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Mathematics
Quarter 3 – Module 9:
Describe a Proportion

ALTERNATIVE DELIVERY MODE

Mathematics – Grade 9
Alternative Delivery Mode
Quarter 3 – Module 9: Describe a Proportion
First Edition, 2020

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Describe a Proportion

DepED
DEPARTMENT OF EDUCATION

Introductory Message

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

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

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

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

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

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

Thank you.

What I Need to Know

This module was designed and written with you in mind. It is here to help you master **Describing a Proportion.** 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.

This module will help you understand ratio and proportion. It will also guide you in determining whether given two ratios are proportional or not and learn how to find the missing term in a proportion.

After going through this module, you are expected to:

- describe a proportion, and solve problems involving ratio and proportion. **M9GE – IIIf – 36**
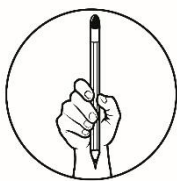
What I Know

Find out how much you already know about proportions. Write the letter that you think is the correct answer on a sheet of paper. Answer all items. After taking and checking this short test, take note of the items that you were not able to answer correctly and look for the right answer as you go through this module.

1) Which among the following fractions is equivalent to the ratio 6 to 4?

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

2) In a Geometry class, there are 9 males and 11 females. What is the ratio of males to the total number of students?

A. $\frac{9}{11}$　　　　B. $\frac{11}{9}$　　　　C. $\frac{11}{20}$　　　　D. $\frac{9}{20}$

3) Which among the following is a proportion?

A. $\frac{5}{4} = \frac{9}{8}$　　　B. $\frac{3}{9} = \frac{2}{6}$　　　C. $\frac{18}{10} = \frac{25}{45}$　　　D. $\frac{1}{7} = \frac{3}{20}$

4) The ratio $\frac{28}{40}$ is proportional to the ratio _____.

A. $\frac{14}{20}$　　　　B. $\frac{7}{10}$　　　　C. $\frac{35}{60}$　　　　D. $\frac{5}{14}$

For questions **5 to 7**, solve for the value of x in the given proportion.

5) $\frac{3}{4} = \frac{x}{8}$

A. 6　　　　　B. 8　　　　　C. 9　　　　　D. 16

6) $\frac{7}{x} = \frac{2}{6}$

A. 2　　　　　B. 12　　　　　C. 21　　　　　D. 42

7) $\frac{2}{9-x} = \frac{4}{2x+3}$

A. $\frac{9}{4}$　　　　B. $\frac{33}{5}$　　　　C. $\frac{21}{8}$　　　　D. $\frac{15}{4}$

8) On a map, 1 inch represents 100 feet. How many inches would represent 350 feet?

A. $\frac{1}{100}$　　　　B. $\frac{3}{5}$　　　　C. $\frac{7}{2}$　　　　D. $\frac{5}{3}$

9) In a Geometry class, the ratio of the number boys to the number girls is 2 to 3. If there are 20 students in this class, how many girls are there?

A. 8　　　　　B. 12　　　　　C. 20　　　　　D. 30

10) Sandy wants to give a party for 90 people. She has a punch recipe that makes 2 gallons of punch that serve 15 people. How many gallons of punch should she make for her party?

A. 12　　　　　B. 6　　　　　C. 4　　　　　D. 2

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Ratio and Proportion

In the previous topic, you already learned about the conditions that make a quadrilateral a parallelogram. This time let us have a deeper understanding of the application of those theorems and properties. You will learn in this module to find measures of angles, sides and other quantities involving parallelograms.

What's In

FINDING THE RATIO

What is Ratio?

Ratio is the comparison between two quantities of the same units. It is the result of comparing them by division. Since the quantities are of the same kind, ratio doesn't make use of units. The comparison of quantities that considers different units is called **rate**. The ratio or rate can be represented in four ways and can be written as:

"a to b", $a{:}b, \text{a/b}$ or $\frac{a}{b}$.

Examples:

1) Find the ratio of a to b if a = 6 cm and b = 8 cm.

   Answer: 6:8 or 3:4

2) Find the ratio of 1 meter to 20 centimeters.

   Answer: 1 meter = 100 centimeters so, 100:20 or 5:1

3) Write the ratio of the number of female presidents to the number of male presidents of the Philippines in different forms.

   Answer: 2 to 13, 2:13 (colon form) and $\frac{2}{13}$ (fraction form)

TRY THIS!

Express each of the following as ratios in simplest forms.

(For nos. 1-5 in fraction forms and for no. 6 in colon form)

1) Php 6 to Php 72

2) 1 hour to 40 minutes

3) 2 weeks to 4 days

4) Eight out of 30 passengers are tourists. Find the ratio of the number of tourists to the number of other passengers.

5) Elmer has 42 marbles. Fourteen marbles are red while the rest are green. What is the ratio of the number of red marbles to the number of green marbles?

6) In a certain room, there are 28 women and 21 men.

    a. What is the ratio of the number of men to the number of women?

    b. What is the ratio of the number of women to the total number of people?

What's New

Johnny, Jay, and Jun buy *calamansi* from the same wholesale dealer and sell them at retail as follows:

    Johnny: Php24 for every 10 pieces
    Jay: Php27 for every 12 pieces
    Jun: Php36 for every 15 pieces

Which one is a better buy?

The ratios of the cost of calamansi to the number of pieces for Johnny, Jay and Jun are 24:10, 27:12, 36:15 respectively. Simplifying these ratios, we have 12:5 for Johnny, 9:4 for Jay and 12:5 for Jun. This means that Johnny and Jun sell the calamansi for the same price, but Jay sell the calamansi for a cheaper price.

As you can see in the problem, two ratios may or may not be equal. They are equal if they can be expressed into the same simplest ratio, otherwise they are unequal. The ratios 24:10 and 36:15 are equal because both can be expressed as 12:5. The ratio 27:15 is not equal to 24:10 or to 36:15. Equal ratios can form a proportion, in this case 24:10=36:15.

A **proportion** is the equality between two ratios. If ratios $a:b$ and $c:d$ are equal, the proportion formed can be written in two ways:

    $a:b = c:d$ or $\frac{a}{b} = \frac{c}{d}$, where $b \neq 0, d \neq 0$
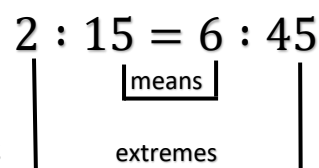
and is read as "a is to b as c is to d".

Each quantity in a proportion is called **term** of the proportion. Thus, in the proportion $a{:}b = c{:}d$, a, b, c, and d are the terms. **b** and **c** are called **means** while **a** and **d** are called **extremes**.

Example:

The equation 2:15 = 6:45 is a *proportion*.
In the given proportion, 15 and 6 are called **means**;
2 and 45 are the **extremes**.

$$2 : 15 = 6 : 45$$

means

extremes

If two ratios can be simplified into the same ratio, then the two ratios form a proportion.

Let's have an example:

Which of the following ratios are equal?

1. 32:80   2. 27:72   3. 18:63   4. 34:85

Simplifying each ratio, we have
1. 32:80 = **2:5**   2. 27:72 = **3:8**   3. 18:63 = **2:7**   4. 34:85 = **2:5**

Since the ratios in items 1 and 4 have the same simplest form, then 32:80 is equal to 34:85.This can be written as a proportion, $32{:}80 = 34{:}85$ or $\frac{32}{80} = \frac{34}{85}$.

In a proportion, the product of the means is equal to the product of the extremes. In $\frac{a}{b} = \frac{c}{d}$ or $a{:}b = c{:}d$, a times d is equal to b times c, or $ad = bc$.

Two ratios are proportional if the product of the means is equal to the product of the extremes.

To check the equality of the ratios written in the form of a proportion we get the product of the means and the product of the extremes, or we use cross multiplication if the ratios are in fraction form.

So, in $32{:}80 = 34{:}85$
$(80)(34) = (32)(85)$
$2{,}720 = 2{,}720$

Since the answers are both 2,720, then the ratios are equal, therefore, a proportion is formed.

Examples:

1) Determine if $\frac{4}{12} = \frac{9}{27}$ is a proportion or not.

Method 1: By simplifying the ratios

$$\frac{4}{12} = \frac{9}{27} \rightarrow \frac{1}{3} = \frac{1}{3}$$

Each of these ratios (fractions) in simplest form is $\frac{1}{3}$ which indicates that the two ratios form a proportion.

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Method 2: By multiplying the means and multiplying the extremes

$$\frac{4}{12} = \frac{9}{27} \qquad (4)(27) = (12)(9)$$
$$108 = 108 \text{ (TRUE)}$$

2) Is $26:65 = 8:20$ a proportion?

Method 1: By simplifying the ratios

$$\frac{26}{65} = \frac{8}{20} \rightarrow \frac{2}{5} = \frac{2}{5}$$

Each of the ratios in simplest form is $\frac{2}{5}$. Therefore, the given is a proportion.

Method 2: By multiplying the means and multiplying the extremes

$$26:65 = 8:20 \qquad (26)(20) = (65)(8)$$
$$520 = 520 \text{ (TRUE)}$$

Activity 1: *Is this Fair?*

Write ratios for the quantities mentioned in each situation then compare the ratios. If those ratios are equal, write FAIR and if not, write UNFAIR. Explain your answer.

1) Ron and Mark are card collectors. Ron traded 24 basketball cards for 15 boxing cards and Mark traded 20 basketball cards for 32 boxing cards. Is this fair?

2) On a math exam, Lily scored 85 points for answering 17 questions correctly and Tom scored 80 points for answering 16 questions correctly. Is this fair?

3) Mary paid Php18,400 for 2 tickets to a concert and Kimmy paid Php26,600 for 3 tickets to the same concert. Is this fair?

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What is It

Properties of Proportion

The following properties show different ways of rewriting proportions that do not alter the meaning of their values.

Properties of Proportion	
Cross Multiplication Property / Means-Extremes Property	If $\frac{a}{b} = \frac{c}{d}$ then $ad = cb$; $b \neq 0$; $d \neq 0$
Alternation Property	If $\frac{a}{b} = \frac{c}{d}$ then $\frac{a}{c} = \frac{b}{d}$; $b \neq 0$; $c \neq 0$; $d \neq 0$
Inverse Property / Reciprocal Property	If $\frac{a}{b} = \frac{c}{d}$ then $\frac{b}{a} = \frac{d}{c}$; $a \neq 0$; $b \neq 0$; $c \neq 0$; $d \neq 0$
Addition Property	If $\frac{a}{b} = \frac{c}{d}$ then $\frac{a+b}{b} = \frac{c+d}{d}$; $b \neq 0$; $d \neq 0$
Subtraction Property	If $\frac{a}{b} = \frac{c}{d}$ then $\frac{a-b}{b} = \frac{c-d}{d}$; $b \neq 0$; $d \neq 0$
Sum Property of the Original Proportion	If $\frac{a}{b} = \frac{c}{d}$, then $\frac{a}{b} = \frac{c}{d} = \frac{a+c}{b+d}$; $b \neq 0$; $d \neq 0$

Example:

Rewrite $\frac{y}{x} = \frac{3}{10}$ using the different properties and verify whether the ratios in the rewritten proportions are still equal using Cross Multiplication Property.

Property and Resulting Proportion	Verification using Cross Multiplication Property
Original Proportion: $\frac{y}{x} = \frac{3}{10}$	$10y = 3x$
Alternation Property: $\frac{y}{3} = \frac{x}{10}$	$10y = 3x$
Inverse Property: $\frac{x}{y} = \frac{10}{3}$	$3x = 10y$
Addition Property: $\frac{y+x}{x} = \frac{3+10}{10}$ $\frac{y+x}{x} = \frac{13}{10}$	$(y+x)(10) = (x)(13)$ $10y + 10x = 13x$ $10y = 13x - 10x$ $10y = 3x$
Subtraction Property: $\frac{y-x}{x} = \frac{3-10}{10}$ $\frac{y-x}{x} = \frac{-7}{10}$	$(y-x)(10) = (x)(-7)$ $10y - 10x = -7x$ $10y = 10x - 7x$ $10y = 3x$
Sum Property of the Original Proportion: (1) $\frac{y+3}{x+10} = \frac{3}{10}$ or (2) $\frac{y+3}{x+10} = \frac{y}{x}$	$(y+3)(10) = (x+10)(3)$ $10y + 30 = 3x + 30$ $10y = 3x$ $(y+3)(x) = (x+10)(y)$ $xy + 3x = xy + 10y$ $3x = 10y$

All of the proportions yielded $10y = 3x$, which implies that there is no difference in their values.

Solving Proportions

We can solve for the missing values in a proportion using the Cross Multiplication Property or by Means-Extremes Property.

Examples:

1) Solve for the value of x in $\frac{2}{5} = \frac{x}{30}$ Solution:
$$5(x) = (2)(30)$$
$$5x = 60$$
$$x = 12$$

2) Solve for the value of b in   Solution:
$$5:25 = b:150$$
$$(5)(150) = 25b$$
$$25b = 750$$
$$b = 30$$

3) Solve for the value of d in   Solution:
$$\frac{2/5}{6} = \frac{4/5}{d}$$
$$\left(\frac{4}{5}\right)\left(\frac{6}{1}\right) = \frac{2}{5}d$$
$$\frac{24}{5} = \frac{2}{5}d$$
$$2d = 24$$
$$d = 12$$

4) Solve for the value of x in   Solution:
$$\frac{4x-1}{3} = \frac{6x+1}{5}$$
$$5(4x - 1) = 3(6x + 1)$$
$$20x - 5 = 18x + 3$$
$$20x - 18x = 5 + 3$$
$$2x = 8$$
$$x = 4$$

TRY THIS!

Solve for the value of x in each of the following proportions.

1) $\frac{8}{3} = \frac{24}{x}$ 2) $\frac{2}{3} = \frac{x}{9}$ 3) $\frac{18}{11x-4} = \frac{2}{x}$

Word Problems Involving Proportions

In solving word problems, determine the given ratios then set up a proportion.

1) The ratio of the number of boys to the number of girls in the Mathematics club is 4 to 5. If there are 25 girls in the club, how many boys are in the club?

Solution: Let x be the number of boys in the club.
$$\frac{n(boys)}{n(girls)} : \frac{4}{5} = \frac{x}{25}$$
$$4 \cdot 25 = 5 \cdot x$$
$$100 = 5x$$
$$x = \mathbf{20}$$
There are 20 boys in the Mathematics club.

2) In a photograph, Jane is 9 cm tall and her brother John is 10 cm tall. Jane's actual height is 153 cm. What is John's actual height?

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Solution: Let x be the actual height of John in cm.

$$\frac{9}{10} = \frac{153}{x}$$

$$9x = 153(10)$$

$$9x = 1{,}530$$

$$x = 170\ cm$$

John's actual height is 170 cm

3) Ms. Peters wants to prepare a party for 80 people. She has a chocolate cake recipe that makes 3 small cakes that can serve 16 people. How many cakes does she need to bake for her party?

Solution: Let x be the number of cakes to be baked for the party.

$$\frac{3\ cakes}{16\ people} = \frac{x}{80\ people}$$

$$(3)(80) = 15x$$

$$240 = 16x$$

$$x = 15$$

She needs to make 15 cakes for her party.

TRY THIS!

1) A map of a resort uses the scale of 2cm for every 100m. If the swimming pool is actually 250m away from the rooms. How far would the pool be from the rooms on the map?

2) The ratio of the numbers of letters used in two words is 5 to 3. If the first word contains 15 letters, how many letters are in the second word?
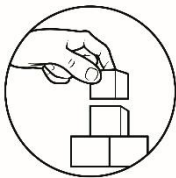
 What's More

I. TRUE or FALSE. Write TRUE if the statement is true, otherwise, false.

_____1. $\frac{4}{5} = \frac{16}{18}$

_____2. 3:5 and 12:20 are equal ratios.

_____3. If $\frac{x}{15} = \frac{15}{60}$, then $x = 3$.

_____4. If $\frac{3}{5} = \frac{6}{10}$, so $3 \times 6 = 5 \times 10$.

_____5. 7 miles in 10 minutes = 3.5 miles in 5 minutes

II. **Can the given pair of ratios form a proportion? Write Yes or No on your answer sheet**

1) 4:5, 24:30

2) 2:7, 20:56

3) 22:10, 88:40

4) 4:10, 28:70

5) 5:12, 15:36

6) $\frac{7}{10}, \frac{35}{70}$

7) $\frac{6}{14}, \frac{9}{21}$

III. **Match the process of rewriting a proportion used in each item in column A to the corresponding property in column B. Write the letter of the correct answer on your answer sheet.**

A	**B**
_____1) If $\frac{7}{m} = \frac{3x}{4}$ then $\frac{4}{m} = \frac{3x}{7}$	A. Cross Multiplication Property / Means-Extremes Property
_____2) If $\frac{3}{k} = \frac{15}{14}$ then $15k = 42$	B. Alternation Property
_____3) If $\frac{2x}{3} = \frac{4y}{5}$, then $\frac{4y}{5} = \frac{2x+4y}{8}$	C. Inverse Property / Reciprocal Property
_____4) If $\frac{3}{x} = \frac{12}{4b}$ then $\frac{3+x}{x} = \frac{12+4b}{4b}$	D. Addition Property
_____5) If $\frac{5}{r} = \frac{7}{17}$ then $\frac{r}{5} = \frac{17}{7}$	E. Subtraction Property
	F. F. Sum Property of the Original Proportion

IV. **Find the value of x in each proportion.**

1) $\frac{4}{7} = \frac{8}{x}$

2) $\frac{x}{6} = \frac{24}{x}$

3) $\frac{4x-1}{3} = \frac{6x+1}{5}$

What I Have Learned

A **ratio** is a comparison between two numbers or quantities. For a ratio, the two quantities must be in the same unit. The comparison of quantities that considers different units is called rate.

We can express a ratio in four ways: Phrase form, division form, colon form and fraction form.

A **proportion** is the equality between two ratios. Each quantity in a proportion is called **term** of the proportion. Thus in the proportion a:b = c:d, a, b, c, and d are the terms. **b** and **c** are called **means** while **a** and **d** are called **extremes**.

Two ratios are proportional if the product of the means is equal to the product of the extremes. That is, if $\frac{a}{b} = \frac{c}{d}$, where b≠ 0 and d≠ 0 , then **ad = bc**.

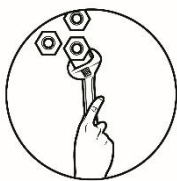The following is true for any proportion: $\frac{a}{b} = \frac{c}{d}$

a) $\frac{a}{c} = \frac{b}{d}$; $b \neq 0; c \neq 0; d \neq 0$ (Alternation Property)

b) $\frac{b}{a} = \frac{d}{c}$; $a \neq 0; b \neq 0; c \neq 0; d \neq 0$ (Inverse Property),

c) $\frac{a+b}{b} = \frac{c+d}{d}$; b≠ 0; $d \neq 0$ (Addition Property),

d) $\frac{a-b}{b} = \frac{c-d}{d}$; $b \neq 0; d \neq 0$ (Subtraction Property) and

e) $\frac{a}{b} = \frac{c}{d} = \frac{a+c}{b+d}$ (Sum Property of the Original Proportion)

What I Can Do

TEST YOURSELF!

Read and answer each question carefully. Choose the word/s or number/s from the right that corresponds to the correct answer and write it on your answer sheet.

|		
1)	Is $\frac{21}{168} = \frac{12}{96}$ a proportion?	Yes No
2)	Find the value of n in $\frac{5}{7} = \frac{15}{n}$	7 14 21 105
3)	What are the respective values of a and b in $\frac{48}{16} = \frac{a}{12}$ and $\frac{6}{b} = \frac{48}{16}$	$a = 2; b = 24$ $a = 3; b = 36$ $a = 36; b = 2$ $a = 24; b = 3$
4)	A map of a park shows a distance of 3 kms represented by half an inch. How far is the river from the flower garden if it is 4 inches on the map?	6 kms 24 kms 2.4 kms 60 kms
5)	In $\frac{8}{15} = \frac{16}{x}$, what is the value of x?	20 30 40 50
6)	The proportion $\frac{2}{3x} = \frac{4}{b}$ is equivalent to $\frac{b}{3x} = \frac{4}{2}$ based on what property of proportion?	Inverse property Alternation property
7)	Find the value of x in the proportion: $4 : 7 = (x - 4) : (x + 2)$	2 4 12 16
8)	The ratio of the number of dogs to the number of cats in a shelter is 5 to 2. If there are 30 dogs, what is the total number of cats and dogs in the shelter?	12 30 42 50
9)	Joy is a local competitive eater with a record of eating 15 hotdog sandwiches in 2 minutes. If she continues to eat at this pace, how many hotdog sandwiches can she eat in 240 seconds?	15 30 25 45 50
10)	In the special kare kare recipe of Julia's mother, every $1\frac{1}{2}$ kilos of beef require $\frac{3}{4}$ cup of peanut. How many cups of peanut will she need to cook 3 kilos of beef for the same recipe for their family reunion?	$\frac{3}{4}$ cups $\frac{3}{2}$ cups $\frac{9}{2}$ cups $\frac{9}{4}$ cups

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Read and answer each of the following items thoroughly. Write the letter of the correct answer on your answer sheet.

1) Lucille's photo comes in two sizes: 14 cm x 9 cm and 15 cm x 10 cm. Are these dimensions proportional?
   A. Yes　　　　B. No　　　　C. Maybe　　　　D. Insufficient Information

2) Two different classes were asked whether they would prefer a field trip to Corregidor or to an ice cream plant. In class A, 10 out of 15 students prefer Corregidor. In Class B, 20 out of 30 preferred Corregidor. Are these quantities proportional?
   A. Yes　　　　B. No　　　　C. Maybe　　　　D. Insufficient Information

3) The ratio $\frac{16}{51}$ is proportional to the ratio _____.
   A. $\frac{4}{13}$　　　　B. $\frac{8}{27}$　　　　C. $\frac{51}{16}$　　　　D. $\frac{32}{102}$

For numbers 4-7, find the value of x in each of the given proportions.

4) $6:10 = x:25$
   A. 5　　　　B. 15　　　　C. 25　　　　D. 30

5) $\frac{4}{x} = \frac{x}{16}$
   A. 2　　　　B. 4　　　　C. 8　　　　D. 64

6) $\frac{4}{9} = \frac{x+4}{2x+13}$
   A. 38　　　　B. 16　　　　C. 12　　　　D. 9

7) $x:4 = 45:3$
   A. 180　　　　B. 34　　　　C. 60　　　　D. 15

8) A barbeque spareribs recipe that serves 4 people needs one kilo of pork spareribs. If you want to prepare the dish for 20 people in a family gathering, how much pork spareribs do you need?
   A. 4 kilos　　　B. 5 kilos　　　C. 6kilos　　　D.7 kilos

9) Five notebooks cost Php162.5. If I will buy12 notebooks at this rate, how much will I spend?
   A. Php390　　B. Php32.5　　C. Php163.5　　D. Php325

10) Elaine drove her car 99 kms and used 9 liters of fuel. Assuming that the car will continue consuming fuel at the same rate, how many kilometers can she drive with 12 liters of fuel?
   A. 143　　　　B. 118　　　　C. 121　　　　D. 132
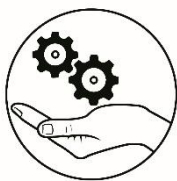
Additional Activities

Let's answer the following!

A. Answer each of the following items accurately and write the letter of the correct answer on your answer sheet.

1) Are $\frac{14}{42}$ *and* $\frac{5}{15}$ proportional?
   A. Yes   B. No

2) Write the ratio 15 girls to 6 boys in simplest fraction form,
   A. $\frac{2}{5}$ C. $\frac{3}{5}$
   B. $\frac{5}{3}$ D. $\frac{5}{2}$

3) Solve the value of k in $\frac{k}{6} = \frac{15}{18}$
   A. 5   C. 60
   B. 3.3333333   D. 90

4) Solve the value of Q in 2 / 3 = 3 / Q.
   A. 2   C. 4.5
   B. 9   D. 6

5) Fill in the missing number into the ratio table.

1	2	3	4
5	10		20

   A. 5   C. 25
   B. 15   D. 12

B. Reflective Learning Sheet

PROBLEM – BASED LEARNING WORKSHEET

The Book Tally of Ms. H' Class!

      After a whole year of reading, the students in Ms. Heteroza's class are ready to tally the number of books that were read. The students read a total of 725 books. There were many different types of books that were read. A few of the students took everyone's lists and organized them into categories. Then they tallied the number of books in each category and composed a list.

    History 108 books

    Adventure 270 books

    Romance 95 books

    Mystery 125 books

    Nature/Science 127 books

Then the students began comparing the number of books in each category. They compared the three largest categories with each other. They compared adventure to nature/science, adventure to mystery, and mystery to nature/science.

LET'S ANALYZE

1) What is the ratio of adventure to nature/science books? Write your answer in simplest form too.

    _____
    _____

2) What is the ratio of adventure to mystery books? Write your answer in simplest form.

    _____
    _____

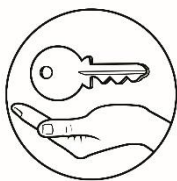3) What is the ratio of mystery to nature/science? Write your answer in simplest form.

    _____
    _____

4) Do any of these ratios form a proportion? Why or why not?

    _____
    _____

Answer Key

WHAT I CAN DO
1) Yes
2) 21
3) $a = 36; b = 2$
4) 24 kms
5) 30
6) alternation
7) 12
8) 42
9) 30
10) $\frac{2}{3}$

ADDITIONAL ACTIVITIES
1. A
2. D
3. A
4. C
5. B

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

PROBLEM-BASED LEARNING WORKSHEET
1) $\frac{127}{270}$
2) $\frac{25}{54}$
3) $\frac{125}{127}$
4) None of these ratios form a proportion because none of them ratios are equal.

WHAT'S MORE

I.	II.	III.	IV.
1) False	1) Yes	1) B	1) $x =$
2) True	2) No	2) A	2) $x =$
3) False	3) Yes	3) F	3) $x = 4$
4) False	4) Yes	4) D	
5) True	5) Yes	5) C	
	6) No		
	7) Yes		

WHAT IS IT
1) $x = 9$
2) $x = 6$
3) $x = 2$

Word Problem:
1) 5cm
2) 2.9 letters

WHAT I KNOW
1) C   6) C
2) D   7) D
3) B   8) C
4) B   9) B
5) A   10) A

WHAT'S IN
1) $^1/_{12}$
2) $^3/_2$
3) $^7/_2$
4) $^4/_{11}$
5) $^1/_2$
6) a. 21:28 or 3:4
   b. 28:49 or 4:7

WHAT'S NEW
Activity 1:
1) UNFAIR
2) FAIR
3) UNFAIR

References

Velayo, M.M. (2015). *Mathematics 9: The Easy Strategies*. Philbooks Publication & Trading, Corp. Cainta, Rizal

Nivera, G. C and Lapinid, M. R (©2013). *Grade 9 Mathematics: Patterns and Practicalities.* Don Bosco Press, Inc.

Orines, F.B.(©2008). "Next century Mathematics: Geometry" Phoenix Publishing House Inc., Quezon City.

Mathematics Learners Material for Grade 9.

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E-SEARCH

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You may also check the following link for your reference and further learnings on describing a proportion.

- https://mathbitsnotebook.com/JuniorMath/RatioProportion/RPProportions.html
- https://mathbitsnotebook.com/JuniorMath/RatioProportion/RPProportionPractice.html
- https://www.trivalley.k12.oh.us/userfiles/566/Classes/62972/Ratio%20and%20Proportion%20Examples%20for%20Home.pdf
- https://cdn.kutasoftware.com/Worksheets/PreAlg/Proportions.pdf
- https://www.uges.k12.wi.us/site/handlers/filedownload.ashx?moduleinstanceid=2623&dataid=4961&FileName=accelerated_pe_ch_5.pdf
- https://math.wonderhowto.com/how-to/apply-fundamental-rule-proportions-302393/

    https://byjus.com/maths/ratios-and-proportion/