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Mathematics
Quarter 2 – Module 1:
Relating Fraction and Ratio

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Quarter 2 – Module 1: Relating Fraction and Ratio
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Mathematics
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Relating Fraction and Ratio

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 gain a better understanding of the relationship between ratio and proportion. The scope of this module allows you to use it in many different learning situations. The language used recognizes your diverse vocabulary level.

The module contains a lesson on Expressing One Value as a Fraction of Another Given Their Ratio and Vice Versa (**M6NS-IIa-129**).

After going through this module, you are expected to:

1. recognize that the relationship between two quantities can be shown using ratios and fractions;
2. use concrete objects or draw pictorial models to show the relationship between ratios and fractions; and
3. express one value as a fraction of another given their ratio and vice versa.

What I Know

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

1) Rex has 3 sons and 4 daughters.
   A. The ratio of the number of sons to the number of daughters is ____ : ____.
   B. The number of sons is _____ of the number of daughters.

2) The volume of juice in Glass A is $\frac{9}{5}$ of the volume of juice in Glass B.
   A. Draw a block model to compare the volumes of juice in the two glasses.
   B. Express the volume of juice in Glass B as a fraction of the volume of juice in Glass A.
   C. Find the ratio of the volume of juice in Glass A to the volume of juice in Glass B.
   D. Find the ratio of the volume of juice in Glass A to the total volume of juice in the two glasses.

3) Larry, Irma and Gary joined a spelling bee. The ratio of Larry's score to Irma's score to Gary's score is 4 : 5 : 7.
   A. Draw a block model to compare the scores of the three children.
   B. What is the ratio of Larry's score to the total scores of the three children in simplest form?
   C. What fraction of Irma's score is Gary's score?
   D. What fraction of the total scores of the three children is Irma's score?

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<table>
<tr><td>**Lesson**
1</td><td>**Expressing One Value as a Fraction of Another Given their Ratio and Vice Versa**</td></tr>
</table>

You have learned previously that we write a fraction to represent a part of a whole. We can also compare quantities using ratio. But are fractions and ratios the same? In this lesson, we will find out how fractions and ratios are related, and how they can be used to compare two quantities.

What's In

A. Write ratios for the following illustration. Write your answers on your answer sheet.
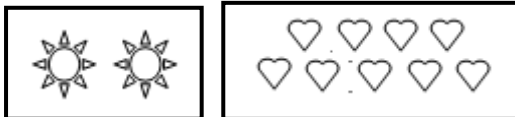
1) suns to hearts   _____
2) hearts to total number of figures   _____
3) suns to total number of figures   _____
4) hearts to suns   _____
5) total number of figures to suns   _____

B. The number of flowers in Lito's garden is represented as follows.

Gumamela [ ][ ][ ][ ]
Orchid   [ ][ ][ ][ ][ ]

Write ratios and a question that matches each ratio.

Example:
   7 : 12   What is the ratio of the number of orchids to the total number of flowers in the garden?

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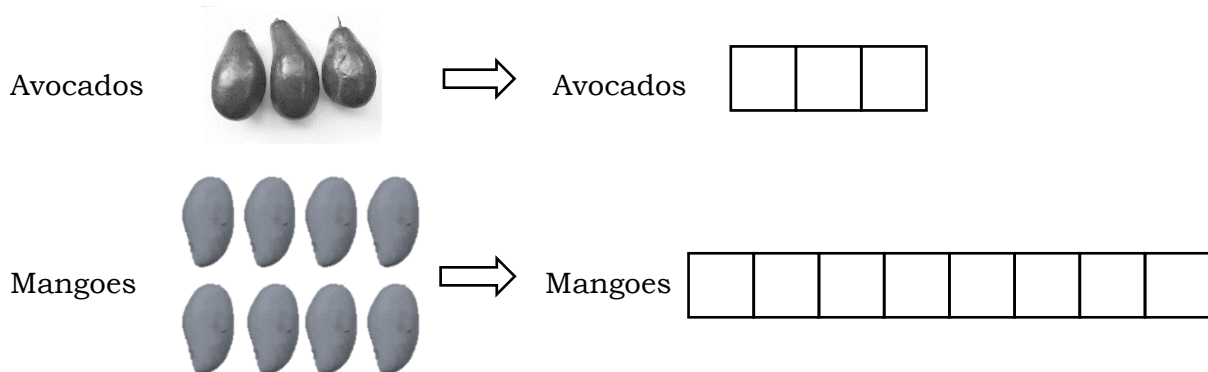4. _____ _____
5. _____ _____

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What's New

Raymond bought 3 avocados and 8 mangoes. Use ratios and fractions to compare the number of fruits that he bought.

How do you compare the number of mangoes and the number of avocados using fractions and ratios?

What is It

We can draw model to show the number of fruits Raymond bought.

Avocados Avocados

Mangoes Mangoes

The ratio of the number of avocados to the number of mangoes Raymond bought is 3 : 8.

This ratio can also be written as a fraction:

$$\frac{\text{Number of avocados}}{\text{Number of mangoes}} = \frac{3}{8}$$

➡ the first quantity of the ratio
➡ the second quantity of the ratio

The number of avocados is $\frac{3}{8}$ of the number of mangoes.

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The ratio of the number of mangoes to the number of avocados Raymond bought is 8 : 3.
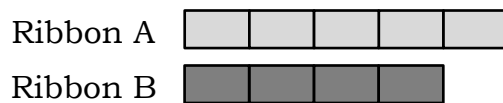
This ratio can also be expressed as a fraction:

$$\frac{\text{Number of mangoes}}{\text{Number of avocados}} = \frac{8}{3}$$

The number of avocados is $\dfrac{8}{3}$ of the number of mangoes.

Here are other examples.

1) Ribbon A is 5 m long. Ribbon B is 4 m long.

Ribbon A
Ribbon B

The ratio of the length of Ribbon A to the length of Ribbon B is 5 **:** 4.

Total length of the two ribbons = 5 + 4 = 9 m.

Express the length of Ribbon A as a fraction of the total length of the two ribbons.	➡	$\dfrac{\text{length of Ribbon A}}{\text{total length of the two ribbons}} = \dfrac{5}{9}$

The length of Ribbon A is $\dfrac{5}{9}$ of the total length of the two ribbons.
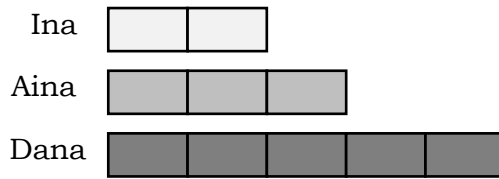
What fraction of the total length of the two ribbons is the length of Ribbon B?	➡	$\dfrac{\text{length of Ribbon A}}{\text{total length of the two ribbons}} = \dfrac{4}{9}$

The length of Ribbon A is $\dfrac{4}{9}$ of the total length of the two ribbons.

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2) Ina, Aina and Dana saved some money from their allowance in the ratio 2 : 3 : 5.

The amount of money Ina saved is $\frac{2}{3}$ of the amount of money Aina saved.

The amount of money Dana saved is $\frac{5}{3}$ of the amount of money Aina saved.

Total amount of money saved **= 2 + 3 + 5**

= 10 units

The ratio of the amount of money Aina saved to the total amount of money saved is **3 : 10**.

The amount of money Aina saved is $\frac{3}{10}$ of the total amount of money saved.

The ratio of the amount of money Dana saved to the total amount of money saved is **5 : 10 = 1 : 2**.

The amount of money Dana saved is $\frac{1}{2}$ of the total amount of money saved.

3) Sofia's height is $\frac{5}{7}$ of Arnel's height.

The ratio of Sofia's height to Arnel's height is 5 : 7.

The ratio of Arnel's height to Sofia's height is 7 : 5.

The total height of the two friends is 5 + 7 = 12 units.

The ratio of Arnel's height to the total height of the two friends is 7 : 12.

Arnel's height is $\frac{7}{12}$ of the total height of the two friends.

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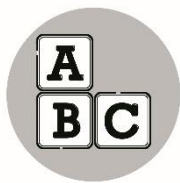4) Bryan is 4 times as old as Linda.

Bryan [ ][ ][ ][ ]
Linda [ ]

The ratio of Bryan's age to Linda's age is 4 :1.

Linda's age is $\frac{1}{4}$ of Bryan's age.

Their total age = 4 + 1 = 5 units
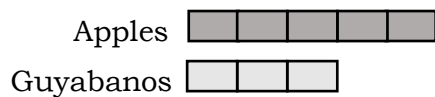
Linda's age is $\frac{1}{5}$ of their total age.

The ratio of Bryan's age to their total age is 4 : 5.

What's More

Study each situation carefully. Then complete each statement. Write your answers on your answer sheet.

1) There are 5 apples and 3 guyabanos on a table.

Apples [ ][ ][ ][ ][ ]
Guyabanos [ ][ ][ ]

The ratio of the number of apples to the number of guyabanos is ____ : ____.

$$\frac{\text{Number of apples}}{\text{Number of guyabanos}} = \frac{\square}{\square}$$

The number of apples is _____ of the number of guyabanos.

The ratio of the number of guyabanos to the number of apples is ____ : ____.

$$\frac{\text{Number of guyabanos}}{\text{Number of apples}} = \frac{\square}{\square}$$

The number of guyabanos is _____ of the number of apples.

2) Tina has 2 red marbles and 5 blue marbles.

Red marbles ☐☐
Blue marbles ☐☐☐☐☐

The ratio of the number of blue marbles to the number of red marbles is
____ : ____.

$$\frac{\text{Number of blue marbles}}{\text{Number of red marbles}} = \frac{\square}{\square}$$

The number of blue marbles is _____ of the number of red marbles.

The ratio of the number of red marbles to the total number of marbles is
____ : ____.

$$\frac{\text{Number of red marbles}}{\text{Total number of marbles}} = \frac{\square}{\square}$$

The number of red marbles is _____ of the total number of marbles.

3) Rey is 7 times as heavy as his son Ivan.

Rey ☐☐☐☐☐☐☐
Ivan ☐

The ratio of Ivan's weight to Rey's weight is ____ : ____.

Ivan's weight is $\frac{\square}{\square}$ of Rey's weight.

Their total weight is _____ + _____ = _____ units.

Ivan's weight is $\frac{\square}{\square}$ of their total weight.

The ratio of Rey's weight to their total weight is ____ : ____.

Rey's weight is $\frac{\square}{\square}$ of their total weight.

4) The number of stamps Percy has is $\frac{7}{3}$ of the number of stamps May has.

Percy ☐☐☐☐☐☐☐
May ☐☐☐

The number of stamps May has is _____ of the total number of stamps they have.

The ratio of the number of stamps Percy has to the total number of stamps they have is _____ : _____.

The ratio of the number of stamps Percy has to the number of stamps May has to the total number of stamps they have is _____ : _____ : _____.

5) Hassan had ₱15, Julie had ₱30, and Arnel had ₱21.

The total amount of money they had is _____.

The ratio of the amount of money Julie had to the amount of money Arnel had in its simplest form is _____ : _____.

The amount of money Hassan had is _____ of the amount of money Arnel had.

The amount of money Julie had is _____ of the total amount of money they had.

In its simplest form, the ratio of the total amount of money Hassan and Arnel had to the total amount of money all three had is _____ : _____.

 What I Have Learned

Fractions and ratios can be used to compare two quantities.

When a ratio is given, one value can be expressed as a fraction of another.

When a fraction is given, the quantities can be expressed as a ratio.

How are ratios similar to fractions? How do they differ?

What I Can Do

Work on each set of tasks. Write your solutions and answers on your answer sheet.

A. The volume of water in Bottle A is $\frac{7}{8}$ of the volume of water in Bottle B.

    1) Draw a model to compare the volumes of water in Bottle A and Bottle B.
    2) Find the ratio of the volume of water in Bottle A to the volume of water in Bottle B.
    3) Find the ratio of the volume of water in Bottle A to the total volume of water in the two bottles.
    4) Express the volume of water in Bottle B as a fraction of the total volume of water in both bottles.

B. Ramona scored a total of 18 points in a 20-item Math test.
    1) What is the ratio of the number of correct answers to the number of incorrect answers? Give your answer in simplest form.
    2) What is the ratio of the number of incorrect answers to the total number of test items?
    3) What fraction of the total number of test items is the number of correct answers?

C. $\frac{1}{3}$ of Jose's money is equal to $\frac{1}{4}$ of Diwa's money.

    1) Find the ratio of Jose's money to Diwa's money.
    2) What is the ratio of the total amount of money to Jose's money?
    3) What fraction of the total amount of money is Diwa's money?

D. In a box, the number of squares is 5 times as much as the number of triangles.

    The number of circles is $\frac{4}{5}$ of the number of squares.

    1) Draw a model to compare the numbers of squares, triangles and circles.
    2) What fraction of the number of circles is the number of triangles?
    3) Find the ratio of the number of squares to the number of triangles to the number of circles.
    4) In its simplest form, what is the ratio of the number of triangles and circles to the total number of shapes?
    5) Express the number of circles as a fraction of the total number of shapes in its simplest form.

Assessment

A. Read and analyze each item carefully. Then choose the letter of the best answer.

1) Nena bought some books and notebooks during a sale. The ratio of the number of books to the number of notebooks is 7 : 9. Which of the following models illustrates this situation?

A.

C.

B.

D.
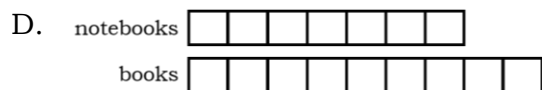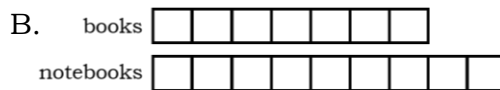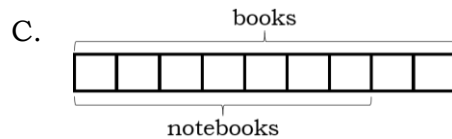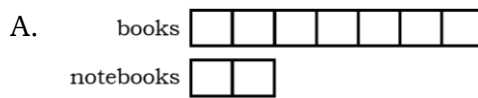
2) Jun ran a distance that is $\frac{11}{8}$ of the distance John ran. Which of the following CANNOT be answered by the given information?
   A. The ratio of the distance John ran to the distance Jun ran
   B. The distance Jun ran as a fraction of the total distance the two boys ran
   C. The ratio of the total distance the two boys ran to the distance John ran
   D. The actual distance that each boy ran

3) A store sold 10 gallons of palm oil and 8 gallons of olive oil. What fraction of the total amount of vegetable oil sold is the number of gallons of olive oil?
   A. $\frac{4}{9}$ B. $\frac{10}{8}$ C. $\frac{5}{9}$ D. $\frac{9}{4}$

4) In a class, the number of girls is $\frac{11}{30}$ of the total number of pupils. What is the ratio of the number of boys to the number of girls in the class?
   A. 11 : 19   B. 11 : 30   C. 19 : 11   D. 30 : 19

5) Alex, Caleb and Minda shared a sum of money in the ratio 5 : 6 : 7. Which of the following statements is FALSE?
   A. Alex's money is $\frac{5}{7}$ of Minda's money.
   B. The ratio of Minda's money to the sum of money the three shared is 7 : 15.
   C. The sum of money the three shared is 3 times Caleb's money.
   D. The sum of Caleb and Minda's money is $\frac{13}{5}$ of Alex's money.

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B. Read and analyze each situation carefully. Then, answer the questions that follow. Show your solutions and provide your answers in simplest form.

1) In Kyle's garden, there are 14 pots of roses and 20 pots of daisies.
   a. What is the ratio of the number of pots of daisies to the number of pots of roses?
   b. What fraction of the total number of pots is the number of pots of daisies?

2) Mrs Perez has three bags of flour. The ratio of the amount of flour in Bag A to the amount of flour in Bag B is 2 : 3. The amount of flour in Bag C is 2 times as much as the amount of flour in Bag B.
   a. What is the ratio of the amount of flour in Bag A to the amount of flour in Bag B to the amount of flour in Bag C?
   b. What is the ratio of the total amount of flour in the three bags to the amount of flour in Bag B?
   c. What fraction of the amount of flour in Bag C is the amount of flour in Bag A?

Additional Activities

A. The length of a rectangle is 5 times as long as its width.
   1) What is the ratio of the length of the rectangle to its width to its perimeter?
   2) What fraction of the perimeter of the rectangle is the width of the rectangle?
   3) The perimeter of the rectangle is 384 cm. What are the length and width of the rectangle?

B. On a table, the total number of pens and pencils is $\frac{16}{9}$ of the number of pencils.

   Rico drew the following model to compare the number of pens and the number of pencils.

   pens   ☐☐☐☐☐☐☐

   pencils   ☐☐☐☐☐☐☐☐☐
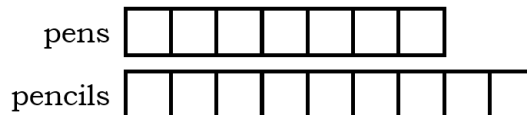
   Is he correct? Explain.

C. Here are statements comparing the number of girls and the number of boys.

> The ratio of the number of girls to the number of boys is 5 : 3.

> The number of girls is $\dfrac{3}{5}$ of the number of boys.

Are the two statements equivalent? Explain your reasoning.

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Answer Key

What's In

A.
1) 2 : 9
2) 9 : 11
3) 2 : 11
4) 9 : 2
5) 11 : 2

B. (In any order)
5 : 12   What is the ratio of the number of gumamelas to the total number of flowers in the garden?
5 : 7   What is the ratio of the number of gumamelas to the number of orchids?
7 : 5   What is the ratio of the number of orchids to the number of gumamelas?
12 : 5   What is the ratio of the total number of flowers in the garden to the number of gumamelas?
12 : 7   What is the ratio of the total number of flowers in the garden to the number of orchids?

What I Can Do

A.
Bottle A ▢▢▢▢▢▢
Bottle B ▢▢▢▢▢▢▢▢
1)
2) 7 : 8
3) 7 : 15
4) $\frac{7}{8}$

B.
1) 9 : 1
2) 1 : 10
3) $\frac{9}{10}$

C.
1) 3 : 4
2) 7 : 3
3) $\frac{4}{7}$

D.
squares ▢▢▢▢
triangles ▢
circles ▢▢▢
1)
2) $\frac{1}{4}$
3) 5 : 1 : 4
4) 1 : 2
5) $\frac{2}{5}$

Additional Activities

A.
1) 5 : 1 : 12
2) 1 : 12
3) length = 160 cm, width = 32 cm

B. Yes. (Explanations may vary).

C. No. (Explanations may vary).

Assessment

I.
1) B
2) D
3) A
4) C
5) B

II.
1)
a) 10 : 7
b) $\frac{10}{17}$
2)
a) 2 : 3 : 6
b) 3 : 11
c) $\frac{1}{3}$

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What's More

1) The ratio of the number of apples to the number of guyabanos is 5 : 3.

$$\frac{5}{3} = \frac{\text{Number of apples}}{\text{Number of guyabanos}}$$

The number of apples is $\frac{5}{3}$ of the number of guyabanos.

The ratio of the number of guyabanos to the number of apples is 3 : 5.

$$\frac{3}{5} = \frac{\text{Number of guyabanos}}{\text{Number of apples}}$$

The number of guyabanos is $\frac{3}{5}$ of the number of apples.

2) The ratio of the number of blue marbles to the number of red marbles is 5 : 2.

$$\frac{5}{2} = \frac{\text{Number of blue marbles}}{\text{Number of red marbles}}$$

The number of blue marbles is $\frac{5}{2}$ of the number of red marbles.

The ratio of the number of red marbles to the total number of marbles is 2 : 7.

$$\frac{2}{7} = \frac{\text{Number of red marbles}}{\text{Total number of marbles}}$$

The number of red marbles is $\frac{2}{7}$ of the total number of marbles.

3) The ratio of Ivan's weight to Rey's weight is 1 : 7.

Ivan's weight is $\frac{1}{7}$ of Rey's weight.

Their total weight is 7 + 1 = 8 units.

Ivan's weight is $\frac{1}{8}$ of their total weight.

The ratio of Rey's weight to their total weight is 7 : 8.

Rey's weight is $\frac{7}{8}$ of their total weight.

4) The number of stamps May has is $\frac{3}{10}$ of the total number of stamps they have.

The ratio of the number of stamps Percy has to the total number of stamps they have is 7 : 10.

The ratio of the number of stamps Percy has to the number of stamps May has to the total number of stamps they have is 7 : 3 : 10.

5) The total amount of money they had is ₱66.

The ratio of the amount of money Julie had to the amount of money Arnel had in its simplest form is 10 : 7.

The amount of money Hassan had is $\frac{5}{7}$ of the amount of money Arnel had.

The amount of money Julie had is $\frac{5}{11}$ of the total amount of money they had.

In its simplest form, the ratio of the total amount of money Hassan and Arnel had to the total amount of money all three had is 6 : 11.

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