



## Adding and subtracting fractions

- Adding and subtracting fractions using efficient methods
- Understanding that a recurring decimal is an exact fraction
- Converting a recurring decimal to a fraction

Keywords

You should know

explanation 1a

explanation 1b

**1** Work these out.

**a**  $\frac{3}{5} + \frac{4}{5}$

**b**  $\frac{7}{12} + \frac{5}{12}$

**c**  $\frac{15}{21} - \frac{8}{21}$

**d**  $\frac{17}{20} + \frac{7}{20} - \frac{13}{20}$

**2** Work these out.

**a**  $\frac{3}{8} + \frac{1}{4}$

**b**  $\frac{5}{7} - \frac{3}{14}$

**c**  $\frac{11}{12} - \frac{1}{6}$

**d**  $\frac{3}{5} + \frac{7}{10}$

**e**  $\frac{5}{6} - \frac{1}{3}$

**f**  $\frac{11}{18} + \frac{1}{9}$

**g**  $\frac{17}{20} - \frac{2}{5}$

**h**  $\frac{3}{5} + \frac{7}{25}$

**i**  $\frac{29}{30} - \frac{5}{6} + \frac{1}{5}$

**j**  $\frac{11}{24} + \frac{3}{8} - \frac{1}{4}$

**k**  $\frac{2}{9} + \frac{1}{6} - \frac{1}{18}$

**l**  $\frac{7}{20} + \frac{4}{5} - \frac{7}{10}$

**3** Find the answers to these.

**a**  $\frac{1}{4} + \frac{2}{3}$

**b**  $\frac{5}{6} - \frac{1}{5}$

**c**  $\frac{1}{10} + \frac{3}{4}$

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

**e**  $\frac{3}{8} + \frac{2}{5}$

**f**  $\frac{4}{5} + \frac{3}{7}$

**g**  $\frac{7}{9} - \frac{4}{7}$

**h**  $\frac{3}{11} + \frac{6}{7}$

**i**  $\frac{9}{10} - \frac{1}{5} - \frac{1}{2}$

**j**  $\frac{8}{9} + \frac{2}{3} - \frac{11}{18}$

**k**  $\frac{1}{8} + \frac{5}{6} - \frac{2}{3}$

**l**  $\frac{6}{7} - \frac{1}{2} + \frac{1}{3}$

**4** Jack's football team won  $\frac{2}{5}$  of their games and drew  $\frac{1}{4}$  of them.

How many did they lose?

**5** These are unit fraction cards.



**a** Which two cards make this true?  $\square + \square = \frac{7}{12}$

**b** Which two cards make this true?  $\square - \square = \frac{1}{6}$

**c** Which three cards make this true?  $\square + \square - \square = \frac{7}{12}$

**d** Which three cards make the biggest answer for this?

$$\square + \square - \square = \square$$

Write out the calculation and answer.

**6** In a bag of coloured counters  $\frac{3}{16}$  are red,  $\frac{1}{4}$  green and  $\frac{5}{12}$  are yellow.  
The rest are blue.

What fraction are blue?

**7**  $1 = \frac{1}{3} + \frac{4}{6}$

1 is written as the sum of two fractions.

Each of the digits in the fractions is different.

Find four other ways of writing 1 using two fractions and four different digits.

**8** Write two questions that would give the answer  $\frac{5}{12}$  for each calculation.

**a** adding two fractions

**b** subtracting two fractions

## explanation 2a

## explanation 2b

**9** Work these out.

**a**  $1\frac{1}{2} + 3\frac{1}{4}$

**b**  $2\frac{3}{5} + 1\frac{1}{10}$

**c**  $3\frac{5}{6} - 1\frac{2}{3}$

**d**  $2\frac{3}{10} + 1\frac{1}{5}$

**e**  $4\frac{1}{2} - 2\frac{1}{6}$

**f**  $5\frac{7}{12} - 3\frac{1}{2}$

**g**  $7\frac{17}{20} + 1\frac{3}{10}$

**h**  $5\frac{3}{8} + 7\frac{1}{2}$

**i**  $4\frac{1}{6} - 1\frac{2}{3}$

**j**  $5\frac{7}{9} + 2\frac{2}{3}$

**k**  $3\frac{5}{12} - 1\frac{5}{6}$

**l**  $3\frac{1}{4} + 6\frac{11}{12}$

**10** Find the answers to these.

**a**  $2\frac{3}{4} - 1\frac{2}{5}$

**b**  $3\frac{2}{5} + 1\frac{1}{2}$

**c**  $3\frac{2}{3} - 1\frac{1}{4}$

**d**  $4\frac{4}{7} - 2\frac{3}{4}$

**e**  $5\frac{3}{8} + 2\frac{3}{5}$

**f**  $2\frac{1}{6} - 1\frac{3}{4}$

**g**  $4\frac{3}{10} + 3\frac{3}{8}$

**h**  $4\frac{5}{6} - 2\frac{8}{9}$

**i**  $1\frac{3}{5} + 2\frac{1}{2} + \frac{7}{10}$

**j**  $4\frac{5}{6} - \frac{11}{12} + 1\frac{1}{3}$

**k**  $5\frac{11}{20} + 2\frac{2}{5} - 1\frac{3}{4} + 4\frac{3}{10}$

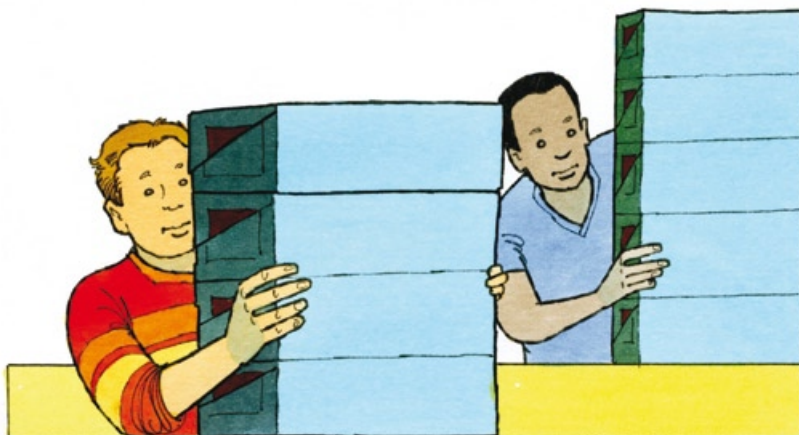
**11** Zoe did  $3\frac{1}{2}$  hours homework on Saturday and  $2\frac{3}{5}$  hours on Sunday.

How long did she spend doing homework over the weekend?

**12** Jason and Simon were preparing advertising brochures for posting.

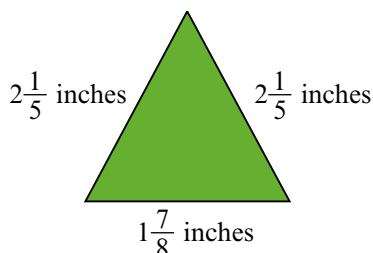
Jason used  $5\frac{5}{12}$  boxes of brochures and Simon used  $4\frac{2}{3}$  boxes.

How many more boxes did Jason use?

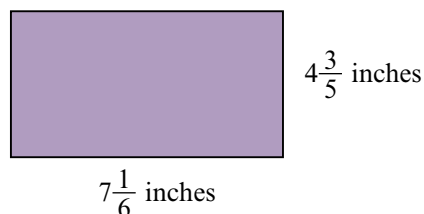


**13** Find the perimeter of each shape.

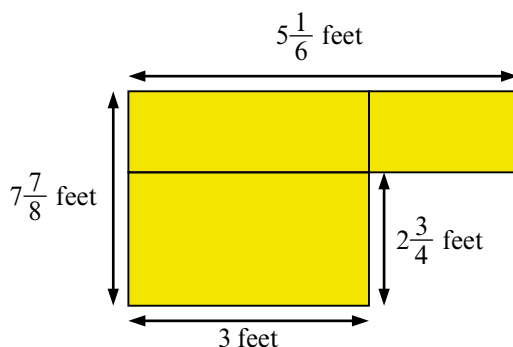
**a**



**b**



**c**



**14** Find the next term in each sequence.

**a**  $\frac{3}{4}, 1\frac{5}{8}, 2\frac{1}{2}, 3\frac{3}{8}, \dots$

**b**  $2\frac{2}{3}, 4\frac{5}{6}, 7, 9\frac{1}{6}, \dots$

**15** What number is exactly halfway between  $1\frac{2}{3}$  and  $2\frac{1}{12}$ ?

**16** Copy and complete this magic square.

$1\frac{1}{3}$		$4\frac{1}{3}$
	$3\frac{7}{12}$	
		$5\frac{5}{6}$

The numbers in each row, column and diagonal of a magic square have the same total.

**17** Write two questions that would give the answer  $5\frac{3}{8}$  for each calculation.

**a** adding two mixed numbers

**b** subtracting two mixed numbers

- 18** When I printed a text document it covered  $12\frac{3}{4}$  pages of A4 paper.  
 When I changed the font size the document covered only  $10\frac{4}{5}$  pages.  
 How much less space does the document now take?

- 19** Sally had 12 empty jam jars.

She filled  $9\frac{5}{6}$  of the jars with strawberry jam.

$3\frac{1}{4}$  jars of jam were eaten.

What fraction of the jars are now empty?



explanation 3a

explanation 3b

explanation 3c

- 20** James said that  $\frac{3}{20}$  could be written as a terminating decimal because the prime factors of 20 are 2 and 5.
- a** Is James correct? Explain.
- b** Why will a fraction convert to a terminating decimal if its denominator only has prime factors of 2 and 5?
- 21** Without using your calculator, state which of these fractions are terminating decimals.

How do you know?

- |                          |                           |                         |                            |                          |
|--------------------------|---------------------------|-------------------------|----------------------------|--------------------------|
| <b>a</b> $\frac{3}{8}$   | <b>b</b> $\frac{13}{16}$  | <b>c</b> $\frac{6}{9}$  | <b>d</b> $\frac{7}{20}$    | <b>e</b> $\frac{13}{15}$ |
| <b>f</b> $\frac{11}{25}$ | <b>g</b> $\frac{19}{100}$ | <b>h</b> $\frac{7}{12}$ | <b>i</b> $\frac{213}{500}$ | <b>j</b> $\frac{21}{30}$ |

- 22** Write these fractions as decimals. Use your calculator where necessary.

- |                          |                          |                          |                          |                          |
|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| <b>a</b> $\frac{7}{20}$  | <b>b</b> $\frac{1}{8}$   | <b>c</b> $\frac{5}{7}$   | <b>d</b> $\frac{2}{3}$   | <b>e</b> $\frac{12}{25}$ |
| <b>f</b> $\frac{21}{50}$ | <b>g</b> $\frac{23}{36}$ | <b>h</b> $\frac{18}{30}$ | <b>i</b> $\frac{22}{30}$ | <b>j</b> $\frac{13}{18}$ |

- 23** Write each decimal as a fraction in its lowest terms.

- |                    |                    |                    |                    |
|--------------------|--------------------|--------------------|--------------------|
| <b>a</b> 0.4       | <b>b</b> 0.375     | <b>c</b> 0.38      | <b>d</b> 0.275     |
| <b>e</b> 0.3333... | <b>f</b> 0.6666... | <b>g</b> 0.2222... | <b>h</b> 0.9999... |

**24** Copy and complete these workings to find the fraction equal to each decimal.

**a**  $0.\dot{6}\dot{7}$       Let  $x = 0.676767\dots$       and       $100x = 67.676767\dots$

$$100x = 67.676767\dots$$

$$- \quad x = 0.676767\dots$$

$$99x = \underline{\hspace{2cm}}$$

$$x = \underline{\hspace{2cm}}$$

**b**  $0.4\dot{5}\dot{6}$       Let  $10x = 4.565656\dots$       and       $1000x = 456.565656\dots$

$$1000x = 456.5656\dots$$

$$- \quad 10x = 4.5656\dots$$

$$990x = \underline{\hspace{2cm}}$$

$$x = \underline{\hspace{2cm}}$$

**c**  $0.304\dot{5}$       Let  $100x = 30.454545\dots$       and       $10000x = 3045.454545\dots$

$$10000x = 3045.454545\dots$$

$$- \quad 100x = 30.454545\dots$$

$$9900x = \underline{\hspace{2cm}}$$

$$x = \underline{\hspace{2cm}}$$

**d** In part **a** values of  $x$  and  $100x$  are used, in part **b**  $10x$  and  $1000x$  and in part **c**  $100x$  and  $10000x$ . Explain why these numbers were chosen.

**25** What multiples of  $x$  would you use to convert these recurring decimals into fractions?

Do not work out the fractions.

**a**  $0.5\dot{8}$

**b**  $0.64\dot{3}$

**c**  $0.840\dot{5}$

**26** Convert these recurring decimals into fractions.

**a**  $0.\dot{3}\dot{4}$

**b**  $0.\dot{8}\dot{1}$

**c**  $0.7\dot{2}\dot{3}$

**d**  $0.5\dot{1}\dot{9}$

**e**  $0.24\dot{3}\dot{7}$

**f**  $0.213\dot{4}$