

# Percentages

Write these as percentages:  $\frac{3}{5}$ ,  $\frac{17}{20}$ ,  $\frac{2}{3}$ , 0.23, 0.65, 1.237

Write these percentages as fractions: 34%, 7%, 142%.

Calculate 16% of 25, 5% of 80, 17% of £500

What percentage of 125 is 45?

A population grows from 130,000 to 160,000. What percentage increase is this?

A \$2000 investment increases by 17%, then decreases by 15%, how much is it now worth?

$$\% \frac{1}{100}$$

$$50\% = 50 \times \frac{1}{100} = \frac{50}{100} = \frac{1}{2}$$

$$20\% = 20 \times \frac{1}{100} = \frac{20}{100} = \frac{1}{5}$$

# Percentages

Write these as percentages:

$$\frac{3}{5} = \frac{3 \times 20}{5 \times 20} = \frac{60}{100} = 60\%$$

$$\frac{17}{20} = \frac{17 \times 5}{20 \times 5} = \frac{85}{100} = 85\%$$

$$\frac{2}{3} = \frac{2 \times \frac{100}{3}}{3 \times \frac{100}{3}} = \frac{200}{100} = \frac{66.66...}{100} = 66.66...%$$

$$0.23 = 23\%$$

$$0.65 = 65\%$$

$$1.237 = 123.7\%$$

Write these percentages as fractions:

$$0.34 = 34\% = \frac{34 \div 2}{100 \div 2} = \frac{17}{50}$$

$$0.07 = 7\% = \frac{7}{100}$$

$$1.42 = 142\% = \frac{142}{100} = \frac{71}{50}$$

$$\frac{2}{3} = 0.666... = 66.666...%$$

$$0.23 = \frac{23}{100} = 23\%$$

# Percentages

Calculate  $\frac{1}{100} \times$

$$16\% \text{ of } 25 = \frac{16}{100} \times 25 = \frac{16 \times 25}{100} = \frac{16 \times \cancel{25}}{4 \times \cancel{25}} = 4$$

$$5\% \text{ of } 80 = \frac{5}{100} \times 80 = \frac{5 \times 80}{100} = \frac{\cancel{5} \times 8 \times \cancel{10}}{\cancel{5} \times 2 \times \cancel{10}} = 4$$

$$17\% \text{ of } \pounds 500 = \frac{17}{100} \times 500 = \frac{17 \times 500}{100} = \frac{17 \times \cancel{5} \times \cancel{100}}{\cancel{100}} = 85 \quad \underline{\underline{\pounds 85}}$$

What percentage of 125 is 45?

answer  $x$

$$x\% \text{ of } 125 = 45$$

$$\frac{x}{100} \times 125 = 45$$

$$\frac{x}{100} = \frac{45}{125}$$

$$x = \frac{100 \times 45}{125}$$

$$= \frac{\cancel{100} \times \cancel{9} \times \cancel{5}}{\cancel{25} \times \cancel{5}} = 36$$

# Percentages

A population grows from 130,000 to 160,000.  
 What percentage increase is this?

$$\begin{aligned}
 \% \text{ increase} &= \frac{\text{change}}{\text{original}} \\
 &= \frac{160,000 - 130,000}{130,000} \\
 &= \frac{30,000}{130,000} \\
 &= \frac{3}{13} = 0.2307\dots \\
 &= 23.07\dots\%
 \end{aligned}$$

	old	new	change	% change
	5	5	0	0%
	5	0	-5	$\frac{-5}{5} = -1$ $= -100\%$
	5	20	15	$\frac{15}{5} = 3$ $= 300\%$

$$\text{percentage change} = \frac{\text{change}}{\text{original}}$$

# Percentages

A \$2000 investment increases by 17%, then decreases by 15%, how much is it now worth?

$$2000 \xrightarrow[\substack{\times 1.17 \\ = \underline{1} + \underline{0.17}}]{\text{increase by 17\%}} \underline{2000} + \underline{17\% \times 2000}$$

$$= 2,340$$

$$\downarrow \text{decrease by 15\%} \\ \times 0.85 = \underline{1} - \underline{0.15}$$

$$\underline{2,340} - \underline{15\% \times 2,340}$$

$$= \underline{\underline{1,989}}$$

$$\underline{\underline{\$1,989}}$$