

Ratios

A ratio is: a comparison of quantities measured in the same units

gas to oil
50 : 1



How do we write ratios?



part to part

hearts to circles

2 term $\div 3 \leftarrow 3 : 6 \rightarrow \div 3$
 $1 : 2$

hearts to triangle to circles

3 term $3 : 1 : 6$

part to whole

hearts to ^(total) all shapes

$3 : 10$

also can be expressed as a fraction $\rightarrow \frac{3}{10}$

a decimal $\rightarrow 3 \div 10 = 0.3$

a percent $\rightarrow 0.3 \times 100 = 30\%$

How do we make equivalent ratios? \rightarrow

multiply or divide all terms by the same number.

$\times 5 \leftarrow 40 : 1 \rightarrow \times 5$
 $200 : 5$

$\div 8 \rightarrow$
 $\frac{8}{16} = \frac{1}{2}$
 $\div 8 \leftarrow$

Rates **include units!*

A rate is:

- the ratio of 2 measurements with different units.

example: dried mangos at Save-On cost \$3.49 per 100 g

$$\text{or } \$3.49/100 \text{ g or } \frac{\$3.49}{100 \text{ g}}$$

Proportions

A proportion is:

a statement that says two ratios or two rates are equivalent.

example: 3 km in 2 hours is equivalent to 9 km in 6 hours

$$\text{or } \frac{3 \text{ km}}{2 \text{ hr}} = \frac{9 \text{ km}}{6 \text{ hr}}$$

Find the missing parts:

$$\frac{2}{3} = \frac{10}{15}$$

(OR) $\frac{2}{3} = \frac{10}{15}$

$$\frac{2}{4} = \frac{1}{2}$$

(OR) $\frac{2}{4} = \frac{1}{2}$

$$\frac{2 \times 15}{3} = 10$$

$$\frac{4 \times 1}{2} = 2$$

$$3 : \underline{2} = 9 : 6$$

$$2 : 3 = 24 : \underline{36}$$

$$\frac{3}{?} = \frac{9}{6}$$

$$\frac{2:3}{24:36}$$

$$\frac{3 \times 6}{9} = 2$$

*split into two parts

$$\frac{16}{20} = \frac{4}{5} = \frac{24}{30}$$

$$\frac{\$4.14}{3 \text{ kg}} = \frac{\$1.38}{1 \text{ kg}} = \frac{\$9.66}{7 \text{ kg}}$$

$$\frac{20 \times 4}{5} = 16$$
$$\frac{4}{5} = \frac{24}{30}$$

~~$$\frac{\$4.14}{3 \text{ kg}} = \frac{\$1.38}{1 \text{ kg}}$$~~

~~$$\frac{\$4.14}{3 \text{ kg}} = \frac{\$9.66}{7 \text{ kg}}$$~~

Many problems can be solved using proportions – make sure you understand this concept!

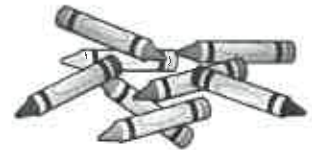
a) You can go 294 km in 3 hours, how far can you go in 1 hour?

~~$$\frac{294 \text{ km}}{3 \text{ hr}} = \frac{\quad}{1 \text{ hr}}$$~~
$$= \boxed{98 \text{ km}}$$



b) The Crayola crayon company can make 2400 crayons in 4 minutes. How many crayons can they make in 15 minutes?

~~$$\frac{2400 \text{ cray.}}{4 \text{ min}} = \frac{\quad}{15 \text{ min}}$$~~
$$= \boxed{9000 \text{ crayons}}$$



- c) Mixing 4 mL of red paint and 15 mL of yellow paint makes orange paint. How much red would be needed if you use 100 mL of yellow paint?

$$\begin{array}{l} \text{R} \rightarrow 4 \text{ mL} \\ \text{Y} \rightarrow 15 \text{ mL} \end{array} = 100 \text{ mL}$$
$$= 26.\bar{6}$$
$$= 26.\underline{6}6666\dots$$
$$= \boxed{26.7 \text{ mL}}$$



**Units are important when setting up proportions.
Pay attention to the units and include them in your answer!**