

# Grade 7

## NUMBER SENSE AND NUMERATION: RATIO AND RATE

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Play the **Ratio Game** first.

Click on <http://www.bbc.co.uk/skillswise/numbers/wholenumbers/ratioandproportion/ratio/game.shtml> to play.

You may also go to [www.wiredmath.ca](http://www.wiredmath.ca) for the link.

**Ratio:** A way to compare two or more things in quantity, amount or size. For example, five out of every eight students have pets is a ratio of 5:8.

- A ratio can be written as **A:B**,  $\frac{A}{B}$  or “**A to B**”.

**Equivalent Ratio:** Ratios that represent the same fractional number, value or measure. For example, 4:2 is equivalent to 2:1.

A ratio is in **simplest form** when its terms have no common factors.

For example, to write 32:24 in simplest form:

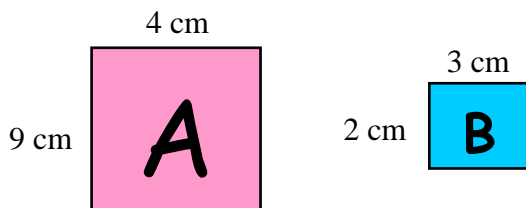
1. Find the greatest common factor (GCF) of 32 and 24.

2. Divide its terms by the GCF.

$$(32 \div 8) : (24 \div 8)$$

3. The resulting ratio, 4:3 is in the simplest form.

- Write a ratio, in simplest form, to compare the items in each sentence.
  - There were 15 boys and 12 girls in grade 7 class.
  - Janet had 3 skirts and 12 pants.
  - A bag contained 20 marbles, 12 of them are red and the rest of them are blue. What is the ratio of blue marbles to red marbles? What is the ratio of total marbles to blue marbles?
- An object's weight on the Earth's surface compared to on the Sun's surface is a ratio of 1:28. If a stone weighs 400 units on the Earth's surface, how much does it weigh on the Sun's surface?
- Write a ratio to compare the area of the following two figures.



**Did You Know?**  
The Sun is not a planet but a star?



4. Write two ratios equivalent to each ratio.

- a. 3:7
- b. 2:3
- c. 3:4
- d. 5:6
- e. 4:6
- f. 14:21

5. Fill in the missing numbers.

- a.  $1:2 = 3: \underline{\hspace{1cm}}$
- b.  $9:18 = 1: \underline{\hspace{1cm}}$
- c.  $36:42 = 6: \underline{\hspace{1cm}}$
- d.  $7:56 = 1: \underline{\hspace{1cm}}$
- e.  $3:14 = 15: \underline{\hspace{1cm}}$
- f.  $44:66 = 4: \underline{\hspace{1cm}}$

6. The scale of a map reads 1:125,000. What is the distance between Happy Valley and Beauty Valley, which are 2.5 cm apart on the map?

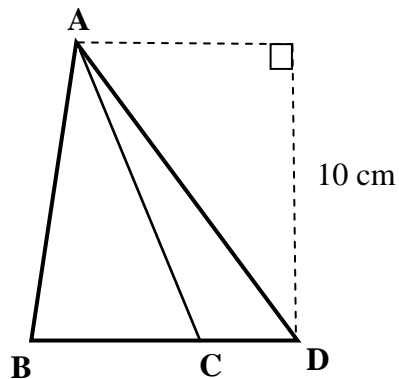
7. Maria wants to draw a rectangle with length to width ratio of 5:7. What are the dimensions of the largest rectangle that she can draw using a 20 cm by 30 cm piece of paper?

8. A study shows that five out of every one hundred Canadians have had a diagnosis of cancer. If the population of Canada is 34,000,000. How many Canadians have had a diagnosis of cancer?

9. In a group of 100 people, the ratio of men to women is 1:3. How many women in this group?

10. The area of triangle ABD is  $50 \text{ cm}^2$ . The length of BC to CD has a ratio of 15:10.

- a. What is the length of BC and CD?
- b. Write a ratio to compare the area of triangle ABC to the area of triangle ABD.



## Ratios and Music

### Interesting Fact!

The mathematician *Pythagoras* discovered that there is a simple mathematical relationship between the frequencies of sounds that produce the musical scale.

Note	Frequency
ti	$\frac{15}{8}$ of $x$
la	$\frac{5}{3}$ of $x$
so	$\frac{3}{2}$ of $x$
fa	$\frac{4}{3}$ of $x$
mi	$\frac{5}{4}$ of $x$
re	$\frac{9}{8}$ of $x$
do (middle C)	$x$

**Rate:** A fixed ratio that is used to compare different kinds of quantities. For example, apples are on sale at 6 for \$3.

**Unit Rate** compares number of units of the first type of quantity to one unit of the second type of quantity. For example, kilometres per hour, cost per item or earnings per year.

11. Express as unit rate.

- A customer service department received 20 calls in 5 hours.
- Peter read 40 pages in 2 hours.
- A train travelled 138 km in 60 minutes.
- A car travelled 30 km in 20 minutes.
- A plane flew 210 km in 15 minutes.

12. Gasoline costs \$5.25 for 5 litres.

- What is the cost per litre?
- How much would 35 litres of gasoline cost?
- How much gasoline could you purchase for \$50?

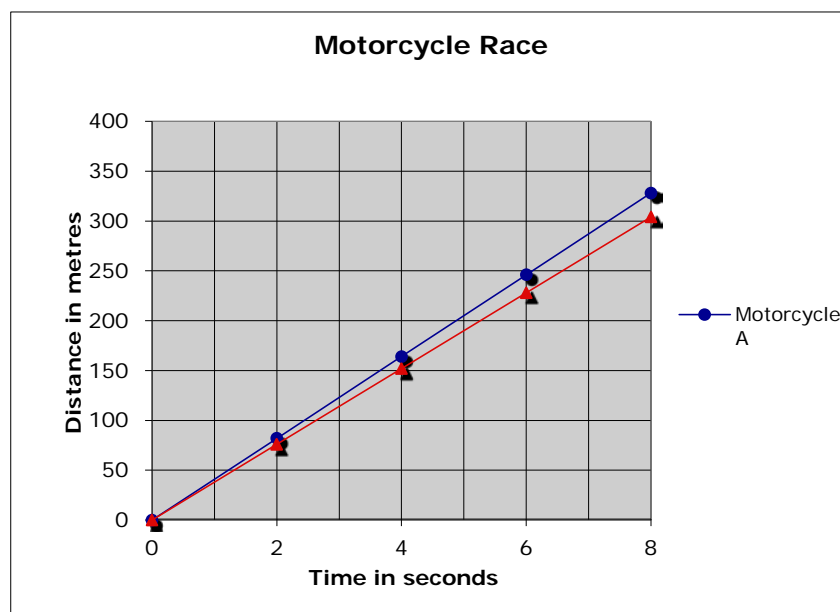


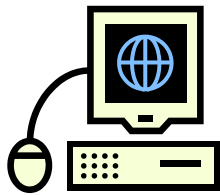
13. Steve plans to travel to New York during his summer holidays. The rate of exchange is \$1.18 CND to \$1 USD. How many USD would Steve get for \$800 CND?

14. Company A rents a car for \$0.12/km plus \$29.69/day. Company B rents a car for \$0.11/km plus \$32.30/day. Which company gives a better deal for a trip of 3500 km and it takes 3 days?

15. Refer to the following graph.

- What is the speed of each motorcycle?
- How far apart are the motorcycles after 10 seconds?





**Try These!**  
**Determine the Ratio**

<http://www.321know.com/rat62bx2.htm>

**Unit Rates**

<http://www.321know.com/rat-unit-rate.htm>

**CHALLENGE YOURSELF!!!**

16. Write each three-term ratio in the simplest term.

- a. 10:15:25
- b. 3:27:15
- c. 6:24:36
- d. 100:150:250
- e. 49:56:35

17. Determine the value of each variable.

- a.  $\frac{x}{7} = \frac{9}{4}$
- b.  $\frac{10}{2} = \frac{48}{x} = \frac{z}{5}$
- c.  $\frac{6.4}{8} = \frac{18}{y}$
- d.  $2.6:n = 4.8:1.2$

18. Two bags contain the same number of marbles. In one bag, the ratio of black marbles to white marbles is 4:3. In the other bag, the ratio is 3:2. Which bag contains more black marbles?



19. How many metres would you travel in 15 minutes at 62 km/h?

20.

Car	Fuel Used (L)	Distance (km)
Nissan Sentra	155.4	1850
Honda Civic Hybrid	100.11	2130
Lincoln Zephyr	235.62	1980
Mazda 3	120.12	1320
Toyota Highlander 4X4	222.25	1750

- a. Determine the rate of fuel consumption in L/100 km for each car.
- b. How much fuel would be used by each car on a trip of 8000 km?
- c. If fuel costs \$1.07 /L, calculate the fuel cost for each car for a trip of 8000 km.

**A Slice of History**

The *Golden Ratio - Phi* is a ratio of 1:1.61803 that named after Phidias (c. 500 - 432 BC). It is a unique number that have some interesting properties. Examples of the *Golden Ratio* can be found everywhere. For instance, it was used in glass pyramid of the Louvre, in Paris

