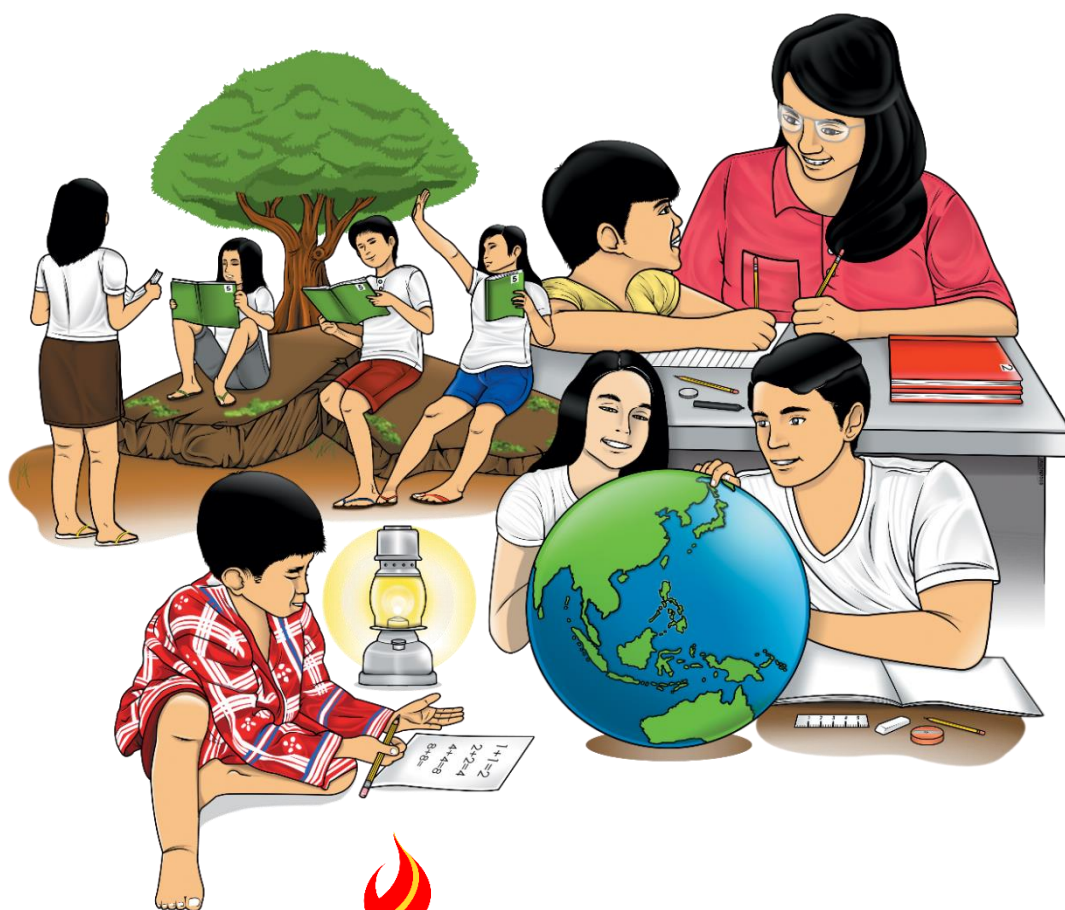


Mathematics

Quarter 2 – Module 3: Solving Problems Involving Different Types of Proportion



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Mathematics – Grade 6

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Quarter 2 – Module 3: Solving Problems Involving Different Types of Proportion

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Mathematics

Quarter 2 – Module 3: Solving Problems Involving Different Types of Proportion



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 finding the missing term in a proportion. The scope of this module permits it to be used in many different learning situations. The language used recognizes your diverse vocabulary level. 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 contains lessons on:

1. finding a missing term in a proportion (direct, inverse, and partitive);
(M6NS-IIb-133); and,
2. solving problems involving direct proportion, partitive proportion and inverse proportion in different contexts such as distance, rate, and time using appropriate strategies and tools **(M6NS-IIc-134)**.

The module is divided into three lessons, namely:

- Lesson 1 – Solving Word Problems Involving Direct Proportion
- Lesson 2 – Solving Word Problems Involving Inverse Proportion
- Lesson 3 – Solving Word Problems Involving Partitive Proportion

After going through this module, you are expected to:

1. find a missing term in a proportion (direct, inverse, and partitive);
2. use models, tables, and illustrations to understand, identify and differentiate direct, inverse, and partitive proportions; and,
3. solve problems involving direct proportion, partitive proportion and inverse proportion in different contexts such as distance, rate, and time using appropriate strategies and tools.



What I Know

A. Write the letter of the correct answer on your answer sheet.

1) Which of the following is a proportion?

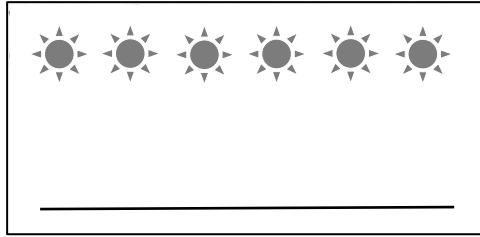
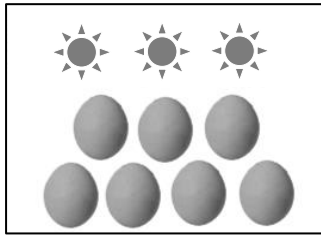
A. $4:5 = 6:10$

B. $8:12 = 4:6$

C. $3:4 = 2:9$

D. $9:3 = 8:7$

2) Which is the proportion for the following illustration?



A. $3:7 = 6:14$

B. $3:6 = 7:14$

C. $7:6 = 14:3$

D. $3:7 = 14:6$

3) Find the missing term in $12:9 = \underline{\hspace{1cm}}:3$.

A. 4

B. 6

C. 10

D. 15

4) Complete the proportion: 2 doctors to 4 nurses = 6 doctors to _____ nurses.

A. 3

B. 8

C. 9

D. 12

5) In every 2 printers there are 3 laptops. If there are 6 printers, how many laptops are there?

A. 4

B. 6

C. 7

D. 9

B. Solve the following problems. Write your answer on your answer sheet.

6) In a store display, there are 4 skirts for every 12 blouses. How many blouses are there if there are 8 skirts? Create a model for this problem.

7) Nico rakes dry leaves in his grandparents' farm during his free time. He earns ₱25 for $\frac{1}{2}$ hour of work. How many hours does he need to work to earn ₱800.00?

8) The ratio of the caps to the handkerchiefs in a dry good store is 6 to 20. How many handkerchiefs are there if there are 3 caps?

9) A jeepney can travel 25 kilometers in 30 minutes. At the same speed, how far will it travel in 120 minutes? Represent the data in a table.

10) Carla reads 5 pages of a novel in 10 minutes. She reads 9 pages in 18 minutes. Is her time proportional to the number of pages read? Why?

Lesson**1****Solving Word Problems
Involving Direct Proportion**

You have learned what are ratios and proportions. Let's use your knowledge on ratio and proportion in this lesson. This will help you identify and solve problems that involve direct proportion. This will also guide you how to find the missing term in a direct proportion.

***What's In***

A. Tell whether each pair of ratios form a proportion. Write YES if it is a proportion and NO if it is not.

- 1) $2:5 = 4:10$
- 2) $3:4 = 6:8$
- 3) $5:6 = 4:5$
- 4) $4:12 = 3:9$
- 5) $12:4 = 10:5$

B. Puzzle: Use each number once to form three proportions.

7	6	3	9
49	2	8	12
4	14	1	48



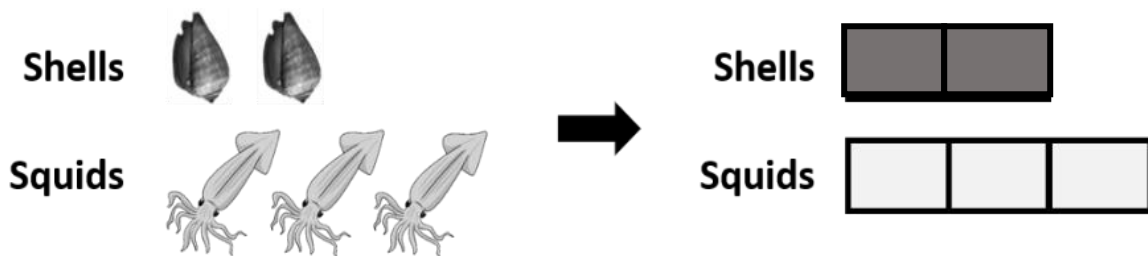
What's New

Mother plans to cook mixed seafoods for our lunch. She will mix 2 pieces of shells for every 3 pieces of small squids. How many shells will she need to mix with 12 pieces of squids?



What is It

Let us illustrate the problem.



The ratio of the number of shells to the number of squids is 2 : 3.
This can also be shown in the following table.

Number of shells	2	4	6	?
Number of squids	3	6	9	12
Shells : Squids	2 : 3	4 : 6	6 : 9	? : 12

As the number of shells increases, the number of squids also increases.
The number of shells and number of squids are **directly proportional** to each other.

Write a proportion to solve this problem.

$$\frac{\text{number of shells}}{\text{number of squids}} = \frac{2}{3} = \frac{?}{12}$$

How can we find the missing term in this proportion?

Method 1: Using mental math (in fraction form)

$$\frac{2}{3} = \frac{?}{12} = 8$$

x 4

Think: The product of 3 and what number is 12?

Because the product of 3 and 4 is 12, multiply the numerator by 4 to find the missing term.

Method 2: Using mental math (in colon form)

number of shells : number of squids

Because the product of 3 and 4 is 12, multiply the first term by 4 to find the missing term.

$$2 : 3 = ? : 12$$

x 4 x 4

Think: The product of 3 and what number is 12?

The missing term in the proportion is 8.

Mother will need **8** shells to mix with twelve pieces of squids.

There are other ways that can help us find the missing term in a proportion.

Let us look at another example.

A store sells globes and hourglasses. The ratio of the number of hourglasses to the number of globes in their stockroom is 5 : 3. If there are 20 hourglasses, how many globes are there?

Number of hourglasses	5	20
Number of globes	3	?
Hourglasses : Globes	5 : 3	20 : ?

As the number of hourglasses increases, the number of globes also increases. This means that the number of hourglasses is directly proportional to the number of globes.

Set up the proportion to solve the problem.

$$\frac{5}{3} = \frac{20}{?} \Rightarrow \text{direct proportion}$$

How can we find the missing term in this proportion?

Method 1: Using cross products (in fraction form)

$$\frac{5}{3} = \frac{20}{?}$$

$5 \times ? = 3 \times 20$ (The cross products of a proportion are equal.)

$5 \times ? = 60$ (Think: 5 multiplied by what number is 60?)

Method 2: Using cross products (in colon form)

$$\begin{array}{c} \text{means} \\ \overbrace{5 : 3 = 20 : ?} \\ \text{extremes} \end{array}$$

The first and last terms are called the *extremes*.

The second and third terms are called the *means*.

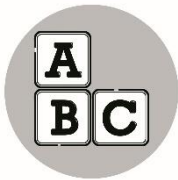
$$\begin{array}{c} 60 \\ \overbrace{5 : 3 = 20 : ?} \\ 5 \times ? = 60 \end{array}$$

In a proportion, the products of the means and the extremes are equal.

(Think: 5 times what number is 60?)

The missing term in the proportion is 12.

There are **12** globes in the store's stockroom.



What's More

A. Find the missing term in a direct proportion using any methods learned.

1) $1 : 3 = \underline{\quad} : 6$
 $1 \times 6 = 3 \times \underline{\quad}$
 $\underline{\quad} = 3 \times (?)$
 $6 \div 3 = (?)$
 $\underline{\quad} = (?)$

2) $\underline{\quad}$ laptops to 5 desktops = 6 laptops to 15 desktops
 $\underline{\quad} \times 15 = 5 \times 6$
 $(?) \times 15 = \underline{\quad}$
 $(?) = \underline{\quad} \div 15$
 $(?) = \underline{\quad}$

B. Write a proportion for the given situation.

3) You can buy 3 pencils for ₱45. Write a proportion that gives the cost of buying 7 pencils.
 $\underline{\quad} : \underline{\quad} = \underline{\quad} : \underline{\quad}$

4) Two camping tents can accommodate 8 boy scouts. Write the proportion to find the number of tents needed by 12 boy scouts.
 $\underline{\quad} : \underline{\quad} = \underline{\quad} : \underline{\quad}$

5) Four curtains are needed to cover 3 window panes. There are 16 curtains. Write the proportion that will give the number of window panes.
 $\underline{\quad} : \underline{\quad} = \underline{\quad} : \underline{\quad}$



What I Have Learned

A direct proportion is a relationship between two quantities that increase or decrease in the same ratio.

A ratio table can be used to organize information in a word problem involving direct proportion.

Direct proportions can be solved using mental math or cross products.



What I Can Do

A certain store arranges different kinds of fruits in a tray for sale. Some of the fruits included in the tray are 5 oranges, 3 chicos, 2 melons, 12 lanzones, 4 *dalanghita*, 6 mangosteens, and 8 guavas.

The store sells fruits arranged in different sizes of trays.

A. If the ratio of the number of fruits remains constant, answer the problems below which involve direct proportion. Show your solutions on your answer sheet.

- 1) 4 *dalanghita* to 2 melons = 8 *dalanghita* to ____ melons
- 2) ____ lanzones to 5 oranges = 36 lanzones to 15 oranges
- 3) 8 guavas to 6 mangosteens = ____ guavas to 24 mangosteens

B. Read and solve the problem using any of the methods learned. Show your solution on your answer sheet.

- 1) Aling Minang sells soup during recess. If she gained P32.00 for 8 bowls sold, how much did she earn for selling 10 bowls?
- 2) Mang Andoy cooked *suman*. He used 6 glasses of coconut milk for 2 kg of *malagkit* rice. How much coconut milk did he use if he cooked 3 kg *malagkit* rice?
- 3) The fuel consumption of a vehicle is 12 L for every 108 km. What distance can it travel in 15 liters of fuel?
- 4) Rhea prepared *puto* cheese for her daughter's birthday. She steamed 30 pieces of *puto* cheese in 12 minutes. How many minutes did it take her to cook 200 pieces?



Assessment

A. Write the letter of the correct answer on your answer sheet.

1) Which of the following is a proportion?

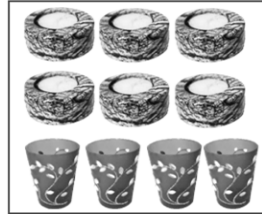
A. $5:6 = 10:12$

B. $9:12 = 3:8$

C. $7:4 = 8:4$

D. $9:3 = 8:7$

2) Which is the proportion for the following illustration?



A. $6:8 = 4:12$

B. $6:4 = 12:8$

C. $8:6 = 4:12$

D. $3:4 = 6:12$

3) Find the missing term in $6 : 8 = 3 : \underline{\hspace{1cm}}$.

A. 3

B. 4

C. 6

D. 9

4) A faucet can fill eight pails of water in 10 minutes. How many pails can be filled with water in 5 minutes by the same faucet.

A. 4

B. 5

C. 6

D. 8

5) There are 2 skilled workers for every 4 ordinary laborers. If there are 8 skilled workers, how many are ordinary laborers?

A. 3

B. 6

C. 12

D. 16

B. Solve the following problems. Write your answer on your answer sheet.

1) Jino uses his bicycle whenever his mother tells him to do an errand. He can reach a 10-meter distance in 4 seconds. How far did he go if he traveled for 20 seconds? Represent the data in a table and answer the problem.

2) You can buy 3 sandwiches for ₱75.00. If you paid ₱125.00, how many sandwiches did you buy?

3) Mother prepared a brine solution to preserve fish. She mixed 250 ml water with 5 tablespoons salt. How much salt did she use if she mixed 1500 ml water?

4) In a community, 2 out of 3 families were Pantawid Pamilyang Pilipino Program (4Ps) recipients. If there are 6 4P's recipients in a particular community, how many families are there in all? Create a model to solve this problem.

5) Rizza can type 40 words in 60 seconds using her laptop. How long will it take her to type a 360-word essay?



Additional Activities

Answer the problems on your answer sheets.

- 1) The table below shows the number of seconds you spend answering your Mathematics modules at home. Find the number of seconds you spend per items.

No. of Items	2	4	6	8
Seconds	150	300	450	600

- 2) A healthy female guppy can reproduce an average of 40 fry every month. There are 3 female guppies in an aquarium. How many fry can they reproduce in 30 days? Fill in the needed data to answer the problem.

No. of female guppies	No. of fry
1	40
3	

- 3) Mrs. Romeo mixed 4 gallons of white paint to 3 liters of orange paint to be used in painting the exterior walls of their house. If she used 8 gallons of white paint, how many liters of orange paint were used to complete the mixture? Draw a model to solve this problem?
- 4) Brando planted 15 seedlings in 2 hours. At this rate, how many seedlings can he plant in 6 hours?
- 5) Tell whether $24:30 = 4:8$ forms a direct proportion. If not, change one of the terms to make it a direct proportion.
- 6) Alice sells mixed vegetables by packs in her store. In a pack, the ratio of okra to eggplants is 12 to 10. If she made bigger packs with 20 pieces of eggplants, how many pieces of okra should she put in it?
- 7) In Jasmine's bracelet making project, she uses 12 blue beads for every 6 red beads she placed. How many blue beads does she need if she has 18 red beads?
- 8) Mother used 5 curtains for 3 window panes. If there are 6 window panes in the living room, how many curtains did she use? Draw a model to solve the problem.
- 9) A barangay provided the residents with a livelihood program. Each family-recipient was given with 2 goats to raise. If 24 families were recipients of this program, how many goats were given? Create a table to represent the data and solve for the answer.
- 10) Two printers can print 25 pages of the module in 1 minute. How many pages can 4 printers print in 2 minutes?



Answer Key

What I Know

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

B.

6.

7. 16 hours
8. 10 handkerchiefs
9. 100 km
10. Yes. The cross products are equal. (Possible answer)

What's In

A.

1. Yes
2. Yes
3. No
4. Yes
5. No

B. Possible Answers

- 1:6 = 8:48
- 3:9 = 4:12
- 2:7 = 14:49

What's More

1. 2
- 18
- 6
- 2
- 12
- 2
- 2
- 2
- 30
- 2
3. 4:5 = 7:105
4. 2:8 = 3:12
5. 4:3 = 16:12

What I Can Do

A.

1. 4
2. 12
3. 32

B.

1. ₱40
2. 9 glasses
3. 135 km
4. 80 minutes

Assessment

A.

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

B.

- 1.

Distance	10 m	50 m
Time	4 sec	20 sec

Answer: 50 m

2. 5 sandwiches
3. 30 tablespoons
- 4.
5. 540 seconds

Additional Activities

1. 75 seconds
2. 120 fry
- 3.
4. 45
5. 24:30 = 4:5 (Possible Answer)
6. 24 okra
7. 36 blue beads
- 8.
- 9.

Family-recipient	1	24
Goats	2	48

Answer: 48 goats

10. 100 pages



What I Know

A. Among the given number of situations, identify the following proportions. Write **DP** for Direct Proportion and **IP** for Inverse Proportion. Write your answers on your answer sheet.

- 1) The fuel consumption of a car is 5 liters of diesel per 85 kilometers. What distance can the car cover with 7 liters?
- 2) It takes 7 days for 25 laborers to harvest mango in the orchard. How long will 35 laborers take to harvest mango on the same orchard?
- 3) If 20 men can plant rice in a field in 10 days; in how many days can 30 men plant rice in the same days?
- 4) The cost of transporting 30 sacks of rice for 115 kilometers in a truck is ₱1 500.00. What will be the cost of transporting 35 sacks for 125 kilometers?
- 5) A motorcycle takes 55 minutes to reach 40 kilometers. How long will it take to reach 60 kilometers?

B. Solve the problems involving inverse proportions.

- 1) Five workers can finish a landscaping job in 12 days. How many days will 4 workers finish the same job at the same rate?
- 2) Twelve dressmakers can finish sewing 15 sets of uniforms in 8 days. How many dressmakers is needed to finish the same number of uniforms in 6 days?
- 3) You have a budget to buy 12 pieces of apples that cost ₱10 each. If the price of apples increased to ₱15 each, how many apples can you buy?
- 4) A family of 6 members can consume a certain amount of rice in 12 days. If 3 relatives stayed with them, how long will they consume the same amount of rice?
- 5) Three farmers can finish plowing the field within 10 days. How many more farmers are needed to finish the same job within 5 days?

Lesson**2****Solving Word Problems
Involving Inverse
Proportion**

Ratios and proportion have been learned by you in Grade 5 and in Lesson 1 of this module. This lesson will help you identify and solve problems that involve inverse proportion. This will also guide you how to find the missing term in an inverse proportion.

***What's In***

A. Find the missing term in each proportion. Write your answers on your answer sheet.

1) $7 : 11 = \square : 44$

2) $18 : 3 = 6 : \square$

3) $\square : 4 = 4 : 8$

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

4) A certain company has 32 employees in all its 8 store branches last year. This year, the company's business expands and has 16 store branches now. How many employees does the company need for all its 16 store branches considering there is an equal number of employees in each branch?

5) Twenty-five pieces of chico cost ₱80. How much should you pay for 5 pieces of chico?

***What's New***

Study the following situation which we will discuss later.

Denie's weekly allowance lasts for 5 days when she spends P24 daily. This week, she plans to make her allowance last for 6 days. How much should she spend per day then?



What is It

Use the four-step problem-solving process to guide you.

Understand

What is asked?

I am looking for the amount of money Denie should spend per day so that her weekly allowance will last for 6 days.

What do I know about the problem?

I know that Denie's weekly allowance lasts for 5 days when she spends ₱24 a day. For her weekly allowance to last longer, she needs to spend less per day.

This means that when the amount of money she spends a day *decreases*, the number of days that her weekly allowance will last *increases*.

This word problem involves **inverse proportion**.

Plan

I can organize the given information in a table.

		decrease
Amount of money spent per day	₱24	?
Number of days the allowance will last	5	6
	increase	

To set up the proportion, I need to switch the terms in one quantity to make the ratios equivalent.

$$\begin{array}{ccc}
 \begin{array}{l} \text{Amount of money to be spent per} \\ \text{day for the allowance to last } \underline{5 \text{ days}} \end{array} & \begin{array}{c} \curvearrowleft \\ \frac{\text{₱}24}{6} \\ \curvearrowright \end{array} & = & \begin{array}{c} \begin{array}{l} \text{Amount of money to be spent per} \\ \text{day for the allowance to last } \underline{6 \text{ days}} \end{array} \\ \frac{?}{5} \\ \begin{array}{l} \curvearrowleft \\ \text{Number of days the allowance will} \\ \text{last when } \underline{\text{₱?}} \text{ is spent per day} \end{array} \end{array}
 \end{array}$$

Solve

Use cross products to find the missing term.

$$\frac{\text{P}24}{6} = \frac{?}{5}$$

$$\text{P}24 \times 5 = ? \times 6 \quad (\text{The cross products of a proportion are equal.})$$

$$\text{P}120 = ? \times 6 \quad (\text{Think: 120 is the product of what number and 6?})$$

The missing term is 20.

Check

$$\frac{\text{P}24}{6} = \frac{\text{P}20}{5}$$

$$\text{P}24 \times 5 = \text{P}20 \times 6$$

$$\text{P}120 = \text{P}120 \quad (\text{The cross products are equal.})$$

Answer: Denie should spend only **P20** a day for her allowance to last 6 days.

Here's another example:

When a super typhoon hit a barangay, 15 families along the river side were transferred to the evacuation center. The Department of Social Welfare and Development (DSWD) provided certain packs of food for them which are enough for 8 meals. But 5 more families along the shoreline were also evacuated and brought to the same evacuation center. How many meals will the food last now given the same amount of food with additional family evacuees?

Use the four-step problem-solving process to guide you.

Understand

What is asked?

I am looking for the time the food will last if consumed by 20 families (15 + 5 more families).

What do I know about the problem?



I know that a certain pack of food will last for 8 meals for 15 family evacuees. If 5 more families were added, the food will last less than 8 meals.

This means that when the number of families *increases*, the number meals the food will last *decreases*.

This word problem involves **inverse proportion**.

Plan

I can organize the given information in a table.

		increase
		
Number of Family evacuees	15	20
Number of Meals the food will last	8	?
		decrease
		

To set up the proportion, I need to switch the terms in one quantity to make the ratios equivalent.

$$\begin{array}{ccc}
 \begin{array}{c} \text{Number of family} \\ \text{evacuees at first.} \end{array} & \begin{array}{c} \text{15} \\ \hline \end{array} & \begin{array}{c} \text{Number of family evacuees after 5} \\ \text{more families joined the 15 families.} \end{array} \\
 & \text{= } & \\
 \begin{array}{c} \text{Number of meals the food} \\ \text{will last for 20 families.} \end{array} & \begin{array}{c} \text{?} \\ \hline \end{array} & \begin{array}{c} \text{8} \\ \hline \end{array} \\
 & & \begin{array}{c} \text{Number of meals the food} \\ \text{will last for 15 families.} \end{array}
 \end{array}$$

Solve

Use cross products to find the missing term.

$$\frac{15}{?} = \frac{20}{8}$$

$$15 \times 8 = 20 \times ? \quad (\text{The cross products of a proportion are equal.})$$

$$120 = 20 \times ? \quad (\text{Think: 120 is the product of what number and 20?})$$

The missing term is 6.

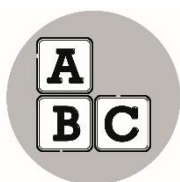
Check

$$\frac{15}{6} = \frac{20}{8}$$

$$15 \times 8 = 20 \times 6$$

$$120 = 120 \quad (\text{The cross products are equal.})$$

Answer: The pack of food will last for **6 days** for 20 family evacuees.



What's More

A. Answer the following problems based on the given situation. Write your answers on your answer sheet.

- 1) Five volunteers can finish painting the school fence in 8 days. So, _____ volunteers can finish the same job in 4 days at the same rate.

No. of volunteers	No. of days
5	4
(?)	8

$$5 \times 8 = (?) \times 4$$

$$\square = (?) \times 4$$

$$\square \div 4 = (?)$$

$$\square = (?)$$

- 2) If 6 pickers can pick 10 boxes of mangoes in 2 hours, how long will 4 pickers pick 10 boxes of mangoes at the same rate?

No. of pickers	No. of hours
10	(?)
4	2

$$10 \times 2 = 4 \times (?)$$

$$\square = 4 \times (?)$$

$$\square \div 4 = (?)$$

$$\square = (?)$$

- 3) Five dressmakers can sew 50 pajamas in 12 days. How many days will the 4 dressmakers sew 50 pajamas?

No. of dressmakers	No. of days
5	(?)
4	12

$$5 \times 12 = 4 \times (?)$$

$$\square = 4 \times (?)$$

$$\square \div 4 = (?)$$

$$\square = (?)$$

- 4) In a barber shop, 3 barbers can finish cutting the hair of 8 customers in 4 hours. How many barbers can finish cutting the hair of 8 customers in 6 hours?

No. of barbers	No. of hours
3	6
(?)	4

$$3 \times 4 = (?) \times 6$$

$$\square = (?) \times 6$$

$$\square \div 6 = (?)$$

$$\square = (?)$$

- 5) Six fishermen can catch 3 kilos of fish in 5 hours. How many fishermen can catch them in 3 hours?

No. of fishermen	No. of hours
6	3
(?)	5

$$6 \times 5 = (?) \times 3$$

$$\square = (?) \times 3$$

$$\square \div 3 = (?)$$

$$\square = (?)$$



What I Have Learned

An inverse proportion is a relationship between two quantities in which one increases as the other decreases in the same ratio.

A ratio table can be used to organize Information in a word problem involving inverse proportion.

Inverse proportions can be solved using mental math or cross products.



What I Can Do

Read and understand the following situations. Set up the mathematical equation for the inverse proportion and solve. Show your solutions on your answer sheet.

- 1) Two farmers can finish plowing the field in 6 days. How long will 3 farmers finish plowing the same field?
- 2) A family with 4 members can consume a sack of rice in 25 days.
So, a family with _____ members can consume it in 10 days at the same rate.
- 3) If 4 men can finish cutting the grasses in a 10-acre lawn in 6 days, how many more men can finish the same job in 3 days?
- 4) Three laborers were assigned to build the perimeter fence. If 6 laborers can build it in 10 days, how long will they be able to finish the job?
- 5) Three men can harvest 2 sacks of *palay* in 120 minutes. How many minutes will 9 men harvest the same amount of rice?
- 6) During the Brigada Eskwela, it takes 6 volunteers to finish repairing the armchairs in 4 days. How many volunteers are needed to repair the same number of armchairs in 3 days?
- 7) A private organization prepared food packs good for 5 days to 40 families in a barangay during the COVID-19 community quarantine. How long will the food supply last if 10 more families moved in?



Assessment

A. Identify whether the given problem below is *direct* or *inverse* proportion. Write your answer on your answer sheet.

- 1) Twenty beneficiaries who were affected by flood can consume 12 *gantas* of rice in 10 days. If five more beneficiaries were added to consume the same amount of rice, how long will they consume the rice?
- 2) In a printing press, twelve printing machines can print 200 copies of workbooks. If 8 printing machines were used, how many workbooks were printed?
- 3) A 20-meter post casts a shadow of 8 meters. Calculate the height of the post that will cast a shadow of 12 meters under the same condition.
- 4) Nine pipes can fill a swimming pool in 2 hours. How long will it take to fill the swimming pool with 12 pipes?
- 5) If 30 meters of rope cost ₱235.00, find the cost of 43 meters of rope.

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

- 6) If four workers can completely install floor tiles in 12 hours, at the same rate, how long will 3 workers do the same job?
- 7) In a farm, 12 men can build a *Bahay Kubo* in 5 days. How long will 4 men build the same project?
- 8) Six orphans can consume a certain amount of food in an orphanage in 15 days. So, 30 orphans can consume the same amount of food in _____ days.
- 9) A crate of seedlings can be planted by 18 volunteers in 4 minutes. How many volunteers are needed to plant the crate of seedlings in 9 minutes?
- 10) If 15 Brigada Eskwela volunteers can paint the walls of classroom buildings in 7 hours, then how many Brigada Eskwela volunteers can paint the same job in 3 hours?



Additional Activities

A. Modified true or false. Write **True** if the statement is correct. If not, change the underlined number/word to make the statement correct.

- 1) Two laborers can finish constructing a mini-fence in 6 days. So, 3 laborers can finish the same job in 4 days.
- 2) Five pickers are needed to pick a certain number of chicos in 6 minutes if two pickers can pick the same number of chicos in 9 minutes.
- 3) If 3 laborers can prepare the rice field for planting in 8 days, 4 laborers can do the same job in 6 days.
- 4) The budget is enough for 20 guests who will be served with 6 meals. If there are 30 guests with the same budget, they will be served with 6 meals.
- 5) The school can earn ₱500.00 from 12 consignees in 10 days. It takes 30 days to earn the said amount from 4 consignees.

B. Read and analyze the problems. Show your solutions on your answer sheet.

- 6) A road widening contractor has enough money to pay 10 laborers for 12 days. If he adds 5 more laborers, and pay them at the same rate, what do you think will happen to the number of days they work? Why?
- 7) Six dressmakers can finish sewing 12 sets of school uniforms in 10 days. How many days will it take 4 dressmakers to finish the same sets of school uniforms?
- 8) Twenty 5-kilogram boxes are needed to pack 100 kilograms of mangoes. If the seller decides to pack them in 4-kilogram boxes instead, how many of these boxes does he need?
- 9) Berto opens six water faucets to fill the tank with water in 120 minutes. How many water faucets does he need to open to fill the same tank with water in 90 minutes?
- 10) Fifteen volunteers are needed to perform minor repairs in the library within 5 days during the Brigada Eskwela. How many days will it take 25 volunteers to do the same job?



Answer Key

<p>Assessment</p> <p>A. 1. Inverse Proportion 2. Direct Proportion 3. Direct Proportion 4. Inverse Proportion 5. Direct Proportion</p> <p>B. 1. 16 hours 2. 15 days 3. 3 days 4. 8 volunteers 5. 35 volunteers</p> <p>Additional Activities</p> <p>A. 1. True 2. 3 3. True 4. 4 5. True</p> <p>B. 6. The number of days will decrease because the number of laborers increased. 7. 15 days 8. 25 boxes 9. 8 faucets 10. 3 days</p>	<p>What's More</p> <p>A. 1. IP 2. DP 3. IP 4. IP 5. DP</p> <p>B. 1. 40 4. 12 10 20 5. 30 30 10</p> <p>What I Can Do</p> <p>1. 4 days 2. 10 members 3. 4 more men 4. 20 days 5. 40 minutes 6. 8 volunteers 7. 4 days</p>	<p>What I Know</p> <p>A. 1. DP 2. IP 3. IP 4. DP 5. DP</p> <p>B. 1. 15 days 2. 16 dressmakers 3. 8 apples 4. 8 days 5. 3 more farmers</p> <p>What's In</p> <p>A. 1. 28 2. 1 3. 2 B. 4. 64 5. 16</p>
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What I Know

Answer the following questions based on the given situation. Write your answers on your answer sheet.

- 1) The ratio of two numbers is 7:3. Their sum is 150.
 - A. Draw a model to illustrate the problem.
 - B. What is the bigger number?
 - C. What is the smaller number?

- 2) During the mango harvest, the ratio of good ones to export quality is 3:5. The total harvest is 24 tons.
 - A. Draw a model to illustrate the problem.
 - B. How many tons are the good ones?
 - C. How many tons are the export quality?

- 3) The ratio of boys to girls in a classroom is 9:5. There are 42 children in all.
 - A. Draw a model to illustrate the problem.
 - B. How many boys are there?
 - C. How many girls are there?

- 4) In an aquarium, the ratio of yellow fish to blue fish is 4:5. The total number of fishes is 72.
 - A. Draw a model to illustrate the problem.
 - B. How many are yellow fish?
 - C. How many are blue fish?

- 5) Blue, green, and white socks are in the ratio of 6:2:5. The total number of socks is 65.
 - A. Draw a model to illustrate the problem.
 - B. How many are blue socks?
 - C. How many more white socks are there than green socks?

Lesson

3

Solving Problems Involving Partitive Proportion

You have learned what are ratios and proportions. In this lesson, you will use your knowledge in finding the missing term in partitive proportions. You will also apply what you have learned in identifying and solving problems that involve partitive proportion.



What's In

Identify which type of proportion is involved in each problem. Write **direct proportion** or **inverse proportion**. Then **solve**.

- 1) The ratio of the glasses to the plates is 2:6. If there are 24 plates, how many glasses are there?
Type of proportion: _____ Answer: _____
- 2) The ratio of the teacher to the learners is 2:30. If there are 5 teachers, how many learners are there?
Type of proportion: _____ Answer: _____
- 3) Two water pumps can fill a water tank in 20 minutes. How many minute will it take 4 pumps to fill the tank at the same rate?
Type of proportion: _____ Answer: _____
- 4) In a barangay, the ratio of the government employees to private employees is 3:7. If in a certain barangay there are 15 government employees, how many private employees are there?
Type of proportion: _____ Answer: _____
- 5) Paper planes can be folded by 4 children in 10 minutes. How many children can fold the paper planes in 8 minutes?
Type of proportion: _____ Answer: _____



What's New

Marcelo harvested 20 pomelos and mangoes in their backyard. The ratio of the number of pomelos to the number of mangoes is 2 : 3. How many pomelos and how many mangoes did he harvest?



What is It

Use the four-step problem-solving process to guide you.

Understand

What is asked?

I am looking for the number of pomelos and the number of mangoes that Marcelo harvested.

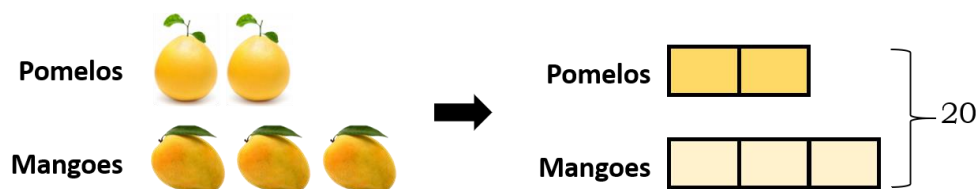
What do I know about the problem?

I know that Marcelo harvested a total of 20 pomelos and mangoes. The number of pomelos and number of mangoes are in the ratio 2 : 3. The total number needs to be divided proportionally into parts based on the given ratio.

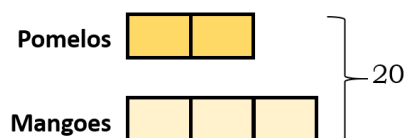
This word problem involves **partitive proportion**.

Plan

I can draw a model.



Solve



5 units \rightarrow 20

1 unit $\rightarrow 20 \div 5 = 4$

Add the terms of the ratio.

Divide the total by the sum of the terms.

2 units $\rightarrow 2 \times 4 = 8$ pomelos

3 units $\rightarrow 3 \times 4 = 12$ mangoes

} Multiply each term by the value of each unit.

Check

8 pomelos + 12 mangoes = 20 fruits

The ratio of the number of pomelos to the number of mangoes is 8 : 12.

In simplest form, 8 : 12 = 2 : 3.

Answer: Marcelo harvested **8 pomelos** and **12 mangoes**.

Another example:

Thea visited her grandparents in the farm. The ratio of the chicken to ducks is 7:4. The difference is 15. How many chickens and how many ducks are there?

Use the four-step problem-solving process to guide you.

Understand

What is asked?

Thea is looking for the number of chicken and the number of ducks in the farm.

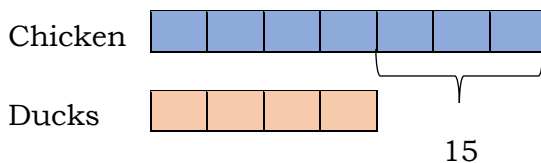
What do I know about the problem?

I know that the number of chicken and the number of ducks Thea saw in the farm is in the ratio of 7:4. The difference of chicken and ducks is 15.

This word problem involves **partitive proportion**.

Plan

I can draw a model.



Solve

3 units \rightarrow 15

1 unit $\rightarrow 15 \div 3 = 5$

Difference of terms in two ratio.

Divide the terms by the number of units.

7 units $\rightarrow 7 \times 5 = 35$ chickens

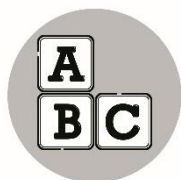
4 units $\rightarrow 4 \times 5 = 20$ ducks

} Multiply each term by the value of each unit.

Check

35 chickens – 20 ducks = 15 difference in the number of two animals

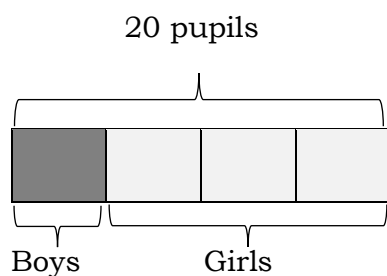
Answer: Thea saw **35 ducks and 20 chickens** in the farm.



What's More

Solve the problems involving partitive proportion by filling in the blanks with the needed data.

- 1) The ratio of the boys to the girls is 1:3. There are 20 pupils. How many boys and how many girls are there?



4 units = 20 pupils

1 unit = $20 \div \underline{\hspace{2cm}}$

1 unit = $\underline{\hspace{2cm}}$

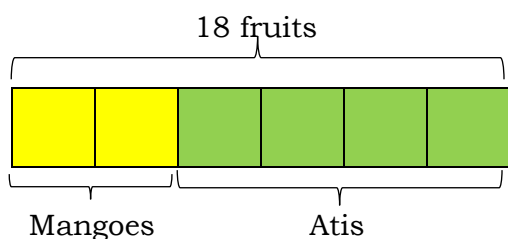
Number of boys : 1 unit \times 1 = $\underline{\hspace{2cm}}$ pupils

Number of girls : 3 units \times $\underline{\hspace{2cm}}$ = $\underline{\hspace{2cm}}$ pupils

Therefore, out of 20 pupils, there are $\underline{\hspace{2cm}}$ boys and $\underline{\hspace{2cm}}$ girls.

- 2) If the ratio of the mangoes to atis is 2:4, how many of each kind are there if there are 18 fruits?

There are 18 mangoes and atis.



6 units = 18 fruits

1 unit = $18 \div \underline{\hspace{2cm}}$

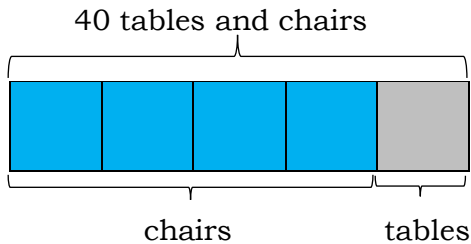
1 unit = $\underline{\hspace{2cm}}$

Number of mangoes : 2 units x 3 = ____ mangoes

Number of atis : 4 units x ____ = ____ atis

Therefore, out of 18 fruits, there are ____ mangoes and ____ atis.

- 3) There are 40 tables and chairs. How many tables and how many chairs are there if the ratio of the chairs to tables is 4:1?



5 units = 40 tables and chairs

1 unit = $40 \div$ ____

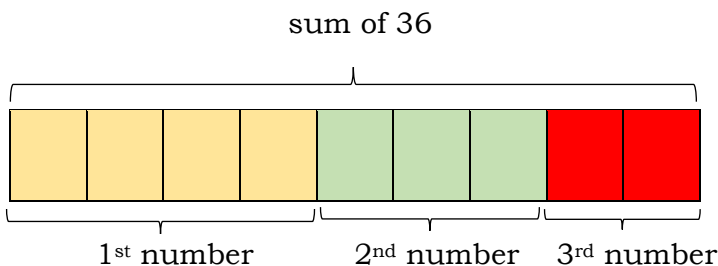
1 unit = ____

Number of chairs : 4 units x 8 = ____ chairs

Number of tables : 1 unit x ____ = ____ tables

Therefore, out of 40 tables and chairs, there are ____ chairs and ____ tables.

- 4) The ratio of three numbers is 4:3:2. The sum of these numbers is 36.
The numbers are ____, ____, and ____ respectively.



9 units = 36

1 unit = $36 \div$ ____

1 unit = ____

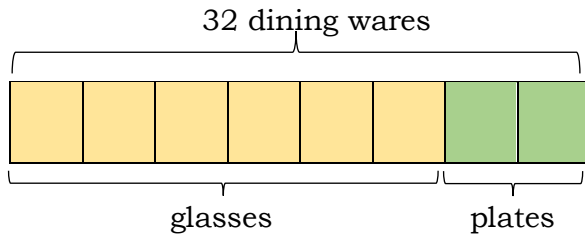
1st number : 4 units x 4 = ____

2nd number : 3 units x ____ = ____

3rd number : 2 units x ____ = ____

Therefore, the three numbers are ____, ____ and ____.

- 5) The ratio of the glasses to the plates is 2:6. If there are 32 dining wares, how many are plates?



$$8 \text{ units} = 32$$

$$1 \text{ unit} = 32 \div \underline{\hspace{2cm}}$$

$$1 \text{ unit} = \underline{\hspace{2cm}}$$

$$\text{Number of glasses : } 6 \text{ units} \times 4 = \underline{\hspace{2cm}}$$

$$\text{Number of plates : } 2 \text{ units} \times \underline{\hspace{2cm}} = \underline{\hspace{2cm}}$$

Therefore, out of 32 dining wares, there are $\underline{\hspace{2cm}}$ and $\underline{\hspace{2cm}}$.



What I Have Learned

Partitive proportion is a type of proportion in which a whole is divided into parts according to a given ratio.

To find a missing value in a partitive proportion:

- 1) add the terms of the given ratio;
- 2) divide the total by the sum of the terms; and,
- 3) multiply each term by the value of each unit.



What I Can Do

A. Match the column A with column B. Write the letter of the correct answer on your answer sheet. Then answer the puzzle below.

Column A	Column B
1.) The ratio of the papaya to the eggplant is 2:3. There are 25 fruits and vegetables. How many papayas are there?	N - 45 and 27
2.) If the ratio of the avocado to the tar apple is 2:5. How many tar apples are there if there are 21 fruits?	B - 10
3.) The ratio of roses to daisies is 8:3. The difference in their numbers is 20. So there are ____ roses and ____ daisies.	I - 60
4.) The difference of two even numbers in the ratio 5:3 is 24. What is the bigger number?	A - 32 and 12
5.) The sum of two numbers is 72. Their ratio is 5:3. What are the two numbers?	T - 70
	R - 15

Write the letter of your correct answers in this order to find the answer for the puzzle.

Challenge: It is an amazing three-pound organ that controls all functions of the body.

1 2 3 4 5

B. Read and understand the given situation below. Show the solution on your answer sheet.

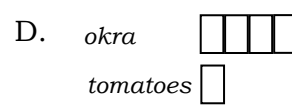
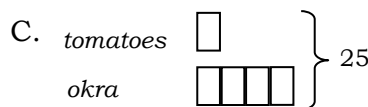
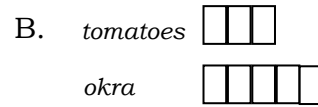
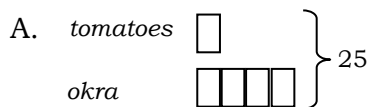
- 6) The ratio of calamansi to chicos is 4:5. If there are 54 trees, how many chicos are there?
- 7) Rikka planted lilies and dahlias in her flower garden. The ratio of lilies to dahlias is 2:5. How many are lilies if she planted 49 flowers?



Assessment

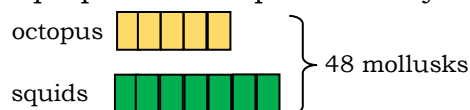
A. Solve the problem involving partitive proportion. Write the letter of the correct answer on your answer sheet.

- 1) The ratio of the tomatoes to okra is 1:4. There are 25 fruits and vegetables. How many are tomatoes? Which of the following models illustrate the problem?



- 2) The ratio of ampalaya to squash is 2:6. If there are 24 vegetables, how many are squash?
- A. 10 B. 12 C. 18 D. 20
- 3) There are 30 insects in a garden. The ratio of butterflies to dragonflies is 3:2. How many butterflies are there?
- A. 15 B. 18 C. 21 D. 24

- 4) What proportion is represented by the following illustration?



- A. 7:5=14:10 B. 5:7=20:28 C. 2:4=4:8 D. 5:7=12:48
- 5) The ratio of starfish and seahorse is 5:3. There are 24 sea creatures. How many are seahorses?
- A. 9 B. 15 C. 21 D. 32

B. Solve the problems involving partitive proportion using any of the methods learned. Show your solutions and write your answer on your answer sheet.

- 6.) In an animal shelter, the ratio of cats to dogs is 6:3. The difference in their numbers is 12. How many cats and how many dogs are there?
- 7) A farmer harvested his root crops. The ratio of camote to potatoes is 6:9. If he harvested 90 kg of root crops, how many are potatoes?
- 8) The teacher arranged the books and notebooks of the pupils. It was found out that the ratio of the books to the notebooks is 5:6. There were 132 pieces of books and notebooks. How many were books?
- 9) The ratio of the two numbers is 8:5. If their difference is 120, what are the 2 numbers?
- 10) The ratio of mugs to glasses to tea cups is 2:3:4. There are 135 drink-ware. How many are tea cups?



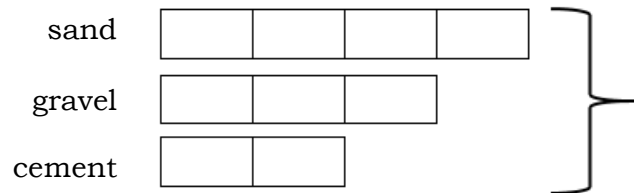
Additional Activities

Solve problems involving partitive proportion using any of the methods learned. Show your solutions and write your answer on your answer sheet.

Answer the problems and write your answer on your answer sheet.

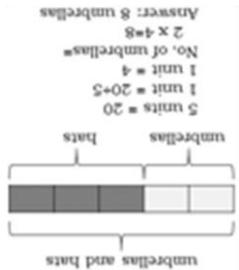
- 1) There are 20 kilograms of squid and fish in a freezer. If the fish is 2 parts of the whole, what part is the squid?
- 2) The ratio of umbrellas to hats is 2:3. If there are 20 hats and umbrellas, how many are umbrellas? Draw a model and solve the problem.
- 3) The sum of 2 numbers is 48. Write the possible ratios using the numbers 2, 3, 4, and 6 that will give the sum of 48.
- 4) The ratio of greater number and smaller number is 5:2. Their sum is 45. Change one of the terms in the ratio to make the proportion correct.
- 5) The product of two numbers is 192. If the ratio of the two numbers is 4:3, what are the two numbers?
- 6) The sum of even numbers is 24. Their ratio is 3:2:1. So, the even numbers are ____, ____ and ____ respectively.

- 7) A certain bakery donates 180 pieces of bread to the typhoon victims. The ratio of *pandesal* to cheese bread is 4:2. Another bakery donates 240 pieces of bread. The ratio of *pandesal* to cheese bread is 5:3. What is the new ratio of the *pandesal* to the cheese bread?
- 8) Mang Jimmy needs a mixture of 4 parts white paint and 5 parts blue paint to achieve a certain shade of blue to be painted on the tables and chairs. A mixture of 7 liters of white paint and 6 liters of blue paint is available. How will he fix the mixture to get the same shade of blue?
- 9) In the public parking lot, the ratio of private cars to jeepneys is 3:9. In each jeepney, there are 6 passengers. How many passengers are there if there are 96 vehicles?
- 10.) Create a problem involving the mixture of sand, gravel and cement for a foot walk project using the model below. Then, solve your problem.





Answer Key

<p>What I Can Do</p> <p>1. B 6. 30 chicos 2. R 3. A 4. I 5. N</p> <p>Assessment</p> <p>1. A 2. C 3. B 4. B 5. A 6. 24 cats, 12 dogs 7. 54 potatoes 8. 60 books 9. 320 and 200 10. 60 teacups</p> <p>Additional Activities</p> <p>1. 3</p>  <p>2. 2:4, 4:2, 3:9, 9:3, 2:6, 6:2, 3:2, 2:2, 13:2, 5:4, 16, 12, 12, 8, 4, 9:5</p> <p>8. To get the same shade of blue, add 1 L of white paint and 4 L of blue paint.</p> <p>9. 432 passengers</p> <p>10. A foot walk project mixed sand, gravel and cement with a ratio of 4:3:1. If they used 144 bags of the mixture, how many bags of cement was used? 18 bags cement (Possible Answer)</p>	<p>What's More</p> <p>1. $\frac{4}{5}$ 5 pupils 5, 15 pupils 5 boys, 15 girls</p> <p>2. $\frac{6}{3}$ 6 mangoes 3, 12 ats 6 mangoes, 12 ats</p> <p>3. $\frac{8}{5}$ 32 chairs 8, 8 tables 32 chairs, 8 tables</p> <p>4. $\frac{9}{4}$ 16 4, 12 4, 8 16, 12 and 8</p> <p>5. $\frac{8}{4}$ 24 24 glasses, 8 plates</p> <p>What I Can Do</p> <p>1. 10 papayas 2. 15 tar apples 3. 32 roses, 12 daisies 4. 60 5. 45 and 27 6. 30 chicos 7. 14 lilies</p>	<p>What I Know</p> <p>1. a. bigger number 150 b. smaller number 105 c. 45</p> <p>2. a. good ones 24 tons b. export quantity 9 c. 15</p> <p>3. a. boys 42 children b. girls 27 c. 15</p> <p>4. a. yellow fish 72 fishes b. blue fish 32 c. 40</p> <p>5. a. blue socks 65 socks b. green socks white socks 30 c. 15</p> <p>What's In</p> <p>1. Direct, 6 2. Direct, 75 3. Inverse, 10 4. Direct, 35 5. Inverse, 5</p>
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