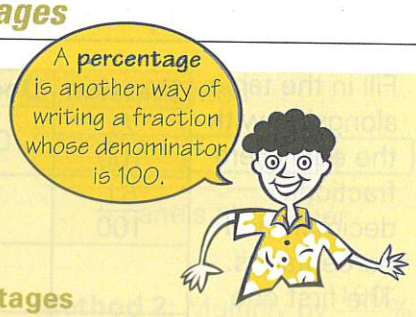


Percent (%) means 'out of 100'.

Example:

1. The percentage 14% is the same as the fraction $\frac{14}{100}$
2. The fraction $\frac{35}{100}$ can also be written as 35%

Converting fractions and decimals to and from percentages

Percentage to a fraction: Write the percentage over 100, then simplify if possible,
e.g. $45\% = \frac{45}{100} = \frac{9}{20}$

Fraction to a percentage: Fractions over 100 convert directly to percentages, e.g. $\frac{17}{100} = 17\%$.
Convert other fractions to equivalent fractions over 100 first.
Alternatively, simply multiply the fraction by 100%.

Example: Change $\frac{3}{4}$ to a percentage.

Method 1: Change to fraction over 100

$\frac{3}{4} = \frac{75}{100}$ $\frac{3 \times 25}{4 \times 25}$

$= 75\%$

Method 2: Multiply by 100

$\frac{3}{4} \times \frac{100}{1}\% = \frac{300}{4}\%$ $\frac{3 \times 100}{4 \times 1}$

$= 75\%$

Percentage to a decimal: Percentages are fractions with denominator 100, so convert directly to decimals with 2 decimal places, e.g. $17\% = \frac{17}{100} = 0.17$; similarly $56\% = 0.56$
Add zeros as place holders where necessary, e.g. $4\% = \frac{4}{100} = 0.04$

Decimal to a percentage: Reverse the above process, adding zeros as place holders if necessary.

Example:

1. $0.45 = \frac{45}{100}$ which is 45%
2. $0.07 = \frac{7}{100}$ which is 7%
3. 0.5 = 0.50 which is 50%

Practising fractions, decimals and percentages

1. Change the following percentages to decimals (express as a fraction first).
   a. $43\% = \frac{\quad}{100} = \quad$ b. $87\% = \frac{\quad}{100} = \quad$ c. $22\% = \frac{\quad}{100} = \quad$ d. $3\% = \frac{\quad}{100} = \quad$
2. Convert the following decimals to fractions over 100 then to percentages.
   a. $0.31 = \frac{\quad}{100} = \quad\%$ b. $0.95 = \frac{\quad}{100} = \quad\%$ c. $0.05 = \frac{\quad}{100} = \quad\%$ d. $0.4 = \frac{\quad}{100} = \quad\%$
3. Change the following percentages to fractions, simplifying where necessary.
   a. $37\% = \frac{\quad}{\quad}$ b. $20\% = \frac{\quad}{\quad} = \frac{\quad}{\quad}$ c. $42\% = \frac{\quad}{\quad} = \frac{\quad}{\quad}$ d. $56\% = \frac{\quad}{\quad} = \frac{\quad}{\quad}$
4. Convert the following fractions to percentages:
   a. $\frac{3}{20} = \frac{\quad}{100} = \quad\%$ b. $\frac{57}{100} = \quad\%$ c. $\frac{3}{4} = \frac{\quad}{100} = \quad\%$ d. $\frac{7}{25} = \frac{\quad}{100} = \quad\%$
5. Multiply the following fractions by 100% to change them to percentages.
   a. $\frac{2}{5} = \frac{2}{5} \times \frac{100}{1}\% = \quad\% = \quad\%$ b. $\frac{17}{20} = \frac{17}{20} \times \frac{100}{1}\% = \quad\% = \quad\%$
   c. $\frac{8}{25} = \frac{8}{25} \times \frac{100}{1}\% = \quad\% = \quad\%$ d. $\frac{11}{10} = \frac{11}{10} \times \frac{100}{1}\% = \quad\% = \quad\%$

Number/Algebra: Equivalent fractions, decimals and percentages

1. Fill in the table alongside with the equivalent fractions, decimals and percentages. The first one has been done for you.

Fraction	Decimal	Percentage
$\frac{21}{100}$	0.21	21%
$\frac{61}{100}$		
		37%
	0.85	
		6%
	0.07	
	0.6	
		14%
$\frac{9}{10}$		
$\frac{1}{2}$		
$\frac{4}{25}$		
		40%
	0.02	
$\frac{1}{4}$		
	0.99	

2. **What do music teachers give you?**

Find the letter of the equivalent fraction, decimal or percentage in the table below to crack the code. One of the letters will be used twice!

A	0.24
C	1 whole
D	0.71
E	50%
I	5%
N	$\frac{1}{5}$
O	0.42
S	80%
U	62%
V	$\frac{1}{50}$

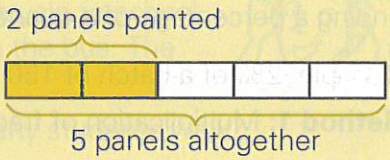
$\frac{\quad}{\frac{4}{5}}$ $\frac{\quad}{42\%}$ $\frac{\quad}{0.62}$ $\frac{\quad}{\frac{2}{10}}$ $\frac{\quad}{71\%}$

$\frac{\quad}{\frac{24}{100}}$ $\frac{\quad}{\frac{71}{100}}$ $\frac{\quad}{2\%}$ $\frac{\quad}{0.05}$ $\frac{\quad}{100\%}$ $\frac{\quad}{\frac{1}{2}}$

Working space

Number/Algebra: Expressing a quantity as a percentage of a whole

Hilbert has 5 panels to paint for the set for the school play. He has painted 2 panels. To express the painted area as a percentage of the whole area, express it as a fraction first. Then change the fraction to a percentage.



Example: What percentage has Hilbert painted?

Fraction painted = $\frac{2}{5}$

Method 1: Rename the fraction with denominator 100

$\frac{2}{5} = \frac{40}{100}$ (× 20 above, × 20 below)

= 40% painted

or

Method 2: Multiply by $\frac{100}{1}\%$

$\frac{2}{5} = \frac{2}{5} \times \frac{100}{1}\% = \frac{2 \times 100}{5 \times 1}\% = \frac{200}{5}\%$

= 40% painted

Example: Flora broke 5 of her mother's set of 20 cups. What percentage is broken?

Fraction broken = $\frac{5}{20}$

Method 1: Rename the fraction with denominator 100

$\frac{5}{20} = \frac{25}{100}$ (× 5 above, × 5 below)

= 25% broken

or

Method 2: Multiply by $\frac{100}{1}\%$

$\frac{5}{20} = \frac{5}{20} \times \frac{100}{1}\% = \frac{5 \times 100}{20 \times 1}\% = \frac{500}{20}\%$

= 25% broken

Practising expressing a quantity as a percentage of a whole

1. Express each quantity as a percentage of the whole using equivalent fractions with denominator 100. The first one has been done for you.

   * 6 out of 10 = $\frac{6}{10} = \frac{60}{100}$ = 60 %
   a. 7 out of 20 = $\frac{\quad}{\quad} = \frac{\quad}{100}$ = ____ %
   b. 3 out of 10 = $\frac{\quad}{\quad} = \frac{\quad}{100}$ = ____ %
   c. 42 out of 50 = $\frac{\quad}{\quad} = \frac{\quad}{100}$ = ____ %
   d. 2 out of 25 = $\frac{\quad}{\quad} = \frac{\quad}{100}$ = ____ %
   e. 4 out of 5 = $\frac{\quad}{\quad} = \frac{\quad}{100}$ = ____ %

2. Express the first quantity as a percentage of the second. Find the percentage remaining.

   * 6 eggs out of 12 eggs — $\frac{6}{12} \times \frac{100}{1} = \frac{600}{12} = 50\%$ — %remaining = 100 − 50 = 50 %
   a. 8 shoes out of 10 shoes — %remaining = ____ = ____ %
   b. 12 nuts out of 25 nuts — %remaining = ____ = ____ %
   c. 8 pies out of 20 pies — %remaining = ____ = ____ %
   d. 3 rocks out of 5 rocks — %remaining = ____ = ____ %

Number/Algebra: Finding a percentage of a quantity

Finding a percentage of a quantity is similar to finding a fraction of a quantity.

Example: 2% of a batch of 150 heaters is faulty. How many heaters are faulty?

Remember: 'of' means multiply.

Method 1: Multiplication of fractions.

$$2\% \text{ of } 150 = \frac{2}{100} \times \frac{150}{1}$$

$$= \frac{300}{100} \leftarrow \text{multiply numerators}$$

$$\leftarrow \text{multiply denominators}$$

$$= 3 \text{ heaters}$$

Method 2: Multiplication of decimals.

$$2\% \text{ of } 150 = 0.02 \times 150 \quad \text{since } 2\% = 0.02$$

$$= 3.00$$

$$= 3 \text{ heaters} \quad \text{since } 2 \times 150 = 300 \text{ and inserting 2 decimal places in answer}$$

This means that 100 – 2 = 98% of the heaters are not faulty, which is 150 – 3 = 147 heaters.

You can use your calculator to check the answer. Since 2% = 0.02 as a decimal, 2% of 150 = 0.02 × 150. Press 0 . 0 2 × 1 5 0 = to get the answer.

Multiplication of fractions can be used to find a percentage of a fraction.

For example 25% of $\frac{3}{8}$ becomes $\frac{1}{4} \times \frac{3}{8}$ which is $\frac{3}{32}$.

Practising finding a percentage of a quantity

1. Use multiplication of fractions to find these percentages of quantities.

* 10% of 80 = $\frac{10}{100} \times \frac{80}{1} = \frac{800}{100} = 8$

a. 7% of 100 = ____ × ____ = ____ = ____

b. 25% of 8 = ____ × ____ = ____ = ____

c. 5% of 60 = ____ × ____ = ____ = ____

d. 20% of $\frac{15}{8}$ = ____ × ____ = ____ = ____

e. 75% of $\frac{2}{3}$ = ____ × ____ = ____ = ____

2. Which is more? Put > 'is greater than' or < 'is less than' between the two quantities. Use the working space or your calculator, e.g. 15% of 40 = 0.15 × 40 = 6.

a. 15% of 40 ____ 10% of 50

6 ____

b. 20% of 45 ____ 30% of 20

____ ____

c. 25% of 60 ____ 50% of 32

____ ____

d. 2% of 250 ____ 8% of 50

____ ____

Working space

3. On her first day of competition, Jane won 15% of the 20 games.
On her second day of competition, Jane won 20% of the 30 games.

a. How many games did Jane win on the first day? ____ games

b. How many games did Jane win on the second day? ____ games

4. In a sale, 5% of the price is paid as a deposit. Find the deposit on the following items.

* A table costs $600. Deposit = 5% of $600 = $\frac{5}{100} \times \frac{600}{1} = \frac{3\,000}{100} = \$30$

a. A clock costs $200. Deposit = ____ = ____ = ____ = $

b. A sofa costs $700. Deposit = ____ = ____ = ____ = $

Number/Algebra: Reviewing fractions, decimals and percentages

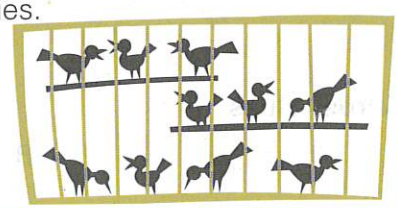
1. A school has 560 students. 15% of the students ride a bicycle to school, 17% are driven to school by their parents and 18% catch the bus. The remainder of the students walk to school.

   a. What percentage walks? ____ % b. How many students walk? ____

2. 65% of the 18 500 people who went to a rugby match were males. How many females went? ____

3. Bobby hits a target 0.4 of the time. Sally hits the target $\frac{9}{20}$ of the time. Peter hits the target 43% of the time. Who is the best shot? ____

4. Hinemoa has 10 birds in her aviary: 7 budgies and 3 canaries.

   a. What fraction of her birds are budgies? ____

   b. What percentage of her birds are budgies? ____ %

   c. What percentage of her birds are canaries? ____ %

5. $\frac{7}{8}$ of the school's students took part in the swimming sports. There are 520 students in the school.

   a. How many students went swimming? ____

   b. How many students did not swim? ____

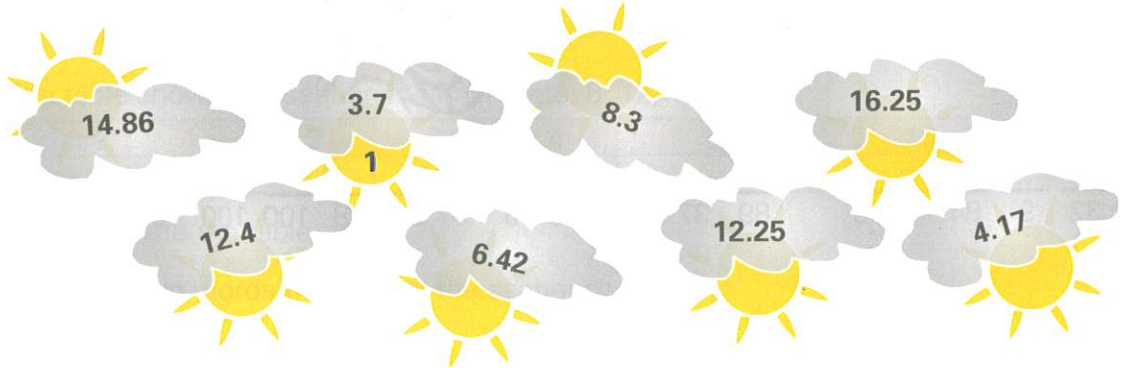
   Working space

6. John got $\frac{36}{45}$ in his maths test. What percentage did he get? ____ %

   Hint: Simplify the fraction first. Then change to %.

7. Mr and Mrs Wilson pay 9% interest on their loan of $3 200. Calculate 9% of $3 200 to find how much interest they pay. $ ____

8. Fill in the suns to put these cloud numbers in order of size from smallest (1) to biggest (8). The first one has been done for you.

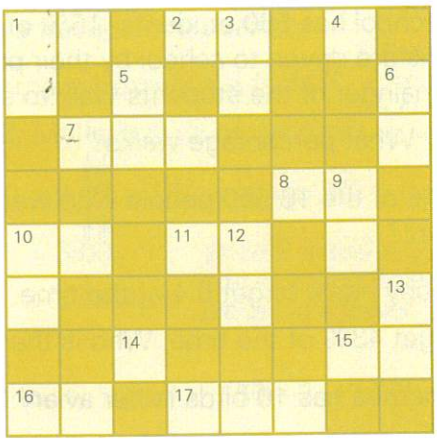
   

Number/Algebra: Fun with fractions, decimals and percentages

Fun Page

Work out the answers to the questions below.
Insert answers into the crossword.

Use your answers to crack the code below.

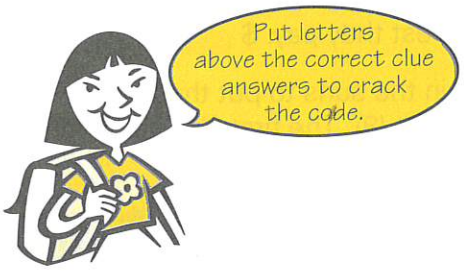


Across clues

1. 37% = $\frac{\square}{100}$ **R**
2. 18% = 0.$\square$ **O**
4. 60% = 0.$\square$ **N**
7. 0.95 = $\frac{95}{\square}$ **G**
8. 89% = $\frac{\square}{100}$ **B**
10. $\frac{7}{10}$ = $\square$% **L**
11. $\square$% = $\frac{75}{100}$ **E**
14. 0.09 = $\square$% **A**
15. 20% of $\frac{9}{10}$ = $\frac{\square}{100}$
16. $\frac{1}{4}$ = $\square$% **W**
17. 25% of 1 000 = $\square$ **I**

Down clues

1. 25% of 128 = $\square$ **H**
3. $\frac{42}{50}$ = $\square$% **T**
5. $\frac{2}{5}$ = $\square$% **!**
6. 20% of \$90 = \$$\square$
9. $\frac{24}{25}$ = $\square$%
10. $\frac{3}{4}$ = $\square$%
12. 10% of 550 = $\square$
13. $\frac{29}{50}$ = $\square$%



25	32	9	84		9		89	37	9	250	6		89	18	100	100	70	75	37	40