Multiplying and dividing fractions

- Multiplying a fraction by a fraction
- Dividing a fraction by a fraction by multiplying by the reciprocal
- Problem-solving involving fractions

Keywords

You should know

explanation 1 online

1 Work these out, simplifying your answer where possible.

a $\frac{2}{3} \times \frac{4}{5}$ **b** $\frac{5}{6} \times \frac{3}{4}$ **c** $\frac{5}{9} \times \frac{8}{9}$ **d** $\frac{3}{4} \times \frac{9}{10}$

e $\frac{7}{9} \times \frac{5}{8}$ **f** $\frac{3}{10} \times \frac{13}{20}$ **g** $\frac{11}{12} \times \frac{5}{7}$ **h** $\frac{5}{6} \times \frac{9}{11}$

i $7 \times \frac{2}{9}$ **j** $5 \times \frac{5}{6}$ **k** $4 \times \frac{4}{9}$ **l** $8 \times \frac{5}{11}$

2 Work these out. Cancel first if you can and simplify your answer where possible.

a $\frac{7}{9} \times \frac{27}{14}$ **b** $\frac{9}{14} \times \frac{2}{5}$ **c** $\frac{5}{6} \times \frac{9}{11}$ **d** $\frac{2}{3} \times \frac{3}{4}$

e $\frac{3}{4} \times \frac{10}{9}$ **f** $\frac{2}{3} \times \frac{12}{20}$ **g** $\frac{3}{7} \times \frac{21}{24}$ **h** $\frac{5}{12} \times \frac{16}{25}$

i $\frac{20}{33} \times \frac{22}{65}$ **j** $\frac{3}{4} \times \frac{5}{7} \times \frac{2}{3}$ **k** $\frac{5}{6} \times \frac{9}{20} \times \frac{12}{20}$ **l** $2 \times \frac{1}{3} \times \frac{4}{5}$

3 Cancel the common factors where possible, then work out these multiplications.

a $\frac{3}{12} \times \frac{8}{13}$ **b** $\frac{7}{11} \times \frac{55}{56}$ **c** $\frac{24}{29} \times \frac{58}{60}$ **d** $\frac{23}{48} \times \frac{36}{69}$

4 A paving slab is $\frac{1}{2}$ metre wide by $\frac{3}{4}$ metre long.

What is the area of the paving slab in square metres?

5 A magician had 5 pieces of rope each $\frac{3}{4}$ metre long.

He put them in a hat and then pulled them out joined together.

How long was the piece he pulled out of the hat?

explanation 2a | explanation 2b | online

6 Rewrite each of these divisions as a multiplication, then work out the answer.

a $\frac{5}{9} \div \frac{3}{4}$ **b** $\frac{10}{11} \div \frac{3}{22}$ **c** $\frac{11}{12} \div \frac{5}{3}$ **d** $\frac{2}{3} \div \frac{1}{2}$

e $\frac{7}{10} \div \frac{4}{5}$ **f** $\frac{9}{10} \div \frac{3}{4}$ **g** $\frac{5}{6} \div 2$ **h** $\frac{7}{10} \div 3$

7 Work out these divisions without a calculator. Cancel where possible.

a $\frac{7}{10} \div \frac{14}{19}$ **b** $\frac{5}{18} \div \frac{35}{36}$ **c** $\frac{12}{84} \div \frac{9}{45}$ **d** $\frac{27}{35} \div \frac{9}{21}$

e $\frac{18}{20} \div \frac{6}{10}$ **f** $3 \div \frac{3}{5}$ **g** $8 \div \frac{4}{5}$ **h** $12 \div \frac{3}{4}$

8 Work out these divisions, making sure you cancel the common factors where possible.

a $\frac{2}{9} \div \frac{17}{18}$ **b** $\frac{21}{25} \div \frac{42}{75}$ **c** $\frac{40}{63} \div \frac{60}{81}$ **d** $\frac{39}{105} \div \frac{13}{35}$

e $\frac{15}{11} \div \frac{3}{4}$ **f** $\frac{31}{36} \div \frac{5}{6}$ **g** $\frac{45}{63} \div \frac{25}{27}$ **h** $\frac{39}{54} \div \frac{13}{66}$

explanation 3

9 Work out these multiplications.

a $2\frac{1}{4} \times \frac{2}{3}$ **b** $3\frac{5}{8} \times \frac{4}{7}$ **c** $2\frac{1}{2} \times 1\frac{5}{7}$ **d** $1\frac{2}{3} \times \frac{6}{11}$

e $3\frac{7}{8} \times 2\frac{1}{4}$ **f** $2\frac{1}{4} \times 3\frac{2}{3}$ **g** $3\frac{3}{4} \times 1\frac{3}{5}$ **h** $\left(1\frac{3}{4}\right)^2$

10 A note pad is $3\frac{3}{4}$ inches wide and $4\frac{2}{5}$ inches long.
Calculate its area and give the unit of measurement.

11 Harley had $6\frac{1}{2}$ bottles of juice. Each bottle held $1\frac{3}{4}$ litres of juice.
How much juice did Harley have altogether?

12 Work out these divisions.

a $1\frac{2}{3} \div \frac{10}{9}$ **b** $\frac{5}{6} \div 2\frac{1}{12}$ **c** $3\frac{3}{4} \div \frac{3}{8}$ **d** $4\frac{2}{5} \div 1\frac{1}{9}$

e $3\frac{1}{2} \div \frac{3}{4}$ **f** $10 \div 1\frac{2}{3}$ **g** $4\frac{1}{2} \div 3$ **h** $2 \div 1\frac{3}{4}$

13 A yacht has 60 miles to travel to get back to port.
It travels $7\frac{1}{2}$ miles each hour.
How long will it take to get back to port?

14 A hovercraft completes one crossing in $1\frac{3}{4}$ of an hour.
What is the greatest number of crossings it can make in a 24-hour period?
Your answer must be a whole number.

15 For each calculation, write whether you would expect the answer to be smaller or larger than the first fraction.

a $\frac{4}{5} \div \frac{1}{5}$ **b** $\frac{6}{7} \div 1\frac{2}{3}$ **c** $\frac{21}{10} \times \frac{7}{6}$ **d** $\frac{13}{5} \times \frac{3}{4}$

16 A pupil handed in this calculation. Can you spot the errors in their working?

$$1\frac{4}{5} \div \frac{10}{27} = \frac{\cancel{9}^{1}}{\cancel{5}_{1}} \div \frac{\cancel{10}^{2}}{\cancel{27}_{3}} = \frac{1}{1} \times \frac{3}{2} = \frac{3}{2}$$

Write out the solution correctly.

explanation 4 online

17 Write the answers to these.

a $\frac{1}{5}$ of 30 **b** $\frac{1}{8}$ of 56 **c** $\frac{1}{7}$ of 63 **d** $\frac{1}{4}$ of 48

e $\frac{1}{7}$ of 35 **f** $\frac{1}{9}$ of 81 **g** $\frac{1}{4}$ of 15 **h** $\frac{1}{3}$ of 20

i $\frac{1}{5}$ of 27 **j** $\frac{1}{12}$ of 50 **k** $\frac{1}{20}$ of 45 **l** $\frac{1}{15}$ of 65

18 Work these out.

a $\frac{2}{3}$ of 15 **b** $\frac{3}{4}$ of 28 **c** $\frac{3}{5}$ of 55 **d** $\frac{7}{8}$ of 56

e $\frac{3}{5}$ of 35 **f** $\frac{5}{9}$ of 45 **g** $\frac{2}{5}$ of 40 **h** $\frac{3}{8}$ of 64

19 Baxter the St Bernard dog weighs 60 kg.
$\frac{3}{5}$ of his mass is water.
How many kilograms of Baxter is water?

20 Of the 160 women who gave birth in a hospital, $\frac{3}{20}$ had twins.
How many women did not have twins?

21 In a science experiment Arshad's group used $\frac{1}{5}$ of a 750 ml bottle of copper sulphate.

a How much did Arshad's group use?

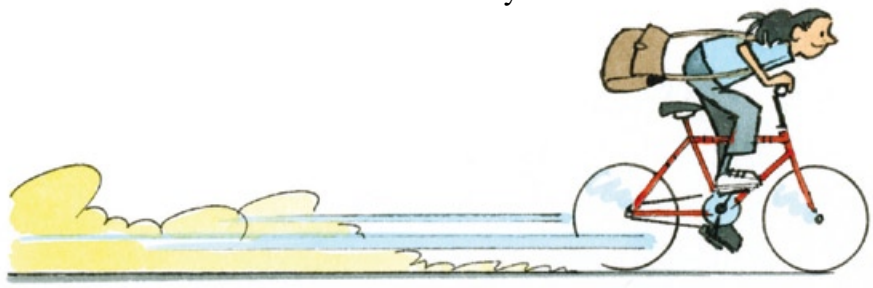
b Jamilah's group used $\frac{2}{3}$ of the copper sulphate that was left in the bottle after Arshad's group had put the bottle back.
How much did Jamilah's group use?

22 Which in each pair is larger? Show your working.

a $\frac{4}{5}$ of 45 or $\frac{5}{6}$ of 42 **b** $\frac{2}{3}$ of 81 or $\frac{11}{12}$ of 60 **c** $\frac{3}{4}$ of 24 or $\frac{2}{3}$ of 27

explanation 5a explanation 5b

23 A class of 36 students was asked how they travelled to school one morning.
$\frac{1}{4}$ of the class travelled by bicycle, $\frac{2}{9}$ by bus, $\frac{1}{3}$ on foot, and the rest by car.
What fraction of the students travelled by car?



24 In a bag of 28 coloured counters, $\frac{1}{4}$ are red, $\frac{2}{7}$ are blue and the rest are yellow.
What fraction of the counters are yellow?

25 Library books are on average $1\frac{1}{4}$ cm thick.
Calculate how many books would fit on a shelf of each of these lengths.

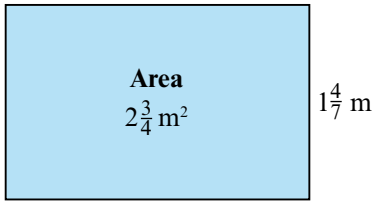
a 15 cm **b** 45 cm **c** 3 m

26 A bottle contains $1\frac{1}{2}$ litres of detergent.
Each load of washing needs $\frac{1}{20}$ of a litre.
How many loads of washing can be done using one bottle?

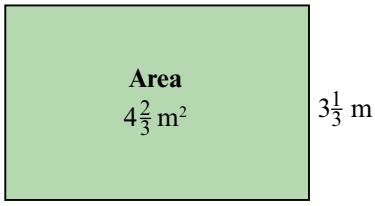
27 **a** Find the length of each rectangle.

b Which of the rectangles has the greater length?

i



ii



28 **a** Ben eats $\frac{1}{4}$ of a packet of biscuits.
What fraction of the remaining biscuits would he need to fill up the packet again?

b The next day, he eats another $\frac{1}{8}$ of the packet of biscuits.
What fraction of the remaining biscuits would he need now to fill up the packet again?

29 Two sports teams are being chosen from different classes.
The first team includes 5 players out of a class of 16.
The second team includes 8 players out of a class of 25.
Which team involves the larger fraction of the class from which it was chosen, and by how much?

30 Write two questions, involving multiplying or dividing by a fraction, that have the answer $\frac{11}{20}$.