ESW Support Materials

Fractions, Decimals and Percentages

The purpose of these materials is to assist centres with supporting their learners when working towards the Essential Application of Number Skills (EAoNS) qualification at Level 2, and preparing for the EAoNS Level 2 Confirmatory Test.

The materials consist of:

- a brief explanation of the basics
- worked examples
- practice questions and answers with workings
- multiple choice test practice questions and answers with workings.

The contents of these materials are as follows:

Fractions and percentages

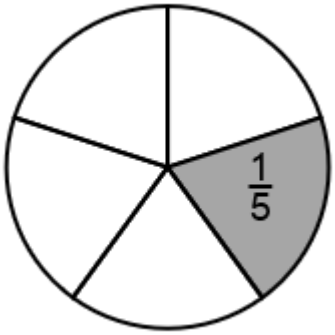
A **fraction** describes part of a whole.

A fraction has two numbers, written like this: $\frac{1}{5}$

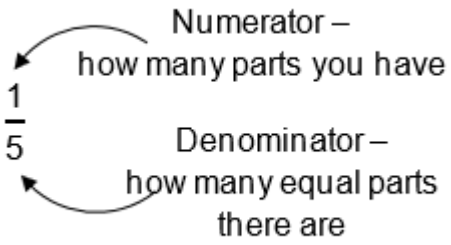
$\frac{1}{5}$ is one fifth.

If you have $\frac{1}{5}$ of something, it means that the whole thing has been divided into five equal parts and you have one of the parts.

This circle has 5 equal parts, and 1 part is shaded.
So $\frac{1}{5}$ of the circle is shaded.



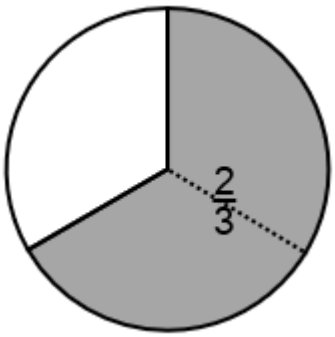
The numbers in a fraction have special names.
The top number is the numerator.
The bottom number is the denominator.



Here's another fraction: $\frac{2}{3}$

The bottom number is 3, so the whole has 3 equal parts.
The top number is 2, so you have 2 of the parts.

$\frac{2}{3}$ of the circle is shaded.



A **percentage** is another way of talking about part of a whole.

A **percentage** is a kind of fraction.

In a percentage, the whole is always divided into 100 equal parts.

So the bottom number (denominator) of the fraction is always 100

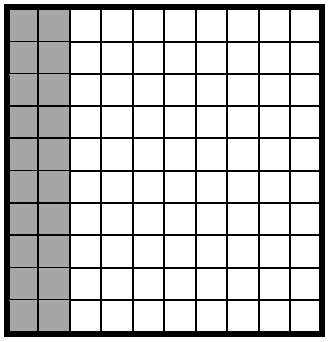
A percentage is written as a number with the percentage sign %, like this: 20%

20% is another way of saying $\frac{20}{100}$.

If we have 20% of something, we can think of it as the whole thing divided into 100 equal parts and we have 20 of the parts.

The large square is divided into 100 small squares.
20 of the small squares are shaded.

So 20% of the large square is shaded.



Converting a fraction to a percentage.

A percentage is a kind of fraction.
Percentages are fractions of 100.
This makes it easy to compare them.

To convert any fraction to a percentage, work out that fraction of 100

Example

To convert $\frac{2}{5}$ to a percentage you work out $\frac{2}{5}$ of 100

First divide 100 by the bottom number (denominator). 100 ÷ 5 = 20
This is dividing 100 into 5 equal parts.
$\frac{1}{5}$ of 100 is 20
So $\frac{1}{5}$ is equivalent to $\frac{20}{100}$

$\frac{2}{5}$ is two lots of $\frac{1}{5}$
So multiply the answer 20 by the top number (numerator). 20 × 2 = <u>40</u>

Answer $\frac{2}{5}$ is <u>40%</u>.

Example:

What percentage is the same as $\frac{7}{20}$?

Work out $\frac{7}{20}$ of 100
Divide 100 by the bottom number (denominator) 100 ÷ 20 = 5
This is dividing 100 into 20 equal parts.
So $\frac{1}{20}$ of 100 is 5

$\frac{7}{20}$ is seven lots of $\frac{1}{20}$
So multiply the answer 5 by the top number (numerator). 7 × 5 = <u>35</u>

Answer: $\frac{7}{20}$ is <u>35%</u>.

Example:

What is $\frac{2}{9}$ as a percentage?

Divide 100 by the bottom number (denominator) 100 ÷ 9 = 11.11….
This is dividing 100 into 9 equal parts.
So $\frac{1}{9}$ of 100 is 11.11…

$\frac{2}{9}$ is two lots of $\frac{1}{9}$
So multiply the answer 11.11… by the top number (numerator). 11.11… × 2 = 22.22…

Answer: $\frac{2}{9}$ is 22.2% (to 1 decimal place).

Try these – answers on the next page.
What percentage is the same as…?

a. $\frac{9}{20}$

b. $\frac{4}{5}$

c. $\frac{7}{10}$

d. $\frac{9}{25}$

e. $\frac{3}{8}$

f. $\frac{13}{20}$

g. $\frac{5}{6}$

Answers

a. $\frac{9}{20}$ 100 ÷ 20 = 5

5 × 9 = 45

$\frac{9}{20}$ = 45%

b. $\frac{4}{5}$ = 80%

c. $\frac{7}{10}$ = 70%

d. $\frac{9}{25}$ = 36%

e. $\frac{3}{8}$ = 37.5%

f. $\frac{13}{20}$ = 65%

g. $\frac{5}{6}$ = 83.3% (to 1 decimal place)

Common errors to avoid

- $\frac{3}{10}$ and $\frac{1}{3}$ are close, but they are not the same.
  $\frac{3}{10}$ = 30%. $\frac{1}{3}$ = 33.3% (to 1 decimal place).
- $\frac{1}{10}$ is 10%. The denominator (bottom number) has the same number as the percentage. This is **not** true for any other fraction. $\frac{1}{20}$ is **not** the same as 20%.

Solving problems with fractions and percentages.

Some problems are about comparing fractions and percentages.

Example: Which is greater, $\frac{11}{50}$ or 18%?

To solve this, convert $\frac{11}{50}$ to a percentage.

100 ÷ 50 = 2
2 × 11 = 22
Answer: 22%

22% is greater than 18%, so $\frac{11}{50}$ is greater than 18%.

Example: Which percentage is closest to $\frac{9}{10}$?

A. 9% B. 89% C. 95%

Convert $\frac{9}{10}$ to a percentage.

100 ÷ 10 = 10
10 × 9 = 90
Answer: 90%
89% is closer to 90% than 9% or 95%, so the answer is B.

Example: Which fraction is closest to 40%?

A. $\frac{3}{10}$ B. $\frac{9}{20}$ C. $\frac{11}{25}$

Convert the fractions to percentages.

A 100 ÷ 10 = 10 10 × 3 = 30 $\frac{3}{10}$ = 30%	B 100 ÷ 20 = 5 5 × 9 = 45 $\frac{9}{20}$ = 45%	C 100 ÷ 25 = 4 4 × 11 = 44 $\frac{11}{25}$ = 44%

44% is closer to 40% than 30% or 45%, so the answer is C.

Practice questions

1. Which is greater, $\frac{7}{10}$ or 65%?

2. Which is greater, $\frac{2}{3}$ or 65%?

3. Which is greatest, $\frac{3}{5}$, $\frac{17}{25}$ or 65%?

4. Which is smallest, $\frac{3}{4}$, $\frac{17}{20}$ or 78%?

5. Which percentage is closest to $\frac{16}{25}$?

A. 16% B. 34% C.62% D. 78%

6. Which percentage is closest to $\frac{1}{6}$?

A. 6% B. 18% C.60% D. 61%

7. Which percentage is closest to $\frac{5}{8}$?

A. 16% B. 40% C.58% D. 61%

8. Which fraction is closest to 36%?

A. $\frac{3}{10}$ B. $\frac{1}{3}$ C. $\frac{7}{20}$ D. $\frac{2}{5}$

9. Which fraction is closest to 94%?

A. $\frac{7}{8}$ B. $\frac{22}{25}$ C. $\frac{9}{10}$ D. $\frac{19}{20}$

10. Which fraction is closest to 22%?

A. $\frac{13}{50}$ B. $\frac{1}{4}$ C. $\frac{1}{5}$ D. $\frac{9}{50}$

Answers

1. $100 \div 10 = 10$ $10 \times 7 = 70\%$

   So $\frac{7}{10}$ is greater than 65%.

2. $100 \div 3 = 33.33\ldots$ $33.33\ldots \times 2 = 66.66\ldots\%$

   So $\frac{2}{3}$ is 66.7% (to 1 decimal place)

   $\frac{2}{3}$ is greater than 65%.

3. $100 \div 5 = 20$ $20 \times 3 = 60\%$ so $\frac{3}{5}$ is 60%

   $100 \div 25 = 4$ $4 \times 17 = 68\%$ so $\frac{17}{25}$ is 68%

   So $\frac{17}{25}$ is the greatest.

4. $100 \div 4 = 25$ $25 \times 3 = 75\%$ so $\frac{3}{4}$ is 75%

   $100 \div 20 = 5$ $5 \times 17 = 85\%$ so $\frac{17}{20}$ is 85%.

   So $\frac{3}{4}$ is the smallest.

5. $100 \div 25 = 4$ $4 \times 16 = 64\%$ so $\frac{16}{25}$ is 64%

   The closest percentage is 62%, so the answer is C.

6. $100 \div 6 = 16.66\ldots$ $16.66\ldots \times 1 = 16.66\ldots\%$ so $\frac{1}{6}$ is 16.7% (to 1 decimal place)

   The closest percentage is 18% so the answer is B.

7. $100 \div 8 = 12.5$ $12.5 \times 5 = 62.5\%$ so $\frac{5}{8}$ is 62.5%

   The closest percentage is 61% so the answer is D.

8. $100 \div 10 = 10$ $10 \times 3 = 30\%$ so $\frac{3}{10}$ is 30%.

   $100 \div 3 = 33.33\ldots$ $33.33\ldots \times 1 = 33.33\ldots\%$ so $\frac{1}{3}$ is 33.3% (to 1 decimal place).

   $100 \div 20 = 5$ $5 \times 7 = 35\%$ so $\frac{7}{20}$ is 35%.

   $100 \div 5 = 20$ $20 \times 2 = 40\%$ so $\frac{2}{5}$ is 40%.

   The closest to 36% is $\frac{7}{20}$ (35%) so the answer is C.

9. $100 \div 8 = 12.5$ $12.5 \times 7 = 87.5\%$ so $\frac{7}{8}$ is 87.5%

$100 \div 25 = 4$ $4 \times 22 = 88\%$ so $\frac{22}{25}$ is 88%

$100 \div 10 = 10$ $10 \times 9 = 90\%$ so $\frac{9}{10}$ is 90%

$100 \div 20 = 5$ $5 \times 19 = 95\%$ so $\frac{19}{20}$ is 95%.

The closest to 94% is $\frac{19}{20}$ (95%) so the answer is D.

10. $100 \div 50 = 2$ $2 \times 13 = 26\%$ so $\frac{13}{50}$ is 26%

$100 \div 4 = 25$ $25 \times 1 = 25\%$ so $\frac{1}{4}$ is 25%

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

$100 \div 50 = 2$ $2 \times 9 = 18\%$ so $\frac{9}{50}$ is 18%

The closest to 22% is $\frac{1}{5}$ (20%) so the answer is C.

Expressing one number as a fraction of another

Expressing one number as a fraction of another often involves simplifying the fraction.

Example:
A factory has 64 employees, and 24 of them walk to work.
What fraction of all the employees walk to work?

In this fraction, the bottom number (denominator) is 64, the total number of employees.
The top number (numerator) is 24, the number who walk to work.
The fraction is $\frac{24}{64}$

To simplify this, divide 24 and 64 by a number that gives a whole number answer with no remainders (also called a common factor).

In this case, 24 and 64 can both be divided by 8, so 8 is a common factor of 24 and 64
$24 \div 8 = 3$ and $64 \div 8 = 8$
So, $\frac{24}{64} = \frac{3}{8}$

3 and 8 don't have a common factor so $\frac{3}{8}$ cannot be simplified any more.

So the answer is $\frac{3}{8}$ of employees walk to work

Example:

Jane books a holiday. The table shows the costs.

Spending	Cost
Flight	£160
Hotel	£200
Insurance	£40

What fraction of the total cost is the flight?

The flight cost is £160.

The total cost is not shown in the table, but it can be worked out.

£160 + £200 + £40 = £400

The fraction of the cost of the flight is $\frac{160}{400}$

10 is a common factor 0f 160 and 240 as both numbers end in zero.

16 ÷ 10 = 16 and 40 ÷ 10 = 40

A common factor of 16 and 40 is 8

16 ÷ 8 = 2 and 40 ÷ 8 = 5

$$\frac{160}{400} = \frac{2}{5}$$

Answer: The flight is $\frac{2}{5}$ of the total cost of the holiday.

Practice questions

Simplify these fractions.

1. $\frac{9}{24}$ 2. $\frac{12}{20}$ 3. $\frac{3}{15}$ 4. $\frac{18}{63}$ 5. $\frac{21}{28}$

6. In a survey of 150 pet owners, 105 people said they had a dog.
   What fraction of pet owners have a dog?

7. The normal price of a phone is £240
   Dan saves £60 with a voucher.
   What fraction of the normal price does Dan save?

8. Out of a total of 60 shops in a town, 36 sell clothes.
   What fraction of the shops sell clothes?

9. The table shows the drinks served in a café one day.

Drink	Number served
Coffee	56
Tea	8
Chocolate	10
Other	6

   What fraction of all the drinks served were coffees?

10. The table shows the star ratings given by viewers of a TV show.

Stars	Number of viewers
5 stars	45
4 stars	19
3 stars	13
2 stars	3
1 star	1

   What fraction of all the viewers gave 5 stars?

Answers

1. A common factor of 9 and 24 is 3
   $9 \div 3 = 3$ and $24 \div 3 = 8$
   No more common factors
   Answer $\frac{3}{8}$

2. A common factor of 12 and 20 is 4
   $12 \div 4 = 3$ and $20 \div 4 = 5$
   No more common factors
   Answer $\frac{3}{5}$

3. A common factor of 3 and 15 is 3
   $3 \div 3 = 1$ and $15 \div 3 = 5$
   No more common factors
   Answer $\frac{1}{5}$

4. A common factor of 18 and 63 is 9
   $18 \div 9 = 2$ and $63 \div 9 = 7$
   No more common factors
   Answer $\frac{2}{7}$

5. A common factor of 21 and 28 is 7
   $21 \div 7 = 3$ and $28 \div 7 = 4$
   No more common factors
   Answer $\frac{3}{4}$

6. A common factor of 105 and 150 is 5
   $105 \div 5 = 21$ and $150 \div 5 = 30$

   A common factor of 21 and 30 is 3
   $21 \div 3 = 7$ and $30 \div 3 = 10$
   No more common factors
   Answer $\frac{7}{10}$

7. A common factor of 60 and 240 is 10
   $60 \div 10 = 6$ and $240 \div 10 = 24$

   A common factor of 6 and 24 is 6
   $6 \div 6 = 1$ and $24 \div 6 = 4$
   No more common factors
   Answer $\frac{1}{4}$

8. A common factor of 36 and 60 is 2
$36 \div 2 = 18$ and $60 \div 2 = 30$

A common factor of 18 and 30 is 2
$18 \div 2 = 9$ and $30 \div 2 = 15$

A common factor of 9 and 15 is 3
$9 \div 3 = 3$ and $15 \div 3 = 5$
No more common factors

Answer $\frac{3}{5}$

9. $56 + 8 + 10 + 6 = 80$

$\frac{56}{80}$

A common factor of 56 and 80 is 2
$56 \div 2 = 28$ and $80 \div 2 = 40$

A common factor of 28 and 40 is 2
$28 \div 2 = 14$ and $40 \div 2 = 20$

A common factor of 14 and 20 is 2
$14 \div 2 = 7$ and $20 \div 2 = 10$
No more common factors

Answer $\frac{7}{10}$.

10. $45 + 19 + 13 + 3 + 1 = 81$

$\frac{45}{81}$

A common factor of 45 and 81 is 9
$45 \div 9 = 5$ and $81 \div 9 = 9$
No more common factors

Answer $\frac{5}{9}$

Converting percentages to fractions

A percentage is a fraction out of 100. The % symbol means ‘out of 100’

To convert a percentage to a fraction, write it in full.

So 91% is the same as $\frac{91}{100}$

Sometimes, we can simplify the fraction.

Example:
Convert 45% to a fraction.

45% = $\frac{45}{100}$
A common factor of 45 and 100 is 5
45 ÷ 5 = 9 and 100 ÷ 5 = 20
No more common factors
$\frac{45}{100} = \frac{9}{20}$

So 45% = $\frac{9}{20}$

Practice questions
Convert the percentages to fractions, and simplify them where possible. Answers below.
a. 80%

b. 65%

c. 56%

d. 14%

e. 90%

f. 64%

g. 74%

h. 45%

i. 40%

j. 70%

Answers

a. $80\% = \frac{80}{100}$

$80 \div 20 = 4$

$100 \div 20 = 5$

Answer $\frac{4}{5}$

b. $65\% = \frac{65}{100}$

$65 \div 5 = 13$

$100 \div 5 = 20$

Answer $\frac{13}{20}$

c. $56\% = \frac{56}{100}$

$56 \div 4 = 14$

$100 \div 4 = 25$

Answer $\frac{14}{25}$

d. $14\% = \frac{14}{100}$

$14 \div 2 = 7$

$100 \div 2 = 50$

Answer $\frac{7}{50}$

e. $90\% = \frac{90}{100}$

$90 \div 10 = 9$

$100 \div 10 = 10$

Answer $\frac{9}{10}$

f. $64\% = \frac{64}{100}$

$64 \div 4 = 16$

$100 \div 4 = 25$

Answer $\frac{16}{25}$

g. $74\% = \frac{74}{100}$

$74 \div 2 = 37$

$100 \div 2 = 50$

Answer $\frac{37}{50}$

h. $45\% = \frac{45}{100}$

$45 \div 5 = 9$

$100 \div 5 = 20$

Answer $\frac{9}{20}$

i. $40\% = \frac{40}{100}$

$40 \div 20 = 2$

$100 \div 20 = 5$

Answer $\frac{2}{5}$

j. $70\% = \frac{70}{100}$

$70 \div 10 = 7$

$100 \div 10 = 10$

Answer $\frac{7}{10}$

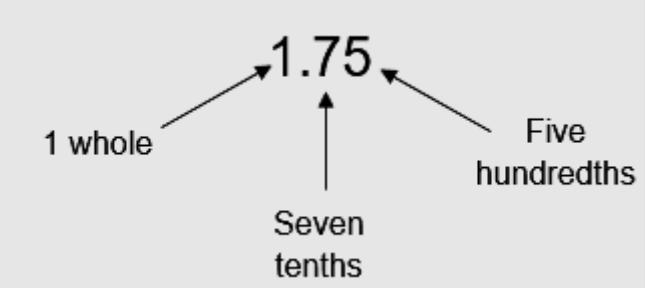
Decimals

A **decimal** is a different way of talking about parts of a whole.

In a decimal, digits to the left of the decimal point are whole numbers.
Digits to the right of the decimal point are fractions, tenths, then hundredths, then thousandths and so on.

The position of a digit shows its value. This is often called ‘place value’

Example



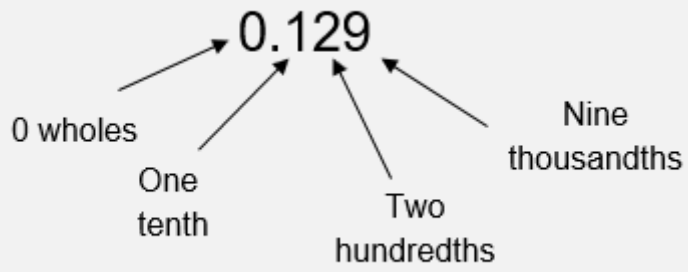
The digit to the left of the decimal point shows one whole.

The first digit to the right of the decimal point is seven tenths.

The next digit to the right is five hundredths.

1.75 is the same as 1 and $\frac{7}{10}$ and $\frac{5}{100}$ or $1\frac{75}{100}$

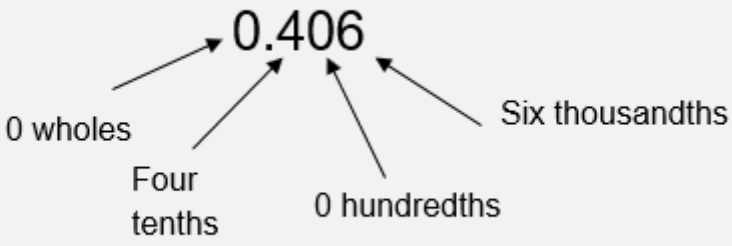
Example



0.129 is zero wholes, one tenth two hundredths and nine thousandths

0.129 is the same as $\frac{1}{10}$ and $\frac{2}{100}$ and $\frac{9}{1000}$ or $\frac{129}{1000}$

Example



0.406 is zero wholes, four tenths, zero hundredths and six thousandths

0.406 is the same as $\frac{4}{10}$ and $\frac{0}{100}$ and $\frac{6}{1000}$ or $\frac{406}{1000}$

Converting decimals to percentages

To convert a decimal to a percentage, multiply the decimal by 100

For example, 0.35 as a percentage is 0.35 × 100, which is 35%

A simple way to multiply a number by 100 is to move the digits two places to the left.

Watch out for a decimal that's only got one digit.

For example, 0.7 as a percentage is 0.7 × 100

This is 70%

We need to include a zero which isn't shown on the decimal.

Example with more than two digits

What is 0.528 as a percentage?

0.528 × 100 = 52.8

Answer: 0.528 = 52.8%

Converting percentages to decimals

To convert a percentage to a decimal, divide the percentage by 100

A simple way to divide a number by 100 is to move the digits two places to the right.

So, 62% as a decimal is 62 ÷ 100, which is 0.62

What is 80% as a decimal?

80 ÷ 100 = 0.8

Answer: 80% = 0.8

Don't write the zero at the end (called a **trailing zero**) unless it's a price.

So we talk about a weight of 0.8 kilograms (no trailing zero)…

…but a correct price would be £0.80 (with a trailing zero)

What is 47.5% as a decimal?

47.5 ÷ 100 = 0.475

Answer: 47.5% = 0.475

Practice questions

1. What is 0.1 as a percentage?

2. What is 0.525 as a percentage?

3. What is 0.71 as a percentage?

4. What is 0.225 as a percentage?

5 What is 0.3 as a percentage?

6. What is 20% as a decimal?

7. What is 37% as a decimal?

8. What is 87.5% as a decimal?

9. What is 69.3% as a decimal?

10. What is 40% as a decimal?

Answers

1. 0.1 × 100 = 10
Answer 10%

2. 0.525 × 100 = 52.5
Answer 52.5%

3. 0.71 × 100 = 71
Answer 71%

4. 0.225 × 100 = 22.5
Answer 22.5%

5 0.3 × 100 = 30
Answer 30%

6. 20 ÷ 100 = 0.2
Answer 0.2

7. 37 ÷ 100 = 0.37
Answer 0.37

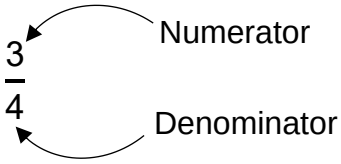
8. 87.5 ÷ 100 = 0.875
Answer 0.875

9. 69.3 ÷ 100 = 0.693
Answer 0.693

10. 40 ÷ 100 = 0.4
Answer 0.4

Converting fractions to decimals

A fraction has a number at the top (numerator), and the bottom (denominator).
The numbers are separated by a line.



The line shows a division.

So the fraction $\frac{3}{4}$ is the same as 3 ÷ 4

Put 3 ÷ 4 into a calculator, and the answer is 0.75

So $\frac{3}{4}$ as a decimal is 0.75

Without a calculator, work out 3 ÷ 4 using long division.
Put a decimal point and extra zeros after the 3

$$
\begin{array}{r}
0.75 \\
4\,\overline{)\,3.00} \\
\underline{2.8} \\
20 \\
\underline{20} \\
0
\end{array}
$$

For more on long division, see
https://mathsmadeeasy.co.uk/gcse-maths-revision/long-division/
https://www.mathsisfun.com/long_division.html

For a mixed fraction (a whole number with a fraction), convert the fraction, then add the whole number.

For example, what is $1\frac{3}{5}$ as a decimal?

Convert $\frac{3}{5}$ to a decimal.

Work out 3 ÷ 5

3 ÷ 5 = 0.6

Add the whole number 1 + 0.6 = 1.6

Answer: $1\frac{3}{5}$ = 1.6

Practice questions

Convert the fractions to decimals.

a. $\frac{1}{5}$ b. $\frac{3}{10}$ c. $\frac{9}{20}$ d. $1\frac{1}{4}$ e. $1\frac{7}{10}$

f. What is $\frac{1}{20}$ as a decimal?

A 0.02 B 0.05 C 0.2 D 0.5

g. Which decimal is closest to $1\frac{4}{5}$?

A 1.2 B 1.45 C 1.75 D 1.9

h. Which decimal is closest to $4\frac{2}{3}$?

A 4.23 B 4.5 C 4.7 D 4.83

i. Which decimal is closest to $1\frac{3}{4}$?

A 1.12 B 1.8 C 1.85 D 1.9

j. Which decimal is closest to $2\frac{5}{8}$?

A 2.6 B 2.58 C 2.45 D 2.4

Answers

a. $\frac{1}{5} = 1 \div 5 = 0.2$

b. $\frac{3}{10} = 3 \div 10 = 0.3$

c. $\frac{9}{20} = 9 \div 20 = 0.45$

d. $\frac{1}{4} = 1 \div 4 = 0.25$

$1\frac{1}{4} = 1 + 0.25 = 1.25$

e. $\frac{7}{10} = 7 \div 10 = 0.7$

$1\frac{7}{10} = 1 + 0.7 = 1.7$

f. $\frac{1}{20} = 1 \div 20 = 0.05$, so the answer is B

g. $\frac{4}{5} = 4 \div 5 = 0.8$

$1\frac{4}{5} = 1 + 0.8 = 1.8$

1.75 is the closest option to 1.8 so the answer is C

h. $\frac{2}{3} = 2 \div 3 = 0.67$

$4\frac{2}{3} = 4 + 0.67 = 4.67$ (to 2 decimal places)

4.7 is the closest option to 4.67 so the answer is C

i. $\frac{3}{4} = 3 \div 4 = 0.75$

$1\frac{3}{4} = 1 + 0.75 = 1.75$

1.8 is the closest option to 1.75 so the answer is B

j. $\frac{5}{8} = 5 \div 8 = 0.625$

$2\frac{5}{8} = 2 + 0.625 = 2.625$

2.6 is the closest option to 2.625 so the answer is A

Converting decimals to fractions

To convert a decimal to a fraction, look at the position of the digits to the right of the decimal point.

The first number to the right of the decimal represents tenths, the next number hundredths, then thousandths and so on.

Example

What is 0.7 as a fraction?

The 0 before the decimal means no wholes.

The 7 to the right of the decimal point means seven tenths.

$0.7 = \frac{7}{10}$

Example

What is 0.63 as a fraction?

The number 0 before the decimal means no wholes.

The numbers 6 and 3 after the decimal are 6 tenths and 3 hundredths or 63 hundredths.

$0.63 = \frac{63}{100}$

Example

What is 0.06 as a fraction?

There are no wholes, no tenths, and 6 hundredths.

$0.06 = \frac{6}{100}$

Example

What is 1.27 as a fraction?

There is 1 whole, 2 tenths and 7 hundredths.

2 tenths and 7 hundredths are equal to 27 hundredths.

$1.27 = 1\frac{27}{100}$

Simplify the fractions whenever possible.

Example

What is 0.45 as a fraction?

There are no wholes, 4 tenths and 5 hundredths.

4 tenths and 5 hundredths are equal to 45 hundredths.

0.45 is $\frac{45}{100}$.

A common factor of 45 and 100 is 5, so divide 45 and 100 by 5

45 ÷ 5 = 9 and 100 ÷ 5 =20

So 0.45 is the same as $\frac{45}{100}$, which is $\frac{9}{20}$

Practice questions

Convert the decimals to fractions and simplify whenever possible.

a. 0.97 b. 0.03 c. 0.7 d. 1.2 e. 4.68

f. Which fraction is the same as 2.35?

A. $2\frac{3}{5}$ B. $2\frac{7}{20}$ C. $2\frac{1}{8}$ D. $2\frac{1}{3}$

g. Which fraction is the same as 0.125?

A. $\frac{1}{25}$ B. $\frac{1}{8}$ C. $\frac{5}{12}$ D. $1\frac{2}{5}$

h. Which fraction is closest to 0.71 ?

A. $\frac{69}{100}$ B. $\frac{4}{5}$ C. $\frac{3}{4}$ D. $\frac{2}{3}$

i. Which fraction is closest to 0.13 ?

A. $\frac{1}{5}$ B. $\frac{1}{10}$ C. $\frac{1}{20}$ D. $\frac{1}{4}$

j. Which fraction is closest to 0.44 ?

A. $\frac{49}{100}$ B. $\frac{2}{5}$ C. $\frac{1}{2}$ D. $\frac{1}{3}$

Answers

a. $0.97 = \frac{97}{100}$

b. $0.03 = \frac{3}{100}$

c. $0.7 = \frac{7}{10}$

d. $1.2 = 1\frac{20}{100}.$

20 is a common factor of 20 and 100

20 ÷ 20 = 1 and 100 ÷ 20 = 5

Answer: $1\frac{1}{5}$

e. $4.68 = 4\frac{68}{100}.$

4 is a common factor of 68 and 100

68 ÷ 4 = 17 and 100 ÷ 4 = 25

Answer: $4\frac{17}{25}$

f. $2.35 = 2\frac{35}{100}.$

5 is a common factor of 35 and 100

35 ÷ 5 = 7 and 100 ÷ 5 = 20

Answer: B $2\frac{7}{20}$

g. $0.125 = \frac{1}{10} + \frac{2}{100} + \frac{5}{1000} = \frac{125}{1000}$

5 is a common factor of 125 and 1000

125 ÷ 5 = 25 and 1000 ÷ 5 = 200

5 is a common factor of 25 and 200

25 ÷ 5 = 5 and 200 ÷ 5 = 40

5 is a common factor of 5 and 40

5 ÷ 5 = 1 and 40 ÷ 5 = 8

Answer: B $\frac{1}{8}$

h. To compare the fractions, convert them to decimals.

A. $\frac{69}{100}$ = 0.69

B. $\frac{4}{5}$ 4 ÷ 5 = 0.8

C. $\frac{3}{4}$ 3 ÷ 4 = 0.75

D. $\frac{2}{3}$ 2 ÷ 3 = 0.67 (2 decimal places)

0.69 is closest to 0.71, so the answer is A. $\frac{69}{100}$

i. A. $\frac{1}{5}$ 1 ÷ 5 = 0.2

B. $\frac{1}{10}$ 1 ÷ 10 = 0.1

C. $\frac{1}{20}$ 1 ÷ 20 = 0.05

D. $\frac{1}{4}$ 1 ÷ 4 = 0.25

0.1 is closest to 0.13, so the answer is B. $\frac{1}{10}$

j. A. $\frac{49}{100}$ = 0.49

B. $\frac{2}{5}$ 2 ÷ 5 = 0.4

C. $\frac{1}{2}$ 1 ÷ 2 = 0.5

D. $\frac{1}{3}$ 1 ÷ 3 = 0.33 (2 decimal places)

0.4 is closest to 0.44, so the answer is B. $\frac{2}{5}$

Test practice questions

1. A shop reduces its prices by 5% in a sale.
What fraction is the same as 5%?

A	$\frac{1}{5}$
B	$\frac{5}{10}$
C	$\frac{1}{20}$
D	$\frac{1}{50}$

2. The table shows reviews of a takeaway.

Rating	**Number of customers**
Excellent	24
Good	27
OK	20
Poor	1

What fraction of all the customers gave an Excellent rating?

A	$\frac{1}{2}$
B	$\frac{1}{3}$
C	$\frac{8}{9}$
D	$\frac{3}{10}$

3. A worker earns $1\frac{1}{4}$ times the usual pay for working at weekends.

What is $1\frac{1}{4}$ as a decimal?

A	1.5
B	1.4
C	1.25
D	1.04

4. A company tests a sample of 40 of its products.

It found that 2 of the products in the sample were faulty.

What percentage of the products in the sample were faulty?

A	2%
B	5%
C	10%
D	20%

5. A phone display shows the battery has 23% charge.

Which fraction is closest to 23%?

A	$\frac{1}{5}$
B	$\frac{2}{3}$
C	$\frac{3}{10}$
D	$\frac{27}{100}$

6. There are 3500 home fans and 1500 away fans in a stadium for a match.

What fraction of all the fans are away fans?

A	$\frac{1}{15}$
B	$\frac{3}{10}$
C	$\frac{3}{7}$
D	$\frac{3}{4}$

7. A survey found that $\frac{7}{8}$ of people prefer coffee to tea.

What percentage is the same as $\frac{7}{8}$?

A	12.5%
B	56%
C	78%
D	87.5%

8. One mile is approximately 1.6 kilometres.

What is 1.6 as a fraction?

A	$1\frac{3}{50}$
B	$1\frac{1}{16}$
C	$1\frac{1}{6}$
D	$1\frac{3}{5}$

9. The table shows the costs of organising an event.

Item	**Cost**
Venue	£60
Food	£210
Music	£30

What percentage of the total cost was spent on the venue?

A	5%
B	20%
C	25%
D	60%

10. A driving school has a success rate of 88%.

Which fraction is closest to 88%?

A	$\frac{3}{4}$
B	$\frac{4}{5}$
C	$\frac{9}{10}$
D	$\frac{19}{20}$

11. The table shows information about members of a judo club.

Level	**Number of members**
Beginner	21
Intermediate	28
Advanced	7

What fraction of all the members are beginners?

A	$\frac{3}{8}$
B	$\frac{3}{5}$
C	$\frac{5}{8}$
D	$\frac{3}{4}$

12. A carpenter uses screws that are $\frac{5}{8}$ of an inch long.

Which decimal is equal to $\frac{5}{8}$?

A	0.16
B	0.375
C	0.58
D	0.625

13. A pound weight is approximately 0.45 kg.

Which fraction is the same as 0.45?

A	$\frac{2}{5}$
B	$\frac{9}{20}$
C	$\frac{4}{5}$
D	$\frac{9}{10}$

14. A taxi company announces a 6% increase in fares.

What fraction is equal to 6%?

A	$\frac{5}{30}$
B	$\frac{1}{6}$
C	$\frac{3}{50}$
D	$\frac{3}{5}$

15. The tables shows the results of a travel to work survey.

Method of travel	**Number of people**
Car	48
Public transport	6
Walk	4
Cycle	2

What percentage of all the people in the survey travel to work by car?

A	4%
B	8%
C	25%
D	80%

Answers

1. $5\% = \frac{5}{100}$

   To simplify, a common factor of 5 and 100 is 5

   $5 \div 5 = 1$ and $100 \div 5 = 20$

   Answer C $\frac{1}{20}$

2. The number of customers that gave an Excellent rating is 24

   The total number of customers = 24 + 27 + 20 + 1 = 72

   The fraction is $\frac{24}{72}$

   To simplify, a common factor of 24 and 72 is 8

   $24 \div 8 = 3$ and $72 \div 8 = 9$

   A common factor of 3 and 9 is 3

   $3 \div 3 = 1$ and $9 \div 3 = 3$

   Answer B $\frac{1}{3}$

3. To convert $\frac{1}{4}$ to a decimal, work out $1 \div 4$

   $1 \div 4 = 0.25$

   Add the whole number 1 + 0.25 = 1.25

   Answer C 1.25

4. There were 2 faulty products

   The total number of products was 40

   The fraction is $\frac{2}{40}$

   To simplify, divide 2 and 40 by the common factor 2

   $\frac{2}{40} = \frac{1}{20}$

   To convert to a percentage, divide 100 by 20 $100 \div 20 = 5$

   Multiply the answer by 1 $5 \times 1 = 5$

   Answer B 5%

5. Convert the fractions to percentages.

A $\frac{1}{5}$

100 ÷ 5 = 20

20 × 1 = 20

20%

B $\frac{2}{3}$

100 ÷ 3 = 33.33…

33.33… × 2 = 66.66…

66.7% (to 1 decimal place)

C $\frac{3}{10}$

100 ÷ 10 = 10

10 × 3 = 30

30%

D $\frac{27}{100}$

100 ÷ 100 = 1

1 × 27 = 27

27%

The nearest percentage to 23% is 20%

Answer A $\frac{1}{5}$

6. The number of away fans is 1500

The total number of fans is 3500 + 1500 = 5000

The fraction is $\frac{1500}{5000}$

To simplify, a common factor of 1500 and 5000 is 100

1500 ÷ 100 = 15 and 5000 ÷ 100 = 50

A common factor of 15 and 50 is 5

15 ÷ 5 = 3 and 50 ÷ 5 = 10

Answer B $\frac{3}{10}$

7. 100 ÷ 8 = 12.5

12.5 × 7 = 87.5

Answer D 87.5%

8. $0.6 = \frac{6}{10}$

To simplify, divide 6 and 10 by the common factor 2

$\frac{6}{10} = \frac{3}{5}$

Add the whole number $1 + \frac{3}{5} = 1\frac{3}{5}$

Answer D $1\frac{3}{5}$

9. The cost of the venue is £60

The total cost is 60 + 210 + 30 = £300

The fraction is $\frac{60}{300}$

To simplify, divide 60 and 300 by the common factor 10

60 ÷ 10 = 6 and 300 ÷ 10 = 30

Divide 6 and 30 by the common factor 6

6 ÷ 6 = 1 and 30 ÷ 30 = 5

$\frac{60}{300} = \frac{1}{5}$

Convert $\frac{1}{5}$ to a percentage

100 ÷ 5 = 20

20 × 1 = 20

Answer B 20%

10. Convert the fractions to percentages.

A. $\frac{3}{4}$ 100 ÷ 4 = 25

25 × 3 = 75

75%

B. $\frac{4}{5}$ 100 ÷ 5 = 20

20 × 4 = 80

80%

C. $\frac{9}{10}$ 100 ÷ 10 = 10

10 × 9 = 90

90%

D. $\frac{19}{20}$ 100 ÷ 20 = 5

5 × 19 = 95

95%

The closest percentage to 88% is 90%

Answer C $\frac{9}{10}$

11. The number of beginners is 21
The total number of members = 21 + 28 + 7 = 56
The fraction is $\frac{21}{56}$
To simplify, a common factor of 21 and 56 is 7
21 ÷ 7 = 3 and 56 ÷ 7 = 8
No more common factors
Answer A $\frac{3}{8}$

12. To convert $\frac{5}{8}$ to a decimal, work out 5 ÷ 8
Using long division

$$
\begin{array}{r}
0.625 \\
8\,\overline{)\,5.000} \\
\underline{4.8} \\
20 \\
\underline{16} \\
40 \\
\underline{40} \\
0
\end{array}
$$

5 ÷ 8 = 0.625

Answer D 0.625

13. 0.45 = $\frac{45}{100}$
To simplify, divide 45 and 100 by the common factor 5
45 ÷ 5 = 9 and 100 ÷ 5 = 20

Answer B $\frac{9}{20}$

14. 6% = $\frac{6}{100}$
To simplify, a common factor of 6 and 100 is 2
6 ÷ 2 = 3 and 100 ÷ 2 = 50
Answer C $\frac{3}{50}$

15. There were 48 people who travelled by car

The total number of people in the survey was 48 + 6 + 4 + 2 = 60

The fraction is $\frac{48}{60}$

To simplify, divide 48 and 60 by the common factor 12

48 ÷ 12 = 4 and 60 ÷ 12 = 5

To convert $\frac{4}{5}$ to a percentage, divide 100 by 5 100 ÷ 5 = 20

Multiply the answer by 4 20 × 4 = 80

Answer D 80%