequence (Year)	**Number of Kilograms of Lanzones**
1st year	50
2nd year	50+5=55
3rd year	55+5=60
4th year	
5th year	
6th year	
7th year	
8th year	

So, how many kilograms of lanzones did Mang Juan harvest on the 8th year? Yes. He harvested 85 kilograms of lanzones.

Very good. You did it right!

What is It

There are problems in mathematics that can be solved by observing sequences and patterns. A sequence is a list of numbers or objects in a defined or logical order. Patterns and repetitive sequences can be found in nature, shapes, events, sets of numbers and anywhere. Studying sequences is not that difficult. You simply need to analyze the given terms and identify the rule for generating the next term in the sequence.

Study the table below:

Sequence	**Rule**	**Next Three Terms**
a) 3, 6, 9, 12,...	Every term after the first is obtained by adding 3 to the number preceding it. 0 + 3= 3; 3 + 3= 6; 6 + 3= 9, ...	15, 18, 21
b) 1,4,9, 16,...	Multiply the counting numbers by itself, that is, square the counting numbers. 1 x 1=1; 2 x 2= 4; 3 x 3= 9, ...	25, 36, 49
c) 1, 2, 4, 7,...	After 1 and 2, add the previous two numbers, then plus 1 1+2+1= 4; 2+4+1= 7	12, 20, 33
d) 1, 2, 4, 8, 16,...	Multiply the previous term by 2. 1 x 2=2; 2 x 2=4; 4 x 2=8; 8 x 2=16, ...	32, 64, 128

Did you understand the lesson?
Very good. Try to answer the activity below.

Activity: Fill Me In

Directions: Find the next three terms in each sequence. Then, write the rule in finding the next term. Write your answer on separate sheet of paper.

Sequence	**Next Three Terms**	**Rule**
1) 3,6,12,24, ...		
2) 2, 9, 16, 23, ...		
3) 53, 46, 39, 32, ...		
4) 5, 12, 26, 54, ...		
5) 5, 20, 50,110, ...		

What's More

In this section, you will use the concepts and examples that were presented earlier to answer the different activites provided.

Activity 1: Match Me

Directions: Match the sequence in Column A to the rule that generates the terms of the sequence in Column B. Write your answer on a separate sheet of paper.

Column A (Sequence)	Column B (Rules)
1) 8, 11, 14, 17, ...	**A.** Multiply by 3 and subtract 1
2) 12, 24, 48, 96, ...	**B.** Subtract by 7
3) 7, 15, 31, 63, ...	**C.** Multiply by 2 and add 1
4) 56, 49, 42, 35, ...	**D.** Multiply by 2
5) 14, 41, 122, 365, ...	**E.** Add 3

Activity 2: Complete Me

Directions: Given the first term and the rule, make a sequence consisting of four (4) terms. Write your answer on a separate sheet of paper.

First Term	Rule	First 4 terms of the Sequence
1) 2	Add 4 and minus 3	
2) 3	Multiply by 2 and subtract 1	
3) 4	Add 3 and minus 2	
4) 5	Subtract 2 and plus 5	
5) 1	Add 1 times 2	

Activity 3: Define Me

Directions: Give the pattern or rule for generating each sequence. Write your answer on a separate sheet of paper.

1) 1, 4, 7, 10, 13,... Rule: _____
2) 3, 8, 18, 38, 78,... Rule: _____
3) 60, 56, 52, 48, 44,... Rule: _____
4) 2, 8, 32, 128, 512,... Rule: _____
5) 2, 9, 44, 219, 1094,... Rule: _____

Congratulations! You made it this far.

What I Have Learned

To check how well you understood the lesson in this module, answer the activities below.

Activity: True or False

Directions: Read each statement carefully. Write **True** if the statement is correct. If the statement is incorrect, write False and change the underlined word, number, or symbol to make it correct. Write your answer on a separate sheet of paper.

_____1) In the sequence 3, 7, 15 and 31, you have to multiply by 2 and add 1 to get the next term which is 63.

_____2) The first term in a sequence is 4. If the rule is "add 5 and subtract by 2", the first 5 terms of this sequence are 4, 7, 10, 13, and 15".

_____3) A pattern is a list of numbers or objects in a defined or logical order.

_____4) 4, 8, 12, 16 and 20 form a sequence. 8 is called the second term.

_____5) The rule of the sequence 4, 9, 19, 40, 79... is "multiply by 2 and add 1".

What I Can Do

The concept of sequences can also be used in solving word problems. Below is an activity that needs application of the knowledge you acquired in the lesson.

Activity:

Directions: Read each problem carefully. Answer it to the best that you can and write your answers on separate sheet of paper.

1) Nicole is writing a poem. She writes 7 words on the first line, 14 words on the second line, 28 words on the third line, and 56 words on the fourth line. If this pattern continues, how many words will Nicole write on the fifth line?

2) Cindy is making a tally of the people visiting her art gallery. She noticed that 25 people visited her art gallery on the first day, 35 people visited on the second day, and 45 people visited on the third day. Given the same pattern, on what day did 65 people visit her art gallery?

3) Iriss sorted pens in small boxes. He put 1 pencil in the first box, 4 pencils in the 2nd box, 16 pencils in the 3rd box, and 64 pencils in the 4th box. Following the same pattern, how many pencils did Iriss place in the 5th box?

4) Chandy was given an allowance of P750. He spent P100 on the 1st day, P150 on the 2nd day, P200 on the 3rd day and so on. In how many days will his allowance last?

5) Christian saved Php 14 on Saturday, Php 17 on Sunday, Php 20 on Monday, Php 23 on Tuesday. If this pattern continues, how much will he save next Sunday?

Assessment

At this point, since the lesson is already done and its concept was discussed exhaustively with different activities, it is time to assess the knowledge you gained from this module.

Multiple Choice

Directions: Read each statement carefully. Choose the letter of your best answer and write the chosen letter on a separate sheet of paper.

1) What are the next shapes?

A. B. C. D.

2) What is the next term in the sequence 42, 40, 38, ...?
A. 36 B. 35 C. 34 D. 33

3) 5, 10, 15, 20, 25, ... What is the next number in the sequence?
A. 28 B. 30 C. 32 D. 35

4) By observing the pattern, what is the missing value?
5, 7, ____, 11, 13
A. 6 B. 8 C. 9 D. 10

5) What is the next number in the sequence 0, 4, 8, 12, 16, ____?
A. 32 B. 28 C. 24 D. 20

6) Determine the next term in the sequence 1, 10, 100, 1 000, ____?
A. 10 000 B. 100 000 C. 1 000 000 D. 10 000 000

7) What is the sequence formed having the rule of multiplying by 2?
A. 1, 2, 3, 4, 5 B. 2, 4, 6, 8, 10 C. 1, 2, 4, 8, 16 D. 2, 6, 10, 14, 18

8) Which sequence is generated by the rule "multiply the first term by 2 and add 1"?
A. 1, 3, 7, 15 B. 3, 6, 9, 12 C. 2, 4, 6, 8 D. 0, 4, 8, 12

9) What numbers will complete the sequence 0, ____, 8, 15, 24, ____?
A. 2, 28 B. 5, 30 C. 6, 34 D. 3, 35

10) Renalyn's weekly savings from her school allowance are as follows: P10 on the first week, P15 on the second week, P20 on the third week, and so on. How much will she save on the fifth week?
A. P 25 B. P30 C. P35 D. P40

Additional Activities

To enhance your knowledge and skills on this lesson, answer the activity below.

Find the missing term and give the pattern rule of the following sequences.

1)

14	17	20	23	

Rule: _____

2)

24	30	36	42	

Rule: _____

3)

132	121	110	99	

Rule: _____

4)

5	10	20	40	

Rule: _____

5)

4	19	94	469	

Rule: _____

Answer Key

What's New

65, 70, 75, 80, 85

What's In

1. 30, 35, 40
2. 11, 13, 15
3. 81, 243, 729
4. 14, 17, 20
5. 64, 125, 216

What I Know

1. A
2. C
3. C
4. C
5. C
6. D
7. D
8. B
9. B
10. A

What's More

Define Me

1. Add 3
2. Multiply by 2 and add 2 or add 1 multiply by 2
3. Minus 4
4. Multiply by 4
5. Multiply by 5 and minus 1

What Is It

1. 48, 96, 192	Multiply by 2
2. 30, 37, 44	Add 7
3. 25, 18, 11	Subtract 7
4. 110, 222, 446	Multiply by 2 and add 2 or Add 1 and multiply by 2
5. 230, 470, 950	Add 5 and multiply by 2

What Can I Do

1. 112 words
2. 5th day
3. 256 pencils
4. 4 days
5. P38

What I Have Learned

1. True
2. False, 16
3. False, Sequence
4. True
5. False, 39

What's More

Match Me Complete Me

1. E 1. 2, 3, 4, 5
2. D 2. 3, 5, 9, 17
3. C 3. 4, 5, 6, 7
4. B 4. 5, 8, 11, 14
5. A 5. 1, 4, 10, 22

Additional Activities

1. 26	Add 3
2. 48	Add 6
3. 88	Subtract 11
4. 80	Multiply by 2
5. 2344	Multiply by 5 and minus 1

Assessment

1. B
2. A
3. B
4. C
5. D
6. A
7. C
8. A
9. D
10. B

References

21ST Century Mathletes, Textbook, Grade 6

Manuel T Kota, et al. *Soaring 21ST Century Mathematics*. Phoenix Publishing House, Grade 5, 2005

Lesson Guides in Elem. Math, Grade 5

Angelina P. Lumbre, Alvin C Ursua, Donnel P. Placer, Jaime R. Burgos, *21st Century Mathletes*. (2016). Vibal Group Inc.

For inquiries or feedback, please write or call:

Department of Education - Bureau of Learning Resources (DepEd-BLR)

Ground Floor, Bonifacio Bldg., DepEd Complex
Meralco Avenue, Pasig City, Philippines 1600

Telefax: (632) 8634-1072; 8634-1054; 8631-4985

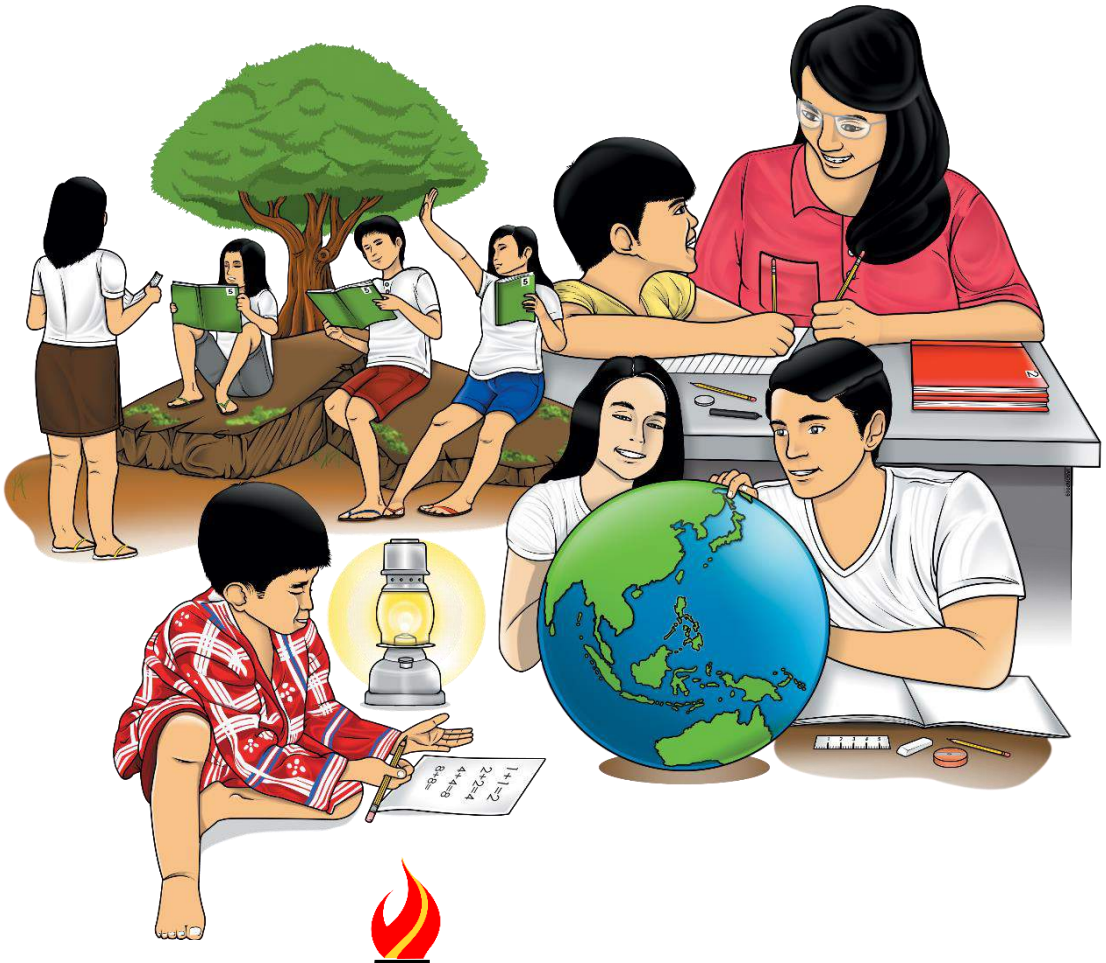
Email Address: blr.lrqad@deped.gov.ph * blr.lrpd@deped.gov.ph

5

DepED
DEPARTMENT OF EDUCATION

Mathematics

Quarter 3 – Module 14: Simple Equations Involving One or More Operations



ALTERNATIVE DELIVERY MODE
ADM

GOVERNMENT PROPERTY
NOT FOR SALE

Mathematics– Grade 5
Alternative Delivery Mode
Quarter 3 – Module 14: Simple Equations Involving One or More Operations
First Edition, 2020

Republic Act 8293, Section 176 states that: No copyright shall subsist in any work of the Government of the Philippines. However, prior approval of the government agency or office wherein the work is created shall be necessary for exploitation of such work for profit. Such agency or office may, among other things, impose as a condition the payment of royalties.

Borrowed materials (i.e., songs, stories, poems, pictures, photos, brand names, trademarks, etc.) included in this book are owned by their respective copyright holders. Every effort has been exerted to locate and seek permission to use these materials from their respective copyright owners. The publisher and authors do not represent nor claim ownership over them.

Published by the Department of Education
Secretary: Leonor Magtolis Briones
Undersecretary: Diosdado M. San Antonio

Development Team of the Module

Writer : Eunilaine M. Serrato, Danilo S. Jadulco
Editor : Jose J. Sagadal, Jr., Elizabeth Deligero
Reviewer : Renato S. Cagomoc, Rolando Lacbo, Joshua Sherwin T. Lim
Illustrator : Noel E. Sagayap
Layout Artist : Joey Sustitudo , Joan T. Briz
Management Team:
Ma. Gemma M. Ledesma
Arnulfo R. Balane
Rosemarie M. Guino
Joy B. Bihag
Ryan R. Tiu
Sarah S. Cabaluna
Thelma Cabadsan-Quitalig
Elena S. De Luna
Renato S. Cagomoc
Noel E. Sagayap
Geraldine P. Sumbise
Joshua Sherwin T. Lim

Printed in the Philippines by

Department of Education – Region VIII

Office Address: DepEd Regional Office No. 8, Candahug, Palo, Leyte
Telefax: (053)-832- 2997
E-mail Address: region8@deped.gov.ph

5

Mathematics

Quarter 3 – Module 14: Simple Equations Involving One or More Operations

DepED
DEPARTMENT OF EDUCATION

Introductory Message

This Self-Learning Module (SLM) is prepared so that you, our dear learners, can continue your studies and learn while at home. Activities, questions, directions, exercises, and discussions are carefully stated for you to understand each lesson.

Each SLM is composed of different parts. Each part shall guide you step-by-step as you discover and understand the lesson prepared for you.

Pre-tests are provided to measure your prior knowledge on lessons in each SLM. This will tell you if you need to proceed on completing this module or if you need to ask your facilitator or your teacher's assistance for better understanding of the lesson. At the end of each module, you need to answer the post-test to self-check your learning. Answer keys are provided for each activity and test. We trust that you will be honest in using these.

In addition to the material in the main text, Notes to the Teacher are also provided to our facilitators and parents for strategies and reminders on how they can best help you on your home-based learning.

Please use this module with care. Do not put unnecessary marks on any part of this SLM. Use a separate sheet of paper in answering the exercises and tests. And read the instructions carefully before performing each task.

If you have any questions in using this SLM or any difficulty in answering the tasks in this module, do not hesitate to consult your teacher or facilitator.

Thank you.

What I Need to Know

This module was designed and written with you in mind. It is here to help you master the use of different strategies to solve for the unknown in simple equations involving one or more operations on whole numbers and fractions. The scope of this module permits it to be used in many different learning situations. The language used recognizes the diverse vocabulary level of students. The lessons are arranged to follow the standard sequence of the course. But the order in which you read them can be changed to correspond with the textbook you are now using.

The module is divided into two lessons, namely:

- Lesson 1 – Simple Equations Involving One Operation
- Lesson 2 – Simple Equations Involving More Operations

After going through this module, you are expected to:

1. use different strategies to solve for the unknown in simple equations involving one or more operations on whole numbers and fractions; and
2. appreciate the use of different problem-solving strategies to make solving math problems easier.

What I Know

Good day, everyone! In this module, you will learn about solving equations. Let us find out first what you already know about it.

Directions: Choose the letter of the best answer. Write your answers on a separate sheet.

1. What do you call the symbols that do not have fixed values in an algebraic expression?
   A. term B. variable C. constant D. phrase
2. In the expression $12ab$, what is the constant?
   A. 12 B. a C. b D. ab
3. What is the value of $4x + 6$, if $x = 2$?
   A. 10 B. 12 C. 14 D. 16
4. Which is the verbal phrase of the algebraic expression $5y + 2$?
   A. five numbers increased by two
   B. five times the sum of y and two
   C. two more than five times a number y
   D. two is more than five times a number y
5. Which is the algebraic translation of the phrase "*a number x decreased by ten equals 5*"?
   A. $x + 10 = 5$ B. $10 - x = 5$ C. $10x = 5$ D. $x - 10 = 5$
6. What is the value of x that will satisfy the equation $3x = 15$?
   A. 5 B. 10 C. 12 D. 15
7. What is the solution of the equation $y - 6 = 13$?
   A. 7 B. 10 C. 19 D. 21
8. Which equation has {3} as a solution set?
   A. $y + 1 = 3$ B. $2y - 5 = 1$ C. $4y = 7$ D. $5y + 2 = 10$
9. What is the value of a if $3a - 4$ is equal to 2?
   A. 2 B. 3 C. 4 D. 5
10. Which statement is **TRUE**?
    A. $5x = 20$, if $x = 5$ C. $3x - 6 = 9$, if $x = 5$
    B. $8 + x = 21$, if $x = 16$ D. $\frac{2}{3}x = 10$, if $x = 5$

CONGRATULATIONS! If you got a score of 9 or 10, you should not have any difficulty studying the lesson in this module.

If you got a score of 8 or below, you may need to study the lesson more carefully and do all the given activities.

Lesson 1 Simple Equations Involving One Operation

Arithmetic is concerned mainly with the study of numbers using different operations Algebra is concerned with the study of symbols or variables–and the operations or rules relating them. Variables represented by letters are often used as symbols for numbers.

The essence of algebra lies in representing quantities as symbols other than numerals. This is the advantage of applying algebra and not arithmetic alone in solving practical problems. These different symbols are grouped into expressions which in turn bring meaning to equations.

This module will enlighten us on the wonders and usefulness of algebra together with its importance in our lives.

Do the following activities to learn the different problem-solving strategies.

What's In

Directions: Solve for the unknown. Match the mathematical statement in Column A with the answer in Column B that make the statement true. Write your answer on a separate sheet.

Example: $\square + 2 = 5$

$\square + 2 - 2 = 5 - 2$

$\square = 3$

Column A	Column B
_____ 1. $\square + 7 = 9$	A. 4
_____ 2. $9 - \square = 5$	B. 12
_____ 3. $3 + 4 = 10 - \square$	C. 2
_____ 4. $\square + 4 = 5 + 5$	D. 10
_____ 5 $\square = 3$ (4)	E. 3
	F. 6

What's New

Simple Equations Involving One Operation

Consider the following:

$2x$	$2b + 2d$	$2c + 5 = 25$	$3y - 2$
$a + 3 = 8$	$4b - 6 = 10$	$\frac{1}{4} + x = \frac{3}{4}$	$\frac{3}{4}x + 1$

Which are equations?

Can you solve the value of the variable to make each equation true?

The table below answers the first question.

Equations	**Not Equations**
$a + 3 = 8$	$2x$
$4b - 6 = 10$	$2b + 2d$
$2c + 5 = 25$	$3y - 2$
$\frac{1}{4} + x = \frac{3}{4}$	$\frac{3}{4}x + 1$

What is It

An **equation** is a mathematical sentence that uses an equal sign "=". The equal sign indicates that two mathematical expressions have the same value. Hence, the expression on the left side is equal to the expression on the right side of the equation.

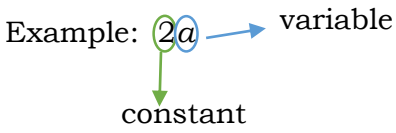
Below are some examples of equations:

$2 + 3 = 7 - 2$	$2 + 4 = 6$	$10 = 1 + 2 + 3 + 4$	$\frac{2}{9} + p = 2$
$k + 3 = 3k - 5$	$2x - 5 = 7$	$2\,(2) = 8 \div 2$	$3a = 18$

An equation is a statement that two mathematical expressions are equal. Many equations contain variables.

A **variable** or **unknown** is represented by a symbol, usually a letter, that may take on different values.

A **constant** is a fixed value and does not change.



If an equation involves a variable, then a **solution** to the equation is a number that when substituted to the variable will make the equation true. The collection of all the solutions to an equation is called its **solution set.** The process of finding a solution is called **solving an equation**.

In solving an equation, you can try the following:

1. Write the equation
2. Group similar terms on one side.
3. Perform the indicated operations.
4. Simplify the answer.
5. Check.

Note that the truth of an equation does not change if we apply the following properties.

Properties of Equality

1. **Addition Property of Equality:**
   If $a = b$, then $a + c = b + c$, where a, b, c are whole numbers.

This property states if you add the same number to both sides of an equation, the two sides remain equal.

Example 1: Let's try this numeric equation 5 + 7 = 12

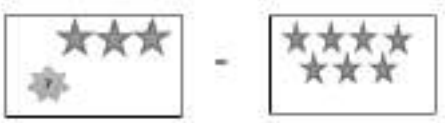
$$5 + 7 + 2 = 12 + 2$$

$$14 = 14$$

Adding 2 to each side of the original equation results to 14. Notice that the resulting sides are still equal.

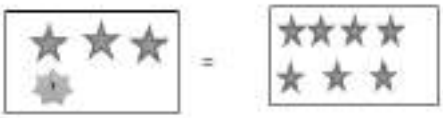
The addition property of equality states that if you add the same value to both sides of the equation, the resulting expressions will remain equal.

Example2: Solve ***x* + 3 = 7** using models.



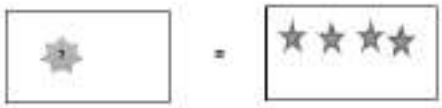
$x + 3 = 7$

Model the equation.



$x + 3 - 3 = 7 - 3$

Remove the same number of counters (stars) from each side.



$x = 4$

The number of counters (stars) remaining on the right side that represents the value of x.

Check:

Substitute $x = 4$ in the equation.

$x + 3 = 7$

$4 + 3 = 7$

$7 = 7$

Subtraction has the same result as adding the opposite. Hence, the addition property of equality can be used for subtraction as well. So, the equality remains if you add or subtract the same value from both sides of an equation.

Example 3: Solve for *f* in the equation ***f* – 2 = 7**.

Solution:

$f - 2 = 7$

$f - 2 + 2 = 7 + 2$ Add 2 to both sides of the equation

$f + 0 = 9$

$\boldsymbol{f = 9}$

To check the solution, substitute 9 for *f* in the equation

Check:

$f - 2 = 7$

$9 - 2 = 7$

$7 = 7$

Example 4: Solve for d in the equation $\boldsymbol{d + 3 = 5}$.

Solution:

$d + 3 = 5$

$d + 3 - 3 = 5 - 3$ Subtract 3 from both sides of the equation

$\boldsymbol{d = 2}$

To check the solution, substitute 2 for **d** in the equation

Check:

$d + 3 = 5$

$2 + 3 = 5$

$5 = 5$

Example 5: Solve for n in the equation $\frac{1}{4} + \boldsymbol{n} = \frac{3}{4}$

Solution:

$\frac{1}{4} + n = \frac{3}{4}$

$\frac{1}{4} - \frac{1}{4} + n = \frac{3}{4} - \frac{1}{4}$ Subtract $\frac{1}{4}$ from both sides of the equation

$\boldsymbol{n} = \frac{2}{4}$ or $\frac{1}{2}$

To check the solution, substitute $\frac{2}{4}$ for **n** in the equation

Check:

$\frac{1}{4} + n = \frac{3}{4}$

$\frac{1}{4} + \frac{2}{4} = \frac{3}{4}$

$\frac{3}{4} = \frac{3}{4}$

2. **Multiplication Property of Equality**

If $a = b$, then $ac = bc$, where a, b, c are whole numbers not equal to zero.

This property states that if you multiply the same nonzero number to both sides of an equation, the two sides remain equal.

Example 6: Let's try the numeric equation $2 \cdot 4 = 8$. If you multiply both sides of this equation by 2, you will still get a true equation.

$2 \cdot 4 = 8$

$2 \cdot 4 \cdot 2 = 8 \cdot 2$

$16 = 16$

Example 7: Solve $\mathbf{2b = 10}$.

Solution:

$\frac{2b}{2} = \frac{10}{2}$ Divide both sides of the equation by 2 to get the value of b. Dividing by 2 is the same as multiplying by $\frac{1}{2}$ which is the reciprocal of 2.

$\boldsymbol{b = 5}$ Answer

To check the solution, substitute 5 for **b** in the equation

Check:

$2b = 10$

$2(5) = 10$

$10 = 10$

Example 8: Solve $\frac{1}{3}\boldsymbol{a = 2}$.

Solution:

$\frac{1}{3}a = 2$ Multiply both sides of the equation by 3 (which is the reciprocal of $\frac{1}{3}$) to get the value of a.

$(\frac{1}{3}\ a)3 = 2(3)$

$\boldsymbol{a = 6}$

To check the solution, substitute 6 for a in the equation

Check:

$\frac{1}{3}a = 2$

$\frac{1}{3}(6) = 2$

$\frac{6}{3} = 2$

$2 = 2$

If you understand this topic, answer the activity below. If not, you can go back and review.

Direction: Solve for the unknown.

1. $3a + 6 = 33$
2. $3/2 = c + ½$
3. $b = 3/5 + 2/5$

What's More

For practice and understanding, do the activities below.

Activity 1: Looking Through Me
Directions: Solve each equation.

1. $4x - 5 = 11$
2. $2 + 4x = 14$
3. ¾ x + 4 = 6
4. $20 - 5x = 30$
5. $3x = -9$

Activity 2: Match, Match, Match
Directions: Inside the box are possible answers for the given equations. Match the letter of the correct solution to each equation.

A. -4	B. 4	C. 10	D. 3/8	E. 3

1. $5x - 1 = 14$
2. $-4x - 3 = 13$
3. $2x = ¾$
4. $3x + 3 = 15$
5. $2x - 9 = 11$

Activity 3: Guess Me, Guess me

Directions: Solve for the value of the variable that will make each equation **true**. Write the letter of the correct answer and guess the word.

	1. $2x + 5 = 25$
	2. $5a - 32 = 28$
	3. $75 = 5c$
	4. $\frac{1}{5} + h = \frac{3}{5}$
	5. $\frac{20}{y} = 5$
	6. $8d = 48$
	7. $b - 7 = 45$
	8. $3b = 42$

N 14	**T** 4	**I** 6	**O** 52	**Q** 12	**E** 10	**A** $\frac{2}{5}$	**U** 15

What I Have Learned

Remember the different terms in this module. Answer the activity below.

Directions: Identify what is being described by the statement. Write your answers on a separate sheet.

_____1. It is a sentence in mathematics that contains an equal sign.
_____2. It is a symbol or letter that may take different values.
_____3. It is a fixed value that does not change.
_____4. It is a number that makes an equation true.
_____5. It is a process of finding the solution of an equation.

What I Can Do

Directions: Solve the following problems using different strategies. Choose the letter of the correct answer.

1. Lyka's grandmother left a pack of polvoron on the table. Althea ate 2 of them, his dad ate 4 of them, and they gave 11 of the polvorons to the kids playing outside. At the end of the day, only 4 polvorons were left in the plastic container. How many pieces of polvorons were there in the pack at the start?
   A. 6 B. 11 C. 17 D. 21

2. Athena has a weekly allowance of P 1,000.00 from her aunt. She plans to save some money for future use. On Tuesday, she deposited P12.00 in her bamboo bank. She deposited three times this amount on Wednesday and on Friday. How much money did she save in all?
   A. P 72.00 B. P 84.00 C. P916.00 D.P 928.00

3. Manilyn had P46.00 left after buying groceries. She bought 2 cans of sardines for P11.50 each and 1 kilo of salt for P30.00. How much money did she have at the start?
   A. P 57.50 B. P 76.00 C. P 87.50 D. P99.00

4. Albert ordered 3 pairs of sandals and a pair of black shoes. Each pair of sandals cost P140.00. He paid P840.00 in all. What was the cost of the pair of black shoes?
   A. P 140.00 B. P 280.00 C. P 420.00 D. P 840.00

5. Cecilia weighs 42.7 kg now. She gained 5.9 kg over the last two years. What was her weight two years ago?
   A. 36.8 kg B. 44.7kg C. 48.6kg D. 64.5 kg

Assessment

To check if you understand this module, answer the activity below. This covers all the lessons presented.

Multiple Choice

Directions: Choose the letter of the correct answer. Write your answers on a separate sheet.

1. After finishing buying vegetables at the market, Ruby wants to have P 35.00 left. She plans to buy slippers for P 25.00 and a coin purse for P15.00. How much money does she need?
   A. P 95.00 B. P 85.00 C. P 75.00 D.P 65.00

2. What is the value of x that will make the equation $6x - 9 = 27$ **true**?
   A. 6 B. 7 C. 8 D. 9

3. Jasmine ordered 3 kilos of dalandan for P29.00 per kilo and 1 pack of kalamansi. The total cost was P 150.00. What was the cost of the kalamansi?
   A. P 103.00 B. P 93.00 C. P 73.00 D.P 63.00

4. What is the solution of $\frac{1}{2}\boldsymbol{y} = 30$?
   A. 49 B. 50 C. 59 D. 60

5. Jeramie baked cupcakes. She put them on the table. After breakfast, Vanessa ate 4 cupcakes and got 7 for her playmates. During lunchtime, father and mother ate 13 cupcakes in all. There were 36 cupcakes left on the table. How many cupcakes did Jeramie bake?
   A. 30 B. 60 C. 90 D. 120

6. Three times a number decreased by four equals thirty-five. What is the number?
   A. 10 B. 11 C. 12 D. 13

7. What is the solution of $7y + 11 = 60$?
   A. 7 B. 9 C. 11 D. 13

8. When Rizalyn rode on a jeepney, there were already passengers sitting. At the next stop, 3 people got on and 4 people got off. Three stops later, 6 people got on. All 14 people got off the terminal station. How many people were in the jeepney when Rizalyn got on the jeepney?
   A. 9 B. 8 C. 7 D. 6

9. Scarlet gave 10 stickers from her collection to Stephanie and Jaynard. Then she gave 14 stickers to Melissa and 6 stickers to Starla. She still had 275 stickers. How many stickers were in Scarlet's collection, to begin with?
   A. 395 B. 315 C. 310 D. 30

10. Which equation is **true** if $x = 4$?
   A. $20 = 6x - 4$ B. $4x - 1 = 7$ C. $1 + 5x = 10$ D. $3x = 7$

Got a score of 8-10? CONGRATULATIONS! Job well done. See you in the next lesson. If you scored below 8, you may have to go over the lesson and do the exercises again.

Additional Activities

Directions: Translate each problem into an equation, then solve for the unknown.

1. A number decreased by 17 is 29. What is the number?

2. How many kilograms of mangoes can you buy with P 560.00 if one kilogram costs P 70.00?

3. Christopher and his four close friends went on a tour in Palawan. They decided to divide the expenses evenly. If each of them paid P 1,205.00, find their total expenses.

4. Twice a number decreased by 15 equals 9. Find the number.

5. After she lost 26 pounds in her diet, Melissa weighed 178 pounds. What was her original weight?

What I Know

Good day, everyone! Another lesson will be discussed. Answer first the activity below. Take note of the items unanswered and find the right answer as you go through this module.

Directions: Choose the letter of the correct answer. Write your answers on a separate sheet.

1. Which is the correct translation of "Twice the number x increased by seven is equal to thrice the number x decreased by five."?
   A. $2x - 5 = 3(x + 7)$ C. $2x + 7 = 3x - 5$
   B. $2(x - 5) = 3x + 7$ D. $2(x - 5) = 3(x + 7)$
2. Refer to number 1. Twice the number x increased by seven is equal to thrice the number x decreased by five. What is the number?
   A.2 B. 5 C. 7 D. 12
3. What is the value of x that will make the equation $5x = 3x + 32$ **true**?
   A.4 B. 8 C. 12 D. 16
4. Which equation has a solution set of {2}?
   A. $5b = 45$ B. $6m - 1 = 9$ C. $4x + 3 = 11$ D. $3y + 5 = 0$
5. What is the solution of $6y = 2y + 36$?
   A. 2 B. 4 C. 7 D. 9
6. Which of the following is **true** if $a = 5$?
   A. $10a = 6a + 20$ C. $7a + 5 = 4a + 8$
   B. $6(a+4) = 5a + 25$ D. $a = 2a - 10$
7. One of the following equations has {0} as the solution set. Which one is it?
   A. $3y = 2y + 1$ C. $5y + 8 = 3y + 8$
   B. $2(y + 4) = y - 4$ D. $4y + 15 = y$
8. What is the solution of the equation $3(x + 5) = x + 21$?
   A. 1 B. 2 C. 3 D. 4
9. Which equation is **true** when the given value of x is substituted?
   A. $2x = x + 1$, if $x = 1$ C. $2(x+1) = x + 2$, if $x = 2$
   B. $2x - 1 = x + 2$, if x = 0 D. $2x + 1 = x$, if $x = 1$
10. Which is the verbal translation of $3x + 4 = 2x - 5$?
    A. Three times a number and four is less than five and twice the number.
    B. The sum of thrice a number and four is equal to the difference of twice the number and five.
    C. Thrice the sum of a number and four is twice the difference of the number of five.
    D. Three times four is equal to two times the opposite of five.

CONGRATULATIONS! If you got a score of 9 or 10, you should not have any difficulty studying the lesson in this module.

If you got a score of 8 or below, you may need to study the lesson more carefully and do all the given activities.

Lesson 2 Simple Equations Involving More Operations

In the previous lesson, you were taught how to solve for the unknown in simple equations. However, some equations have more than one variable term such as in 3x - 6 = 2x + 10. In this module, you will learn how to use different strategies to solve equations involving more operations.

This module will continue to enlighten us on the importance of algebra. Do the following activities to learn different problem-solving strategies.

What's In

Simple Equations Involving More Operations

Consider the following:

$5x + 1 = 3x + 7$	$y - 1 = 7$	$3m - 1 = 4$	$3(x + 1) = 2x + 8$
$b + 5 = 8 - 3$	$a = 8 - 5a$	$\frac{2}{5} + 2x = \frac{3}{5} - x$	$5b = 20$

Which equations has more than one term with variables?

Can you find the solution of each equation?

What's New

To answer the first question above, we group the given equations into two.

Equations with More than One Term with Variables	**Equations with Only One Term with Variable**
$5x + 1 = 3x + 7$	$b + 5 = 8 - 3$
$a = 8 - 5a$	$y - 1 = 7$
$\frac{2}{5} + 2x = \frac{3}{5} - x$	$5b = 20$
$3(x + 1) = 2x + 8$	$3m - 1 = 4$

To find the solution of each equation involving more terms with variables, the following discussion will be helpful.

What is It

Solving an equation means to find the value of the variable which will make the equation true. A basic technique in solving equations is to place all terms with variables on one side of the equation.

We must combine the terms with variables into a single term. We then find the value of the variable that will make the equation true.

There are terms in the equation which are called "like terms" because they have the same variable raised to the same exponent. For example, $5y$ and $6y$ are like terms, but $5y$ and $6m$ are not like terms. Like terms can be combined by adding their coefficients and copying the same variable. Thus:

$$5y + 6y = 11y\ .$$

To solve an equation, the following properties are helpful.÷

Addition Property of Equality:

- Add the same number to both sides of an equation.
- Subtract the same number from both sides of an equation.

Multiplication Property of Equality:

- Multiply the same nonzero number to both sides of an equation.
- Divide both sides of an equation by the same nonzero number.

Consider the given examples:

Example 1: Solve $3x + 7 = 2x + 12$.

Solution:	$3x + 7 = 2x + 12$	Write the equation.
	$3x + 7 - 7 = 2x + 12 - 7$	Subtract 7 from both sides of the equation.
	$3x = 2x + 5$	$7 - 7 = 0$, and $12 - 7 = 5$
	$3x - 2x = 2x - 2x + 5$	Subtract 2x from both sides of the equation. $3x - 2x = x$, and $2x - 2x = 0$
	x = 5	Answer

Example 2: Solve $5a + 3 = 3a + 4$.

Solution:	$5a + 3 = 3a + 4$	Write the equation.
	$5a + 3 - 3 = 3a + 4 - 3$	Subtract 3 from both sides of the equation.
	$5a = 3a + 1$	$3 - 3 = 0$, and $4 - 3 = 1$
	$5a - 3a = 3a - 3a + 1$	Subtract 3a from both sides of the equation. $5a - 3a = 2a$, and $3a - 3a = 0$
	$\frac{2a}{2} = \frac{1}{2}$	Divide both sides by 2 to find the value of a.
	$a = \frac{1}{2}$	Answer

Example 3: Find the solution of $3(y - 2) = 2y$.

Solution:	$3(y - 2) = 2y$	Write the equation.
	$3y - 6 = 2y$	Simplify by multiplying $3(y - 2)$
	$3y - 6 + 6 = 2y + 6$	Add 6 to both sides of the equation.
	$3y = 2y + 6$	$6 - 6 = 0$
	$3y - 2y = 2y - 2y + 6$	Subtract $2y$ from both sides of the equation. $3y - 2y = y$, and $2y - 2y = 0$
	$y = 6$	Answer

Application and Problem Solving

Example 4: Four times a number decreased by 5, is thrice the number increased by 10. What is the number?

Understand

a. What is asked?
   - The number

b. What are the given facts?
   - Four times a number decreased by 5, is thrice the number increased by 10.

Plan

Translate the sentence into an equation.

Four times a number decreased by 5, is thrice the number increased by 10.

Let x be the number.

$4x \quad - 5 \quad = \quad 3x \quad + 10$

Solve

Solution:

$4x - 5 = 3x + 10$	Equation formed
$4x - 3x - 5 = 3x - 3x + 10$	Subtract $3x$ from both sides of the equation
$x - 5 = 10$	Simplify
$x - 5 + 5 = 10 + 5$	Add 5 to both sides of the equation
$x = 15$	Answer

Answer

Therefore, the number is 15.

Check

Substitute $x = 15$ in the equation.

$4x - 5 = 3x + 10$	Original equation
$4\ (15) - 5 = 3\ (15) + 10$	Substitute $x = 15$.
$60 - 5 = 45 + 10$	Simplify.
$55 = 55$	True statement

Therefore, $x = 15$ is the solution to the equation $4x - 5 = 3x + 10$.

Activity

Directions: Solve the following problems. Show your solutions.

1. $5x - 6 = 4(x - 3)$
2. $4(x - 3) = 2 + 3(x - 1)$
3. Don Emilio, split his money amounting to P19,250,000.00 among his 3 children and a grandchild. Each child gets the same amount and the grandchild gets one half as much as each child gets. How much does each person receive?

In summary, in solving an equation, follow the steps below:

1. Write the equation.
2. Group similar terms on one side.
3. Perform the indicated operations.
4. Simplify the answer.
5. Check.

The problem-solving steps are stated below.

1. Understand
2. Plan
3. Solve
4. Answer
5. Check

This is the UPSAC method.

Did you understand the lesson? Well, if you do, work on the next activities. If not, review the previous lessons and activities.

What's More

Activity 1: Match Me

Directions: Match the equation in Column A with its solution in Column B.

Column A	Column B
1. $3x = x + 8$	a. 25
2. $3y + 2 = 5y - 4$	b. 10
3. $5\ (x - 2) = 4x$	c. 4
4. $16 - 5y = 9y + 2$	d. 3
5. $\frac{4}{5}x - 5 = \frac{3}{5}x$	e. 1

Activity 2: Know Me

Directions: Translate each equation into verbal sentences. Solve each equation.

1. $3x + 6 = 2x - 3$
2. $2x = 5x - 6$
3. $5 + 4x = 9 - 3x$

Activity 3: Compare Me

Directions: Compare the solutions of equations in each number. Use->, <, or = in the circle.

1. $2x + 5 = 3(x - 2)$ ◯ $3x - 1 = 2(x + 5)$
2. $3x + 4 = 6x - 2$ ◯ $4x + 3 = 2x + 6$
3. $2 + 3x = x - 6$ ◯ $3 + 2x = x - 1$
4. $2(3x - 1) = 5x$ ◯ $4x = 4 + 2(x + 3)$
5. $2x + 1 = 3(x + 1)$ ◯ $4x + 1 = 3(x + 1)$

If you get a score of 10 or more in these 3 activities, very good. To enhance more your abilities in solving word problems, try to answer the next activity.

What I Have Learned

Directions: Solve the problem below step by step using the UPSAC method.

Problem: The regular price of a bracelet was reduced by P20.00. Emily paid P140.00 for the bracelet. What was the regular price?

What I Can Do

Activity: Message Hunting

Directions: Find the value of the variable that will make each equation true. Match each letter with the correct answer in the code below to answer the question "*What is your idea about Math in your life"?*

1. 3x + 2 = x - 4, **H**
2. y + 4 = 5y – 8, **E**
3. 2b – 1 = b + 4, **F**
4. 2 + 7a = 4a - 4, **M**
5. 5y = 3y – 8, **A**
6. -4 + 3x = -2x + 6, **I**
7. 9a + 1 = 8a - 4, **T**
8. 2(x – 4) = 3(x – 3), **L**
9. 2x + 4 = 3(x – 1), **S**

CODE:

____	____	____	____	____	____	____	____	____	____
- 2	- 4	-5	-3	2	7	1	2	5	3

Assessment

Multiple Choice: Choose the letter of the correct answer. Write your answers on a separate answer sheet.

1. Which is **true** when the given value of x is substituted in the equation?
   A. $3x + 5 = 2x + 8$, if $x = 2$ C. $2x = 10 + 7x$, if $x = -2$
   B. $5x = x + 12$, if $x = 5$ D. $6x - 2 = 2x + 14$, if $x = 4$

2. Which equation is **true** if $y = 1$?
   A. $3y = 2y + 8$ C. $1 - 2y = 3y - 9$
   B. $4y + 5 = 3y + 6$ D. $y = 3y - 1$

3. Which equation has {2} as a solution set?
   A. $5x + 2 = 3x + 6$ C. $6(x + 1) = 2x + 10$
   B. $3x = x + 2$ D. $8x + 5 = 4x - 11$

4. What is the solution of $86 + 9a = 5a + 100$?
   A. 1 B. 2 C. 3 D. 4

5. What is the solution of $13y = 5y + 104$?
   A. 8 B. 11 C. 13 D. 15

6. Which equation is **FALSE** if $a = 2$?
   A. $6a + 1 = 4a + 5$ C. $5(a-3) = 2a + 3$
   B. $7a = 2a + 10$ D. $9a - 10 = 3a + 2$

7. What is the value of x that will make the equation $6(x - 5) = 3x + 12$ **TRUE**?
   A. 11 ` B. 12 C. 13 D. 14

8. Which is the mathematical translation of "The difference of five times a number and eight is four times the number increased by twenty."?
   A. $5x - 8 = 4x + 20$ C. $-5x + 8 = 4x + 20$
   B. $5(x + 8) = 4(x + 20)$ D. $8 - 5x = 4(x + 20)$

9. What is the solution of $11a = 6a + 35$?
   A. 4 B. 5 C. 6 D. 7

10. What is the value of x that will satisfy the equation $\frac{1}{2}x + 3 = x$?
    A. 6 B. 8 C. 10 D. 12

Got a score of 8-10? CONGRATULATIONS! Job well done. See you in the next lesson. If you scored below 8, you may have to go over the lesson and do the exercises again.

Additional Activities

A. **Directions:** Translate each problem into an equation, then solve for the unknown.

Find the number of calories in a lemon and mango if:

a. A mango has 40 calories more than that in a lemon.
b. Fifteen lemons have as many calories as 5 mangoes.

B. **Directions:** Solve the following problems.

1. The sum of thrice a number and 4 is the same as twice the number increased by 15. What is the number?
   A. 11 B. 14 C. 17 D. 19

2. What is the solution of $15a - 49 = 8a$?
   A. 6 B. 7 C. 8 D. 9

3. A videoke machine rental has two plans. Under Plan A, a videoke machine is rented for P 300.00 plus P 15.00 for each additional hour. Under Plan B, a videoke machine is rented for P 350.00 plus P 10.00 for each additional hour. What number of hours would result in the same cost?
   A. 5 B. 10 C. 15 D. 20

4. What is the value of y that will satisfy $5\ (2 - y) = 3y$?
   A. $\frac{2}{5}$ B. $\frac{4}{5}$ C. $\frac{5}{4}$ D. $\frac{5}{2}$

5. What is the value of x that will make the equation $6x - 7 = 3x + 11$ **TRUE**?
   A. 3 B. 4 C. 5 D. 6

Answer Key – Lesson 1

What I Know

1. B
2. A
3. C
4. C
5. D
6. A
7. C
8. B
9. A
10. C

What's In

1. c
2. a
3. e
4. f
5. b

What is It

1. a = 9
2. c = 1
3. b = 1

What's More

Looking Through Me

1. X = 4
2. X = 3
3. X = 8/3
4. X = -2
5. X = -3

Match, Match, Match

1. E
2. A
3. D
4. B
5. C

Guess Me, Guess Me

1. E
2. Q
3. U
4. A
5. T
6. I
7. O
8. N

What I Can Do

1. D
2. B
3. D
4. C
5. A

What I Have Learned

1. Equation
2. Variable
3. Constant
4. Solution of an Equation
5. Solving an Equation

Assessment

1. C
2. A
3. D
4. D
5. B
6. D
7. A
8. A
9. D
10. A

Additional Activities

1. 46
2. 8
3. P 6, 025.00
4. 12
5. 204

Lesson 2

What I Can Do

-2	M
-4	A
-5	T
-3	H
2	I
7	S
1	L
2	I
5	F
3	E

Assessment

1. D
2. B
3. A
4. B
5. C
6. C
7. D
8. A
9. B
10. A

Additional Activities

Equation:

$15a=5(a+40)$

- There are 20 calories in a lemon
- There are 60 calories in a mango

1. A
2. B
3. B
4. C
5. D

What I Know

1.	C
2.	D
3.	D
4.	D
5.	C
6.	A
7.	C
8.	C
9.	A
10.	B

What is It?

1. $5x - 6 = 4(x - 3)$
   $5x - 6+6 = 4x - 12+6$
   $5x + (- 4x) = 4x + (-4x)-12 + 6$
   $x = -6$
2. $4(x - 3) = 2 +3(x - 1)$
   $4x - 12 = 2 + 3x - 3$
   $4x + (-3x) -12 + 12 = -1 + 12$
   $x = 11$
3. Let x = represent each child's part
   ½ x = the grandchild's part

$x + x + x + ½\ x = 19{,}250{,}000$; ½ = 0.5

$3.5\ x = 19{,}250{,}000$; $x = \frac{19{,}250{,}000}{3.5}$

$x = 5{,}500{,}000$

Answer:

Each child will receive P5,500,000.00 and the grandchild will receive P2,750,000.00

What I Have Learned

Solutions:

- **Understand**
  a. What is asked?
     - What is the original price of the bracelet?
  b. What are the given facts?
     - The bracelet is reduced by P20.00
     - The bracelet amounted to P140.00
- **Plan**
     - Translate the phrase " the bracelet is reduced by P20.00 and the bracelet amounted to P140.00"
- **Solve**

Let x represent the original price of the bracelet

$x - 20 = 140$

Equation

$x - 20 = 140$
$x -20 + 20 = 140 + 20$
$x = 160$

- **Answer**

The original price of the bracelet is P160.00

- **Check**

Substitute $x = 160$ in the equation

$x - 20 = 140$
$160 - 20 = 140$
$140 = 140$

Therefore, P160 is the original price of the bracelet

What's More

Match Me Know Me

1. C 1. Thrice a number added by six is twice that
2. D number minus three ; x = -9
3. B 2. Twice a number is five times a number less
4. E six ; x = 2
5. A 3. Five added by four times a number is equal to nine minus thrice a number. ; $x = 4/7$

Compare Me

1. = 2. > 3. = 4. < 5. =

References

Lumbre, Angelina P. and Ursua, Alvin C.. 2016. *21st Century Mathletes 5 Textbook*. Quezon City: Vibal Group, Inc.

Project EASE (Effective and Alternative Secondary Education) Module. Pasig City.

For inquiries or feedback, please write or call:

Department of Education - Bureau of Learning Resources (DepEd-BLR)

Ground Floor, Bonifacio Bldg., DepEd Complex
Meralco Avenue, Pasig City, Philippines 1600

Telefax: (632) 8634-1072; 8634-1054; 8631-4985

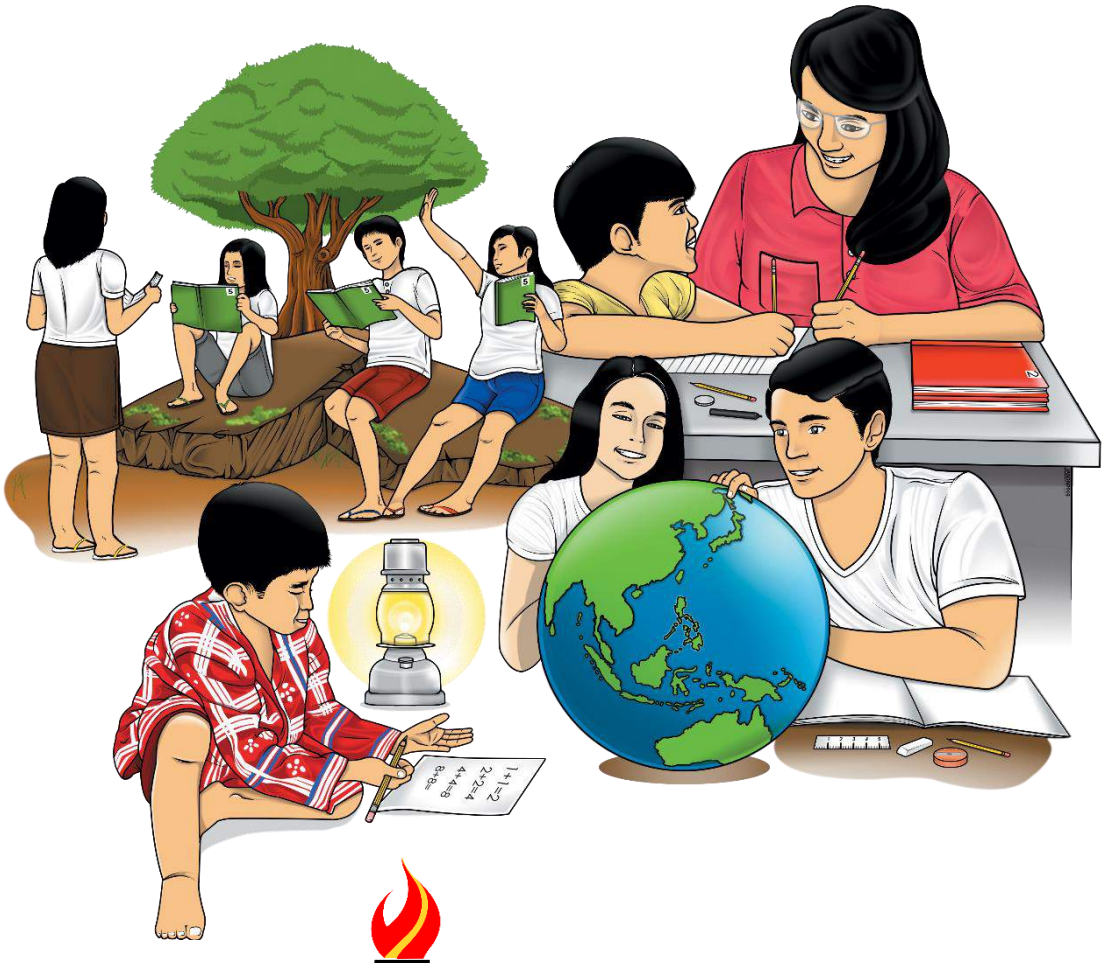
Email Address: blr.lrqad@deped.gov.ph * blr.lrpd@deped.gov.ph

5

DepED
DEPARTMENT OF EDUCATION

Mathematics

Quarter 3 – Module 15: Measures Time Using 12-Hour and 24-Hour Clock



ALTERNATIVE DELIVERY MODE
ADM

GOVERNMENT PROPERTY
NOT FOR SALE

Mathematics – Grade 5
Alternative Delivery Mode
Quarter 3 – Module 15: Measures Time using 12-hour and 24-hour clock
First Edition, 2020

Republic Act 8293, Section 176 states that: No copyright shall subsist in any work of the Government of the Philippines. However, prior approval of the government agency or office wherein the work is created shall be necessary for exploitation of such work for profit. Such agency or office may, among other things, impose as a condition the payment of royalties.

Borrowed materials (i.e., songs, stories, poems, pictures, photos, brand names, trademarks, etc.) included in this book are owned by their respective copyright holders. Every effort has been exerted to locate and seek permission to use these materials from their respective copyright owners. The publisher and authors do not represent nor claim ownership over them.

Published by the Department of Education
Secretary: Leonor Magtolis Briones
Undersecretary: Diosdado M. San Antonio

Development Team of the Module

Writer : Ma. Lourdes G. Tangaran, Danilo S. Jadulco

Editor : Robirth Ornopia

Reviewer : Renato S. Cagomoc, Rolando Lacbo, Joshua Sherwin T. Lim, Miguel Jr. V. Dumas

Illustrator : Razle L. Jabelo

Layout Artist : Joey Sustitudo , Joan T. Briz

Management Team:

Ma. Gemma M. Ledesma
Arnulfo R. Balane
Rosemarie M. Guino
Joy B. Bihag
Ryan R. Tiu
Sarah S. Cabaluna
Thelma Cabadsan-Quitalig
Elena S. De Luna
Renato S. Cagomoc
Noel E. Sagayap
Geraldine P. Sumbise
Joshua Sherwin T. Lim

Printed in the Philippines by

Department of Education – Region VIII

Office Address: DepEd Regional Office No. 8, Candahug, Palo, Leyte

Telefax: (053)-832-2997

E-mail Address: region8@deped.gpv.ph

5

Mathematics

Quarter 3 – Module 15: Measuring Time Using 12-Hour and 24-Hour Clocks

DepED
DEPARTMENT OF EDUCATION

Introductory Message

This Self-Learning Module (SLM) is prepared so that you, our dear learners, can continue your studies and learn while at home. Activities, questions, directions, exercises, and discussions are carefully stated for you to understand each lesson.

Each SLM is composed of different parts. Each part shall guide you step-by-step as you discover and understand the lesson prepared for you.

Pre-tests are provided to measure your prior knowledge on lessons in each SLM. This will tell you if you need to proceed on completing this module or if you need to ask your facilitator or your teacher's assistance for better understanding of the lesson. At the end of each module, you need to answer the post-test to self-check your learning. Answer keys are provided for each activity and test. We trust that you will be honest in using these.

In addition to the material in the main text, Notes to the Teacher are also provided to our facilitators and parents for strategies and reminders on how they can best help you on your home-based learning.

Please use this module with care. Do not put unnecessary marks on any part of this SLM. Use a separate sheet of paper in answering the exercises and tests. And read the instructions carefully before performing each task.

If you have any questions in using this SLM or any difficulty in answering the tasks in this module, do not hesitate to consult your teacher or facilitator.

Thank you.

What I Need to Know

Hi, mathletes☺. Time influences our daily activities so it is good to keep track of it. We have to use our time wisely. From ancient times to about the end of the sixteenth century, sundials were used to tell time. Later, the candle clock and water clock were invented. Today, we have more sophisticated watches, digital clocks, and other electronic devices to help us tell time. Remember to place a.m. or p.m. to indicate the use of the 12-hour clock format and H or Hour for the 24-hour clock format.

When you finish this module, you will be able to:

- measure time using a 12-hour and 24-hour clocks.

What I Know

Directions: Choose the letter of the correct answer. Write your answers on a separate sheet.

1. How many days are there in 48 hours?
   A. 2 B. 3 C. 4 D. 5

2. What time is 1 hour and 30 minutes after 6:00 in the morning?
   A. 7:30 p.m. B. 4:30 p.m. C. 7:30 a.m. D. 4:30 a.m.

3. What time in the 24- hour format is 11:45 a.m.?
   A. 23:45 H B. 11:45 a.m. C. 23:45 p.m. D. 11:45 H

4. What is 90 seconds when expressed in minutes and seconds?
   A. 90 minutes C. 1 minute and 30 seconds
   B. 1 minute and 20 seconds D. 1 minute and 40 seconds

5. What is 16:40 hours military time when expressed in 12-hour time?
   A. 16:40 p.m. B. 4:40 a.m. C. 4:40 p.m. D. 4:40 H

6. Junior high school students end their class at 5:00 p.m. What time is it in the 24-hour format?
   A. 15:00 H B. 17:00 a.m. C. 17:00 p.m. D. 17: 00 H

7. Office hours usually starts at 8 a.m. What is this time in 24-hour format?.
   A. 8:00 a.m. B. 08:00 H C. 20:00 p.m. D. 20:00 H

8. How many hours are there in one and a half days?
   A. 36 B. 30 C. 44 D. 48

9. What time is 5 minutes to 1:00 in the afternoon in 12-hour format?
   A. 12:55 a.m. B. 12:55 p.m. C. 12:55 H D. 1: 05 p.m.

10. What time is 12:00 midnight in military time?
    A. 00.00 H B. 00.00 p.m. C. 00.00 a.m. D. 00.00 mn

What's In

Recall the units of time conversion.

Units of Time Conversion Table
1 millennium = 10 centuries
1 century = 10 decades
1 decade = 10 years
1 year = 12 months
1 month = 4 weeks
1 week = 7 day
1 day = 24 hours
1 hour = 60 minutes
1 minute = 60 seconds

Alfred wants to be on time. He is working from home. The table shows his morning routine and time spent for each task.

If Alfred starts his work at 7: 30 a.m. What time should he wake up to be able to do all activities in his morning routine before starting his work? What is the allocated period of time or scheduled time for each morning routine?

Morning Routine	**Time Needed**	**Scheduled Time**
Prayer	5 minutes	
Cleaning of Bed	10 minutes	
Breakfast	25 minutes	
Bath	20 minutes	
Dressing up	30 minutes	
Work	8 hours	7:30 a.m. to 3:30 p.m.

What's New

What time should Alfred wake up? What is the total time needed for his morning routine?

Add the time spent for each task before work:

5 + 10 + 25 + 20 + 30 = 90 minutes

Therefore, Alfred needs 90 minutes for his morning routine before work.

Use ratio and proportion to convert 90 minutes to hours:

1 hour: 60 minutes = n hours: 90 minutes

$$\frac{1}{60} = \frac{n}{90}$$

$$60n = 90$$

$$n = \frac{90}{60}$$

n = 1.5 hours or 1 hour and 30 minutes

90 minutes is equal to 1 hour and 30 minutes.

Subtract 1 hour and 30 minutes from 7:30 AM:

hour: minutes

7:30 a.m.

\-

1:30

_____

6:00 a.m.

Thus, Alfred should wake up at 6:00 a.m. to have enough time for his morning routine and be ready for work on time.

Be familiar with the following terms that are used in telling time.

1. *Midnight:* 12:00 a.m
2. *Quarter* = ¼ hour = 15 minutes
3. *Half* = ½ hour = 30 minutes
4. 20 minutes *after* 9 in the morning*:* add 20 minutes to the current time 9:00 a.m.
5. 5 minutes *before* 12 noon: subtract 5 minutes from the current time 12:00 p.m.
6. 10 minutes *past* 12 midnight: add 10 minutes to the current time 12:00 a.m.
7. *Quarter to* 2 in the afternoon*:* means *before*; subtract 15 minutes from the current time 2:00 p.m.

Example:

1. What will be the time 3 hours and 10 minutes after 4:20 p.m.?

Solution: Add 3 hours to 4:20 pm. That is, 3:00 + 4:20 = 7:20 p.m.
Add 10 minutes to 7:20 p.m. That is, 00:10 + 7:20 p.m. = 7:30 p.m.

The answer is 7:30 p.m.

2. What time is 40 minutes past 3:30 p.m.?
   Solution: Add 40 minutes to 30 minutes. The answer is 70 minutes. Since 60 minutes is equal to 1 hour, rewrite 70 minutes as 60 minutes + 10 minutes. Then, add 1 to 3 for hours and annex the 10 minutes. Thus

   70 minutes = 60 minutes + 10 minutes
   70 minutes = 1 hour + 10 minutes
   1:10 + 3:00 = 4:10 p.m.

   The answer is 4:10 p.m.

3. What time is 1 hour and 20 minutes before 8:00 a.m.?

   Solution: Subtract 1 hour and 20 minutes from 8:00 a.m.
   Since 60 minutes is equal to 1 hour, rewrite 8:00 as 7 hours: 60 minutes. Subtract 1 from 7 and 20 from 60 minutes, thus,

   8:00 = 7: 60
   Subtract: 7 - 1 = 6 and 60 - 20 = 40 minutes.

   The answer is 6:40 a.m.

Activity:

Directions: Identify the time indicated.

1. 2 hours and 15 minutes before 4:35 p.m. _____
2. 10 minutes to midnight _____
3. Quarter after 8:55 a.m. _____
4. 1 hour and 45 minutes after 9:00 a.m. _____
5. Half past 6 in the evening _____

What Is It

You can tell time in 12-hour or 24-hour format. The table below shows correspondence between the 12-hour clock and 24-hour clock.

12-hour Clock	24-hour Clock
12:00 midnight	00:00 H
12:01 a.m. – 11: 59 a.m.	00:01 H – 11:59 H
12: 00 noon - 11:59 p.m.	12:00 H – 23:59 H

The 12-hour and 24-hour clocks are both written in the format:

Hours: Minutes

The 12-hour clock uses the abbreviations a.m. and p.m. after the time.

The 24-hour clock does not have a.m. and p.m.. It uses H for hours.

1:00 p.m. becomes 13:00 in 24-hour clock

Examples:	
9:05 a.m. is 9:05 H	9:05 p.m. is 21:05 H
7:27 a.m. is 7:27 H	7:27 p.m. is 19:27 H
12:10 a.m. is 00:10 H	12:10 p.m. is 12:10 H

For the 12-hour clock, a.m. and p.m. are placed to tell if the time is in the morning or afternoon.

***Ante meridiem* (a.m., A.M., AM)** means this time is from midnight until morning before noon, that is, 12:00 a.m. to 11:59 a.m.

***Post meridiem* (p.m., P.M., PM)** means this time is the afternoon before midnight, that is, 12:01 noon to 11:59 p.m.

The 12-hour clock runs from 12 midnight (12:00 a.m.) to 11:59 a.m. and then from 12 noon (12:00 p.m.) to 11:59 p.m.

The 24-hour clock, is often called **military clock** or **military time.** It starts at 00:00 which is midnight, until 23:59 (11:59 pm). It does not require a.m. and p.m. to be written after the time. Instead, H or hours is placed to indicate the use of the 24-hour clock format. The 24-hour notation without H is also accepted.

Changing 12-hour clock (a.m./p.m.) to 24-hour clock

1. **Add 12** to any hour after noon (**1:00 p.m. to 11:59 p.m.**).

   Example: Change the following in 24-hour time format.

   a. 4:45 p.m.
   b. 11:30 p.m.

   Solution:

   a. Add 12 to 4:45 p.m.
      4:15 + 12 = 16:45
      The 24-hour time format of 4:45 p.m. is 16:45H.

   b. Add 12 to 11:30 p.m.
      11:30 + 12 = 23:30
      The 24-hour notation of 11:30 p.m. is 23:30H.

2. Subtract 12 for the first hours of the day (**12 midnight to 12:59 a.m.**)

   Example: Change the following to the 24-hour time format.

   a. 12:35 a.m.
   b. 12 midnight

   Solution:

   a. Subtract 12 from 12:35 a.m.
      12:35 – 12 = 0:35
      The 24-hour time format of 12:35 a.m. is 0:35 H.

   b. Subtract 12 from 12 midnight.
      12:00 – 12 = 0:00
      The 24- hour notation of 12 midnight is = 0:00 H.

3. Retain hours: minutes format and use H instead of a.m. from 1:00 a.m. to 11:59 a.m.

   Example: Change 11:30 a.m. in 24-hour time format.

   Answer: 11:30 H

Changing 24-hour clock to 12-hour clock

The following simple steps will help you change a 24-hour time to a 12-hour time with 'a.m.' and 'p.m.'.

- If the hour is exactly 12, simply annex p.m. to the time.
- If the hour is 00, change it to 12 and annex a.m. to the time.
- If the hour is greater than 12, simply subtract 12 from the hour and annex p.m. to the time.
- If the hour is less than 12, simply annex a.m. to the time and take away any leading zeros.

Note: The minutes and seconds never change when changing between 24 hour and 12-hour times.

Examples

1. Change 14:36 to 12-hour format.
   Solution: Subtract 12 from 14 and annex p.m. to the time, thus

   14:36 – 12 = 2:36 p.m.

2. Change 00:45 to 12-hour format.
   Solution: Change 00 to 12 and annex a.m. to the time, thus

   00:45 = 12:45 a.m.

3. Change 20:36 to 12-hour format.
   Solution: Subtract 12 from 20 and annex p.m. to the time, thus

   20:36 – 12 = 8:36 p.m.

4. Change 02:12 to 12-hour format.
   Solution: Simply annex a.m. to the time and take away the zero before the hour 2.

   02:12 = 2:12 a.m.

Activity: Filling Me- Up

Directions: Fill in the correct time in each blank. Write your answer on a separate answer sheet.

Number	12-hour	24-hour	Number	12-hour	24-hour
1.	5:59 p.m.		3.		18:45 H
2.		14:24 H	4.	7:05 a.m.	

What's More

Activity 1: Change Me

Directions: Change the 24-hour clock times to 12-hour clock times.

12-hour clock	24-hour clock	12-hour clock	24-hour clock
	04:25 H		16:25 H
	09:20 H		21:20 H
	02:55 H		14:55 H

Activity 2: Change Me More
Directions: Change the 12-hour clock times to 24-hour clock times.

12-hour clock	24-hour clock	12-hour clock	24-hour clock
4:25 a.m.		4:25 p.m.	
9:20 a.m.		9:20 p.m.	
2:55 a.m.		2:55 p.m.	

Activity 3. Fill Me More

Directions: Express the following times in 12-hour and 24-hour clock formats.

	Time	12-hour clock	24-hour clock
1.	10 minutes past 05:00H		
2.	30 minutes to 7:00 p.m.		
3.	Noon		
4.	quarter after 4:00 a.m.		
5.	1 hour and 10 minutes before 8:45 p.m.		

What I Have Learned

Activity: Modified True or False

Directions: Write **True** if the statement is correct. If the statement is incorrect, change the underlined word(s) to make it correct.

1. Quarter means ¼ an hour.
2. Ante Meridiem (a.m.) means the time is before 12 midnight and after 12 noon.
3. Post Meridiem (p.m.) means the time is after 12 noon and before 12 midnight.
4. 12-hour clock were used by soldiers.
5. "Before" in "5 minutes before 1 PM" means you have to add from the current time.

What I Can Do

Directions: Tell the time. Choose the letter of the correct answer. Write your answers on a separate sheet.

1. I am between 15:00H and quarter past 3 in the afternoon. What time am I?
   A. 3:05 a.m. B. 3:45 a.m. C. 3:05 p.m. D. 3:45 p.m.

2. My hour will not change in the next 20 minutes. What time am I?
   A. 12:35 B. 1:45 C. 11:50 D. 2:40

3. I am quarter to 10 in the evening. What time am I?
   A. 9:45 a.m. B. 10:15 a.m. C. 10:15 p.m. D. 9:45 p.m.

4. I am half past 8 in the morning. What time am I?
   A. 7:30 a.m. B 8:30 a.m. C. 7:30 p.m. D. 8:30 p.m.

5. My time corresponds to midnight. What time am I?
   A. 0:00 B. 0:05 C. 11:59 D. 12:00

Assessment

Directions: Choose the letter of the correct answer.

1. How many hours are there in 2 days?
   A. 24 B. 36 C. 44 D.48

2. What time is 2 hours and 30 minutes after 8:00 in the evening?
   A. 10:30 p.m. B.10:30 H C. 10:30 a.m. D. 10:30

3. Office hours usually starts at 8 a.m. What is this time in a 12-hour format?.
   A. 8:00 a.m. B. 08:00 H C. 20:00 p.m. D. 20:00 H

4. How many hours are there in 3 days?
   A. 36 B. 48 C. 72 D. 60

5. What is 15 minutes to 2:00 in the afternoon in 24-hour format?
   A. 14:45 p.m. B. 14:45 a.m. C. 14:45 H D. 13: 45 H

6. What is 12:00 midnight in military time?
   A. 00.00 H B. 00.00 p.m. C. 00.00 a.m. D. 00.00 m.n.

7. How will you write 10:45 p.m. in 24-hour format?
   A. 22:45 H B. 20:45 H C. 10:45 p.m. D. 10:45 a.m.
   B.
8. What is 75 seconds when expressed in minutes and seconds?
   A. 75 minutes C. 1 minute and 20 seconds
   C. 1 minute and 25 seconds D. 1 minute and 15 seconds
   D.
9. How will you express 08:40 hours military time in 12-hour time?
   A. 6:40 p.m. B. 8:40 a.m. C. 8:40 p.m. D. 8:40 H

10. Classes of elementary pupils end at 4:00 p.m. What is this time in 24-hour format?
    A. 04:00 H B. 04:00 p.m. C. 16:00 H D. 16: 00 p.m.

Additional Activities

Directions: Change the 12-hour clock times in 24-hour clock format. Write your answers on a separate sheet.

Example: 3:00 p.m. = 15:00 H

1. 6:45 p.m.
2. 5:15 p.m.
3. 4:15 p.m.
4. 7:15 p.m.
5. 8:05 p.m.

Answer Key

Assessment	Additional Activities		What I Know
1. D	1. 18.45 H		1. A
2. A	2. 17:15 H		2. C
3. A	3. 16.15 H		3. D
4. C	4. 19:15 H		4. C
5. D	5. 20:05 H		5. C
6. A			6. D
7. A	**What's More**		7. B
8. D			8. A
9. B	**Change Me**		9. B
10. C	1. 4:25 a.m.	4:25 p.m.	10.A
What I Can Do	2. 9:20 a.m.	9:20 p.m.	
1. C	3. 2:55 a.m.	2:55 p.m.	**What's New**
2. A			
3. D	**Change Me More**		1. 2:20 p.m.
4. B	1. 04:25H	16:25H	2. 11:50 p.m.
5. A	2. 09:20H	21:20H	3. 9:10 a.m.
What is It	3. 02:55H	14:55H	4. 10:45 a.m.
1. 17:59H	Fill Me More		5. 6:30 p.m.
2. 2:24 p.m.	12 – hour	24 - hour	
3. 6:45 p.m.	1. 5:10 a.m.	0?5:10H	**What I have**
Learned			
4. 07:05H	2. 6:30 p.m.	18:30H	1. True
What's In	3. 12:00 noon	12:00H	2. After, before
1. 6:00-6:05 a.m.	4. 4:15 a.m.	04:15H	3. True
2. 6:05-6:15 a.m.	5. 7:35 p.m.	19:35H	4. 24-hour
3. 6:15-6:40 a.m.			5. subtract
4. 6:40-7:00 a.m.			
5. 7:00-7:30 a.m.			

References

Lumbre, Angelina P. and Ursua, Alvin C. 2016. *21st Century Mathletes 5 Textbook*. Quezon City: Vibal Group, Inc.

Mathematics Grade 5 Teacher's Guide

"*24-Hour Clock Conversion Worksheets"*
https://www.mathsalamanders.com/24-hour-clock-conversion.ht

For inquiries or feedback, please write or call:

Department of Education - Bureau of Learning Resources (DepEd-BLR)

Ground Floor, Bonifacio Bldg., DepEd Complex
Meralco Avenue, Pasig City, Philippines 1600

Telefax: (632) 8634-1072; 8634-1054; 8631-4985

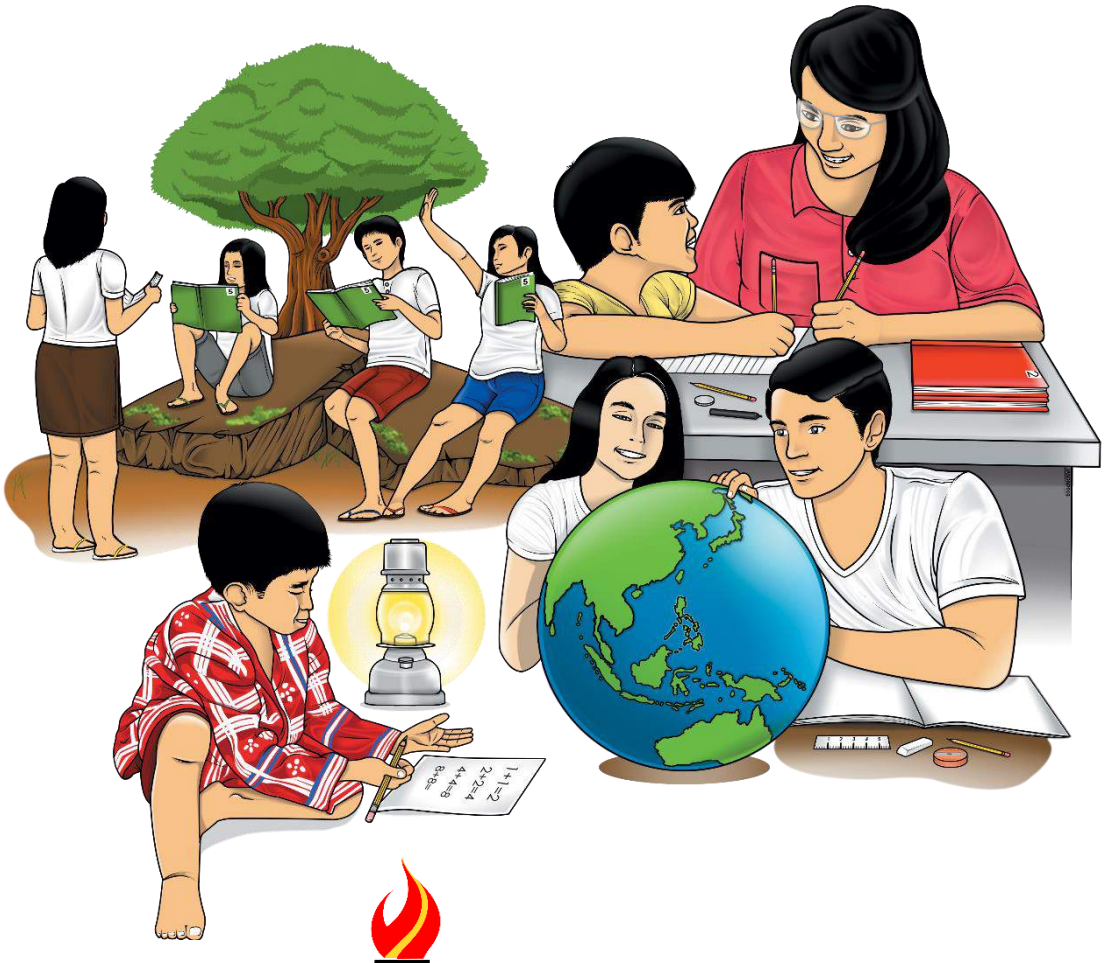
Email Address: blr.lrqad@deped.gov.ph * blr.lrpd@deped.gov.ph

5

DepED
DEPARTMENT OF EDUCATION

Mathematics

Quarter 3 – Module 16: Calculating Time in Different World Time Zones



ALTERNATIVE DELIVERY MODE
ADM

GOVERNMENT PROPERTY
NOT FOR SALE

Mathematics – Grade 5
Alternative Delivery Mode
Quarter 3 – Module 16: Calculating Time in Different World Time Zones
First Edition, 2020

Republic Act 8293, Section 176 states that: No copyright shall subsist in any work of the Government of the Philippines. However, prior approval of the government agency or office wherein the work is created shall be necessary for exploitation of such work for profit. Such agency or office may, among other things, impose as a condition the payment of royalties.

Borrowed materials (i.e., songs, stories, poems, pictures, photos, brand names, trademarks, etc.) included in this book are owned by their respective copyright holders. Every effort has been exerted to locate and seek permission to use these materials from their respective copyright owners. The publisher and authors do not represent nor claim ownership over them.

Published by the Department of Education
Secretary: Leonor Magtolis Briones
Undersecretary: Diosdado M. San Antonio

Development Team of the Module

Writer	**:** Ma. Lourdes G. Tangaran
Editor	**:** Niann L. Atis, Geraldine P. Sumbise
Reviewers	**:** Renato S. Cagomoc, Rolando Lacbo, Joshua Sherwin T. Lim**,** Riza P. Palconit
Illustrator	**:** Salvacion Sarmiento
Layout Artist	**:** Joey Sustitudo, Joan T. Briz
Management Team:	Ma. Gemma M. Ledesma Arnulfo R. Balane Rosemarie M. Guino Joy B. Bihag Ryan R. Tiu Sarah S. Cabaluna Thelma Cabadsan-Quitalig Elena S. De Luna Renato S. Cagomoc Noel E. Sagayap Geraldine P. Sumbise Joshua Sherwin T. Lim

Printed in the Philippines by

Department of Education – Region VIII

Office Address: DepEd Regional Office No. 8, Candahug, Palo, Leyte

Telefax: (053)-832- 2997

E-mail Address: region8@deped.gov.ph

5

Mathematics

Quarter 3 – Module 16: Calculating Time in Different World Time Zones

DepED
DEPARTMENT OF EDUCATION

Introductory Message

This Self-Learning Module (SLM) is prepared so that you, our dear learners, can continue your studies and learn while at home. Activities, questions, directions, exercises, and discussions are carefully stated for you to understand each lesson.

Each SLM is composed of different parts. Each part shall guide you step-by-step as you discover and understand the lesson prepared for you.

Pre-tests are provided to measure your prior knowledge on lessons in each SLM. This will tell you if you need to proceed on completing this module or if you need to ask your facilitator or your teacher's assistance for better understanding of the lesson. At the end of each module, you need to answer the post-test to self-check your learning. Answer keys are provided for each activity and test. We trust that you will be honest in using these.

In addition to the material in the main text, Notes to the Teacher are also provided to our facilitators and parents for strategies and reminders on how they can best help you on your home-based learning.

Please use this module with care. Do not put unnecessary marks on any part of this SLM. Use a separate sheet of paper in answering the exercises and tests. And read the instructions carefully before performing each task.

If you have any questions in using this SLM or any difficulty in answering the tasks in this module, do not hesitate to consult your teacher or facilitator.

Thank you.

What I Need to Know

Hi, Mathletes! The International Meridian Conference was held in October 1884, in Washington, D.C. to determine a prime meridian for international use. The conference discussed the choice of a meridian to be employed as a common zero of longitude and as the standard of time reckoning throughout the world. It resulted in the recommendation of the Greenwich Meridian as the international standard for zero degrees longitude. That's when the different time zones started.

In this module you are going to learn how to calculate time in different world time zones in relation to the Philippines. To do this, we need to use the world time zone map to easily understand the time differences.

When you finish this module, you will be able to:

* perform calculations with time in different time zones in relation to the Philippines,
* calculate 12-hour and 24-hour clock times and conversions between time zones in relation to the Philippines, and
* appreciate the importance of the world time zone map for us to easily understand the time difference.

Before you start exploring the lesson, let us check if you are familiar with calculating time in different world time zones.

What I Know

Directions: Choose the letter that corresponds to the correct answer. A score of 10 is excellent, 8-9 is very good, and a score of 5-7 is good.

1. What is the name of the imaginary lines in which time at different places on earth depend on?
   A. Prime Meridian
   B. Lines of Latitude
   C. Lines of Longitude
   D. International Date Line

2. Before the 19th century, the standard for clocks was usually inspired by the sun and star patterns. Which branch of science deals with the study of celestial bodies and their movements?
   A. Astrology
   B. Astronomy
   C. Cosmetology
   D. Meteorology

3. Which of the following shows midnight in a 24-hour clock?
   A. 12:00 a.m.
   B. 12:00 H
   C. 24:00 H
   D. 0:00 H

4. Each time zone is 15 degrees wide. What is the time difference between each time zone?
   A. 1 hour
   B. 4 hours
   C. 6 hours
   D. 12 hours

5. Which describes the current time for different areas of the world?
   A. Time Zone
   B. Lines of Latitude
   C. Greenwich Meridian
   D. International Time

6. If it is 11:30 a.m. in the Philippines, what is its equivalent time in India?
   A. 14:00H
   B. 2:30 p.m.
   C. 9:00 a.m.
   D. 9:00 p.m.

7. How many hours is the time difference between Philippine Standard Time and Buenos Aires, Argentina?
   A. –11 hours
   B. +11 hours
   C. -12 hours
   D. +12 hours

8. The rotation of the earth is related to time and different time zones in the world. How many hours would it take the earth to move 15 degrees on its axis?
   A. 5
   B. 3
   C. 1
   D. 0

9. What time would it be in Calbayog City, Philippines if it is 3:00 a.m. in Riyadh, Saudi Arabia?
   A. 5:00 a.m.
   B. 8:00 a.m.
   C. 5:00 p.m.
   D. 8:00 p.m.

10. If it is 16:00 H in Tacloban City, what time is it in San Francisco, California?
   A. 12:00 a.m.
   B. 1:00 p.m.
   C. 12:00 noon
   D. 13:00 H

Lesson 1 Calculating Time in the Different World Time Zones

Knowing the time zones is very important for communication and travel. To be able to identify and calculate time zones, you must know the terms like lines of longitude, prime meridian, and International Date Line. Understanding the different time zones and calculating time in the different world time zones is a plus skill.

Have you ever experienced a time change? Are you curious to know how time zones differ around the world? Let's explore.

What's In

Let us review. In the 24-hour clock system, time is written as the number of hours that have passed since midnight. It is not divided in 2 parts of 12 hours each, but it continues for a period of 24 hours. The 12-hour clock runs from 12 a.m. (midnight) to 12 noon, and then from 12 p.m. to 12 midnight. The 24- hour clock uses the numbers 00:00 to 23:59 (midnight is 00:00). The 24-hour clock is a time keeping convention where the day runs from midnight to midnight and is split into 24 hours.

1 a.m.→01:00 H 2 a.m.→02:00 H 4 a.m.→04:00 H

To convert 12-hour clock (AM/PM) to 24-hour clock, add 12 to any hour after noon,-and subtract 12 for the first hour of the day.

Example: from 1:00 p.m. to 11:59 p.m., add 12 hours;

4:45 p.m. = 16:45 H 11:30 p.m. = 23:50 H

For the first hour of the day (12 Midnight to 12:59 a.m.), subtract 12 hours.

Example: 12:35 a.m. = 0:35 H 12 Midnight = 0:00 H

Let's see if you can recall how to measure time using 12-hour and 24-hour clocks.

Answer the questions below. Give the equivalent time.

1) How do we write 4:30 a.m. in a 24-hour time format?
2) What time in 24-hour format is 12:15 p.m.?
3) What is the equivalent time of 17:54 H in a 12-hour clock format?
4) How do we write 16:30 H in a 12-hour clock format?
5) How is 9:15 p.m. written in a 24-hour clock format?

What's New

This module is going to guide you how to calculate time in different world time zones in relation to the Philippines.

Time zones define and establish the appropriate time within individual countries and regions.

Every country may have a particular standard time zone which is convenient for its world cooperation. The time zones obey specific rules referring to geographical principles of longitude. The standard time appears to be a tool used by the whole world to facilitate the processes of people's life.

If you have been to a courier or airport, or hotels and remittance centers, you will notice that there are several clocks displaying different times. Study the clocks below and analyze the problem.

Your sister works as a nurse in one of the hospitals in Sydney, Australia. She is a front liner treating COVID-19 patients, since the pandemic started. She calls every 7:00 p.m. in the Philippines to check if your parents and other siblings are all okay.

Imagine that you are living in Sydney with your sister. What time is it in Sydney when your sister makes these calls?

What Is It

Time Zones have an enormous impact on business, communication, and world management. How did it all begin?

In October 13, 1884, U.S. President Chester Alan Arthur convened the **International Meridian Conference** in Washington. It was attended by 41 delegates from 25 nations. The conference established that the meridian passing through the Royal Observatory at Greenwich would be the world's Prime Meridian. All longitude lines would be measured both east and west from it up to180 degrees. The conference also established **Greenwich Mean Time** as a standard for astronomy and setting time zones.

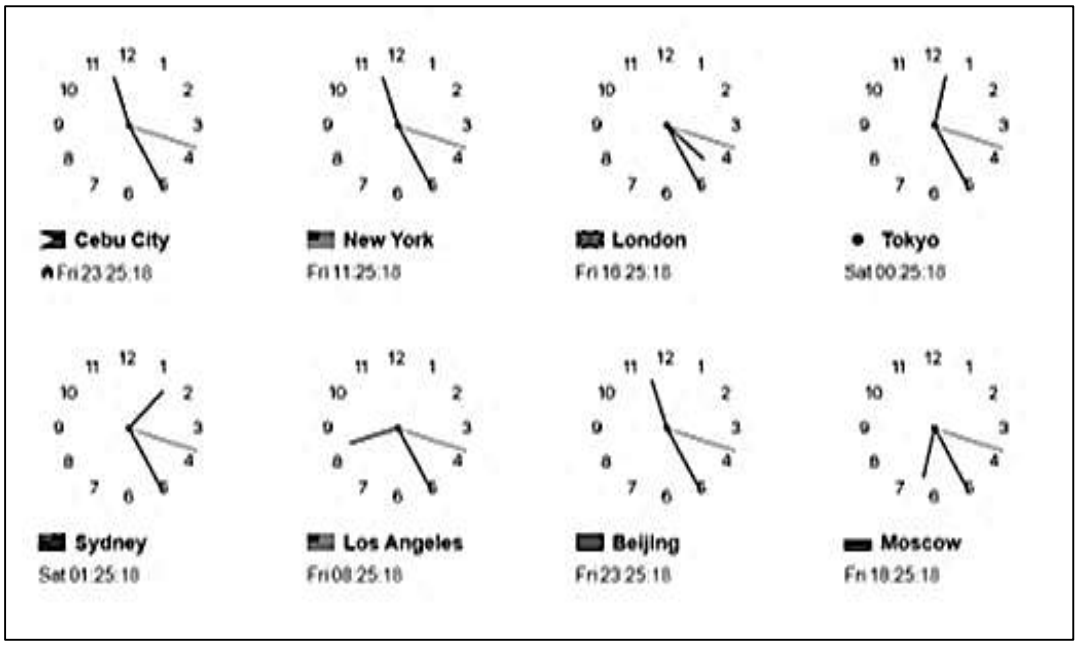
Viewing a cross section of the globe from the north pole coordinates are presented

A **time zone** is a region of the globe that observes a uniform standard time for legal, commercial and social purposes. Time zones tend to follow the boundaries of countries and their subdivisions instead of strictly following longitude. Below is a time zone map showing an example of the way time zones are divided.

Different times at different places in the world are caused by the movement of the Earth, 15 degrees longitude every hour. Since there are 24 hours in a day, there are 24 standard time zones. Note that 24 hours x 15◦ = 360◦. Time zones are counted from the Prime Meridian or at 0◦ longitude. Each time zone is counted at 15◦ intervals and extends 7½◦ to the left and to the right of a central meridian.

For example, if it is 11:25 p.m. in the Philippines, it is also 11:25 p.m. in the places 7½◦ to the left and right of the Philippines. If it is 8:25 a.m. in Los Angeles, it is also 8:25 a.m. in the places 7½◦ to the left and to the right of Los Angeles.

Suppose today is Friday and the time is 11:25 p.m. (23:15 H) in Cebu City. It is also Friday in New York City but the time is 11:25 a.m. In another time zone, it is Saturday, 00:25 H, in Tokyo, Japan, while in Los Angeles, California it is still Friday, 8:25 a.m. Why is this so? Study the clocks below.



To see the relationship of time in certain places to the time in the Philippines, take a look at the table below and note that (+) means **ahead** and (-) means **behind**. Use this table in identifying the time in a particular place as how it is related to the time in our country.

Cities/Countries	**Difference from Philippine Standard Time (PST)**	**Example**
Manila, Philippines	**PST**	**Saturday, 03:00 H**
Buenos Aires, Argentina	-11	Friday, 16:00 H
Madrid, Spain	-7	Friday, 20:00 H
Canberra, Australia	+3	Saturday, 06:00 H
London, England	-8	Friday, 19:00 H
Beijing, China	SAME	Saturday, 03:00 H
Cairo, Egypt	-6	Friday, 21:00 H
Milan, Italy	-7	Friday, 20:00 H
Athens, Greece	-6	Friday, 21:00 H
New Delhi, India	-2:30	Saturday, 00:30 H
Singapore, Singapore	SAME	Saturday, 03:00 H
Tokyo, Japan	+1	Saturday, 04:00 H
Ontario, Canada	-13	Friday, 14:00 H
Paris, France	-7	Friday, 20:00 H
Honolulu, Hawaii	-18	Friday, 09:00 H
Sydney, Australia	+3	Saturday, 05:00 H
Vientiane, Laos	-1	Saturday, 02:00 H
Wellington, New Zealand	+5	Saturday, 08:00 H
Warsaw, Poland	-7	Friday, 20:00 H
Moscow, Russia	-5	Friday, 22:00 H
New York, USA	-13	Friday, 14:00 H
Riyadh, Saudi Arabia	-5	Friday, 22:00 H
Caracas, Venezuela	-12	Friday, 15:30 H
Washington, USA	-13	Friday, 14:00 H
Hanoi, Vietnam	-1	Saturday, 02:00 H
Oregon, USA	-16	Friday, 11:00 H

Example 1:

Let's consider the problem presented earlier.

> Your sister works as a nurse in one of the hospitals in Sydney, Australia. She is a front liner treating COVID-19 patients since the pandemic started. She calls every 7:00 p.m. in the Philippines to check if your parents and other siblings are all okay.
>
> Imagine that you are living in Sydney with your sister. What time is it in Sydney when your sister makes these calls?

Understand:

a. What is asked?
   We need to know the time in Sydney when it is 7:00 p.m. here in the Philippines.

b. What are the given facts?
   The time in the Philippines is 3 hours **behind** that of Sydney. Your sister calls every 7:00 p.m. in the Philippines.

Plan:

Add 3 hours to 7:00 p.m.

Solve:

Simply, add 3 + 7 = 10. Therefore, the time in Sydney is 10:00 p.m. when it is 7:00 p.m. here in the Philippines.

Example 2:

Maria is a public school teacher in Calbayog City. For extra income, she teaches language and communication subjects online. Her clients are mostly non-English speaking students based in Japan. What time should she go online if her first session starts at 8:00 p. m. in Japan?

Understand:

a. What is asked?
   What time it is in the Philippines when it is 8:00 p. m. in Japan

b. Given facts:
   Japan's time is 1 hour ahead of the Philippines. Maria needs to go online at 8:00 p.m. in Japan.

Plan:

Subtract 1 hour to 8:00 p.m.

Solve:

8 - 1 = 7. Therefore, Maria goes online for her class when it is 7:00 p.m. here in the Philippines.

Now, try to answer the next one by yourself.

Example 3:

Jessica has been living in Canada for more than 10 years. Her mother is flying to Ontario to visit her. The time in the Philippines is 13 hours ahead of Ontario. The trip from the Philippines to Canada takes 14 hours and 30 minutes. If her mom's flight departs from the Ninoy Aquino International Airport at 8:00 a.m., at what time will the airplane arrive at the airport in Ontario?

Congratulations for reaching this part of the lesson. You are now ready to do the activities below.

What's More

Activity 1: My Time Is Precious!

Directions: For each given time in the Philippines, determine the equivalent time in the given country. Express your answer both in 12-hour and 24-hour clock formats.

Philippine Time (PST)		**What time is it in:**	**24-hour clock**	**12-hour clock**
1.	2:30 H	Buenos Aires, Argentina		
2.	5:15 am	Canberra, Australia		
3.	12:45 am	Athens, Greece		
4.	15:20 H	Tokyo, Japan		
5.	8:30 pm	Washington, USA		

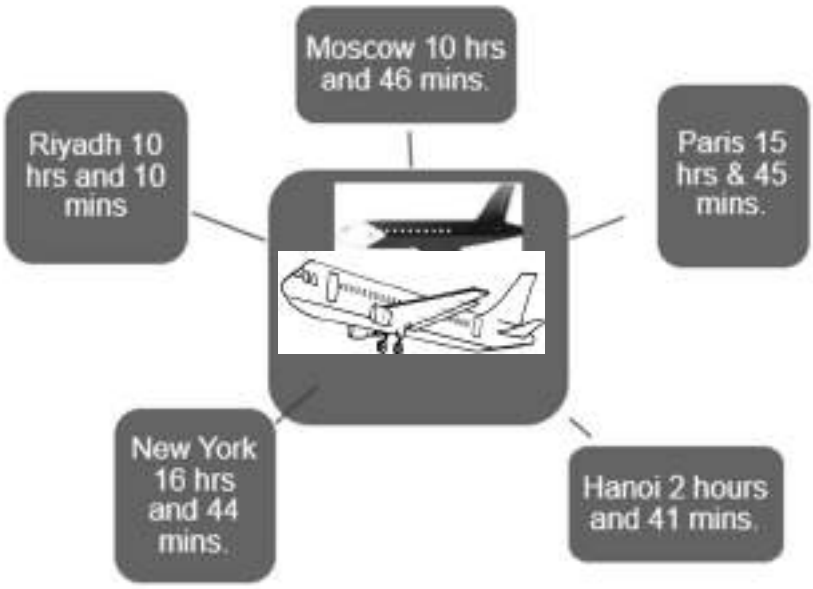
Activity 2: Give Me More Time!

Directions: Fill out the table below. Tell the time of the following countries based on the Philippine Standard Time. If it is Tuesday, 6:00 a.m. in the Philippines, what time and day is it in the following countries?

Countries	Time and Day
1. Paris	
2. London	
3. Singapore	
4. Australia	
5. Washington	

Activity 3: Let's Travel the World!

Directions: Work out the time that you will land in each of these cities if you fly from the Philippines. You will need to know how long the flight takes and the time adjustment as a result of the time zones. The travel time from the Philippines to each city is given in the diagram. Use the time zone map to help you fill out the table.



Destination	Departs at (PST)	Time Difference from PST	Time of Arrival (PST 24-hour clock)	Time of Arrival (PST 12-hour clock)
Riyadh	06:00 H			
Paris	08:00 H			
Moscow	22:00 H			
Hanoi	09:30 H			
New York	14:00 H			

Destination	Departs at (PST)	Travel Time	Time of Arrival in the City (24-hour clock)	Time of Arrival in the City (12-hour clock)
Riyadh	06:00 H			
Paris	08:00 H			
Moscow	22:00 H			
Hanoi	09:30 H			
New York	14:00 H			

What I Have Learned

Directions: Summarize what you have learned in this module. Write the correct answers in the blanks.

1-3. To calculate time in different world time zones with reference to a particular time in the Philippines, we need to use the _____ _____ _____ map to easily understand their time difference.

4-6. The _____ _____ _____ established that the meridian passing through the Royal Observatory at Greenwich would be the world's Prime Meridian.

7. The different times at different places in the world are caused by the movement of the Earth, _____degrees longitude in every hour.

8-9. In calculating time difference, (+) means _____ and ___ means behind.

10. There are 24 hours in a day, and there are _____ standard time zones.

Excellent job! Two more activities to answer and you're done with this module.

What I Can Do

Directions: Read the problem carefully. Answer the questions that follow.

Tony lives in Japan. His brother Andrei lives in the Philippines. Their grandmother is in India and wants both boys to call her at 2 p.m. in Japan and Philippines times.

a. What time in India will Tony call?
b. What time in India will Andrei call?

Assessment

Directions: Choose the letter that corresponds to the correct answer. For your solutions you can use an extra sheet of paper. A score of 10 is excellent, 8-9 is very good, and a score of 5-7 is good.

1. On which of the following do the times at different places on earth depend?
   A. Imaginary lines
   B. Lines of Latitude
   C. Lines of Longitude
   D. International Date Line

2. Before the 19th century, which inspired the standard for clocks?
   A. Planets
   B. Constellation
   C. Sun and star
   D. Prime Meridian

3. Which of the following shows the time of midnight in a 24-hour clock?
   A. 12:00 a.m.
   B. 12:00 H
   C. 24:00 H
   D. 0:00 H

4. How wide in degrees is each time zone?
   A. 12
   B. 15
   C. 24
   D. 180

5. What occurred on October 13, 1884 in Washington D.C., USA?
   A. Time Zone Meeting
   B. Greenwich Meridian
   C. International Meridian Conference
   D. International Time

6. If it is 15:30 H in the Philippines, what is its equivalent time in New Delhi, India?
   A. 1:30 a.m.
   B. 2:00 p.m.
   C. 13:00 H
   D. 14:00 H

7. How many hours is the time difference between Philippine Standard Time and Taiwan, Taipei?
   A. -2 hours
   B. +1 hour
   C. +2 hours
   D. same time

8. Which movement of the earth is related to time and different time zones?
   A. orbit
   B. rotation
   C. revolution
   D. circumference

9. What time would it be in Cebu City if it is 1:00 a.m. in Athens, Greece?
   A. 6:00 a.m.
   B. 7:00 p.m.
   C. 7:00 a.m.
   D. 6:00 p.m.

10) If your cousin lives in Oregon, USA, and he says that at 12:00 noon his favorite cooking show will be aired live on TV, what is its equivalent time in the Philippines?
   A. 4:00 p.m. the same day
   B. 4:00 a.m. the next day
   C. 4:00 a.m. the same day
   D. 4:00 p.m. the next day

Additional Activities

Directions: Analyze the clocks below. The clock on the left side is set in the Philippine Standard Time (PST) at 8:55 a.m. and the clock on the right side is from other cities/countries time zone, which is 9: 12 p.m. How much time has passed from the first clock to the second clock? What is the time difference? Name at least 5 cities/countries that has the said time difference when compared to PST.

8:55 a.m.

9:12 p.m.

Answer Key

What's New

Departure: 8:00 AM (08:00H). Travel time:
14 hours and 30 minutes
8:00H + 14:30H = 22:30H
Ontario, Canada is 13 hours behind the
Philippines (PST)
22:30H – 13:00H = 9:30H (9:30 AM)
Jessica's mother will arrive at Ontario at
9:30 AM

WHAT'S IN

1. 4:30 H
2. 12:15 H
3. 5:54 p.m.
4. 4:30 p.m.
5. 21:15 H

What I know

1. C
2. B
3. D
4. A
5. A
6. C
7. A
8. C
9. B
10. A

WHAT CAN I DO

1. 10:30 am
2. 11:30 am

WHAT I HAVE LEARNED

1-3. world time zone
4-6. International Meridian
Conference
7. 15
8-9. ahead, (-)
10.24

Additional Activities

The difference is roughly 12 hours (12 hours and 17 minutes).
Cities with 12-hour difference from the Philippines
These are just sample answers, there can be many more

1. Connecticut, USA
2. Delaware, USA
3. Georgia, USA
4. Florida, USA
5. Santiago, Chile

Assessment

1. C
2. C
3. D
4. B
5. C
6. C
7. D
8. B
9. C
10. B

What's more

Activity 1

	24-hour	12-hour
1.	14:30H a day before	2:30 pm a day before
2.	8:15 H	8:15 am
3.	18:45H a day before	6:45 pm a day before
4.	16:20 H	4:20 pm
5.	7:30H	7:30 am

Activity 2

	Countries	**Time**
1.	Paris	Monday, 11:00 pm
2.	London	Monday, 10:00 pm
3.	Singapore	Tuesday, 6:00 am
4.	Australia	Tuesday, 9:00 am
5.	Washington	Monday, 5:00 pm

Activity 3

Destination	**Departs at (PST)**	**Time Difference from PST**	**Time of Arrival (PST 24-hour clock)**	**Time of Arrival (PST 12-hour clock)**
Riyadh	06:00 H	-5	16:10 H	4:10 p.m.
Paris	08:00 H	-7	23:45 H	11:45 p.m.
Moscow	22:00 H	-5	8:46 H next day	8:46 a.m. next day
Hanoi	09:30 H	-1	12:11 H	12:11 p.m.
New York	14:00 H	-13	6:44 H next day	6:44 a.m. next day

Destination	**Departs at (PST)**	**Travel Time**	**Time of Arrival in the City (24-hour clock)**	**Time of Arrival in the City (12-hour clock)**
Riyadh	06:00 H	10 h 10 min	11:10 H	11:10 a.m.
Paris	08:00 H	15 h 45 min	16:45 H	4:45 p.m.
Moscow	22:00 H	10 h 46 min	3:46 H next day	3:46 a.m. next day
Hanoi	09:30 H	2 h 41 min	11:11 H	11:11 a.m.
New York	14:00 H	16 h 44 min	17:44 H	5:44 p.m.

References

24timezones. “The Supreme Guide to World Time Zones.” World Time Zones: Supreme Guide. 24timezones, April 24, 2020. https://24timezones.com/world-time-zones#gref.

Alfred, Randy. “Oct. 13, 1884: Greenwich Resolves Subprime Meridian Crisis.” Wired. Conde Nast, June 4, 2017. https://www.wired.com/2010/10/1013greenwich-prime-meridian/.

Mathematics Grade 5 Teachers Guide. *21st Century Mathematics Textbook Grade 5*

“Study.com.” Accessed October 19, 2020. https://study.com/academy/lesson/identifying-calculating-time-zones.html.

“The Greenwich Meridian.” The Greenwich Meridian - where east meets west: International Meridian Conference (1884). Accessed October 19, 2020. http://www.thegreenwichmeridian.org/tgm/articles.php?article=10.

“What Is a Time Zone,” October 15, 2015. https://www.worldtimeserver.com/learn/what-is-a-time-zone/.

For inquiries or feedback, please write or call:

Department of Education - Bureau of Learning Resources (DepEd-BLR)

Ground Floor, Bonifacio Bldg., DepEd Complex
Meralco Avenue, Pasig City, Philippines 1600

Telefax: (632) 8634-1072; 8634-1054; 8631-4985

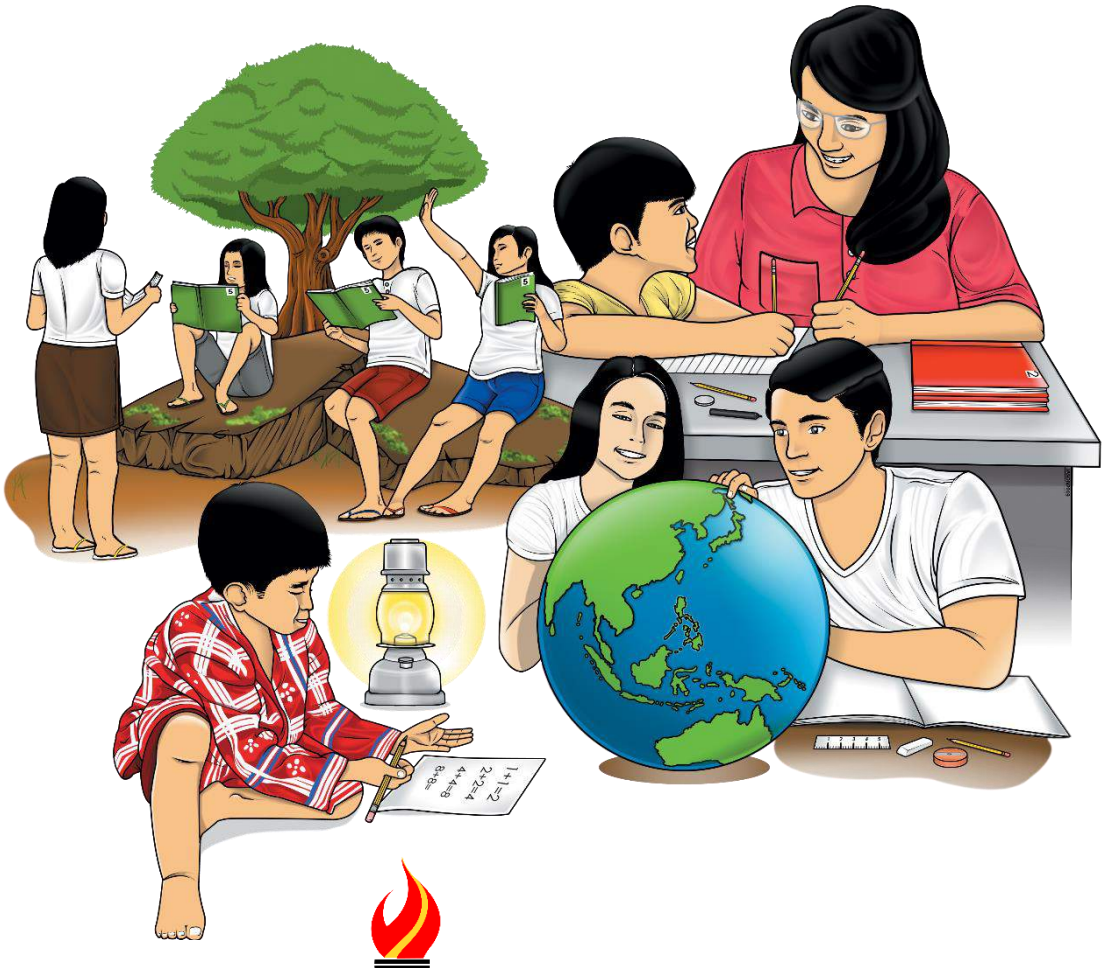
Email Address: blr.lrqad@deped.gov.ph * blr.lrpd@deped.gov.ph

5

DepED
DEPARTMENT OF EDUCATION

Mathematics

Quarter 3 – Module 17:
Solving Problems Involving Time



ALTERNATIVE DELIVERY MODE
ADM

GOVERNMENT PROPERTY
NOT FOR SALE

Mathematics – Grade 5
Alternative Delivery Mode
Quarter 3 – Module 17: Solving Problems Involving Time
First Edition, 2020

Republic Act 8293, section 176 states that: No copyright shall subsist in any work of the Government of the Philippines. However, prior approval of the government agency or office wherein the work is created shall be necessary for exploitation of such work for profit. Such agency or office may, among other things, impose as a condition the payment of royalties.

Borrowed materials (i.e., songs, stories, poems, pictures, photos, brand names, trademarks, etc.) included in this module are owned by their respective copyright holders. Every effort has been exerted to locate and seek permission to use these materials from their respective copyright owners. The publisher and authors do not represent nor claim ownership over them.

Published by the Department of Education
Secretary: Leonor Magtolis Briones
Undersecretary: Diosdado M. San Antonio

Development Team of the Module

Writers: Ma. Lourdes Tangaran

Editors: Jose J. Sagadal Jr

Reviewers: Renato S. Cagomoc, Rolando Lacbo, Joshua Sherwin T. Lim, Rodrigo Ventures Jr., Annie N. Adona

Layout Artist: Joey Sustitudo, Emmanuel S. Gimena Jr.

Management Team: Ma. Gemma M. Ledesma
Arnulfo R. Balane
Rosemarie M. Guino
Joy B. Bihag
Ryan R. Tiu
Sarah S. Cabaluna
Thelma Cabadsan-Quitalig
Elena S. De Luna
Renato S. Cagomoc
Noel E. Sagayap
Geraldine P. Sumbise
Joshua Sherwin T. Lim

Printed in the Philippines by _____

Department of Education – Region VIII

Office Address: DepEd Regional Office No. 8, Candahug, Palo, Leyte
Telefax: (053)-832-2997
E-mail Address: region8@deped.gov.ph

5

Mathematics

Quarter 3 – Module 17:
Solving Problems Involving Time

DepED
DEPARTMENT OF EDUCATION

Introductory Message

This Self-Learning Module (SLM) is prepared so that you, our dear learners, can continue your studies and learn while at home. Activities, questions, directions, exercises, and discussions are carefully stated for you to understand each lesson.

Each SLM is composed of different parts. Each part shall guide you step-by-step as you discover and understand the lesson prepared for you.

Pre-tests are provided to measure your prior knowledge on lessons in each SLM. This will tell you if you need to proceed on completing this module or if you need to ask your facilitator or your teacher's assistance for better understanding of the lesson. At the end of each module, you need to answer the post-test to self-check your learning. Answer keys are provided for each activity and test. We trust that you will be honest in using these.

In addition to the material in the main text, Notes to the Teacher are also provided to our facilitators and parents for strategies and reminders on how they can best help you on your home-based learning.

Please use this module with care. Do not put unnecessary marks on any part of this SLM. Use a separate sheet of paper in answering the exercises and tests. And read the instructions carefully before performing each task.

If you have any questions in using this SLM or any difficulty in answering the tasks in this module, do not hesitate to consult your teacher or facilitator.

Thank you.

What I Need to Know

Good day, Mathletes! We face problems involving time every day. We have to decide what time to wake up to be ready for our 8 AM class. To make the right decision, we need to consider how much time is needed for us to shower, dress up, have breakfast, and be ready for the class. This module was especially written to help you solve such problems.

To get the most from this module, be sure to do all the activities and exercises, and keep a positive outlook. Before you know it, you have already solved these problems in a systematic and logical way.

When you are done with this module, you are expected to:

- figure out what time it was, what time it will be, or how much time went by in the different events or occasions described;
- state the steps in solving word problems on measurement of time; and
- solve problems involving time.

What I Know

Directions: Read and understand each problem below. Choose the letter of the correct answer. Write your answers on a separate sheet of paper.

The four classes started their lessons at 6:45 a.m. If they stayed in class for 5 hours, what time did they finish?

Skill Sharpener in Elementary Mathematics IV p. 72

1. What is asked?
   A. The time they started
   B. The time they stayed in class
   C. The lessons they had with the time
   D. The time they finished their lessons

2. What operation shall we use to solve the problem?
   A. Addition
   B. Subtraction
   C. Division
   D. Multiplication

3. If n is the unknown, what is the correct number sentence?
   A. 6:45 + 5:00 = n
   B. 6:45 x 5:00 = n
   C. 6:45 – 5:00 = n
   D. 6:45 + 5 + 4 = n

4. Which of the following is the answer to the problem?
   A. 1:45 am
   B. 11:45 am
   C. 11:50 am
   D. 11:45 pm

Father began working on the field at 5:00 a.m. He worked for 4 hours without stopping. What time did he finish?

Skill Sharpener in Elementary Mathematics IV p. 72

5. What is asked?
   A. The time father finished the work
   B. The time father went to the field
   C. The time father started the work
   D. The time he went home

6. What is the correct number sentence?
   A. 5:00 – 4:00 = n
   B. 5:00 x 4:00 = n
   C. 5:00 + 4:00 = n
   D. 5:00 + 4 + 1 = n

7. Which of the following is the answer to the problem?
   A. 1:00 am
   B. 9:00 am
   C. 10:0 am
   D. 9:00 pm

Martha took the dog for a walk at 5:00 a.m. She came back at 7:00 a.m. How long was she out?

Regional Test Item Bank, Mathematics 5, Test I.1, p.116

8. How many minutes was she out with her dog?
   A. Martha was out for 12 minutes.
   B. Martha was out for 100 minutes.
   C. Martha was out for 120 minutes.
   D. Martha was out for 60 minutes.

9. Jenny started baking at 6:15 pm. She finished baking at 7: 20 pm of the same day. How long did it take Jenny to bake?
   A. 55 minutes
   B. 1 hour and 5 minutes
   C. 1 hour and 12 minutes
   D. 1 hour and 35 minutes

10. The time in Manila is 2 hours behind Sydney. The flight from Manila to Sydney takes 7 hours. If an airplane leaves Manila at 8:00 pm, Monday, at what time and day in Sydney will the plane arrive?
   A. 2:00 am, Tuesday
   B. 3:00 am, Tuesday
   C. 4:00 am, Tuesday
   D. 5:00 am, Tuesday

Lesson 1 Solving Problems Involving Time

What's In

In the previous modules, you have learned how to convert units of time and to measure time using a 12-hour and a 24-hour clock.

Let us first recall that time can be expressed in different units.

Study the table below.

Units of Measurement (Time)	***Equivalent***
1 millennium	10 centuries
1 century	10 decades
1 decade	10 years
1 year	12 months
1 month	4 weeks
1 week	7 days
1 day	24 hours
1 hour	60 minutes
1 minute	60 seconds

In the **12-hour clock**, a.m. and p.m. are placed at the end to denote whether the time is in the morning or afternoon. These are abbreviations when the 12-hour clock is used.

The *ante meridiem* (a.m.) is after 12 midnight and before 12 noon. It is 12:01 a.m. to 11:59 a.m.

The *post meridiem* (p.m.) is after 12 noon and before midnight. It is *12:01* p.m. to 11:59 p.m.

The **24-hour clock,** also referred to as the **Military Clock,** uses the numbers **00:00 to 23:59.** Midnight is **24:00 or 00:00**. It does not require a.m. and p.m. Instead, **H** or **Hours** is placed at the end of the time to indicate the use of the 24-hour clock format. There are some who use it without H or Hours.

The 24-hour clock is a time-keeping convention where the day runs from midnight to midnight and is split into **24 hours,** from **hour 0 to hour 24**.

Converting time in a.m. or p.m. to 24-hour clock

1. The time from 1:00 a.m. to noon is almost the **same** in Military clock. Then, remove the a.m. and p.m.

   Examples: 1:30 a.m. = 1:30 10:30 a.m. = 11:00
   2:05 a.m. = 2:05 11:59 a.m. = 11:59

2. **Add 12** to any hour after noon and before midnight. That is, from 1:00 p.m. to 11:59 p.m., **add 12** hours. Then, remove the a.m. and p.m.

   Examples: 4:45 p.m. = 16:45 11:30 p.m. = 23:30

3. For the first hour of the day, 12 midnight to 12:59 a.m., **subtract 12 hours.** Then, remove the a.m. and p.m.

   Examples: 12:35 a.m. = 0:35 12 Midnight = 0:00

   Now, try to check your previous knowledge by answering the following.

Directions:

A. Determine the time between the two indicated times. Choose the letter of the correct answer. Write your answers on your answer sheet. Note that the times are given on a same day.

1. 7:00 a.m. and 10:00 a.m. A. 2 hours B. 4 hours
   C. 3 hours D. 5 hours

2. 11:00 p.m. and 1:00 a.m. A. 1 hour B. 2 hours
   C. 3 hours D. 4 hours

B. Supply the missing numeral. Write your answers on your answer sheet.

3. 65 seconds = _____ minutes _____ seconds
4. 125 seconds = _____ minutes _____ seconds
5. 1 hours = _____ minutes

C. Complete the data. Write your answer on your answer sheet.

6. There are _____ hours in a day.
7. There are _____ seconds in 1 minute.
8. There are _____ hours in 120 minutes.

D. Fill in the table by converting from 12-hour clock to 24-hour clock and vice versa. Write your answer on your answer sheet.

	12-hour	**24-hour**
9.	5:00 p.m.	
10.		16:00 H

Keep going! You are doing well.

What's New

This time, you will go through different problems involving time. A better understanding on how these problems is solved is an important skill to master in order to easily find solutions to such situations. We all know that there are a lot of real-life experiences that involve time problems. Hence, you need to increase your understanding on how this goes.

Now, I want you to help me find solution to this situation.

> Jhune wants to help the Calbayog City front liners by providing them with snacks. He prepares a snack combo of special spaghetti and kakanin for 60 persons. How many minutes will it take to prepare 60 snacks combos if it takes 50 seconds to pack each one?

This situation needs conversion from one unit of time to another.

What is It

In solving problem involving time, you need to have focus on what the problem is all about. **Problem solving** is a process or act of defining or finding solution to a problem. Identifying the facts and deciding on the ways or strategies to use is a basic skill one must possess to come up with the solution. Likewise, mastery on conversion from one unit of time to another unit of time as previously discussed is very much important as you go through a series of exercises in this module.

We follow this four-step plan.

1. **Understand** by identifying what is being asked in the problem and the relevant facts stated.
2. **Plan** by choosing a strategy to solve the problem, either by using variable, equation and a model. Identifying the operation to be used as signaled by clue or key words stated in the problem.
3. **Solve** by performing the identified strategy or tool to solve the problem; and
4. **Check** the process by verifying the reasonableness of the answer. State the answer in sentence form.

Consider the situation involving Jhune and the time to be spent for repacking. We follow the four-step plan.

Understand - What is asked in the problem? - What are the given facts?	It asked for the time, in minutes, that is needed to finish packing the snack combos. It takes 50 seconds to pack each snack combo. She needed to pack 60 snack combos.
Plan - Choose a strategy - Select the operation (use **clue/key** words in the problem).	Use conversion from one unit of time to another. To change a smaller unit of time to a bigger unit, divide.
Solve **-** Perform the strategies	To answer the question, find the total number of seconds needed to pack the snack combos. Then, convert it to minutes. We now have the following. **50 seconds x 60 = 3000 seconds** Converting seconds to minutes, we have: $3000 \text{ seconds} = 3000 \text{ seconds} \times \frac{1 \text{ minute}}{60 \text{ seconds}}$ $= \frac{3000 \text{ minutes}}{60}$ $= 50 \text{ minutes}$
Check - Verify the reasonableness of the answer.	It takes 50 seconds to pack a snack combo. As it takes less than a minute to prepare a snack combo, it follows that 60 packs will require less than 60 minutes. The answer makes sense. Moreover, proportion can be done to solve the problem. 1 pack: 50 seconds 1 minute: 60 seconds × 60 × 60 × 50 × 50 **60 packs**: 300 seconds **50 minutes**: 300 seconds

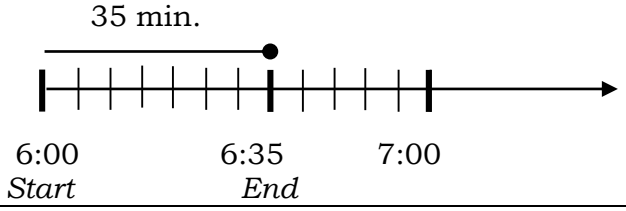
Answer: *It will take 50 minutes to finish packing the snack combos.*

Here are other examples of real-life problems involving time. Some involve solving elapsed time. **Elapsed time** is the length of time when an event happened. It means the length of time from the start to the end.

Notice how these problems are being solved using the four-step plan.

Rod jogs every morning around the Barangay Park. This morning, he started jogging at 6:00 a.m. and ended at 6:35 a.m. How many minutes did he jog this morning?

Follow the *four-step plan* to solve the problem.

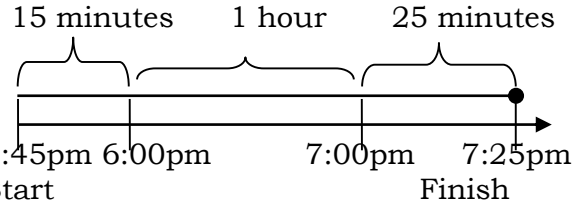
Understand - What is asked in the problem? - What are the given facts?	The problem is asking for the time that elapsed from 6:00 a.m. to 6:35 a.m. on the same day. Rod started jogging from 6:00 a.m. to 6:35 a.m.
Plan - Choose a strategy - Select the operation (use **clue/key** words in the problem)	Use an equation or a timeline. Subtraction (how long)
Solve **-** Perform the strategies.	**Using an equation** Let n be the time spent jogging To find n, we need to subtract the time he finished jogging from the time he started. 6:35 – 6:00 = n 6:35 – 6:00 = **35 minutes** Alternatively, we have the following. 6:35 *(You can subtract vertically.)* - 6:00 35 = n **Using a timeline** 
Check - Verify the reasonableness of the answer…	From 6:00 a.m. to 6:35 a.m., there is only change in the minutes section. The elapsed time of 35 minutes is therefore logical.

Hence, Rod spent **35 minutes** *jogging around the Barangay Park.*

Study this next situation.

Jomari started baking banana cakes at 5:45 p.m. He finished baking at 7:25 p.m. How long did it take Jomari to bake the cakes?

Let us follow the *four-step plan* to solve the problem.

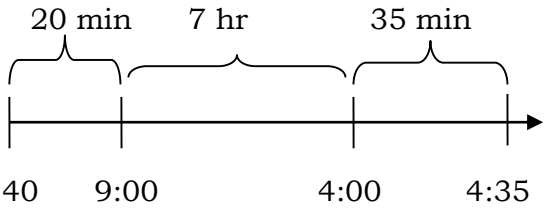
Understand - What is asked in the problem? - What are the given facts?	The problem is asking for the time that elapsed from 5:45 p.m. to 7:25 p.m. on the same day.
Plan - Choose a strategy - Select the operation (use **clue/key** words in the problem)	Use an equation. Subtraction (how long) can be used to solve the problem.
Solve **-** Perform the strategies	**Using an equation** Let *n* be the time spent in baking the cakes To find *n*, we need to subtract the time he started baking from the time he finished baking it. Hence, we have the following. 7:25 - 5:45 = *n* Alternatively, we can do the operation vertically. 7 25 (*align the hours and minutes)* - 5 45 2 -20 *Since, we cannot take away 45 minutes from 25 minutes, we will do regrouping.* *7:00 – 1:00 = 6:00 and 60 minutes,* *then add it to 25 minutes = 85 minutes* Therefore, we now have the following. 6 85 (this is equivalent to 7:25) - 5 45 1 40 *n = 1:40*
Check - Verify the reasonableness of the answer.	The time line below verifies the answer.  15 minutes + 1 hour + 25 minutes = 1 hour and 40 minutes Thus, the solution is correct.

Answer*: Jomari baked banana cakes for 1 hr and 40 minutes.*

If it is still difficult for you to understand, here's one more example.

A bus left the terminal at 8:40 a.m. It arrived at its destination at 4:35 p.m. on that same day. How long was the trip?

Follow the ***four-step plan*** to solve this problem.

Understand - What is asked in the problem? - What are the given facts?	The problem is asking for the length of time travelled. The start time is 8:40 a.m. and the end time is 4:35 p.m. on the same day.
Plan - Choose a strategy	Use a number line.
Solve **-** Perform the strategies	**Using a number line** We have the following  To find the length of time the bus had travelled to reach its destination, add all the time spent when it started travelling until it reached the destination. 7 hr + 20 min + 35 min **7 hr and 55 min**
Check - Verify the reasonableness of the answer.	If you add 8 hours to 8:40 am, you will get 4:40 p.m, which is just 5 minutes more than the arrival time of the bus. If you subtract 5 minutes from 4:40 p.m., you will get 4:35 p.m. Thus, the answer 7 hours and 55 minutes is reasonable.

Answer: *The bus travelled for* **7 hrs and 55 minutes.**

Now try to study the next example concerning the relationship of time in a different country to the time in the Philippines. Let's check this out.

The time in Manila is 6 hours ahead of Rome. The flight from Manila to Rome takes 9 hours. If an airplane leaves Manila by 9:00 a.m., at what time in Rome will the plane arrive?

Using the four-step plan, we have the following.

Understand - What is asked in the problem? - What are the given facts?	The problem is asking for the time in Rome that the plane will arrive in Rome. The time in Manila is 6 hours ahead of Rome. The flight from Manila to Rome takes 9 hours. The airplane left Manila at 9:00 a.m.
Plan - Choose a strategy - Select the operation (use **clue/key** words in the problem)	Add 9 hours to 9:00 a.m., and then subtract 6 hours since Manila time is 6 hours ahead of Rome time.
Solve **-** Perform the strategies	**Solution** Add 9 hours to 9:00 a.m. **9 + 9 = 18 – 12 = 6** Since there cannot be 18 hours in a 12-hour clock, so we subtract 12 from 18. Since we subtracted 12, it means that a.m. has passed already. It is already p.m. of the same day. The plane will arrive at *6:00 p.m.*, Philippine Standard Time (PST), and since PST is 6 hours ahead of Rome. So, 6:00 p.m. – 6 hours = **12:00 p.m.** in Rome.
Check - Verify the reasonableness of the answer.	From 6:00 p.m., you go back 9 hours. Is the answer 9:00 a.m.? If so, your answer is logical.

Answer: *Therefore, the plane will arrive at 12:00 noon in Rome.*

I guess you are now ready for the next exercises. If ever something is not clear, just get back to the details and review the examples. You are doing well! Keep moving!

What's More

Now that you have read and have gone through the examples in solving problems involving time, try and check your understanding about the lesson. Enjoy doing the following activities!

Activity 1: Give Me Time, Please?

Directions: Copy and complete the table by filling the elapsed time. Write your answers on a separate sheet of paper.

Start Time	End Time	Elapsed Time
1. 06:10	06:40	
2. 05:04	05:54	
3. 1:05 p.m.	1:50 p.m.	
4. 4:45 a.m.	5:45 a.m.	
5. 7:35 a.m.	9:35 a.m.	

Activity 2: Time Check

Directions: Analyze the word problem below. Match the questions in Column A with the answers in Column B. Write the letter of your choice on a separate sheet of paper.

Flor spends 1 hour and 20 minutes cleaning the house every day. Today, she started at 7:30 a.m. At what time will she be done cleaning?

Column A	Column B
1. What is asked? 2. What are given? 3. What is the operation to be used? 4. What is the equation/number sentence? 5. Perform your solution to the problem. 6. What is the answer to the problem?	A. Addition B. Flor will finish cleaning at 8:50 a.m. C. The time Flor will be finished cleaning the house D. 7:30 + 1:20 = 8:50 E. The start time is 7:30 a.m. and it takes 1 hr and 20 min to do the job F. 7:30 + 1:20 = ***n*** G. G. Subtraction

Activity 3: Time Is Gold

Directions: Read and understand the following situations. Fill in the four-step plan to solve the problem. Problem 1 has been done for you as a guide. Write your answers on a separate sheet of paper.

<table>
<tr><td colspan="2">Problem 1

The ferry from Matnog, Sorsogon left at 3:30 p.m. on Monday. It arrived in San Isidro Ferry Terminal, Northern Samar at exactly 5:49 p.m. on the same day. How long was the trip?</td></tr>
<tr><td>Understand
- What is asked in the problem?

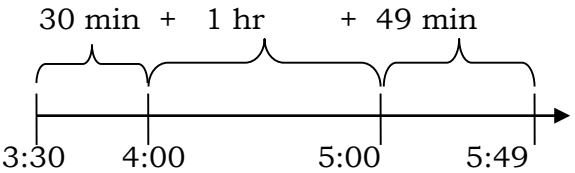
- What are the given facts?</td><td>1. The problem is asking for the length of time the ferry took to travel. That is the elapsed time from 3:30 p.m. to 5:49 p.m.

2. The start time is 3:30 p.m. and the end time is 5:49 pm.</td></tr>
<tr><td>Plan
- Choose a strategy/strategies and the operation to be used</td><td>3.Use an equation; subtraction (how long)</td></tr>
<tr><td>Solve
- Perform the strategies</td><td>4. Let n be the time spent for the trip.

To find n, subtract the time the ferry left Matnog, Sorsogon from the time it arrived in San Isidro Ferry Terminal.

Hence, we have the following.
5:49 – 3:30 = n
We have:
5 : 49 (the time it arrived in San Isidro Ferry Terminal)
- 3 : 30 (the time it left in Matnog, Sorsogon)
2 : 19 = n

Answer: The trip lasted for 2 hours and 19 minutes.</td></tr>
<tr><td>Check
- Verify the reasonableness of the answer.</td><td>5.Use a number line

Hence: 1 hr + 30 min + 49 min = 1 hr and 79 min
(1 hr = 60 min), so 79 min = 1 hr and 19 min
1 hr + 1 hr + 19 min = 2 hrs and 19 min

The answer is reasonable.</td></tr>
</table>

Problem 2 Allen began his breakfast at 6:00 a.m. and finished at 6:50 a.m. How long did it take him to eat? Mathematics LM, Grade 4, p.117	
Understand - What is asked in the problem? - What are the given facts?	1. _____ 2. _____
Plan - Choose a strategy/strategies and the operation to be used	3. _____
Solve **-** Perform the strategies	4. _____
Check - Verify the reasonableness of the answer.	5. _____

Answer: _____

Problem 3 Luigi was invited by his cousin to visit Canada. The trip from Philippines to Canada is 14 hours and 30 minutes. If his plane left the Philippines at 6:00 a.m., what time in the Philippines will he be able to arrive in Canada? Mathematics LM, Grade 4, p.117	
Understand - What is asked in the problem? - What are the given facts?	1. _____ 2. _____
Plan - Choose a strategy/strategies and the operation to be used	3. _____
Solve **-** Perform the strategies	4. _____
Check - Verify the reasonableness of the answer.	5. _____

Answer: _____

Excellent! You have reached this far. You are doing well. Keep going.

What I Have Learned

Based from the lesson you have just studied, answer the following questions.

Directions: Read and understand the problem carefully. Do as indicated. Write your answers on separate sheet of paper.

1. What are the steps in solving problems involving measurement of time? Use the problem below to explain your answers.

Johan was invited by his cousins to visit Australia. The trip from the Philippines to Australia is about 7 hours. If his plane left the Philippines at 10:00 a.m., what time in the Philippines will he be able to arrive in Australia?

Step 1: _____
Step 2: _____
Step 3: _____
Step 4: _____

2. Write down your own strategies/ways in solving problems involving measurement of time.

_____
_____
_____

What I Can Do

Congratulations! You are almost done with the challenges in this module. After you have learned the four-step plan in solving problems involving time, it's now time for you to apply these skills in your real-life. Truly, time is one of the most important blessings in life. Using it wisely and productively can bring us to where we want to be, but wasting it can make our life miserable. Every second counts. There's no turning back. Make use of the time for your advantage.
Here's a situation that you need to solve.

Activity: Right Timing

Directions: Read and understand the following problem carefully. Then, do what is asked. Show your solution on a separate sheet of paper.

You plan to visit your cousin Mario who lives in the city. You leave your home at 7:30 a.m., Saturday. It takes 27 hours and 25 minutes to reach the city. At what time and day will you see your cousin?

Understand:	1. What is asked? _____
	2. What are the given facts? _____
Plan:	3. What strategy/operation will you use to solve the problem? _____
Solve:	4. What is the answer? _____
Check:	5. Is your answer correct? _____

Finally, you are almost done with this module. Take a short break, then do the last two challenges.

Assessment

Directions: Read and understand each problem below. Choose the letter of the correct answer. Write your answers on a separate sheet of paper.

Mrs. Villas' cake was in the oven from 3:00 p.m. to 4:45 p.m. How long was the cake in the oven?

Regional Test Item Bank, Mathematics 5, Test II.1, p.116

1. What is asked?
   A. The length of time the cake was sold
   B. The length of time the cake was decorated
   C. The length of time the cake was in the oven
   D. The length of time the cake was put in the oven

2. What is the correct number sentence for the problem?
   A. 4:45 + 3:00 = n
   B. 4:45 – 3:00 = n
   C. 3:00 – 4:45 = n
   D. 3:00 × 4:45 = n

3. What is the correct answer to the problem?
   A. 1 hr and 45 minutes
   B. 7 hrs and 45 minutes
   C. 6 hrs and 45 minutes
   D. 2 hrs and 45 minutes

A delivery man started delivering the goods at 3:30 p.m. He took $1\frac{1}{2}$ hours to finish his round. What time did he finish?

Regional Test Item Bank, Mathematics 5, Test II.2, p.116

4. What is asked?
   A. The time the delivery man arrived
   B. The time the delivery man took the goods
   C. The time the delivery man started delivering
   D. The time the delivery man finished his round

5. In solving this problem, which step comes first?
   A. Choose a strategy/operation to be used.
   B. Identify what is asked in the problem.
   C. Verify your answer if it is correct.
   D. Perform your strategy.

6. What is the correct answer to the problem?
   A. 2:00 p.m.
   B. 5:00 p.m.
   C. 4:00 p.m.
   D. 6:00 p.m.

7. What is asked?
   A. The length of time it takes to travel to Tacloban
   B. The length of time spent in the terminal
   C. The time it arrives in Tacloban
   D. The time the bus leaves the terminal

8. What is the correct number sentence?
   A. 4:00 – 6:20 = n
   B. 6:20 – 4:00 = n
   C. 4:00 + 6:20 = n
   D. 6:20 + 4:00 = n

9. What is the correct answer to the problem?
   A. 2 hrs and 20 minutes
   B. 2 hrs and 10 minutes
   C. 3 hrs and 20 minutes
   D. 3 hrs and 40 minutes

Jonas started working on his math project at 9:00 a.m. He finished by 10:20 a.m on the same day. How many minutes did he work on his project?

10. What is the correct answer to the problem?
    A. 20 minutes
    B. 60 minutes
    C. 80 minutes
    D. 120 minutes

Excellent! You are doing well. One last activity and you are done with this module.

Additional Activities

Directions: Read and understand the following carefully. Solve the problem. Copy the problems and solve them on a separate sheet of paper.

1. Trixie started her homework at 5:30 p.m. She finished it at 8:00 p.m. How long (in minutes) did it take her to do her homework?

2. A plane landed in Calbayog at 2:30 p.m. It departed from Cebu at 11:30 a.m on the same day. How long did the plane fly from Cebu to Calbayog?

3. Ashley paints for 1 hour and 22 minutes. She started painting at 2:17 p.m. What time did she finish painting?

Well done! You are done with this module. Hooray!

Answer Key

What I Have Learned

1. Step 1 Understand the problem. The problem is asking for the time of arrival in Australia if Johan leaves the Philippines at 10 in the morning and it takes 7 hours of travel.

   Step 2 Planning for the solution. The strategy to use can be using an equation or using the number line.

   Step 3 Solving the problem. 10:00 + 7:00 = 17:00 or 5:00 p.m.

   Step 4 Checking if the answer is reasonable. It is reasonable because 7 hours after 10 in the morning must be afternoon.

2. Answers vary.

What I Can Do

1. The time and day that you and Mario can meet
2. The start time is 7:30 a.m., a Saturday and the travel time is 27 hours and 25 minutes
3. Use of an equation or a number line
4. 10:55 a.m., Sunday
5. The answer is reasonable because it takes 27 hours and 25 minutes for the travel. That is more than a day. Hence, the answer must be the following day and 3 hours and 25 minutes after 7:30 a.m.

Additional Activities

1. 150 minutes
2. 3 hours

Assessment

1. C
2. B
3. A
4. D
5. B
6. B
7. A
8. B
9. B
10. C

What's More

Activity 1: Give Me Time, Please?

Start Time	End Time	Elapsed Time
1. 06:10	06:40	30 minutes
2. 05:04	05:54	50 minutes
3. 1:05 p.m.	1:50 p.m.	45 minutes
4. 4:45 a.m.	5:45 a.m.	1 hour
5. 7:35 a.m.	9:35 a.m.	2 hours

Activity 2: Time Check

1. C
2. E
3. A
4. F
5. D
6. B

Activity 3: Time is Gold

Problem 2

1. The length of time Allan took to eat his breakfast
2. The start time is 6:00 am and the end time is 6:50 am.
3. Use equation or a number line.
4. 6:50 – 6:00 = 0:50
5. The answer is 50 minutes. It is logical because there is no change in the number in the hour section.

Activity 3: Time is Gold

Problem 3

1. The time of arrival in Canada in Philippine time
2. The trip is 14 hours and 30 minutes long.
   The plane took off at 6:00a.m.
3. Use an equation or a number line.
4. 6:00 + 14:30 = 20:30 or 8:30 p.m.
5. The number line can be used for verification.

References

Lumbre, Angelina P. and Alvin C. Ursua. 2016. *21st Century Mathletes 5 Textbook.* Quezon City: Vibal Group, Inc.

Mathematics LM, Grade 4, p. 117

Regional test Item Bank, Mathematics 5, pp. 116-117

Skill Sharpener in Elementary Mathematics IV, p. 72

For inquiries or feedback, please write or call:

Department of Education - Bureau of Learning Resources (DepEd-BLR)

Ground Floor, Bonifacio Bldg., DepEd Complex
Meralco Avenue, Pasig City, Philippines 1600

Telefax: (632) 8634-1072; 8634-1054; 8631-4985

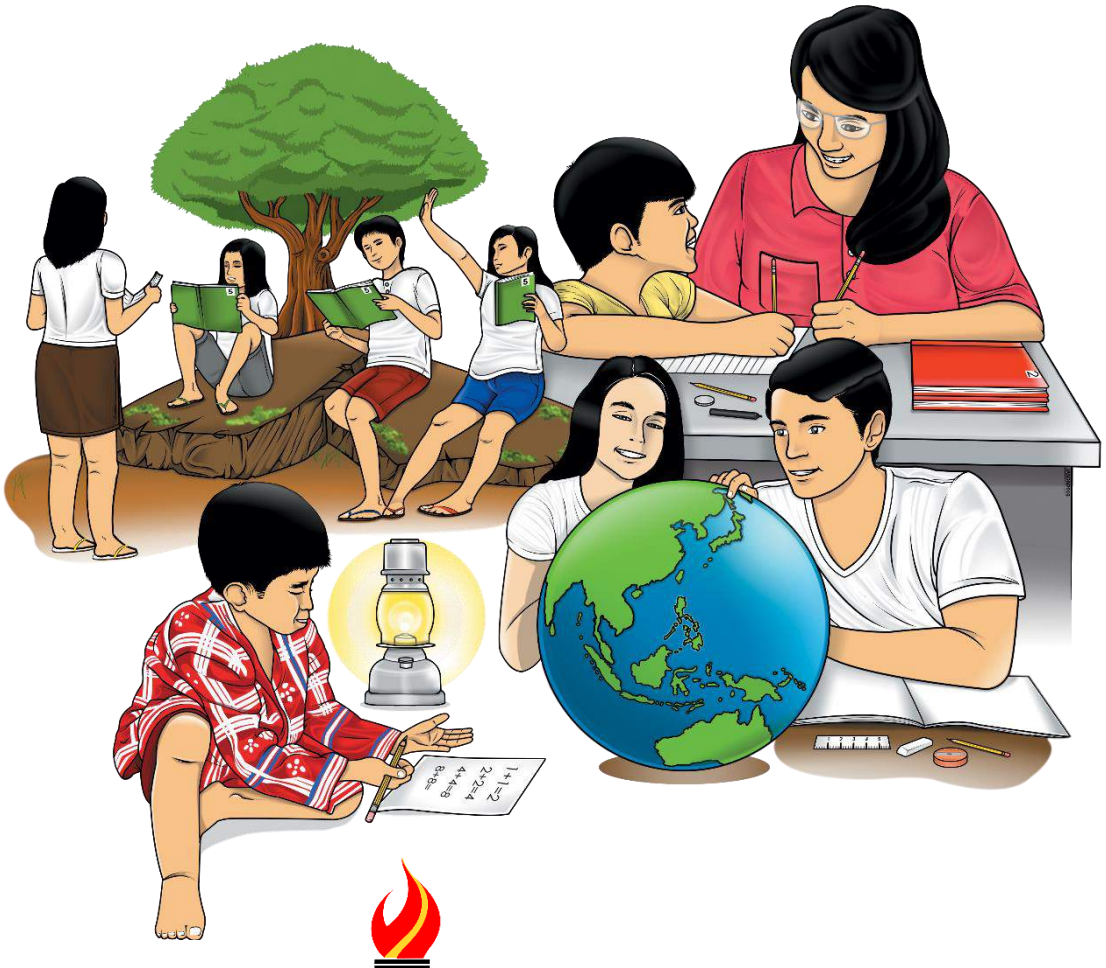
Email Address: blr.lrqad@deped.gov.ph * blr.lrpd@deped.gov.ph

5

DepED
DEPARTMENT OF EDUCATION

Mathematics

Quarter 3 – Module 18: Visualizing the Circumference of a Circle



ALTERNATIVE DELIVERY MODE
ADM

GOVERNMENT PROPERTY
NOT FOR SALE

Mathematics – Grade 5
Alternative Delivery Mode
Quarter 3 – Module 18: Visualizing the Circumference of a Circle
First Edition, 2020

Republic Act 8293, section 176 states that: No copyright shall subsist in any work of the Government of the Philippines. However, prior approval of the government agency or office wherein the work is created shall be necessary for exploitation of such work for profit. Such agency or office may, among other things, impose as a condition the payment of royalties.

Borrowed materials (i.e., songs, stories, poems, pictures, photos, brand names, trademarks, etc.) included in this module are owned by their respective copyright holders. Every effort has been exerted to locate and seek permission to use these materials from their respective copyright owners. The publisher and authors do not represent nor claim ownership over them.

Published by the Department of Education
Secretary: Leonor Magtolis Briones
Undersecretary: Diosdado M. San Antonio

Development Team of the Module

Writers: Ma. Melanie S. Villa

Editors: Jose J. Sagadal Jr., Bayani Adona

Reviewers: Renato S. Cagomoc, Rolando M. Lacbo, Joshua Sherwin T. Lim, Daniel C. Guevarra

Illustrator: Razle L. Jabelo

Layout Artist: Joey Sustitudo, Razle L. Jabelo, Emmanuel S. Gimena Jr.

Management Team: Ma. Gemma M. Ledesma
Arnulfo R. Balane
Rosemarie M. Guino
Joy B. Bihag
Ryan R. Tiu
Sarah S. Cabaluna
Thelma Cabadsan-Quitalig
Elena S. De Luna
Renato S. Cagomoc
Noel E. Sagayap
Geraldine P. Sumbise
Joshua Sherwin T. Lim

Printed in the Philippines by _____

Department of Education – Region VIII

Office Address: DepEd Regional Office No. 8, Candahug, Palo, Leyte
Telefax: (053)-832-2997
E-mail Address: region8@deped.gov.ph

5

Mathematics

Quarter 3 – Module 18: Visualizing the Circumference of a Circle

DepED
DEPARTMENT OF EDUCATION

Introductory Message

This Self-Learning Module (SLM) is prepared so that you, our dear learners, can continue your studies and learn while at home. Activities, questions, directions, exercises, and discussions are carefully stated for you to understand each lesson.

Each SLM is composed of different parts. Each part shall guide you step-by-step as you discover and understand the lesson prepared for you.

Pre-tests are provided to measure your prior knowledge on lessons in each SLM. This will tell you if you need to proceed on completing this module or if you need to ask your facilitator or your teacher's assistance for better understanding of the lesson. At the end of each module, you need to answer the post-test to self-check your learning. Answer keys are provided for each activity and test. We trust that you will be honest in using these.

In addition to the material in the main text, Notes to the Teacher are also provided to our facilitators and parents for strategies and reminders on how they can best help you on your home-based learning.

Please use this module with care. Do not put unnecessary marks on any part of this SLM. Use a separate sheet of paper in answering the exercises and tests. And read the instructions carefully before performing each task.

If you have any questions in using this SLM or any difficulty in answering the tasks in this module, do not hesitate to consult your teacher or facilitator.

Thank you.

What I Need to Know

Hello, Mathletes! This module was designed to help you develop your understanding of circles and their circumferences, as well as test your abilities to visualize them. This module also includes activities which will add to your understanding as they relate to experiences in your daily life.

When you finish this module, you will be able to:

- visualize the circumference of a circle;
- describe the circumference of a circle; and
- appreciate the importance of visualizing a circle's circumference in your daily life.

First, let us check what you have learned so far.

What I Know

Directions: Read and understand the following statements carefully. Choose the letter that corresponds to the best answer. Write your answers on a separate sheet of paper.

1. Which of the following describes the circumference of a circle?
   A. the distance around the circle
   B. distance between two points on a circle
   C. the distance from the center of a circle to any point on the circle
   D. the halfway distance from the center of a circle to any point on the circle

2. One of the following circular objects has a circumference that is much bigger than the others in the group. Which one is it?
   A. plate
   B. wall clock
   C. pizza pie
   D. Ferris wheel

3. Which of the following common things has a circumference which measures approximately 10 inches?
   A. A cymbal
   B. A swimming pool
   C. A wedding ring
   D. A circular earring

4. Which of the following common circular objects has a much bigger circumference than the rest of the objects in the group?
   A. a basin
   B. a bottle cap
   C. a 10-peso coin
   D. a round pendant of a necklace

5. Which of the following common things has a circumference that is closest to the circumference of a motorcycle tire?
   A. a Ferris wheel
   B. a round bracelet
   C. a circular swimming pool
   D. a plastic basin for washing clothes

6. Which of the following is **not** true?
   A. The bigger the circle is, the longer its circumference is.
   B. If the diameter increases, then the circumference of a circle decreases.
   C. You can measure the circumference of a circle using a tape measure.
   D. The circumference of any circle divided by its diameter is approximately equal to 3.14.

7. Which of the following pairs is likely to have circumferences that are almost of the same length?
    A. A coin and a small basin
    B. A hula hoop and the rim of a cup
    C. A round wall clock and a round plate
    D. A bicycle wheel and a Ferris wheel

8. Which circle has the longest circumference?
    A. A circle with a radius of 1 m
    B. A circle with a diameter of 10 mm
    C. A circle with a radius of 15 km
    D. A circle with a diameter of 20 cm

9. Which situation requires finding the circumference of the object?
    A. Finding the height of a pole
    B. Deciding which box contains more space
    C. Determining which water melon is the heaviest
    D. Determining how much plastic tube is needed to create a Hula hoop

10. Which of the following best represents a circumference?
    A. A hotcake
    B. A slice of pizza
    C. The crust of a round pie
    D. Half of a circular kakanin

Lesson 1 Visualizing the Circumference of a Circle

What's In

Can you still remember the different terms related to circle? Let's see if you can recall of some of them.

For example, you are given the following objects: a 1-peso coin, a globe, and a ball. What do they have in common?

Yes, you are correct! They are all closed figures and round. Which of them can represent circles, and which ones do not? Why?

If you still remember, a *circle* is a set of all points in a plane that have the same distance from a fixed point called its center. Hence, a 1-peso coin can be used to represent a circle. However, a globe and a ball have the shape of a circle but are not considered as representations of circles because they are better representations of spheres. A sphere is a three-dimensional figure.

The radius and the diameter of a circle are terms related to a circle.

A *radius* is a line segment from the center to any point on the circle. It is the distance from the center to a point on the circle.

A *diameter* is a line segment which passes through the center of a circle and whose endpoints are on the circle. Its length is twice that of the radius.

Take a look at this figure.

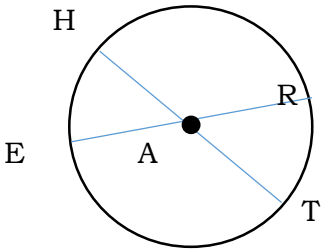


Figure 1

The line segment **HT** represents the diameter of the circle**.** The line segment **AR** is a radius of the circle. Point A is the center of the circle. Can you identify other diameters or radii (plural for radius) that are found in the circle?

Exercise 1

Directions: Using Figure 1 on page 3, answer the following. Use a separate answer sheet for your answer.

a. Name another diameter.

1. _____

b. List down other radii.

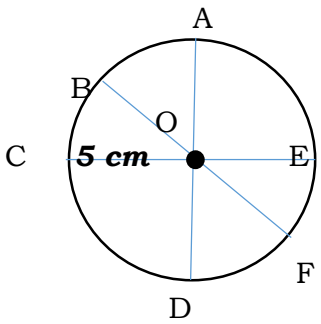
2. _____
3. _____
4. _____

c. If the distance between point A to point R is 3 cm, what is the distance between point E to point R?

5. _____

Exercise 2

Directions: Using the figure below, determine which of the following statements is true or not. Write **FACT** if the statement is true and **BLUFF** if it is false. Write your answers on a separate sheet of paper.



_____ 6. Point O is the center of the circle.
_____ 7. There are 6 given diameters in this circle.
_____ 8. Line segment OE is half the length of line segment AD.
_____ 9. Line segment CE divides the circle into two halves.
_____ 10. If radius OC measures 5 cm, then the distance from point A to D is 10 cm.

Keep going! You are doing well.

What's New

By this time, you have already gained knowledge about how circles look like and the parts related to them.

Let's review the figures below.

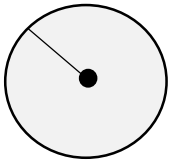


Figure 1

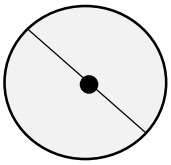


Figure 2

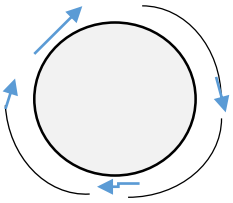


Figure 3

Figure 1 illustrates a **radius** of the circle. Figure 2 shows a **diameter**. Figure 3 illustrates the **circumference** of a circle.

How will you determine the circumference of any circle?

What is It

The circumference of a circle can be represented by the length of the crust of a circular pizza or the distance around a round plate.

Suppose you walk along the path of a circular park and you reach the same point from where you started. The *distance* that you travelled is the *circumference* of the circular park.

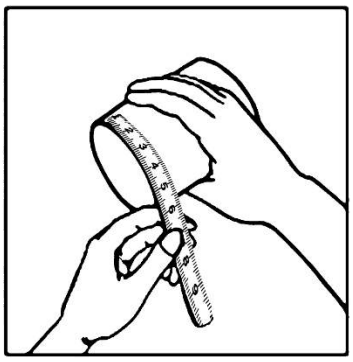
A dressmaker wraps a tape measure around your wrist to know the *circumference* of your wrist. He or she uses a tape measure to know the *length* of your waistline. Health professionals use a tape measure to know the head circumference of a baby. This is done with the assumption that the tape measure is forming a circle.

These are just a few of the different applications of the circumference of a circle which are present in our lives. Can you think of some other applications?

Circumference is the distance around a circle. To help us visualize this, we can use a string, ruler, meter stick or tape measure depending upon the size of the circular object that will be measured. The circumference of a circle can be measured in meters, feet, centimeters, inches, decimeters, millimeters, or even kilometers.

Let us consider the situation below.

Get an empty can. Visualize how to measure the distance around it.



Problem: Can you imagine the distance around an empty can?

Solution: As shown, wind a strip of paper once around the can. The length of the strip is the distance around the circle. This is the ***circumference*** of the empty can.

Considering the size the circle, we can visualize the measure of the distance around it. Is it big or small? Then, you can determine the unit of measure to use depending on its size.

Is there a relationship between the circumference and the length of a diameter of a circle?

To understand the concept further, do the following activity.

Experiment 1

Directions: Read and understand each of the following. Copy the table below on a separate sheet of paper. Do as indicated.

Materials:

- 5 circular objects of different sizes (Examples: plate, wall clock)
- Tape measure or a piece of string or a strip of paper
- Ruler
- A calculator

Procedures:

1. Use a tape measure to measure the distance around the circular objects (*circumference*) in centimeters.
2. If there is no tape measure, wrap around a piece of string or a strip of paper once the circular objects. You should end up with a single loop of string or strip of paper. Use a ruler to determine the length (*circumference*) of the string or paper in centimeters.
3. Use a ruler to measure the diameter of the each object.
4. Divide the circumference and diameter.
5. Record your observation.

Circular Objects	Circumference (***C***) *in cm*	Diameter (***d***) *in cm*	**C ÷ d**
A			
B			
C			
D			
E			

After getting the average of all the entries in the last column, what have you found out? Are they equal or almost equal?

Upon measuring the distance around the circle and dividing it by the diameter, you will get a constant value whatever sizes of circles you have. It is an irrational number (a decimal that is non-repeating and non-terminating) and it cannot be expressed as a fraction nor a decimal. This why the Greek letter $\boldsymbol{\pi}$ (phi) is used to denote its value. However, the rational numbers **3.14** and $\frac{\mathbf{22}}{\mathbf{7}}$ are used as approximation for π.

It is also important to imagine how small or big the circular object looks like, so that we can visualize its circumference.

Activity 1

Directions: Read and understand each of the following. Copy the table below on your answer sheet. Write Yes or No if the given is illustrating the circumference of a given circular object. The first two are done for you.

Circular Objects	Is it modelling the circumference of a circle?
1. the whole round wall clock	No (It represents the area of the clock.)
2. the crust of a circular apple pie	Yes
3. a slice of round kakanin	
4. the whole circular pizza	
5. a wedding ring	
6. the half of a round cake	
7. the lace around a circular table	

Excellent! You can now visualize and describe the circumference of a circle or any circular object. Keep going.

What's More

Well done! You have reached this far! Keep going.

After going through the examples on visualizing the circumference of a circle, let's try some challenging activities below.

Activity 1: A Tool 4 Me

Directions: A piece of string is wrapped around each of the following objects. Visualize if the length of the string representing the circumference of the circular object can be best measured using a **meter stick** or a **ruler**. Write your answers on a separate sheet of paper.

1. a soft drink bottle cap
2. a 10-peso coin
3. a circular pool
4. a car tire
5. a round necklace pendant
6. a circular fountain in a park

Activity 2: Unit My Picture!

Directions: Match the picture in Column A with the appropriate unit of measure of its circumference in Column B. You may use an option more than once. Write the letter of your answer on a separate answer sheet.

Column A	***Column B***
1.	A. millimeter
2.	B. centimeter
3.	C. meter
4.	
5.	

Activity 3: A or B?

1. Which one has a bigger circumference?
   A. a bottle cap with a radius of 1.8 cm
   B. a 5-peso coin which has a diameter of 2.5 cm

2. The following can be seen at Pilar National Agricultural High School. Which one has a smaller circumference?
   A. A round table with a radius of 3 feet
   B. A circular flower garden with a diameter of 5 feet

3. Jose bought two circular mirrors at Metro Gaisano, Calbayog City. Which has a greater circumference?
   A. The mirror with a diameter of 25 cm
   B. The mirror with a radius of 13 cm

What I Have Learned

Directions: Copy and complete the following on a separate sheet of paper.

1. The _____ of a circle is the distance around it.

2. Using your own words, how do you visualize and describe the circumference of a circle? Give an example.

Great job! You are doing well. Try the next activity.

What I Can Do

Directions: Visualize the problem below. Describe briefly what you have discovered. Write your answers on a separate sheet of paper.

A. Gilbert put two circular wall clocks side by side without overlapping. The diameter of the first clock measures 20 cm. The diameter of the second clock is equal to the radius of the first clock. Which of the following is true?

   1. The circumference of the first wall clock is longer than the second wall clock.
   2. The circumference of the first wall clock is shorter than the second wall clock.
   3. The two wall clocks have the same circumference

B. If the diameter of a circle increases, what happens to its circumference?

Assessment

Directions: Read and understand the following statements carefully. Choose the letter that corresponds to the best answer. Write your answers on a separate sheet of paper.

1. Which of the following statements is **true**?
   A. A whole round cake illustrates the circumference of the cake.
   B. The circumference of a circular park is the amount of space inside the park.
   C. The circumference of a circular park is the distance around the park.
   D. A slice of bibingka is the circumference of the bibingka.

2. Which of the following common circular objects has a circumference that is much bigger than the others in the group?
   A. A bus tire
   B. A truck tire
   C. A wash basin
   D. A Ferris wheel

3. Which of the following has a circumference that is nearest to the circumference of a bus tire?
    A. A wash basin
    B. A Ferris wheel
    C. A round earring
    D. A circular swimming pond

4. Which of the following may illustrate the circumference of the given object?
    A. The whole circular kakanin
    B. The crust of a circular pie
    C. A slice of a circular pizza
    D. Half of a round cake

5. Which of the following pairs of circular objects have almost the same measures of their circumferences?
    A. a plate and a 5-peso coin
    B. an earring and a wall clock
    C. a 10-peso coin and a bottle cap
    D. a bicycle wheel and a Ferris wheel

6. Which of the following circular objects has a circumference that measures approximately 80 cm?

A. 1-peso coin

B. softdrink cap

C. food plate

D. motorcycle tire

7. Which of the following is true?
    A. The smaller the circle is, the shorter its circumference is.
    B. The circumference of a circle is equal to π (pi) multiplied by its radius.
    C. If the diameter increases, the circumference of a circle remains the same.
    D. The circumference of a circle is the distance from one point to any point on the circle.

8. Which of the following circles has the shortest circumference?
    A. A circle with a radius of 6 cm
    B. A circle with a diameter of 13 cm
    C. A circle with a diameter of 5 m
    D. A circle with a radius of 3 m

9. Suppose you are given two round mirrors. The first mirror has a diameter of 20 cm. The second is twice the diameter of the first. If you put the mirrors side by side without overlapping, which of the following show how to get the total distance around the two circles?
    A. the circumference of the first circle is subtracted from the circumference of the second circle
    B. the circumference of the first circle is added to the circumference of the second circle
    C. the sum of 10 inches is added to 20 inches
    D. the 10 inches is multiplied by 2

10. Let C be the circumference of the given circular objects. Which of the following is **most reasonable**?

A.	B.	C.	D.
C = 9.42 mm food plate	C = 6.28 in casserole cover	C = 27.8 cm masking tape	C = 7.85 mm 5-peso coin

Perfect! One last task and you are done with this module. Are you proud of yourself?

Additional Activities

Look around and collect at least 5 circular objects. Describe the circumference of each circular object. Write your answers on a separate sheet of paper.

Congratulations! Give yourself a pat on your shoulder. You did well!

Answer Key

What I Know

1. A
2. D
3. A
4. A
5. D
6. B
7. C
8. C
9. D
10. C

What's In

Exercise 1

1. Line segment ER

For items 2 to 4, these come in any order.

Line segment AH
Line segment AE
Line segment AT

5. 6 cm

Exercise 2

6. Fact
7. Bluff
8. Fact
9. Fact
10. Fact

What's More

Activity 3: A or B?

1. A
2. B
3. B

What is It

Activity 1

3. No
4. No
5. Yes
6. No
7. Yes

What's More

Activity 1: A Tool 4 Me

1. Ruler
2. Ruler
3. Meter stick
4. Meter stick
5. Ruler
6. Meter stick

Activity 2: Unit My Picture!

1. A
2. B
3. B
4. A
5. C

What I Can Do

A. Statement 1
B. If the diameter of a circle increases, the circumference also increases.

What I Have Learned

1. circumference
2. Answers vary.

Additional Activities

Answers vary.

Assessment

1. C
2. D
3. A
4. B
5. C
6. C
7. A
8. A
9. B
10. C

References

Coronel, Carmelita C. and Bamba, Nelia D. 2010. *Mathemtics for a Better Life 5 Textbook.* Quezon City: SD Cor[orations, Inc.

Lumbre, Angelina P. and Alvin C. Ursua. 2016. *21st Century Mathletes 5 Textbook.* Quezon City: Vibal Group, Inc.

Mathematics I for First Year High School Textbook. SEDP Series

For inquiries or feedback, please write or call:

Department of Education - Bureau of Learning Resources (DepEd-BLR)

Ground Floor, Bonifacio Bldg., DepEd Complex
Meralco Avenue, Pasig City, Philippines 1600

Telefax: (632) 8634-1072; 8634-1054; 8631-4985

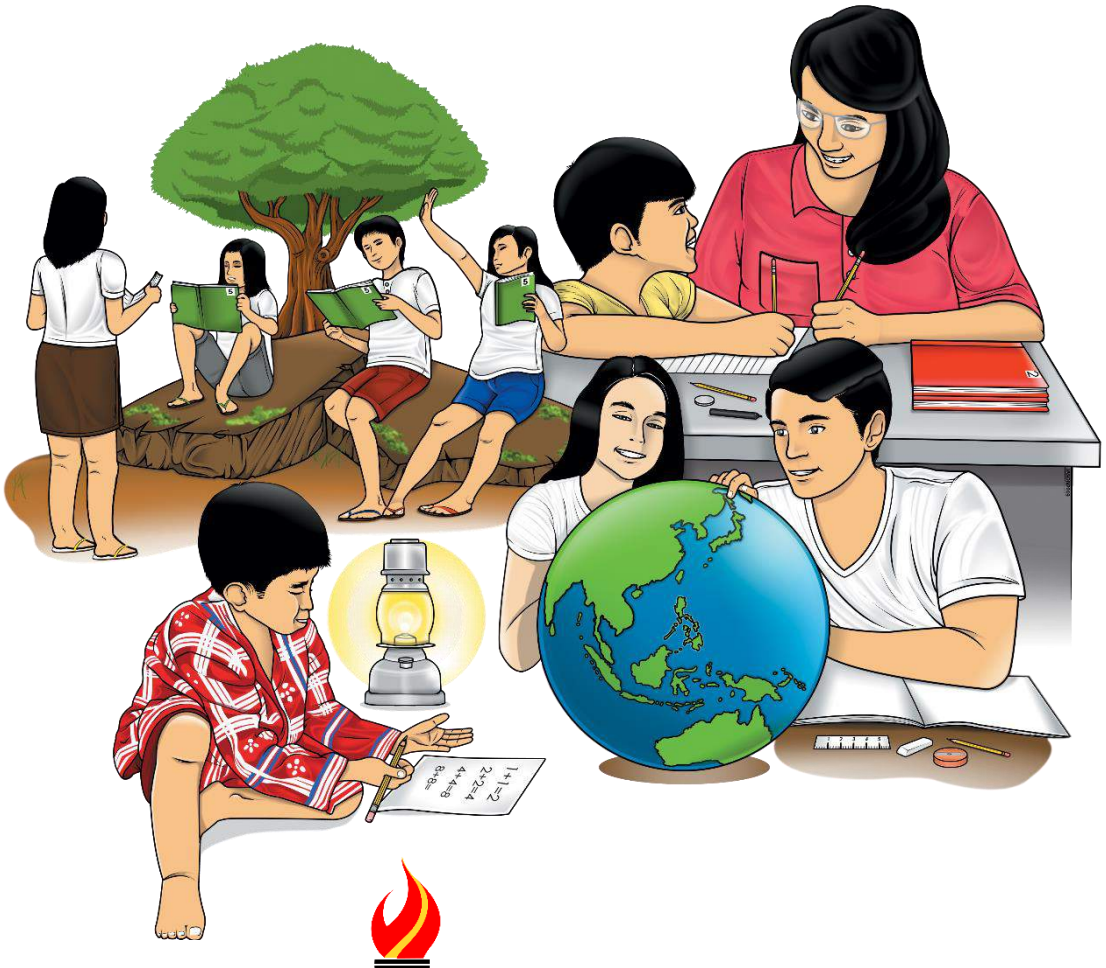
Email Address: blr.lrqad@deped.gov.ph * blr.lrpd@deped.gov.ph

5

DepED
DEPARTMENT OF EDUCATION

Mathematics

Quarter 3 – Module 19: Measuring the Circumference of a Circle Using Appropriate Tools



ALTERNATIVE DELIVERY MODE
ADM

GOVERNMENT PROPERTY
NOT FOR SALE

Mathematics – Grade 5
Alternative Delivery Mode
Quarter 3 – Module 19: Measuring the Circumference of a Circle Using Appropriate Tools
First Edition, 2020

Republic Act 8293, section 176 states that: No copyright shall subsist in any work of the Government of the Philippines. However, prior approval of the government agency or office wherein the work is created shall be necessary for exploitation of such work for profit. Such agency or office may, among other things, impose as a condition the payment of royalties.

Borrowed materials (i.e., songs, stories, poems, pictures, photos, brand names, trademarks, etc.) included in this module are owned by their respective copyright holders. Every effort has been exerted to locate and seek permission to use these materials from their respective copyright owners. The publisher and authors do not represent nor claim ownership over them.

Published by the Department of Education
Secretary: Leonor Magtolis Briones
Undersecretary: Diosdado M. San Antonio

Development Team of the Module

Writers: Ma. Meanie S. Villa

Editors: May Meldred S. Normor and Jose J. Sagada Jr.

Reviewers: Renato S. Cagomoc, Rolando Lacbo, Joshua Sherwin T. Lim, Rolando Eco

Illustrator: Razle L. Jabelo

Layout Artist: Joey Sustitudo, Jaycee B. Barcelona

Management Team: Ma. Gemma M. Ledesma, Arnulfo R. Balane, Rosemarie M. Guino
Joy B. Bihag, Ryan R. Tiu, Sarah S. Cabaluna,
Thelma Cabadsan-Quitalig, Elena S. De Luna,
Renato S. Cagomoc, Noel E. Sagayap, Geraldine P. Sumbise
Joshua Sherwin T. Lim

Printed in the Philippines by _____

Department of Education – Region VIII

Office Address: DepEd Regional Office No. 8
Candahug, Palo, Leyte
Telefax: (053)-832- 2997
E-mail Address: region8@deped.gpv.ph

5

Mathematics

Quarter 3 – Module 19: Measuring the Circumference of a Circle Using Appropriate Tools

DepED
DEPARTMENT OF EDUCATION

Introductory Message

This Self-Learning Module (SLM) is prepared so that you, our dear learners, can continue your studies and learn while at home. Activities, questions, directions, exercises, and discussions are carefully stated for you to understand each lesson.

Each SLM is composed of different parts. Each part shall guide you step-by-step as you discover and understand the lesson prepared for you.

Pre-tests are provided to measure your prior knowledge on lessons in each SLM. This will tell you if you need to proceed on completing this module or if you need to ask your facilitator or your teacher's assistance for better understanding of the lesson. At the end of each module, you need to answer the post-test to self-check your learning. Answer keys are provided for each activity and test. We trust that you will be honest in using these.

In addition to the material in the main text, Notes to the Teacher are also provided to our facilitators and parents for strategies and reminders on how they can best help you on your home-based learning.

Please use this module with care. Do not put unnecessary marks on any part of this SLM. Use a separate sheet of paper in answering the exercises and tests. And read the instructions carefully before performing each task.

If you have any questions in using this SLM or any difficulty in answering the tasks in this module, do not hesitate to consult your teacher or facilitator.

Thank you.

What I Need to Know

Good day, Mathletes! This module was designed and written with you in mind. It is here to help you gain understanding in measuring the circumference of a circle using appropriate tools. Measuring the circumference of a circle is a very important skill in solving real-life problems involving circles. Likewise, exciting and challenging activities will be provided in this module to solidify your knowledge of the main concepts.

When you complete this module, you are expected to:

1. measure the circumference of a circle using appropriate tools; and
2. appreciate the importance of measuring the circumference of a circle in real-life situations.

Are you excited? Let us check what you know about measuring the circumference of a circle using appropriate tools.

What I Know

Directions: Read and understand the given. Choose the letter that corresponds to the correct answer. Write your answers on a separate sheet of paper.

1. Which of the following tools will **NOT** be helpful in measuring the circumference of a circular wall clock?
   A. a piece of string
   B. a tape measure
   C. a compass
   D. a ruler

2. Which of the following is the best tool to measure the circumference of a circular flower garden?
   A. a ruler
   B. a compass
   C. a tape measure
   D. a vernier caliper

3. A string is wrapped once around a coin. Which of the following is the best tool to measure the length of the string?
   A. a ruler
   B. a compass
   C. a laser tape measure
   D. a vernier caliper

4. What unit of measure is appropriate to use in measuring the circumference of a wall clock?
   A. millimetre B. centimeter C. kilometre D. meter

5. To measure the circumference of a bottle cap, what unit of measure will you use?
   A. metre B. millimeter C. kilometre D. micrometer

6. To measure the circumference of a round paper plate, what appropriate tool will you use?
   A. a ruler
   B. a compass
   C. a laser tape measure
   D. a vernier calliper

7. What appropriate unit of measure is used to measure the circumference of a common yoyo?
   A. metre B. centimeter C. kilometre D. micrometer

8. Which of the following is the best tool to measure the circumference of a circular jewellery stone?
   A. a ruler
   B. a compass
   C. a tape measure
   D. a mechanical calliper

9. If a satellite's orbit follows a circular path, what appropriate unit of measure is used to measure the circumference of the orbit?
   A. kilometer B. centimeter
   C. millimeter D. meter

10. Which of the following units of measure is **not** used to measure the circumferences of small circular objects?
   A. centimeter B. micrometer
   C. millimeter D. light year

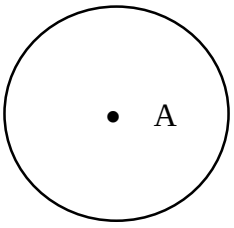
Lesson 1 Measuring the Circumference of a Circle Using Appropriate Tools

To measure the length of any object including the circumferences of circles, there are appropriate tools that you can use. Say for instance, the circumference of a bottle cap can be measured by a tape measure or a strip of paper and a ruler. The circumference of a wall clock can be measured by using a tape measure or a piece of string and a meter stick. The unit of measure is also an important factor to consider in measuring the circumference of a circle. Knowledge about how these tools are used for a particular object is a prerequisite skill in order to deepen your understanding of circles.

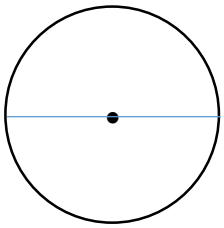
Let's now enjoy exploring the exciting facts about circles.

What's In

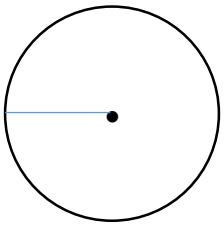
A **circle** is a set of points in a plane where every point is of equal distance from a fixed point called its **center**. It is a close curve figure.



The above figure shows that point A is the *center* of the circle.



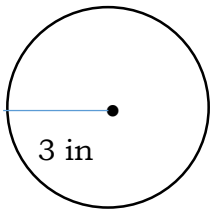
The figure above shows a *diameter* or the distance between two points on a circle which forms a straight line passing through its center.



The figure above illustrates a *radius* or the distance between the center of a circle and any point on the circle.

In the above figures, they show that the *diameter* of a circle (d) is twice as long as its *radius* (r). Hence, $d = 2r$ or $r = \frac{1}{2}d$.

Example: The radius of a circle is 3 inches. What is the diameter of the circle?



Since the radius is 3 inches, the diameter is 6 inches.

Try the activity that follows. You can do it!

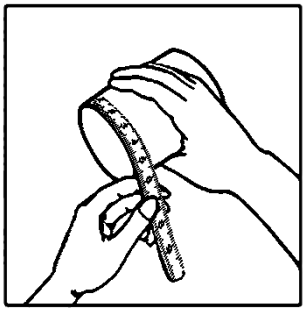
Directions: Copy and complete the table by filling in the missing information. Write your answer on your answer sheet.

Name of Circle	Radius (cm)	Diameter (cm)
1. Circle ***D***	4	_____
2. Circle ***Y***	_____	9
3. Circle ***L***	6.5	_____
4. Circle ***A***	_____	20
5. Circle ***N***	12	_____

What's New

In the previous lesson, you learned how to visualize the circumference of a circle. In this module, you will be learn how to measure the circumference of a circle using appropriate tools. Remember that your prior understanding of the circumference of a circle will be of great help in determining the appropriate tools to use in finding circumference of a given circular object.

Consider the figure below.



Problem: What tool or tools will you use to measure the distance around this empty milk can? (The top of the can represents a circle.)

Can you find an appropriate tool or tools to find its circumference?

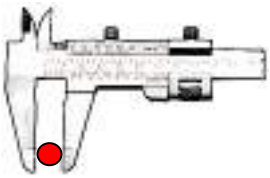
What is It

Getting the circumference of a circular object is common in our life. We need it in determining the length of a ribbon to wrap around a bottle for gift giving, for instance. When you see a dressmaker or tailor, they may wrap a tape measure around your wrist to record its measure. They may also wrap a tape measure around your waistline to ensure that the skirt or pair of pants will fit your waist perfectly. These are done with the assumption that your waist and wrist are circular in shape.

Tape measures are usually available from 6 feet to 33 feet in length or about 1.2 meters to 10 meters. Most of the time, a tape measure is the appropriate tool to measure the circumference of a circular object because it can bend while measuring.

If a tape measure is not available, we can measure the circumference of a circle by using a piece of string, strip of paper, ruler or meter stick depending upon the size of the circular object. These tools are the common measuring tools for lengths.

If a circular object is small, you can use a piece of string or a strip of paper. The string must be long enough to wrap around the circle once. Find the place on the string that completes the loop, touching the end of the string that you started with. Use a pair of scissors to cut it at this point. Take the loop of string and measure it on a ruler or a caliper. The length of your string is the same as the circumference of the circle.



A Vernier caliper

You are familiar with *rulers*. They are readily available measuring tools to measure short lengths. They usually have ruled scales in centimeters, millimeters or inches. Their lengths vary from 12 inches to 18 inches or from about 30 cm to 46 cm. A *calliper* can also be used to measure short lengths. Vernier calipers allow readings to the nearest 0.01 millimeter or 10 micrometers. That is too small! Callipers can be used to measure the circumferences of tiny circular jewellery stones.

If an object is big or wide, you can use a tape measure to wrap around the circular object. You may also use a piece of string to wrap around the circular object. Then, a meter stick or laser tape measure can be used to measure the length of the string.

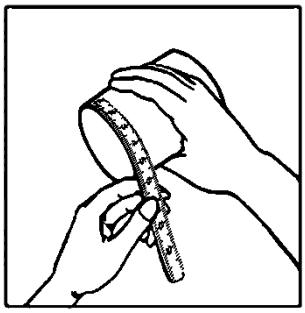
Meter sticks are used to measure objects that are larger than a piece of paper. Their lengths can be one meter or 2 meters. They show ruled scales in centimeters and millimeters. *Laser tape measures* are suitable for short and long distances. They use optics and laser physics to give accurate measurements.

There are other advanced measuring tools that can be used for long and short distances. With the advancement of our technology, smart phones are able to replace rulers, meter sticks and tape measures. However, the advance tools are most of the time expensive and uses electricity. Rulers, meter sticks and tape measure are readily available and require little maintenance.

If we consider the size of a circular object and the appropriate tool to be used in measuring its circumference, the same is true with the unit of measure. The common units of measure used in measuring the circumference of a circle are meter, centimeter, millimeter, foot, yard and inch. We commonly use the metric system like meters, centimeters and millimeters. Other countries use the imperial system for their units of measurements like feet, yards and inches.

If we need to measure a small circular object, we can use centimeter, millimeter, decimeter, or inches. However, for bigger or wider objects, the units that can be used are foot, yard, meter or kilometer.

To find the distance around a milk can, we have to do the following.



Solution: Wind a strip of paper once around the can. The length of the strip is the distance around the circle. The distance around the circle is called *circumference.*

Considering the size or length of the strip of paper, we can determine an appropriate tool to measure its length. A ruler or *tape measure* can be used for this purpose. The units of measure that can be used are decimeter, centimeter, millimeter, or inch.

Consider this example.

Dylan wanted to measure the distance of the circular vegetable garden in the school. How can he do it?

Solution:

In measuring the circumference of the circular garden, the following can be done.

a. The tape measure can be wrapped once around the garden. If the available tape measure is long enough, the length can be directly measured.
b. If tape measure is not available, the following can be done:
   Step 1. Wind once a piece of string around the circular garden. The string must be long enough to wrap once around the garden.
   Step 2. Use a pair of scissors to cut the string at the point that completes the loop, touching the end of the string that you started with.
   Step 3. Take the loop of string and measure it on a meter stick or ruler.
c. Decide the unit of measure to use. It can be in meters or yards. The length of the string is the circumference of the garden.

Great job! You have reached this far. Are you not proud of yourself? You should be. Keep going!

What's More

Now that you have understood the concepts of measuring the circumference of a circle using different tools, let us try the next activities.

Activity 1: Tool Box

Directions: Suppose a string is wrapped once around each of the given circular objects. Give the appropriate tool that can be used to measure the circumference of each item. Choose your answer from the choices inside the box. Write your answers on your answer sheet.

ruler	meter stick	calliper

1. a 10-peso coin
2. a lagoon
3. a stone on a ring
4. a pool
5. a steering wheel of a car

Activity 2: Unit-y Please!

Using the circular objects below, identify the appropriate unit of measure for each common object. Choose the letter of your answer from inside the box. Write your answers on your answer sheet.

A. millimeter	C. centimeter
B. kilometer	D. meter

1. A bicycle wheel
2. A round mirror
3. A Ferris wheel
4. A 25-centavo coin
5. A car tire
6. A bottle cap

Activity 3: U Complete Me

Directions: Copy and complete the table below. The first one is done for you.

Circular Objects	Tools to measure the circumference	Unit of Measurement
1. a one peso coin	Tape measure or a string and a ruler	millimeter
2. a car tire		
3. a round wall clock		
4. a round paper plate		
5. a round stone in an earring		
6. a circular pond		

What I Have Learned

Directions: Read and understand the following carefully. Do as indicated. Write your answers on a separate sheet of paper.

1. Give at least 4 tools that you can use to measure the circumference of the circle.
   a.
   b.
   c.
   d.
2. List down at least 4 units of measure in finding the circumference of a circle.
   a.
   b.
   c.
   d.

3. How do you measure the circumference of a circle with a given tool? Give an example.

Excellent! You are doing well. Continue with the next activity.

What I Can Do

Directions: Copy and complete the table below by giving the appropriate unit of measure and measuring tool for the object given in every situation. Write your answers on a separate sheet of paper.

Objects	**Unit of Measure** (*in, mm, cm, m*)	**Measuring Tool** (ruler, meter stick, tape measure or calliper)
1. Marilou jogs around a *circular park*.		
2. A *circular table top* needs a lace to decorate its edge.		
3. Father plants pechay in a *circular basin*.		
4. Manuel paints the *circular concrete fence*.		
5. Ana finds a beautiful wedding ring with a *round diamond*.		

Assessment

Directions: Read and understand the given. Choose the letter that corresponds to the correct answer. Write your answers on a separate sheet of paper.

1. The circumference of one of the objects below can be best measured by a ruler. Which one is it?
   A. a circular clock B. a circular swimming pool
   C. a circular pond D. a truck tire

2. If you have to measure the circumference of a circular plate, which of the following tools are you **not** going to use?
   A. a piece of string
   B. a tape measure
   C. a protractor
   D. a ruler

3. What appropriate tool can be used to measure the circumference of a circular hoop earring?
   A. a protractor B. a calliper
   C. a tape measure D. a meter stick

4. What appropriate unit of measure is used to measure the circumference of a circular Frisbee?
   A. micrometer B. millimetre C. centimeter D. meter

5. To measure the circumference of a Ferris wheel, what unit of measure will you use?
   A. micrometer B. millimetre C. centimeter D. meter

6. In order to measure the circumference of a circular wall clock, what appropriate tool will you use?
   A. a protractor B. a calliper
   C. a tape measure D. a meter stick

7. What appropriate unit of measure is used to measure the circumference of a stone of an earring?
   A. micrometer B. millimetre C. centimeter D. meter

8. Which of the following is the best tool to measure the circumference of a circular diamond in a ring?
   A. a ruler
   B. a meter stick
   C. a tape measure
   D. a vernier calliper

9. If an orbit follows a circular path, what appropriate unit of measure is used to measure the circumference of the orbit of a planet?
   A. millimeter B. meter C. kilometer D. centimeter

10. Which of the following units of measure is **not** used to measure the circumferences of big circular objects?
   A. meter B. micrometer C. foot D. yard

Got a score of 8-10? CONGRATULATIONS! Job well done. See you in the next module. If below 8, you may have to go over the lessons and the exercises again.

Additional Activities

Directions: Collect at least 5 circular objects of different sizes. Use a piece of string to wrap around your chosen object. Copy and complete the table below. One is done for you. Use a separate sheet of paper for your answers.

Objects	**Unit of Measure** (*mm, cm, m*)	**Measuring Tool** (ruler, meter stick, tape measure, calliper)	**Circumference** (rounded to the nearest whole number)
1. Compact disc	cm	ruler or tape measure	12 cm
2.			
3.			
4.			
5.			
6			

Perfect! You are done with this module. You deserve a good break. Hooray!

Answer Key

What I Know

1.	C	6.	A
2.	C	7.	B
3.	A	8.	D
4.	D	9.	C
5.	B	10.	D

What's In

1. 8
2. 4.5
3. 13
4. 10
5. 20

What's More

Activity 1: Tool Box

1. Ruler
2. Metre stick
3. Caliper
4. Metre stick
5. Metre stick

Activity 2: Unit-y Please

1. C
2. C
3. D
4. A
5. C
6. A

Activity 3: U Complete Me

1. This is already answered.
2. Tape measure or a string and a metre stick; metre or inch
3. Tape measure or a string and a ruler; centimeter or inch
4. Tape measure or a string and a ruler; centimeter or inch
5. Tape measure or a string and a caliper; millimetre
6. Tape measure or a string and a metre stick; metre, foot or yard

What's I Have Learned

1. These come in any order.
   a. String
   b. Ruler
   c. Tape measure
   d. Meter stick
   e. Caliper
   f. Laser tape measure
2. These come in any order.
   a. Inch
   b. Millimetre
   c. Centimetre
   d. Metre
   e. Kilometre
   f. Micrometre
   g. Yard
   h. foot
3. Answer vary

What I Can Do

1. m, metre stick
2. cm; tape measure or ruler
3. cm; tape measure or ruler
4. m; tape measure or meter stick
5. mm; caliper

Assessment

1. A
2. C
3. C
4. C
5. D
6. C
7. B
8. D
9. C
10. B

Additional Activities

Answers vary.

References

Coronel, Carmelita C. and Bamba, Nelia D. 2010. *Mathematics for a Better Life 5 Textbook.* Quezon City: SD Corporations, Inc.

Lumbre, Angelina P. and Alvin C. Ursua. 2016. *21st Century Mathletes 5 Textbook.* Quezon City: Vibal Group, Inc.

Osano, Lany A. 2012. *Math Beyond Excellence Revised Edition 5 Worktext.* JFC Quezon City. Publishing House, Inc.

Mathematics I for First Year High School Textbook. SEDP Series

For inquiries or feedback, please write or call:

Department of Education - Bureau of Learning Resources (DepEd-BLR)

Ground Floor, Bonifacio Bldg., DepEd Complex
Meralco Avenue, Pasig City, Philippines 1600

Telefax: (632) 8634-1072; 8634-1054; 8631-4985

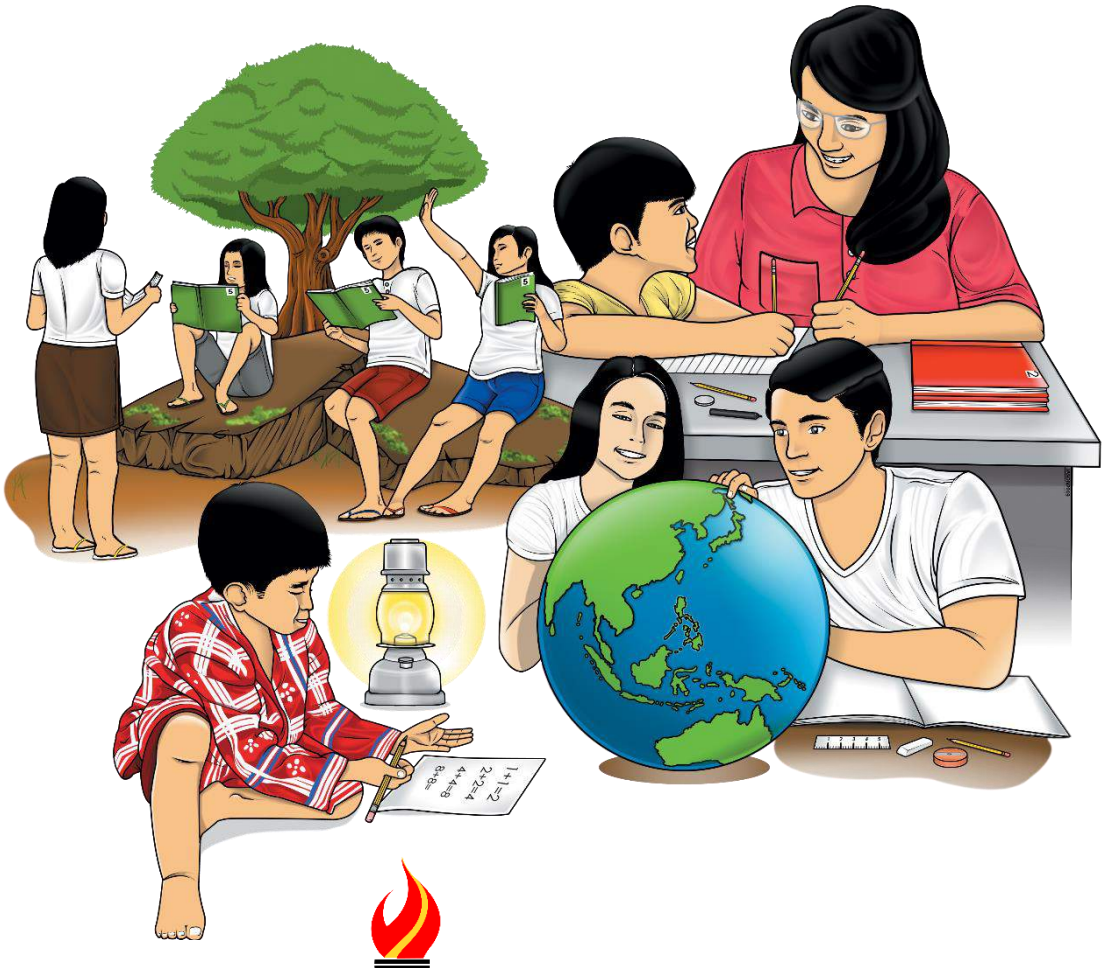
Email Address: blr.lrqad@deped.gov.ph * blr.lrpd@deped.gov.ph

5

DepED
DEPARTMENT OF EDUCATION

Mathematics

Quarter 3 – Module 20:
Finding the Circumference of a Circle



ALTERNATIVE DELIVERY MODE
ADM

GOVERNMENT PROPERTY
NOT FOR SALE

Mathematics – Grade 5
Alternative Delivery Mode
Quarter 3 – Module 20: Finding the Circumference of a Circle
First Edition, 2020

Republic Act 8293, section 176 states that: No copyright shall subsist in any work of the Government of the Philippines. However, prior approval of the government agency or office wherein the work is created shall be necessary for exploitation of such work for profit. Such agency or office may, among other things, impose as a condition the payment of royalties.

Borrowed materials (i.e., songs, stories, poems, pictures, photos, brand names, trademarks, etc.) included in this module are owned by their respective copyright holders. Every effort has been exerted to locate and seek permission to use these materials from their respective copyright owners. The publisher and authors do not represent nor claim ownership over them.

Published by the Department of Education
Secretary: Leonor Magtolis Briones
Undersecretary: Diosdado M. San Antonio

Development Team of the Module

Writers: Fe C. Cruz

Editors: Jose J. Sagada Jr.

Reviewers: Renato S. Cagomoc, Rolando Lacbo, Joshua Sherwin T. Lim,
Teodora P. Coreal. Rodel V. Rosales

Illustrator: -

Layout Artist: Joey Sustitudo, Jaycee B. Barcelona

Management Team: Ma. Gemma M. Ledesma, Arnulfo R. Balane, Rosemarie M. Guino
Joy B. Bihag, Ryan R. Tiu, Sarah S. Cabaluna,
Thelma Cabadsan-Quitalig, Elena S. De Luna,
Renato S. Cagomoc, Noel E. Sagayap, Geraldine P. Sumbise
Joshua Sherwin T. Lim

Printed in the Philippines by _____

Department of Education – Region VIII

Office Address: DepEd Regional Office No. 8
Candahug, Palo, Leyte
Telefax: (053)-832- 2997
E-mail Address: region8@deped.gpv.ph

5

Mathematics

Quarter 3 – Module 20: Finding the Circumference of a Circle

DepED
DEPARTMENT OF EDUCATION

Introductory Message

This Self-Learning Module (SLM) is prepared so that you, our dear learners, can continue your studies and learn while at home. Activities, questions, directions, exercises, and discussions are carefully stated for you to understand each lesson.

Each SLM is composed of different parts. Each part shall guide you step-by-step as you discover and understand the lesson prepared for you.

Pre-tests are provided to measure your prior knowledge on lessons in each SLM. This will tell you if you need to proceed on completing this module or if you need to ask your facilitator or your teacher's assistance for better understanding of the lesson. At the end of each module, you need to answer the post-test to self-check your learning. Answer keys are provided for each activity and test. We trust that you will be honest in using these.

In addition to the material in the main text, Notes to the Teacher are also provided to our facilitators and parents for strategies and reminders on how they can best help you on your home-based learning.

Please use this module with care. Do not put unnecessary marks on any part of this SLM. Use a separate sheet of paper in answering the exercises and tests. And read the instructions carefully before performing each task.

If you have any questions in using this SLM or any difficulty in answering the tasks in this module, do not hesitate to consult your teacher or facilitator.

Thank you.

What I Need to Know

Hello there, Mathletes! As you know, a circle is a plane figure that is commonly used in art, design, architecture, manufacturing, engineering, and many others. In fact, the coins in your purse are circular in shape! In this module, you will learn how to find the circumference of a circle. Your ability to learn the concepts and keep up with the tasks will depend to a large extent on your willingness to learn. So, are you ready?

At the end of this module, you are expected to:

1. find the radius and diameter of a circle;
2. find the circumference of a circle; and
3. appreciate the value of knowing how to find the circumference of a circle in real-life situations.

What I Know

Directions: Read each statement carefully. Choose the letter that corresponds to the best answer. Write your answer on a separate sheet of paper.

1. If the diameter of a circle is 14 cm, how long is the radius?
   A. 6 cm B. 7 cm C. 14 cm D. 28 cm

2. Which of the following is the formula in finding the circumference of a circle if the radius is given?
   A. $C = \pi$ x d B. C = r x d C. $C = \pi$ x r D. C = 2 x π x r

3. If a circle's radius measures 15 cm, what is its diameter?
   A. 30 cm B. 15 m C. 17 cm D. 7.5 cm

4. Rolly receives a gold medal whose diameter is 15 cm. Which of the following expressions will give the circumference of the medal?
   A. 3.14 x 7.5 B. 3.14 x 1.5 C. 3.14 x 15 D. 3.14 + 15

5. If the radius is doubled, what happens to the diameter of the circle?
   A. The diameter is also doubled.
   B. The diameter remains the same.
   C. The diameter is increased by 2.
   D. The diameter will be the same as the radius.

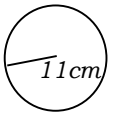
6. The circular pond has a diameter of 7 meters. What is the circumference of the pond to the nearest meter? Use π = 3.14.
   A. 14 B. 17 C. 20 D. 22

7. Marlon's bicycle wheel has a diameter of 40 cm. What is the circumference of the wheel?
   A. 120.40 cm B. 121.12 cm C. 122.05 cm D. 125.60 cm

8. Myrna's circular garden is 10 meters in diameter. How many meters of wire are needed to put a fence around it? Use π=3.14.
   A. 25.50 m B. 30.10 m C. 31.40 m D. 32.50 m

9. Mr. Corsiga is laying out a circular garden whose circumference is 251.20 meters. What is its radius? Use π=3.14.
   A. 40 m B. 50 m C. 125 m D. 250 m

10. Using π=3.14, find the circumference of the circle:



   A. 70.28 cm B. 69.08 cm C. 67.02 cm D. 66.12 cm

Please check your answers against the answer key on page 11.

CONGRATULATIONS! If you got a score of 9 or 10, you should not have any difficulty studying the lesson in this module.

If you got a score of 8 or below, you may need to study the lesson more carefully and do all the given activities.

Lesson 1 Finding the Circumference of a Circle

To find the circumference of a circle, it is important to identify its diameter or radius. Deriving the formula for getting the circumference of a circle is also very helpful for you to understand how the formula was arrived at.

What's In

Before we take the challenges ahead, let's first look back at the wonderful world of circles.

A circle is a closed plane figure, but unlike a polygon, it is not bounded by line segments. It is made up of points which are equidistant from a fixed point called the ***center***. A circle has many parts. In finding the circumference of a circle, we only need the measure of its ***diameter*** or ***radius***.

Diameter, denoted by ***d***, is the distance between two points on a circle which form a straight line passing through its center.

Radius, denoted by ***r***, is the distance from the center to any point on the circle. The radius is half the length of the diameter. ($r = \frac{1}{2} d$)

Circumference, denoted by ***C***, is the distance around the circle.

INVESTIGATIVE ACTIVITY

Let us explore the ratio between a circle's circumference and diameter through this activity.

1. Measure the circumference of three circular cans of different sizes by wrapping a string around each can and measuring the length of the string at the point where it overlaps.
2. Measure the diameter of the can using a ruler.
3. Divide the circumference of each can by its diameter.
4. Tabulate the results for the 3 cans.

Can	Circumference	Diameter	C/d
A			
B			
C			

What do you observe about the quotient of the circumference and diameter?

The ratio of any circle's circumference to its diameter is constant, and that is about $\frac{22}{7}$, or **3.14**. This ratio is represented by the Greek letter $\boldsymbol{\pi}$ (pi). Using the ratio, you can write the formula in finding the circumference of a circle.

The investigative activity above showed that $\frac{C}{d} = \pi$, where $\boldsymbol{C}$ is the circumference and $\boldsymbol{d}$ is the diameter of the circle. By multiplying both sides of the equation by $\boldsymbol{d}$, we get $\boldsymbol{C = \pi \times d}$. Thus, to find the circumference of a circle:

a. If the diameter is given, multiply the diameter by π. Use $\pi = 3.14$.
$$\boldsymbol{C = \pi \times d}$$

b. If the radius is given, multiply π by twice the radius. Use $\pi = 3.14$.
$$\boldsymbol{C = 2r \times \pi} \quad \text{or} \quad \boldsymbol{C = 2 \times \pi \times r}$$

Here's a simple drill for you.

Activity 1

Directions: Each item refers to the same circle. Find the diameter of the circle when its radius is given. Find the radius of the circle when the diameter is given.

Radius	Diameter
1. 6 inches	_____
2. _____	22 m
3. 15 mm	_____
4. _____	18 km
5. 22.5 cm	_____

Activity 2

Directions: Complete the table. Given the following, write the correct formula in finding the circumference of the circle. The first one has been done for you.

Given	Formula
1. r = 5 in	$C = 2 \times \pi \times r$
2. d = 3 m	
3. r = 10 mm	
4. r = 15 dm	
5. d = 7 m	

What's New

Two formulas are used to find the circumference (denoted by **C)** of a circle, depending on the given information.

Formulas for Finding the Circumference of a Circle

1. If the diameter is given:
   $\boldsymbol{C = \pi \times d}$
2. If the radius is given :
   $\boldsymbol{C = \pi \times 2r}$
   or
   $\boldsymbol{C = 2 \times \pi \times r}$
   since the value of diameter is twice the radius; $d = 2r$

   where $\boldsymbol{C}$ = circumference
   $\boldsymbol{d}$ = diameter
   $\boldsymbol{r}$ = radius
   $\pi = 3.14$

Given the formula in finding the circumference of the circle, you can also derive the following formulas:

1. To find the **diameter** of the circle, divide the circumference by π (3.14). Hence;
   $\boldsymbol{d} = \frac{C}{\pi}$

2. To find the **radius** of the circle, divide the circumference by $\boldsymbol{2\pi}$. Hence,
   $\boldsymbol{r} = \frac{C}{2\pi}$

What is It

Consider the situation:

Mrs. Violeta Banzon plants roses in her circular flower garden whose diameter is 8 meters. She wants to build a fence around the garden to protect her roses. How long will the fence be?

Can you help her solve this problem?

Since the diameter of the circular flower garden is 8 meters, we use the formula when the diameter is given. So,

$C = \pi \times d$

Given: $d = 8\ m$
Find: C?
Solution:

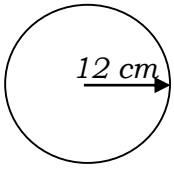
$C = \pi \times d$
$= 3.14 \times 8$
$= 25.12$ m

Therefore, Mrs. Banzon needs 25.12 meters *of fencing materials.*

Let's have more examples.

Example 1:

What is the circumference of the circle whose radius is 12 centimeters?



Since the radius of the circle is given, we use the formula below:

$C = 2 \times \pi \times r$

So:

Given: $r = 12\ cm$
Find: C?
Solution:

$C = 2 \times \pi \times r$
$= 2 \times 3.14 \times 12$
$= 75.36$ cm

Therefore, the circumference of the circle is **75.36 centimeters**.

Example 2:

What is the diameter of a circle whose circumference is 37.68 centimeters?

Since the circumference of the circle is given and we are going to find its **diameter**, we use the formula below:

$$\boldsymbol{d} = \frac{\boldsymbol{C}}{\pi}$$

So:

Given: $\boldsymbol{C}$ = *37.68 cm*
Find: $\boldsymbol{d}$*?*
Solution:

$$\boldsymbol{d} = \frac{\boldsymbol{C}}{\pi}$$

$$= \frac{\mathbf{37.68}}{3.14}$$

$$= 12 \text{ cm}$$

Therefore, the diameter of the circle is 12 centimeters.

Example 3:

If the circumference of a circle is 23.55 cm, what is its radius?

Since the circumference of the circle is given and we are going to find its **radius**, we use the formula below:

$$\boldsymbol{r} = \frac{\boldsymbol{C}}{2\pi}$$

So:

Given: $\boldsymbol{C}$ = *23.55 cm*
Find: $\boldsymbol{r}$*?*
Solution:

$$\boldsymbol{r} = \frac{\boldsymbol{C}}{2\pi}$$

$$= \frac{\mathbf{23.55}}{2\ x\ 3.14}$$

$$= \frac{\mathbf{23.55}}{6.28}$$

$$= 3.75 \text{ cm}$$

Therefore, the radius of the circle is **3.75 *cm***.

Are you now excited to use your knowledge of finding the circumference of a circle to answer the exercises in this module?

What's More

This time, you will answer some exercises to check your ability in finding the circumference of the circle. Just relax and refer to the previous examples as your guide.

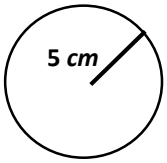
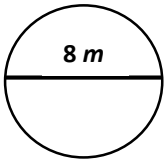
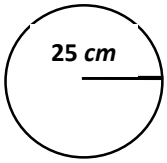
Activity 1: Let's C!

Directions: Find the circumference of the circle given its radius or diameter. You can use an extra sheet for your solution.

1. ***r*** = 2 m
   C = _____
2. ***d*** = 16 cm
   C = _____
3. ***d*** = 18 dm
   C = _____
4. ***r*** = 8 cm
   C = _____
5. ***r*** = 15 km
   C = _____

Activity 2: C - Saw

Directions: Fill in the needed information based on the given illustration. The first one has been done for you.

1. 	2. 	3. 
Radius: ***5 cm***	Radius:	Radius:
Diameter: ***10 cm***	Diameter:	Diameter:
Circumference: ***31.4 cm***	Circumference:	Circumference :

Activity 3: The Circle of Life

Directions: Draw a circle with the given radius or diameter using a compass and ruler and find its circumference

1. d = 9 cm
2. r = 18 mm
3. r = 7 cm
4. d = 28 cm
5. d = 30 m

What I Have Learned

Let's check what you have learned by answering the following questions.

1. What is the formula in finding the circumference of a circle given the following:
   a. Diameter? _____
   b. Radius? _____
2. Which one is wider: a garden whose circumference is 62.8 meters or a room with a diameter of 19 meters? Why?
3. Complete the statement below.

   In this lesson, aside from finding the circumference of a circle, I also learned that _____
   _____
   _____.

What I Can Do

Circles are present everywhere. Day in and day out, we are in close encounter with these figures.

Let's see if you can solve the following real-life problems:

1) The round table in a farm house has a radius of 92.8 cm. Find the distance around the table.
2) You want to make a beautiful tablecloth for the round table in (1). It has an allowance of 15 cm from the edge. What is the circumference of the tablecloth?

See, you have made it this far! Give yourself a hug for keeping up with the challenges in this module. Always keep up the good work.

Assessment

Directions: Read each statement carefully. Choose the letter that best corresponds to the correct answer. Write it on your answer sheet.

1. Which of the following is the formula in finding the circumference of a circle if the diameter is given?
   A. $C = 2 \times \pi \times r$ B. $C = \pi \times d$ C. $C = \pi \times r$ D. $C = r \times d$

2. If the diameter of a circle is 15 meters, then what is the radius?
   A. 7 m B. 7.5 m C. 8.5 m D. 30 m

3. If the radius of a circle is 12.3 cm, then what is its diameter?
   A. 20.8 cm B. 21.20 cm C. 23.40 cm D. 24.6 cm

4. Find the circumference of a plate to the nearest inch with a diameter of 8 in.
   A. 8 B. 16 C. 20 D. 25

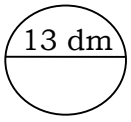
5. Danilo is jogging on a circular track with a circumference of 501.40 ft. Find the radius of the track to the nearest foot.
   A. 80 B. 120 C. 250 D. 500

6. The radius of a basin is 9.2 in. What is the circumference to the nearest inch?
   A. 58 B. 59 C. 60 D. 90

7. A wheel has a diameter of 9 meters. What is the circumference of the wheel?
   A. 27.35 m B. 28.26 m C. 29.15 m D. 26.12 m

8. Mr. Delos Santos had a circular lagoon. The distance across the lagoon passing through the center is 25 meters. What is the distance around it?
   A. 77.3 m B. 76.2 m C. 78.5 m D. 75.1

9. What is the circumference of a circular table with a diameter of 14 meters?
   A. 40.75 m B. 42.12 m C. 43.96 m D. 44.15 m

10. Using $\boldsymbol{\pi} = 3.14$, find the circumference of the circle. 

    A. 40.82 dm B. 41.20 dm C. 42.13 dm D. 43.4 dm

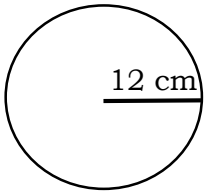
Please check your answers with the ANSWER KEY on page 11.

Got a score of 8-10? CONGRATULATIONS! Job well done. See you in the next module. If below 8, you may have to go over the lessons and the exercises again.

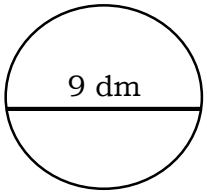
Additional Activities

Directions: Find the circumference of each circle. Use 3.14 for the value of π. (Note: Circles not drawn to scale.)

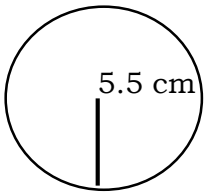
1.



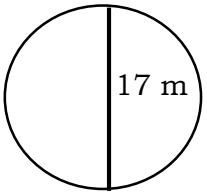
2.



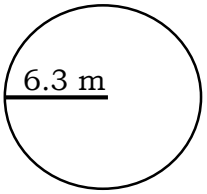
3.



4.



5.



Answer Key

What I Know

1. B
2. D
3. A
4. C
5. A
6. D
7. D
8. C
9. A
10. B

What's In

Activity 1

1. 12 in
2. 11 m
3. 30 mm
4. 9 km
5. 45 cm

Activity 2

1. $C = 2 \times \pi \times r$
2. $C = \pi \times d$
3. $C = 2 \times \pi \times r$
4. $C = 2 \times \pi \times r$
5. $C = \pi \times d$

What's More

Activity 1: Let's C

1. 12.56 m
2. 50.24 cm
3. 56.52 dm
4. 50.24 cm
5. 94.2 km

What's More

Activity 2: C-Saw

Radius: 5 in	Radius: 4 m	Radius: 25 cm
Diameter: 10 in	Diameter: 8 m	Diameter: 50 cm
Circumference: 31.4 in	Circumference: 25.12 m	Circumference: 157 cm

Activity 3: The Circle of Life

1 2 3 4 5

d = 9 cm
C = 28.26 cm

r = 18 mm
C = 113.40 cm

r = 12 cm
C = 75.36 m

d = 28 cm
C = 87.92 cm

d = 30 m
C = 94.2 m

What's I Have Learned

1. a. $C = \pi \times d$
   b. $C = 2 \times \pi \times r$
2. Garden whose circumference is 62.8 meters
   or Room with a diameter of 19 meters?
   Solution:
   $C = \pi \times d$
   $= 3.14 \times 19$ m
   $= 59.66$ m
   Therefore, the ***garden whose circumference is 62.8 meters is wider*** than the room with a diameter of 19 meters because its circumference is greater than the circumference of the room by 3.14 meters.
3. Answers may vary.

What I Can Do

1. $C = 582.784$ cm
2. 2. $C = 676.984$ cm

Assessment

1. B	6. A
2. B	7. B
3. D	8. C
4. D	9. C
5. A	10. A

Additional Activities

1. 75.36 in
2. 28. 26 dm
3. 34.54 cm
4. 53.38 m
5. 39.564 m

References

De Leon Jr., A. (1998). *Today's Math* (3rd Ed). Sibs Publishing House, Inc.

Lumbre, A. P. and Alvin C. & Ursua, A. (2016). *21st Century Mathletes 5 Textbook.* Vibal Group, Inc.

Banao, M. & Barron, A. *(2007) Building New Horizon in MATH*. A Simplified Approach Worktext 5. St. Augustine Publications, Inc.

Mathematics I Textbook, SEDP Series

Burns, W. *PRE-GED Mathematics*, Steck-Vaughn Company, P.O. Box 26015, Austin, Texas 78755

For inquiries or feedback, please write or call:

Department of Education - Bureau of Learning Resources (DepEd-BLR)

Ground Floor, Bonifacio Bldg., DepEd Complex
Meralco Avenue, Pasig City, Philippines 1600

Telefax: (632) 8634-1072; 8634-1054; 8631-4985

Email Address: blr.lrqad@deped.gov.ph * blr.lrpd@deped.gov.ph

5

DepED
DEPARTMENT OF EDUCATION

Mathematics

Quarter 3 – Module 21:
Solving Routine and Non-routine Problems Involving the Circumference of a Circle

ALTERNATIVE DELIVERY MODE
ADM

GOVERNMENT PROPERTY
NOT FOR SALE

Mathematics – Grade 5
Alternative Delivery Mode
Quarter 3 – Module 21: Solving Routine and Non-routine Problems Involving Circumference of a Circle
First Edition, 2020

Republic Act 8293, Section 176 states that: No copyright shall subsist in any work of the Government of the Philippines. However, prior approval of the government agency or office wherein the work is created shall be necessary for exploitation of such work for profit. Such agency or office may, among other things, impose as a condition the payment of royalties.

Borrowed materials (i.e., songs, stories, poems, pictures, photos, brand names, trademarks, etc.) included in this book are owned by their respective copyright holders. Every effort has been exerted to locate and seek permission to use these materials from their respective copyright owners. The publisher and authors do not represent nor claim ownership over them.

Published by the Department of Education
Secretary: Leonor Magtolis Briones
Undersecretary: Diosdado M. San Antonio

Development Team of the Module

Writer: Fe C. Ortiz

Editors: Eunilaine M. Serrato and Jose J. Sagadal Jr

Reviewers: Renato S. Cagomoc, Rolando Lacbo, Joshua Sherwin T. Lim, Arlene R. Restor

Layout Artist: Joey Sustitudo, Razle L. Jabelo

Management Team: Ramir B. Uytico
Arnulfo R. Balane
Rosemarie M. Guino
Joy B. Bihag
Ryan R. Tiu
Sarah S. Cabaluna
Thelma Cabadsan-Quitalig
Elena S. De Luna
Renato S. Cagomoc
Noel E. Sagayap
Geraldine P. Sumbise
Joshua Sherwin T. Lim

Printed in the Philippines by

Department of Education – Region VIII
Office Address: DepEd Regional Office No. 8
Candahug, Palo, Leyte
Telefax: (053)-323- 3156
E-mail Address: region8@deped.gpv.ph

5

Mathematics

Quarter 3 – Module 21:
Solving Routine and Non-routine Problems Involving the Circumference of a Circle

DepED
DEPARTMENT OF EDUCATION

Introductory Message

This Self-Learning Module (SLM) is prepared so that you, our dear learners, can continue your studies and learn while at home. Activities, questions, directions, exercises, and discussions are carefully stated for you to understand each lesson.

Each SLM is composed of different parts. Each part shall guide you step-by-step as you discover and understand the lesson prepared for you.

Pre-tests are provided to measure your prior knowledge on lessons in each SLM. This will tell you if you need to proceed on completing this module or if you need to ask your facilitator or your teacher's assistance for better understanding of the lesson. At the end of each module, you need to answer the post-test to self-check your learning. Answer keys are provided for each activity and test. We trust that you will be honest in using these.

In addition to the material in the main text, Notes to the Teacher are also provided to our facilitators and parents for strategies and reminders on how they can best help you on your home-based learning.

Please use this module with care. Do not put unnecessary marks on any part of this SLM. Use a separate sheet of paper in answering the exercises and tests. And read the instructions carefully before performing each task.

If you have any questions in using this SLM or any difficulty in answering the tasks in this module, do not hesitate to consult your teacher or facilitator.

Thank you.

What I Need to Know

Hi, Mathletes! In this module, you will learn how to solve routine and non-routine problems involving the circumference of a circle.

Routine problems use clear procedures. You may follow a step-by-step process to solve them. In contrast, non-routine problems use procedures that are not immediately clear. Such problems challenge our thinking skills. They may be solved using different strategies.

After going through this module, you are expected to:

- solve routine and non-routine problems involving the circumference of circle.

What I Know

Directions: Read each problem and answer the questions that follow. Write the letter of your answer on a separate answer sheet.

What is the radius of a circle whose circumference is 31.4 meters?

1. Which of the following formulas should be used to solve the problem?
   A. C = π r B. r = $\frac{C}{2\pi}$ C. r = 2 π C D. r = $\frac{2\pi}{C}$

2. What is the radius of the circle?
   A. 5 B. 8 C. 9 D. 10

A circular garden's diameter is 5 meters. If Jose walks around the garden three times, how far will he have walked?

3. Which of the following formulas may be used to solve the problem?
   A. C = πd B. C= 2π C. C = 2πd D. C = 2d

4. What is the total distance covered by Jose if he walks around the garden three times?
   A. 15.7 m B. 31.4 m C. 47.1 m D. 94.2 m

Reina's old cylindrical pen holder has a height of 13 cm and a radius of 5 cm. She wants to wrap a decorative paper around its curved surface to give the pen holder a new look. What are the dimensions of the decorative paper needed for this purpose?

5. What is the shape of the decorative paper that will be wrapped around the cylindrical pen holder?
   A. cube B. rectangle C. rhombus D. square

6. What is the formula for finding the area of the rectangle?
   A. length x radius
   B. (2 x length) + (2 x width)
   C. width x width
   D. length x width

7. What is the circumference of the pen holder?
   A. 15.7 cm B. 24.6 cm C. 31.4 cm D. 62.8 cm

8. In this problem, which dimension of the decorative paper is given by the circumference of the pen holder?
   A. width B. length C. diagonal D. perimeter

9. What is the width of the decorative paper needed to cover the curved surface of the cylinder?

   A. 5 cm B. 13 cm C. 18 cm D. 31.4 cm

10. What are the dimensions (in cm) of the decorative paper needed to cover the curved surface of the cylinder?

    A. 5 x 13 C. 13 x 18
    B. 5 x 31.4 D. 13 x 31.4

CONGRATULATIONS! If you got a score of 9 or 10, you should not have any difficulty studying the lesson in this module.

If you got a score of 8 or below, you may need to study the lesson more carefully and do all the given activities.

Lesson 1 Solving Routine and Non-routine Problems Involving the Circumference of a Circle

Problem solving is a fundamental skill that any mathematics learner should possess. In many countries, developing problem solving skills is the primary goal of learning mathematics.

What's In

In the previous module, you learned that to find the circumference or distance around the circle, you can use the following formulas:

a. If the diameter is given:
$$C = \pi d$$

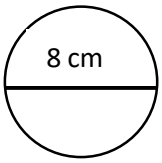
b. If the radius is given:
$$C = 2\pi r$$

where ***d*** is the diameter, ***r*** is the radius, and $\pi = 3.14$ (*as approximation*).

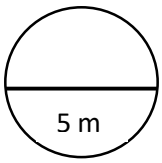
Note that the diameter is twice as long as the radius. That is, $d = 2r$.

Let's try the following exercises.

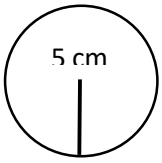
Directions: Find the circumference of each circle. (Use $\pi = 3.14$)

1. 

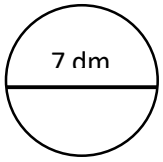
d = 8 cm
C = _____

2. 

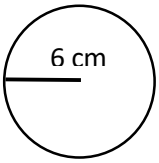
d = 5 m
C = _____

3. 

r = 5 cm
C = _____

4. 

d = 7 dm
C = _____

5. 

r = 6 cm
C = _____

What's New

Now that you know the circle and its parts and you know how to find its circumference, you are now ready to solve routine and non-routine problems involving the circumference of a circle.

We know that many situations in real life require finding the circumference of a circle. Here is one example.

Every morning Mario jogs around a circular path that measures 20 meters across the center. He wants to know how far he has run when he goes around it once.

How will he find the answer? Can you help him?

What Is It

As discussed in the previous modules, **problem solving** is a process or an act of defining or finding a solution to a problem. To solve a problem, one must begin by identifying the given facts and what is being asked, and devising a plan to find the answer.

When solving problems involving the circumference of a circle, it helps to remember the formulas for finding the circumference of the circle given its diameter **(C = πd)** or radius (**C = 2πr).**

.

The **four-step plan** below is a helpful guide in solving any problem.

1. **Understand** by identifying what is being asked and what the relevant facts are in the problem.
2. **Plan** by choosing a strategy to solve the problem. You may draw or illustrate the situation in the problem, use a table, graph, variable, or an equation. Some key words may help in identifying the operation/s to be used.
3. **Solve** by performing the operations needed to find the answer.
4. **Check** by verifying if the answer is correct or not.

Let us use the ***four-step plan*** to solve the problem introduced in the previous page.

Every morning Mario jogs around a circular path which measures 20 meters across the center. He wants to know how far he has run when he goes around it once.

• **Understand** - What is being asked in the problem? - What are the given facts?	- How far does Mario run by going around the path once? - The circular path measures 20 meters across the center.

• **Plan** Choose a strategy. Select the operation (use **clue/key** words in the problem).	Since the path is circular, the distance around it is its circumference and the distance across passing through the center is its diameter. The circumference is unknown and ***d = 20 m***. Use the formula for finding the circumference of a circle when the diameter is given. $C = \pi d$
• **Solve** Perform the strategies.	$C = \pi d$ $= 3.14 \times 20\ m$ $= 62.8\ meters$ ***Answer****: Mario runs* ***62.8 meters*** *when he goes around the circular path once.*
• **Check** Verify if the answer is correct.	$C = \pi d$ 62.8 m = 3.14 x 20 m 62.8 m = 62.8 m Double check the computations and make sure that you use the correct unit of measure.

Here are other examples of real-life problems involving the circumference of a circle.

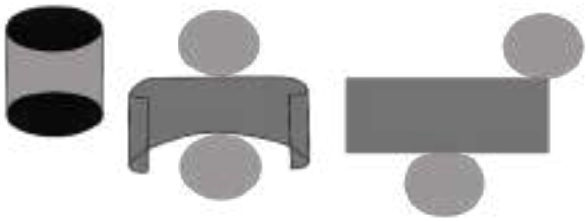
These problems will be solved using the four-step plan.

Problem 1

Ally wants to reuse an old cylindrical coin bank whose length is 18 cm and whose diameter is 4 cm. She wants to give the coin bank a new look by wrapping a decorative paper around its curved surface. What are the dimensions of the decorative paper needed to wrap around it?

Before solving this problem, consider the following information or facts about the cylinder:

- A cylinder has **two congruent bases** and a **curved surface.** It is formed by a rectangle, which is the side (or curved surface) of the cylinder, and two circles, which are the two bases of the cylinder. The net of a cylinder is shown below.



- The cylinder's net consists of two circles and a rectangle. The rectangle's dimensions (height and width) are given by the **circumference** of the circle and the height of the cylinder. In a rectangle, the longer side is the length while the shorter side is the width.

Now you are ready to solve the problem following the ***four-step plan***.

• **Understand** - What is being asked in the problem? - What are the given facts?	- What are the dimensions (length and width) of the decorative paper needed to wrap around the coin bank? - The coin bank is a cylinder whose height is 18 cm and whose diameter is 4 cm.
• **Plan** - Choose a strategy - select the operation (use **clue/key** words in the problem)	The height of the cylinder gives one side of the rectangular paper, that is, 18 cm. The measure of the other side of the rectangular paper is the circumference of the circle. - Use the formula for finding the circumference of a circle when the diameter is given. That is, $C = \pi d$

• **Solve** **-** Perform the strategies	***C* = *πd*** **=** ***3.14*** x ***4 cm*** **=** ***12.56 cm*** Thus, rectangular paper has a width of 12.56 cm. Recall that the length of the decorative paper is 18 cm. ***Answer****: The decorative paper needed is 18 cm long and 12.56 cm wide.*
• **Check** **-** Verify if the answer is correct	Double check the computations. The cylinder is 18 cm long and the distance around it is 12.56 cm. Hence, a rectangular paper that is 18 cm long and 12.56 cm wide will be able to cover the entire side of the cylinder.

Here is another example.

The wheel of a bicycle has a radius of 20 cm. Find the distance it covers in one complete turn.

Using the four-step plan, we have:

• **Understand** - What is being asked in the problem? - What are the given facts?	What is the distance the bicycle wheel covers in one complete turn? The wheel has a radius of 20 cm.
• **Plan** - Choose a strategy - select the operation (use **clue/key** words in the problem)	Since the circumference of the wheel is the distance covered when it completes one turn, we need to find the circumference of the circle whose radius is 20 cm. We can use the following formula: **C = 2πr** since the radius is given (***r = 20 cm***).
• **Solve** **-** Perform the strategies	***C = 2πr*** **=** ***2*** x ***3.14*** x ***20 cm*** **=** ***125.6 cm*** ***Answer****: The wheel covers a distance of* ***125.6 cm*** *in one complete one turn.*

• **Check** - Verify if the answer is correct	Using the previous discussion: $C \div 2r = \pi$ $125.6 \div 2(20) = 3.14$ $125.6 \div 40 = 3.14$ $3.14 = 3.14$ The answer is correct.

I'm sure, you are now ready to take on some exciting exercises involving the circumference of a circle. Just remember to do the tasks following the guide as explained earlier. You can do it!

What's More

Activity 1: MATCH Me, Ney Ney...

Directions: Match the questions in Column A with their corresponding answers in Column B. Write your answers on a separate sheet of paper. Refer to the problem below.

Manuel wants to build a fence around a circular pond. The radius of the pond is 3.2 m. How long should the fence be?

Column A	Column B
1. What is being asked in the problem?	***a***. 6.4 m
2. What is/are the given fact/s?	***b***. 20.1 m
3. What is the formula to be used?	***c***. length of the fence needed to enclose the pond
4. What is the answer?	***d***. r = 3.2 m
5. What is the diameter of the garden?	***e***. C = 2 π r

Activity 2: I Can FILL It!

Directions: Read and solve the problem below.

1. The diameter of a circle is 12 decimeters. What is its circumference?
   Formula: _____
   Answer: _____

2. A circular tablecloth will be decorated with lace trimmings. Its diameter is 124 cm How many meters of lace will be used?
   Formula: _____
   Answer: _____

3. The bicycle covered a distance 188.4 cm with one turn of the wheel. What is the radius of wheel?
   Formula: _____
   Answer: _____

Activity 3: It's FOUR You!

Directions: Read each problem and fill in the needed information using the four-step plan.

The perimeter of a square is 50 cm. What is the circumference of the largest circle that can be drawn inside the square?

• **Understand** 1. What is being asked in the problem? 2. What are the given facts?	1._____ 2. _____
• **Plan** 3. Choose a strategy - select the operation (use **clue/key** words in the problem)	3._____
• **Solve** **4.** Perform the strategies	4._____
• **Check** **5.** Verify if the answer is correct	5._____

What I Have Learned

Directions. Fill in the blanks

After going through this module and performing all the activities, I have learned that

(1) _____is the distance around the circle. When the diameter is given, the circumference can be found using the formula (2)_____. When the radius is given, the formula for finding the circumference is (3)_____. To solve a problem, first we need to identify what is being (4)_____ and what are the given (5)_____.

Truly, mathematics provides us with the strategies and tools to solve problems in real life. It teaches us how to analyze a situation, think critically, and work systematically and patiently until we arrive at the solution.

So, give it a try in this next exercise. Have fun!

What I Can Do

Directions: Read, analyze, and solve the following problem.

1. Mr. Edgardo Cruz bought two round wall clocks. The blue wall clock has a circumference of 53.38 cm while the brown wall clock has a circumference of 65.94 cm. How much longer is the diameter of one wall clock than the other?

Assessment

A. Directions: Find the circumference of each circular object. Write your answer on a separate sheet of paper.

1. A table top with a diameter of 90 cm
2. A mirror with a diameter of 18 cm
3. A picture frame with a diameter of 15 cm
4. A wall clock with a radius of 22 cm
5. A circular pond with a radius of 5.5 m

B. Directions: Read and solve the following word problems. Write your answer on a separate sheet of paper.

6. The circle has a circumference of 40.82 cm. What is its diameter?
   A. 12cm B. 13 cm C. 14cm D. 15 cm

7. A circular fishpond has a 6.4 m diameter. How many meters of fence is needed to enclose the fishpond?
   A. 20.066 m B. 20.096 m C. 21.066m D. 21.096 m

8. The distance around a circular fountain is 25.12 m. What is its radius?
   A. 2 m B. 3 m C. 4 m D. 5 m

For items 9 – 10: Jessica has a square paper whose edge measures 30 cm.

9. What is the diameter of the largest circle that she can cut out from the square paper?
   A. 60 cm B. 50 cm C. 40 cm D. 30 cm

10. What is the circumference of the largest circle that she can cut out from the square paper?
    A. 94.2 cm B. 86.9c m C. 64.2 cm D. 56.8 cm

CONGRATULATIONS! *If you got a score of 9 or 10, you have understood the lesson.*

If you got a score of 8 or below, you may need to restudy the lesson more carefully and do all the given activities.

Additional Activities

Directions: Read each problem and solve for the answer using the four-step plan.

1. A wheel has a diameter of 40 centimeters. How far does it roll after 5 complete revolutions?

2. A circle is drawn around a square. If the circumference of the circle is 50.24 cm, what is the length of the diagonal of the square?

Answer Key

What I Know

1. B
2. A
3. A
4. C
5. B
6. D
7. C
8. B
9. B
10. D

What's In

1. 25.12 cm
2. 15.7 m
3. 31.4 cm
4. 21.98 cm
5. 37.68 cm

What's More
Activity 1

1. C
2. D
3. E
4. B
5. A

What's More
Activity 2

1. Formula: $C = \pi d$
   Answer: 37.68 dm
2. Formula: $C = \pi d$
   Answer: 389.36 cm
3. Formula: $r = \frac{c}{2\pi}$
   Answer: 30 cm

What I Have Learned

1. Circumference
2. $C = \pi d$
3. $C = 2\pi r$
4. Asked
5. facts

Assessment

1. 282.6 cm
2. 56.52 cm
3. 47.1 cm
4. 138.16 cm
5. 34.54 m
6. B
7. B
8. C
9. D
10. A

What's More
Activity 3

1. The circumference of the largest circle that can be drawn on the square paper
2. 50 cm perimeter of square
3. Use the formulas:
   $C = \pi d$, for circumference of the circle
   $P = 4s$, for the perimeter of a square
4. Solve:
   $4s = 50$ cm
   $s = 50 + 4$
   $s = 12.5$ cm
   The side of the square is 12.5 cm. This is also the diameter of the circle.
   Thus,
   $C = \pi d$
   $C = \pi$ x 12.5 cm
   $C = 39.25$
5. Check: Recheck your solution.
   $C = \pi d$
   $39.25 = \pi$ x 12.5
   39.25 cm = 39.25 cm

Additional Activities

1. 628 cm
2. 16 cm

References

Banao, M.-& Barron, A. (2007). *Building New Horizon in Math*: *A Simplified Approach Worktext 5.* (Sampaloc, Manila: Augustine Publication, Inc.)

Barlow, Jim, Burns, William, et. Al. (2000) *Pre-Ged Mathematics* (Texas, USA: Steck-Vaughn Company)

Lumbre, A-& Ursua, A. (2016). *21st Century Mathletes 5 Textbook.* Quezon City: Vibal Group, Inc.

Mendoza, B., Castillo, F & Felipe, R. (1995). *Skill Sharpener in Elementary Mathematics 5.* (Quezon City: Cultural Publisher)

For inquiries or feedback, please write or call:

Department of Education - Bureau of Learning Resources (DepEd-BLR)

Ground Floor, Bonifacio Bldg., DepEd Complex
Meralco Avenue, Pasig City, Philippines 1600

Telefax: (632) 8634-1072; 8634-1054; 8631-4985

Email Address: blr.lrqad@deped.gov.ph * blr.lrpd@deped.gov.ph