



## Ratio and Rate

Suggested time: 45 minutes

### **What's important in this lesson:**

It is important for you recognize the difference between a ratio and a rate and be able to work confidently with both of them. When you are describing the rates, be sure that the statements you are making are very clear and to the point.

### **Complete these steps:**

1. Read through the Lesson portion of the package independently.
2. Complete the required 'Practice' questions.
3. If you have questions about the examples or the 'Practice' questions seek assistance from the teacher as needed.
4. Use 'Practice' Answer Keys to check your answers as they work through the package. If you are making errors, have your teacher review these questions with you.
5. Complete the Ratio and Rate Assignment
6. Complete the Reflective Activity

### **Hand-in the following to your teacher:**

1. Practice Problems from the Student Handout
2. Ratio and Rate Assignment
3. Reflective Activity

### **A Conversation with the teacher:**

1. Complete the Reflective Activity and then discuss your answers with your teacher.

### **Questions for the teacher:**



## Ratio and Rate

### Part A - Let's Compare! - Ratios

A **ratio** is a comparison of 2 numbers without units (often because they are the same things).

A ratio can be written in 3 ways.

A to B      or      A:B      or       $\frac{A}{B}$

### Examples

1. A class has 13 male and 15 females.

a. The ratio of males to females can be written as...

13 to 15      or      13:15      or       $\frac{13}{15}$

b. The ratio of females to total students would be...

15 to 28      or      15:28      or       $\frac{15}{28}$

Notice that the ORDER of the numbers is the same as the ORDER of the words!

2. A parking lot has 6 motorcycles, 21 cars, and 7 trucks.

a. What is the ratio of cars to truck?

The ratio of cars to trucks is 21:7.

This means that for every 21 cars, there are 7 trucks.

...but this answer can be REDUCED!

**21:7 = 3:1**      WHY?      HOW?

Since 21 and 7 are BOTH DIVISIBLE by 7 (like an equivalent fraction), and...

$$21 \div 7 = 3, \text{ and } 7 \div 7 = 1$$

So, the ratio of cars to trucks is actually 3:1. i.e. For every 3 cars, there is 1 truck!

## Student Handout: Unit 1 Lesson 5



- b. What is the ratio of trucks to motorcycles? **7:6**  
This does NOT reduce, since there is no number that divides into both 7 and 6)

So, the ratio of trucks to motorcycles is 7:6 i.e. For every 7 trucks, there are 6 motorcycles.

- c. What is the ratio of cars to motorcycles? **21:6**

Does this REDUCE? YES!

Both numbers are divisible by 3, so...

$$\mathbf{21:6 = 7:2}$$

So, the ratio of cars to motorcycles is 7:2 i.e. For every 7 cars, there are 2 motorcycles.

### 3. 3-termed ratios

Using example 2, what is the ratio of...

- a. trucks to cars to motorcycles?

$$7:21:6 \quad (\text{notice the order})$$

- b. cars to trucks to total vehicles?

$$\mathbf{21:7:34} \quad (\text{since } 6 + 7 + 21 = 34)$$

### Practice Problems

- Write the ratio 12:24 in lowest terms - \_\_\_\_\_
- Write the ratio (the answer) from 1 in 2 different ways: \_\_\_\_\_ and \_\_\_\_\_
- If the "12" in part 1 represents the number of apples, and the 24 represents the number of oranges, then complete this statement...

FOR EVERY \_\_\_\_\_, THERE ARE \_\_\_\_\_

- Write the ratio 4:8:24 in lowest terms - \_\_\_\_\_

## Student Handout: Unit 1 Lesson 5



5. Use the group of shapes below to write the following ratios. Reduce where needed!

XOOX=OO=XOX =XOOXXXO=X= OOX=X=O=OOO
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- a. Find the ratio of X's to O's
- b. Find the ratio of O's to ='s
- c. Find the ratio of X's to ='s to O's
- d. Find the ratio of O's to the total number of symbols in the box
6. Write any 3 TRUE statements about the symbols in the box. All 3 statements must begin with: "For every..." (LOWEST TERMS!)

**\* Check these answers before moving on to part B!**



Part B - Rate

**Rate** is very similar to RATIO except that...

- \* RATE compares items with different units
- and \* RATE is usually divided out...
- and \* RATE answers have TWO units

Examples

1. Rate of Speed

Terry travels 120km in 2 hours. What is his (average) RATE of SPEED?

*Notice that the two numbers have different units! (km and hours)*

$$\begin{aligned} \text{Terry's RATE of SPEED} &= \frac{120\text{km}}{2\text{hr}} \\ &= 60\text{km} / \text{hr} \quad \text{*Notice the 2 different units!} \end{aligned}$$

This means that, on average, Terry traveled 60 km EVERY hour.

Why did the question contain the word "AVERAGE"?

*Well, it's not likely that Terry traveled at an exact speed of 60 km/hr for the whole 2 hours! The word "AVERAGE" is used when the RATE is likely to change often.*

2. RATE of PAY

Beth earns \$56.40 for working an 8 hour shift. What is her RATE of PAY?

*Notice that "AVERAGE" isn't used, since her hourly RATE of PAY probably stayed the same for the entire shift*

$$\begin{aligned} \text{Beth's RATE of PAY} &= \frac{\$56.40}{8\text{hr}} \\ &= \$7.05 / \text{hr} \end{aligned}$$

Do you see the 2 units?  
\$ and hr

This means that Beth makes \$7.05 EVERY hour.



**Not all rates are calculated per HOUR.**

3. The glaciers have melted 35cm in the past 3 years. What is the RATE of MELT?

$$\begin{aligned} \text{RATE of MELT} &= \frac{35\text{cm}}{3a} \\ &= 11.\dot{6} / a \\ &= 11.7\text{cm} / a \end{aligned}$$

The letter “a” is often used for years, since “annum” (latin for year) begins with “a”.

Round this to 1 decimal place!

This means that the glaciers melt 11.7cm EVERY year.

Practice Problems

For each rate problem below...

- Calculate the RATE (to 1 decimal place where needed)
- Write a sentence which describes the RATE (use the word EVERY, as in the examples)

1. Sally walks 7 days a week. This week she walked a total of 24.5km.

2. Sue gets paid by the hour. She earned \$328.80 in 40 hours.

3. The plane flew a distance of 3000km in 7 hours.

## Student Handout: Unit 1 Lesson 5



4. I can eat 120 jellybeans in 25 minutes.

5. A box of 54 cookies has to feed 9 people (equally).

**\* Check the answers to these questions before moving on!**



## Ratio and Rate Assignment

1. a. Count the number of letters in the sentence below:

**“My favourite topic to learn in math is RATIO!”**

- i. total number of letters - \_\_\_\_\_
  - ii. number of vowels (aeiouy) - \_\_\_\_\_
  - iii. number of consonants - \_\_\_\_\_
- b. Write the ratio of...
- i. vowels : consonants - \_\_\_\_\_
  - ii. total letters : consonants : vowels - \_\_\_\_\_
  - iii. CAPITAL LETTERS : total letters - \_\_\_\_\_ = \_\_\_\_\_
  - iv. CAPITAL LETTERS : lower case letters - \_\_\_\_\_ = \_\_\_\_\_

- c. Complete the statement below:

“For every ONE CAPITAL letter in the sentence above, there are \_\_\_\_\_ lower case letters.”

2. My friend can type 2000 words in 50 minutes. Find out her RATE of TYPING.
3. A hockey player makes \$1,000,000 a year, and plays 72 games. Find his RATE of PAY per game.





**Reflection**  
**Developing Concepts in Proportional Reasoning**

1. Explain why it is important to express all fractions in their simplest form.

2. Identify 3 jobs in which you would regularly use fractions.

I. \_\_\_\_\_

II. \_\_\_\_\_

III. \_\_\_\_\_

3. Describe how you would change  $\frac{27}{4}$  into a mixed number.