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Mathematics
Quarter 1 – Module 6:
Operations on Rational Numbers

ALTERNATIVE DELIVERY MODE

IADM

Mathematics – Grade 7
Alternative Delivery Mode
Quarter 1 – Module 6: Operations on Rational Numbers
First Edition, 2020

7

Mathematics
Quarter 1 – Module 6:
Operations on Rational Numbers

DepED
DEPARTMENT OF EDUCATION

Introductory Message

For the facilitator:

Welcome to the Mathematics 7 Alternative Delivery Mode (ADM) Module on Operations on Rational numbers!

This module was collaboratively designed, developed and reviewed by educators both from public and private institutions to assist you, the teacher or facilitator in helping the learners meet the standards set by the K to 12 Curriculum while overcoming their personal, social, and economic constraints in schooling.

This learning resource hopes to engage the learners into guided and independent learning activities at their own pace and time. Furthermore, this also aims to help learners acquire the needed 21st century skills while taking into consideration their needs and circumstances.

In addition to the material in the main text, you will also see this box in the body of the module:

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

As a facilitator you are expected to orient the learners on how to use this module. You also need to keep track of the learners' progress while allowing them to manage their own learning. Furthermore, you are expected to encourage and assist the learners as they do the tasks included in the module.

For the learner:

Welcome to the Mathematics 7 Alternative Delivery Mode (ADM) Module on Operations on Rational numbers!

The hand is one of the most symbolized part of the human body. It is often used to depict skill, action and purpose. Through our hands we may learn, create and accomplish. Hence, the hand in this learning resource signifies that you as a learner is capable and empowered to successfully achieve the relevant competencies and skills at your own pace and time. Your academic success lies in your own hands!

This module was designed to provide you with fun and meaningful opportunities for guided and independent learning at your own pace and time. You will be enabled to process the contents of the learning resource while being an active learner.

This module has the following parts and corresponding icons:

	What I Need to Know	This will give you an idea of the skills or competencies you are expected to learn in the module.
	What I Know	This part includes an activity that aims to check what you already know about the lesson to take. If you get all the answers correct (100%), you may decide to skip this module.
	What's In	This is a brief drill or review to help you link the current lesson with the previous one.
	What's New	In this portion, the new lesson will be introduced to you in various ways such as a story, a song, a poem, a problem opener, an activity or a situation.
	What is It	This section provides a brief discussion of the lesson. This aims to help you discover and understand new concepts and skills.
	What's More	This comprises activities for independent practice to solidify your understanding and skills of the topic. You may check the answers to the exercises using the Answer Key at the end of the module.
	What I Have Learned	This includes questions or blank sentence/paragraph to be filled in to process what you learned from the lesson.
	What I Can Do	This section provides an activity which will help you transfer your new knowledge or skill into real life situations or concerns.

	Assessment	This is a task which aims to evaluate your level of mastery in achieving the learning competency.
	Additional Activities	In this portion, another activity will be given to you to enrich your knowledge or skill of the lesson learned. This also tends retention of learned concepts.
	Answer Key	This contains answers to all activities in the module.

At the end of this module you will also find:

References	This is a list of all sources used in developing this module.

The following are some reminders in using this module:

1. Use the module with care. Do not put unnecessary mark/s on any part of the module. Use a separate sheet of paper in answering the exercises.
2. Don't forget to answer *What I Know* before moving on to the other activities included in the module.
3. Read the instruction carefully before doing each task.
4. Observe honesty and integrity in doing the tasks and checking your answers.
5. Finish the task at hand before proceeding to the next.
6. Return this module to your teacher/facilitator once you are through with it.

If you encounter any difficulty in answering the tasks in this module, do not hesitate to consult your teacher or facilitator. Always bear in mind that you are not alone.

We hope that through this material, you will experience meaningful learning and gain deep understanding of the relevant competencies. You can do it!

What I Need to Know

This module was designed and written with you in mind. It is here to help you master the four basic operations on rational numbers. The scope of this module permits it to be used in many different learning situations. The language used recognizes the diverse vocabulary level of students. The lessons are arranged to follow the standard sequence of the course. But the order in which you read them can be changed to correspond with the textbook you are now using.

The module is divided into three lessons, namely:

- Lesson 1 – Addition and Subtraction of Fractions
- Lesson 2 – Addition and Subtraction of Decimals
- Lesson 3 – Multiplication and Division of Fractions
- Lesson 4 – Multiplication and Division of Decimals

After going through this module, you are expected to:

1. add and subtract fractions;
2. add and subtract decimals;
3. multiply and divide fractions;
4. multiply and divide decimals;
5. solve real life problems involving rational numbers.
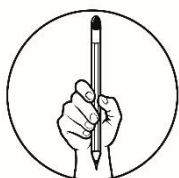
What I Know

Multiple Choice. Choose the letter of the correct answer.

1. Which of the following are similar fractions?

   A. $\frac{1}{2}, \frac{1}{3}, \frac{1}{4}$ B. $\frac{1}{3}, \frac{2}{3}, 3$ C. $\frac{1}{7}, \frac{2}{3}, \frac{3}{4}$ D. $\frac{1}{9}, \frac{4}{9}, \frac{5}{9}$

2. Add $\frac{3}{8}$ and $\frac{1}{8}$.

   A. $\frac{4}{8}$ B. $\frac{1}{2}$ C. $\frac{1}{3}$ D. $\frac{2}{8}$

3. What is the least common denominator of $\frac{1}{3}$, $\frac{1}{2}$ and $\frac{1}{4}$?

   A. 6 B. 8 C. 12 D. 24

4. Subtract $\frac{1}{6}$ from $\frac{5}{6}$.

   A. $\frac{1}{6}$ 　　　　 B. $\frac{1}{2}$ 　　　　 C. $\frac{2}{3}$ 　　　　 D. $\frac{1}{3}$

5. Nancy bought $4\frac{3}{4}$ kilos of chicken and gave $1\frac{1}{2}$ kilos to her friend. How many kilos of chicken was left?

   A. $3\frac{1}{4}$ 　　　　 B. $4\frac{3}{4}$ 　　　　 C. $3\frac{3}{4}$ 　　　　 D. $4\frac{1}{4}$

6. Find the sum of 15.789, 2.51 and 6.5.
   　　　A. 2.4799 　　　　 B. 24.799 　　　　 C. 247.99 　　　　 D. 2479.9

7. Subtract 0.67 from 0.93.
   　　　A. 0.06 　　　　 B. 0.16 　　　　 C. 0.26 　　　　 D. 0.36

8. Simplify: 1.039 + 0.92 -1.82
   　　　A. 0.069 　　　　 B. 0.139 　　　　 C. 0.269 　　　　 D. 0.369

9. A biscuit factory originally packaged 0.65 kg of crackers per box. To increase profitability, the company reduced the weight by 0.035 kg. What is the new weight per pack?
   　　　A. 0.516 　　　　 B. 0.561 　　　　 C. 0.615 　　　　 D. 0.651

10. Rollie earns Php 8,000.78 per month as a basic salary. In addition, Php 5,725.53 as commission and Php 852.35 as overtime pay in January. How much did he earn that month?
    　　　A. Php 14 578.66 　　　　　　 C. Php 14 785.66
    　　　B. Php 14 758.66 　　　　　　 D. Php 14 875.66

11. Multiply $\frac{2}{3}$ by $\frac{3}{8}$.

    A. $\frac{1}{4}$ 　　　　 B. $\frac{3}{8}$ 　　　　 C. $\frac{3}{4}$ 　　　　 D. 1

12. Divide $\frac{9}{4}$ by $\frac{3}{2}$.

    A. $\frac{1}{2}$ 　　　　 B. $\frac{3}{2}$ 　　　　 C. $\frac{4}{3}$ 　　　　 D. $\frac{9}{2}$

13. Find the product of $2\frac{3}{5}$ and $\frac{2}{13}$.

    A. $\frac{5}{6}$ 　　　　 B. $\frac{3}{4}$ 　　　　 C. $\frac{1}{2}$ 　　　　 D. $\frac{2}{5}$

14. Find the quotient: $6\frac{1}{2} \div 2\frac{3}{4}$.

    A. $\frac{11}{26}$ 　　　　 B. $\frac{26}{11}$ 　　　　 C. $\frac{12}{13}$ 　　　　 D. $\frac{13}{12}$

15. A 40 Liter tank is to be filled with water by repeatedly pouring from a can which holds $2\frac{1}{2}$ liters. How many water pouring are needed to fill the tank?

  A. 16   B. 18   C. 20   D.22

16. Divide 8.4 by 3.
  A. 2.6   B. 2.7   C. 2.8   D. 2.9

17. Multiply 53.61 by 1.02.
  A. 45.7811   B. 54.6822   C. 63.5933   D. 72.4344

18. Find the quotient: 842.4 ÷ 0.024
  A. 35,100   B. 35,110   C. 35,111   D. 35, 200

19. Find the product of 2.215 and 0.001.
  A. 0.2215   B. 0.02215   C. 0.002215   D. 0.0002215

20. Marco has 5.75 meters of ribbon. He has to cut the ribbon into 5 parts with equal lengths. How long is each part of the ribbon?
  A. 1.15 m   B. 1.25m   C. 1.35m   D. 1.45m

Lesson 1	**Addition and Subtraction of Fraction**

Congratulations on making this far! How is your positive-negative journey on the previous module? Have you mastered the rules? This module will provide you with exciting activities on Addition and Subtraction of Fractions. Good luck dear!

After using this module, you are expected to:
1. Add and subtract similar fractions;
2. Add and subtract dissimilar fractions; and
3. Add and subtract mixed numbers.

What's In

Addition and Subtraction of whole numbers is of great help in adding and subtracting rational numbers.

1. Add 220 and 117.

2. Subtract 367 from 345.

3. 98+231-188 = _____

Notes to the Teacher

Let the student explore his ideas, guide him that he can express his skills and talents. Facilitate him to enhance his output.

What's New

A cake was sliced into 8 parts. If each of these kids gets a slice of cake, what part of the cake will be left? Will the remaining cake be enough if there will be 5 more kids coming?

What is It

In adding and subtracting fractions, we have to consider if they are similar fractions, dissimilar fractions or mixed fractions.

A. Similar Fractions

Similar fractions are fractions that have the same denominator. Below are examples of similar fractions.

$$\frac{1}{6}, \frac{5}{6}, \frac{11}{6} \quad \text{and} \quad \frac{1}{12}, \frac{5}{12}, \frac{17}{12} \longleftarrow \text{denominator}$$

Take note that fractions can be added and subtracted *only when these fractions are similar fractions.*

If a, b and c denote integers, and b ≠ 0, then

$$\frac{a}{b} + \frac{c}{b} = \frac{a+c}{b} \qquad \text{and} \qquad \frac{a}{b} - \frac{c}{b} = \frac{a-c}{b}$$

Examples:

1. $\frac{1}{5} + \frac{2}{5} = \frac{1+2}{5} = \frac{3}{5}$

2. $\frac{5}{21} + \frac{3}{21} = \frac{5+3}{21} = \frac{8}{21}$

3. $\frac{6}{7} - \frac{2}{7} = \frac{6-2}{7} = \frac{4}{7}$

4. $\frac{8}{15} - \frac{4}{15} = \frac{8-4}{15} = \frac{4}{15}$

B. Dissimilar Fractions

Dissimilar fractions are fractions with different denominators. Below are examples of dissimilar fractions.

$$\frac{1}{2}, \frac{5}{3}, \frac{11}{6} \quad \text{and} \quad \frac{1}{12}, \frac{5}{7}, \frac{17}{22} \longleftarrow \text{denominator}$$

Dissimilar fractions cannot be added or subtracted directly. First, you need to convert dissimilar fractions to similar fractions.

Steps in Adding and Subtracting Fractions

1. With different denominators, $\frac{a}{b}$ and $\frac{c}{d}$, where b ≠ 0 and d ≠ 0, Rename the fractions to make them *similar* which denominator is the least common multiple of b and d.

2. Add or subtract the numerators of the resulting fractions.

3. Write the result as a fraction whose numerator is the sum or difference of the numerators and which denominator is the least common multiple of b and d.

Examples:

1. $\dfrac{2}{5} + \dfrac{1}{4} = $ _____

LCM of 5 and 4 is 20. The LCD is 20.

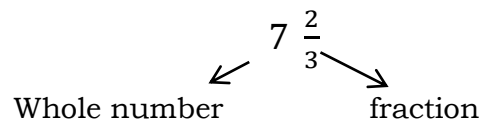$$\dfrac{2}{5} + \dfrac{1}{4} = \dfrac{8}{20} + \dfrac{5}{20} = \dfrac{8+5}{20} = \dfrac{13}{20}$$

2. $\dfrac{2}{3} - \dfrac{1}{2} = $ _____

LCM of 3 and 2 is 6. The LCD is 6.

$$\dfrac{2}{3} - \dfrac{1}{2} = \dfrac{4}{6} - \dfrac{3}{6} = \dfrac{4-3}{6} = \dfrac{1}{6}$$

C. Mixed Numbers

Mixed Numbers are quantities that have a whole number part and a fraction part. Below are examples of mixed fractions.

$$3\,\dfrac{1}{4} \qquad\qquad\qquad 7\,\dfrac{2}{3}$$

Whole number   fraction   Whole number   fraction
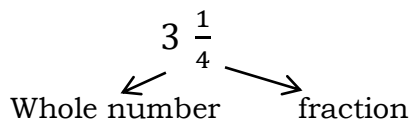
Steps in Adding and Subtracting Mixed Numbers

1. Find the LCD of the fractions in the mixed numbers to make them similar fractions.
2. Add or subtract the whole numbers and the similar fractions.
3. Simplify if the resulting fraction is improper fraction.

Examples:

1. $2\dfrac{3}{4} + 1\dfrac{2}{3} = $ _____

Whole number	fraction
(2+1)	$\dfrac{3}{4} + \dfrac{2}{3}$
3	$\dfrac{9}{12} + \dfrac{8}{12}$
3	$\dfrac{9+8}{12}$
$3\dfrac{17}{12}$ $\quad(\dfrac{17}{12}$ is $1\dfrac{5}{12})$	

$3 + 1\frac{5}{12}$
$4\frac{5}{12}$

add the whole number and fractions

the LCM of 4 and 3 is 12, so the LCD is 12

Simplify the improper fraction

2. $7\frac{1}{2} - 1\frac{1}{3} =$ _____

Whole number	fraction
(7-1)	$\frac{1}{2} - \frac{1}{3}$
6	$\frac{3}{6} - \frac{2}{6}$
6	$\frac{3-2}{6}$
$6\frac{1}{6}$	

subtract the whole number and fractions

the LCM of 2 and 3 is 6, so the LCD is 6.
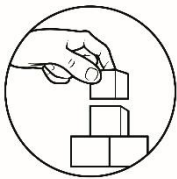
What's More

A. Perform the indicated operations and express your answer in simplest form.

1. $\frac{2}{9} + \frac{3}{9} =$ _____   2. $\frac{7}{9} - \frac{1}{9} =$ _____

3. $\frac{5}{11} + \frac{4}{11} =$ _____   4. $\frac{16}{24} - \frac{6}{12} =$ _____

5. $\frac{7}{20} + \frac{3}{8} =$ _____   6. $\frac{4}{9} - \frac{1}{4} =$ _____

7. $\frac{2}{5} + \frac{7}{10} =$ _____   8. $2\frac{5}{12} - \frac{1}{3} =$ _____

9. $8\frac{1}{4} + \frac{2}{7} =$ _____   10. $9\frac{5}{7} - 3\frac{2}{7} =$ _____

B. Give the number asked for.

1. What is three more than three and one-fourth?

2. Subtract from 15 the sum of $2\frac{1}{3}$ and $4\frac{2}{5}$. What is the result?

3. Increase the sum of $6\frac{3}{14}$ and $2\frac{2}{7}$ by $3\frac{1}{2}$. What is the result?

4. Decrease $21\frac{3}{8}$ by $5\frac{1}{5}$.

5. What is $8\frac{4}{5}$ minus $3\frac{2}{7}$?

What I Have Learned

To sum it up, let us complete the statements. Choose your answer from the box that best completes each of the statement below.

simplify	same	addition and subtraction	different
difference	whole number	converted	denominator

1. Similar fractions are fractions with the _____ denominators.
2. Similar fractions are added by adding the numerators while retaining the _____.
3. Similar fractions are subtracted by getting the _____ between the two numerators while retaining the denominator.
4. Dissimilar fractions are fractions that have _____ denominators.
5. Dissimilar fractions should first be _____ to similar fractions before adding or subtracting them.
6. Mixed numbers are quantities that have a _____ part and a fraction part.
7. Whole numbers can be changed to mixed numbers so that _____ operations are possible with problems involving a combination of mixed numbers, whole numbers and fractions.
8. Always _____ your answer to lowest term.
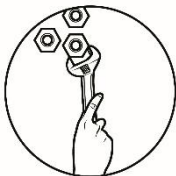
What I Can Do

Here is another activity that lets you apply what you learned about the addition and subtraction of fractions by doing the following activities.

A. Solve the following problem.

1. Tatay cleaned the room and swept the yard before leaving the house. It took him $\frac{1}{4}$ hour to clean his room and $\frac{2}{4}$ hour to sweep the yard. How many hours did he work before he left for the automotive shop?

2. Jay and Rey are comparing their heights. If Jay's height is $120 \frac{3}{4}$ cm. and Rey's height is $96 \frac{1}{3}$ cm. What is the difference in their heights?

3. Aling Baya has 12 ¼ kilos of beef to sell. If she was able to sell 9 ½ kilos of beef, how much meat was left to sell?

Great work! You did a good job in applying what you have learned!

Lesson **2**	**Addition and Subtraction of Decimals**

Congratulations on making this far! How is your addition and subtraction of fractions journey on the previous module? Have you mastered the rules? This module will give you more exciting activities on the Addition and Subtraction of Decimals. Good luck dear!

After using this module, you are expected to:
1. add and subtract decimal numbers; and
2. solve problems involving addition and subtraction of decimals and money.

What's In

This module is a continuation of the concepts on the operations on rational numbers. Mastering the rules in the previous module will help you speed up in completing this module.

Perform the indicated operation.

1. $\frac{8}{5} + \frac{4}{5} =$ 3. $\frac{2}{3} - \frac{2}{5} =$ 5. $4 \frac{1}{8} - \frac{3}{4} =$

2. $\frac{8}{3} - \frac{16}{9} =$ 4. $\frac{7}{8} - \frac{5}{6} =$

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What's New

Upin cycled 1.85 km from his house to the library, 0.535 km from the library to the Post Office and 2.7 km from the Post Office to his house. What is the total distance that Upin cycled? What operation/s is/are involved in solving the problem?

What is It

Decimals are added and subtracted just like whole numbers, align the decimal points, add or subtract the numbers in columns and insert the decimal point in the answer immediately beneath the decimal points in the numbers being added or subtracted.

A. Addition of Decimals

Examples

1. Add. 0.005 + 9.684

```
        0.005          align
  +     9.684          add
        9.869          affix decimal point
```

2. Add: 34.095 + 8.68

```
        34.095
  +      8.68
        42.775
```

B. Subtraction of Decimals

Examples

3. Subtract: 37.428 – 10.634

$$\begin{array}{r} 37.428 \\ - \quad 10.634 \\ \hline 26.794 \end{array}$$

4. Subtract: 65.030 – 26.732

$$\begin{array}{r} 65.030 \\ - \quad 26.732 \\ \hline 38.298 \end{array}$$
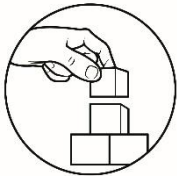
 What's More

Perform the indicated operation.

1. 5.84 + 3.81

2. 12.7 + 5.62

3. 1.85 + 0.86

4. 41.5 + 725.4

5. 654.1 + 32.95

6. 129.08 – 3.52

7. 84.52 – 41.8

8. 14.046 – 0.854

9. 35.33 – 7.58

10. 141.5 – 101.5

 What I Have Learned

To sum it up, let us complete the statements. Choose your answer from the box that best completes each statement below.

insert	decimals	whole numbers
align	zeros	decimal point

1. Adding decimals is very similar to adding _____.

2. Line up the number vertically so that all the decimal points are _____.

3. Add extra _____ to the right of the number so that each number has the same number of digits to the right of the decimal point.

4. Place the _____ of the result in line with the other decimal points.
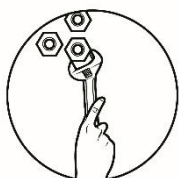
What I Can Do

Solve the following problems.

1. Mt. Everest in the Himalayas at 8,488 km is the highest mountain in the world. The Marianas Trench in the Pacific Ocean at 11.03 km is the deepest part of the ocean. Find the vertical distance from the top of the highest mountain in the world to the deepest part of the ocean.

2. The new rate of increase per kilowatt hour of electricity is Php0.125. What is the resulting rate if the original rate per kilowatt hour was Php 8.97?

3. A serving of fish has 15.2 g of protein. A serving of beef of the same size has 22.1g. How much more protein there is in beef than in the fish?

Lesson 3 | Mathematics: Multiplication and Division of Fraction

In this lesson, you will learn how to multiply and divide rational numbers. While

there are rules and algorithms to remember, this lesson also shows why those rules and algorithms work.

What's In

Multiplication of whole numbers is of great help in multiplying and dividing fractions.

1. Multiply 22 and 17.

2. Multiply 13 and 14.

3. Multiply 123 and 31.

Notes to the Teacher

Let the students explore his ideas, guide him that he can express his skills and talents. Facilitate him to enhance his output.

What's New

Ana bought $\frac{3}{4}$ kgs. of carrots for her pet rabbit. Her pet ate $\frac{1}{3}$ of this. How much kilograms of carrots did her pet eat?

What is It

A. Multiplication of Fraction

To multiply fractions, multiply numerator by numerator and denominator by denominator. Write the answer in simplest form.

$$\frac{a}{b} \bullet \frac{c}{d} = \frac{ac}{bd}$$

Examples

1. It takes Aida $\frac{3}{4}$ of an hour to complete a piece of cross-stitch. How many hours will it take her to complete a dozen pieces?

   This calls for multiplication sentence.

   $\frac{3}{4} \bullet 12 \qquad = \qquad \frac{3}{4} \bullet \frac{12}{1} \qquad$ Renaming 12 to $\frac{12}{1}$

   $\qquad\qquad = \qquad \frac{36}{4} \, or \, 9$

   Thus, Aida can complete a dozen pieces in 9 hours.

2. Find the product: $\left(\frac{3}{5}\right)\left(\frac{2}{3}\right)$

   $\left(\frac{3}{5}\right)\left(\frac{2}{3}\right) \quad = \quad \frac{6}{15} \quad$ Multiply the numerator by numerator and denominator by denominator.

   $\frac{6}{15} \div \frac{3}{3} = \frac{2}{5} \qquad$ Simplify by dividing both the numerator and denominator with the GCF which is 3.

   Thus, the product is $\frac{2}{5}$.

B. Division of fraction

   a. To divide fractions, multiply the dividend by the multiplicative inverse (reciprocal) of the divisor.
   b. If the given is a mixed fraction, change to improper fraction and follow the first rule.

$$\frac{a}{b} \div \frac{c}{d} = \frac{a}{b} \bullet \frac{d}{c} = \frac{ad}{bc}$$

Examples

1. Consider this situation.

    A 20-liter tank is to be filled with water by repeatedly pouring from a can which holds $2\frac{1}{2}$ liters. How many times pouring are needed to fill the tank?

    This calls for a division sentence.

    $20 \div 2\frac{1}{2}$ = $20 \div \frac{5}{2}$ Change mixed fraction to improper fraction

             = $\frac{20}{1} \cdot \frac{2}{5}$ Multiply the dividend to the multiplicative inverse of the divisor

             = $\frac{20 \cdot 2}{1 \cdot 5}$ Multiply the fractions

             = $\frac{40}{5}$ or 8   Simplify

    Thus, it requires 8 pouring's of water to fill the 20-liter tank.

2. Find the quotient: $6\frac{2}{3} \div 1\frac{1}{2}$

             = $\frac{20}{3} \div \left(\frac{3}{2}\right)$ Change mixed fraction to improper fraction

             = $\left(\frac{20}{3}\right)\left(\frac{2}{3}\right)$ Multiply the dividend to the multiplicative inverse of the divisor

             = $\frac{40}{9}$ or $4\frac{4}{9}$ Change to mixed number.

    Thus, the quotient is $\frac{40}{9}$ or $4\frac{4}{9}$.
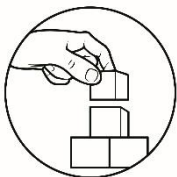
What's More

Perform the indicated operation.

1. $\frac{5}{6} \cdot \frac{2}{3}$ 6. $20 \div \frac{2}{3}$

2. $7 \cdot \dfrac{2}{3}$

3. $\dfrac{4}{20} \cdot \dfrac{2}{5}$

4. $10\dfrac{5}{6} \cdot 3\dfrac{1}{3}$

5. $\dfrac{9}{20} \cdot \dfrac{25}{27}$

7. $\dfrac{5}{12} \div \dfrac{3}{4}$

8. $\dfrac{5}{50} \div \dfrac{20}{35}$

9. $5\dfrac{3}{4} \div 6\dfrac{2}{3}$

10. $\dfrac{9}{16} \div \dfrac{3}{4}$

What I Have Learned

To sum it up, let us complete the statements. Choose your answer from the box that best completes the statements below.

improper	numerator	division
reciprocal	multiply	simplify

1. To find the product of fraction, we simply multiply the _____ and multiply the denominators.
2. To find the product of mixed numbers, change them to improper fraction and then _____.
3. To divide fractions, multiply the dividend by the _____ of the divisor.
4. If the given is a mixed fraction, change to _____ fraction and follow the first rule.

What I Can Do

Solve the following:

1. Julie spent $3\dfrac{1}{2}$ hours doing her assignment. Ken did his assignment for $1\dfrac{2}{3}$ times as many hours as Julie did. How many hours did Ken spend doing his assignment?

2. How many thirds are there in six-fifths?

3. Hanna donated $\frac{2}{5}$ of her monthly allowance to the Iligan survivors. If her monthly allowance is Php3500, how much did she donate?

Lesson 4	Multiplication and Division of Decimals

Congratulations on making this far! How is your journey on the previous module? Have you mastered the rules in multiplying and dividing fractions? In this module, you are going to multiply and divide decimals. Good luck!

What's In

Multiplying and dividing whole numbers is of great help in multiplying and dividing rational numbers. Perform the indicated operation.

1. Multiply 236 by 5.
2. Divide 1245 by 3.

Notes to the Teacher

Students' knowledge in multiplying and dividing whole numbers will help speed you in learning this module. Let us check your understanding in multiplying and dividing whole numbers.

What's New

James bought 1.75 kilos of Tilapia. If each kilo is worth ₱130.50, how much did he pay for the tilapia? What operation will you use? How much did James pay for the Tilapia?

What is It

The rules in multiplying and dividing decimals is almost the same as the rules in multiplying whole numbers except that you have to be extra cautious of the decimal point.

A. Multiplying decimals

Examples
1. Multiply 321.4 by 0.31.

    Arrange the numbers vertically.

$$\begin{array}{r} 321.4 \\ \times\ \underline{0.31} \end{array}$$

    Multiply the numbers, as if you are multiplying whole numbers.

$$\begin{array}{r} 321.4 \\ \times\ \underline{0.31} \\ 3214 \\ \underline{9642} \\ 99634 \end{array}$$

Starting from the rightmost end of the product, move the decimal point to the left the same number of places as the sum of the decimal places in the multiplicand and the multiplier

321.**4**	**One decimal place**
x <u>0.**31**</u>	**Two decimal places**
3214	
<u>9642</u>	
99.**634**	**Three decimal places**

2. Multiply 12.123 by 3.05

    Arrange the numbers vertically.

$$\begin{array}{r} 12.123 \\ \times\ \underline{3.05} \end{array}$$

Multiply the numbers, as if you are multiplying whole numbers.

$$
\begin{array}{r}
12.123 \\
3.05 \\
\hline
60615 \\
00000 \\
\underline{36369} \\
3697515
\end{array}
$$

Starting from the rightmost end of the product, move the decimal point to the left the same number of places as the sum of the decimal places in the multiplicand and the multiplier.

$$
\begin{array}{r}
12.\mathbf{123} \qquad \textbf{Three decimal places} \\
\times\ 3.\mathbf{05} \qquad \textbf{Two decimal places} \\
\hline
60615 \\
00000 \\
\underline{36369} \\
36.\mathbf{97515} \qquad \textbf{Five decimal places}
\end{array}
$$

B. Dividing decimals

1. Divide 12.159 by 3

If the divisor is a whole number, divide the dividend by the divisor applying the rules of a whole number. The position of the decimal point is the same as that in the dividend.

$$
\begin{array}{r}
4.053 \\
3\overline{\smash{)}\,12.159} \\
\underline{-12} \\
1 \\
\underline{-0} \\
15 \\
\underline{-15} \\
9 \\
\underline{-9} \\
0
\end{array}
$$

2. Divide 365.55 by 1.5

If the divisor is not a whole number, make the divisor a whole number by moving the decimal point in the divisor to the rightmost end, making the number seem like a whole number.

$$
1.5\,\overline{\smash{)}\,365.55}
$$

$$
15.\,\overline{\smash{)}\,365.55}
$$

Move the decimal point in the dividend to the right the same number of places as the decimal point was moved to make the divisor a whole number.

```
      _____
15 ) 3 6 5 . 5 5

      _____
15 ) 3 6 5 5 . 5
```

Lastly divide the new dividend by the new divisor.

```
           2 4 3 . 7
      _____
15 )  3 6 5 5 . 5
      3 0
      ___
        6 5
        6 0
        ___
          5 5
          4 5
          ___
          1 0 5
          1 0 5
          _____
              0
```

What's More

A. Multiply the following.

1. 562.31 • 25

4. 13.206 • 0.00012

2. 29 103 • 1.33

5. 0.1234 • 0.0055

3. 8 721.231 • 5.2

B. Divide the following:

6. 34.625 ÷ 5

9. 1 199.01 ÷ 5.1

7. 7 982 ÷ 1.3

10. 25 552 ÷ 3.2

8. 80.96 ÷ 2.3

What I Have Learned

To sum it up, let us complete the statements for the rules in multiplying and dividing decimals. Choose your answer from the box that best completes each of the statements below.

Multiply	Divide	left	right	the same
different	horizontal	vertical	sum	difference
rightmost	leftmost	divisor	dividend	multiplicand

A. Rules in Multiplying Rational Numbers in Decimal Form
1. Arrange the numbers in a _____ column.
2. _____ the numbers, as if you are multiplying whole numbers.
3. Starting from the _____ end of the product, move the decimal point to the _____ the same number of places as the _____ of the decimal places in the multiplicand and the multiplier.

B. Rules in Dividing Rational Numbers in Decimal Form
1. If the divisor is a whole number, divide the _____ by the _____ applying the rules of a whole number. The position of the decimal point is the same as that in the dividend.
2. If the divisor is not a whole number, make the divisor a whole number by moving the decimal point in the divisor to the _____ end, making the number seem like a whole number.
3. Move the decimal point in the dividend to the _____ the same number of places as the decimal point was moved to make the divisor a whole number.
4. Lastly _____ the new dividend by the new divisor.
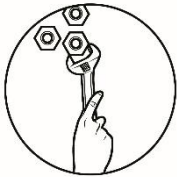
What I Can Do

Answer the following problems.

1. Six students ordered Mango pie and the total cost was P154.50. How much did each student have to pay if they shared the cost equally?

2. If you download 7 songs for ₱53.268 each, what is the total amount you have spent for the 7 songs?

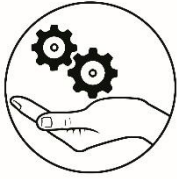3. The product of two numbers is 767.52. If one number is 3.6, find the other number.

Assessment

Multiple Choice. Choose the letter of the correct answer. Write the chosen letter on a separate sheet of paper.

1. What is the sum of $\frac{1}{3}$ and $\frac{1}{4}$?

    A. $\frac{2}{3}$ B. $\frac{2}{4}$ C. $\frac{7}{12}$ D. $\frac{2}{12}$

2. Add $\frac{1}{2}$ to $3\frac{1}{2}$.

   A. $3\frac{1}{2}$ B. $4\frac{1}{2}$ C. 3 D. 4

3. Jazz sold $\frac{1}{2}$ sack of sayote and $\frac{5}{2}$ sack of kamote. How many sacks of vegetable did he sell altogether?

   A. $2\frac{1}{2}$ B. $\frac{6}{2}$ C. 3 D. 2

4. What is the difference between $\frac{5}{3}$ and $\frac{1}{2}$?

   A. $\frac{7}{6}$ B. $\frac{1}{2}$ C. $\frac{4}{6}$ D. $\frac{1}{3}$

5. Solve $5 - \frac{1}{4}$.

   A. $4\frac{1}{4}$ B. $4\frac{3}{4}$ C. $5\frac{3}{4}$ D. $5\frac{1}{4}$

6. Find the sum of 12.2 and 5.81.

   A. 17.38   B.17.83   C.18.01   D. 18.1

7. Find the difference: 63.995 – 15.578

   A. 48.147   B. 48.174   C. 48.417   D. 48.741

8. Perform the indicated operation: 2.05 + 3.022 - 0.91 + 6.389

   A. 10.551   B.10.515   C. 10.155   D. 10.15

9. Helen had Php7500 for shopping money. When she got home, she had Php132.75 in her pocket. How much did she spend for shopping?

   A. Php7763.52   C. Php7367.52
   B. Php7736.25   D. Php7367.25

10. Kim ran the 100-meter race in 135.46 seconds. Tyron ran faster by 15.7 seconds. What was Tyron's time for the 100-meter dash?

   A. 511.61   B.151.16   C. 115.61   D. 115.16

11. What is the product of $\frac{2}{3}$ and $\frac{2}{7}$?

   A. $\frac{4}{3}$ B. $\frac{2}{21}$ C. $\frac{4}{9}$ D. $\frac{4}{21}$

12. What is the quotient of $\frac{7}{4}$ and $\frac{7}{8}$?

   A. 2 B. $\frac{7}{3}$ C. $\frac{7}{12}$ D. 12

13. Janna takes her medicine 3 times a day. How many days will a 60 ml medicine last if $2\frac{1}{2}$ ml is taken each time?

   A. 6   B. 7   C. 8   D. 10

14. Jay will divide his P112,000 among his 3 brothers. His elder brother will receive $\frac{3}{4}$ of the amount while the remaining amount is to be equally divided among the two younger brother. How much will each of the younger brothers receive?
   - A. Php 28,000
   - B. Php 20,000
   - C. Php 18,000
   - D. Php 14,000

15. May bought $\frac{2}{3}$ of a kilo of meat. She cooked $\frac{1}{2}$ of it. How much did she cook?
   - A. $\frac{1}{2}$
   - B. $\frac{1}{3}$
   - C. $\frac{7}{3}$
   - D. $\frac{2}{3}$

16. Multiply 23.41 by 8.
   - A. 187.28
   - B. 187.29
   - C. 187.30
   - D. 187.31

17. Divide 25.48 by 7.
   - A. 2.63
   - B. 2.64
   - C. 3.63
   - D. 3.64

18. Find the product of 1.32 and 23.51.
   - A. 31.0332
   - B. 31.0333
   - C. 31.1332
   - D. 31.1333

19. Fill in the blank: _____ ÷ 3.5 = 32.01.
   - A. 112.005
   - B. 112.015
   - C. 112.115
   - D. 112.035

20. Arjay bought 8.75 meters of cloth for ₱813.75. Find the cost price per meter.
   - A. ₱92.00
   - B. ₱93.00
   - C. ₱94.00
   - D. ₱95.00

Additional Activities

"What do you call a symmetrical open curve formed by the intersection of a circular cone with a plane at a smaller angle with its axis than the side of the cone?"

To answer the question, solve the following problems and write the letter of the correct answer in the box provided below.

2,285.82	$\frac{55}{14}$	0	$\frac{12}{5}$	10.9	-4.3402	$\frac{-17}{12}$	5.92	$\frac{263}{12}$

E. $\frac{8}{5} + \frac{4}{5}$

Y. $4\frac{2}{7} - \frac{5}{14}$

P. $\frac{5}{7} \cdot \frac{1}{5} \cdot \frac{0}{2}$

O. $-\frac{3}{4} - \frac{2}{3}$

A. $5\frac{2}{3} + 16\frac{1}{4}$
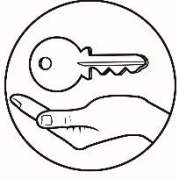
S. $\frac{15}{4} \div \frac{3}{8}$

R. 15.8 – 4.9

U. 62.722 + 8.419

B. 0.0758 + 11.384 – 15.8

H. (275.4) (8.3)

I. (77.6) (0.88) (0.25)

L. 25.9296 ÷ 4.38

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Answer Key

Lesson 1

What's More

A.
1. 5/9
2. 2/3
3. 9/11
4. 1/6
5. 29/40
6. 7/36
7. 11/10 or 1 1/10
8. 25/12 or 2 1/12
9. 239/28 or 8 15/28
10. 45/7 or 6 3/7

B.
1. 25/4 or 6 ¼
2. 8 2/5
3. 12
4. 16 7/40
5. 5 18/35

What I have learned
1. same
2. denominator
3. difference
4. different
5. converted
6. whole number
7. addition and subtraction
8. simplify

What I can do
1. ⅝ hours
2. 24 5/12 cm
3. 2 ¾ kilos

Lesson 2

What's More
1. 9.65
2. 18.32
3. 2.71
4. 766.9
5. 687.05
6. 125.56
7. 42.72
8. 13.192
9. 27.75
10. 40

What I can do
1. 8499.03 km
2. Php 9.095
3. 6.9 grams

Lesson 3

What's More
1. 5/9
2. 4 2/3
3. 2/25
4. 1/9
5. -5/12
6. 30
7. -5/6
8. 7/40
9. 69/80
10. 3/4

What I have learned
1. numerator
2. multiply
3. reciprocal
4. improper

What I can do
1. 5 5/6
2. 3 3/5
3. Php 1,400

Lesson 4

What's More
1. 14,057.75
2. 38,706.99
3. 45,350.4012
4. 0.00158472
5. 0.0006787
6. 6.925
7. 6,140
8. 35.2
9. 235.1
10. 7,985

What I have learned
A.1. Vertical
2. multiply
3. rightmost, left, Sum
B.1. dividend, divisor
2. rightmost
3. right
4. divide

What I can do
1. Php25.75
2. Php 372.876
3. 213.2

What I know

1. D	6. B	11. A	16. C
2. B	7. C	12. B	17. B
3. C	8. B	13. D	18. B
4. C	9. C	14. B	19. C
5. A	10. A	15. A	20. A

References

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