7 Fractions

7.1 Fractions and recurring decimals

Exercise 7.1

Key words

equivalent decimal
improper fraction
mixed number
recurring decimal
terminating decimal
unit fraction

Focus

1 Match each **unit fraction** with the correct **equivalent decimal**.
Write if the fraction is a **terminating decimal** or a **recurring decimal**.
One is done for you: $\frac{1}{6} = 0.1\dot{6}$, recurring decimal

$\frac{1}{2}$	$\frac{1}{3}$	$\frac{1}{4}$	$\frac{1}{5}$	$\frac{1}{6}$	$\frac{1}{7}$	$\frac{1}{8}$	$\frac{1}{9}$	$\frac{1}{10}$
$0.1\dot{6}$	0.25	$0.\dot{3}$	0.5	0.2	$0.\dot{1}$	0.1	$0.\dot{1}42857\dot{}$	0.125

2 Copy and complete the workings to convert each fraction into a decimal.
Write if the fraction is a terminating or recurring decimal.
The first two have been done for you.

Tip

Remember, you may need to carr on the division for more than tw decimal places.

a $\frac{2}{5}$

$$5\overline{)2 \cdot {}^{2}0} \quad 0 \cdot 4$$

$\frac{2}{5} = 0.4$
terminating decimal

b $\frac{2}{3}$

$$3\overline{)2 \;.\; {}^{2}0\;{}^{2}0\;{}^{2}0} \quad 0 \;.\; 6\;6\;6\;\ldots$$

$\frac{2}{3} = 0.\dot{6}$
recurring decimal

c $\frac{3}{4}$

$$4\overline{)3 \;.\; {}^{3}0\;0} \quad 0 \;.$$

d $\frac{3}{5}$

$$5\overline{)3 \;.\; {}^{3}0\;0} \quad 0 \;.$$

e $\frac{5}{6}$

$$6\overline{)5 \;.\; {}^{5}0\;0} \quad 0 \;.$$

f $\frac{2}{7}$

$$7\overline{)2 \;.\; {}^{2}0\;0} \quad 0 \;.$$

g $\frac{3}{8}$

$$8\overline{)3 \;.\; {}^{3}0\;0} \quad 0 \;.$$

h $\frac{4}{9}$

$$9\overline{)4 \;.\; {}^{4}0\;0} \quad 0 \;.$$

i $\frac{7}{10}$

$$10\overline{)7 \;.\; {}^{7}0\;0} \quad 0 \;.$$

j $\frac{2}{11}$

$$11\overline{)2 \;.\; {}^{2}0\;0} \quad 0 \;.$$

3 Use your answers to Question **2** to write these fractions in order of size, starting with the smallest.

$\frac{7}{10}, \frac{3}{5}, \frac{3}{8}, \frac{4}{9}, \frac{2}{11}$

Practice

4 Here are five fraction cards.

A $\frac{7}{8}$ **B** $\frac{4}{5}$ **C** $\frac{3}{10}$ **D** $\frac{3}{20}$ **E** $\frac{8}{25}$

a Without doing any calculations, do you think these fractions are terminating or recurring decimals? Explain why.

b Use a written method to convert each fraction to a decimal.

c Write the fractions in order of size, starting with the smallest.

5 Here are five fraction cards.

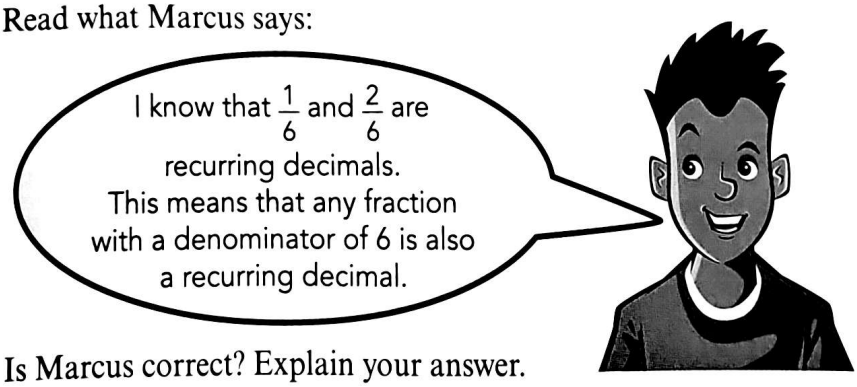
A $\frac{5}{9}$ **B** $\frac{1}{3}$ **C** $\frac{5}{12}$ **D** $\frac{4}{11}$ **E** $\frac{8}{15}$

a Without doing any calculations, do you think these fractions are terminating or recurring decimals? Explain why.

b Use a written method to convert each fraction to a decimal.

c Write the fractions in order of size, starting with the smallest.

6 Read what Marcus says:



Is Marcus correct? Explain your answer.

7 Use a calculator to convert each fraction to a decimal.

a $\frac{8}{9}$ **b** $\frac{17}{20}$ **c** $\frac{4}{15}$ **d** $\frac{27}{40}$

8 Use a calculator to convert these fractions to decimals.

a $\frac{6}{7}$ **b** $\frac{11}{13}$ **c** $\frac{5}{21}$

Tip

Remember, when several digits repeat in a decimal, you only put a dot over the first and last repeating digits, e.g. $\frac{1}{7} = 0.\dot{1}42857\dot{}$

9 This is part of Su's homework.

Question

Write these fractions as decimals.

i $\frac{7}{24}$ ii $\frac{8}{11}$ iii $\frac{11}{18}$ iv $\frac{5}{39}$

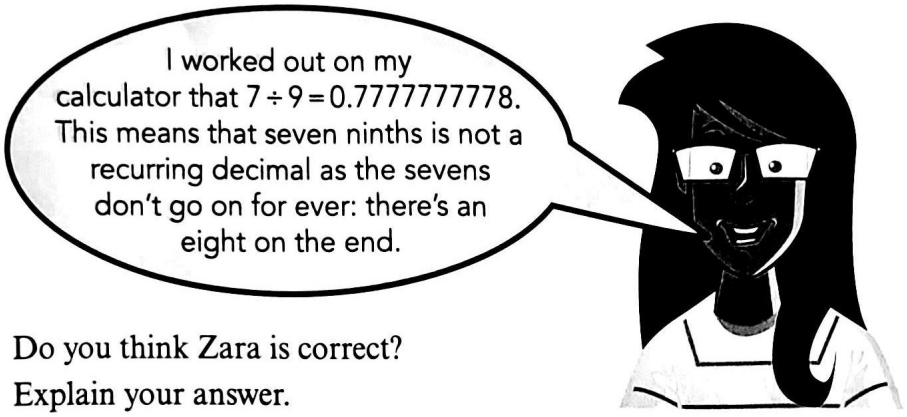
Answer

i $\frac{7}{24} = 0.29\dot{1}6$ ii $\frac{8}{11} = 0.\dot{7}\dot{2}$ iii $\frac{11}{18} = 0.1\dot{6}$ iv $\frac{5}{39} = 0.\dot{1}28205\dot{1}$

a Use a calculator to check Su's homework.

b Explain any mistakes she has made and write the correct answers.

10 Read what Zara says.



Do you think Zara is correct?

Explain your answer.

Challenge

11 There are 27 students in a class. 22 of them are right-handed.
What fraction of the students are left-handed?
Write your answer as a decimal.

12 Write these numbers in order of size, starting with the smallest.
0.56, $\frac{4}{7}$, 0.6, $\frac{7}{13}$, 58.2%, $\frac{18}{27}$, 55%, 0.5

13 Without using a calculator, write each fraction as a decimal.

a $\frac{5}{3}$ **b** $\frac{13}{4}$ **c** $\frac{29}{9}$ **d** $\frac{35}{8}$

14 Write each length of time, in hours, as

i a mixed number **ii** a decimal.

a 3 hours 30 minutes **b** 2 hour 45 minutes

c 1 hour 10 minutes **d** 4 hours 20 minutes

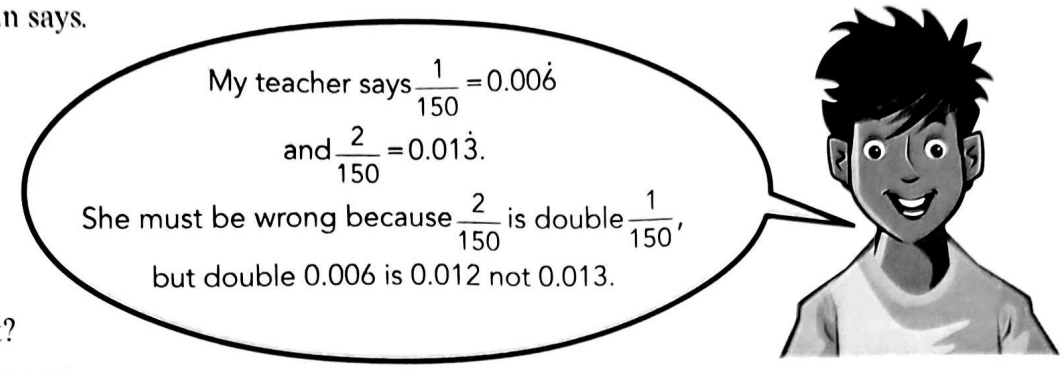
e 9 hours 12 minutes **f** 11 hours 25 minutes

Tips

Start by converting the fractions and percentages to decimals.

Change the **improper fractions** into **mixed numbers** first.

15 Read what Arun says.



Is Arun correct?
Explain your answer.

7.2 Ordering fractions

Exercise 7.2

Focus

For questions **1** to **4**, use the common denominator method.

1 Write the correct sign, = or ≠, between each pair of fractions.
They have all been started for you.

a $\frac{13}{4} \square 3\frac{2}{8}$ $\quad \frac{13}{4} = 3\frac{\square}{4} = 3\frac{\square}{8}$

b $\frac{40}{9} \square 4\frac{1}{3}$ $\quad \frac{40}{9} = 4\frac{\square}{9}$ and $4\frac{1}{3} = 4\frac{\square}{9}$

c $-\frac{9}{6} \square -1\frac{1}{2}$ $\quad -\frac{9}{6} = -1\frac{\square}{6} = -1\frac{\square}{\square}$

d $-4\frac{3}{5} \square -\frac{47}{10}$ $\quad -\frac{47}{10} = -4\frac{7}{10}$ and $-4\frac{3}{5} = -4\frac{\square}{10}$

Tip

Change the improper fractions to mixed numbers first, then use a common denominator to compare the fraction parts.

2 Write the correct symbol, < or >, between each pair of fractions.
They have all been started for you.

a $\frac{7}{2} \square 3\frac{3}{4}$ $\quad \frac{7}{2} = 3\frac{1}{2} = 3\frac{\square}{4}$

b $\frac{13}{3} \square 4\frac{1}{6}$ $\quad \frac{13}{3} = 4\frac{\square}{3} = 4\frac{\square}{6}$

c $8\frac{2}{5} \square \frac{83}{10}$ $\quad \frac{83}{10} = 8\frac{\square}{10}$ and $8\frac{2}{5} = 8\frac{\square}{10}$

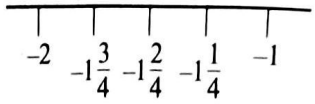
d $\frac{22}{3} \square 7\frac{2}{5}$ $\quad \frac{22}{3} = \square\frac{\square}{3} = \square\frac{\square}{15}$ and $7\frac{2}{5} = 7\frac{\square}{15}$

Tip

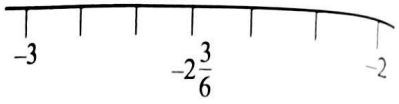
Use the same method as in Question **1**.

3 Write the correct symbol, < or >, between each pair of fractions.
They have all been started for you. Use the number lines to help.

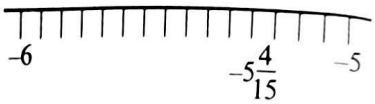
a $-\frac{5}{4}\square-1\frac{1}{2}$ $-\frac{5}{4}=-1\frac{\square}{4}$ and $-1\frac{1}{2}=-1\frac{\square}{4}$



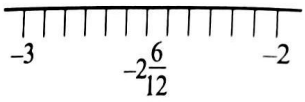
b $-\frac{8}{3}\square-2\frac{5}{6}$ $-\frac{8}{3}=-2\frac{\square}{3}=-2\frac{\square}{6}$



c $-\frac{27}{5}\square-5\frac{4}{15}$ $-\frac{27}{5}=-5\frac{\square}{5}=-5\frac{\square}{15}$



d $-\frac{17}{6}\square-2\frac{3}{4}$ $-\frac{17}{6}=-2\frac{\square}{6}=-2\frac{\square}{12}$ and $-2\frac{3}{4}=-2\frac{\square}{12}$



4 Work out which is larger.

a $-\frac{11}{4}$ or $-2\frac{5}{8}$ **b** $-\frac{23}{10}$ or $-2\frac{2}{5}$ **c** $-7\frac{3}{4}$ or $-\frac{23}{3}$

5 **a** Complete the workings to write each fraction as a decimal.
Work out the **first four** decimal places.

i $-\frac{17}{7}=-2\frac{3}{7}$

$$7\overline{)\,3\,.\,{}^{3}0\;{}^{2}0\;{}^{6}0\;0}\;\begin{matrix}0\;.\;4\;2\end{matrix}$$

$\frac{3}{7}=0.42\square$ $-2\frac{3}{7}=-2.42\square$

ii $-\frac{22}{9}=-2\frac{4}{9}$

$$9\overline{)\,4\,.\,{}^{4}0\;{}^{4}0\;0\;0}\;\begin{matrix}0\;.\;4\end{matrix}$$

$\frac{4}{9}=\square$ $-2\frac{4}{9}=\square$

iii $-\frac{27}{11}=-2\frac{5}{11}$

$$11\overline{)\,5\,.\,{}^{5}0\;{}^{6}0\;0\;0}\;\begin{matrix}0\;.\;4\end{matrix}$$

$\frac{5}{11}=\square$ $-2\frac{5}{11}=\square$

b Write the fractions $-\frac{17}{7}$, $-\frac{22}{9}$ and $-\frac{27}{11}$ in order of size, starting with the smallest.

Practice

6 Write the missing word from each of these sentences.
Use either the word 'larger' or 'smaller'.

a When you compare two fractions with the same denominator, the larger the numerator the ..... the fraction.

b When you compare two fractions with the same numerator, the larger the denominator the ..... the fraction.

7 Write the correct symbol, < or >, between each pair of fractions.

a $\frac{2}{9} \square \frac{7}{9}$ **b** $\frac{15}{8} \square \frac{19}{8}$ **c** $\frac{7}{11} \square \frac{7}{13}$ **d** $\frac{4}{5} \square \frac{4}{3}$

8 Put these fraction cards in order of size, starting with the smallest.

A $-4\frac{1}{5}$ **B** $-\frac{14}{3}$ **C** $-\frac{22}{5}$ **D** $-4\frac{1}{3}$

9 Three friends sat a Spanish test on the same day.
Amina scored $\frac{18}{25}$, Ben scored $\frac{37}{50}$, and Cynthia scored 73%.
Who had the highest percentage score?

10 Two swimming clubs compare the percentage of girl members.
In the Dolphins club, 42 out of 60 members are girls.
In the Seals club, 68% of members are girls.
Which club has the higher percentage of girl members?
Show how you worked out your answer.

Tip
Change the fractions into percentages by writing equivalent fractions with a denominator of 100.

Challenge

11 Write these fractions in order of size, starting with the smallest.

$-\frac{49}{6}$ $-\frac{61}{7}$ $-8\frac{7}{8}$ $-\frac{107}{12}$

Tip
Use the division method.

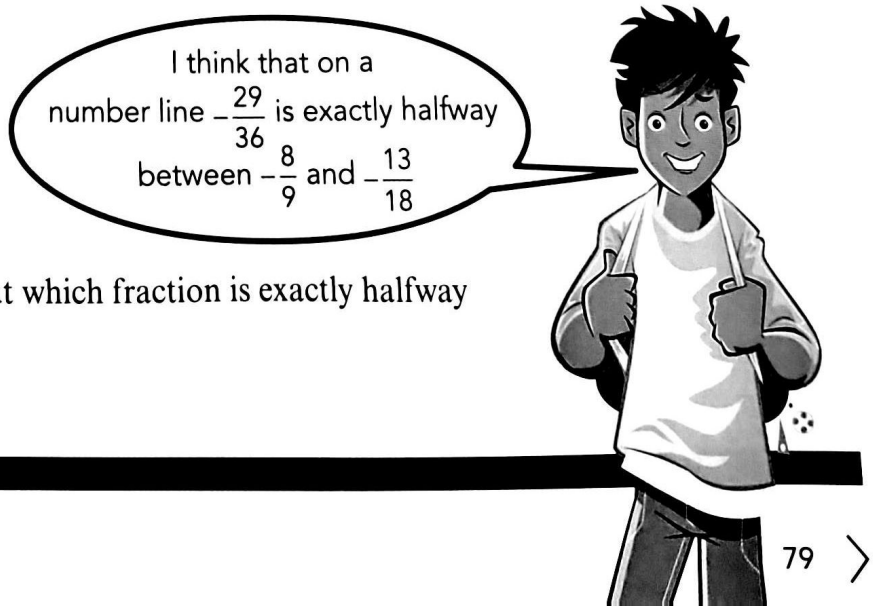
12 One day, a baker sells 87% of his loaves of bread.
The following day, he sells 30 out of 34 loaves.
Use a calculator to work out on which day he sold the greater percentage of bread loaves.

13 In a drugs trial, two different drugs are tested on some patients.
145 patients are given drug A, and it helps 112 of them.
180 patients are given drug B, and it helps 137 of them.
Use a calculator to work out which drug helped the greater percentage of patients.

14 Arun has three fraction cards. He puts them in order, starting with the smallest.

$-\frac{8}{9}$ $-\frac{29}{36}$ $-\frac{13}{18}$

Read what Arun says.



a Is Arun correct?
Explain your answer.

b On a number line, work out which fraction is exactly halfway between $-1\frac{3}{4}$ and $-\frac{11}{6}$.

7.3 Subtracting mixed numbers

Exercise 7.3

Key words
counter-example
linked
range

Focus

1 Copy and complete the steps in each subtraction.

a $4\frac{2}{3}-3\frac{1}{3}$

$\frac{14}{3}-\frac{10}{3}$

$\frac{14}{3}-\frac{10}{3}=\frac{\square}{3}$

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

b $3\frac{2}{9}-1\frac{7}{9}$

$\frac{29}{9}-\frac{16}{9}$

$\frac{29}{9}-\frac{16}{9}=\frac{\square}{9}$

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

c $7\frac{1}{5}-5\frac{2}{5}$

$\frac{\square}{5}-\frac{\square}{5}$

$\frac{\square}{5}-\frac{\square}{5}=\frac{\square}{5}$

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

d $5\frac{3}{7}-2\frac{6}{7}$

$\frac{\square}{7}-\frac{\square}{7}$

$\frac{\square}{7}-\frac{\square}{7}=\frac{\square}{7}$

$\frac{\square}{7}=2\frac{\square}{7}$

2 Work out these subtractions. Show all the steps in your working.

a $2\frac{3}{5}-1\frac{1}{5}$ **b** $4\frac{3}{11}-2\frac{7}{11}$ **c** $3\frac{2}{7}-1\frac{4}{7}$ **d** $6\frac{1}{9}-3\frac{2}{9}$

3 Copy and complete each subtraction.

a $4\frac{1}{2}-2\frac{3}{4}$

$\frac{9}{2}-\frac{11}{4}$

$\frac{18}{4}-\frac{11}{4}=\frac{\square}{4}$

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

b $3\frac{1}{8}-1\frac{1}{4}$

$\frac{\square}{8}-\frac{5}{4}$

$\frac{\square}{8}-\frac{10}{8}=\frac{\square}{8}$

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

c $5\frac{3}{5}-2\frac{3}{10}$

$\frac{28}{5}-\frac{\square}{10}$

$\frac{56}{10}-\frac{\square}{10}=\frac{\square}{10}$

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

d $6\frac{1}{3}-2\frac{1}{6}$

$\frac{\square}{3}-\frac{\square}{6}$

$\frac{\square}{6}-\frac{\square}{6}=\frac{\square}{6}$

$\frac{\square}{6}=4\frac{\square}{6}$

4 Work out these subtractions. Show all the steps in your working.

a $5\frac{5}{6}-\frac{11}{12}$ **b** $4\frac{3}{4}-1\frac{15}{16}$ **c** $10\frac{3}{10}-8\frac{4}{5}$ **d** $6\frac{1}{4}-3\frac{5}{12}$

5 One of these cards gives a different answer to the other two.

A $4\frac{19}{20}-2\frac{7}{10}$ **B** $5\frac{14}{15}-3\frac{3}{5}$ **C** $5\frac{4}{7}-3\frac{5}{21}$

Which one is it? Show all your working.

Practice

6 Bim and Yolander have been out for a training run.

Bim ran for $8\frac{5}{8}$ kilometres. Yolander ran for $10\frac{3}{4}$ kilometres.

a estimate, then **b** calculate, the answers to these questions.

i What is the difference between the distances run by Bim and Yolander?

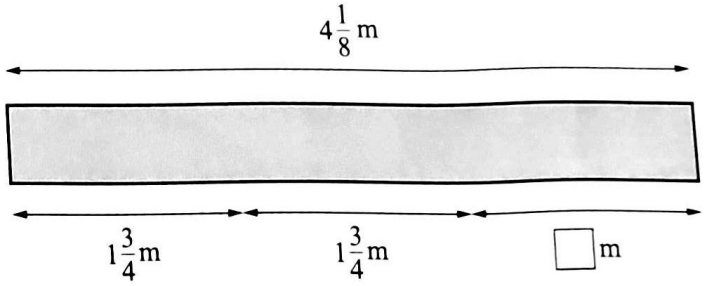
ii How far in total did Bim and Yolander run?

7 Silvie has a piece of wood $4\frac{1}{8}$ m long.

She wants to make some shelves.

She cuts two pieces of wood, each $1\frac{3}{4}$ m long, from the piece she has.

How long is the piece of wood Silvie has left?



8 Copy and complete this subtraction.

$8\frac{1}{4}-3\frac{9}{10}$

Step 1: $\frac{33}{4}-\frac{39}{10}$

Step 2: $\frac{33}{4}-\frac{39}{10}=\frac{\square}{20}-\frac{\square}{20}=\frac{\square}{20}$

Step 3: $\frac{\square}{20}=\square\frac{\square}{20}$

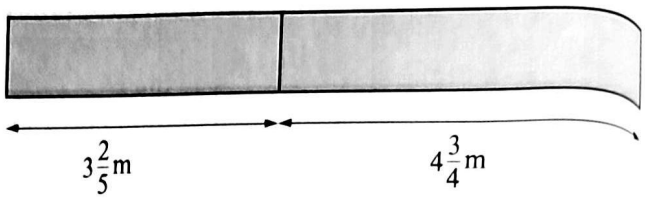
9 Work out these subtractions. Show all the steps in your working.

a $7\frac{1}{2}-3\frac{3}{5}$ **b** $5\frac{2}{9}-3\frac{5}{6}$ **c** $4\frac{3}{4}-1\frac{5}{6}$ **d** $10\frac{1}{8}-5\frac{2}{10}$

10 Xao is a plumber.

He has two pieces of pipe.

The first piece is $3\frac{2}{5}$ m long; the second is $4\frac{3}{4}$ m long.



He fixes them together, as shown in the diagram.

a **i** estimate, then

ii calculate the total length of the two pipes.

Xao wants a pipe that is $10\frac{1}{4}$ m long.

b How much more pipe does he need?

11 The table shows the distances that Nia drives on Monday to Friday one week.

Day	Monday	Tuesday	Wednesday	Thursday	Friday
Distance (km)	$126\frac{1}{2}$	$187\frac{3}{4}$	$105\frac{3}{8}$	$95\frac{7}{10}$	$157\frac{1}{4}$

Nia works out that the **range** of the distances she travels is $91\frac{19}{20}$ km.

Is Nia correct? Explain your answer.

Show all your working.

Challenge

12 This is part of Beth's homework. She has made a mistake in her solution.

Question

Work out $3\frac{4}{9} - 1\frac{3}{4}$

Answer

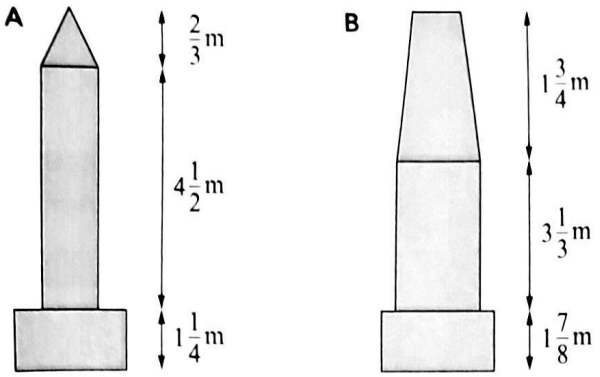
$3\frac{4}{9} = 3\frac{16}{36}$ *and* $1\frac{3}{4} = 1\frac{27}{36}$

$3\frac{16}{36} - 1\frac{27}{36} = 2\frac{11}{36}$

a Explain the mistake Beth has made.

b Work out the correct answer.

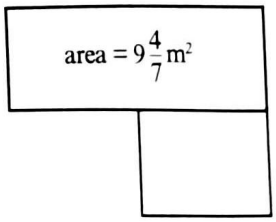
13 The diagram shows two statues. Each statue is made from three parts.
The height of each part, in metres, is shown.



a Which statue is taller? Show your working.

b What is the difference in height between the two statues?

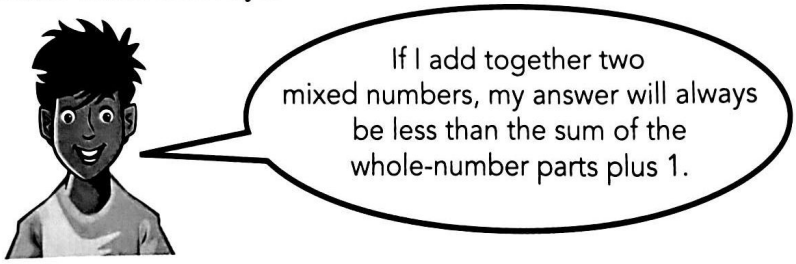
14 The area of this compound shape is $15\frac{2}{3}$m².



The area of one rectangle is $9\frac{4}{7}$m².

a estimate, then **b** calculate the area of the other rectangle.

15 Read what Arun says.

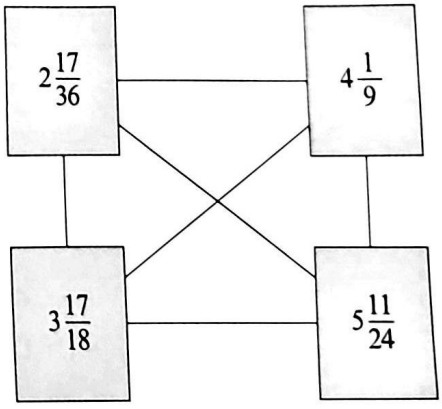


Use at least two **counter-examples** to show that Arun's statement is not true.

Tip

A counter-example is any example that shows a statement is false.

16 The diagram shows four mixed numbers **linked** by lines.



a Work out the total of any two of the linked mixed numbers.

b Without working out all the answers, explain how you can decide which two mixed numbers give the greatest total?

What is this total? Write your answer in its simplest form.

c Work out the difference between any two of the linked mixed numbers.

d Without working out all the answers, explain how you can decide which two mixed numbers give the smallest difference?

What is this difference? Write your answer in its simplest form.

7.4 Multiplying an integer by a mixed number

Exercise 7.4

Key word
median

Focus

1 Copy and complete each multiplication.

a $2\frac{1}{2}\times 6 = 2\times 6 + \frac{1}{2}\times 6$

$= \square + 3$

$= \square$

b $3\frac{1}{4}\times 8 = 3\times 8 + \frac{1}{4}\times 8$

$= \square + \square$

$= \square$

c $5\frac{1}{3}\times 9 = 5\times 9 + \frac{1}{3}\times 9$

$= \square + \square$

$= \square$

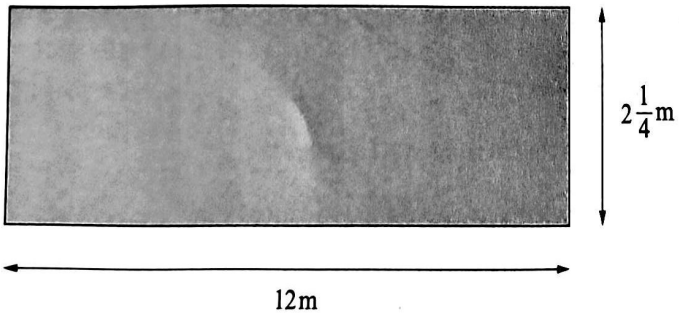
d $4\frac{1}{5}\times 15 = 4\times 15 + \frac{1}{5}\times 15$

$= \square + \square$

$= \square$

Tip
Remember, the area of a rectangle = length × width

2 This rectangle has a length of 12 m and a width of $2\frac{1}{4}$ m.



Work out

a an estimate for the area of the rectangle

b the accurate area of the rectangle.

3 Copy and complete each multiplication.

a $3\frac{2}{3}\times 12 = 3\times 12 + \frac{2}{3}\times 12$

$= \square + 8$

$= \square$

b $2\frac{3}{4}\times 8 = 2\times 8 + \frac{3}{4}\times 8$

$= \square + \square$

$= \square$

c $3\frac{2}{5}\times 10 = 3\times 10 + \frac{2}{5}\times 10$

$= \square + \square$

$= \square$

d $1\frac{5}{6}\times 18 = 1\times 18 + \frac{5}{6}\times 18$

$= \square + \square$

$= \square$

4 Archie uses this formula in a science lesson.

$F = m \times a$

a Estimate the value of F when $m = 21$ and $a = 3\frac{2}{3}$.

When $m = 21$ and $a = 3\frac{2}{3}$, Archie works out that $F = 77$.

b **i** Use your answer to part **a** to help you decide if Archie could be correct.

ii Work out the value of F to help you decide if Archie is correct.

5 Copy and complete each multiplication.

a $3\frac{1}{2}\times 7 = 3\times 7 + \frac{1}{2}\times 7$

$= \square + \frac{7}{2}$

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

$= \square\frac{\square}{\square}$

b $4\frac{1}{4}\times 9 = 4\times 9 + \frac{1}{4}\times 9$

$= \square + \frac{9}{4}$

$= \square + 2\frac{\square}{4}$

$= \square\frac{\square}{\square}$

c $6\frac{2}{3}\times 5 = 6\times 5 + \frac{2}{3}\times 5$

$= \square + \frac{\square}{\square}$

$= \square + \square\frac{\square}{\square}$

$= \square\frac{\square}{\square}$

d $4\frac{3}{5}\times 8 = 4\times 8 + \frac{3}{5}\times 8$

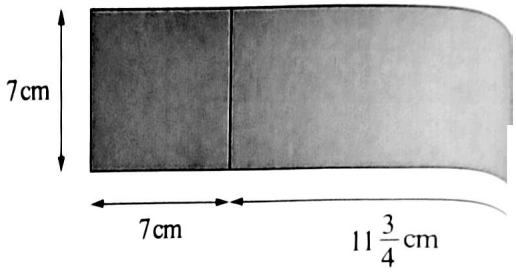
$= \square + \frac{\square}{\square}$

$= \square + \square\frac{\square}{\square}$

$= \square\frac{\square}{\square}$

Practice

6 The diagram shows a square joined to a rectangle.



Show that the total area of the shape is $131\frac{1}{4}$ cm^2.

7 Rosa buys carpet for her bedroom floor.

The floor is a rectangle with length $4\frac{5}{8}$ m and width 3 m.

a Rosa estimates that the area of her bedroom floor is 12 m^2.
Is Rosa correct? Explain your answer.

b Work out the area of her bedroom floor.

Rosa buys carpet that costs \$15 per square metre.
She can only buy a whole number of square metres.
Rosa works out that the carpet will cost her more than \$200.

c Is Rosa correct? Explain your answer.

8 Which is greater, $3\frac{2}{3}\times 25$ or $4\frac{2}{5}\times 21$?

Show all your working.

9 Write these cards in order of size, starting with the smallest.

A $8\times 4\frac{5}{6}$ **B** $12\times 3\frac{1}{5}$ **C** $5\times 7\frac{5}{7}$

10 For each of these calculations, work out

i an estimate **ii** the accurate answer.

Write each answer in its simplest form.

a $2\frac{5}{8}\times 12$ **b** $6\frac{3}{4}\times 10$ **c** $3\frac{1}{12}\times 15$

Challenge

11 Alec works in a factory. His job is to pack boxes.

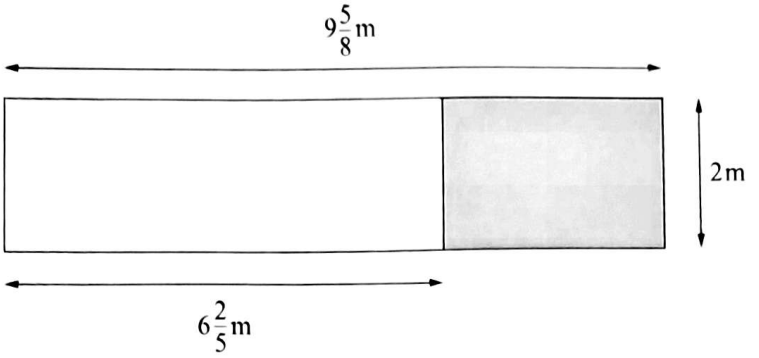
It takes him $3\frac{3}{4}$ minutes to pack one box.

How long will it take him to pack 60 boxes?
Give your answer in hours and minutes.

12 Work out

a an estimate for the area of the grey section of this rectangle

b the accurate area of the grey section of this rectangle.



13 **a** Work out the value of each of these cards.
Write each answer in its simplest form.

$9\times8\frac{5}{6}$ $6\times11\frac{3}{4}$ $12\times7\frac{4}{15}$

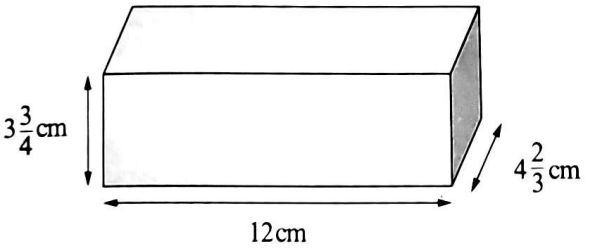
b Write down the **median** value.

c Work out the range of the values.

Tip

Remember, the median is the middle value when the numbers are arranged in order of size.

14 The diagram shows a cuboid.



The length, width and height of the cuboid are shown on the diagram.

a Estimate the volume of the cuboid.

b Raj works out that the volume of the cuboid is 210 cm^3.
Is Raj correct? Show your working.

15 a This is part of Helena's homework.

Question

x is an integer. Work out the value of x when $x \times 5\frac{4}{9} = 65\frac{1}{3}$

Answer

Try $x = 10$ $10 \times 5\frac{4}{9} = 10 \times 5 + 10 \times \frac{4}{9} = 50 + \frac{40}{9} = 50 + 4\frac{4}{9} = 54\frac{4}{9}$

$54\frac{4}{9} < 65\frac{1}{3}$ *so try a bigger value for x*

Try $x = 14$ $14 \times 5\frac{4}{9} = 14 \times 5 + 14 \times \frac{4}{9} = 70 + \frac{56}{9} = 70 + 6\frac{2}{9} = 76\frac{2}{9}$

$76\frac{2}{9} > 65\frac{1}{3}$ *so try a smaller value for x*

Carry on with Helena's homework to find the correct value for x.

b y is an integer.

Use the same method as Helena to work out the value of y when $y \times 7\frac{5}{8} = 99\frac{1}{8}$

7.5 Dividing an integer by a fraction

Exercise 7.5

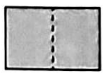
Key word

reciprocal

Focus

1 a Work out the answer to each calculation. Use the diagrams to help you.

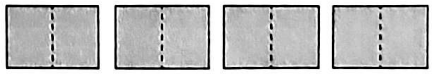
i $1 \div \frac{1}{2}$



ii $2 \div \frac{1}{2}$

iii $3 \div \frac{1}{2}$

iv $4 \div \frac{1}{2}$



1 a Write the answers in

i $\frac{1}{2}$ ÷ 4 ii $\frac{1}{3}$ ÷ 4

b $\frac{1}{4}$ ÷ 2 iv $\frac{1}{5}$ ÷ 2

2 a Work out the answer in each calculation. Use the diagrams to help you.

i $\frac{1}{2}$ ÷ 3

ii $\frac{1}{2}$ ÷ 4

b Write the answers in

i $\frac{1}{3}$ ÷ 3 ii $\frac{1}{4}$ ÷ 3 iii $\frac{1}{5}$ ÷ 3 iv $\frac{1}{6}$ ÷ 3

3 a Work out the answer in each calculation. Use the diagrams to help you.

i $\frac{1}{3}$ ÷ 2

ii $\frac{1}{4}$ ÷ 2

b Write the answers in

i $\frac{1}{2}$ ÷ 4 ii $\frac{1}{3}$ ÷ 4 iii $\frac{1}{4}$ ÷ 4 iv $\frac{1}{5}$ ÷ 4

4 Work out the answer in each calculation. Draw diagrams to help if you want to.

a $\frac{1}{2}$ ÷ 5 b $\frac{1}{3}$ ÷ 4 c $\frac{1}{4}$ ÷ 2

5 Tina is explaining how to divide an integer by a unit fraction.

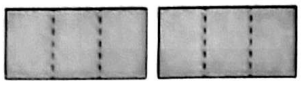
Use Tina's method to work out

a $\frac{1}{2}$ ÷ 6 b $\frac{1}{3}$ ÷ 6 c $\frac{1}{5}$ ÷ 6

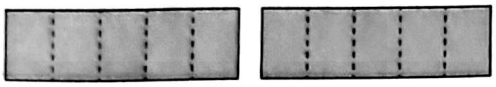
Practice

6 Work out the answer to each calculation. Use the diagrams to help you.

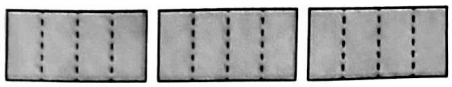
a $2 \div \frac{2}{3}$



b $2 \div \frac{2}{5}$



c $3 \div \frac{3}{4}$



Tip

Think of the questions as:
'How many $\frac{2}{3}$ are in 2?'
'How many $\frac{2}{5}$ are in 2?'
'How many $\frac{3}{4}$ are in 3?'

7 Work out the answer to each calculation.
Use the **reciprocal** method.
The first two have been started for you.

a $8 \div \frac{3}{5} = 8 \times \frac{5}{3} = \frac{40}{3} = \square\frac{\square}{\square}$

b $7 \div \frac{3}{4} = 7 \times \frac{4}{3} = \frac{\square}{\square} = \square\frac{\square}{\square}$

c $9 \div \frac{4}{7}$

d $12 \div \frac{5}{8}$

e $6 \div \frac{7}{9}$

8 Work out the answer to each calculation.
Give each answer as a mixed number in its lowest terms.

a $4 \div \frac{2}{7}$

b $3 \div \frac{9}{10}$

c $10 \div \frac{4}{5}$

d $8 \div \frac{14}{15}$

9 The area of a rectangle is $18\,m^2$.

The width of the rectangle is $\frac{4}{5}$ m.

What is the length of the rectangle?
Give your answer as a mixed number in its lowest terms.

Tip

length = area ÷ width

10 Jaq uses this formula in a science lesson.

$s = u \times t$

a Work out the value of s when $u = \frac{3}{5}$ and $t = 12$.

b Work out the value of t when $s = 22$ and $u = \frac{4}{9}$.

Tip

Rearrange the formula $s = u \times t$ to get $t = \square$

Challenge

11 Which of these two calculation cards gives the greater answer?

A $25 \div \frac{6}{7}$ **B** $25 \div \frac{3}{8}$

Explain how you made your decision.

12 Which of these two calculation cards gives the smaller answer?

A $32 \div \frac{13}{15}$ **B** $35 \div \frac{13}{15}$

Explain how you made your decision.

13 The answers to these three calculation cards are the first three terms in a sequence.

$2 \div \frac{12}{31}$ $3 \div \frac{6}{11}$ $5 \div \frac{6}{7}$

Work out

a the first term of the sequence

b the term-to-term rule of the sequence

c the next three terms in the sequence

d the 10th term in the sequence.

14 A straight line graph has the equation $y = \frac{3}{4}x$

a Copy and complete this table of values.

x	0	2	4	6	8
y					

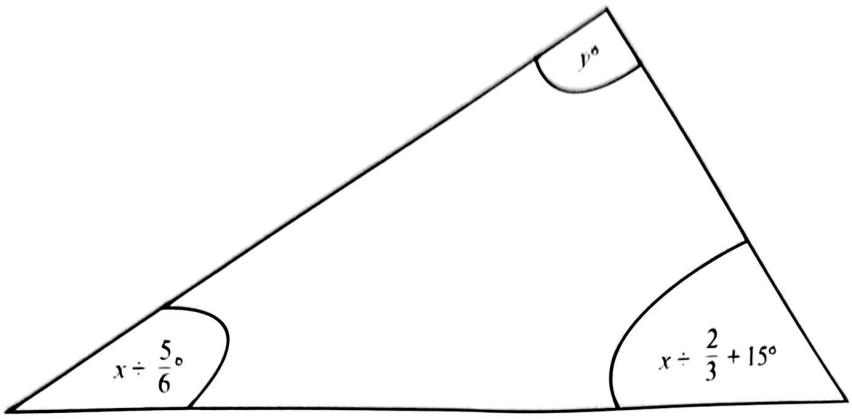
b Draw a coordinate grid going from 0 to 8 on the x-axis and on the y-axis.

Plot the points from the table above. Draw the line $y = \frac{3}{4}x$ from $x = 0$ to $x = 8$.

Tip

Remember, $y = \frac{3}{4}x$ means $y = \frac{3}{4} \times x$, so you need to work out $\frac{3}{4} \times 0$, $\frac{3}{4} \times 2$, etc.

15 The diagram shows a triangle.



a Work out the value of y when $x = 30°$

b Work out the value of y when $x = 43°$

c Explain why it is not possible for x to be 65°.

7.6 Making fraction calculations easier

Exercise 7.6

Focus

In this exercise, work out as many of the answers as you can mentally.
Write each answer in its simplest form and as a mixed number when appropriate.

1 Work out each addition.
Some working has been shown to help you.

a $\frac{1}{5} + \frac{1}{10} = \frac{2}{10} + \frac{1}{10} = \frac{\square}{10}$

b $\frac{1}{9} + \frac{1}{3} = \frac{1}{9} + \frac{\square}{9} = \frac{\square}{9}$

c $\frac{1}{8} + \frac{3}{4} = \frac{1}{8} + \frac{\square}{8} = \frac{\square}{\square}$

d $\frac{1}{4} + \frac{1}{12} = \frac{\square}{12} + \frac{1}{12} = \frac{\square}{12} = \frac{\square}{\square}$

2 Work out each subtraction.
Some working has been shown to help you.

a $\frac{1}{3}-\frac{1}{6}=\frac{2}{6}-\frac{1}{6}=\frac{\square}{6}$

b $\frac{1}{4}-\frac{1}{8}=\frac{\square}{8}-\frac{1}{8}=\frac{\square}{8}$

c $\frac{2}{3}-\frac{1}{9}=\frac{\square}{9}-\frac{1}{9}=\frac{\square}{\square}$

d $\frac{7}{10}-\frac{1}{5}=\frac{7}{10}-\frac{\square}{10}=\frac{\square}{\square}=\frac{\square}{\square}$

3 Work out each addition.
Some working has been shown to help you.

a $\frac{1}{2}+\frac{1}{5}=\frac{1\times5+1\times2}{2\times5}=\frac{5+2}{10}=\frac{\square}{10}$

b $\frac{1}{3}+\frac{1}{7}=\frac{1\times7+1\times3}{3\times7}=\frac{\square+\square}{21}=\frac{\square}{21}$

c $\frac{2}{3}+\frac{1}{4}=\frac{2\times4+1\times3}{3\times4}=\frac{\square+\square}{12}=\frac{\square}{12}$

d $\frac{1}{6}+\frac{3}{5}=\frac{1\times5+3\times6}{6\times5}=\frac{\square+\square}{\square}=\frac{\square}{\square}$

4 Work out each subtraction.
Some working has been shown to help you.

a $\frac{1}{2}-\frac{1}{7}=\frac{1\times7-1\times2}{2\times7}=\frac{7-2}{14}=\frac{\square}{14}$

b $\frac{2}{3}-\frac{1}{5}=\frac{2\times5-1\times3}{3\times5}=\frac{\square-\square}{15}=\frac{\square}{15}$

c $\frac{3}{5}-\frac{2}{7}=\frac{3\times7-2\times5}{5\times7}=\frac{\square-\square}{35}=\frac{\square}{35}$

d $\frac{5}{6}-\frac{3}{5}=\frac{5\times5-3\times6}{6\times5}=\frac{\square-\square}{\square}=\frac{\square}{\square}$

5 In a tennis club, $\frac{1}{3}$ of the members are women, $\frac{2}{5}$ of the members are men and the rest are children.
What fraction of the members are children?

Tip

Work out $\frac{1}{3}+\frac{2}{5}$ first, then subtract your answer from 1.
Remember, $1=\frac{15}{15}$.

Practice

6 Work out these additions and subtractions.
Use the same method as in Questions **1** and **2**.

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

e $\frac{1}{4}+\frac{7}{12}$ **f** $\frac{2}{15}+\frac{2}{5}$ **g** $\frac{2}{3}-\frac{1}{9}$ **h** $\frac{3}{4}-\frac{1}{8}$

i $\frac{1}{5}-\frac{1}{20}$ **j** $\frac{2}{5}-\frac{1}{10}$ **k** $\frac{7}{9}-\frac{1}{3}$ **l** $\frac{11}{15}-\frac{3}{5}$

7 Work out these additions and subtractions.
Use the same method as in Questions **3** and **4**.

a $\frac{1}{4}+\frac{1}{5}$ **b** $\frac{1}{3}+\frac{1}{8}$ **c** $\frac{1}{9}+\frac{1}{5}$ **d** $\frac{1}{4}+\frac{2}{9}$

e $\frac{5}{11}+\frac{1}{2}$ **f** $\frac{2}{9}+\frac{3}{4}$ **g** $\frac{1}{2}-\frac{1}{5}$ **h** $\frac{3}{5}-\frac{1}{4}$

i $\frac{6}{7}-\frac{1}{3}$ **j** $\frac{3}{4}-\frac{2}{5}$ **k** $\frac{7}{11}-\frac{2}{5}$ **l** $\frac{7}{9}-\frac{2}{7}$

8 In a bag of mixed fruits, $\frac{2}{7}$ are lemons, $\frac{3}{8}$ are strawberries and the rest are bananas.

What fraction of the fruits in the bag are bananas?

9 **a** Work out.
Some working has been shown to help you with the first two.

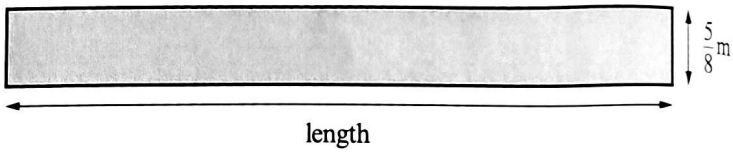
i $6\div\frac{3}{4}=6\times4\div3=\square$ **ii** $9\div\frac{3}{5}=9\times5\div3=\square$ **iii** $7\div\frac{1}{2}$

iv $8\div\frac{2}{7}$ **v** $12\div\frac{3}{5}$ **vi** $20\div\frac{4}{5}$

b Use a calculator to check your answers to part **a**.

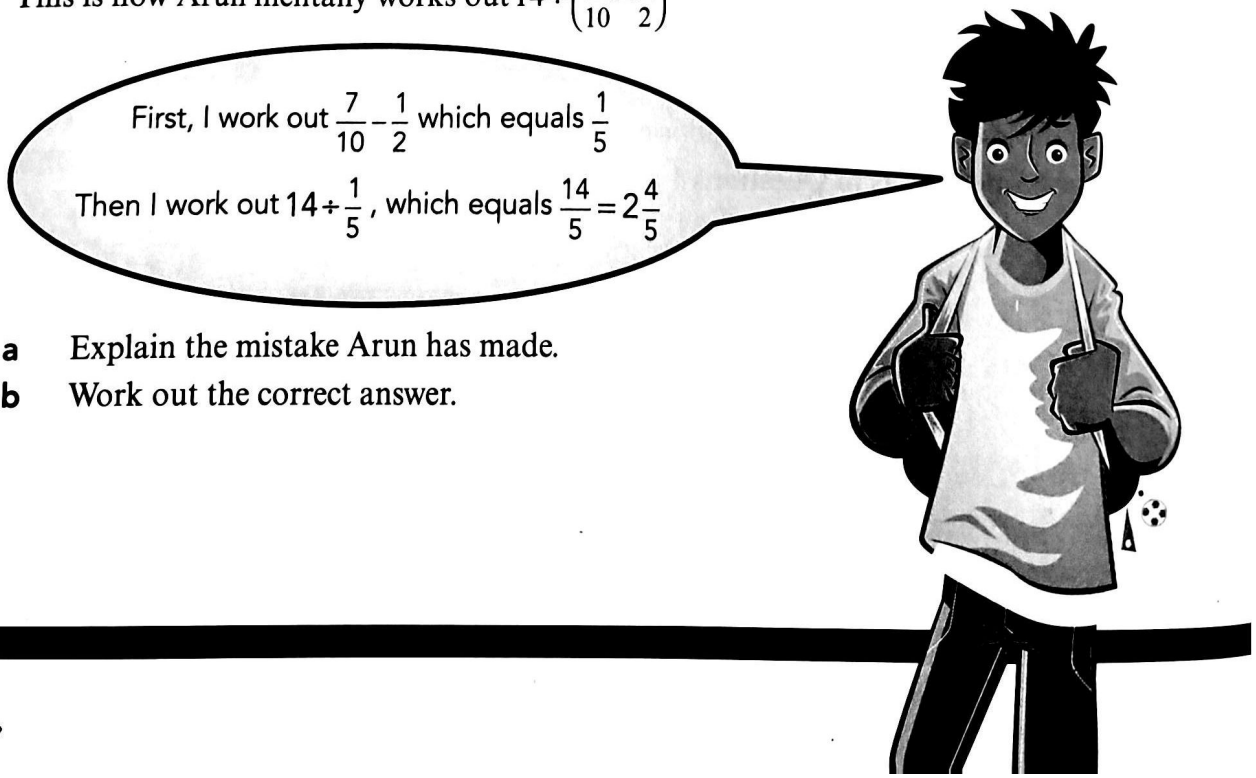
c Did you get the answers to part **a** correct? If not, what mistakes did you make?

10 The diagram shows a rectangle.
The area of the rectangle is $15\,m^2$.
The width of the rectangle is $\frac{5}{8}$ m.
What is the length of the rectangle?



Challenge

11 This is how Arun mentally works out $14\div\left(\frac{7}{10}-\frac{1}{2}\right)$



a Explain the mistake Arun has made.

b Work out the correct answer.

12 **Work** out.

If you cannot do a calculation mentally, write down some workings to help you.

a $10\times\left(\frac{4}{5}-\frac{1}{5}\right)$

b $3\div\left(\frac{1}{6}+\frac{1}{6}\right)$

c $\frac{14}{15}-\left(\frac{3}{5}-\frac{1}{3}\right)$

d $\frac{7}{12}-\left(\frac{1}{4}+\frac{1}{3}\right)$

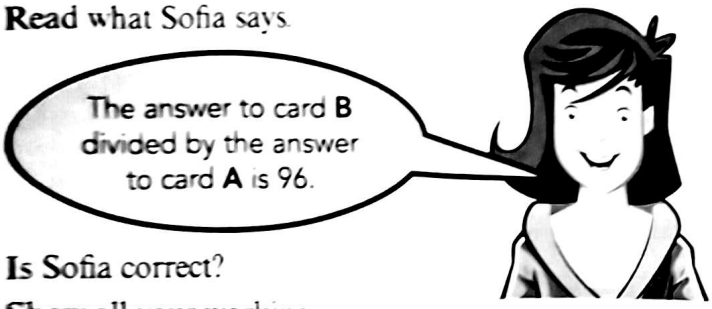
> **Tip**
>
> Remember the correct order of operations brackets, indices, division and multiplication, addition and subtraction

13 **Here** are two calculation cards.

A $\left(\frac{1}{3}+\frac{1}{6}\right)\times\left(\frac{5}{8}-\frac{3}{8}\right)$

B $\left(3\frac{1}{4}+2\frac{3}{4}\right)\div\left(\frac{2}{7}+\frac{3}{14}\right)$

Read what Sofia says.



Is Sofia correct?

Show all your working.

14 **Here** are three formula cards.

$b=\frac{18}{a}$

$c=b\times\left(2\frac{1}{3}-1\frac{5}{6}\right)$

$d=3\left(c-11\frac{3}{4}\right)$

Work out the value of d when $a=\frac{2}{3}$

Explain the method you used.