

Ratios

BUSINESS MATH ABM STRAND

Objectives:

1. define and give examples of a ratio;
2. express a ratio as a fraction in simplest form(odds form and fractional form);
3. simplify a ratio involving rational numbers or decimals;
4. use ratios to compare measurements;
5. write ratios illustrating real-life situations; and
6. solve ratio problems.

Nutritional Info for a pack of Oatmeal

Serving Size: 35g	Serving per package: 11
Nutrients	per 35g
Energy (kcal)	142
Protein (g)	3.5
Carbohydrates (g)	27.3
Dietary fiber (g)	1.8
Magnesium (mg)	27.3

Boardwork:

Show the ratio of the amount of the following:

- a. protein to carbohydrates –
- b. carbohydrates to dietary fiber –
- c. protein to serving size –
- d. dietary fiber to energy –

What is a ratio?

DEFINITION

Remember:

A ratio is a comparison of two quantities by division.
The **ratio of a to b** can be written in two ways:

- a. as a:b (*odds notation*), where the symbol ":" is read as "is to"; or
- b. $\frac{a}{b}$, $b \neq 0$ (*fractional notation*)

Examples:

Example 1:

The ratio of 10 to 12 may be written as 10:12 (*odds notation*) or $\frac{10}{12}$ (*fractional notation*).

Example 2:

Simplify the following ratios to their simplest form.

- a. $\frac{1}{3} : \frac{3}{4}$ b. $1 \frac{1}{3} : \frac{3}{4}$ c. 0.09:0.12

How?

Solution:

To simplify a ratio involving rational numbers, multiply each of the quantities by the LCM of their denominators.

- a. The LCM of 3 and 4 is 12; hence,

$$\frac{1}{3} : \frac{3}{4} \rightarrow 12 \left(\frac{1}{3}\right) : 12 \left(\frac{3}{4}\right) \rightarrow 4:9$$

Alternative solution: (Reduce/simplify the way you would a complex fraction.)

$$\frac{1}{3} : \frac{3}{4} = \frac{\frac{1}{3}}{\frac{3}{4}} = \frac{1}{3} \times \frac{4}{3} = \frac{4}{9} \text{ or } 4:9$$

How?

b. The LCM of the denominators of $1\frac{1}{3} : \frac{3}{4}$ is 12.

$$1\frac{1}{3} : \frac{3}{4} \rightarrow \frac{4}{3} : \frac{3}{4} \rightarrow 12(\frac{4}{3}) : 12(\frac{3}{4}) \rightarrow 16:9$$

Alternative solution:

$$1\frac{1}{3} : \frac{3}{4} = \frac{1\frac{1}{3}}{\frac{3}{4}} = \frac{\frac{4}{3}}{\frac{3}{4}} = \frac{4}{3} \times \frac{4}{3} = \frac{16}{9} \text{ or } 16:9$$

How?

c. When a ratio is in decimal form, write its equivalent form without the decimals then reduce the ratio as needed. The ratio 0.09 : 0.12 may be cleared of decimals by multiplying both the numerator and denominator by 100. That is,

$$\frac{0.09}{0.12} = \frac{0.09 \times 100}{0.12 \times 100} = \frac{9}{12} = \frac{3}{4} \text{ or } 3:4$$

Alternative solution: Convert to fraction so as to show which power of 10 is to be multiplied to the ratio.

$$\frac{0.09}{0.12} = \frac{\frac{9}{100}}{\frac{12}{100}} = \frac{9}{12} = \frac{3}{4} \text{ or } 3:4$$

Examples:

Example 3:

In a class of 40 students, the ratio of passing grades to failing grades is 5 to 3. How many failed the course?

Solution:

The ratio 5 to 3 (or 5:3 or $\frac{5}{3}$) indicates that for every 5 + 3 = 8 students, there are 3 who would fail. That is,

$\frac{3}{8}$ of the class failed or $\frac{3}{8}(40) = 15$ students failed.

How do we use ratios in measurement?
When comparing measurements, we use the same unit of measurement in the numerator as in the denominator.

(In this case, **a ratio has no unit.**)

Examples:

Example 4:

A chocolate cake requires an average of one hour of baking time while a cupcake requires only 20 minutes of baking time. What is the ratio of baking time for chocolate cake to that for the cupcake? Express your answer in simplest form.

How?

Solution:

The chocolate cake requires 1 hour or 60 minutes to bake. The cupcake requires 20 minutes to bake. Therefore, the ratio of the baking time for the chocolate cake to that for the cupcake is 60:20. In simplest form, this is 3:1. (Note that the final answer has no unit.)

Examples:

Example 5:

Write the ratio, 28 days to 8 weeks, as a fraction in lowest terms.

How?

Solution:

Change 28 days to weeks: 7 days = 1 week, so 28 days = 4 weeks. Therefore, $\frac{4 \text{ weeks}}{8 \text{ weeks}} = \frac{1}{2}$. The ratio of 28 days to 8 weeks is 1:2.

Would the answer be the same when you write the number of weeks as a number of days? Explain.

One application of ratio is finding the size or value of different groups of quantities given the ratio.

Examples:

Example 6:

A piece of string, 20 cm long, is divided into two pieces in the ratio 3:2. What is the length of each of the two pieces of string?

How?

Solution:

Ratio = 3:2

Therefore, the Number of parts = $3 + 2 = 5$

Length of each part = $\frac{20}{5} = 4$ cm

Length of the longer piece = 4 cm 3 parts = 12 cm

Length of the shorter piece = 4 cm 2 parts = 8 cm

How?

Alternative Solution:

The total number of equal parts = $3 + 2 = 5$.

The length of the longer piece = $\frac{3}{5}$ of the length of the whole string = $\frac{3}{5} \times 20 = 12$ cm.

The length of the shorter piece = $\frac{2}{5}$ of the length of the whole string = $\frac{2}{5} \times 20 = 8$ cm .

Other examples

TO ILLUSTRATE RATIOS
IN REAL-LIFE SITUATIONS

Situations:

- We always use ratio in cooking: the ratio of eggs to flour; the ratio of salt to water; the ratio of chickens to pork.
- When at the grocery store, I buy 5 bananas for 60 pesos. The ratio is written as 5:60 or 60:5 or 12:1.
- At a grocery store, there was a sale of buy one take one free loaf of bread at PHP70. That is, for every loaf of bread you buy, you get one free. The ratio is 1:1.

Mastery Test:

PROBLEMS

- A survey asked 130 students which between the subjects Accountancy and Marketing is their preference. The result is given by the table below.

Response	Solution
Accountancy	70
Marketing	60
Total	130

Write each of the following ratios as a fraction in simplest form.

- students who prefer Accountancy to all students surveyed;
- students who prefer Marketing to students who prefer Accountancy.

2. A family of 5 people whose gross monthly income is PhP30,000 budgeted the following amounts for their major monthly expenditures:

House Rent	Php 8,000
Food	Php 6,000
Electricity	Php 2,000
Others	Php 1,000

- What is the ratio of the house rent to the food bill?
- What is the ratio of the food bill to the gross monthly income of the family?
- What is the ratio of the electricity bill to the food bill?
- What is the ratio of the other expenses to the gross monthly income of the family?

3. Write each ratio as a fraction in simplest form.

- In Metro Manila, 7 out of ten people live in rented homes.
- In a village, 120 homes in 130 have cable TV connection.
- In the Philippines, 35,000,000 out of 100,000,000 people are active in Facebook.
- In a college, there are 120 students on scholarship out of 500 students.

4. To make a 500-g cake, 6 cups of flour, 3 cups of butter, and 1.5 cups of sugar are needed. Write down the ratio of:

- the amount of sugar to the amount of flour;
- the amount of flour to the amount of butter to the amount of sugar.

For lesson handout,
visit:

<http://jacs.weebly.com>



THANK YOU!