

Simplifying and Ordering Fractions

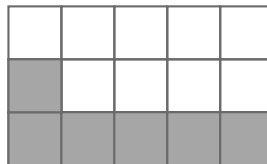
Solutions

For Pearson Edexcel GCSE Mathematics (1MA1) • Foundation tier

Each question is shown in grey, followed by the working, one step per line. The final answer is in a box. *Marks* shows how the marks are usually given in the exam, and **Tip** points out a common mistake.

1 (2 marks)

Here is a shape.



(a) Write down the fraction of the shape that is shaded.

Count the squares: 15 altogether.

Count the shaded squares: 6.

So $\frac{6}{15}$ is shaded.

Answer: $\frac{6}{15}$ (or $\frac{2}{5}$)

Tip: The fraction is shaded squares over **all** the squares, not shaded over unshaded ($\frac{6}{9}$).

(b) Write your answer to (a) in its simplest form.

6 and 15 are both in the 3 times table.

Divide the top and bottom by 3:

$$\frac{6 \div 3}{15 \div 3} = \frac{2}{5}$$

Answer: $\frac{2}{5}$

2 (1 mark)

Write $\frac{24}{36}$ in its simplest form.

Find the highest common factor (HCF) of 24 and 36: it is 12.

Divide the top and bottom by 12:

$$\frac{24 \div 12}{36 \div 12} = \frac{2}{3}$$

Answer: $\frac{2}{3}$

3 (2 marks)

Write the missing numbers.

$$\frac{3}{4} = \frac{\boxed{}}{20} = \frac{18}{\boxed{}}$$

First box: the bottom has been multiplied by 5 ($4 \times 5 = 20$).

So multiply the top by 5: $3 \times 5 = 15$

Second box: the top has been multiplied by 6 ($3 \times 6 = 18$).

So multiply the bottom by 6: $4 \times 6 = 24$

Answer: 15 and 24

Marks: 1 mark for 15. 1 mark for 24.

4 (1 mark)

Exactly two of these fractions are equal to $\frac{3}{5}$

$$\frac{6}{9} \quad \frac{9}{15} \quad \frac{15}{20} \quad \frac{12}{20} \quad \frac{10}{15}$$

Write down these two fractions.

Simplify each fraction:

$$\frac{6}{9} = \frac{2}{3} \text{ (divide by 3)}$$

$$\frac{9}{15} = \frac{3}{5} \text{ (divide by 3)}$$

$$\frac{15}{20} = \frac{3}{4} \text{ (divide by 5)}$$

$$\frac{12}{20} = \frac{3}{5} \text{ (divide by 4)}$$

$$\frac{10}{15} = \frac{2}{3} \text{ (divide by 5)}$$

Answer: $\frac{9}{15}$ and $\frac{12}{20}$

Tip: $\frac{15}{20}$ has a 3 on the top of its simplest form, but it is $\frac{3}{4}$, not $\frac{3}{5}$. Simplify fully before you decide.

5 (1 mark)

Explain why $\frac{3}{8}$ and $\frac{9}{24}$ are equivalent.

$$3 \times 3 = 9 \text{ and } 8 \times 3 = 24$$

The top and bottom of $\frac{3}{8}$ have both been multiplied by 3, which gives $\frac{9}{24}$.

So the two fractions are equal.

Answer: Both multiplied by 3

6 (1 mark)

Shade $\frac{3}{4}$ of this shape.



There are 8 squares.

$\frac{1}{4}$ of 8 is $8 \div 4 = 2$

So $\frac{3}{4}$ of 8 is $3 \times 2 = 6$

Shade any 6 squares (for example, as shown).

Answer: any 6 squares

7 (2 marks)

(a) Write $\frac{23}{6}$ as a mixed number.

How many whole 6s go into 23?

$$23 \div 6 = 3 \text{ remainder } 5$$

So 3 wholes and $\frac{5}{6}$ left over.

Answer: $3\frac{5}{6}$

(b) Write $4\frac{2}{5}$ as an improper fraction.

Each whole is $\frac{5}{5}$, so 4 wholes = $\frac{20}{5}$

Add the $\frac{2}{5}$: $20 + 2 = 22$

$$\text{So } 4\frac{2}{5} = \frac{22}{5}$$

Answer: $\frac{22}{5}$

Tip: Multiply the whole number by the denominator, then add the numerator:

$4 \times 5 + 2 = 22$. The denominator stays as 5.

8 (2 marks)

Write the following fractions in order of size.

Start with the smallest fraction.

$$\frac{9}{20} \quad \frac{2}{5} \quad \frac{1}{2} \quad \frac{3}{10}$$

Write them all as twentieths, because 20, 5, 2 and 10 all divide into 20.

$\frac{9}{20}$ stays the same.

$$\frac{2}{5} = \frac{8}{20}$$

$$\frac{1}{2} = \frac{10}{20}$$

$$\frac{3}{10} = \frac{6}{20}$$

In order: $\frac{6}{20}, \frac{8}{20}, \frac{9}{20}, \frac{10}{20}$

Answer: $\frac{3}{10}, \frac{2}{5}, \frac{9}{20}, \frac{1}{2}$

Tip: Do not order fractions by the size of the denominators. Change them to the same denominator first, and show this working.

Marks: 1 mark for writing them with a common denominator (or as decimals). 1 mark for the correct order.

9 (2 marks)

Show that $\frac{7}{10}$ is exactly halfway between $\frac{3}{5}$ and $\frac{4}{5}$

Write all three fractions with denominator 10:

$$\frac{3}{5} = \frac{6}{10} \quad \text{and} \quad \frac{4}{5} = \frac{8}{10}$$

From $\frac{6}{10}$ to $\frac{7}{10}$ is $\frac{1}{10}$.

From $\frac{7}{10}$ to $\frac{8}{10}$ is also $\frac{1}{10}$.

The gaps are equal, so $\frac{7}{10}$ is exactly halfway.

Answer: $\frac{6}{10}$ and $\frac{8}{10}$, both $\frac{1}{10}$ from $\frac{7}{10}$

Tip: In a “show that” question you must show every step. Just writing “7 is between 6 and 8” is not enough: show that the two gaps are equal.

Marks: 1 mark for writing $\frac{3}{5}$ and $\frac{4}{5}$ with a common denominator, e.g. $\frac{6}{10}$ and $\frac{8}{10}$. 1 mark for a complete explanation (equal gaps, or $\frac{6+8}{2} = 7$).

10 (2 marks)

Which is larger, $\frac{4}{7}$ or $\frac{5}{9}$?

You must show your working.

Use a common denominator: $7 \times 9 = 63$

$$\frac{4}{7} = \frac{4 \times 9}{63} = \frac{36}{63}$$

$$\frac{5}{9} = \frac{5 \times 7}{63} = \frac{35}{63}$$

36 is more than 35, so $\frac{4}{7}$ is larger.

Answer: $\frac{4}{7}$

Marks: 1 mark for writing both with a common denominator (or as decimals: 0.571... and 0.555...). 1 mark for $\frac{4}{7}$ with correct working.

11 (2 marks)

There are 45 cars in a car park. 27 of the cars are silver.

Write down the fraction of the cars that are silver.

Give your answer in its simplest form.

Fraction that are silver: $\frac{27}{45}$

The HCF of 27 and 45 is 9.

$$\frac{27 \div 9}{45 \div 9} = \frac{3}{5}$$

Answer: $\frac{3}{5}$

Tip: Give your answer as a fraction when the question asks for one. A decimal (0.6) or percentage (60%) will not get full marks.

Marks: 1 mark for $\frac{27}{45}$. 1 mark for $\frac{3}{5}$.

12 (2 marks)

There are 60 students in a year group.

36 of the students walk to school.

What fraction of the students do **not** walk to school?

Give your answer in its simplest form.

Number who do not walk: $60 - 36 = 24$

Fraction who do not walk: $\frac{24}{60}$

The HCF of 24 and 60 is 12.

$$\frac{24 \div 12}{60 \div 12} = \frac{2}{5}$$

Answer: $\frac{2}{5}$

Tip: Read carefully: the question asks for the students who do **not** walk. $\frac{36}{60} = \frac{3}{5}$ is the fraction who do walk.

Marks: 1 mark for $\frac{24}{60}$. 1 mark for $\frac{2}{5}$.

13 (3 marks)

Which one of $\frac{5}{6}$, $\frac{7}{8}$ and $\frac{11}{10}$ is nearest to 1?

You must show all your working.

Find how far each fraction is from 1.

$$\frac{5}{6} \text{ is less than } 1: 1 - \frac{5}{6} = \frac{1}{6}$$

$$\frac{7}{8} \text{ is less than } 1: 1 - \frac{7}{8} = \frac{1}{8}$$

$$\frac{11}{10} \text{ is more than } 1: \frac{11}{10} - 1 = \frac{1}{10}$$

$$\frac{1}{10} \text{ is the smallest of } \frac{1}{6}, \frac{1}{8} \text{ and } \frac{1}{10}.$$

So $\frac{11}{10}$ is nearest to 1.

Or use decimals: 0.833... is 0.166... away, 0.875 is 0.125 away and 1.1 is 0.1 away.

Answer: $\frac{11}{10}$

Tip: A fraction bigger than 1 can still be the nearest to 1. Compare the distances from 1, not the fractions themselves.

Marks: 1 mark for changing to forms you can compare (e.g. decimals, or a common denominator of 120). 1 mark for finding all three distances from 1. 1 mark for $\frac{11}{10}$ with correct working.
