

Ratio – a comparison of two numbers or quantities **with the same units**.



Figure 1: There are 3 black squares to 1 grey square

Ratios can be show in different ways:

a. 2 cups of milk to 7 cups of water	b. \$5 to \$9
--------------------------------------	---------------

Example 2: Write each ratio in simplest form.

a. $\frac{6}{15}$	b. 4:12	c. 6 to 10
-------------------	---------	------------

Example 3: Write the following ratios in simplest form:

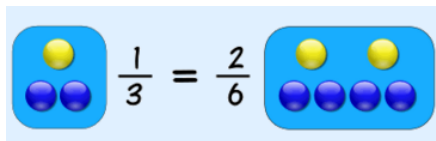
a. 45 minutes to 1 hour	b. 250 g to 1kg	c. 1m to 175cm
-------------------------	-----------------	----------------

Rate – a comparison of two numbers having **different units**.

A rate is usually written as a 'unit rate', in which the second term is always 1.

<p>Example 4: John earns \$60 for working 4 hours. What is his rate of pay?</p>	<p>Example 5: A car runs at a speed of 30m/s. How far can it run in 1 minute?</p>
<p>Example 6: A 200g bag of mixed nuts costs \$3.40. Calculate the unit rate.</p>	<p>Example 7: A Comparison A 200g bag of popcorn costs \$6.00. A 500g bag costs \$10.00. Find the unit rate of each bag to compare which size is the better value.</p>

Proportion – is an equation which states that two ratios are equal. $\frac{a}{b} = \frac{c}{d}$



Some proportions can be solved with simple multiplication or division between equivalent ratios, others are more complicated and can be solved using ‘cross multiplication’.

<p>Example 8: $\frac{3}{4} = \frac{x}{12}$</p>	<p>Example 9: $\frac{5}{x} = \frac{25}{15}$</p>	<p>Example 10: $\frac{1.4}{x} = \frac{30}{25}$ *see below</p>
--	---	---

Cross multiplication

Example 1: Find the missing value ‘m’

*You should be able to answer this by solving the ‘simple’ equivalent fraction but I will use this simple example to show you how cross multiplication works.

Question	Draw the cross	STEP 1: Set up the equation	STEP 2: Simplify	STEP 3: Get the unknown value alone by dividing both sides by the number on the same side as the unknown value.
$\frac{1}{5} = \frac{m}{8}$	$\frac{1}{5} \times \frac{m}{8}$	$1 \times 8 = m \times 5$	$8 = m \times 5$	$\frac{8}{5} = \frac{m \times 5}{5}$ $1.6 = m$

Example 2:

Question	Draw the cross	STEP 1: Set up the equation	STEP 2: Simplify	STEP 3: Get the unknown value alone by dividing both sides by the number on the same side as the unknown value.
$\frac{4.5}{6} = \frac{3.6}{m}$				

Proportion Problems:

<p>Example 11: A pendulum completes 7 swings every three seconds. How many swings does it complete in a minute?</p>	<p>Example 12: Apples are \$2.00 per dozen (12), how many apples can you get for \$5.50?</p>	<p>Example 13: A 17” computer monitor has a width of 15”. Since monitors are proportionate, what is the width of 48” computer monitor?</p>
--	---	---

Day 14: Ratios, Rates & Proportions

Practice: Ratios, Rates, and Proportions

Write the following as ratios in lowest terms

a. 73 days to 1 year

b. 35cents to \$1.05

c. 750 mL to 1.5 L

d. 3 min to 45 sec

Find the unit rate of the following:

e. Mike earns \$42 in 6 hours.

f. \$350 for 8 people to attend a party

g. 24 pop for \$6.96

Answer the following rate problems:

h. Jack earned \$50 in 10 hours, while John earned \$105 in 20 hours. Which person had the better rate of pay?

i. A bus travels 10 km in 25 minutes. At this rate, how far will the bus travel in one hour?

j. Oranges are \$2.00 per dozen. At this rate, how many oranges could you get for \$3.50

k. Katherine cycled 30 km in 2 hours. If she continues at the same rate, what distance will she travel in 7 hours?

l. Which is the better value? \$350 for a bus of 35 people, or \$440 for a bus of 40 people?

m. Which is the better value? 28 g of mixed nuts for \$0.84, or 35g of mixed nuts for \$1.40?

Find the missing value in the following proportions *round to 2d.p. where necessary

n. $\frac{3}{8} = \frac{m}{5}$

o. $\frac{2}{k} = \frac{11}{4.5}$

p. $\frac{1.2}{2.8} = \frac{3}{p}$

q. $\frac{5}{3.2} = \frac{2.5}{y}$

ANSWERS: a. 1:5, b. 1:3, c. 5:6, d. 4:1, e. \$7/h, f. \$43.75/p, g. \$0.29/pop, h. John, i. 24km/h, j. 21oran., k. 105 km, l. \$350/35, m. 28g/\$0.84, n. m=1.88, o. k=0.82, p. p=7, q. y=1.6