

Multiplying and Dividing Fractions

Solutions

For AQA GCSE Mathematics (8300) • 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. Give each answer in its simplest form.

(a) $\frac{2}{3} \times \frac{4}{5}$

To multiply fractions, multiply the tops and multiply the bottoms.

Tops: $2 \times 4 = 8$

Bottoms: $3 \times 5 = 15$

8 and 15 have no common factor, so $\frac{8}{15}$ is already in its simplest form.

Answer: $\frac{8}{15}$

(b) $\frac{3}{8} \times 4$

Write 4 as a fraction: $4 = \frac{4}{1}$

$$\frac{3}{8} \times \frac{4}{1} = \frac{12}{8}$$

Simplify by dividing top and bottom by 4:

$$\frac{12}{8} = \frac{3}{2}$$

Answer: $\frac{3}{2}$ (or $1\frac{1}{2}$)

2 (1 mark)

Circle the answer to $\frac{1}{2} \div 4$

Options: 2, $\frac{1}{8}$, 8, $\frac{1}{6}$

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

$$\frac{1}{2} \times \frac{1}{4} = \frac{1}{8}$$

Check: half of something, shared into 4, gives an eighth.

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

Tip: Turn the number you divide **by** upside down. Here 4 becomes $\frac{1}{4}$. Do not turn $\frac{1}{2}$ upside down.

3 (2 marks)

Work out $\frac{5}{6} \div \frac{2}{3}$

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

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

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

$$= \frac{15}{12}$$

Divide top and bottom by 3: $\frac{15}{12} = \frac{5}{4}$

Answer: $\frac{5}{4}$ (or $1\frac{1}{4}$)

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

Marks: 1 mark for $\frac{5}{6} \times \frac{3}{2}$. 1 mark for the correct answer.

4 (2 marks)

Work out $\frac{3}{5}$ of $\frac{10}{21}$

“Of” means multiply.

$$\frac{3}{5} \times \frac{10}{21} = \frac{30}{105}$$

The HCF of 30 and 105 is 15.

$$\frac{30}{105} = \frac{2}{7}$$

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

Marks: 1 mark for $\frac{3}{5} \times \frac{10}{21}$. 1 mark for $\frac{2}{7}$.

5 (2 marks)

Work out $\frac{5}{9} \times 7$

Give your answer as a mixed number.

Write 7 as $\frac{7}{1}$.

$$\frac{5}{9} \times \frac{7}{1} = \frac{35}{9}$$

Change to a mixed number:

$$35 \div 9 = 3 \text{ remainder } 8$$

$$\text{So } \frac{35}{9} = 3\frac{8}{9}$$

Answer: $3\frac{8}{9}$

Tip: Multiply only the top by 7. A common wrong answer is $\frac{35}{63}$, from multiplying the top and the bottom.

Marks: 1 mark for $\frac{35}{9}$. 1 mark for $3\frac{8}{9}$.

6 (3 marks)

Work out $1\frac{1}{2} \times 2\frac{2}{3}$

First change each mixed number to an improper fraction.

$$1\frac{1}{2} = \frac{3}{2}$$

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

$$\text{Multiply: } \frac{3}{2} \times \frac{8}{3} = \frac{24}{6}$$

$$24 \div 6 = 4$$

Answer: 4

Tip: Do not multiply the whole numbers and the fractions separately (1×2 and $\frac{1}{2} \times \frac{2}{3}$). That gives the wrong answer. Change to improper fractions first.

Marks: 1 mark for changing to improper fractions. 1 mark for multiplying them. 1 mark for 4.

7 (3 marks)

Work out $2\frac{1}{4} \div 1\frac{1}{2}$

Change to improper fractions:

$$2\frac{1}{4} = \frac{9}{4}$$

$$1\frac{1}{2} = \frac{3}{2}$$

Multiply by the reciprocal of $\frac{3}{2}$, which is $\frac{2}{3}$:

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

Simplify: $\frac{18}{12} = \frac{3}{2} = 1\frac{1}{2}$

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

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

8 (1 mark)

Kyle says,

‘When you multiply two fractions, the answer is always bigger than both fractions.’

Is he correct? Tick a box.

Give a reason for your answer.

Try an example.

$$\frac{2}{3} \times \frac{3}{4} = \frac{6}{12} = \frac{1}{2}$$

$\frac{1}{2}$ is smaller than $\frac{2}{3}$ and smaller than $\frac{3}{4}$.

So the answer is not always bigger. Kyle is wrong.

Answer: No, $\frac{2}{3} \times \frac{3}{4} = \frac{1}{2}$, which is smaller than both fractions.

Tip: Multiplying by a fraction less than 1 makes a number smaller. One example that does not work is enough to show Kyle is wrong.

9 (2 marks)

Maya has 9 litres of juice.

She pours the juice into bottles.

Each bottle holds $\frac{3}{4}$ of a litre.

How many bottles can she fill?

We need to know how many $\frac{3}{4}$ litres fit into 9 litres.

So work out $9 \div \frac{3}{4}$

$$9 \div \frac{3}{4} = 9 \times \frac{4}{3}$$

$$= \frac{36}{3} = 12$$

Answer: 12

Marks: 1 mark for $9 \div \frac{3}{4}$ or $9 \times \frac{4}{3}$. 1 mark for 12.

10 (2 marks)

A rectangle has length $3\frac{1}{2}$ m and width $\frac{4}{5}$ m.

Work out the area of the rectangle.

Give your answer as a mixed number.

Area of a rectangle = length $\times$ width

Change $3\frac{1}{2}$ to an improper fraction: $3\frac{1}{2} = \frac{7}{2}$

$$\frac{7}{2} \times \frac{4}{5} = \frac{28}{10}$$

Simplify: $\frac{28}{10} = \frac{14}{5}$

$14 \div 5 = 2$ remainder 4, so $\frac{14}{5} = 2\frac{4}{5}$

Answer: $2\frac{4}{5} \text{ m}^2$

Marks: 1 mark for $\frac{7}{2} \times \frac{4}{5}$. 1 mark for $2\frac{4}{5}$.

11 (4 marks)

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

Give your answer as a mixed number.

Change the mixed number to an improper fraction:

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

Multiply by the reciprocal of $\frac{3}{4}$, which is $\frac{4}{3}$:

$$\frac{10}{3} \times \frac{4}{3} = \frac{40}{9}$$

Change back to a mixed number:

$$40 \div 9 = 4 \text{ remainder } 4$$

$$\text{So } \frac{40}{9} = 4\frac{4}{9}$$

Answer: $4\frac{4}{9}$

Tip: The question asks for a mixed number. Students often lose the last mark by leaving the answer as $\frac{40}{9}$.

Marks: 1 mark for $\frac{10}{3}$. 1 mark for multiplying by $\frac{4}{3}$. 1 mark for $\frac{40}{9}$. 1 mark for writing your answer as a correct mixed number.
