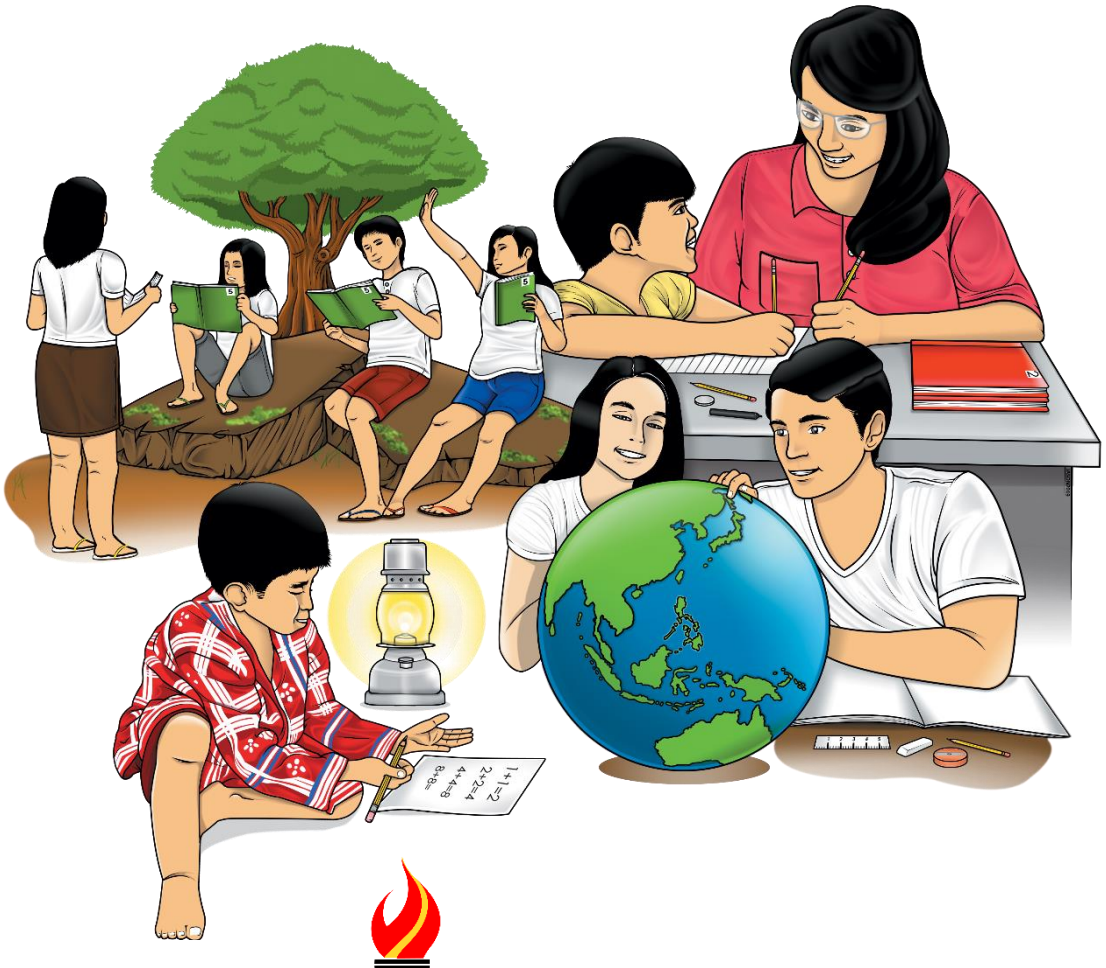
5

DepED
DEPARTMENT OF EDUCATION

Mathematics

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



ALTERNATIVE DELIVERY MODE
ADM

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

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

Development Team of the Module

Writers: Frederick S. Cruz

Editors: Nian L. Atis, Veronica Afable

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

Illustrator: Salvacion Sarmiento

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

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

Printed in the Philippines by _____

Department of Education – Region VIII

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

5

Mathematics

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

DepED
DEPARTMENT OF EDUCATION

Introductory Message

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

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

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

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

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

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

Thank you.

What I Need to Know

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

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

After going through this module, you are expected to:

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

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

What I Know

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

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

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

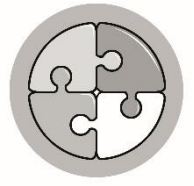
3. Princess, a grade five pupil, had a notebook with 30 pages. If she used 10 pages, what percent of the pages of the notebook did she use? *Which of the following is asked in the problem?*
    a. Base
    b. Rate
    c. Percentage
    d. Proportion

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

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

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

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



What's In

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

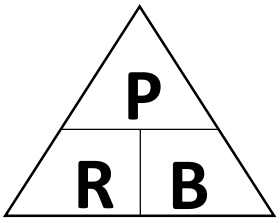
Percentages are like fractions and decimals. They can be used to describe the proportion of a whole and its parts. Percentage is a term from a Latin word which means "out of one hundred". We may therefore consider percentage as part of a whole. That whole or total is the base. The number with the percent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

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

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

Thus,

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



Consider the sample situation that follows.

Example 1

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

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

P = R ×B Rate = 10% Base = P60

Percentage = 10% ×P 60.00

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

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

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

n out of 60 = 10 out of 100

n:60 = 10:100

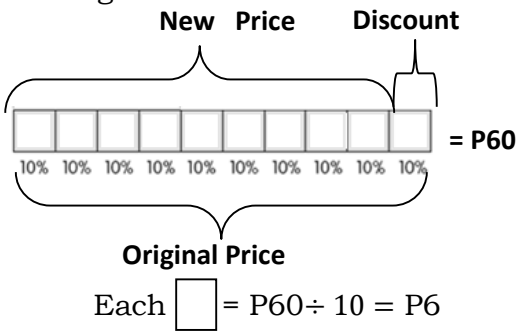
By the cross-product rule, we have the following.

$100 \times n = 60 \times 10$

$100n = 600$

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

$n = 6$



Each ☐ = P60÷ 10 = P6

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

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

Try the problem below.

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

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

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

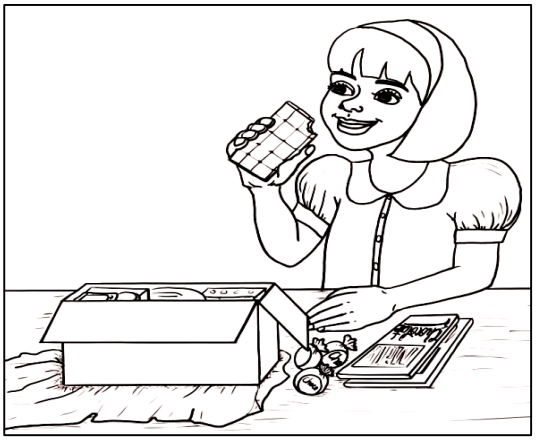
What's New

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

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

Read carefully the problem below.

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



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

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

What is It

Now, let's discuss the earlier word problem.

Example 1

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

First Step: What are given in the problem?

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

Second Step: What do we need to find out?

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

Third Step: What does 4 represent?

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

Fifth Step: What does 80% represent?

It represents the rate (80 out of 100).

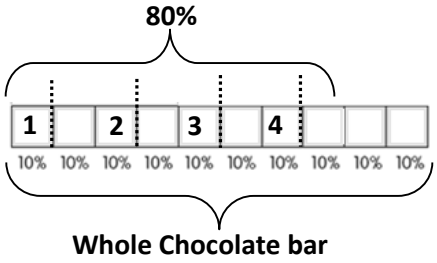
Now, let the whole part of chocolate bar be *n*.

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

Base = Percentage divided by Rate

$n = 4 \div 80\%$

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

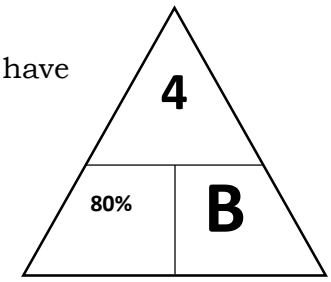


Therefore, the chocolate bar has 5 parts, in which 4 parts have been eaten by Emmie. The bar model is also helpful in solving the problem.

Using the Techan's Triangle

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

Thus, we have



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

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

$$= \frac{4}{0.80}$$

$$= 5$$

Example 2

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

First Step: What are given in the problem?

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

Second Step: What do we need to find out?

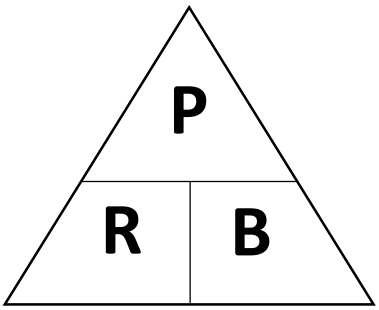
We need to find out the amount of discount *(percentage)* and the amount he had to pay to the cashier.

Third Step: What does P2 750 represent?

It represents the base (or the whole).

Fifth Step: What does 20% represent?

It represents the rate (20 out of 100).



We are now ready to solve the problem.

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

So, we write

Percentage = rate × base.

n = 20% of 2 750

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

= 55 000 ÷ 100

= 550

= P2 750

Each ☐ = P2 750 ÷ 5 = P 550

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

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

P2750.00 – P550.00 = P2200.00

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

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

Example 3

What is 20% of 30?

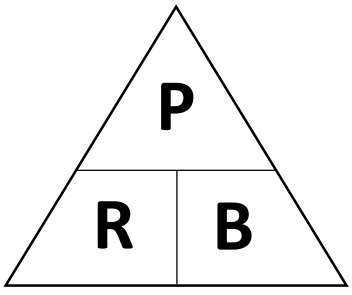
Solution: The base is 30. The rate is 20%. The unknown is the percentage.

P = R × B

Percentage = Rate × base

$= 20\% \times 30$

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



Hence, the 20% of 30 is 6.

Example 4

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

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

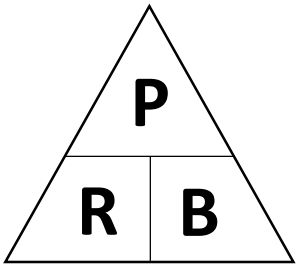
B = P divided by R

Base = Percentage divided by the Rate

$= 14 \div 5\%$

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

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



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

Example 5

What percent of 120 is 30??

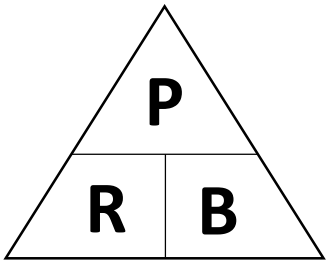
Solution: The base is 120. The percentage is 30. The unknown is the rate.

R = P divided by B

Rate = Percentage divided the Base

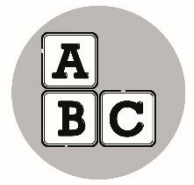
$= 30 \div 120$

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



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

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



What's More

Activity 1 Rate Me One More Time!

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

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

Activity 2 Find Me in Words!

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

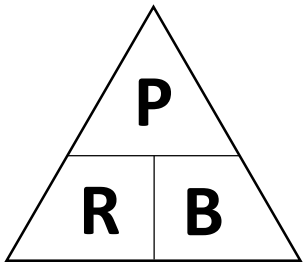
Given	Base	Rate	Percentage
1)	200	Unknown	16
2)			
3)			
4)			
5)			
6)			

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

Activity 3 What are Missing on Me!

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

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



The solution for Problem 1 is given below.

Percentage = Rate × Base

25% of P 500 = 25/100× P 500 = P 125.

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

What I Have Learned

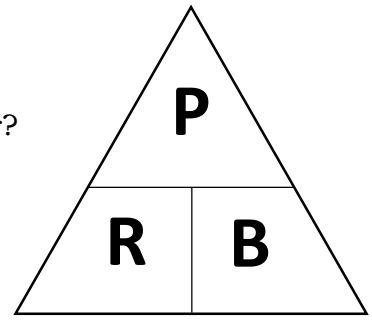
A. In your own words, how are you going to identify the base, percentage and rate in a word problem? Consider the given below for your explanation.

The 50% of 300 is 150.

Identify the base, rate and percentage.

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

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



Excellent! You are almost done. Keep going!

What I Can Do

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

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

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

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

a. What are the given data in the problem?

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

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

Assessment

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

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

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

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

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

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

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

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

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

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

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

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

Additional Activities

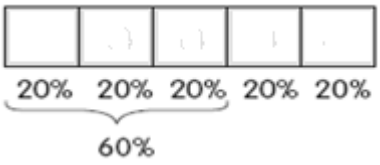
Directions: Copy the following on your answer sheet. Show your solution. One is done for you.

1. What is 40% of 300? 

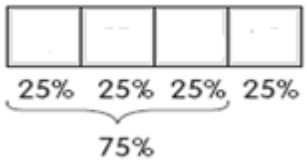
= 300

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

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

2. What 60% of 200? 

= 200

3. What is 75% of 600? 

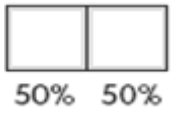
= 600

4. What is 20% of P 350? 

= P 350

5. What is 80% of P 48? 

= P48

6. What is 50% of P 24.50? 

= P 24.50

Answer Key

What I Know

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

What's In

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

What's More

Activity 1 Rate me One More Time!

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

Activity 2 Find Me in Words!

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

Activity 3 What are Missing On Me!

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

What I Have Learned

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

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

1. 200 2. 20% 3. 40

What I Can Do

a. Given data:

Principal amount of P15,000.00

Interest of P150 a month

Rate of 1% monthly

b. Base = P15 000

Rate = 1%

Percentage = P150

Assessment

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

Additional Activities

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

References

Mathematics 5 Teacher's Guide

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

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

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

https://khanacademy.org

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

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

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

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

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

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

For inquiries or feedback, please write or call:

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

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

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

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