

## 1.7 Rates, Ratios, Decimals and Percents

**RATE:** Comparison of two quantities with different units.

Ratios have the **SAME** units.

2 cups flour to 3 cups sugar  
 4 children to 2 adults (people)  
 7 marks out of 10 marks

Rates have **DIFFERENT** units.

50 goals in 25 games  
 \$6 for 12 oranges  
 400km/5 hrs

**UNIT RATE:** Comparison of two quantities in which the second term is 1 unit.

Ex. 1 Determine the unit rate for each.

a) 50 goals in 25 games

$$\begin{aligned} & \frac{50 \text{ goals}}{25 \text{ games}} \div 25 \\ & = \frac{2 \text{ goals}}{1 \text{ game}} \\ & = 2 \text{ goals/game} \end{aligned}$$

b) \$6 for 12 oranges

$$\begin{aligned} & \frac{\$6}{12 \text{ oranges}} \div 12 \\ & = \frac{\$0.5}{1 \text{ orange}} \\ & = \$0.50/\text{orange} \end{aligned}$$

c) 400km/5 hrs

$$\begin{aligned} & \frac{400 \text{ km}}{5 \text{ hrs}} \div 5 \\ & = 80 \text{ km/hr} \end{aligned}$$

Ex. 2 Cereal comes in 3 sizes. What is the best deal?



Ⓒ  
 ≈ means approx.

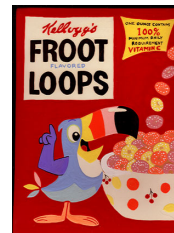
500 g for  
 \$2.99

$$\frac{500\text{g}}{\$2.99} \approx 167\text{g}/\text{\$}$$



800 g for  
 \$4.29

$$\frac{800\text{g}}{\$4.29} \approx 186\text{g}/\text{\$}$$



650 g for  
 \$ 3.69

$$\frac{650\text{g}}{\$3.69} \approx 176\text{g}/\text{\$}$$

↑ Best deal!!  
 Most grams per \$

Ratio: A comparison of like quantities with the same units.

Ex. 3:4 or  $\frac{3}{4}$  is read as "3 to 4"

Like fractions, ratios should be left in lowest terms.

Ex. 3:6 should be left as 1:2

$$\frac{3 \div 3}{6 \div 3} = \frac{1}{2}$$

Ex. 3 Write each ratio in lowest terms.

a)  $28:50$   
 $\begin{matrix} \div 2 & \div 2 \\ = 14:25 \end{matrix}$

Same as  
 $\frac{28}{50} = \frac{14}{25}$

b)  $2.5 : 3.75$   
 $\begin{matrix} \times 100 & \times 100 \\ = 250 : 375 \end{matrix}$

$$\begin{aligned} &= 250 : 375 \\ &\begin{matrix} \div 25 & \div 25 \\ = 10 : 15 \end{matrix} \rightarrow = 2 : 3 \\ &\begin{matrix} \div 5 & \div 5 \end{matrix} \end{aligned}$$

lowest terms  
 =no decimals  
 =no fractions

c)  $\frac{1}{3} : \frac{3}{5}$   
 $\begin{matrix} 5 \times & 3 \times 3 \\ = \frac{5}{15} : \frac{9}{15} \\ = \frac{5}{15} : \frac{9}{15} \\ = 5 : 9 \end{matrix}$

d)  $2\frac{1}{2} : -3\frac{2}{3}$   
 $\begin{matrix} 3 \times 5 & - 11 \times 2 \\ = \frac{15}{6} : -\frac{22}{6} \\ = 15 : -22 \end{matrix}$

Ex. 4 An animal shelter currently has 24 dogs and 32 cats.

a) Write a ratio, in simplest form to compare the number of cats to the number of dogs.

CATS : DOGS  
 $\begin{matrix} = 32 : 24 \\ \div 8 & \div 8 \end{matrix} \rightarrow = 4 : 3$

b) Write a ratio, in simplest form to compare the number of dogs to the number of cats.

DOGS : CATS  
 $= 3 : 4$

c) What is the ratio of dogs to the total number of animals?

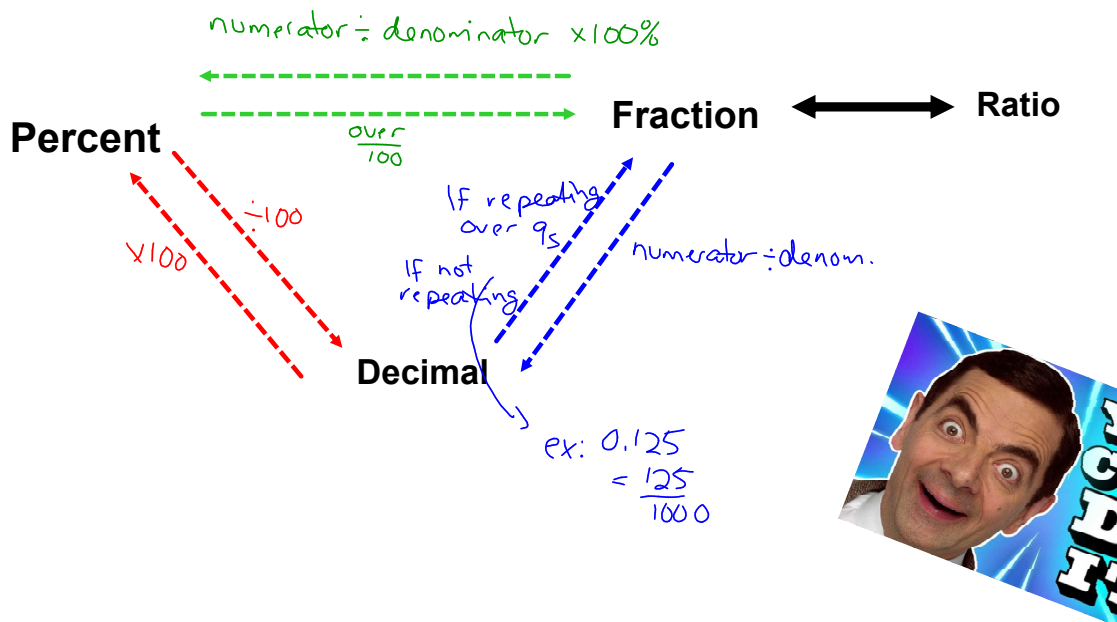
DOGS : TOTAL  
 $= 24 : 56$   
 $= 3 : 7$

TOTAL = DOGS + CATS  
 $= 24 + 32$   
 $= 56$

PERCENT: Literally means "out of 100". It can be written as a fraction out of 100 or as a decimal.

Percent	Decimal	Fraction
48%	0.48	$\frac{48}{100}$
7%	0.07	$\frac{7}{100}$

How do you convert between percent, ratio, fraction and decimals??



Ex. 5 Complete the table.

Percent	Decimal	Fraction	Ratio
26%	0.26	$\frac{26 \div 2}{100 \div 2} = \frac{13}{50}$	13:50
60%	$\xrightarrow{\times 100}$ 0.6	$\frac{3}{5}$	3:5
120%	1.2	$\frac{120}{100} = \frac{6}{5}$	6:5
0.3%	$\xrightarrow{\div 100}$ 0.003	$\frac{3}{1000}$	3:1000

Ex. 6

- a) Determine 32 % of 182.

$$\begin{aligned}
 & 32\% \text{ of } 182 \\
 & = 0.32 (182) \\
 & = 58.24
 \end{aligned}$$

- b) What percent is 14 out of 92?

$$\frac{14}{92} = 0.1522$$

Ⓢ

- c) 15 is 25% of what number?

$$\frac{15}{0.25} = 60$$

15 is 25% of what number

'of' means multiply

