

Multiplying and Dividing 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)

Work out $\frac{3}{7} \times \frac{2}{9}$

Give your answer in its simplest form.

Multiply the tops and multiply the bottoms.

$$\frac{3}{7} \times \frac{2}{9} = \frac{6}{63}$$

Divide top and bottom by 3:

$$\frac{6}{63} = \frac{2}{21}$$

Answer: $\frac{2}{21}$

Tip: Always check whether your answer will simplify. Leaving $\frac{6}{63}$ loses the second mark.

Marks: 1 mark for $\frac{6}{63}$ (or any correct unsimplified fraction). 1 mark for $\frac{2}{21}$.

2 (2 marks)

Work out $\frac{4}{9} \div \frac{2}{3}$

To divide by a fraction, multiply by its reciprocal (turn it upside down).

The reciprocal of $\frac{2}{3}$ is $\frac{3}{2}$.

$$\frac{4}{9} \times \frac{3}{2} = \frac{12}{18}$$

Divide top and bottom by 6:

$$\frac{12}{18} = \frac{2}{3}$$

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

Tip: You do not need a common denominator to divide fractions. Keep the first fraction, flip the second, then multiply.

Marks: 1 mark for $\frac{4}{9} \times \frac{3}{2}$. 1 mark for $\frac{2}{3}$.

3 (2 marks)

Work out $\frac{5}{8} \times 12$

Write 12 as $\frac{12}{1}$.

$$\frac{5}{8} \times \frac{12}{1} = \frac{60}{8}$$

$$60 \div 8 = 7 \text{ remainder } 4$$

$$\text{So } \frac{60}{8} = 7\frac{4}{8} = 7\frac{1}{2}$$

Answer: $7\frac{1}{2}$

Marks: 1 mark for $\frac{60}{8}$ (or $\frac{5}{8} \times 12$ worked out correctly in any form). 1 mark for $7\frac{1}{2}$ (or $\frac{15}{2}$ or 7.5).

4 (2 marks)

Work out $\left(\frac{2}{3}\right)^2 \times \frac{9}{10}$

First square $\frac{2}{3}$. Square the top and the bottom:

$$\left(\frac{2}{3}\right)^2 = \frac{2 \times 2}{3 \times 3} = \frac{4}{9}$$

$$\text{Now multiply: } \frac{4}{9} \times \frac{9}{10} = \frac{36}{90}$$

Divide top and bottom by 18:

$$\frac{36}{90} = \frac{2}{5}$$

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

Marks: 1 mark for $\frac{4}{9}$. 1 mark for $\frac{2}{5}$.

5 (1 mark)

Omar works out $\frac{3}{4} \div \frac{1}{2} = \frac{4}{3} \times \frac{1}{2} = \frac{4}{6}$

Explain the mistake Omar has made.

To divide, you keep the first fraction and flip the **second** fraction.

Omar flipped the first fraction instead.

The correct working is:

$$\frac{3}{4} \div \frac{1}{2} = \frac{3}{4} \times \frac{2}{1} = \frac{6}{4} = \frac{3}{2}$$

Answer: He turned the first fraction upside down. He should turn the second fraction upside down. The answer is $\frac{3}{2}$.

6 (3 marks)

Work out $\frac{4}{7} \div \frac{1}{3}$

Give your answer as a mixed number.

Multiply by the reciprocal of $\frac{1}{3}$, which is $\frac{3}{1}$.

$$\frac{4}{7} \times \frac{3}{1} = \frac{12}{7}$$

Change to a mixed number:

$$12 \div 7 = 1 \text{ remainder } 5$$

$$\text{So } \frac{12}{7} = 1\frac{5}{7}$$

Answer: $1\frac{5}{7}$

Tip: The question asks for a mixed number, so $\frac{12}{7}$ only gets 2 of the 3 marks.

Marks: 1 mark for $\frac{4}{7} \times \frac{3}{1}$. 1 mark for $\frac{12}{7}$. 1 mark for $1\frac{5}{7}$.

7 (2 marks)

Show that $5\frac{1}{3} \div 4 = 1\frac{1}{3}$

Change the mixed number to an improper fraction:

$$5\frac{1}{3} = \frac{16}{3}$$

Dividing by 4 is the same as multiplying by $\frac{1}{4}$.

$$\frac{16}{3} \times \frac{1}{4} = \frac{16}{12}$$

Divide top and bottom by 4: $\frac{16}{12} = \frac{4}{3}$

$4 \div 3 = 1$ remainder 1, so $\frac{4}{3} = 1\frac{1}{3}$ ✓

Tip: In a “show that” question, write every step, including the simplifying at the end ($\frac{16}{12} = \frac{4}{3} = 1\frac{1}{3}$).

Marks: 1 mark for $\frac{16}{3}$ and multiplying by $\frac{1}{4}$. 1 mark for showing $\frac{16}{12}$ simplifies to $1\frac{1}{3}$.

8 (3 marks)

Show that $2\frac{2}{3} \times 1\frac{1}{8} = 3$

Change each mixed number to an improper fraction:

$$2\frac{2}{3} = \frac{8}{3}$$

$$1\frac{1}{8} = \frac{9}{8}$$

Multiply: $\frac{8}{3} \times \frac{9}{8} = \frac{72}{24}$

$$72 \div 24 = 3 \quad \checkmark$$

Tip: Do not multiply the whole numbers and the fractions separately. 2×1 and $\frac{2}{3} \times \frac{1}{8}$ does not give the right answer.

Marks: 1 mark for changing to improper fractions. 1 mark for multiplying them. 1 mark for showing the answer is 3.

9 (2 marks)

A piece of ribbon is 6 m long.

It is cut into pieces that are each $\frac{2}{5}$ m long.

How many pieces are there?

We need to know how many $\frac{2}{5}$ m pieces fit into 6 m.

So work out $6 \div \frac{2}{5}$

$$6 \div \frac{2}{5} = 6 \times \frac{5}{2}$$

$$= \frac{30}{2} = 15$$

Answer: 15

Marks: 1 mark for $6 \div \frac{2}{5}$ or $6 \times \frac{5}{2}$. 1 mark for 15.

10 (3 marks)

A jug holds $1\frac{3}{4}$ litres of water.

Sam fills glasses from the jug.

Each glass holds $\frac{1}{5}$ of a litre.

How many glasses can Sam fill completely?

Change to an improper fraction: $1\frac{3}{4} = \frac{7}{4}$

Work out how many $\frac{1}{5}$ litres fit into $\frac{7}{4}$ litres:

$$\frac{7}{4} \div \frac{1}{5} = \frac{7}{4} \times \frac{5}{1} = \frac{35}{4}$$

$$\frac{35}{4} = 8\frac{3}{4}$$

Only full glasses count, so Sam can fill 8 glasses.

Answer: 8

Tip: Read the question again at the end. It asks for glasses filled **completely**, so round $8\frac{3}{4}$ down to 8.

Marks: 1 mark for $\frac{7}{4}$. 1 mark for $\frac{7}{4} \div \frac{1}{5}$ or $\frac{35}{4}$. 1 mark for 8.

11 (3 marks)

Show that $3\frac{1}{3} \div 1\frac{1}{4} = 2\frac{2}{3}$

Change each mixed number to an improper fraction:

$$3\frac{1}{3} = \frac{10}{3}$$

$$1\frac{1}{4} = \frac{5}{4}$$

Multiply by the reciprocal of $\frac{5}{4}$, which is $\frac{4}{5}$:

$$\frac{10}{3} \times \frac{4}{5} = \frac{40}{15}$$

Divide top and bottom by 5: $\frac{40}{15} = \frac{8}{3}$

$$8 \div 3 = 2 \text{ remainder } 2, \text{ so } \frac{8}{3} = 2\frac{2}{3} \quad \checkmark$$

Marks: 1 mark for changing to improper fractions. 1 mark for multiplying by $\frac{4}{5}$. 1 mark for showing the answer is $2\frac{2}{3}$.
