6

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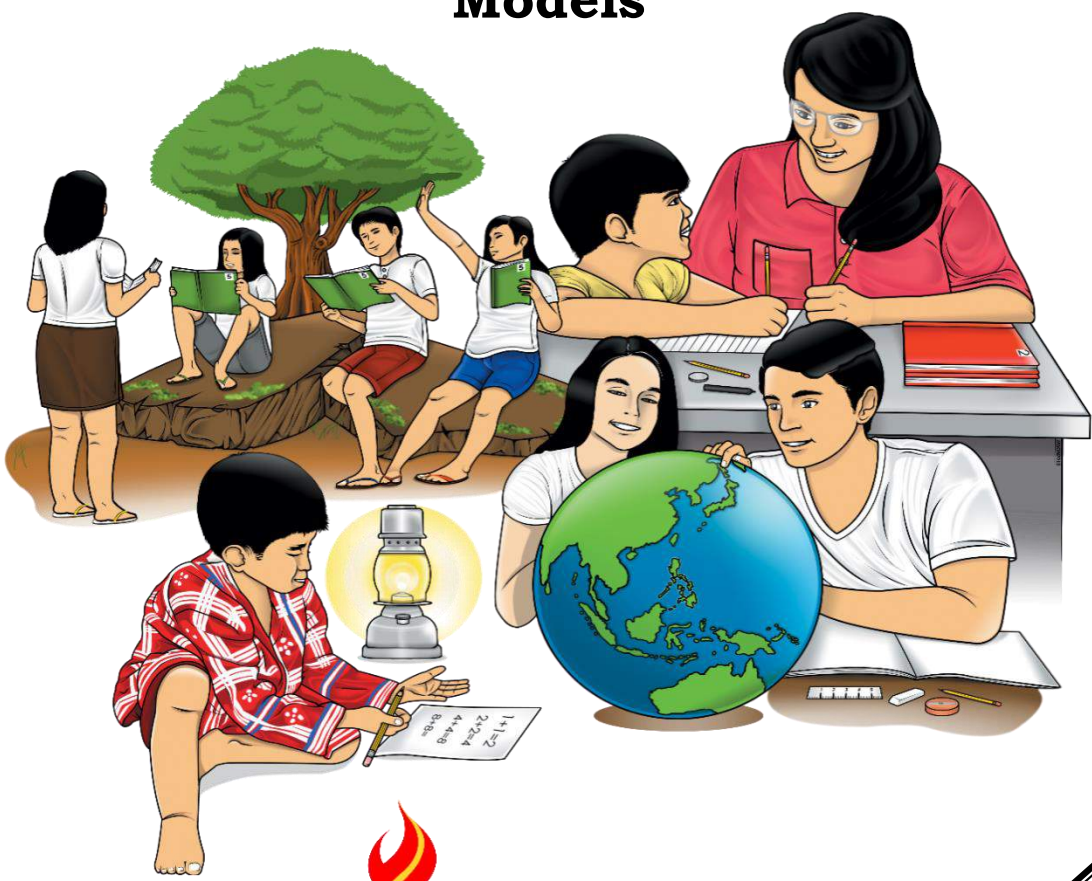
DEPARTMENT OF EDUCATION

Mathematics

Quarter 3 – Module 1:
Visualizing and Describing the Different Solid Figures: Cube, Prism, Pyramid, Cylinder, Cone, and Sphere using Various Concrete and Pictorial Models



ALTERNATIVE DELIVERY MODE
ADM

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Alternative Delivery Mode
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Development Team of the Module

Author: Ritchel P. Maratas

Editors: Mae Joy M. Tan, Susana L. Lutero, Nora B. Rebadomia, Mary Jane O. Amante, Ma. Pinky C. Arquio, Susan T. Dela Torre, Prilyn S. Albarico

Reviewers: Ivy Joy A. Torres, Ma. Theresa L. Tabotabo, Jem Rymon S. Chien Mae Joy M. Tan

Illustrators: Eldiardo E. Dela Peňa

Layout Artists: Eldiardo E. Dela Peňa

Management Team: Ramir B. Uytico, Elena P. Gonzaga, Adonis A. Mosquera, Fevi S. Fanco, Jason R. Alpay, Jem Rymon S. Chien, Pedro T. Escobarte, Jr., Donald T. Genine, Clarissa G. Zamora, Ivy Joy A. Torres, Mae Joy M. Tan, Ethel S. Gali

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Department of Education – Region VI

Office Address: Duran Street, Iloilo City
Telefax: (033)336-2816, (033)509-7653
E-mail Address: region6@deped.gov.ph

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Mathematics

Quarter 3 – Module 1:
Visualizing and Describing the Different Solid Figures: Cube, Prism, Pyramid, Cylinder, Cone, and Sphere using Various Concrete and Pictorial Models

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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 will help you master the skills to visualize and describee the different solid figures: cube, prism, pyramid, cylinder, cone and sphere using various concrete and pictorial models.

The scope of this module discusses different applications of solid figures. The language uses appropriate diverse vocabulary level. The lessons are arranged to follow the standard sequence of your course. But the order in which you study them can be changed to match with the textbook you are now using.

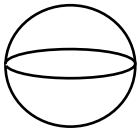
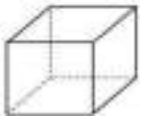
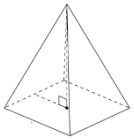
After going through this module, you are expected to:

1. visualize and describe the different solid figures: cube, prism, pyramid, cylinder, cone and sphere using various concrete and pictorial models;
2. differentiate solid figures from plane figures;
3. identify the faces of a solid figures.

What I Know

Before you start studying this module, take this simple test first to find out how much you already know about the topics to be discussed. Write your answers in a separate sheet of paper.

A. Match the names of the solid figure in column A with the figures in column B. Write the letter only.

A.	B.
1. cube	a. 
2. cylinder	b. 
3. cone	c. 
4. pyramid	d. 
5. rectangular prism	e. 
6. sphere	f. 

B. Describe the following solid figures:

Solid Figures	Descriptions
1. cube	
2. rectangular prism	
3. pyramid	
4. cone	
5. cylinder	
6. sphere	

Lesson 1

Visualizing and Describing the Different Solid Figures: Cube, Prism, Pyramid, Cylinder, Cone, and Sphere using Various Concrete and Pictorial Models

This module discusses the different characteristics of solid figures which include the number of edges, number of faces, shapes of the bases. It also shows the difference between solid figures and plane figures. The exercises will help you learn solid figures.

What's In

Identify the solid figure that is represented by each real object below. Write your answer in a separate sheet of paper.

1. can of milk _____
2. funnel _____
3. orange _____
4. shoe box _____
5. tent _____
6. soccer ball _____
7. dice _____
8. globe _____
9. box of chocolate _____
10. drum _____

What's New

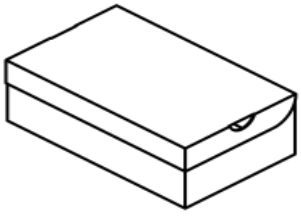
Identify and describe the solid figure represented by the illustration below. Write your answers in a separate sheet of paper.

1. 

2. 

3. 

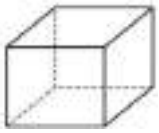
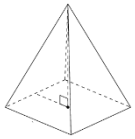
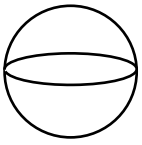
4. 

5. 

What is It

Objects in the real world are called three-dimensional since they have length, width and height. In Mathematics, the three-dimensional figures are called solid figures. A solid figure whose sides are all polygons is called a polyhedron.

The definition and illustrations of solid figures are shown in the table below.

Name of Solid Figures	Definitions	Illustrations
Rectangular Prism	It is composed of two rectangular bases and four rectangular lateral faces.	
Cube	A cube is a prism with a square base. All its faces are square.	
Cylinder	It has two circular base that are congruent and parallel.	
Pyramid	It is a polyhedron whose base is a polygon, and the lateral faces are triangles.	
Cone	It has one circular base which tapers to a point.	
Sphere	It is a curved surface of points that are all of the same distance from the center.	

.

What's More

.

Complete the table below by supplying the required data. Write your answer in your answer sheet.

Solid Figure	Illustration (Draw the Figure)	Number of vertices	Number of faces	Number of edges
1.Rectangular Prism				
2.Square pyramid				
3.Cylinder				
4.Cone				
5.Sphere				
6.Cube				

What I Have Learned

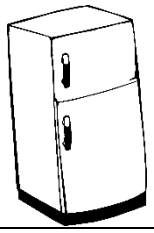
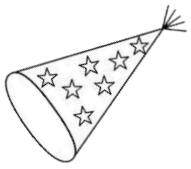
Solid or spatial figures are geometric figures having three dimensions: length, width, and height.

Solid figures include:

1. A cube. It is a prism with a square base. All its faces are squares.
2. A prism. It is a polyhedron whose bases are parallel congruent polygons and whose lateral faces are parallelograms. A prism is named according to the shape of its base. Each face is a polygon. *Example: triangular prism, rectangular prism, cube, pentagonal prism, hexagonal prism, etc.*
3. A pyramid. It is also a polyhedron whose base is a polygon, and the lateral faces are triangle. Pyramids are also named according to the shape of its base. Example: *triangular pyramid, rectangular pyramid, square pyramid, pentagonal pyramid, hexagonal pyramid, etc.*
4. A cone. It is a solid figure that has curved surface and a circular base that tapers into a point.
5. A cylinder. It is a three – dimensional figure with two congruent circular bases.
6. A sphere. It is a curved surface of points that are all of the same distance from the center.

What I Can Do

Name and describe the solid figures represented by the real objects given below.

Real Objects	Name of Solid Figures	Description
1. 		
2. 		
3. 		
4. 		
5. 		

Assessment

A. Draw different solid figures.

Name of Solid Figures	Illustration
1. cube	
2. rectangular Prism	
3. cylinder	
4. cone	
5. pyramid	
6. sphere	

B. Write T if the statement is true and F if it is false.

_____1. The base of a cone is square.

_____2. A cylinder has a circular base.

_____3. The base of an octagonal pyramid has 7 sides.

_____4. A pyramid has a triangular face.

_____5. A cube has six faces.

_____6. A sphere is a plane figure.

_____7. A cone has no vertex.

_____8. A rectangular pyramid has square faces.

_____9. Spatial figures are three – dimensional figures.

_____10. The faces of a prism are triangles.

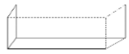
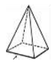
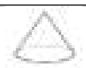
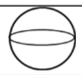
Additional Activities

Complete the table. Write your answer in your answer sheet.

Solid Figure	Illustration (Draw the Figure)	Describe each solid figure
1. rectangular prism		
2. rectangular pyramid		
3. cylinder		
4. cone		
5. sphere		
6. cube		

Answer Key

What's More

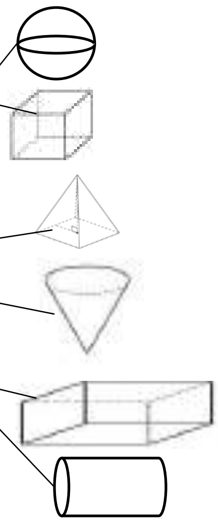
Solid Figure	Illustration	Number of Vertices	Number of faces	Number of edges
1. rectangular Prism		8	6	12
2. square Pyramid		5	5	8
3. cylinder		0	2	0
4. cone		1	1	0
5. sphere		0	0	0

What I Know

A.

1. cube
2. cylinder
3. cone
4. pyramid
5. rectangular Prism
6. sphere

B



What's In
1.cylinder
2.cone
3.sphere
4.rectangular prism
5.pyramid
6. sphere
7. cube
8. sphere
9.rectangular prism
10.cylinder

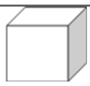
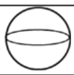
What's New
1.sphere
2.pyramid
3.cylinder
4.cone
5.rectangular prism

B.

Name of Solid Figures	Descriptions
1. cube	It is a prism with a square base. All its faces are squares.
2. rectangular prism	It is composed of two rectangular bases and four rectangular lateral faces.
3. pyramid	It is a polyhedron whose base is a polygon and the lateral faces are triangles
4. cone	It has one circular base.
5. cylinder	It has two circular base that are congruent and parallel.
6. sphere	It is a curved surface of points that are all of the same distance from the center.

Assessment

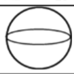
A.

Name of Solid Figures	Illustration
1. Cube	
2. Rectangular Prism	
3. Cylinder	
4. Cone	
5. Pyramid	
6. Sphere	

B.

1. F	6. F
2. T	7. F
3. F	8. F
4. T	9. T
5. T	10. F

Additional Activities:

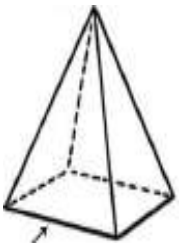
Solid Figure	Illustration	Describe each solid figure
1. rectangular prism		Composed of two rectangular bases and four rectangular lateral faces.
2. rectangular pyramid		It is a three-dimensional figure with a rectangle for a base and triangular face corresponding to each side of the base.
3. cylinder		It has two congruent circular bases that tapers to a point.
4. cone		It has a circular base.
5. sphere		Solid figure whose set of points are equidistant from the center.
6. cube		It is a prism with square base. All its faces are square.

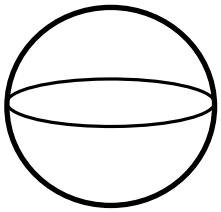
What I Can Do

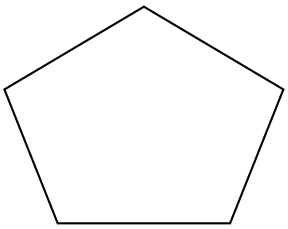
Name of Solid Figures	Description
1. rectangular Prism	Composed of two rectangular bases and four rectangular lateral faces.
2. cylinder	It has two congruent circular bases.
3. cone	It is a solid figure that has a circular base that tapers to a point.
4. cube	It is a prism with a square base. All its faces are square.
5. sphere	It is a solid figure whose set of points are equidistant from the center.

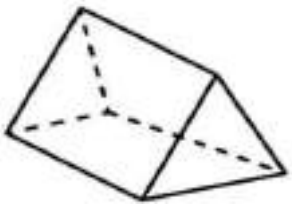
What I Know

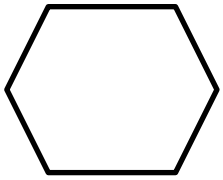
Study the following figures. Write 2D if it is two-dimensional figure and 3D if it is three-dimensional figure.

1.  _____

2.  _____

3.  _____

4.  _____

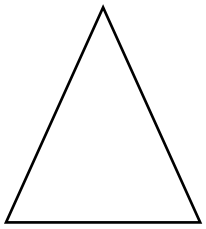
5.  _____

Lesson 2 Differentiating Solid Figures from Plane Figures and Identifying the Faces of a Solid Figure.

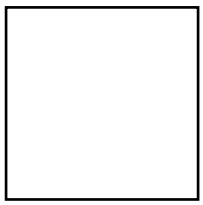
This lesson focuses the difference between the solid figures and the plane figures which include the number of edges, number of faces, shapes of the bases and the difference between solid figures and plane figures.

What's In

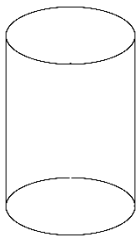
Name the following figures:



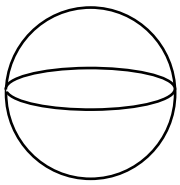
1._____



2._____

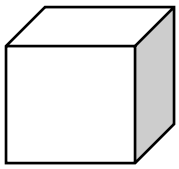


3._____

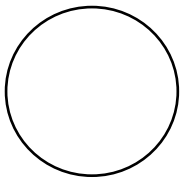


4._____

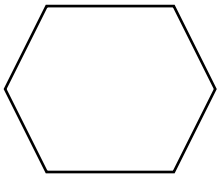
5._____



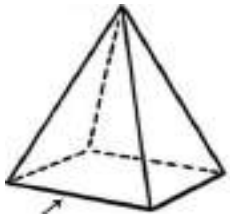
6._____



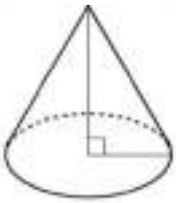
7._____



8._____

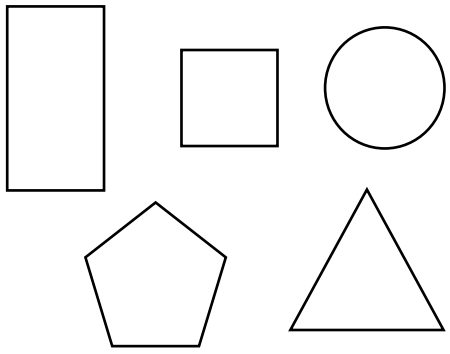
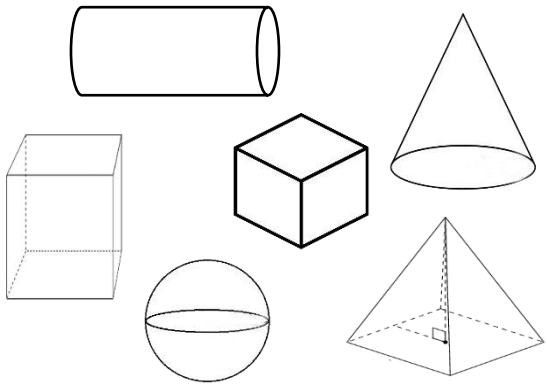


9._____



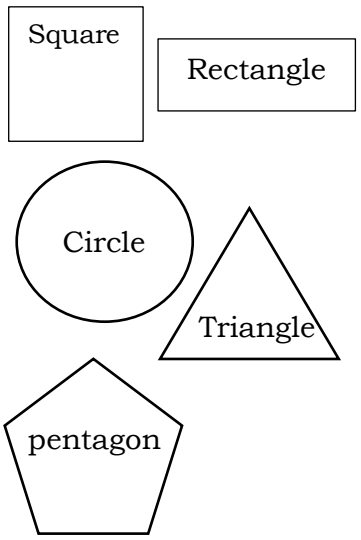
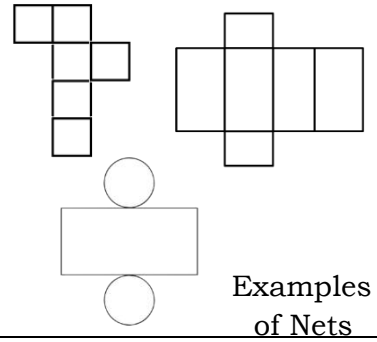
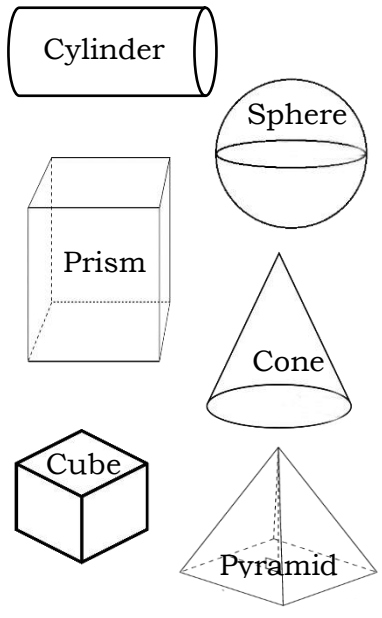
10._____

What's New

Plane Figures	Solid Figures
	

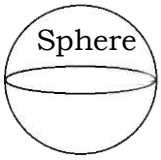
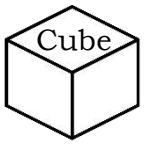
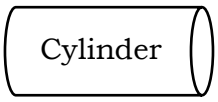
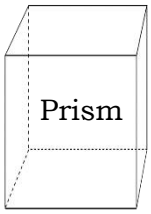
Can you differentiate plane figures from solid figures?

What is It

<table>
<tr><th>Types of Figures</th><th>Definition</th><th>Common Examples</th></tr>
<tr><td rowspan="3">Plane Figures</td><td>Plane figures are flat two-dimensional figure; with length and width.</td><td rowspan="2"> 
</td></tr>
<tr><td>Plane figures are closed figures whose points lie of the same surface.</td></tr>
<tr><td>A closed plane figure that serves as pattern used to form solid figure is called net.</td><td> 
Examples of Nets</td></tr>
<tr><td rowspan="2">Solid Figures</td><td>Solid figures are geometric figures having three dimensions: length, width, and height.</td><td rowspan="2"> 
</td></tr>
<tr><td>Each side of the solid figure is called face. Two faces intersect in a line segment called an edge. Two edges intersect in a point called a vertex.</td></tr>
</table>

What's More

A. Identify the figure described in column A with the solid figures in column B. Write the letter only.

A.	B.
1. I have one circle and one curved side. My curved side surface meets at a sharp point. I have no edges.	a. 
2. I have two congruent circles that are joined by a curved surface. I have no edges or vertices. I can roll.	b. 
3. I am round with no vertices and edges.	c. 
4. I have 6 same shaped faces, 12 equal edges, and 8 vertices.	d. 
5. I have 12 edges, 8 vertices, and 6 faces. I have both square and rectangular faces.	e. 

B. Complete the table below.

Solid Figures	Dimensions	Write Plane or Solid Figure
1. cube		
2. cylinder		
3. square		
4. triangle		
5. rectangular Prism		

What I Have Learned

Plane figures are flat two-dimensional figures with length and width. These are closed figures which points lie on the same surface. Square, rectangle, circle, triangle and pentagon are examples of plane figures.

A net is a closed plane figure that can be folded into solid figure.

Solid figures are geometric figures having three dimensions: length, width and height. Cylinder, prism, sphere, cube, cone and pyramid are common examples of solid figures.

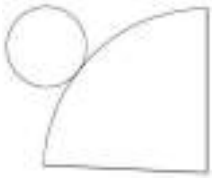
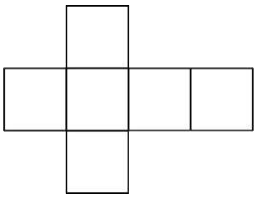
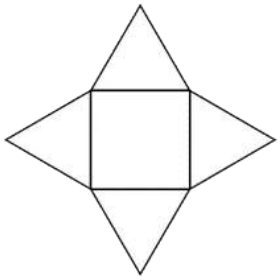
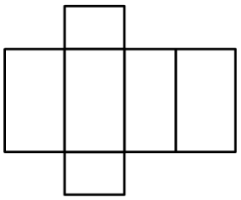
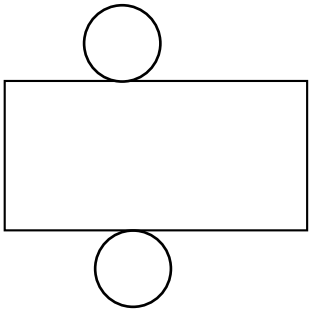
What I Can Do

Illustrate the given solid figures and identify the plane figures that illustrate its faces.

Solid Figure	Illustration (Draw the Figure)	Plane figure that illustrates its faces
1. rectangular prism		
2. square pyramid		
3. hexagonal pyramid		
4. cube		
5. sphere		

Assessment

A. Match the solid figures in column A with their corresponding nets in column B. Write the letter of the correct answer in separate answer sheet.

Column A	Column B
1. Cube	a. 
2. Cylinder	b. 
3. Square pyramid	c. 
4. Cone	d. 
5. Rectangular prism	e. 

B. Fill in the blanks. Choose your answer inside the box.

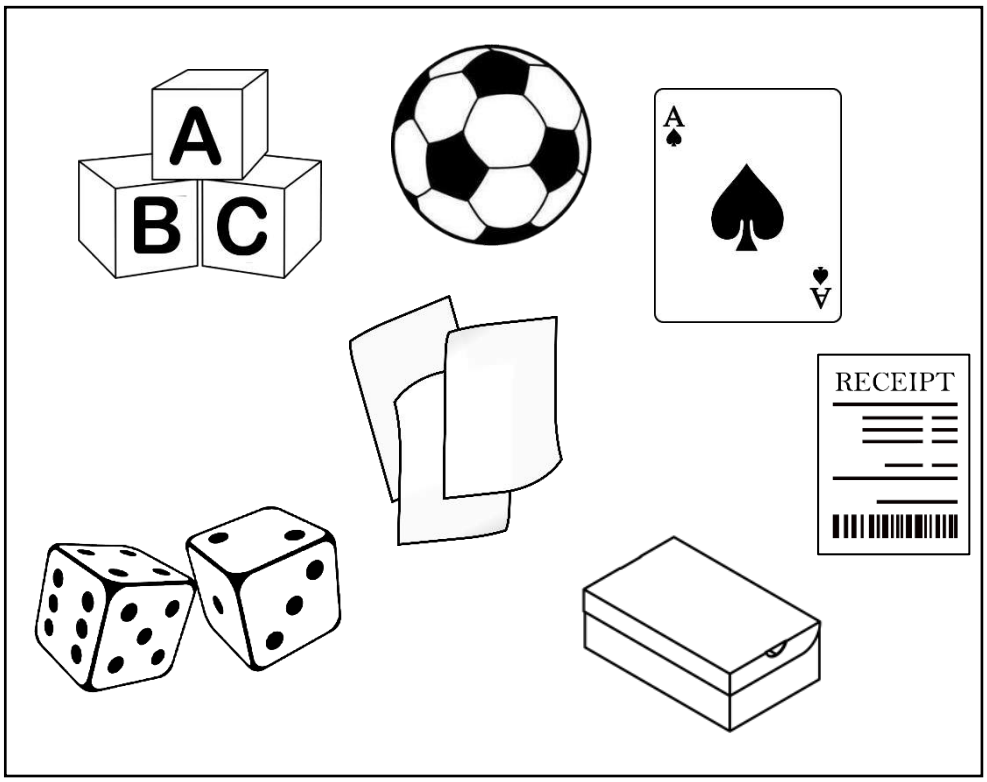
Square	Solid figure	Plane figure	height
length	width,	sphere	rectangle

_____1_____are flat two-dimensional figures with: _____2_____and _____3_____.These are closed figures which points lie on the same surface. _____4_____, _____5_____, circle, triangle, and pentagon are examples of plane figures.

_____6_____are geometric figures having three dimensions: _____7_____, _____8_____and _____9_____. Cylinder, prism, _____10_____, cube, cone and pyramid are common examples of solid figures.

Additional Activities

A boy visited a toy store, and he found the following:



From the items that he found, identify which are plane figures and solid figures. Write your answer on a separate answer sheet.

Answer Key

What I Know

1. 3D
2. 3D
3. 2D
4. 3D
5. 2D

What's In

1. Triangle
2. Square
3. Cylinder
4. Sphere
5. Rectangle
6. Cube
7. Circle
8. Hexagon
9. Pyramid
10. Cone

Assessment

A.	B.	
1. b	1. Plane Figures	6. Solid figures
2. e	2. length	7. length
3. c	3. width	8. width
4. a	4. Square	9. height
5. d	5. rectangle	10. sphere

What's More

A.

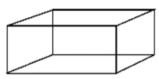
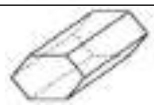
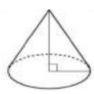
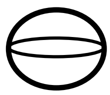
1. b
2. d
3. a
4. c
5. e

What's More

B.

Solid Figure	Dimensions	Plane or Solid Figure
1. Cube	length/width/height	Solid Figure
2. Cylinder	length/width/height	Solid Figure
3. Square	length/width	Plane Figure
4. Triangle	length/width	Plane Figure
5. Rectangular Prism	length/width/height	Solid Figure

What I Can Do

Solid Figure	Illustration (Draw the Figure)	Plane figure that illustrate its faces
1.Rectangular Prism		Rectangle
2.Square Pyramid		Square and triangle
3.Hexagonal prism		Hexagon and Rectangle
4.cube		Square
5.Sphere		a sphere has no faces

Additional Activities

plane figures
receipt
paper
card

Solid Figures
Toy block
Soccer ball
Box
Dice

References:

Most Essential Learning Competencies (MELC) in Mathematics 6

Perez, M. et al. (2016)21st Century MATHletes 6. Philippines: 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

6

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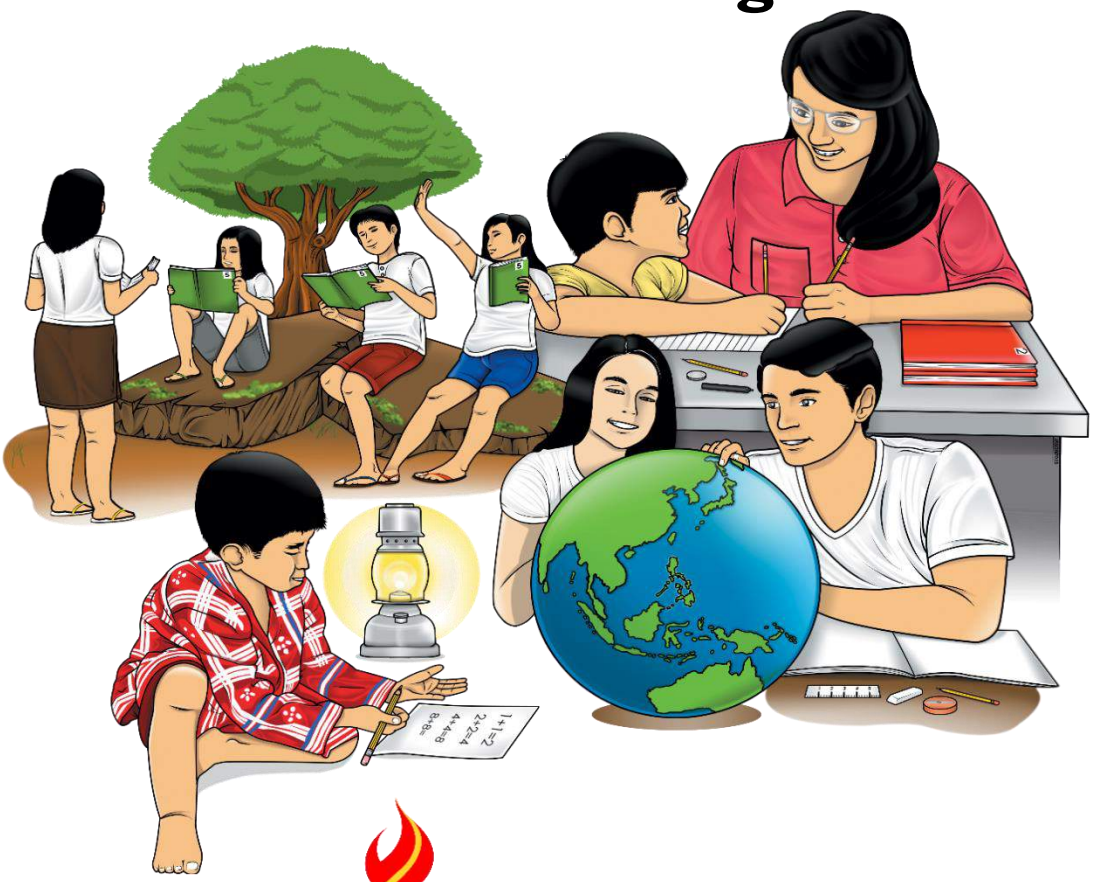
Mathematics

Quarter 3 – Module 2:

Formulating the Rule in Finding the nth term Using Different Strategies



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Alternative Delivery Mode
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Secretary: Leonor Magtolis Briones
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Development Team of the Module

Author: Jem Rymon S. Chien

Editors: Mae Joy M. Tan, Susana L. Lutero, Nora B. Rebadomia, Mary Jane O. Amante,
Ma. Pinky C. Arquio, Susan T. Dela Torre, Ritchel P. Maratas
Reviewers: Ivy Joy A. Torres, Ma. Theresa L. Tabotabo, Mae Joy M. Tan
Illustrators: Jerome Jordan Z. Ponsica, Eldiardo E. Dela Peňa
Layout Artists: Jerome Jordan Z. Ponsica, Eldiardo E. Dela Peňa
Management Team: Ramir B. Uytico
Pedro T. Escobarte, Jr.
Elena P. Gonzaga
Donald T. Genine
Adonis A. Mosquera
Clarissa G. Zamora
Fevi S. Fanco
Ivy Joy A. Torres
Jason R. Alpay
Mae Joy M. Tan
Jem Rymon S. Chien
Ethel S. Gali

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Department of Education – Region VI

Office Address: Duran Street, Iloilo City
Telefax: (033)336-2816, (033)509-7653
E-mail Address: region6@deped.gov.ph

6

Mathematics

Quarter 1 – Module 2:
Formulating the Rule in Finding the nth term Using Different Strategies

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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 will help you master the skills in finding the nth term using different strategies and differentiating expression from equation. The scope of this module allows you to use it in many different learning situations. The language used recognizes your vocabulary level. The lessons were arranged to follow the standard sequence of your course. However, the order in which you study them can be changed to match with the textbook you are now using.

The module is divided into two lessons, namely:

- Lesson 1 – Formulating Rules for Sequences
- Lesson 2 – Differentiating Expression from Equation

After going through this module, you are expected to:

1. formulate the rule in finding the nth term using different strategies (looking for a pattern, guessing and checking, working backwards); and
2. differentiate expression from equation.

What I Know

Part I: Study the following sequences below. Write the rule describing each sequence.

Sequence	nth Term Rule
1. 3,6,9,12 ...	
2. 1,4,9,16 ...	
3. y, y^2, y^3, y^4...	
4. 2,5,8,11...	
5. 2,4,6,8...	

Part 2: Find the next three terms in each item below.

6. 5, 7, 9, 11, ____, ____, ____
7. 15, 18, 21, 24, ____, ____, ____
8. 3, 8, 18, 38, ____, ____, ____
9. 7, 10, 13, 16, ____, ____, ____
10. 18, 27, 36, 45, ____, ____, ____

Lesson 1 Formulating Rules for Sequence

In this module, we will learn some more algebra. We will formulate the rule in finding the nth term in a particular sequence using different strategies (looking for a pattern, guessing and checking and working backwards).

What's In

Answer the following questions. Write your answer in your answer sheet.

I. What are the first five multiples:

1. 4 _____, _____, _____, _____, _____
2. 7 _____, _____, _____, _____, _____
3. 8 _____, _____, _____, _____, _____

II. What is the common difference of the following sequence:

4. 3, 5, 7, 9, 11
5. 16,19, 22, 25

What's New

If you are given the following sequences:

- 3, 6, 9, 12
- 2,5,8,11…
- 1,4,9,16…

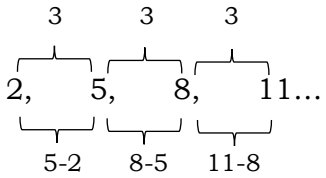
What rules can you formulate to find the nth term of each sequence?

What is It

A sequence is a set of numbers written in order by the application of a definite rule. Each number in the sequence is called a term.

Following certain patterns can help us formulate rules and continue a given sequence of numbers, figures or to fill in the missing numbers or symbols.

Sequence	Formulating the Rule	nth Term Rule	Next Three Terms
a. 3,6,9,12	• Look for a pattern. • Notice that every term after the first is obtained by adding 3 to the number preceding it. 0+3 = 3 (1st term) 3+3 = 6 (2nd term) 6+3 = 9 (3rd term) 9+3 = 12 (4th term) Or Multiply term number by three. 3x1 = 3 (1st term) 3x2 = 6 (2nd term) 3x3 = 9 (3rd term) 3x4 = 12 (4th term)	3n	15, 18, 21

b. 2, 5, 8, 11	• By working backwards, notice that pattern is formed. Subtract 3 to get the next term on the left.  • Use guess and check strategy. Guess: 3n + 1 Check: 3 (1) + 1 = 4 *(This rule is incorrect as we check for the first term. Let's try to guess another rule.* Guess: 3n – 2 Check: 3(1) – 2 = 1 (This is lower than the first term). Let's try to guess another one. Guess: 3n – 1 Check: 3 (1) – 1 = 2 (*This rule is exact for the first term. Try to check the remaining term.* 3 (2) – 1 = 5 3 (3) – 1 = 8 3 (4) – 1 = 11 *(This rule is correct.)*	3n - 1	14, 17, 20
c. 1, 4, 9, 16	• To find the rule, you may look for patterns, work backwards and/or guess and check strategy. • Try this. Multiply the counting number by itself or squaring counting numbers. 1x1 = 1 *(First term)* 2x2 = 4 *(Second term)* 3x3 = 9 *(Third term)* 4x4 = 16 *(Fourth term)*	n^2	25, 36, 49

What's More

Write the rule to find the nth term of the given sequence. Supply the next three terms after.

Sequence	nth Term Rule	Next Three Terms
1. 5,9,13,17…		
2. 3,8,13,18…		
3. 6,12,18,24,30…		
4. 5, 0, -5, -10, -15…		
5. $\frac{1}{5}, \frac{3}{5}, \frac{5}{5}, \frac{7}{5}$ …		

What I Have Learned

To formulate the rule in finding the nth term of a sequence, we can look for:

- a pattern,
- work backwards, and
- guess and check strategies.

What I Can Do

Supply the m missing terms to complete the given sequences and find the nth term. Write your answer on a separate answer sheet.

Sequences	nth Term Rules
1. 5, 8, 11, 14, 17, _____, _____, _____	
2. 1, 4, 7, 10, _____, _____, _____	
3. 10, 14, 18, 22, _____, _____, _____	
4. 5, 9, 13, 17, 21, _____, _____, _____	
5. 8, 14, 20, 26, _____, _____, _____	
6. _____, _____, 19, 25, 31	
7. 1, 8, 27, 64, _____, _____, _____	
8. 2, 5, 10, 17, _____, _____, _____	

Assessment

Find the three terms in each sequence. Write the rule for finding the nth term. Write your answer on a separate answer sheet.

1. 1, 3, 5, 7, 9 _____,_____,_____
   Rule: _____
2. 6, 8, 10, 12, 14 _____,_____,_____
   Rule: _____
3. 7, 10, 13, 16, 19 _____,_____,_____
   Rule: _____
4. 3, 6, 11, 18, 27 _____,_____,_____
   Rule: _____
5. $\frac{2}{3}, \frac{3}{4}, \frac{4}{5}$ _____,_____,_____
   Rule: _____
6. 1, 4, 9, 16, 25 _____,_____,_____
   Rule: _____
7. 12, 10, 8, 6 _____,_____,_____
   Rule: _____
8. 1, 8, 27 _____,_____,_____
   Rule: _____
9. $\frac{1}{2}, \frac{1}{3}, \frac{1}{4}$ _____,_____,_____
   Rule: _____
10. 50, 40, 30 _____,_____,_____
    Rule: _____

Additional Activities

Supply the next three letters, or combination of numbers and letters in the following patterns on a separate sheet of paper.

1. 2a, 3b, 4c…
2. x, 2x, 3x…
3. A,C,E,G,I…
4. a+b, a+3b, a+5b,…
5. r, r^3, r^5…
6. z, y, x, w, v…
7. $\frac{x+1}{2}, \frac{x+2}{3}, \frac{x+3}{4}$…
8. n, 5n, 10n…
9. P11, R9, T7…
10. A26, C24, E22…

Answer Key

What I Know

1. 3n
2. n^2
3. y^n
4. 3n-1
5. 2n
6. 13, 15, 17
7. 27, 30, 33
8. 78, 158, 318
9. 19, 22, 25
10. 54, 63, 72

What I Can Do

		Nth term rule
1.	20,23,26	3n + 2
2.	13, 16, 19	3n - 2
3.	26,30,34	4n + 6
4.	25, 29, 33	4n + 1
5.	32, 38, 44	6n + 2
6.	7, 13	6n + 1
7.	125, 216, 343	n^3
8.	26, 37, 50	$n^2 + 1$

What's In

1. 4, 8, 12, 16, 20
2. 7, 14, 21, 28, 35
3. 8, 16, 24, 32, 40
4. 2
5. 3

Assessment

1. 11,13, 15 — 2n-1
2. 16, 18, 20 — 2n+4
3. 22,25,28 — 3n+4
4. 38, 51,66 — n^2+2
5. $\frac{5}{6}, \frac{6}{7}, \frac{7}{8}$ — $\frac{n+1}{n+2}$
6. 36,49,64 — n^2
7. 4,2,0 — -2n+14 or 14-2n
8. 64, 125,216 — n^3
9. $\frac{1}{5}, \frac{1}{6}, \frac{1}{7}$ — $\frac{1}{n+1}$
10. 20,10,0 — -10n+60 or 60-10n

What's More

1. 4n+1 — 21,25,29
2. 5n-2 — 23,28,33
3. 6n — 36,42,48
4. -5n+10 or 10-5n — -20, -25, -30
5. $\frac{2n-1}{5}$ — $\frac{9}{5}, \frac{11}{5}, \frac{13}{5}$

Additional Activities

1. 5d,6e,7f
2. 4x,5x,6x
3. K,M,O
4. a+7b, a+9b, a+11b
5. r^7, r^9, r^{11}
6. u,t,s
7. $\frac{x+4}{5}, \frac{x+5}{6}, \frac{x+6}{7}$
8. 15n, 20n, 25n
9. V5, X3, Z1
10. G20, I18, K16

What I Know

Identify whether the following shows an expression or an equation. Write EX if it shows an expression while EQ if it is an example of an equation. Write your answer on a separate sheet of paper.

_____1. (5 + 7) – 4

_____2. 10 - 6 x 5

_____3. 10 + 30 = 40

_____4. 5n = 15

_____5. 9 x 3

_____6. 7^3

_____7. 30 – 15 = 5 x 3

_____8. 4n ÷ 9

_____9. 7n + 5 = 75

_____10. 36 – 7 + 10 x 6

Lesson 2 Differentiating Expression from Equation

You've learned in the previous lesson how to formulate a rule in finding nth the nth term in a sequence. This lesson will focus on how to differentiate expression from equation.

What's In

On a separate sheet of paper. translate the following word phrases to numerical expression or equations:

1. The sum of thirty-six and ten _____
2. Three times the sum of six and two _____
3. Ten decreased by four plus seven _____
4. Eight divided by two added to five equals nine _____
5. Twelve times five is equal to sixty _____
6. Ten added to the product of five and ten _____
7. Forty-five divided by nine is five _____
8. Thrice the sum of two and three _____
9. Take away seven from eleven _____
10. Twenty-one plus five equals twenty-six _____

What's New

Observe the given data in the box. What is the difference between the two?

A.	B.
2n – 6	2n – 6 = 4

What is It

An expression is a combination of numbers and variables combined by mathematical operations or symbols.

Examples:

2n – 6	8y - 5
8 + 7	20 ÷ 5 x 12
10 + 3 x 4	2b x 9

An equation is a mathematical sentence formed by placing an equal sign (=) between two expressions.

2n – 6 = 4	3y = 15
45 + 5 = 50	$5^2 = 25$
2 + (2x5) = 12	10 + 7 – 2(3) = 11

What's More

In a separate sheet of paper, determine which of the following are expressions and which are equations by writing it in the proper column.

Expressions	Equations

(15-10) + 13

3x – 2x

4 x 10 = 40

12y = 108

15 x 6 = n

10 – a

5n + 8 = 43

75 + (100 – 23)

120 ÷ 10 x 5 = n

$5^3 - 2^3$

What I Have Learned

An expression is a combination of numbers and variables combined by mathematical operations or symbols while equation is a mathematical sentence formed by placing an equal sign (=) between two expressions.

What I Can Do

Answer the following on a separate sheet of paper.

I. Complete the table below:

Word Problem	Numerical Expression/Equation	Write Expression or Equation
1. Krystel is 15 years old. Her father is 10 years more than twice her age.		
2. Jose weighs 25 kilograms. His uncle weighs thrice as Jose's weight.		

II. Complete the equation by supplying the missing number in each item.

3. $25 - \square = 14 + 1$

4. $\square^3 = 8$

5. $2 + 2 + 2 = 3 \times \square$

Assessment

Identify the following if it is an equation or expression. Write your answer in separate sheet of paper.

1. 30 – 4 + 6 _____
2. 25 x 5 = n _____
3. N = 4 (35 x 5) _____
4. 3n + (5n x 2) _____
5. 5 (9 + n) = 50 _____
6. 14 + 23 _____
7. 36 ÷ 4 = 9 _____
8. 11 x 19 _____
9. $(12)^2 = 144$ _____
10. N + 7 = 8 + 6 _____

Additional Activities

I. Give 5 examples of expressions.

1. _____
2. _____
3. _____
4. _____
5. _____

II. Give 5 examples of equations.

6. _____
7. _____
8. _____
9. _____
10. _____

Answer Key

What I Know

1. EX
2. EX
3. EQ
4. EQ
5. EX
6. EX
7. EQ
8. EX
9. EQ
10. EX

What I Can Do

1. 2 (15) + 10 Expression
2. 3 x 25 Expression
3. 10
4. 2
5. 2

What's In

1. 36 + 10
2. 3 (6+2)
3. 10 – 4 + 7
4. 5 + 8÷2 = 9
5. 12 x 5 = 60
6. 5 x 10 + 10
7. 45 ÷ 9 = 5
8. 3(2+3)
9. 11 - 7
10. 21 + 5 = 26

Assessment

1. Expression
2. Equation
3. Equation
4. Expression
5. Equation
6. Expression
7. Equation
8. Expression
9. Equation
10. Equation

What's More

Expression	Equation
(15 - 10) + 13	4 x 10 = 40
3x - 2x	12y = 108
10 - a	15 x 6 = n
75 + (100 - 23)	5n + 8 = 43
$5^3 - 2^3$	120 ÷ 10 x 5 = n

Additional Activities

1-5 Learner's answers may vary

6-10 Learner's answers may vary

References:

Most Essential Learning Competencies (MELC) in Mathematics 6

Lesson Guide in Elementary Mathematics Grade 6

Perez, M. et al. (2016).21st Century MATHletes 6. Philippines: Vibal Group Inc.

Lara, R. (2005).Enjoying Mathematics 6 Workbook. Philippines: Jedigar Enterprises

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

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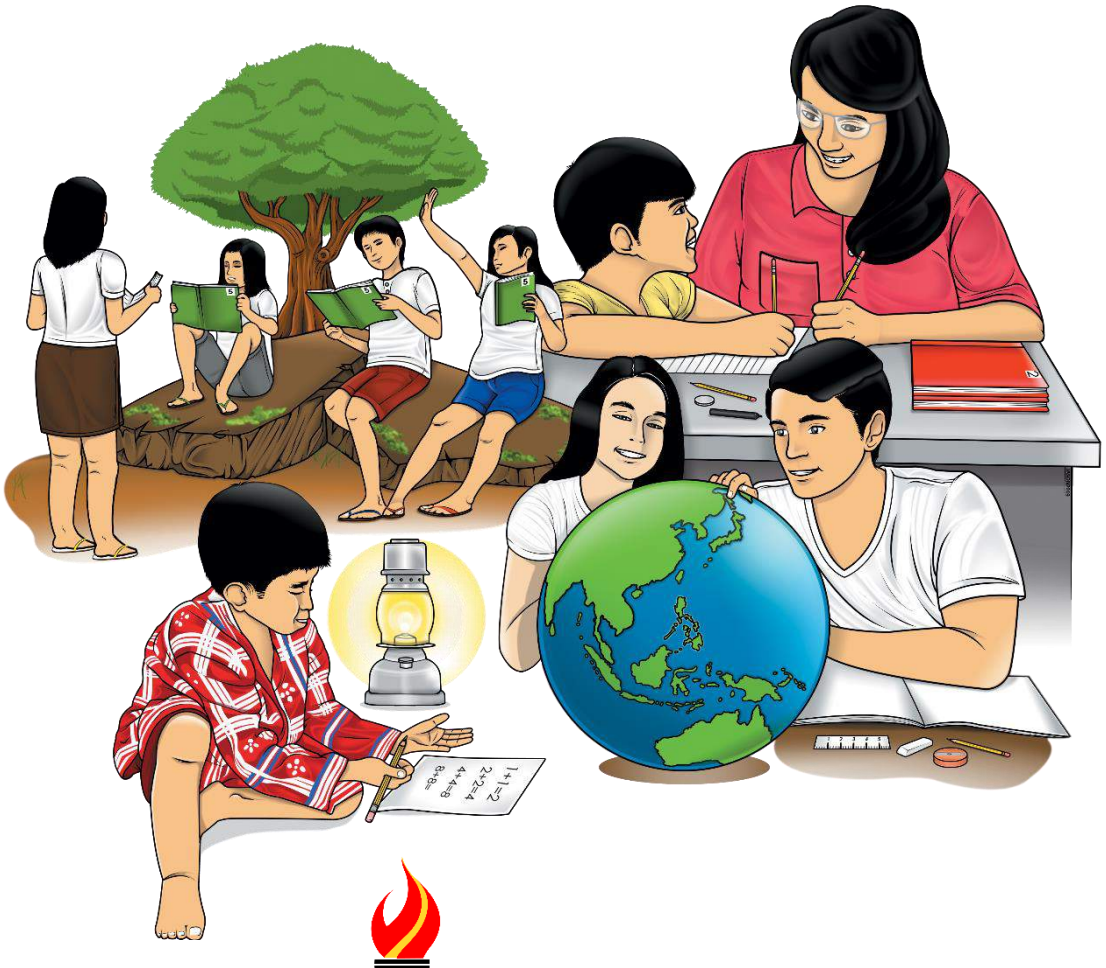
Mathematics

Quarter 3 – Module 3:
Giving Translation of Real-Life Verbal Expressions and Equations Into Letters or Symbols and Vice Versa



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Quarter 3 – Module 3: Giving translation of real-life verbal expressions and equations into letters and symbols
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Development Team of the Module

Author: Robert S. Lapus

Editors: Mae Joy M. Tan, Susana L. Lutero, Nora B. Rebadomia, Mary Jane O. Amante, Ma. Pinky C. Arquio, Susan T. Dela Torre, Ritchel P. Maratas

Reviewers: Ivy Joy A. Torres, Ma. Theresa L. Tabotabo, Jem Rymon S. Chien Mae Joy M. Tan,

Illustrators: Jerome Jordan Z. Ponsica, Eldiardo E. Dela Peňa

Layout Artists: Jerome Jordan Z. Ponsica, Eldiardo E. Dela Peňa, Michael M. Jolo

Management Team: Ramir B. Uytico
Pedro T. Escobarte, Jr.
Elena P. Gonzaga
Donald T. Genine
Adonis A. Mosquera
Clarissa G. Zamora
Fevi S. Fanco
Ivy Joy A. Torres
Jason R. Alpay
Mae Joy M. Tan
Jem Rymon S. Chien
Ethel S. Gali

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Department of Education – Region VI
Office Address: Duran Street, Iloilo City
Telefax: (033)336-2816, (033)509-7653
E-mail Address: region6@deped.gov.ph

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Mathematics

Quarter 3 – Module 3:
Giving Translation of Real-Life Verbal Expressions and Equations Into Letters or Symbols and Vice Versa

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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.

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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 skills in translating real-life verbal expressions and equations into letters or symbols and vice versa. The scope of this module allows you to use it in many different learning situations. The language used recognizes your diverse vocabulary level. The lessons are arranged to follow the standard sequence of your course. But the order in which you read them can be changed to match with the textbook you are now using.

The module is divided into two lessons, namely:

- Lesson 1 – Translating real-life verbal expressions and equations into letters or symbols and vice versa
- Lesson 2 –Identifying a variable in an algebraic expression and equation

After going through this module, you are expected to:

1. Translate real-life verbal expressions and equations into letters or symbols and vice versa (M6AL-IIIe-16) and
2. Identify a variable in an algebraic expression and equation (M6AL-IIIe-17)

What I Know

Translate the following word phrases into algebraic expressions.

1. Seven more than k
2. Five added to q
3. Three subtracted from m
4. c increased by 12
5. Twice n

Translate the following algebraic expressions into word phrases.

6. $14 - 9m$
7. $r - 4$
8. $s \div 8$
9. $2 + (3 \times 5)$
10. $3n + 5$

Lesson 1

Translating Real-life Verbal Expressions and Equations into Letters and Symbols and Vice Versa

In the previous lessons you have learned how to differentiates expression from equation. This time we will focus on translating real-life verbal expressions and equations into letters and vice versa.

What's In

Translate the following algebraic expressions into word phrases. Write your answer in your answer sheet.

1. $2m + n$
2. $3x - 7$
3. $5 + (2x)$
4. $2\ (a + b)$
5. $6x \div 2$
6. $n + 2m$

Notes to the Teacher

This contains helpful tips or strategies that will help you in guiding the learners.

What's New

Read and understand the problem below.

Mr. and Mrs. Romeo own a laundry shop. They have 152 customers this week, 24 fewer than last week. Write an algebraic equation for the number of customers they had last week.

What is It

To translate the given problem into algebraic equation, consider this:

Let m be the number they had last week.

Translation:

Twenty-four fewer than the number last week	is	152
$m - 24$	=	152

Algebraic equation: m – 24 = 152 *(The number of costumers last week is 24 fewer than m is 152)*

Example 2:

A kite is flying at an altitude of m meters. Express algebraically its new altitude after rising 20 meters.

Translate:

$\underbrace{m \text{ meter}}$	$\underbrace{\text{is increased by}}$	$\underbrace{20}$
m	+	20

Algebraic expression: $m + 20$ *(The kite's new altitude is 20 meters more than m meters)*

Example 3 Translate into an algebraic equation: Twice a number decreased by eight is equal to 16.

Let k be the number.

Twice a number	decreased by	eight	is equal to	sixteen
$2k$	-	8	=	16

Algebraic equation: $2k - 8 = 16$

Example 4 Translate into an algebraic equation: If fourteen is added to the difference of a number and 23, the sum is eighty.

Let z be the number.

difference of a number and 23	plus	fourteen	is	eighty
$z - 23$	+	14	=	80

Algebraic equation: $z - 23 + 14 = 80$

Example 5 Translate into an algebraic equation. Thrice the sum of a number and four is thirty-two.

Let w be the number.

thrice	the sum of a number and four	is	thirty-two
3	$w + 4$	=	32

Algebraic equation: $3 (w + 4) = 32$

What's More

A. Translate the following numerical expressions/equations into word phrases.

Numerical Expressions/Equations	Translations
1. $25 + y$	
2. $5n = 120$	
3. $45k$	
4. $2r + 4 = 20$	
5. $t \div 6 = 130$	

B. Translate the following into numerical expression / equation. Write your answers on your answer sheet.

1. Twice the sum of 8 and r
   Translation: _____

2. Mike weighs r pounds. Translate algebraically his weight after he gained 5 pounds.
   Translation: _____

3. Billy is z years old now. Express his age 8 years ago.
   Translation: _____

Refer inside the box for items 4-5.

> Marivic is thrice as old as Roselyn. If Roselyn is m years old, Kris is 3 years older than Roselyn.

4. Express Kris' age algebraically
   Translation: _____

5. Write the expression for the sum of Marivic's and Roselyn's ages.
   Translation: _____

What I Have Learned

To translate verbal expressions and equations into letters or symbols and vice versa, familiarity with words and phrases associated with symbols or operations are very important.

These are key words that might be useful in translating word phrase to mathematical symbols.

Symbols	Meaning/s
+	addition, plus, the sum of, more than, added to, increased by, the total of
-	subtraction, minus, the difference of, less than, decreased by, diminished by, subtracted from, less, take away, fewer than
x, • , ( )	multiplication, times, the product of, of, twice, multiplied by, thrice
÷, /, —	division, divided by, the quotient of, the ratio of, per
=	equals, is equal to, is, is the same as

What I Can Do

Read and translate the following word problems into algebraic equations. Write your answer in your answer sheet.

1. Jose is p centimeters tall. Ben's height is thrice Jose's height. Express Ben's height algebraically.
2. Write an algebraic equation for the cost of 15 liters of gasoline, if x pesos per liter is ₱810.00.
3. Noel is y years old now. Write the algebraic equation for Noel's age if his age 10 years from now is 35.
4. Ten years ago, Art was four times as old as Ken. Write the algebraic equation showing Art's age.
5. If twice a number is increased by 15, the result is 45. Write the algebraic equation of the given statement.

Assessment

Match the word phrases in column A with the numerical expressions /equations in column B. Write the letter of the correct answer in your answer sheet.

A	B
1. a number b subtracted from 12	a. $6y$
2. six times the number y	b. $2x^2$
3. the sum of five and thrice a number z	c. $5 + 3z$
4. twelve divided by n	d. $6x - 5$
5. one less than the product of 4 and y	e. $9k$
6. a number z increased by ten	f. $z + 10$
7. twice the square of a number x	g. $3\ (4r)$
8. thrice the product of 4 and r	h. $4y - 1$
9. nine times a number k	i. $12 - b$
10. six times a number x minus five	j. $12 \div n$

Additional Activities

A. Translate the following verbal phrases into algebraic expressions or equations:

1. five subtracted from twice z
2. a number p less eleven is fifty
3. fifteen decreased by a number p
4. the square of the product of x and y
5. the sum of six and twenty less five equals the number z

B. Translate the following numerical expressions/equations into word phrases:

1. $2x + 5$
2. $5x - 8$
3. $4\ (y + 7)$
4. $2n = 120$
5. $4^2 = 16$

Answer Key

What I Know

1. k+7
2. 5+q / q+5
3. m-3
4. c+12
5. 2n

(for items 6-10, learner may use other related words/phrases associated with the indicated operations)

6. Fourteen decreased by the product of nine and a number / Fourteen minus the product of 9 and a number
7. A number diminished by four / A number minus four / Difference of a number and 4 / Four is subtracted from a number
8. s divided by 8 / The quotient of a number and eight
9. the product of three and five added to two / two plus the product of three and five
10. three times n added to five / three multiplied to five plus five

What's In

1. Two m plus n / Two times m added to n
2. Three x minus seven / Three multiplied by a number less seven / thrice x decreased by 7
3. Five plus the product of two and x / Five added to two times a number / Five is increased by two time a number
4. Twice the sum of a and b / Two time the sum of a and b
5. The product of six and x divided by two / Six times a number divided by two
6. n plus twice m / n added to two times m

What's More

A.

1. twenty-five plus a number / twenty-five added to a number / twenty-five increased by a number

2. five times a number is one hundred twenty / five multiplied by a number is equal to one hundred twenty

3. forty-five times a number / forty-five is multiplied by a number / the product of forty-five and a number

4. twice a number added to four is twenty / two times a number plus four equals twenty

5. a number divided by six is one hundred thirty / the quotient of a number and six is equal to one hundred thirty

B.
1. 2 (8+r) / 2 (r+8)
2. r+5 / r + 5
3. z-8
4. m+3 / 3 + m
5. 3m + m / m + 3m

What I Can Do

1. 3p
2. 15x = ₱810
3. y+10 = 35
4. 4k - 10
5. 2x + 15 = 45

Assessment

1. i	6. f
2. a	7. b
3. c	8. g
4. j	9. e
5. h	10. d

Additional Activities

A.
1. $2z - 5$
2. $p - 11 = 50$
3. 15 – p
4. $(xy)^2$
5. $(6 + 20) - 5 = z$

B.
1. twice a number x plus five
2. five times a number x less eight
3. four times the sum of y and seven
4. twice the number n equals one hundred twenty
5. four squared equals sixteen

Lesson 2 Identifying a Variable in an Algebraic Expression and Equation

In the previous lessons you have learned to translate real-life verbal expressions and equations into letters and vice versa. This time, we will focus on identifying a variable in an algebraic expression and equation.

What's In

A. Identify the number that should replace the question mark to make the mathematical statement correct. Write your answers on your answer sheet.

1. ? + 5= 22
2. 72 ÷ ? = 8
3. 19 =? – 12
4. 7+2= 3+?
5. 21 x ? = 63

B. Translate the following word phrases into algebraic expression and identify the variable(s). Write your answer on your answer sheet.

6. Five times the sum of a and b
7. Twelve decreased by twice x
8. Fifty-one minus the product of r and five
9. Seven is multiplied to the difference of two and x
10. The quotient of twelve and four added to x

What's New

Read and analyze the problem.

Leni bought 5 apples which cost ₱12.00 each. She gave the seller a ₱100.00 bill. How much change did Leni receive?

1. What did Leni buy?
2. How much did she give to the seller?
3. What do you need to find out?
4. What is used to represent unknown number?

What is It

To solve a mathematical problem, the variable is used to represent unknown number. A variable is any letter or symbol that represents a number.

To solve the above problem, let us use variables to represent the unknown numbers.

Let: y = be the cost of apples

z = be the change that Leni received from her ₱100.00 bill

To find the cost of apples, we use this equation: 5 x ₱12.00 = y

Solution: 5 x ₱12.00 = y

P60.00 = y

To find the change Leni received, we use this equation:

₱100.00 – ₱60.00 = z

Solution: ₱100.00 – ₱60.00 = z

₱40.00 = z

Therefore, Leni received ₱40.00 change from her ₱100.00 bill.

What's More

Identify the variable/s in the expressions and equations below. Write your answer on your answer sheet.

1. 15 – (a + 6)

2. 25 ÷ n = 5

3. c = 48

4. 37 – m = 29

5. z = 24 – 18

6. 15 x^3

7. 29 + p = 31

8. b – 30 ÷ 10

9. 24s + 9 = 57

10. (16 ÷ 4) – 3 = x

What I Have Learned

An algebraic expression is a mathematical phrase that uses variables, numerals, and operation symbols.

Any letter or symbol used to represent a number in an algebraic expression or equation is called a variable.

What I Can Do

Translate the following word phrases into an algebraic expression or equation. Use a variable to represent an unknown number. Write your answer on your answer sheet.

1. fifteen is subtracted from the quotient of a and b.
2. a number diminished by seven
3. four greater than two times a number is equal to sixty.
4. the sum of a number and six is forty.
5. thrice a number decreased by twenty
6. the square of a number is sixteen
7. the quotient of twice a number and five
8. twice a number increased by five is thirty-seven
9. a number divided by two
10. the difference between ten times a number and twelve

Assessment

Write the variables used in each item below. Write the correct answer in your answer sheet.

1. 37 – (3 + y)
2. 5 (4 – b)
3. y = 2 + 46
4. n = 24 x 2
5. z x 9 = 90 ÷ 10
6. forty divided by p
7. r less than a product of two and eight
8. eighteen less than x
9. q less than the product of six and for is eighteen
10. the sum of t and fifty-seven is sixty-five

Additional Activities

Translate the following word phrases into algebraic expression or equation. Use variables to represents unknown numbers. Write your answer on your answer sheet.

1. a number less than a quotient of seventy-five and fifteen
2. sixty-four reduced by a number is forty-eight
3. the sum of a number and twelve is 26
4. seventeen added to a number
5. twenty-one added to a number
6. n decreased by three
7. eighteen less than a number
8. a number less thrice fifteen
9. five times a number less three is eighteen.
10. a number added to ninety is five hundred two

Answer Key

What I Know

1. n
2. x
3. n
4. n
5. n
6. p
7. n
8. xy
9. n
10. a

What's In

1. 17
2. 9
3. 31
4. 6
5. 3
6. 5(a+b)   variables are a & b
7. 12-2x   variable is x
8. 51-(5r)   variable is r
9. 7(2-x)   variable is x
10. (12÷4) + x   variable is x

What's More

1. a
2. n
3. c
4. m
5. z
6. x
7. p
8. b
9. s
10. x

What I Can Do

1. (a÷b)-15
2. n-7
3. 2n+4=60
4. n + 6 = 40
5. 3y – 20
6. $x^2 = 16$
7. 2y ÷ 5
8. 2x + 5 = 37
9. y ÷ 2
10. 10n-12

(learners may use any letter or symbol to represent variables)

Assessment

1. y	6. p
2. b	7. r
3. y	8. x
4. n	9. q
5. z	10. t

Additional Activities

1. n-(75÷15)
2. 64-n=48
3. n+12=26
4. 17+n / n+17
5. 21+n / n+21
6. n-3
7. n-18
8. n-3(15)
9. 5n-3=18
10. n+90=502 / 90+n=502

Note: learners may use any letters or symbols to represent variables

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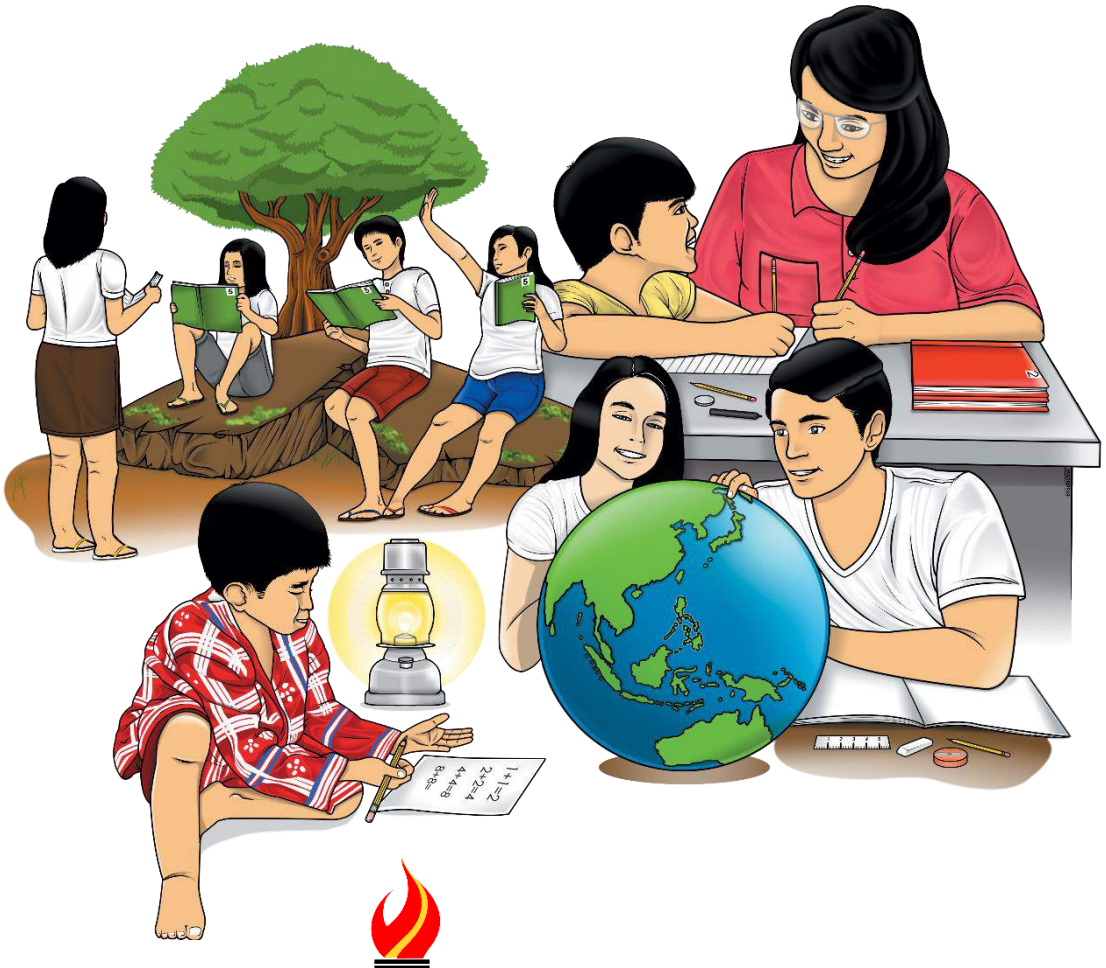
Mathematics

Quarter 3 – Module 4:
Representing Quantities in Real-life Situations Using Algebraic Expressions and Equations



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E-mail Address: region6@deped.gov.ph

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- Lesson 1 – Representing Quantities in Real-life Situations Using Algebraic Expressions and Equations
- Lesson 2 – Solving Routine and Non-routine Problems Involving Different Types of Numerical Equations such as 7+9= __+6

After going through this module, you are expected to:

1. represent quantities in real-life situations using algebraic expressions and equations **(M6AL-I11e-18)** and;

1. solve routine and non-routine problems involving different types of numerical equations such as 7+9= __+6 **(M6AL-I11f-19).**

What I Know

Choose variables to represent the unknown quantities and write an algebraic expression or equation.

1. The sum of four and eight times a number is twenty.
2. The weight of Roman's father is 5 kg less than 3 times Roman's weight.
3. Twenty times a number less two
4. Three times the difference of a number and one
5. Half a number decreased by twelve
6. The difference between three and twice a number plus one
7. The product of a number and nine
8. A number divided by three is eight
9. Six less than a number is forty-five
10. Ten added to a number

Lesson 1

Representing Quantities in Real-life Situations Using Algebraic Expressions and Equations

In the previous lessons, you have learned how to define a variable in an algebraic expression and equation. This time we will focus on how to represent quantities in real-life situations using algebraic expressions and equations.

What's In

Fill in the blanks with the word/s that correctly complete/s the following statements. Choose from the word/s inside the box below. Write your answers on your answer sheet.

Algebraic Expression Constant Numerical Expression Variable Equation

1. _____is a mathematical statement indicating that two algebraic expressions are equal; uses the symbol " = " .
2. _____is an expression that combines numbers and one or more operation symbols.
3. _____is any letter or symbol that represents a number.
4. _____has a fixed value that does not change.
5. _____is a mathematical phrase that uses variables, numerals, and operation symbols.

Notes to the Teacher

This contains helpful tips or strategies that will help you in guiding the learners.

What's New

Read and understand the problem below:

Glenn is a newly hired messenger in a multinational company in Makati. As trainee, he needs to wear a polo-shirt everyday. He was given a clothing allowance of ₱6,000.00. How many polo-shirts can he buy with this amount?

Study the table of prices for typical brands of polo shirts.

Brand	Price per Polo Shirt	Numerical Expression	Number of Shirts
Brand A	₱500.00	6000÷ 500	12
Brand B	₱400.00	6000÷ 400	15
Brand C	₱250.00	6000÷ 250	24
Brand D	₱300.00	6000÷ 300	20
Brand E	₱600.00	6000÷ 600	10

How to represent the above-given situation using algebraic expressions and equations?

What is It

The answer to the question depends on the brand of clothes Glen will buy. The third column gives the *numerical expression* for each brand for the number of shirts that he can buy with the money he has. Our constant is ₱6,000.00. If you do not know the price of a polo shirt, we can use variable to stand for a price. Then we can write an algebraic expression and equation for the number of shirts.

To represent the price of each brand of shirt, we make use of a variable and write an algebraic expression to represent the number of shirts that Glenn can buy for ₱6,000.00.

Let (variable):		Number of Shirts (in Algebraic Expressions)
p = the price of each Brand A shirt	-	₱6,000.00 ÷ p
q = the price of each Brand B shirt	-	₱6,000.00 ÷ q
r = the price of each Brand C shirt	-	₱6,000.00 ÷ r
s = the price of each Brand D shirt	-	₱6,000.00 ÷ s
t = the price of each Brand E shirt	-	₱6,000.00 ÷ t

The equation to get the exact number of polo-shirts per brand are listed in the third column. The variable in each algebraic equation represents the number of shirts per brand.

Common words translated as "="

equals

is, are, were, was

is equal to

result is

yields

Brand	Price per Shirt	Equations	Number of Shirts
Brand A	₱500.00	₱6000 ÷ ₱500 = p	p = 12
Brand B	₱400.00	₱6000 ÷ ₱400 = q	r = 15
Brand C	₱250.00	₱6000 ÷ ₱250 = r	q = 24
Brand D	₱300.00	₱6000 ÷ ₱300 = s	r = 20
Brand E	₱600.00	₱6000 ÷ ₱600 = t	s = 10

So, the number of shirts Glenn can buy using his ₱6000.00 clothing allowance depends on the brand he prefers.

One of the most important skills in math that we have to acquire is the ability to translate verbal phrases or sentences to equations. Aside from the fact that this could be one of the easiest ways to get an accurate answer, it also shows a clean flow of solution which becomes understandable to many if properly presented.

To represent quantities in real-life situations and to translate verbal phrases or sentences to algebraic equations, mastery of translating word phrases to algebraic expressions is necessary.

To write algebraic expressions in a real-life situation:

- Determine which quantity in the situations is unknown and identify a variable to represent the unknown quantity.

Write the expression using a variable to represent the situation. Look for key words in figuring out what mathematical operations to be used.

What's More

Choose a variable to represent the unknown quantities and write an equivalent algebraic expression or equation for the following statements. Write your answers on your answer sheet.

1. five more than x bananas
2. eight pesos added to z pesos
3. seven subtracted from k eggs
4. m increased by ten candies is forty candies
5. twice a number y bacteria
6. nine less than w passengers
7. p chocolates divided by six persons
8. half of k kilograms is seventy kilograms
9. twenty biscuits decreased by p biscuits equals two biscuits
10. thrice a number r rides

What I Have Learned

In representing quantities in real-life situations using algebraic expressions and equations, we make use of variables to represent unknown quantities. Mastery of translating verbal equations into letters or symbols and vice versa is necessary.

What I Can Do

Read and answer the following items. Write you answer in the separate sheet of paper.

1. Joseph bakes same number of cupcakes each day. He used 2 cups of flour in each cupcake. Write the algebraic expression to represent the number of cups of flour Joseph uses each day in baking cupcakes.

2. Melissa runs the same number of kilometers each day. Write the algebraic expression to represent the number of kilometers Melissa ran last March.

3. Rizzi makes bread each day in her bakery. Write the algebraic expression to represent the total number of breads Rizzi made in a week.

4. Daniel caught 20 fish and then ate some. Write the algebraic expression to represent the number of fish Daniel has left.

5. Emil reads the same number of books each month. Write an expression to represent the number of books Emil reads in 3 years.

Assessment

Read and answer the following items using your answer sheet. Write an algebraic expression for each item. Use the given variables to represent the unknown quantities.

1. Raymund has a weight of x kilograms. Express algebraically his weight after he gained 2.6 kilograms.
2. Salome is y years old now. Represent algebraically her age 5 years ago.
3. Sam Moises has n marbles. Represent algebraically the number of marbles that Floyd has if he has 4 less than 5 times the number of marbles Sam Moises has.
4. Express algebraically, in terms of x, the number of meters in x centimeters.
5. Helen is n years old. Helen's father is 4 years more than twice her age. Represent algebraically for the age of Helen's father.

Additional Activities

Read and express the following indicated problems. Write your answer in your answer sheet.

1. If thrice a number is increased by 11, the result is 112. Translate this to an algebraic equation.

2. Dianne saved ₱150.00 from her allowance this week. This amount is ₱50.00 more than twice the amount she saved last week. Write the algebraic equation to solve for the amount she saved last week.

3. Migs has a mass of 65 kilograms. Express algebraically his mass after he gained r kilograms.

For items 4 and 5, refer to the given problem in the box below:

Elaine bought 8 mangoes for ₱15.00 each and 5 apples for ₱12.00 each. She gave the cashier a ₱500.00 bill.

4. Write an expression for the total cost of the fruits she bought.

Write the equation for the amount of change the cashier should give her.

Answer Key

What I Know

1. 4 + 8n = 20
2. 3w – 5
3. 20y - 2
4. 3(p – 1)
5. $\frac{x}{2}$ - 12
6. 3 – 2p + 1
7. 9n
8. n ÷ 3= 8 or $\frac{n}{3} = 8$
9. n-6 = 45
10. 10 + n

What's In

1. Equation
2. Numerical Expression
3. Variable
4. Constant
5. Algebraic Expression

What's More

1. x + 5
2. ₱8.00 + ₱z
3. k – 7
4. m + 10 = 40
5. 2y
6. w – 9
7. $\frac{p}{6}$
8. $\frac{k}{2}$ = 70 , k ÷2 = 70
9. 20 – p = 2
10. 3r

What I Can Do

1. 5x cups of flour
2. 31 y
   (Note: The month of March has 31 days)
3. 7m
   (Note: 1 week has 7 days)
4. 20-z
5. 36r
(Note: 1 year has 12 months; 3 years has 36 months)

Note: Learners may any letters in the alphabets to represent variable.

Assessment

1. x + 2.6
2. y – 5
3. 5n – 4
4. $\frac{x}{100}$
5. 2n + 4

Additional Activities

1. 3n + 11 = 112
2. 2r + ₱50 = ₱150
3. 65 + r
4. (8 x P15.00)+(5x₱12.00)
5. ₱500.00 – [(8 x ₱15.00)+(5x₱12.00)]

Note: (Answers may vary for variable (letter) that represents *a number.*

Lesson 2

Solving Routine and Non-routine Problems Involving Different Types of Numerical Expressions and Equations such as 7+9=__+6

In the previous lessons you have learned how to represent quantities in real-life situations using algebraic expressions and equations. This time, we will focus on how to solve routine and non-routine problems involving different types of numerical equations such as 7+9= __+6 .

What's In

Translate the following word phrases into algebraic equations.

1. Twice a number is equal to six.
2. If three times a number is decreased by two, the answer is seven.
3. The ratio of a number and ten is two.
4. Half of the sum of a number and three is six.
5. The difference of seven and a number is equal to six times the number.

What's New

Read and understand the problem and verbal sentences below.

1. A number increased by 5 is 12. What is the number?
2. The sum of two numbers is 8. If the first number is 3, what is the second number?
3. Shirly is 2 years older than Eda. The sum of their ages is 20. Find their present ages.

If we let x be the unknown number, how can these sentences be translated into mathematical equations? What is the value of x?

What is It

Let's use the Four-Step-Plan to solve the word problems in the previous sections.

To solve the first problem, we follow the following steps:

Step 1: Understand

a. Identify what is/are asked.
   Find the missing number.
b. Identify what is/are given.
   The given data are 5 and 12

Step 2: Plan

a. Represent the data.
   Let x be the missing number
b. Write an equation.

A number	increased by	5	is	12

$x \quad + \quad 5 \quad = \quad 12$

Step 3: Solve

a. Solve the equation

$x + 5 = 12$

$x + 5 \mathbf{- 5} = 12 \mathbf{- 5}$ (subtract 5 in both sides)

$x + 0 = 7$

$x = 7$

Step 4: Check

a. Check the solution.

To check the solution, substitute 7 for x in the equation.

$x + 5 = 12 \rightarrow 7 + 5 = 12$

$12 = 12$

b. Decide if the answer is reasonable.

This time, let's solve the second problem following the same steps:

The sum of two numbers is 8. If the first number is 3, what is the second number?

Step 1: Understand

a. Identify what is/are asked.

Find the second number

b. Identify what is/are given.

8 is the sum of the two numbers

3 is the first number

Step 2: Plan

a. Represent the data.

Let x be the second number

b. Write an equation.

Since, the first number is 3, then, the equation is

$3 + x = 8$.

Step 3: Solve

a. Solve the equation

To solve the equation, do this:

$3 \mathbf{- 3} + x = 8 \mathbf{- 3}$ (subtract 3 from both sides)

$0 + x = 5$

$x = 5$

Step 4: Check

a. Check the solution.

To check the solution, substitute 5 for x in the equation.

$3 + x = 8 \rightarrow 3 + 5 = 8$

$8 = 8$

b. Decide if the answer is reasonable.

To solve the word problem in item number 3, we consider the following steps:

Step 1: Understand

a. Identify what is/are asked.

The ages of Shirly and Eda

b. Identify what is/are given.

Shirly is 2 years older than Eda and

sum of their ages is 20

Step 2: Plan

a. Represent the data.

Let x – be the age of Eda

x + 2 – be the age of Shirly

b. Write an equation.

(x+2) + x = 20

Step 3: Solve

a. Solve the equation

$(x+2) + x = 20$

$2x + 2 = 20$

$2x = 20 - 2$

$2x = 18$

$x = 18 \div 2$

$x = 9$ (age of Eda)

To solve Shirly's age,

$x + 2 = 9 + 2 = 11$

Therefore, Shirly is 11 years old and Eda is 9 years old.

Step 4: Check

a. Check the solution.

Decide if the answer is reasonable.

What's More

Read and solve the following problem. Write your answer in your answer sheet.

1. Eight more than a number is 14. Find the number.
2. A number decreased by 12 is 9. Find the number.
3. Twenty subtracted from Walter's age is 24. Find Walter's age.
4. Ten more than twice Jose's age is 64. Find Jose's age.
5. If a number is increased by 15, the result is the same as two times the number.

What I Have Learned

In solving routine and non-routine problems involving different types of numerical equations such as 7+9= __+6, follow the four-step plan that will help us organize the given information so that we can write an equation that will enable us to solve the problem.

Step 1: Understand

a. Identify what is/are asked.
b. Identify what is/are given.

Step 2: Plan

a. Represent the data.
b. Write an equation.

Step 3: Solve

a. Solve the equation

Step 4: Check

c. Check the solution.

Decide if the answer is reasonable.

What I Can Do

Read and solve the following word problems. Write your answers in your answer sheet.

1. Samantha is y years old now. What is Samantha's age if her age 5 years from now is 17?
2. Aki is g centimeter tall. Pierre's height is 4 less than thrice the height of Aki. The difference between Aki's height when subtracted from Pierre's height will result to 240 centimeters. How tall is Aki?
3. In three years, the price of a new model of an S6 – model phone will be six more than twice its current price. If the projected price of the new S6 phone is ₱ 40,000.00. What is its current price?
4. Benjie is 6 years old. Ruel is 5 years more than thrice Benjie's age. How old is Ruel?
5. Five friends share a box of pencils. Each receives 4 pencils. Find the number of pencils in the box.

Assessment

Solve the following problems following the Four Step Plan "Understand, Plan, Solve and Check Process". Write your answer in your answer sheet.

1. Helen is 13 years old, Helen's father is 6 years more than twice her age. How old is Helen's father?
2. Edna is 155 cm tall. Lilia's height is 10 cm less than twice Edna's height. How tall is Lilia?
3. Roman is 25 kilograms. His father is 5 kg less than 3 times Roman's weight. What is the weight of Roman's father?
4. Francis is ten years old. Ben is twice as old as Francis. What is the age of Ben?
5. Aning is five years old. My age is six years more than thrice her age. How old am I?

Additional Activities

Read and translate the following word problems into algebraic equation. Write your answer in your answer sheet.

1. The sum of three numbers is 20. Two of these numbers are 9 and 6. What is the value of the third number.
2. Alfredo is 5 years older than John, and Maria is 4 years younger than John. If the sum of their ages is 34, how old is John?
3. Find the dimensions of a rectangle if the length is 7 inches more than the width and the perimeter is 54 inches.
4. The area of a rectangle garden is 64 square meters. If the length is 4 times the width, what are the dimensions of the garden?

Answer Key

What I Know

1. x= 64
2. x= 6
3. m= 80
4. c= 135
5. a= 150

What's In

1. 2n = 6
2. 3p – 2 = 7
3. n:10 = 2
4. $\frac{1}{2}(n+3) = 6$ /

   $\frac{3+n}{2} = 6$
5. 7 – a = 6a

What's More

1. 6
2. 21
3. 44
4. 27
5. 15

What I Can Do

1. 12 yrs old
2. 118 cm
3. ₱19,997.00
4. 23 years old
5. 20 pencils

Additional Activities

1. 5
2. 11 years old
3. 10
4. 4m x 16m

Assessment

1. Step 1: Understand
   a. Identify what is/are asked.
   Find the age of Helens father
   b. Identify what is/are given.
   Helen is 13 yrs old
   Her father's age is 6 yrs more than twice her age

   Step 2: Plan
   a. Represent the data.
   Let x – Age of Helen's father
   b. Write an equation.
   6 + 2(13) = x

   Step 3: Solve
   6 + 2 (13) = x
   6 + 26 = x
   32 = x

   Step 4: Check
   a. Check the solution.
   6 + 2 (13) = 32
   6 + 26 = 32
   32 = 32

   Answer: Helen's father is 32 years old

2. Step 1: Understand
   a. Identify what is/are asked.
   The height of Lilia
   b. Identify what is/are given.
   Edna's height is 155 cm
   Lilia's height is 10 cm less than twice Edna's height

   Step 2: Plan
   a. Represent the data.
   Let x – Lilia's height
   b. Write an equation.
   (2 x 155) – 10= x

   Step 3: Solve
   (2 x 155) – 10= x
   310 – 10 = x
   300 = x

   Answer: Lilia's height is 300 cm

   Step 4: Check
   a. Check the solution.
   6 + 2 (13) = 32
   6 + 26 = 32
   32 = 32

Assessment

3. Step 1: Understand
   a. Identify what is/are asked.
      Mass of Roman's father
   b. Identify what is/are given.
      Roman's mass is 25 kg
      His father is 5 kg less than 3 times Roman's mass

Step 2: Plan
   a. Represent the data.
      Let x = Mass of Roman's father
   b. Write an equation.
      (3 x 25) – 5 = x

Step 3: Solve
      (3 x 25) – 5 = x
      75 - 5 = x
      70 = x

Answer: 70 kg is the mass of Roman's father

Step 4: Check
   a. Check the solution.
      (3 x 25) – 5 = 70
      75 - 5 = 70
      70 = 70

4. Step 1: Understand
   a. Identify what is/are asked.
      Age of Ben
   b. Identify what is/are given.
      Francis' age is 10 yrs old
      Ben's age is twice as old as Francis

Step 2: Plan
   c. Represent the data.
      Let x – Ben's age
   d. Write an equation.
      2 x 10 = x

Step 3: Solve
      2 x 10 = x
      2 x 10 = 20

Answer: Ben is 20 years old

Step 4: Check
   a. Check the solution.
      2 x 10 = 20
      20 = 20

Assessment

5. Step 1: Understand
   a. Identify what is/are asked.
      My age
   b. Identify what is/are given.
      Aning is 5 yrs old
      My age is 6 yrs more than thrice Aning's age

Step 2: Plan
   a. Represent the data.
      Let x = my age
   b. Write an equation.
      6 + (3 x 5) = x

Step 3: Solve
      6 + (3 x 5) = x
      6 + 15 = x
      21 = x

Answer: I am 21 years old

Step 4: Check
   a. Check the solution.
      6 + (3 x 5) = 21
      6 + 15 = 21
      21 = 21

References

Most Essential Learning Competencies (MELC) in Mathematics 6

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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

6

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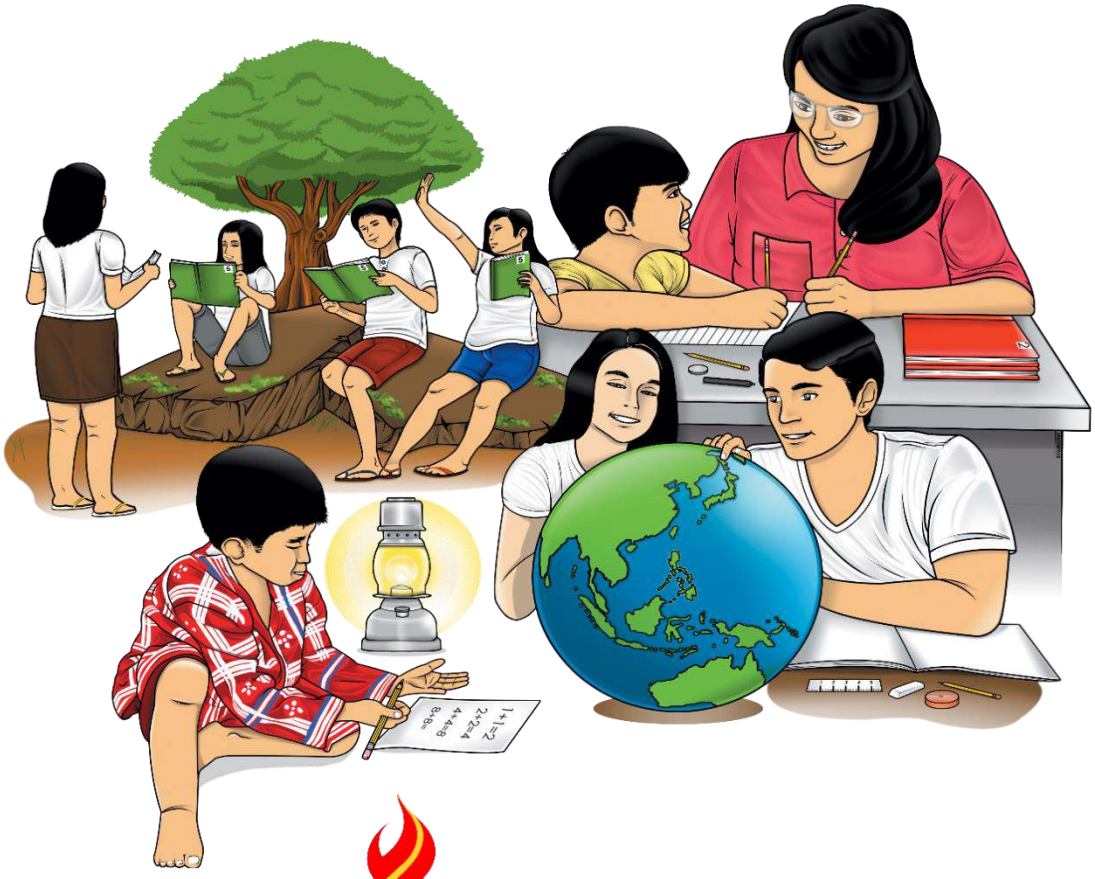
Mathematics

Quarter 3 – Module 5: Calculating Speed, Distance and Time



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Development Team of the Module

Author: Ma. Pinky C. Arquio
Editors: Mae Joy M. Tan, Susana L. Lutero, Nora B. Rebadomia, Ritchel T. Maratas, Mary Jane O. Amante, Susan T. Dela Torre, Jem Rymon S. Chien
Reviewers: Ivy Joy A. Torres, Ma. Theresa L. Tabotabo, Mae Joy M. Tan, Jem Rymon S. Chien
Illustrators: Eldiardo E. Dela Peňa
Layout Artists: Eldiardo E. Dela Peňa, Alfaith G. Poblete
Management Team: Ramir B. Uytico
Pedro T. Escobarte, Jr.
Elena P. Gonzaga
Donald T. Genine
Adonis A. Mosquera
Clarissa G. Zamora
Fevi S. Fanco
Ivy Joy A. Torres
Jason R. Alpay
Mae Joy M. Tan
Jem Rymon S. Chien
Ethel S. Gali

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Department of Education – Region VI

Office Address: Duran Street, Iloilo City
Telefax: (033)336-2816, (033)509-7653
E-mail Address: region6@deped.gov.ph

6

Mathematics

Quarter 3 – Module 5: Calculating Speed, Distance, and Time

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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 was made to help you master the skills in calculating speed, distance, and solving problems involving average speed. The scope of this module allows you to use it in many different learning situations. The language used recognizes your diverse vocabulary level. The lessons are arranged to follow the standard sequence of your course. However, the order in which you read them can be changed to suit with the textbook you are now using.

The module is divided into two lessons, namely:

Lesson 1: Calculating speed, distance, and time

Lesson 2: Solving problems involving average speed

After going through this module, you are expected to:

1. Calculate speed, distance, and time (M6ME-IIIg-17) and
2. Solve problems involving average speed (M6ME-IIIg-18).

What I Know

Read and solve the following problems. Write your answer and complete solution in your answer sheet.

1. How fast did you go if you ran 12 kilometers in 2 hours?

2. How fast did you go if you travelled 1,500 kilometers in just 2 hours?

3. How fast did your jeepney go if it travelled 6 kilometers to school in 10 minutes?

4. How far will you travel if you ride on a motorcycle for 12 minutes at 40 km/h?

5. How far will you travel if you ride your bicycle for 90 minutes at 5 km/h?

6. How long will it take you if you travel a distance of 75 km at a speed of 30 km/hr?

Lesson 1 Calculating Speed, Distance, and Time

In this lesson, we will calculate speed, distance, and time and apply such knowledge in every scenario.

What's In

Fill in the blanks. Choose your answer inside the box and write it in your answer sheet.

distance	Speed	time
$t = \frac{distance}{speed}$	$s = \frac{distance}{time}$	d = speed x time

1. _____ is the distance travelled over a certain period of time.

2. To calculate the total distance travelled, we can simply multiply the given _____ and _____.

3. The formula in calculating time covered by an object is _____.

4. The formula in calculating the speed of an object is _____.

What's New

Study these problems.

Problem #1

Jonathan bought a new car. He drove his car from Manila to Baguio City at an average speed of 65 kilometer per hour, for a total of 4.5 hours. How far did he travel?

Problem #2

A train travelled 555 km at an average speed of 60 kph. How long did the journey take?

Problem #3

A dog runs from one side of a park to the other. The park is 80.0 meters across. The dog takes 16.0 seconds to cross the park. What is the speed of the

What is It

When speed and time are given, the distance travelled is calculated by using the formula:

Distance = Speed × Time

For problem #1, we were given a speed of 65 kilometers per hour, and a time of 4.5 hours.

To find the total distance travelled, we can simply multiply the given speed and time.

Distance = speed x time

Distance = 65 x 4.5 ⟶

$$\begin{array}{r} 65 \\ \times\ 4.5 \\ \hline 325 \\ +\ 260 \\ \hline 292.5 \end{array}$$

Answer: Jonathan travelled 292.5 kilometers.

Problem # 2:

A train travelled 555 km at an average speed of 60 kph. How long did the journey take?

When distance and speed are given the time taken is calculated by using the formula:

Time = Distance/Speed

$$Time = \frac{Distance}{Speed}$$

$$Time = \frac{555}{60}$$

$$Time = 9.25\ hours$$

= 9.25 hours

(We have to convert 0.25 hour to minutes. We know that 1 hour is equal to 60 minutes which is required to convert the measuring time from hours to minutes. Multiply 0.25 hour to 60 minutes. Thus 0.25 hours is equal to 15 minutes.)

Answer: The journey took 9 hours and 15 minutes.

Problem #3:

A dog runs from one side of a park to the other. The park is 80.0 meters across. The dog takes 16.0 seconds to cross the park. What is the speed of the dog?

The distance the dog travels and the time it takes are given. The dog's speed can be found with the formula:

Speed = Distance/Time

$$Speed = \frac{Distance}{Time}$$

$$Speed = \frac{80.0\ meters}{16.0\ seconds}$$

$$Speed = 5.0\ m/s$$

The speed of the dog is 5.0 meters per second.

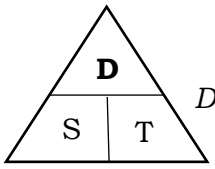
What's More

Read and solve the following problems. Write your answer on your answer sheet.

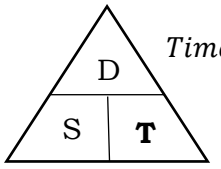
1. David rides his motorcycle for 120 km in 2 hours. What is his average speed in km per hour?
2. How much distance will be covered in 7 hrs at a speed of 62 km per hour?
3. How much distance will be covered in $1\frac{1}{2}$ hour at a speed of 32 km per minute?
4. How much time will be taken to cover a distance of 450 km at a speed of 50 km per hour?
5. A cyclist covers a distance of 12 km at a speed of 8 km per hour. Calculate the time taken to cover this distance.

What I Have Learned

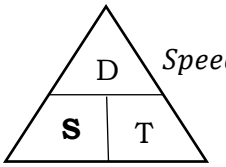
An easy way to remember the **distance**, **speed** and **time equations** is to put the letters into a triangle. The triangles will help you remember these 3 formulas:



Distance = speed x time



$$Time = \frac{Distance}{Speed}$$



$$Speed = \frac{Distance}{Time}$$

Speed – is a scalar quantity that refers to "how fast an object is moving". Speed can be thought of as the rate by which an object covers distance.
Distance- is the total length between two positions.
Time- is the measured period during which an action, process or condition exists or continues.

What I Can Do

Read and solve the following problems. Write your answer and complete solution on your answer sheet.

1. Find the speed when a distance of 142 km and time is covered in 2 hours.
2. Nancy rides her horse with a constant speed of 10 km per hour. How far can she travel in $\frac{1}{2}$ hour?
3. A police car drives with a constant speed of 56 km per hour. How far can it travel in 3 hours?
4. How much time will be taken to cover a distance of 450 km at a speed of 50 km per hour?
5. A man runs at the speed of 15 km per hour. How long will he take to cover 75 kilometers?

Assessment

Do the following. Write your answer and complete solution in your answer sheet.

A. Calculate the distance that you would travel if you drove for:

1. 2 hours at 30 km/h
2. 7 hours at 65 km/h
3. $\frac{1}{2}$ hour at 46 km/h

B. How long does it take to travel:

4. 100 km at 20km/h?
5. 180 km at 45 km/h?
6. 250 km at 50 km/h?

C. Calculate the speed if you travelled:

7. 95 km in 2 hours
8. 180 kms in 3 hours
9. 48 km in 2 hours
10. 250 km in 4 hours

Additional Activities

Read and solve the following problems. Write your answer and complete solution on your answer sheet.

1. A man rides the bike with the speed of 60 km in 3 hours. Calculate the speed of the bike?
2. Lilly is driving a scooter with the speed of 20 km/hr for 2 hours. How much distance will she travel?
3. On a a cycle race, a cyclist is moving with the speed of 20 km/hr. He has to cover a distance of 40 km. How much time will the cyclist need to reach his destination?
4. A tricycle covers a distance of 150 km at a speed of 30 km/hour. Find the time taken to cover the distance.
5. Mike drives his car at a speed of 70 km per hour. What is the distance will he cover in 3 hours 30 minutes?

Answer Key

What I Know

1. 6 km/h
2. 750 km/h
3. 3/5 km/minute
4. 8 km
5. 7.5 km
6. 2.5 hours

What's In

1. Speed
2. speed and time
3. $t = \frac{distance}{speed}$
4. $s = \frac{distance}{time}$

What's More

1. 60 km/hr
2. 434 km
3. 2,880 km
4. 9 hrs
5. $1\frac{1}{2}$ hrs

What I Can Do

1. 71 kph
2. 5 km
3. 168 km
4. 9 hours
5. 5 hours

Assessment

A.

1. 60 km
2. 455 km
3. 23 km

B.

4. 5 hours
5. 4 hours
6. 5 hours

C.

7. 47.5 km/hr
8. 60 km/hr
9. 24 km/hr
10. 62.5 km/hr

Additional Activities

1. 20 km/hour
2. 40 km
3. 2 hours
4. 5 hours
5. 245 km

What I Know

Read and solve the following problems. Write your answer and complete solution on your answer sheet.

1. Calculate the average speed of a car that traveled 240 km in 5 hours.
2. What is the average speed of a bus that traveled 98 km in 2 hours
3. If a truck travelled 208 km in 4 hours, then what is its speed?
4. A motorcycle traveled 368 km in 8 hours. What is the average speed of the motorcycle?
5. How long would it take a plane to fly 3,500 km if it were moving at a constant speed of 500kph?

Lesson 2 Solving Problems Involving Average Speed

In this lesson, we will learn how to solve word problems involving average rate and speed. Average speed is usually applied to vehicles like cars, trains, and airplanes. It is often measured in kilometers per hour (kph).

What's In

Read and solve the following problems. Write your answer and complete solution on your answer sheet.

1. A train travels at a speed of 30mph with a distance of 240 miles. How long does it take the train to complete its journey?

2. Susie estimated that she could run for hours at a steady rate of 8mph. She joined a marathon with a distance of 26 miles. How long should it take her to complete the race? Write the answer in hours and minutes.

3. A car travelled a distance of 540 km in 6 hours. What speed did it travel?

4. A cyclist travelled 20 km in 4hrs. What was the speed of the cyclist?

5. The distance between two cities is 144 km. It takes me 3 hours to travel between these cities. What speed did I travel at?

What's New

Read and understand the problem.

Nandy has to travel a total of 476 kilometers. He travels the first 224 kilometers in 4 hours.

A. Calculate his average speed for the first part of the journey.
B. If his average speed remains the same, calculate the total time for him to complete the journey.

What is It

To calculate the average speed:

Step 1: The formula for average speed is

$$Average\ Speed = \frac{distance}{time}$$

In the problem, you could calculate the average speed by dividing the distance (224 kilometers) by the amount of time it took (4 hours).

Step 2: Using the formula

$$Average\ Speed = \frac{distance}{time}$$

$$Average\ Speed = \frac{224\ kilometers}{4\ hours}$$

$$Average\ Speed = 56\ km/hr$$

Answer: Nandy's average speed is 56 km/hr

To calculate the total time to complete the journey:

Step 1: The formula for time is:

$$Time = \frac{distance}{Speed}$$

Step 2: Using the formula, divide distance by speed

$$Time = \frac{distance}{Speed}$$

$$Time = \frac{476\ kilometers}{56\ km/hr}$$

$$Time = 8.5\ hours$$

Answer: Nandy travelled 476 km for 8.5 hours or 8 hours and 30 minutes.

What's More

Read and answer the following problems. Write your answer and complete solution on your answer sheet.

1. A runner races in the 100-meter dash. It takes her 16 seconds to finish. What is her average speed?
2. Lauren walks 100m in half a minute. What must her average speed have been to travel this distance?
3. A train travels 75 km in 1.5 hrs. How fast is the train going?
4. If Garry drives 5 km in 2 minutes, what was his speed?
5. A baseball is thrown a distance of 15 meters. What is its speed if it takes 0.5 seconds to cover the distance?

What I Have Learned

Average speed is calculated by dividing the total distance that something has travelled by the total amount of time it took to travel that distance.

$$Average\ Speed = \frac{distance}{time} \qquad Time = \frac{distance}{Speed}$$

What I Can Do

Read and solve the following problems. Write your answer and complete solution on your answer sheet.

1. A boy walks 75 meters in 30 minutes. What is the average speed of the boy?
2. A cyclist covers a distance of 50 km in 2 hours. Calculate his average speed.
3. A car takes 4 hours to cover a distance at a speed of 40 kph. What should be its speed to cover the same distance in 1.5 hours?
4. A car travels 360 km in 4 hours. What is the average speed of the car in kilometers per hour?
5. Leth drives her car and covers a distance of 385 km in 3 ½ hours. What is her average speed in kilometers per hour?

Assessment

Read and solve the following problems. Write your answer and complete solution on your answer sheet.

1. Marvin took a 5-hour bicycle trip. In all, he travelled 120 kilometers. What was his average rate of speed?

2. Pea and Sam leave their home at the same time. Pea has 180 kilometers to travel and drives at 80 km/h. Sam has 200 kilometers to travel and also drives at 80 km/h.

   A. How long does Pea's journey take?

   B. How much longer does Sam spend driving than Pea?

3. Adrian travels from Escalante City to Bacolod City every Saturday to visit his mother. The trip takes 2 hours and he usually travels at an average rate of 48 km/h. How many kilometers does Adrian travel from Escalante City to Bacolod City?

Additional Activities

Read and solve the following problems. Write your answer and complete solution on your answer sheet.

1. An owner's jeep travelling at an average speed of 70 km/h left the town at 2:00 p.m. If it arrived in another town at 6:00 p.m., how far are the two towns from one another?

2. A taxi travels with a constant speed of 90 km per hour. How far can it travel in 6 hours?

3. Alfred drives for $1\frac{1}{2}$ hours at 75 km/h, then drives 120 kilometers at 60 km/h, and finally drives for 30 minutes at 65 km/h. Calculate his average speed for the whole journey.

Answer Key

What I Know

1. 48 km/hour
2. 49 km/hour
3. 52 km/hour
4. 46 km/hour
5. 7 hours

What's In

1. 8 hours
2. 3 hours 15 minutes
3. 90 km/hour
4. 5 km/hour
5. 48 km/hour

What's More

1. 6.25 m/s
2. 3.33 m/s
3. 50 km/hour
4. 2.5 km/min
5. 30 m/s

What I Can Do

1. 2.5 meters/min
2. 25 km/hour
3. 106.67 km/h
4. 90 km/h
5. 110 km/h

Assessment

1. 24 kph
2. A. 2.25 hours
   B. 0.25 hours
3. 96 kilometers

Additional Activities

1. 280 km
2. 540 km
3. 66.25 km/hr

References:

Most Essential Learning Competencies (MELC) in Mathematics 6

Perez, M. et al. (2016). *21st Century MATHletes 6. Philippines*: 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

6

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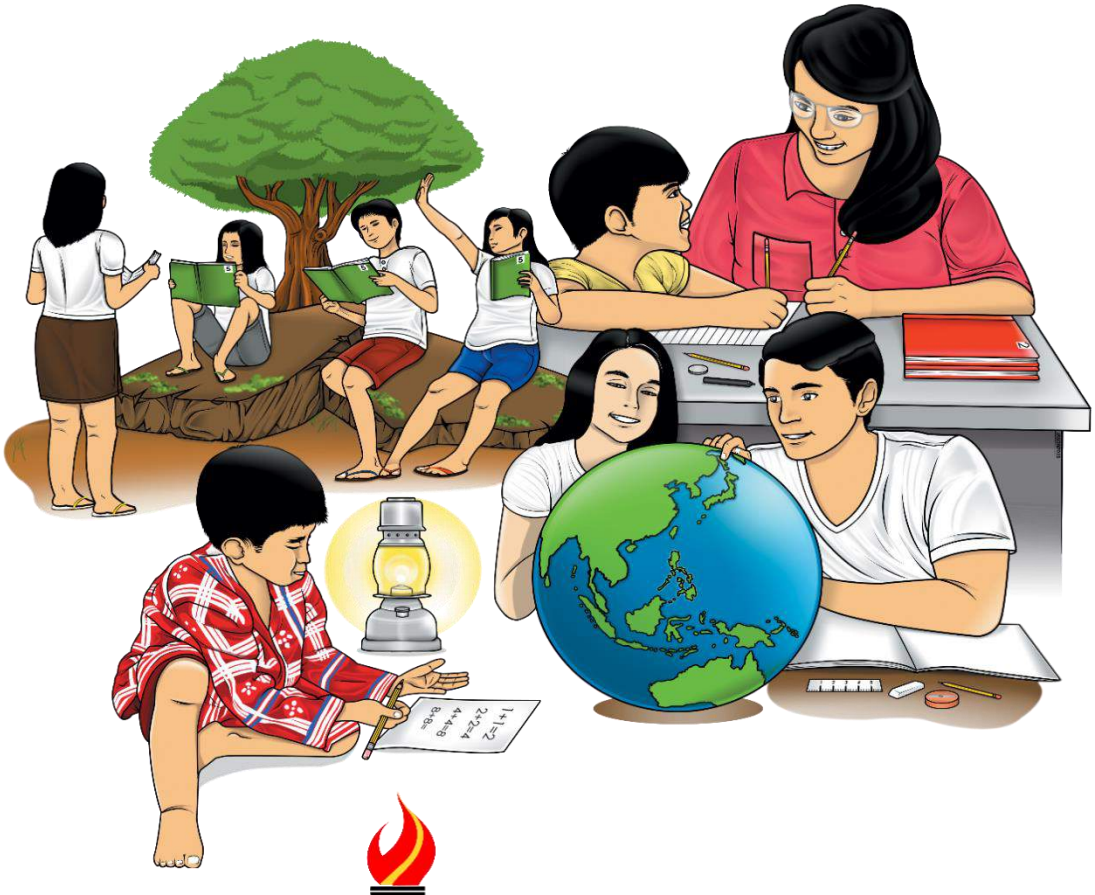
Mathematics

Quarter 3 – Module 6: Area of Composite Figures



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Secretary: Leonor Magtolis Briones
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Development Team of the Module

Author: Rhona S. Macado

Editors: Mae Joy M. Tan, Susana L. Lutero, Nora B. Rebadomia, Ritchel T. Maratas, Mary Jane O. Amante, Susan T. Dela Torre, Jem Rymon S. Chien

Reviewers: Ivy Joy A. Torres, Ma. Theresa L. Tabotabo, Mae Joy M. Tan, Jem Rymon S. Chien

Illustrators: Eldiardo E. Dela Peňa

Layout Artists: Eldiardo E. Dela Peňa, Alfaith G. Poblete

Management Team: Ramir B. Uytico
Pedro T. Escobarte, Jr.
Elena P. Gonzaga
Donald T. Genine
Adonis A. Mosquera
Clarissa G. Zamora
Fevi S. Fanco
Ivy Joy A. Torres
Jason R. Alpay
Mae Joy M. Tan
Jem Rymon S. Chien
Ethel S. Gali

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Department of Education – Region VI

Office Address: Duran Street, Iloilo City
Telefax: (033)336-2816, (033)509-7653
E-mail Address: region6@deped.gov.ph

6

Mathematics

Quarter 3 – Module 6:
Area of Composite Figures

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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 discusses the process in finding the area of a composite figures and the process on how to solve problems involving area of composite figures. It is here to help you master the skills in solving area of composite figures as well as solving word problems. The scope of this module allows you to use it in many different learning situations. The language used recognizes your diverse vocabulary level. The lessons are arranged to follow the standard sequence of your course. However, the order in which you read them can be changed to match with the textbook you are now using.

The module is divided into two lessons, namely:

- Lesson 1 – Finding the area of composite figures formed by any two or more of the following: square, rectangle, circle and semi-circle
- Lesson 2 – Solving routine and non-routine problems involving area of composite figures formed by any two or more of the following triangle, square, rectangle, circle and semi-circle

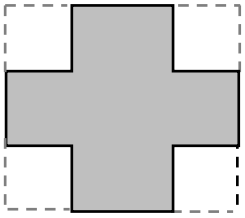
After going through this module, you are expected to:

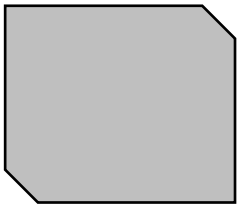
1. find the area of composite figures formed by any two or more of the following: triangle, square, rectangle, circle and semi – circle (M6ME-IIIh-89) and
2. solve routine and non-routine problems involving area of composite figures formed by any two or more of the following: triangle, square, rectangle, circle and semi-circle. (M6ME-III-90)

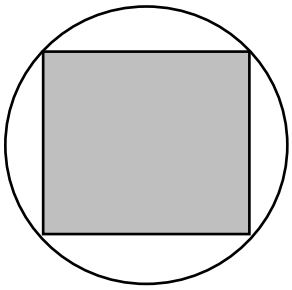
What I Know

Before you start studying this module, take this simple test first to find out how much you already know about the topics to be discussed.

A. Write the letter of the composite figures on your answer sheet.

a. 

b. 

c. 

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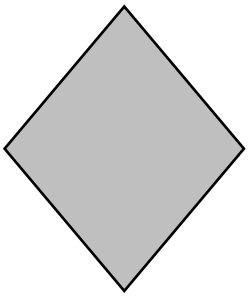
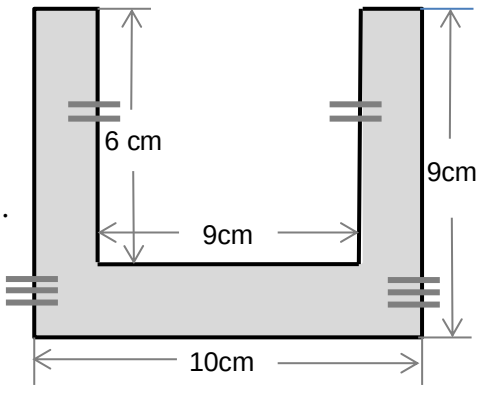
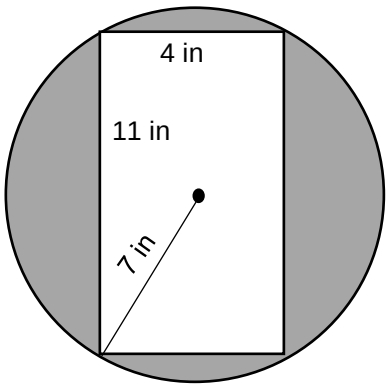
f. 

B. Find the area of the shaded part. Equal number of tick marks are placed to indicate equal measures of parts of the figures.

1. 

2. 

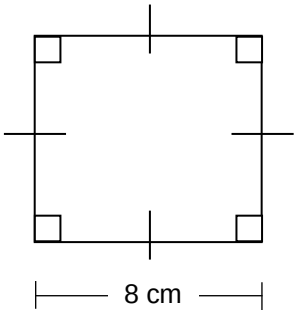
Lesson 1
Area of Composite Figures

In this lesson you will learn how to find the area of composite figures formed by any two or more of the following: triangle, square, rectangle, circle and semi-circle. Take note that illustrations used in this module are not scaled.

What's In

Find the area of the following figures.

1.



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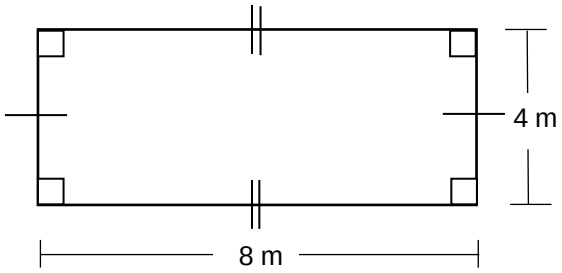

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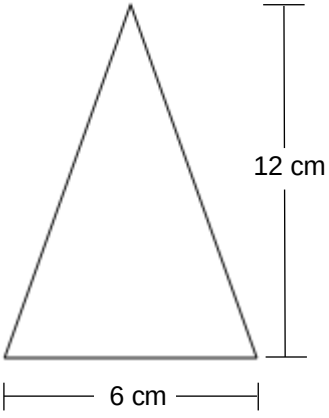

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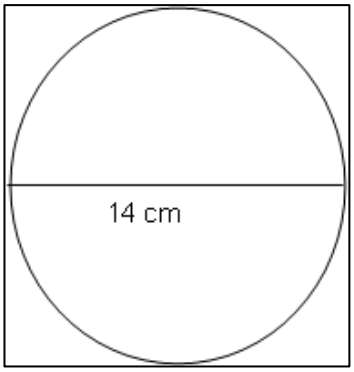
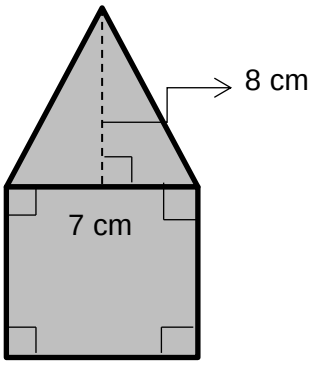


What's New

Look at the figure below.



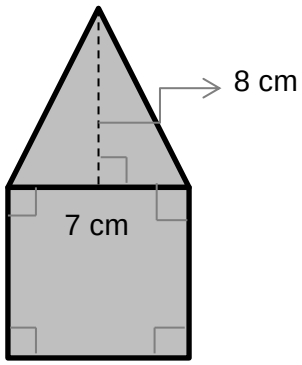
- How many shapes are there?
  - There are two shapes in the figure.
- What are the shapes in the figure?
  - The shapes in the figure are square and triangle.

This is an example of a composite figure. **Composite figures** are figures that can be segmented into two or more of the basic shape.

Can you find the area of the shaded region?

What is It

To find the area of each shaded region, we will consider that all angles marked with perpendicularity symbol (⌐) are right angles.



We can separate the figures into two: a triangle and a square. Now, let us find the area of each figure.

Solution:

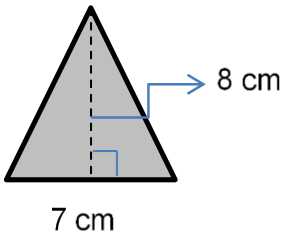
Area of Triangle

$A = \frac{1}{2}$ x b x h

$= \frac{1}{2}$ x 7 cm x 8 cm

$= \frac{1}{2}$ x 56 cm^2

A = 28 cm^2

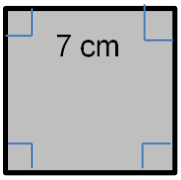


Area of Square

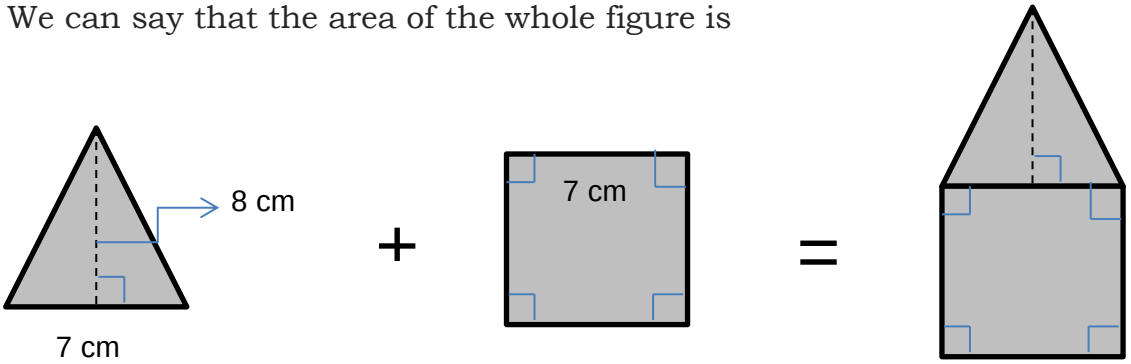
A = s x s

= 7 cm x 7 cm'

A = 49 cm^2



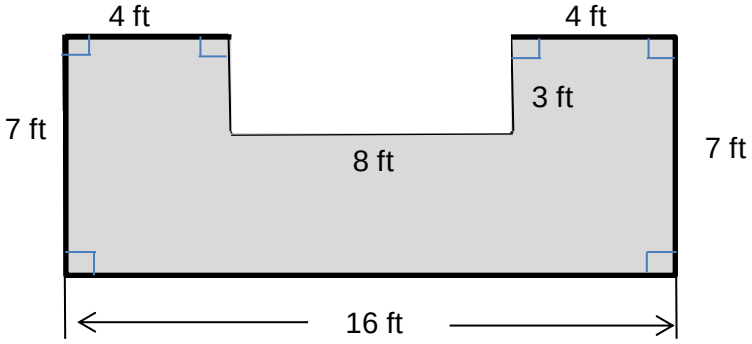
We can say that the area of the whole figure is



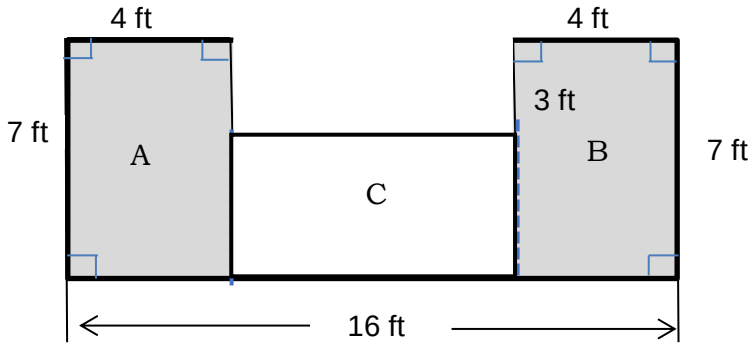
28 cm^2 + **49 cm^2** = **77 cm^2**

Therefore, the area of the composite figure is **77 cm^2**.

Example 2: Find the area of the figure.



We can divide the figure into three rectangles. Two rectangles that measures 7 feet by 4 feet (denoted by A and B below) and the other one that measures 8 feet by 4 feet (denoted with C).



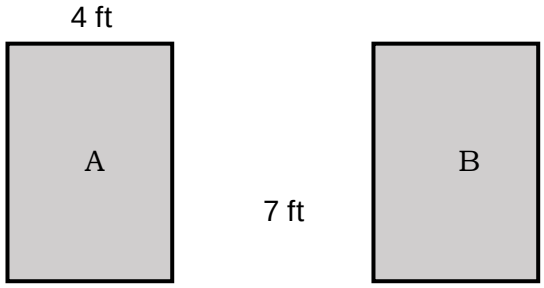
Let us solve the area of each rectangle.

Area of rectangles A and B:

$A_{(A \& B)} = l \times w \times 2$

$= 7 \text{ ft} \times 4 \text{ft} \times 2$

$\mathbf{A_{(A \& B)} = 56 \text{ ft}^2}$

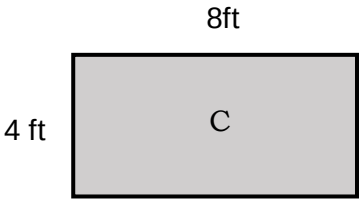


Area of rectangle C:

$A_{(C)} = l \times w$

$= 8 \text{ ft} \times 4 \text{ ft}$

$\mathbf{A_{(C)} = 32 \text{ ft}^2}$

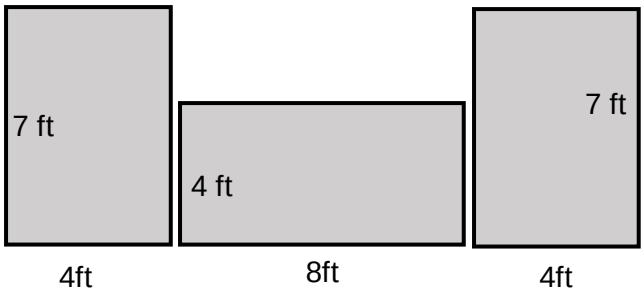


To get the area of the figure, we will add the area of the three rectangles.

$A_{(shaded)} = A_{(C)} + A_{(A \& B)}$

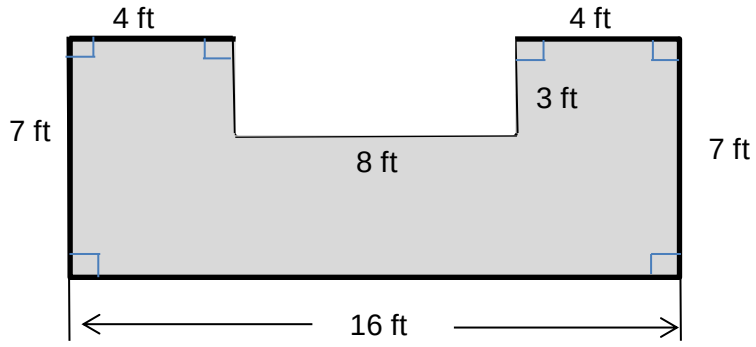
$= 32 \text{ ft}^2 + 56 \text{ ft}^2$

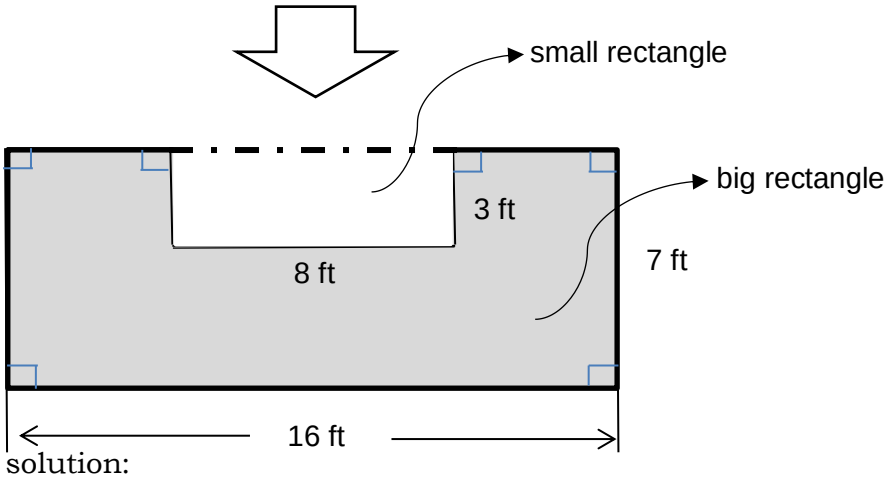
$= \boxed{88 \text{ ft}^2}$



The area of the figure is **88 ft².**

The area of the given figure can be solved by subtracting the area of 3x8 rectangle (small rectangle) from the area of 16 x 7 rectangle (big rectangle).





Consider this solution:

$A_{(\text{big rectangle})} = lw$
$A_{(\text{big rectangle})} = 16 \text{ ft} \times 7 \text{ ft}$
$A_{(\text{big rectangle})} = 112 \text{ ft}^2$

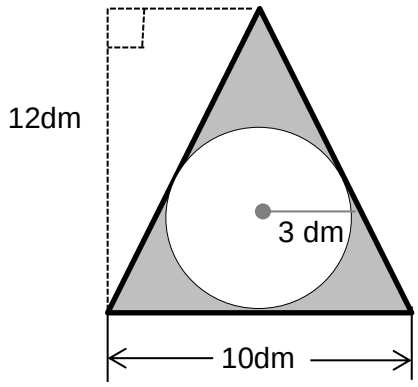
$A_{(\text{small rectangle})} = lw$
$A_{(\text{small rectangle})} = 8 \text{ ft} \times 3 \text{ ft}$
$A_{(\text{small rectangle})} = 24 \text{ ft}^2$

$A_{(\text{big rectangle})} - A_{(\text{small rectangle})} = A_{(\text{shaded figure})}$

$112 \text{ ft}^2 - 24 \text{ ft}^2 = \boxed{88 \text{ ft}^2}$

Example 3:

Find the area of the shaded region. Use $\pi = 3.14$.



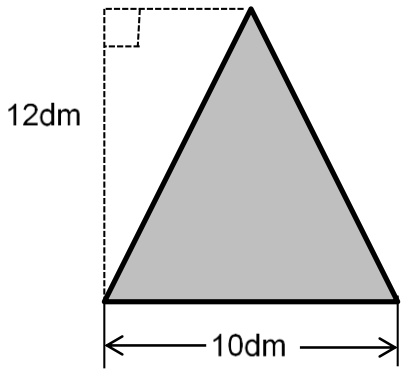
Area of the triangle:

$A = \frac{1}{2} x\ b\ x\ h$

$= \frac{1}{2}\ x\ 10\ dm\ x\ 12\ dm$

$= \frac{1}{2} x\ 120\ dm^2$

A = 60 dm^2



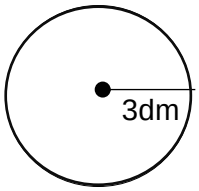
Area of the circle:

A = π x r^2 or π x r x r

= 3.14 x 3 dm x 3 dm

= 3.14 x 9 dm^2

A = 28.27 dm^2

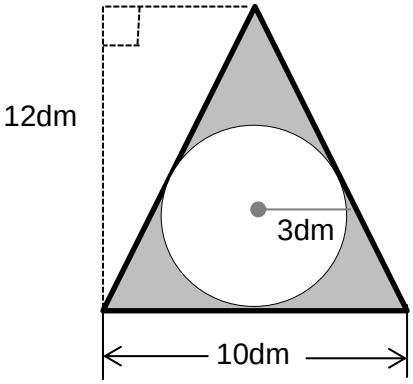


Area of the shaded region:

Area $_{(shaded)}$ = A $_{(triangle)}$ – A $_{(circle)}$

= 60 dm^2 – 28.27 dm^2

Area $_{(shaded)}$ = 31.73 dm^2

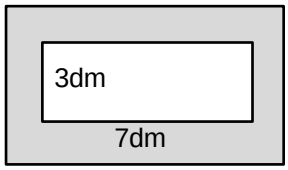


The area of the shaded region is **31.73 dm^2**.

What's More

Find the area of the shaded region on each item. Assume that all angles that appear to be right angles are right angles. Write your answer with complete solution on your answer sheet.

1.



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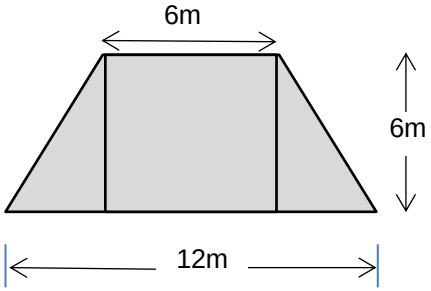

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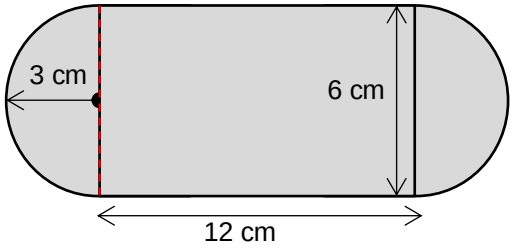

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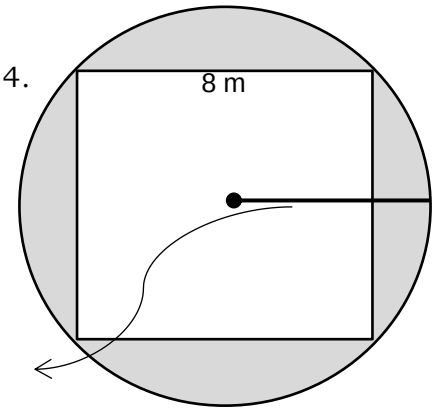

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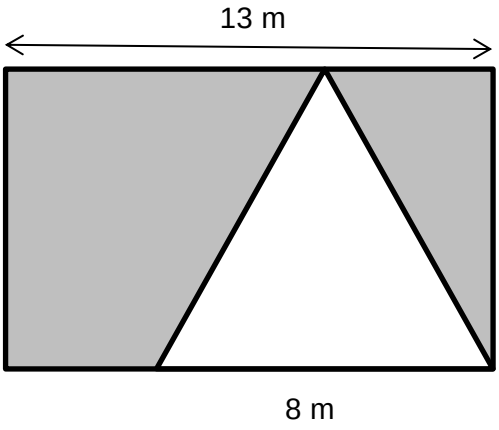


What I Have Learned

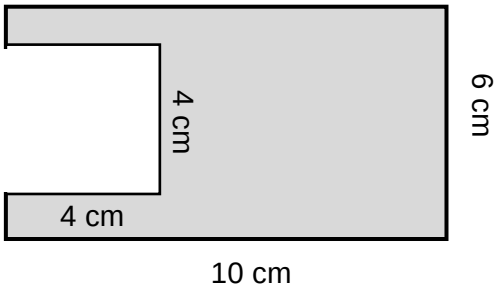
Area is the number of square units needed to cover the surface of plane figures.

Composite figures are figures that can be segmented into two or more basic shapes. Area of composite figures can be solved by finding the area of each shape found in the figure. Add the areas if they are connected and subtract the areas if they overlapped with each other.

What I Can Do

Directions: Find the area of the shaded region on each item. Assume all angles that appear to be right angles are right. Write your answer with complete solution on your answer sheet.

1.



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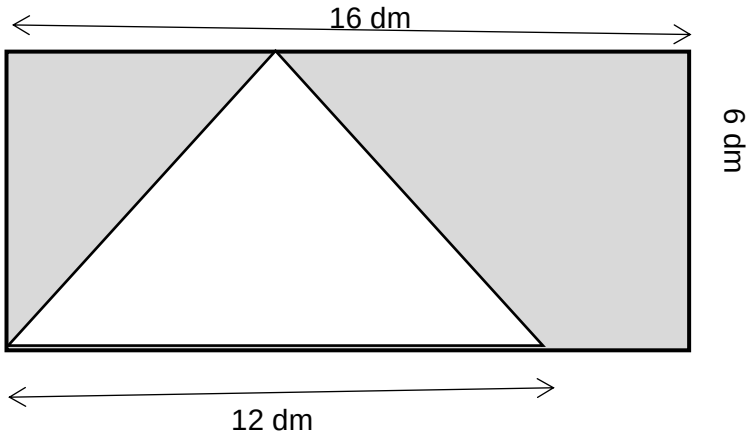

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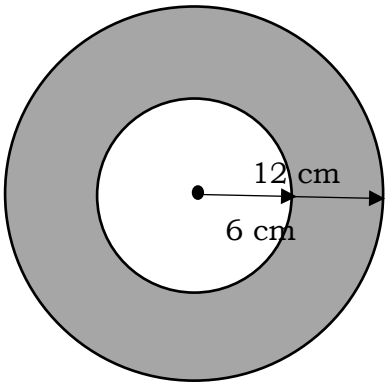

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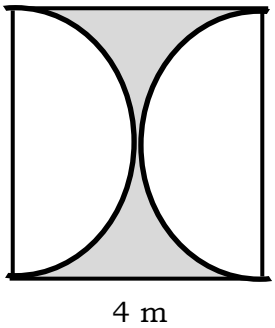
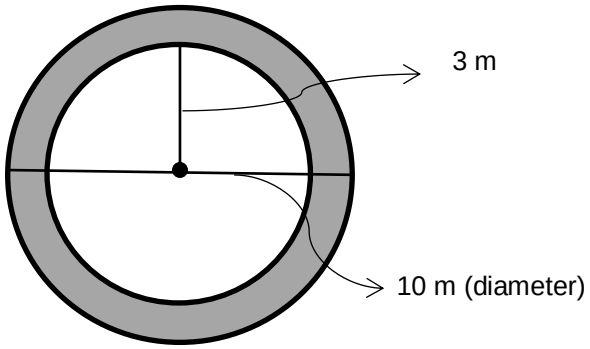


Assessment

Find the area of the shaded part. Write your answer with complete solution on your answer sheet.

1.



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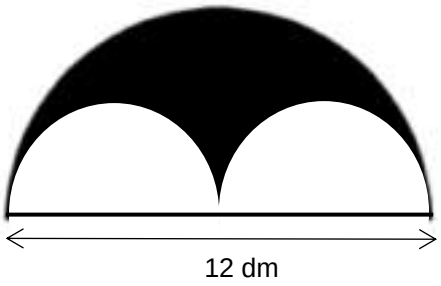

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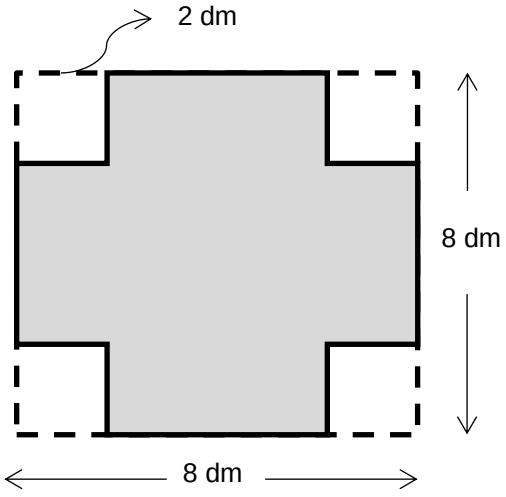

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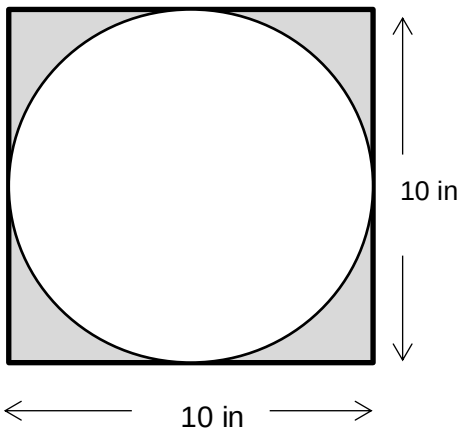

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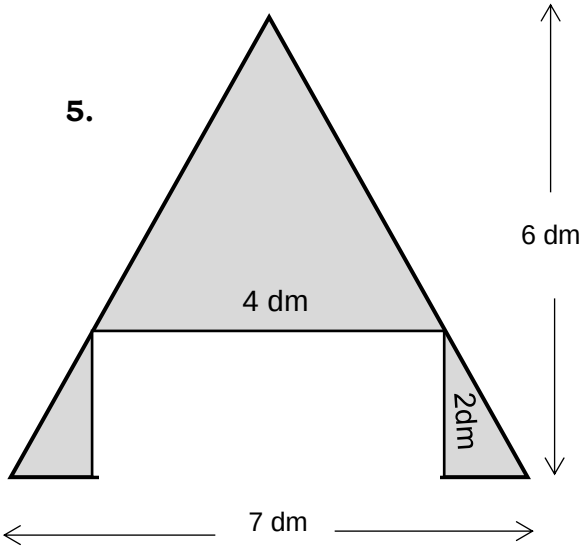
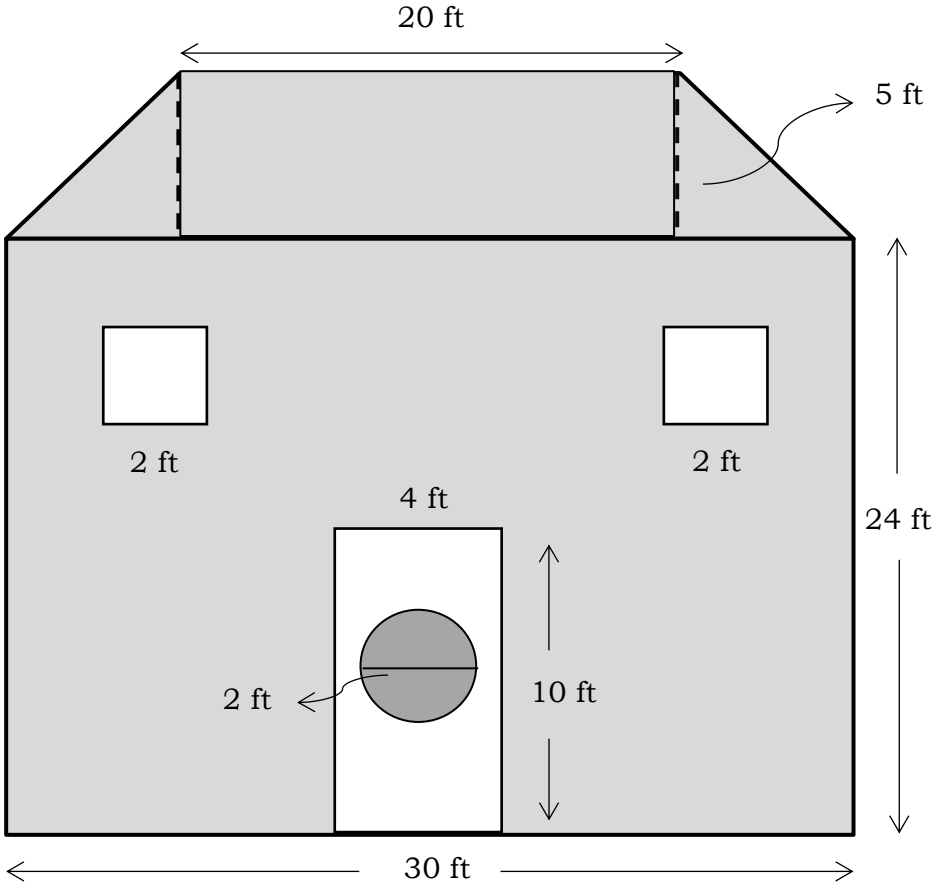


Additional Activities

Look at the drawing below then answer the questions that follow. Write your answers on your paper.



Questions:

_____1. What is the drawing all about?
_____2. How many figures or shapes are there in the drawing?
_____3. What do you call the figure which can be segmented into two or more basic shapes?
_____4. List down the shapes found in the drawing and then write their formula in solving for the area.
   a. _____
   b. _____
   c. _____
   d. _____
_____5. What is the area of the roof?
_____6. What is the area of the unshaded part of the door?
_____7. What is the area of the shaded part of the house?

Answer Key

What I Know

A.

a

d

e

b

B.

1. 36 cm^2
2. 109.86 in^2

What's In

1. 64 cm^2
2. 32 m^2
3. 36 cm^2
4. 53.86 cm^2

What's More

1. 39 dm^2
2. 54 dm^2
3. 100.26 in^2
4. 49.04 m^2
5. 72 m^2

What I Can Do

1. 44 cm^2
2. 60 dm^2
3. 339.12 cm^2
4. 3.44 m^2

Assessment

1. 50.24 m^2
2. 28.26 dm^2
3. 48 dm^2
4. 21.5 in^2
5. 13 dm^2

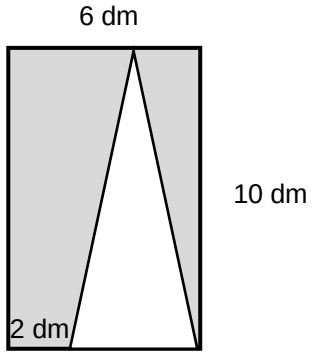
Additional Activities

1. House
2. 4 shapes
3. Composite figures
4. a. Rectangle $A = l \times w$
   b. Square $A = s \times s$
   c. Triangle $A = \frac{1}{2} \times b \times h$
   d. Circle $A = \pi r^2$
5. 125 ft^2
6. 36.86 ft^2
7. 800.14 ft^2

What I Know

Find the area of the following composite figures. Write your answers and complete solutions on your answer sheet.

1.



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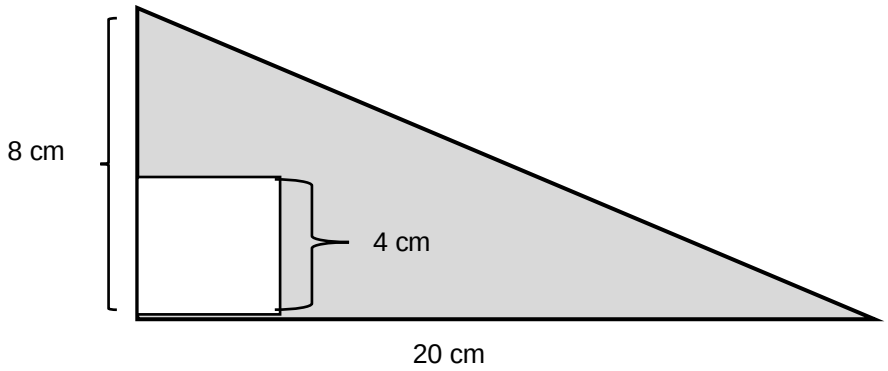


Read and solve the following problems. Write your answer in your answer sheet.

3. A rectangular playground is 90 m long and 60 m wide. It is surrounded by a 3 m wide raceway. What is the area of the raceway?

4. The floor of the school stage needs to be refinished. It is in the shape of a trapezoid. The front and back edges are parallel and measure 12 m by 16 m and it measures 5 m from front to back. Find the area of the stage.

5. A 2-meter road surrounds a square spring. The side of the square measures 20 m. What is the area of the road?

Lesson 2

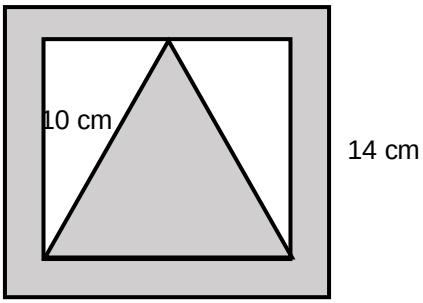
Routine and Non-routine Problems Involving Area of Composite Figures

In the previous lessons you have learned how to find the area of composite figures. This time we will apply what we had learned by solving routine and non-routine problems that involve area of composite figures.

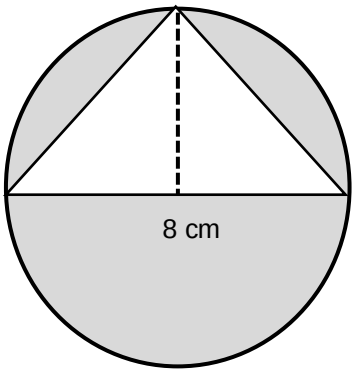
What's In

Solve the following problems. Write your answer and complete solutions on your answer sheet.

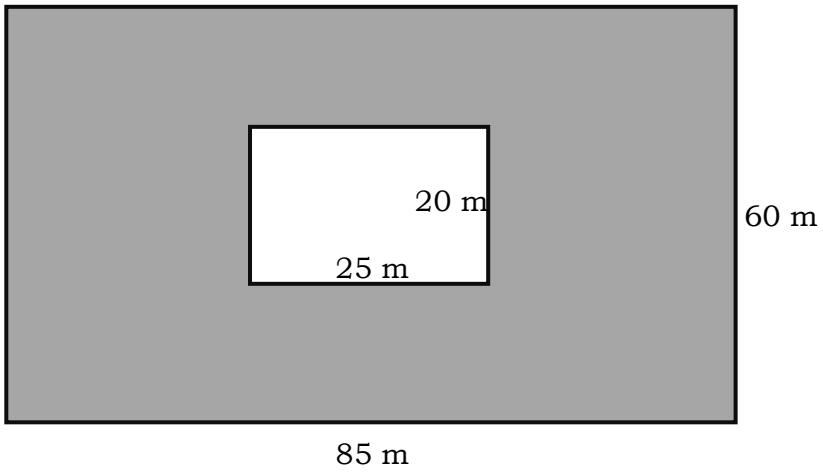
1. Find the area of the shaded region. Assume all figures are squares.



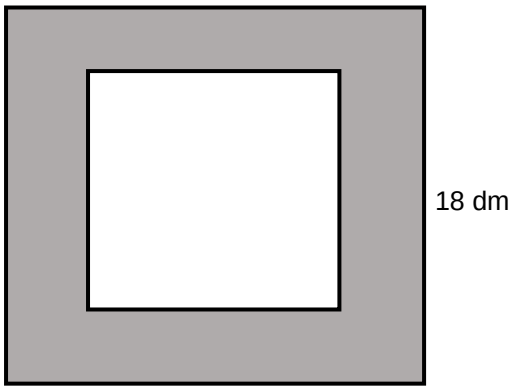
2. Find the area of the shaded region.



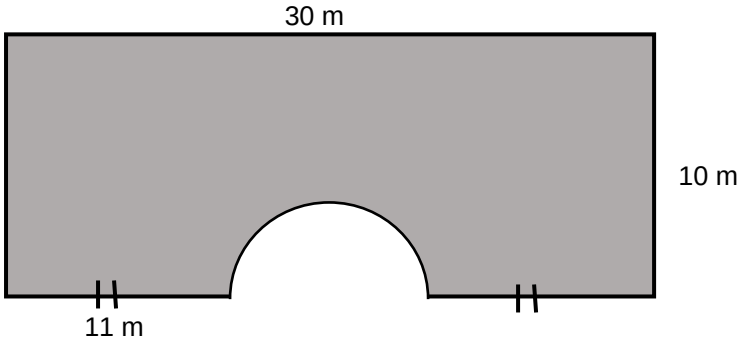
3. A grass lawn is 85 m long and 60 m wide. A rectangular flower plot is found in the middle of the lawn which measures 25 m by 20 m. What is the area covered by the grass?



4. Two squares are positioned as shown. There is a 4 dm margin between the small and large square. What is the area of the shaded part?



5. The diagram below shows the dimensions of Mrs. Lee's swimming pool. A cover is needed for the pool, what is the area of the cover?



What's New

Study this problem:

> Marie bought two leche flan molders. The first molder is a square molder whose side measures 8 inches. The other one is a circular molder with a diameter of 8 inches. How much bigger is the bottom surface of one of the molder than that of the other molder? (Use $\pi = 3.14$)

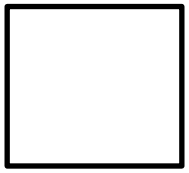
Do you know which molder is bigger?

What is It

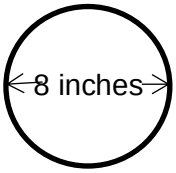
To solve the problem, we will answer the following:

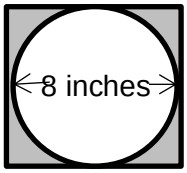
1. Understand:
   a. What is asked?
      Answer: The difference of the area of square molder and circular molder.
   b. What are given?
      Answer: 8 inches side measures of the square molder, 8 inches diameter measures of the circular molder
2. Plan**:** What formula are you going to use?
   *Use the formula in finding the area of circle and square.
3. Solve: Show your computation.

   Solution:
   First, we make an illustration of each. Then compute the areas.



8 inches





8 inches

The area of the square is:

$A = s \times s$

$= 8 \text{ in} \times 8 \text{ in}$

$A = 64 \text{ in}^2$

The diameter of the circle is 8 inches, so the radius is 4 inches. The area of the circle is:

$A = \pi r^2$
$= 3.14 \ (4 \text{ in} \times 4 \text{ in})$
$= 3.14 \times 16 \text{ in}^2$
$A = 50.24 \text{ in}^2$

The square leche flan is larger by about 64 in^2 – 50.24 in^2 = **13.76 in^2.**

4. Check: This is one way to check your answer.

   Go back to your computation. Check if the given dimension is properly substituted to the formula. Check also the flow of your computation.

Problem 2:

A floor is a rectangle, 850 feet by 40 feet, with a semi-circle at each of the short sides. What is the area of the floor ?

1. **Understand:**

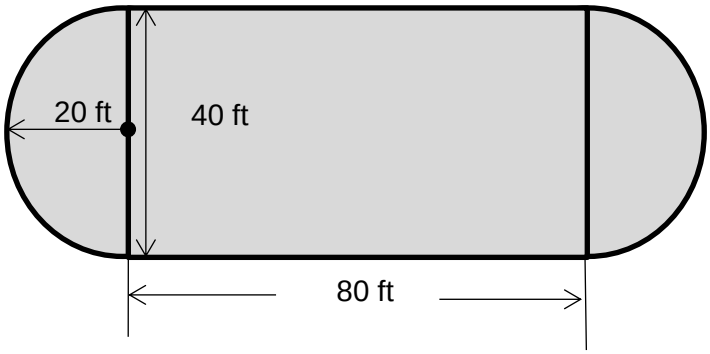
   a. What is asked?
   Answer: The area of the floor.

   b. What are given?
   Answer: rectangle (850 feet by 40 feet), two semi-circle at the short sides

2. **Plan:** What formula are you going to use?
   Use the formula in finding the area of rectangle and circle.

3. **Solve**: Show your computation.
   Solution:

   1. Make an illustration of the problem.



   2. Analyze and identify the figures found in the problem. The figures that we can easily identify are the rectangles and the two semi – circles.

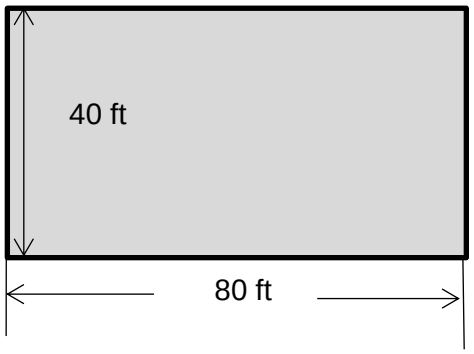
3. Find the area of each figure.

Area of the rectangle

$A = l \times w$

$= 80 \text{ ft} \times 40 \text{ ft}$

$A = 3{,}200 \text{ ft}^2$



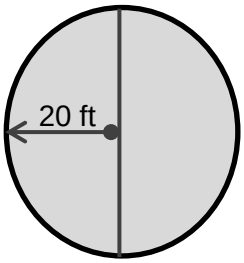
Then let's combine the two semi – circle on both ends of the figures, which will result to a circle. Having this, the combined area of both ends is :

$A = \pi r^2$

$= 3.14 \times 20 \text{ ft} \times 20 \text{ ft}$

$= 3.14 \times 400 \text{ ft}^2$

$A .= 1{,}256 \text{ ft}^2$



Add the areas of the rectangle and the combined semi-circles.

The area of the rectangle is 3,200 ft^2 plus the area of the combined semi-circles which is 1,256 ft^2. The sum is 4,456 ft^2.

Answer: The total area of the floor is 4,456 ft^2.

4. **Check**: This is one way to check your answer.

Go back to your computation. Check if the given dimension is properly substituted to the formula. Check also the flow of your computation.

What's More

Read and solve the problems following the discussed steps. Write your answer and complete solution on your answer sheet.

1. Two identical right triangular pictures whose base measures 12 dm and the height is 8 dm are placed side by side on a rectangular frame that measures 24 dm by 8 dm. Find the area of the frame that is not covered by the picture?
2. The dimension of a rectangular swimming pool is 35 m by 20 m. A 2-m concrete walk is built around the pool. What is the area of the concrete walk?

What I Have Learned

In solving problem involving area of composite figure, we will follow the following steps:

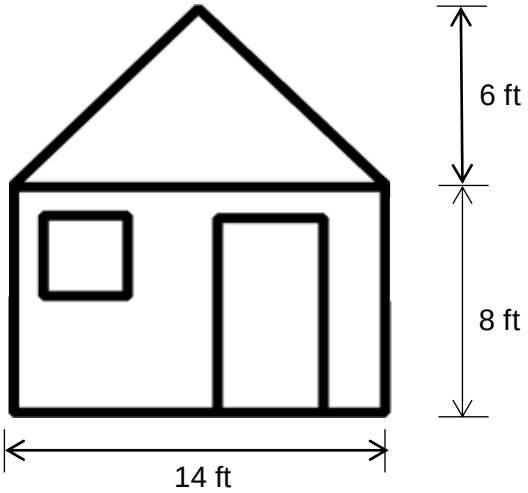
1. Understand:
   a. What is asked?
   b. What are given?
2. Plan: What formula are you going to use?
3. Solve: Show your computation
   a. Make an illustration
   b. Find the area of each figure
   c. Add the areas if the figure is separately drawn from each other.
   d. Subtract the areas if the figures overlapped each other.
4. Check: Check and review your answer.

What I Can Do

Read and solve each problem following the steps. Write your answer and complete solution in your answer sheet.

1. Two circles whose diameter is 6 meters are placed side by side in a rectangular table whose dimension is 12 meters by 6 meters. What is the area of the table not covered by the circle?

2. Jerry was hired to paint the front of a neighbor's shed. Using the illustration on the right for dimensions, how many square feet of paint did he need?



Assessment

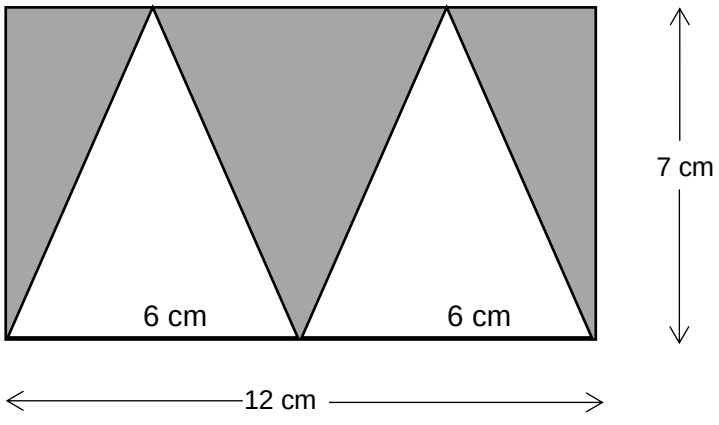
Read and solve the following problems. Write your answer and complete solution in your answer sheet.

1. A rectangle has a length of 7 feet and a width of 4 feet. It is connected with a semi-circle with the same diameter as the width of the rectangle. Find the combined area of the figures.
2. A circular picture whose diameter is 4 decimeters is framed in a rectangular board with dimension of 6 decimeter by 4 decimeters. What is the area of the board that can be seen?
3. A photograph measuring 20 cm by 12 cm is mounted on a rectangular cardboard leaving a margin of 2 cm around. What is the area of the cardboard that is not covered by the photograph?

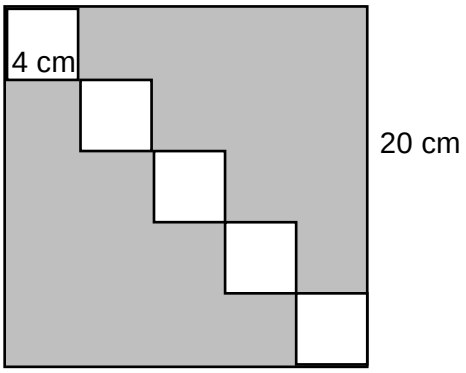
Additional Activities

Read and solve the following: Use $\pi = 3.14$.

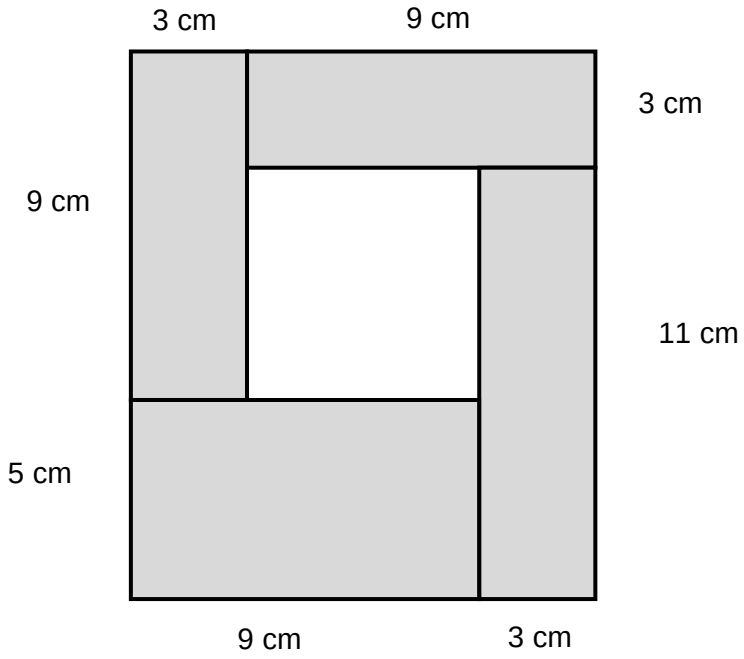
1. Find the area of the shaded part.



2. What is the area of the shaded part?



3. The figure is formed by five rectangles. Find the area of the unshaded region.



Answer Key

What I Know

1. 40 dm^2
2. 64 cm^2
3. 936 m^2
4. 70 m^2
5. 144 m^2

What's In

1. 146 cm^2
2. 34.24 cm^2
3. 4600 m^2
4. 224 dm^2
5. 249.76 m^2

What's More

1. 96 dm^2
2. 236 m^2

What I Can Do

1. 15.48 m^2
2. 154 ft^2

Assessment

1. 34.28 ft^2
2. 11.44 dm^2
3. 114 dm^2

Additional Activities

1. 42 cm^2
2. 320 cm^2
3. 36 cm^2

References:

Lumbre, A. et al. (2016). *21st Century MATHletes Textbook for Grade 5*: Vibal Group Inc.

Perez, M. et al. (2016). *21st Century MATHletes 6. Philippines*: Vibal Group Inc.

Tan, A. et al. (2007). *Hypermath 6. Philippines*: Trinitas Publishing, Inc.

Most Essential Learning Competencies (MELC) in Mathematics 6

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

6

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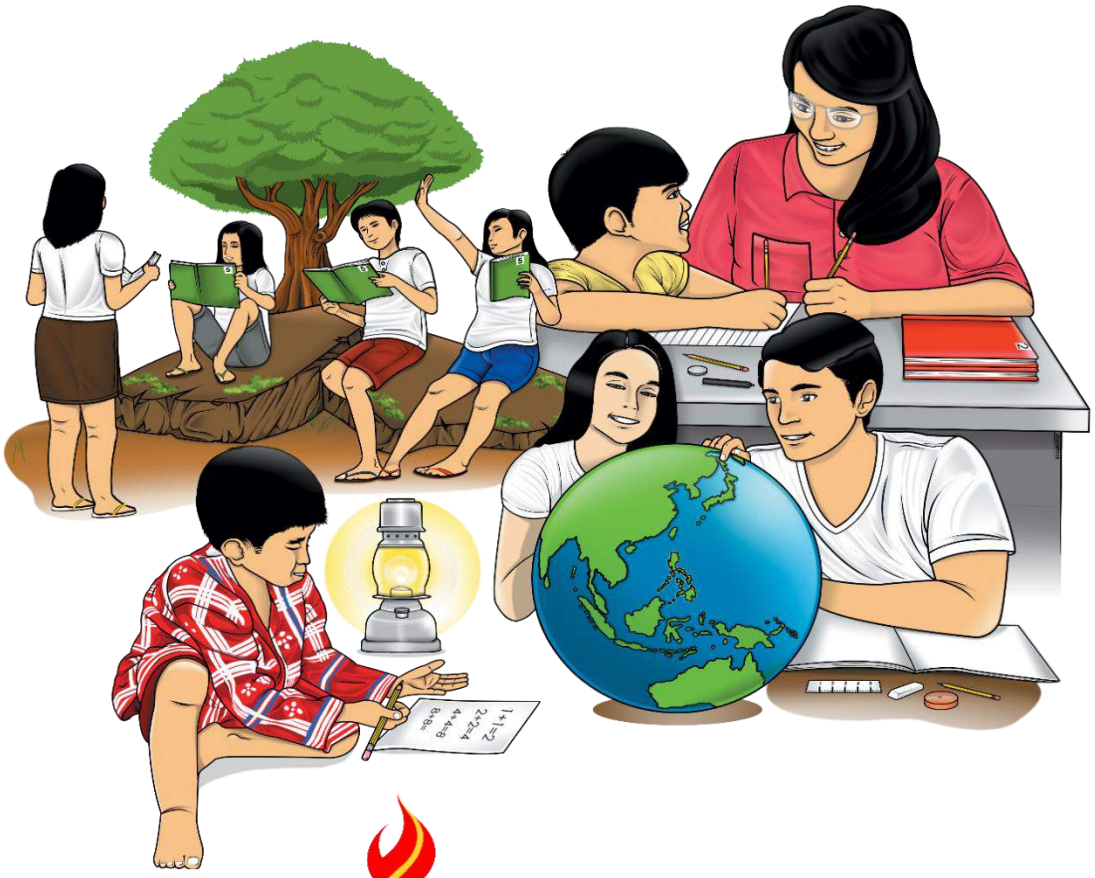
Mathematics

Quarter 3 – Module 7:
Surface Area of Solid/ Space Figures



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ADM

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Quarter 3 – Module 7: Surface Area of Solid/Space Figures
First Edition, 2021

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Development Team of the Module

Author	:	Soraya S. Libunao
Editors	:	Mae Joy M. Tan, Susana L. Lutero, Nora B. Rebadomia, Ritchel T. Maratas,
Reviewers	:	Ivy Joy A. Torres, Ma. Theresa L. Tabotabo, Mae Joy M. Tan, Jem Rymon S. Chien
Illustrators	:	Eldiardo E. Dela Peña
Layout Artists	:	Eldiardo E. Dela Peña, Darven G. Cinchez
Management Team	:	Ramir B. Uytico Pedro T. Escobarte, Jr. Elena P. Gonzaga Donald T. Genine Adonis A. Mosquera Clarissa G. Zamora Fevi S. Fanco Ivy Joy A. Torres Jason R. Alpay Mae Joy M. Tan Jem Rymon S. Chien Ethel S. Gali

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Department of Education – Region VI

Office Address: Duran Street, Iloilo City
Telefax: (033)336-2816, (033)509-7653
E-mail Address: region6@deped.gov.ph

6

Mathematics

Quarter 3 – Module 7
Surface Area of Solid/Space Figures

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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

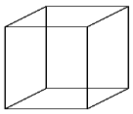
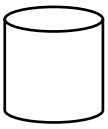
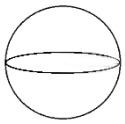
This module was designed and written with you in mind. It is here to help you master the skills in visualizing and describing surface area and naming the unit of measure used for measuring the surface area of solid/space figures.

The scope of this module allows you to use it in many different learning situations. The language used recognizes your diverse vocabulary level. The lessons are arranged to follow the standard sequence of your course. But the order in which you read them can be changed to match with the textbook you are now using.

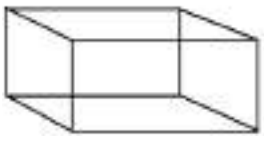
After going through this module, you are expected to visualize and describe surface area and names the unit of measure used for measuring the surface area of solid/space figures. (M6ME-IIIi-91)

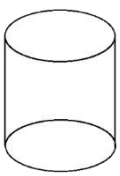
What I Know

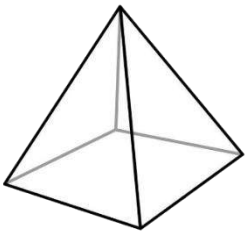
A. Match column A with column B. Write your answers on your answer sheet.

Column A		Column B
1.)		a. sphere
2.)		b. rectangular prism
3.)		c. cube
4.)		d. cylinder
5.)		e. cone
		f. pyramid

B. Write the number of surfaces that make up each of the following figures. Write your answers on your answer sheet.

6. 

7. 

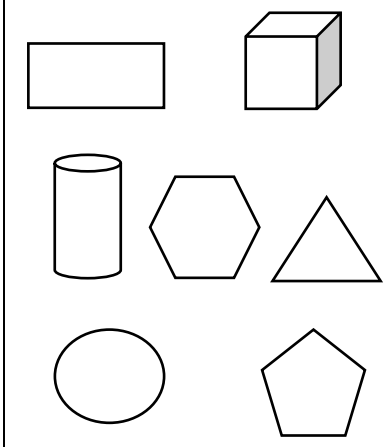
8. 

Lesson 1 Surface Area of Solid/ Space Figures

In the previous lessons you have learned the area of composite figures. This time, we will focus on how to visualize or describe the surface area and name of the unit of measure used for measuring the surface area of solid/space figures.

What's In

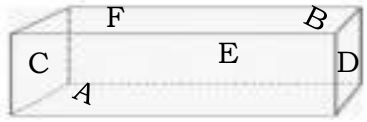
Examine the given in the following table. Classify the figures into their corresponding columns. Write your answers on your answer sheet.

Given Figures	Two-Dimensional Figures	Three- Dimensional Figures
		

What's New

Study the problem below. Answer the questions that follow. Explain your answers to a family member.

What kind of solid figure is this?



What is the shape of the bottom part of box? Is it the same with the shape of the top part?

A	B
BOTTOM	TOP

What is the shape of the right side of the box? Does it have the same shape with the one on the left side?

C	D
Left	Right

Do the back and front sides of the box have the same shape?

E	F
FRONT	BACK

How many faces does the box have?

How many edges and vertices does the box have?

What is It

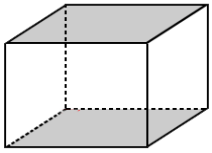
Surface Area (S.A.) is the sum of the areas of the base(s) and the lateral faces of a solid figure. Surface area is measured in square units such as cm^2, ft^2, m^2 and other units. One way to find the surface area of a solid figure is to find the area of its nets.

A. Surface Area of Prism

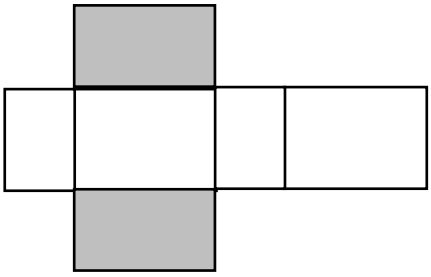
A prism is a polyhedron that has two congruent parallel faces called bases. There are many kinds of prism. A prism is named according to the shape of its base.

- Rectangular prism

Rectangular Prism



Net of Rectangular Prism

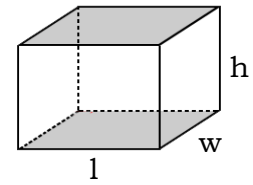


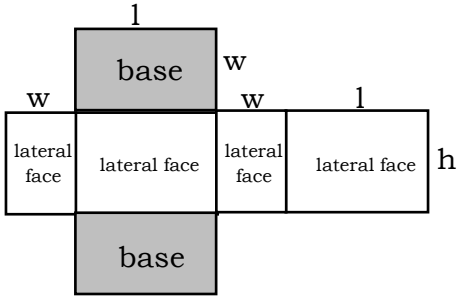
There are six surfaces in a rectangular prism. It is composed of two rectangular bases and four rectangular lateral faces. Rectangular prism has 8 vertices and 12 edges.

The surface area of rectangular prism is the total area of the top, bottom, front, back, left side and right side of rectangles.

Another way to find the surface area of the rectangular prism is to use the lateral area and base areas. Lateral (L.A.) of a prism is the sum of the areas of lateral faces. It is important to find the lateral area of prism first. Lateral faces are the faces in a prism that are not bases.

Rectangular Prism





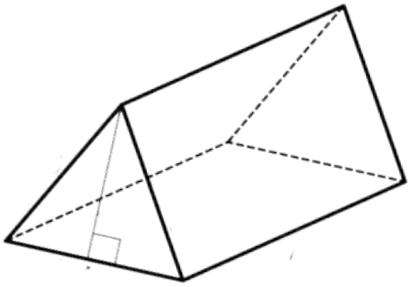
The surface area of rectangular prism is the sum of the lateral area and the area of the two bases. S.A. = 2B + L.A. or S.A. = 2lw + 2lh + 2wh

S.A. = 2lw + 2lh + 2wh

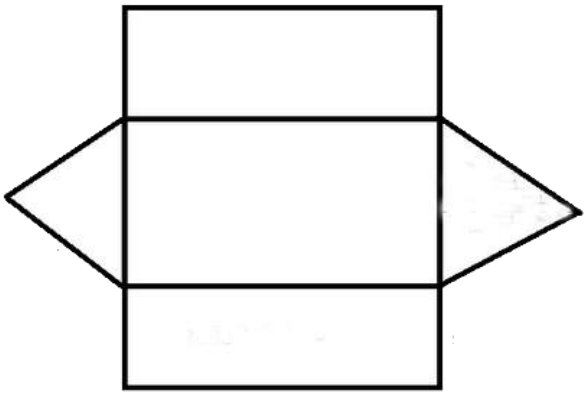
Areas of bases | Areas of lateral faces

- Triangular Prism

Triangular Prism



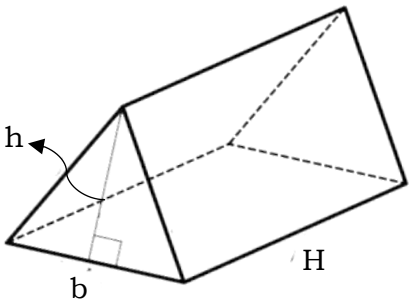
Net of Triangular Prism

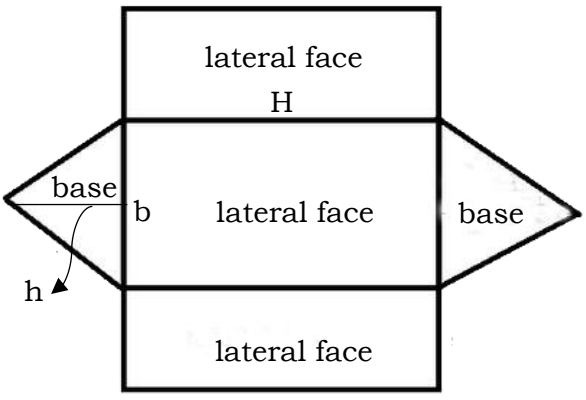


A triangular prism has five faces. These five faces are composed of two triangular bases and three rectangular lateral faces. It has also 6 vertices and 9 edges.

In the triangular prism shown above, the front triangle face is connected to the rear triangle face by the three rectangle faces. The triangle faces are considered the bases, and the rectangle faces are considered lateral faces.

Triangular Prism

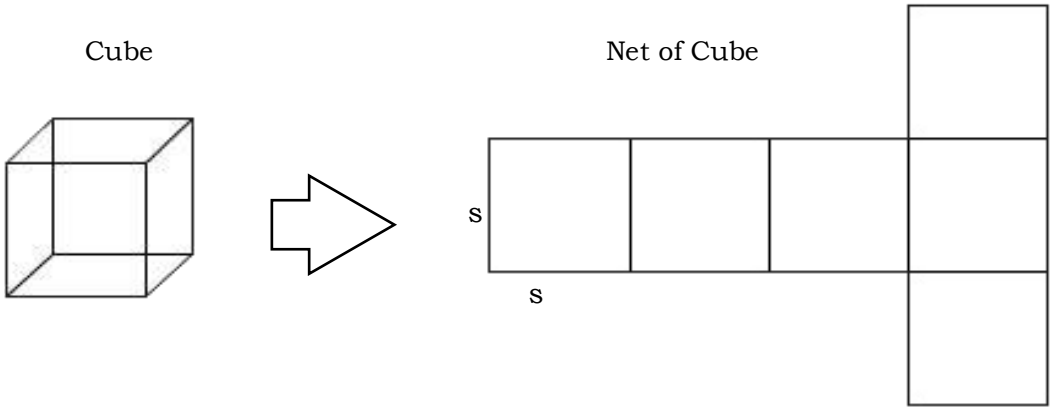




In finding the surface area of the triangular prism, find its Lateral Area (L.A.) first. The lateral area of the triangular prism is the product of the perimeter (p) of the base and height (h). *(L.A. = ph)*

Surface Area (S.A.) of triangular prism is equal to the sum of its Lateral Area (L.A.) and area of 2 bases. *(S.A. = L.A. + 2B)*

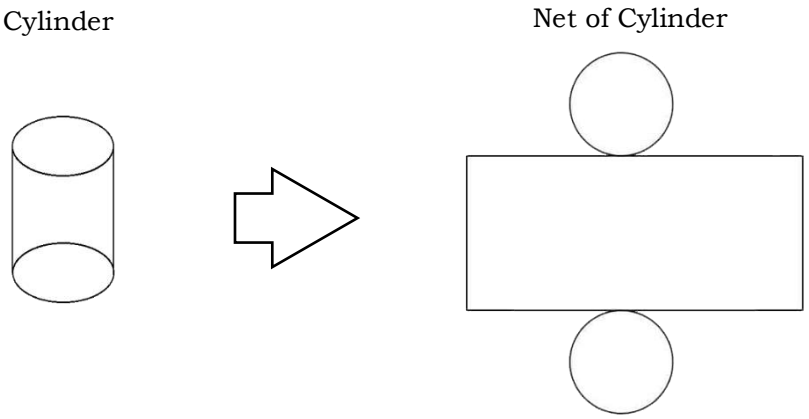
- Cube



A cube is square prism. There are six surfaces of a cube. The bases and the faces have equal sizes. Cube has 8 edges and 12 edges.

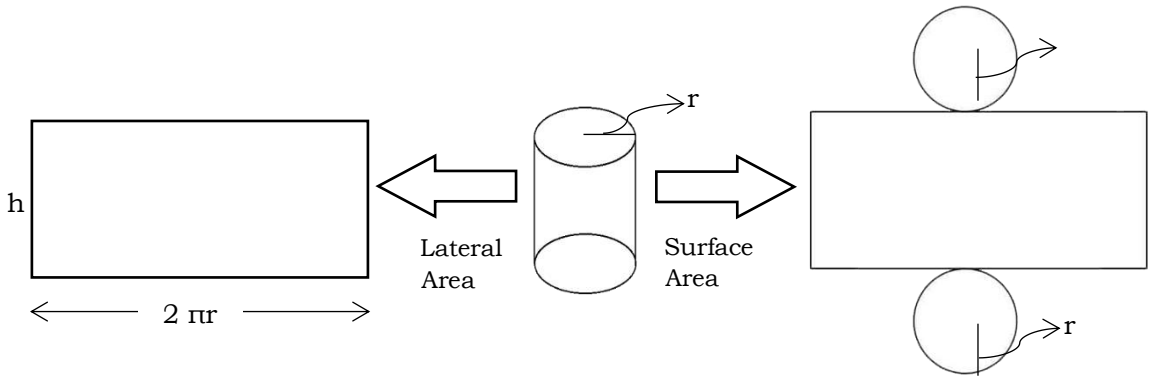
To get the Surface Area (S.A.) of a cube, the six faces is multiplied to the square of the length or side (s). *(S.A. = $6s^2$)*

B. Surface Area of Cylinder



A cylinder has three surfaces: the two bases and one curved surface or lateral surface. It has no vertex and edge. The bases form circles. The curved or lateral surface forms rectangle. The height (or width) of the rectangle is the height of the cylinder. The base length of the rectangle is the circumference of the cylinder.

r

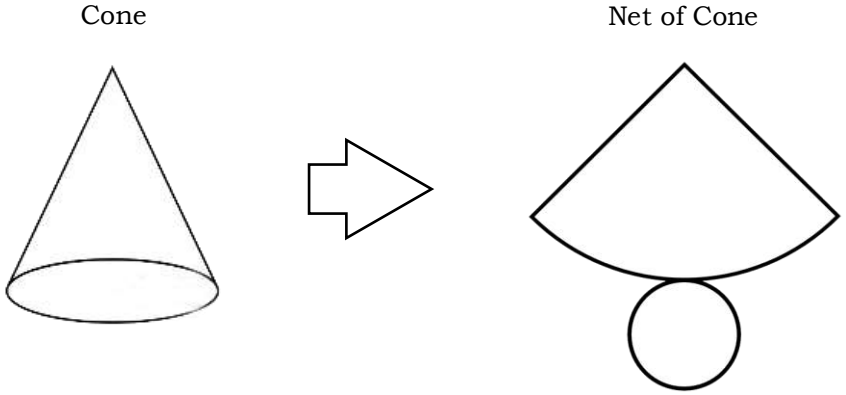


L.A. = 2πrh Area of a base (B) = πr² S.A. = L.A. + 2B

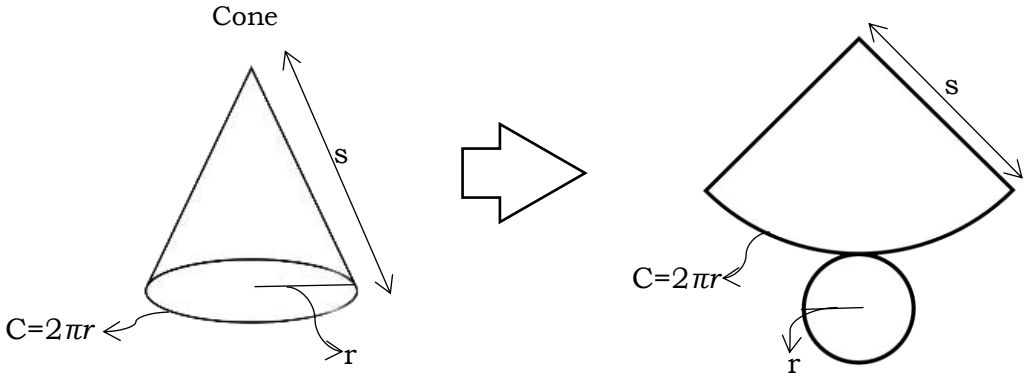
The lateral area of a cylinder is the product of the circumference of the base and the height of the cylinder. *(L.A. 2πrh)*

The surface area of a cylinder is the sum of the lateral area and the areas of the two bases. *(S.A. = L.A. + 2B) or (S.A. = 2πr² + 2πrh)*

C. Area of a Cone

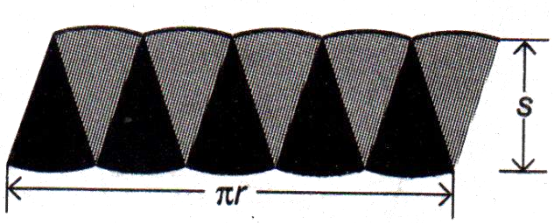


A cone has one circular base and a curved surface with apex or vertex. It has no edge. The area of the circuar base and the area of the curved surface determine the surface area of a cone.



The surface area of a cone is the sum of the lateral area (L.A.) and the area of its base (B). *(S.A. = L.A. + B)*

To find the lateral area (L.A.), imagine cutting the lateral surface into wedges and arranging the wedges to form a figure like a parallelogram.



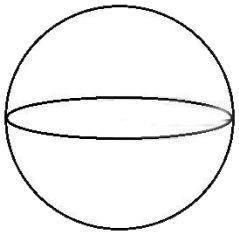
The base of the new figure is πr and the height is the slant height of the curved surface. So, L.A. = πrs

.

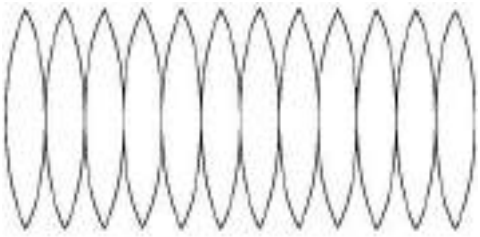
Thus, the surface area of cone is S.A. = L.A. + B or S.A. = πrs + πr²

D. Surface Area of Sphere

Sphere

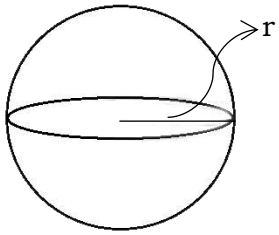


Net of Sphere

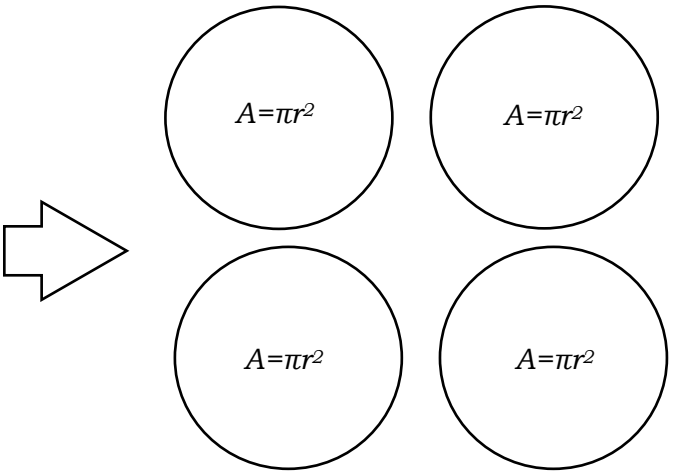


A sphere is perfectly round and symmetrical solid figure. It has no edges and vertices. It is a curved surface of points that are all of the same distance from the center. Like a circle, the distance from the center of a sphere to the surface is known as the radius (r).

Sphere



S.A. = 4πr²

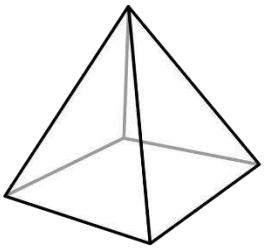


The area of the circle that contains the center of the sphere is πr^2. It would take exactly 4 of these circles to wrap the sphere completely.

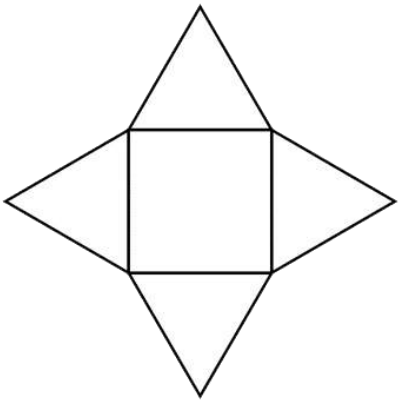
The surface area of a sphere with radius (r) is S.A. = $4\pi r^2$.

E. Pyramid

Pyramid

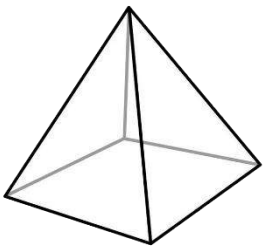


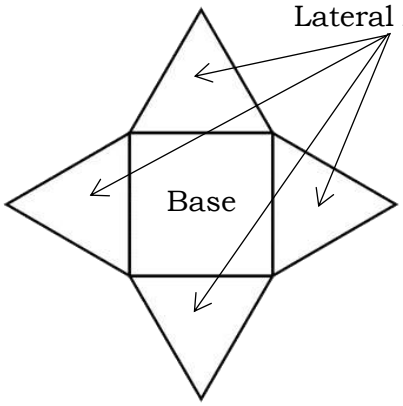
Net of Pyramid



Pyramids are named according to the shape of its base. Examples of pyramids include square pyramid, rectangular pyramid and triangular pyramid. The surface area of any pyramid is the sum of the areas of all the faces, including the base. We can use the net to find a general formula that will help us find the surface area of any pyramid.

Pyramid

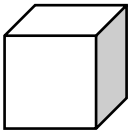




The surface area of any pyramid is the sum of the lateral area and the area of the base. *(S.A. = L.A. + B)*

What's More

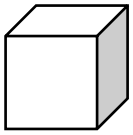
Complete the data in the table below. Example is given for your reference. Write your answers on your answer sheet.

Solid Figures	**Illustration**	**Description**	**No. of faces**	**No. of edges**	**No. of vertices**
Example: cube		Each face is a square	6	12	8
1. Rectangular prism					
2. Triangular prism					
3. Cube					
4. Cylinder					

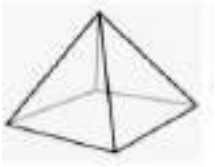
What I Have Learned

Surface Area (S.A.) is the sum of the areas of the base(s) and the lateral faces of a solid figure.

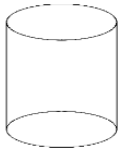
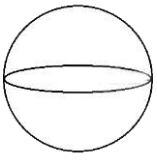
A **Prism** is a polyhedron that has two congruent parallel faces called bases. There are many different kinds of prism. A prism is named according to the shape of its base.

Name	**Shape of the base**	**Description**	**Surface Area**	**Example**
Triangular prism	Triangle	Composed of two triangular bases and three rectangular lateral faces.	$S.A. = L.A. + 2B$	
Rectangular prism	Rectangle	Composed of two rectangular bases and four rectangular lateral faces.	$S.A. = 2B + L.A.$ *or* $S.A. = 2lw + 2lh + 2wh$	
Cube	Square	A cube is a prism with a square base. All its faces are square.	$S.A. = 6s^2$	

A **Pyramid** is a polyhedron whose base is a polygon and the lateral faces are parallelograms. Pyramids are named according to the shape of its base.

Name	Shape of the Base	Surface Area	Example
Triangular pyramid	Triangle	*S.A. = L.A. + B*	
Rectangular pyramid	Rectangle	*S.A. = L.A. + B*	
Square pyramid	Square	*S.A. = L.A. + B*	

Other solid figures have curved surfaces.

Name	Definition	Surface Area	Example
Cylinder	Has two circular bases that are congruent and parallel.	S.A. = L.A. + 2B or S.A. = $2\pi r^2 + 2\pi rh$	
Cone	Has one circular base.	S.A. = L.A. + B or S.A. = $\pi rs + \pi r^2$	
Sphere	Is a curved surface of points that are all of the same distance from the center.	S.A. = $4\pi r^2$	

What I Can Do

Identify the solid figure describe below. Write your answer in your answer sheet.

SOLID FIGURES

1. _____
It is a prism with a square base. All its faces are square.

2. _____
It has one circular base.

3. _____
It is a polyhedron whose base is a polygon and the lateral faces are parallelograms.

4. _____
It is a curved surface of points that are all of the same distance from the center.

5. _____
It has two circular bases that are congruent and parallel.

6. _____
It has triangle base with 3 lateral faces

Assessment

A. Match Colum A with Column B. Write the letter of your answer in your answer sheet.

A	B
1. The base is a polygon and its faces are triangles.	a. rectangular prism
2. It is composed of two rectangular bases and four rectangular lateral faces	b. cone
3. A spatial figure having a circular base and one vertex.	c. pyramid
4. A spatial figure which is perfectly round and symmetrical solid figures with no edge and vertex.	d. cylinder
	e. triangular prism
5. A spatial figure with 2 circular bases, no edge and no vertex.	f. sphere

B. Write T if the statement is true and F if it is false. Write your answer on your answer sheet.

6. All the faces of a cube are squares.

7. A prism is a polyhedron with no congruent bases.

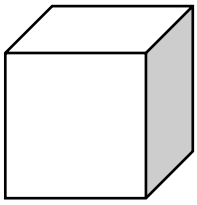
8. A pyramid has no vertex.

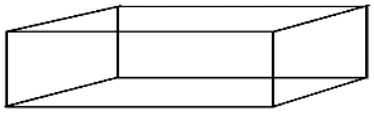
9. Solids have no flat surface.

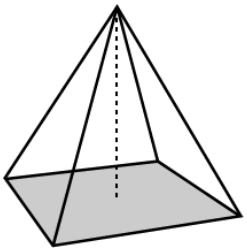
10. A cylinder is a two-dimensional solid figure with two congruent circular base that are parallel.

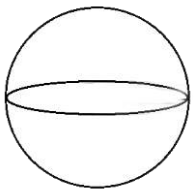
Additional Activities

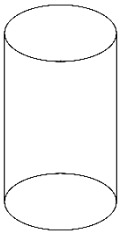
Name the following figures and write the correct formula on finding their surface area. Write your answer in your answer sheet.

1.) 

2.) 

3.) 

4.) 

5.) 

Answer Key

What I Know

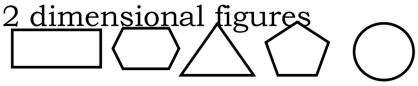
1. c
2. d
3. e
4. b
5. a
6. 6
7. 3
8. 5

What I Can Do

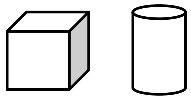
1. Cube
2. Cone
3. Pyramid
4. Sphere
5. Cylinder
6. Triangular Prism

What's In

2 dimensional figures



3 dimensional figures



Additional Activities

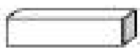
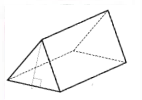
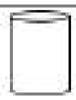
1. Cube S.A. = $6s^2$
2. Rectangular Prism
   S.A. = 2B + L.A. or
   S.A. = 2lw + 2lh + 2wh
3. Pyramid S.A. = L.A. + B
4. Sphere S.A. = $4\pi r^2$
5. Cylinder
   S.A. = L.A. + 2B or
   S.A. = $2\pi r^2 + 2\pi rh$

Assessment

A.
1. c
2. a
3. b
4. f
5. d

B.
6. T
7. F
8. F
9. F
10. T

What's more

Solid Figures	Illustration	description	No. of faces	No. of edge	No. of vertices	No. of sides on each faces
1. Rectangular prism		Composed of two rectangular bases and four rectangular lateral faces.	6	12	8	4
2.Triangular Prism		Composed of two triangular bases and three rectangular...	5	9	6	5
3. cube		A cube is a prism with a square base. All its faces are square.	6	12	8	4
4. cylinder		Has two circular bases that are congruent and parallel	2	2	0	3

References:

A. Book

1. M Caingat, *Enjoying Mathematics 6* (Philippines, Jedigar Enterprises, 2005).

2. M Perez et. al., *21st Century MATHletes 6* (Philippines, Vibal Group Inc., 2016).

3. *Most Essential Learning Competencies in Mathematics 6* (Philippines, Department of Education, 2021).

4. *Lesson Guide in Elementary Mathematics for Grade 6* (Philippines, Department of Education, 2010).

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

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Mathematics

Quarter 3 – Module 8:

Finding the Surface Area of Cubes, Prisms, Pyramids, Cylinders, Cones and Spheres

ALTERNATIVE DELIVERY MODE
ADM

Mathematics – Grade 6
Alternative Delivery Mode
Quarter 3 – Module 8: Finding the Surface Area of Cubes, Prisms, Pyramids, Cylinders Cones and Spheres.
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Development Team of the Module

Author	:	Josephus C. Ibañez
Editors	:	Mae Joy M. Tan, Susana L. Lutero, Nora B. Rebadomia, Ritchel T. Maratas, Mary Jane O. Amante, Susan T. Dela Torre, Jem Rymon S. Chien
Reviewers	:	Ivy Joy A. Torres, Ma. Theresa L. Tabotabo, Mae Joy M. Tan, Jem Rymon S. Chien
Illustrators	:	Eldiardo E. Dela Peña
Layout Artists	:	Eldiardo E. Dela Peña, Darven G. Cinchez
Management Team	:	Ramir B. Uytico Pedro T. Escobarte, Jr. Elena P. Gonzaga Donald T. Genine Adonis A. Mosquera Clarissa G. Zamora Fevi S. Fanco Ivy Joy A. Torres Jason R. Alpay Mae Joy M. Tan Jem Rymon S. Chien Ethel S. Gali

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Department of Education – Region VI

Office Address: Duran Street, Iloilo City
Telefax: (033)336-2816, (033)509-7653
E-mail Address: region6@deped.gov.ph

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Mathematics

Quarter 3 – Module 8:
Finding the Surface Area of Cubes, Prisms, Pyramids, Cylinders, Cones and Spheres

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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 will help you learn the skills to find the surface area of cubes, prisms, pyramids, cylinders, cones and spheres. The scope of this module used in different learning situations. The language used recognizes your diverse vocabulary level. The lessons are arranged to follow the standard sequence of your course. But the order in which you study them can be rearranged to match the textbook you are now using.

After going through this module, you are expected to be able to find the surface areas of cubes, prisms, pyramids, cylinders, cones and spheres.

What I Know

Read and solve the following problem. Write your answer in your answer sheet.

1. Find the circumference of a circular pool with a diameter length of 5m.

2. A rectangular lot has a width of 15 m and length of 20 m. What is the area of the lot?

3. A billboard is in a shape of a triangle with dimensions - 8 meters across its base and 9 meters high. What is the area of the bill board?

4. MJ's vegetable garden has 4 sides. Each side has is in shape of a trapezoid. The bases measure 12 cm and 32 cm. The height is 28 cm. What is the total area of the 4 sides?

5. Which area is larger, the area of a circle 9 dm in diameter or the area of a square whose side is 9 dm? How much larger?

Lesson 1

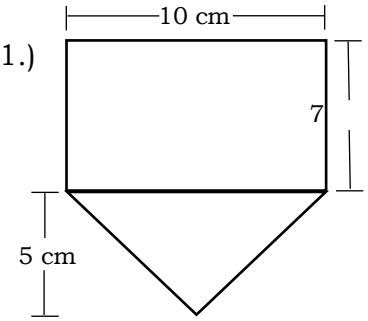
Finding the Surface Area of Cubes, Prisms, Pyramids, Cylinders, Cones, and Spheres

In the previous lessons you have learned how to find the area of composite figures form by any two or more of the following figures such as triangle, square, rectangle, circle, and semi-circle. This time, we will focus on how to find the surface area of cubes, prisms, pyramids, cylinders, cones and spheres.

What's In

Find the area of the following composite figures.

1.)



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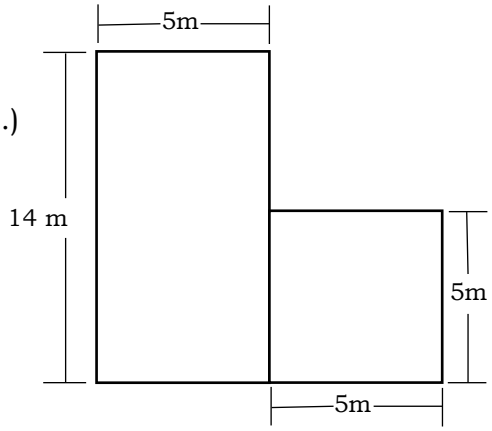
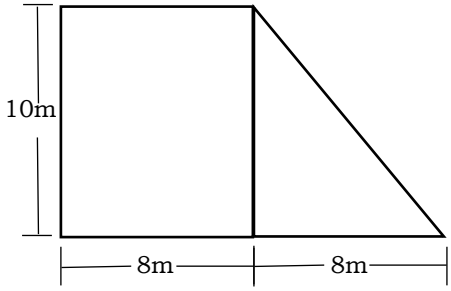


3.)



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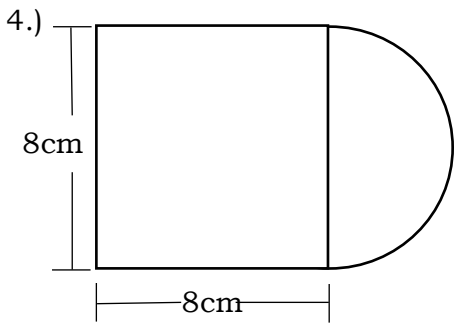

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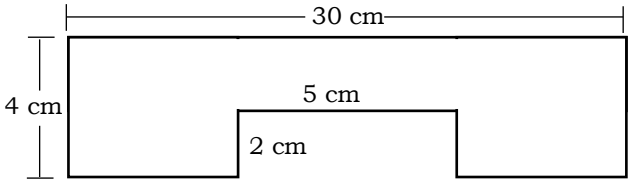


What's New

Study and analyze the problem below.

A rectangular box measuring 4 cm by 5 cm by 2 cm. How many square meters of wrapping paper are needed to cover the four sides of the box?

Can you solve the problem?

What is It

To find the surface area of solid figures such as cubes, prisms, pyramids, cylinders, cones and spheres, you may use the following formula:

A. Surface Area of Prism [Rectangular Prism]

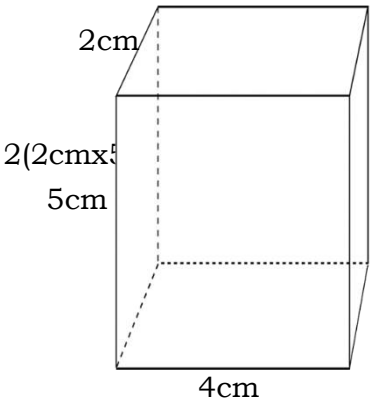
FORMULA:

Surface Area=2(length x width)+2(length x height)+2(width x height)

or

SA=2(lw) + 2(lh) + 2(wh)

Example: Solve for the surface area of the given figure:



Solution:

SA = 2(lw) + 2(lh) + 2 (wh)

SA = 2(4cmx2cm) + 2(4cmx5cm) +

SA = $2(8cm^2) + 2(20cm^2) + 2(10cm^2)$

SA = $16cm^2 + 40cm^2 + 20cm^2$

SA = $76cm^2$

B. Surface area of a Cube

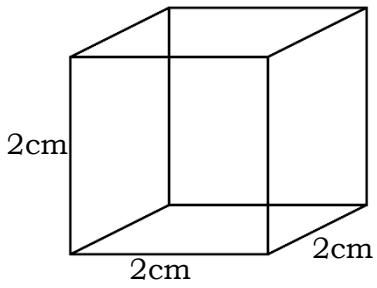
FORMULA:

Surface Area = 6 x side x side

or

SA=6xSxS

Example: Solve for the surface area of the given figure below:



Solution:

SA=6xSxS

SA=6x2cmx2cm

SA=6x4cm²

SA=24cm²

C. Surface Area of a Pyramid

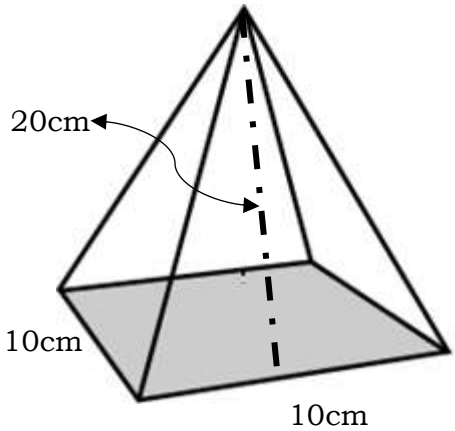
FORMULA:

Surface Area=area of Base + 4(area of face)

or

$$SA = 4(\frac{1}{2}\ bh)$$

Example: Solve for the surface area of this square pyramid.



Solution:

SA = (Area of the Base) + $4(\frac{1}{2}\ bh)$

SA=10cm x 10cm + 4 ($\frac{1}{2}$ 10cm x 20cm)

SA=100cm² + 4 ($\frac{1}{2}$ x 200cm²)

SA=100cm² + 4(100cm²)

SA=100cm² + 400cm²

SA= 500cm²

D. Surface Area of a Cylinder

To solve the surface area of the cylinder, find the lateral area and area of the base.

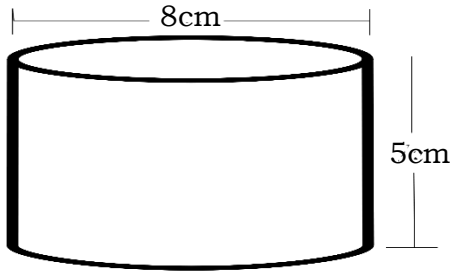
Lateral area = $2\pi rh$

Surface Area = lateral area + 2(area of a circular base)

or

$$SA=2\pi rh + 2\pi r^2$$

Example: Solve for the surface area of the given figure below:



Solution:

$SA=2\pi rh + 2\pi r^2$

$SA=2 \times 3.14 \times 4cm \times 5cm + 2 \times 3.14 \times 4cm \times 4cm$

$SA=6.28 \times 20cm^2 + 6.28 \times 16cm^2$

$SA=125.6cm^2 + 100.48cm^2$

$SA=226.08\ cm^2$

E. Surface Area of a Cone

To find the surface area of the cone, find the sum of the lateral area and area of its base.

Lateral area = πrs

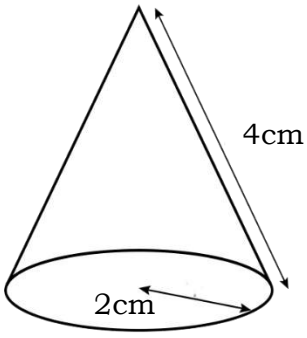
Formula:

Surface Area=area of the base +area of the curved surface

or

$$SA= \pi rs + \pi r^2$$

Example: Solve the surface of the cone.



Solution:

$SA= \pi rs + \pi r^2$

$SA= 3.14 \times 2cm \times 4cm + 3.14 \times 2cm \times 2cm$

$SA= 3.14 \times 8cm^2 + 3.14 \times 4cm^2$

$SA= 25.12cm^2 + 12.56cm^2$

$SA=37.68cm^2$

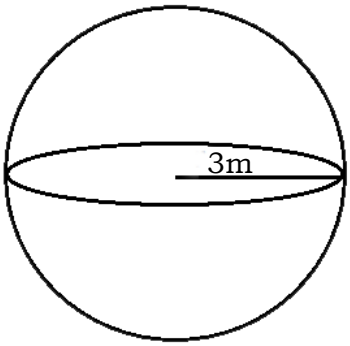
F. Surface Area of a Sphere

Surface Area = 4 x area of the circle

or

$SA=4\pi r^2$

Example:



Solution:

$SA= 4\pi r^2$

$SA = 4(3.14) (3m) (3m)$

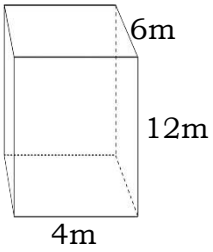
$SA = 12.56 \times 9m^2$

$SA=113.04m^2$

What's More

A. Find the surface area of each solid figure.

1.)



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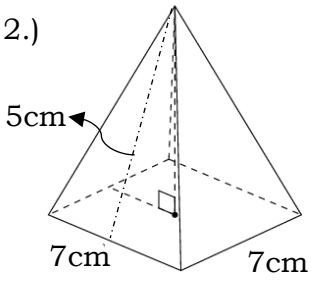

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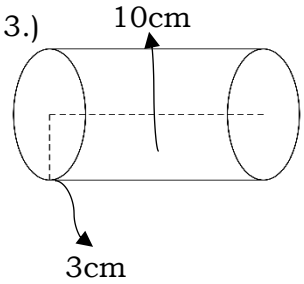

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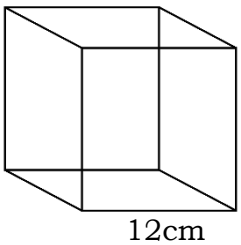


B. Read and solve. Write your solution with label on your answer sheet.

MJ saw a toy plastic ice cream cone while digging a pit of garbage. The slant height of the cone measured 3 cm and its radius is 2cm. Find the needed amount of paint to cover the entire surface of the cone.

What I Have Learned

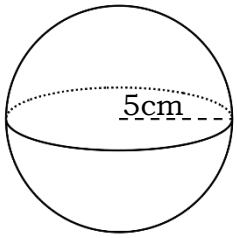
To find the surface area of cubes, prisms, pyramids, cylinders, cones and spheres, you may use the following formula:

Solid Figure	Formula in Finding the Surface Area
Rectangular Prism	SA=2(lw)+2(lh)+2(wh) or SA = 2(lw + lh + wh)
Cube	$SA= 6s^2$
Pyramids	SA=Area of the base + Area of the lateral faces $SA = B + 4 (\frac{1}{2} bh)$
Cylinder	$SA = 2\pi rh + 2\pi r^2$
Cone	$SA = \pi rs + \pi r^2$
Sphere	$SA = 4\pi r^2$

What I Can Do

Direction: Find the surface area of each solid figure. Write your answer on your answer sheet.

1.)



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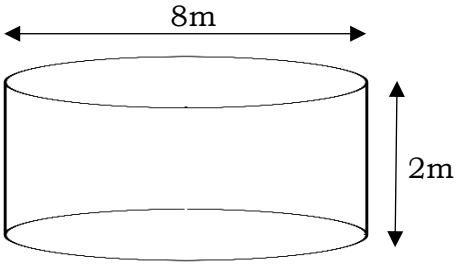

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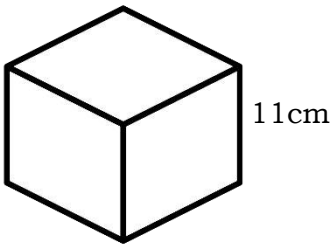

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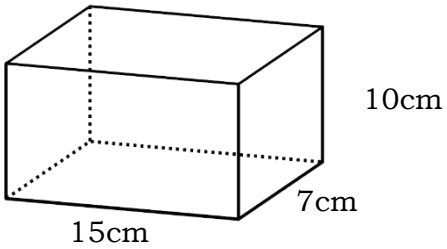

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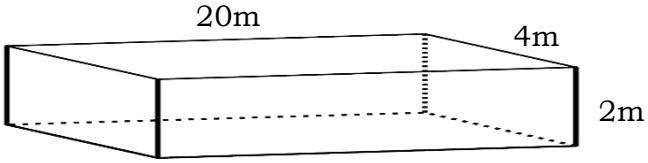
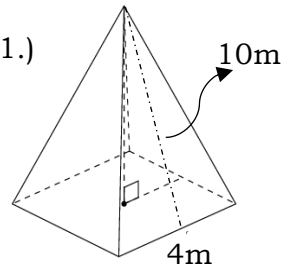


Assessment

A. Find the surface area of each solid figure. Write your answer on your answer sheet.

1.)



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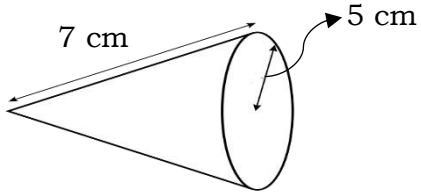

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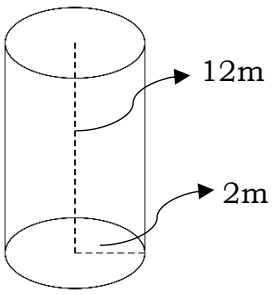

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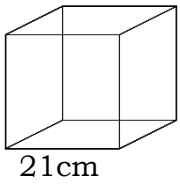
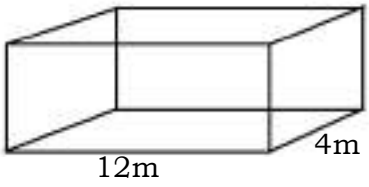


5.)



B. Read and solve the problem. Write your solution on your answer sheets.

1. The surface area of a cube is 486 cm^2.What is the length of each edge?
2. Each edge of a cube is 6cm long. Find the surface area of the cube.
3. A rectangular prism is 8m by 3 m by 2 m. Find its surface area.
4. A hatbox is in a shape of a cylinder that has a diameter of 12cm and a height of 11 cm. How much paper is needed to cover the box?

Additional Activities

Directions: Read the problem carefully and solve.

PROBLEM:

JM is making a birthday gift for his father's birthday. The box for the gift he is using is a rectangular prism with a length of 4m, a width of 2m and a height of 3m. How many square meters of paper does he need to wrap the entire box?

QUESTIONS:

1. What is asked in the problem?
2. What are the given facts that will help you solve the problem?
3. What is the formula that can be used to solve the problem?
4. What is the number sentence?
5. What is the answer to the problem?

Answer Key

What I Know

1. 15.7 m
2. 300 m^2
3. 36 m^2
4. 616 cm^2
5. Area of a square, a difference of 17.415 dm^2

What I Can Do

1. 314 cm^2
2. 150.72 m^2
3. 726 cm^2
4. 650 cm^2
5. 256 cm^2

What's In

1. 95 cm^2
2. 95 m^2
3. 120 m^2
4. 89.12 cm^2
5. 110 cm^2

Assessment

A

1. 96 m^2
2. 188.4 cm^2
3. 175.84 m^2
4. 2,646 cm^2
5. 160 m^2

B

1. 9 cm
2. 216 cm^2
3. 92 m^2
4. 640.56 cm^2

What's More

1. 288m^2
2. 119 cm^2
3. 244.92cm^2
4. 864cm^2

B. 31.4cm^2

Additional Activities

1. the total number of sq. meter of paper he needs to wrap the entire box
2. length of 4m, width of 2m and a height of 3m
3. SA=2(lxw)+2(lxh)+2(wxh)
4. 2(4m x 2m)+2(4m x 3m)+2(2m x 3m)=N
5. 52m^2 of paper she need to wrap the entire box

References:

A. Book

1. M Perez et. al., *21st Century MATHletes 6* (Philippines, Vibal Group Inc., 2016).

2. *Most Essential Learning Competencies in Mathematics 6* (Philippines, Department of Education, 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

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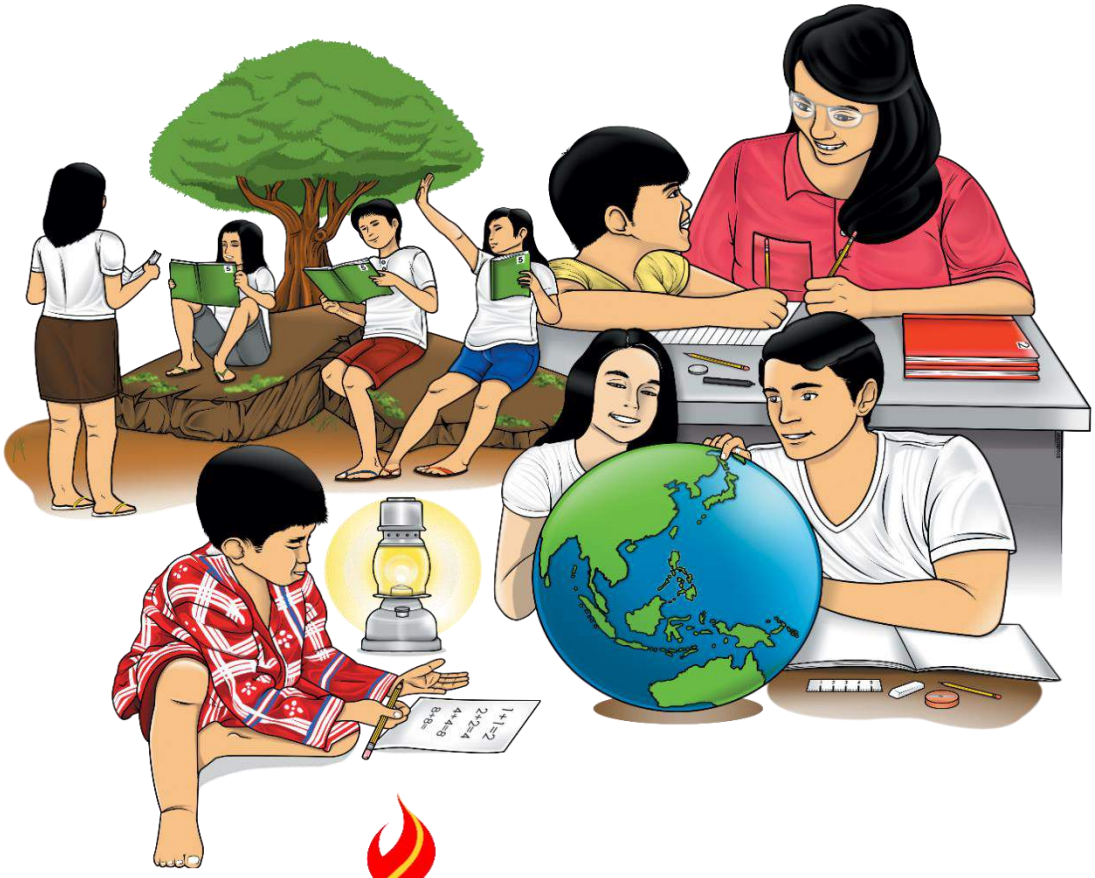
Mathematics

Quarter 3 – Module 9:
Solving Word Problems Involving Measurement of Surface Area



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First Edition, 2021

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Development Team of the Module

Author: Rhona S. Macado

Editors: Mae Joy M. Tan, Susana L. Lutero, Nora B. Rebadomia, Ritchel T. Maratas, Mary Jane O. Amante, Susan T. Dela Torre, Jem Rymon S. Chien

Reviewers: Ivy Joy A. Torres, Ma. Theresa L. Tabotabo, Mae Joy M. Tan, Jem Rymon S. Chien

Illustrators: Eldiardo E. Dela Peňa

Layout Artists: Eldiardo E. Dela Peňa

Management Team: Ramir B. Uytico
Pedro T. Escobarte, Jr.
Elena P. Gonzaga
Donald T. Genine
Adonis A. Mosquera
Clarissa G. Zamora
Fevi S. Fanco
Ivy Joy A. Torres
Jason R. Alpay
Mae Joy M. Tan
Jem Rymon S. Chien
Ethel S. Gali

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Department of Education – Region VI

Office Address: Duran Street, Iloilo City
Telefax: (033)336-2816, (033)509-7653
E-mail Address: region6@deped.gov.ph

6

Mathematics

Quarter 3 – Module 9:
Solving Word Problems Involving Measurement of Surface Area

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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.

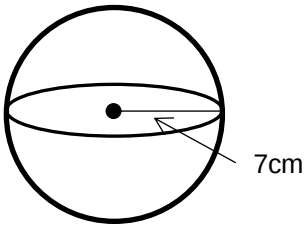
What I Need to Know

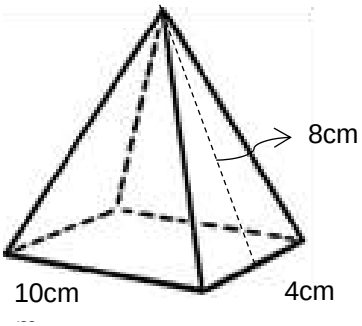
This module was designed and written with you in mind. It is here to help you master the skills in solving word problems involving surface area. this module allows you to use it in various learning situations. The language used recognizes your vocabulary level. The lessons are arranged to follow the standard sequence of your course. But the order in which you read them can be changed to match with the textbook you are now using.

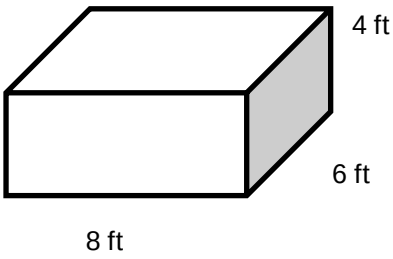
After going through this module, you are expected to be able to solve word problems involving measurement of surface area of different solid objects.

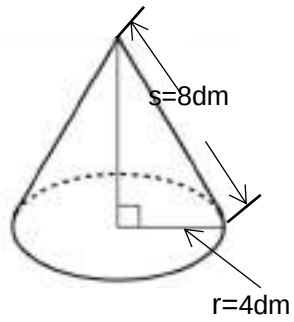
What I Know

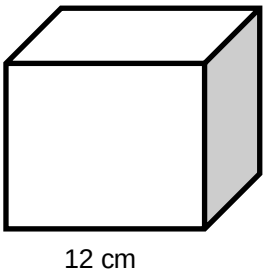
A. On a separate sheet of paper, find the surface area of the following figures:

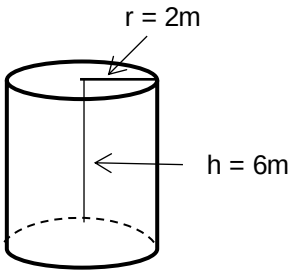
1. 

2. 

3. 

4. 

5. 

6. 

B. Solve the following problems. Write your answer in your answer sheet. Use $\pi = 3.14$

1. A boy is playing with a ball with radius 20 cm. Find the surface area of the ball.

2. A milk can has a radius of 5 cm and a height of 12 cm. How much tin was used to make it?

Lesson 1

Solving Word Problems Involving Measurement of Surface Area

In the previous lessons, you have learned different characteristics of solid figures and how to solve their surface area. This time, we will focus on how to solve word problems involving surface area of solid objects.

What's In

A. On a separate sheet of paper, write **T** if the statement is true and **F** if the statement is false.

_____1. The faces of rectangular pyramid are rectangle.

_____2. A cone has two circular bases.

_____3. The faces of the cube are triangles.

_____4. Surface area refers to the sum of the faces of solid figures.

_____5. A cylinder is a three-dimensional figure with two congruent circular bases that are parallel.

B. Match the solid figure in column A to its surface area formula on column B. Write your answer on a separate sheet of paper.

Column A	**Column B**
1. Cylinder	A. S.A = 2 (lw + lh + wh)
2. Pyramid	B. S.A = $\pi rs + \pi r^2$
3. Cube	C. S.A = $6s^2$
4. Cone	D. S.A = $2\pi rh + 2\pi r^2$
5. Rectangular Prism	E. S.A = $4\pi r^2$
6. Sphere	F. S.A. = l x w x h
	G. S.A = L.A + B

What's New

Read and study the problem below.

Mary wants to wrap her rectangular gift with a dimension of 15 cm by 6 cm by 2 cm. What is the least amount of wrapper can she use to wrap the gift?

Can you help Mary to find the least amount of wrapper to wrap her gift?

What is It

To solve the problem above, we will follow the following steps:

1. Understand:
   a. What is asked?
      Answer: The least amount of wrapper she can use to wrap the gift?
   b. What are the given?
      Answer: dimension: 15 cm by 6 cm by 2 cm
2. Plan: What strategy can we use to solve the problem?

Answer: The problem asked for the wrapper to be used around the gift.

We can solve the problem by finding the surface area of a rectangular prism.

3. Solution: Use the formula to find the surface area of a rectangular prism.

S.A. = 2 (lw + lh + wh)
= 2 (15 cm x 6 cm + 15 cm x 2 cm + 6 cm x 2 cm)
= 2 ($90cm^2$ + 30 cm^2 + 12 cm^2)
= 2 (132 cm^2)
S.A. = 264 cm^2

4. Check:

To check our answer, we will find the area using another formula:

S.A. = 2lw + 2lh + 2wh
= 2 (15 cm x 6 cm) + 2 (15 cm x 2 cm) + 2 (6 cm x 2 cm)
= 2 ($90cm^2$) + 2 ($30cm^2$) + 2 ($12\ cm^2$)
= $180\ cm^2 + 60\ cm^2 + 24\ cm^2$
S.A. = $264\ cm^2$

We have observed that the answer is the same even if we are using different process. So, 264 cm^2 is the amount of wrapper needed to wrap the gift.

Problem 2:

Find the surface area of a can of milk whose diameter is 12 inches and 20 inches high.

Let's analyze the problem:

1. Understand:

   a. What is asked?
   Answer: The surface area of a can of milk.
   b. What are the given?
   Answer: diameter is 12 inches, 20 inches high

2. Plan: What strategy can we use to solve the problem?

   Answer: Find the surface area of a cylinder because a can of milk

   cylinder.

3. Solution: Use the formula in finding the surface area of a cylinder.
   S. A. = $2\pi rh + 2\pi r^2$
   = 2 (3.14) x 6 in x 20 in + 2 (3.14) $(6in)^2$
   = 6.28 x 120 in^2 + 6.28 x 36 in^2
   = 753.6 in^2 + 226.08 in^2
   S.A. = 979.68 in^2

4. Check

To check our answer, we will find the area using another formula:

Step 1: Solve the lateral area.

L.A. = $2\pi rh$

= 2(3.14) x (6 in) x (20 in)

= 6.28 x 120 in^2

= 753.6 in^2

Step 2: Find the surface area.

S.A = L. A. + 2B (Substitute the formula in finding the area of circle)

= L.A. + $2\pi r^2$ (Substitute the value to the formula)

= 753.6 in^2 + 2 (3.14) $(6\ in)^2$ (Multiply: 2 x 3.14 and 3 to itself)

= 753.6 in^2 + 6.28 (36 in^2)

= 753.6 in^2 + 226.08 in^2

S.A.= 979.68 in^2

We have observed that the answer is the same even if we are using a different process. So, 979.68 in^2 is the surface area of the can of milk.

What's More

. Read and solve the following problem using the steps illustrated in the previous section. **Use** π = 3.14

1. Find the surface area of the basketball with a radius of 4.25 cm. Round your answer to the nearest tenths.

2. An ice cream cone has a circular base of radius 2 cm and a slant height of 5 cm. What is the surface area of the cone?

What I Have Learned

The following are the steps to solve a problem:

1. Understand:
   a. What is asked?
   b. What are given?
2. Plan: What formula are you going to use?
3. Solution: Show your computation.
4. Check:

- Surface area (S.A) is the total areas of the surface of solid object.
- Surface Area of Prism

The surface area of a rectangular prism is the sum of all the faces.

$S.A = 2(lw) + 2(lh) + 2(wh)$ or $SA = 2\ (lw + lh + wh)$

The surface area of a cube is the sum of the area of all the faces.

$S.A = 6s^2$

- Surface Area of a Cylinder

The lateral area of a cylinder is the product of the circumference of the base and the height.

The surface of a cylinder is the sum of the lateral area and the areas of the two bases. $S.A = L.A + 2B$ or $S.A = 2\pi rh + 2\pi r^2$

- Surface Area of a Pyramid

The surface area of a pyramid is the sum of the lateral area and the area of the base. $S.A = L.A + B$

- Surface Area of a Cone

The surface area of a cone is the sum of the lateral area and the area of its base.

$S.A = L.A + B$ or $S.A = \pi rs + \pi r^2$

❖ Surface Area of a Sphere

The surface area of a sphere with radius (r) is **$S.A = 4\pi r^2$**

What I Can Do

Read and solve the problems using the steps solving problem. Write your answer on a separate sheet of paper. Use $\pi = 3.14$

1. A wooden cabinet needs repainting. How much surface area needs to be painted if the box has a length of 8m, width of 5 m and height of 6 m?
2. What is the surface area of a sphere whose radius is 4dm?

Assessment

On a separate sheet of paper, solve following the steps on how to solve word problems. Use $\pi = 3.14$

1. Peter and Eric pitched a tent in a shape of a pyramid. The base of the tent is 3 meters wide by 4 meters long. The tent had a slanted height of 5 meters. What was the surface area of the tent?

2. Jason is wrapping a present. The box he is using is a rectangular prism with a length of 8 dm, a width of 5 dm and a height of 4 dm. Find how much paper he needs to wrap the entire box.

3. A cylinder-shaped water pitcher has a radius of 5 inches and a height of 15 inches. Find the surface area of the pitcher.

4. Find the amount of tin needed to make a milk can that has a diameter of 4 cm and a height of 5 cm.

5. A music box has the shape of a cube. Each edge of the music box is 12 centimeters long. What is the surface area of the box?

Additional Activities

Read and solve the following problems. Use $\pi = 3.14$

1. The side of the cube measures 7 cm. Find its surface area.

2. The regular pyramid has a square base whose edge of the base measures 4 m and the slanted height measures 10m. Find the surface area of the pyramid?

3. A box of shoes has dimensions of 20 cm by 12 cm by 9 cm. What is the surface area of the box?

4. A cosmetics company that makes small cylindrical bars of soap. Find the surface area of a bar of soap if the diameter is 4 cm and the height is 9 cm.

5. Gerald own an antique shop. He is applying a coating to a rectangular jewelry box whose dimension is 5 m by 3m by 4m. The can of varnish is enough to cover 80 m^2. Is there enough varnish left in the can to coat the jewelry box? Explain your answer.

Answer Key

What I Know

1. 615.44 cm^2
2. 152 cm^2
3. 208 ft^2
4. 150.72 dm^2
5. 864 cm^2
6. 100.48 m^2
7. 5,024 cm^2
8. 533.8 cm^2

What's In'

A.

1. F
2. F
3. F
4. F
5. T

B.

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

What's More

1. 226.9 cm^2
2. 31 cm^2

What I Can Do

1. 236 m^2
2. 200.96 dm^2

Assessment

1. 47 m^2
2. 184 dm^2
3. 628 m^2
4. 87.92 cm^2
5. 864 cm^2

Additional Activities

1. 294 cm^2
2. 96 m^2
3. 1,056 cm^2
4. 138.16 cm^2
5. The varnish is not enough because the surface area of the jewelry box is 94 m2 and the varnish left could cover only an area of 80 m^2.

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Most Essential Learning Competencies (MELC) in Mathematics 6

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