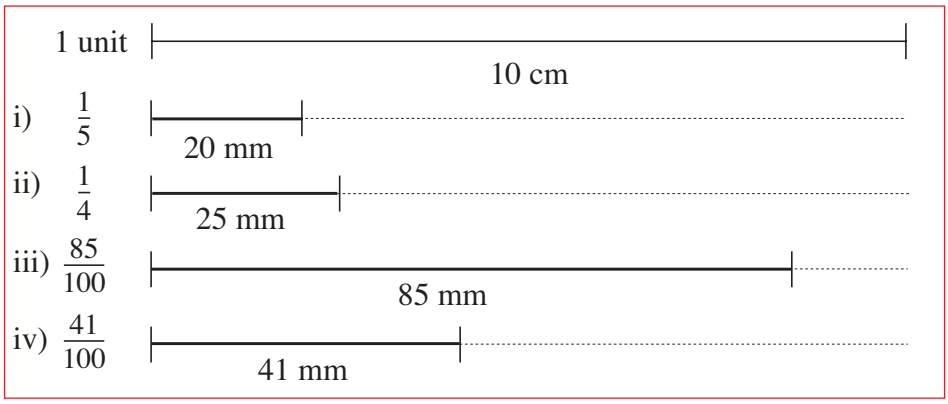
1

a) Use a ruler to draw the required parts of this 10 cm line segment.



b) Express the fractions in hundredths and percentages.

i) $\frac{1}{5} = \frac{20}{100} \rightarrow$ 20%

ii) $\frac{1}{4} = \frac{25}{100} \rightarrow$ 25%

iii) $\frac{85}{100} \rightarrow$ 85%

iv) $\frac{41}{100} \rightarrow$ 41%

2

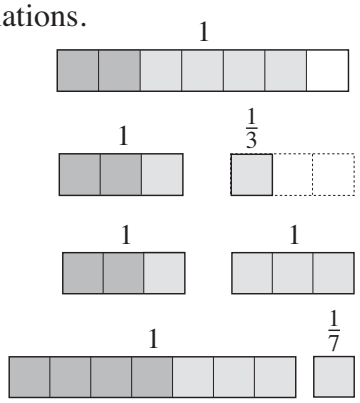
Use the diagrams to help you do the calculations.

a) $\frac{2}{7} \times 3 = \frac{6}{7}$

b) $\frac{2}{3} \times 2 = \frac{4}{3} = 1\frac{1}{3}$

c) $\frac{2}{3} \times 3 = \frac{6}{3} = 2$

d) $\frac{4}{7} \times 2 = \frac{8}{7} = 1\frac{1}{7}$



3

In your exercise book, write each sum as a multiplication, then do the calculation.

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

b) $\frac{2}{7} + \frac{2}{7} + \frac{2}{7} + \frac{2}{7} + \frac{2}{7} = \frac{2}{7} \times 5 = \frac{10}{7} = 1\frac{3}{7}$

c) $\frac{3}{8} + \frac{3}{8} + \frac{3}{8} + \frac{3}{8} + \frac{3}{8} + \frac{3}{8} = \frac{3}{8} \times 6 = \frac{18}{8} = \frac{9}{4} = 2\frac{1}{4}$

d) $\left(-\frac{1}{3}\right) + \left(-\frac{1}{3}\right) = -\frac{1}{3} \times 2 = -\frac{2}{3}$

4

In your exercise book, write each multiplication as an addition, then do the calculation.

a) $\frac{3}{4} \times 4 = 3$

b) $\frac{2}{3} \times 5 = 3\frac{1}{3}$

c) $\frac{4}{7} \times 6 = 3\frac{3}{7}$

d) $\frac{2}{9} \times 3 = \frac{2}{3}$

5

In your exercise book, calculate the sums and differences in two different ways.

a) $\left(\frac{3}{5} + \frac{7}{5}\right) \times 2 = 4$

b) $\left(\frac{6}{7} - \frac{5}{3}\right) \times 3 = -\frac{17}{7}$

c) $\left(\frac{1}{2} + \frac{7}{3}\right) \times 6 = 17$

1

Calculate the products, reducing them to their simplest form where relevant.

a) $\frac{4}{5} \times 2 = 1\frac{3}{5}$ b) $\frac{3}{8} \times 4 = 1\frac{1}{2}$ c) $\frac{3}{4} \times 8 = 6$

d) $\frac{5}{12} \times 8 = 3\frac{1}{3}$ e) $\frac{5}{8} \times 12 = 7\frac{1}{2}$ f) $\frac{5}{11} \times 0 = 0$

2

Fill in the missing numbers. Check that they make the statements true.

a) $\frac{2}{5} \times \boxed{2} = \frac{4}{5}$ b) $\boxed{3} \times \frac{5}{9} = \frac{15}{9}$ c) $\frac{3}{10} \times \boxed{10} = \frac{30}{10}$

d) $\frac{5}{8} \times \boxed{2} = \frac{5}{4}$ e) $\frac{\boxed{5}}{6} \times 4 = \frac{10}{3}$ f) $\frac{5}{\boxed{3}} \times \boxed{6} = 10$

3

Write each calculation in different ways.

a) $\left(\frac{3}{2} + \frac{1}{3}\right) \times 12 = \frac{9+2}{6} \times 12 = \frac{11}{6} \times 12 = \frac{132}{6} = \underline{22}$

or $\left(\frac{3}{2} + \frac{1}{3}\right) \times 12 = \frac{3}{2} \times 12 + \frac{1}{3} \times 12 = \frac{36}{2} + \frac{12}{3}$

$= 18 + 4 = \underline{22}$

or $= \frac{3 \times \overset{6}{\cancel{12}}}{\cancel{2}_1} + \frac{1 \times \overset{4}{\cancel{12}}}{\cancel{3}_1} = 18 + 4 = \underline{22}$

b) $\left(\frac{4}{5} - \frac{2}{3}\right) \times 4 = \frac{12-10}{15} \times 4 = \frac{2}{15} \times 4 = \frac{8}{15}$

or $\left(\frac{4}{5} - \frac{2}{3}\right) \times 4 = \frac{4}{5} \times 4 - \frac{2}{3} \times 4 = \frac{16}{5} - \frac{8}{3}$

$= \frac{48-40}{15} = \frac{8}{15}$

4

Answer each question by writing a division. Use the diagram to help you.

a) What is half of a third? $\frac{1}{6}$ b) What is a third of a quarter? $\frac{1}{12}$

c) What is a quarter of a third? $\frac{1}{12}$ d) What is a fifth of 10 twelfths? $\frac{1}{6}$

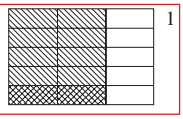
e) What is a third of 3 quarters? $\frac{1}{4}$ f) What is a quarter of 16 twelfths? $\frac{1}{3}$

5

a) One third of the unit has been divided into 5 equal parts.
Write a division about the part which has been shaded twice. $\frac{1}{3} \div 5 = \frac{1}{15}$

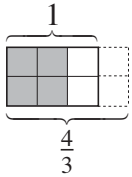
b) Do the division and show it on the diagram in a).

$\frac{2}{3} \div 5 = \frac{2}{15}$



c) Do the division. Amend the diagram to show it.

$\frac{4}{3} \div 2 = \frac{2}{3}$



1 Do the calculations.

a) $\frac{3}{4} + \frac{5}{6} = \frac{9+10}{12} = \frac{19}{12} = 1\frac{7}{12}$ b) $\frac{4}{5} - \frac{3}{10} = \frac{8-3}{10} = \frac{5}{10} = \frac{1}{2}$

c) $\frac{2}{5} \times 10 = \frac{20}{5} = 4$ or $\frac{2}{\cancel{5}_{1}} \times \cancel{10}^{2} = \frac{4}{1} = 4$ d) $\frac{5}{8} \div 4 = \frac{5}{8 \times 4} = \frac{5}{32}$

2 Solve the equations and inequality. Check your solutions.

a) $x = \frac{3}{16}$ b) $y = \frac{2}{5}$ c) $z = \frac{1}{8}$

3 The 4th, 5th and 6th terms of a sequence are given. Complete the sequence so that the first 10 terms are listed.

a) $\frac{1}{6}, \frac{1}{3}, \frac{2}{3}), \frac{4}{3}, \frac{8}{3}, \frac{16}{3}, (\frac{32}{3}, \frac{64}{3}, \frac{128}{3}, \frac{256}{3},)$ [× 2]

b) $(-\frac{1}{7}, \frac{0}{7}, \frac{1}{7}), \frac{2}{7}, \frac{3}{7}, \frac{4}{7}, (\frac{5}{7}, \frac{6}{7}, \frac{7}{7}, \frac{8}{7},)$ [+ $\frac{1}{7}$]

c) $(-\cancel{\frac{1}{0}}, \frac{0}{1}, \frac{1}{2}), \frac{2}{3}, \frac{3}{4}, \frac{4}{5}, (\frac{5}{6}, \frac{6}{7}, \frac{7}{8}, \frac{8}{9},)$

d) $(\frac{486}{5}, \frac{162}{5}, \frac{54}{5}), \frac{18}{5}, \frac{6}{5}, \frac{2}{5}, (\frac{2}{15}, \frac{2}{45}, \frac{2}{135}, \frac{2}{405},)$ [÷ 3]

e) $(4, 2, 1), \frac{1}{2}, \frac{1}{4}, \frac{1}{8}, (\frac{1}{16}, \frac{1}{32}, \frac{1}{64}, \frac{1}{128},)$ [÷ 2]

4 The area of a rectangle is $\frac{80}{3}$ m^2. The length of a side is 6 m.

$A = \frac{80}{3}$ m^2 b

$a = 6$ m

a) What length is the adjacent side of the rectangle?

The length of the adjacent side of the rectangle is 4 and 4 ninths metres.

b) Calculate the perimeter of the rectangle.

The perimeter of the rectangle is 20 and 8 ninths metres.

5 Find a rule and complete the table. Write the rule in different ways.

a	$\frac{15}{3}$	10	$\frac{1}{7}$	$\frac{2}{9}$	$\frac{3}{10}$	$\mathbf{\frac{3}{2}}$	$\mathbf{\frac{1}{3}}$	$\frac{10}{9}$
b	1	2	$\frac{1}{35}$	$\mathbf{\frac{2}{45}}$	$\mathbf{\frac{3}{50}}$	$\frac{3}{10}$	$\frac{1}{15}$	$\mathbf{\frac{2}{9}}$

Rule: $a = b \times 5$, $b = a \div 5$,

or $b \div a = 5$, $a \div b = \frac{1}{5}$

1

Practise calculation. Write details in your exercise book.

a) $\frac{5}{8} + \frac{3}{16} = \frac{13}{16}$ b) $\frac{3}{15} + \frac{7}{10} = \frac{9}{10}$ c) $\frac{3}{7} + \frac{1}{8} = \frac{31}{56}$

d) $\frac{3}{4} - \frac{5}{8} = \frac{1}{8}$ e) $\frac{12}{15} - \frac{2}{5} = \frac{2}{5}$ f) $\frac{3}{8} - \frac{3}{12} = \frac{1}{8}$

g) $\frac{5}{6} \times 6 = 5$ h) $\frac{4}{9} \times 6 = 2\frac{2}{3}$ i) $\frac{5}{8} \times 4 = 2\frac{1}{2}$

j) $\frac{6}{7} \div 3 = \frac{2}{7}$ k) $\frac{5}{7} \div 5 = \frac{1}{7}$ l) $\frac{5}{6} \div 4 = \frac{5}{24}$

2

Practise calculation. Write details in your exercise book.

a) $\frac{5}{6} + \frac{1}{4} - \frac{2}{3} = \frac{10 + 3 - 8}{12} = \frac{5}{12}$

b) $\frac{9}{6} \div 6 \times 4 = \frac{9}{36} \times 4 = \frac{9}{9} = 1$

c) $\frac{7}{6} \times (7 - 4) = \frac{7}{6} \times 3 = \frac{7}{2} = 3\frac{1}{2}$

d) $\frac{8}{3} - \frac{3}{\cancel{4}_{2}} \times \cancel{6}^{3} = \frac{8}{3} - \frac{9}{2} = \frac{16 - 27}{6}$

$= -\frac{11}{6} = -1\frac{5}{6}$

3

Solve the problems in your exercise book. Write the answer here.

a) How many hours are in $\frac{3}{14}$ of a week? 36 hours

b) What part of a week is half a day? $\frac{1}{14}$ of a week

c) How many days is $\frac{24}{3}$ of an hour? $\frac{1}{3}$ of a day

4

Which natural numbers could be written instead of each of the shapes?

a) $\frac{\square}{9} < \frac{11}{9}$ b) $\frac{5}{53} < \frac{\triangle}{53} < \frac{10}{53}$ c) $\frac{7}{3} - \frac{\bigcirc}{3} > 1$

$\square$: 10, 9, 8, 7, 6, 5, 4, 3, 2, 1 $\triangle$: 6, 7, 8, 9 $\bigcirc$: 1, 2, 3

5

Solve the problem in your exercise book.

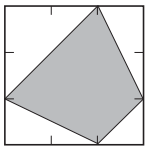
A 10 cm cube can hold 1 litre of water. What height would the water level be in the cube if we pour in to it:

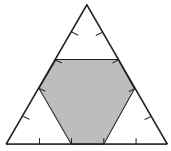
a) 5 cm high b) 7.5 cm high c) 2.5 cm (or 25 mm) high d) 8 cm high

6

What part of the whole unit is shaded?

Write the fraction in different forms in your exercise book.

a) 

b) 

$\frac{1}{2} = \frac{2}{4} = \frac{3}{6} = \frac{9}{18} \ldots$ $\frac{13}{25} = \frac{26}{50} = \frac{39}{75} \ldots$

1

Practise calculation. Write details in your exercise book.

a) $\frac{3}{8} + \frac{7}{20} = \frac{29}{40}$ b) $\frac{4}{7} + \frac{11}{21} = 1\frac{2}{21}$ c) $\frac{2}{9} + \frac{3}{8} = \frac{43}{72}$

d) $\frac{5}{6} - \frac{1}{3} = \frac{1}{2}$ e) $\frac{5}{12} - \frac{1}{3} = \frac{1}{12}$ f) $\frac{11}{15} - \frac{3}{5} = \frac{2}{15}$

g) $\frac{3}{4} \times 8 = 6$ h) $\frac{2}{15} \times 5 = \frac{2}{3}$ i) $\frac{7}{8} \times 4 = 3\frac{1}{2}$

j) $\frac{5}{9} \div 5 = \frac{1}{9}$ k) $\frac{4}{7} \div 2 = \frac{2}{7}$ l) $\frac{3}{8} \div 4 = \frac{3}{32}$

2

Which natural numbers could be written instead of each of the shapes?

a) $\frac{\text{⬡}}{7} < \frac{5}{7}$ ⬡: 4, 3, 2, 1

b) $\frac{3}{23} < \frac{\text{◺}}{23} < \frac{8}{23}$ ◺: 4, 5, 6, 7

c) $\frac{9}{5} - \frac{\text{◠}}{10} > 1$

$\frac{18}{10} - \frac{\text{◠}}{10} > \frac{10}{10}$

◠: 1, 2, 3, 4, 5, 6, 7

3

Solve the equations and inequality. Check your solutions.

a) $x \times 3 = \frac{2}{5}$ $x = \frac{2}{15}$

b) $y + 3 \times y = \frac{20}{3}$ $y = 1\frac{2}{3}$

c) $5 \times z - z < \frac{4}{7}$ $z < \frac{1}{7}$

4

Answer each question by writing a division. Use the diagram to help you.

a) half of a quarter $= \frac{1}{4} \div 2 = \frac{1}{8}$

b) a quarter of a half $= \frac{1}{2} \div 4 = \frac{1}{8}$

c) a quarter of a quarter $\frac{1}{4} \div 4 = \frac{1}{16}$

d) a third of 9 sixteenths $= \frac{9}{16} \div 3 = \frac{3}{16}$

5

a) The perimeter of a square flower-pot is 3 quarters of a metre in length.

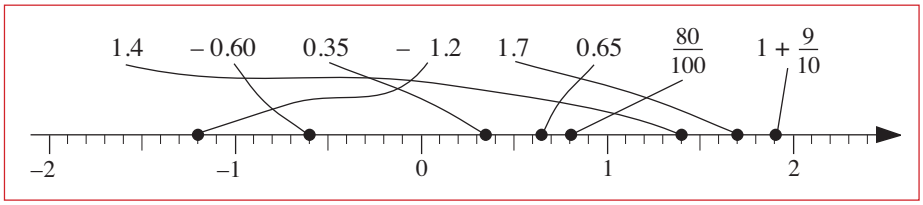
What is the length of each side: i) $\frac{3}{16}$ m ii) $8\frac{3}{4}$ cm

b) Sally poured 2 thirds of a litre of fruit juice equally into 4 cups.
How much fruit juice was in each cup?

i) $\frac{1}{6}$ litre ii) $16\frac{2}{3}$ cl

1

Join the numbers to the corresponding points on the number line.



2

a) $x = 10$: $-12 < -10 < -3 < 2 < 5 < 13$

b) $x = 1$: $-1.2 < -1 < -0.3 < 0.2 < 0.5 < 1.3$

c) $x = 0.1$: $-0.12 < -0.1 < -0.03 < 0.02 < 0.05 < 0.13$

3

List the fractions as decimals in increasing order. Write < or = signs between them.

$\frac{3}{10}, \frac{1}{100}, \frac{27}{100}, \frac{30}{100}, \frac{84}{100}, \frac{70}{100}, \frac{16}{10}, \frac{160}{100}, \frac{7}{10}$

$\frac{30}{100}$ $\frac{160}{100}$ $\frac{70}{100}$

$0.01 < 0.27 < 0.3 = 0.30 < 0.70 = 0.7 < 0.84 < 1.6 = 1.60$

4

Write the decimals as fractions, or as the sum of a whole number and a fraction. Write them in the place-value table.

a) $3.02 = 3 + \frac{2}{100}$ $(= 3 + \frac{1}{50} = 3\frac{1}{50} = \frac{151}{50})$

b) $0.7 = 0 + \frac{7}{10} = \frac{7}{10}$ (No more can be done with it.)

c) $30.46 = 30 + \frac{46}{100}$ $(= 30 + \frac{23}{50} = 30\frac{23}{50} = \frac{1523}{50})$

d) $500.8 = 500 + \frac{8}{10}$ $(= 500 + \frac{4}{5} = 500\frac{4}{5} = \frac{2504}{5})$

e) $100.09 = 100 + \frac{9}{100}$ $(= 100\frac{9}{100} = \frac{10\,009}{100})$

	H	T	U	t	h
a)			3	0	2
b)			0	7	
c)		3	0	4	6
d)	5	0	0	8	
e)	1	0	0	0	9

5

Write the quantities in different units.

a) 4.6 litres = 4 litres 60 cl = 460 cl = 4600 ml

b) 3.067 km = 3 km 67 m = 3067 m = 306 700 cm = 3 067 000 mm

c) 151.4 litres = 151 litres 40 cl = 15140 cl = 151 400 ml

d) 65.2 kg = 65 kg + 200 g = 65 200 g [= 0.0652 tonnes]

1 Convert each pair of fractions so that they have equal denominators. Compare them.

a) $\frac{6}{10}$ [>] $\frac{50}{100}$ b) $\frac{7}{10}$ [>] $\frac{14}{100}$ c) $\frac{5}{100}$ [<] $\frac{20}{100}$

d) $\frac{9}{10}$ [=] $\frac{90}{100}$ e) $\frac{5}{10}$ [<] $\frac{51}{100}$ f) $\frac{161}{1000}$ [>] $\frac{16}{100}$

2 Convert the decimal numbers to hundredths and compare them.

a) 0.6 [>] 0.06 b) 0.7 [=] 0.70 c) 0.11 [>] 0.1

d) 0.03 [<] 0.7 e) 0.07 [<] 0.3 f) 0.4 [>] 0.39

3 Write three numbers between the two decimals.

a) 3.4 < [3.45] [3.53] [3.59] < 3.6

b) 5.2 < [5.21] [5.25] [5.28] < 5.3

c) −0.2 < [−0.1] [0] [0.08] < 0.1

d) 2.9 < [2.91] [2.92] [2.93] < 3

4 Write the next nearest whole number less than and greater than the decimal number.

a) [4] < 4.7 < [5] b) [7] < 7.26 < [8]

c) [0] < 0.09 < [1] d) [99] < 99.99 < [100]

e) [101] < 101.01 < [102] f) [2] < 2.306 < [3]

5 Write the next nearest tenths less than and greater than the decimal numbers.

a) [5.2] < 5.21 < [5.3] b) [3.8] < 3.85 < [3.9]

c) [21.0] < 21.06 < [21.1] d) [0.4] < 0.44 < [0.5]

e) [5] < 5.01 < [5.1] f) [0.9] < 0.97 < [1]

6 a) Round the decimals to the nearest whole number.

2.4 ≈ 2 6.8 ≈ 7 43.5 ≈ 44 59.9 ≈ 60 99.65 ≈ 100

b) Round the decimals to the nearest tenth.

6.34 ≈ 6.3 5.56 ≈ 5.6 8.4 ≈ 8.4 10.20 ≈ 10.2 5.076 ≈ 5.1

c) A melon weighed 3 kg on scales which are accurate to the nearest tenth of a kg. Write an inequality for the **actual** mass of the melon.

m = 3.0 kg (to the nearest tenth of a kg)

1

We had 30 m 58 cm of parcel tape and used 14 m 26 cm. How much parcel tape do we have left? Write the subtraction in the tables.

	10 m	1 m	10 cm	1 cm
	3	0	5	8
–	1	4	2	6
	1	6	3	2

In cm:

	Th	H	T	U
	3	0	5	8
–	1	4	2	6
	1	6	3	2

$$\begin{array}{r} 3058 \\ -1426 \\ \hline 1632 \text{ (cm)} \end{array}$$

In m:

	T	U	t	h
	3	0	5	8
–	1	4	2	6
	1	6	3	2

$$\begin{array}{r} 30.58 \\ -14.26 \\ \hline 16.32 \text{ (m)} \end{array}$$

2

Write each decimal as the sum of units, tenths and hundredths, then do the subtraction in decimal form and fractional form.

$$\begin{array}{rrrrrrrrrrr} & 2 & 0 & . & 4 & 8 & = & 20 & + \frac{4}{10} & + \frac{8}{100} & = 20 + \frac{48}{100} \\ - & 1 & 4 & . & 1 & 6 & = & 14 & + \frac{1}{10} & + \frac{6}{100} & = 14 + \frac{16}{100} \\ \hline & & 6 & . & 3 & 2 & & & & & = 6 + \frac{32}{100} \end{array}$$

3

Do the subtractions, then check them with additions.

a)

$$\begin{array}{rrrrr} & 2 & 2 & . & 8 & 3 \\ - & 1 & 3 & . & 0 & 0 \\ \hline & & 9 & . & 8 & 3 \end{array}$$

	T	U	t	h
	2	$^{10}2$	8	3
–	1_1	3	0	0
		9	8	3

Check:

$$\begin{array}{rrrrr} & & 9 & . & 8 & 3 \\ + & 1 & 3 & . & 0 & 0 \\ \hline & 2 & 2 & . & 8 & 3 \end{array}$$ ✔

b)

$$\begin{array}{rrrrr} & 2 & 2 & . & 0 & 0 \\ - & 1 & 8 & . & 4 & 3 \\ \hline & & 3 & . & 5 & 7 \end{array}$$

	T	U	t	h
	2	$^{10}2$	$^{10}0$	$^{10}0$
–	1_1	8_1	4_1	3
		3	5	7

Check:

$$\begin{array}{rrrrr} & & 3 & . & 5 & 7 \\ + & 1 & 8 & . & 4 & 3 \\ \hline & 2 & 2 & . & 0 & 0 \end{array}$$ ✔

4

Estimate the result here by rounding each decimal to the nearest whole number, then do the calculation accurately in your exercise book.

a) $2.24 + 21.56 + 0.75 \approx 2 + 22 + 1 = 25$

$$\begin{array}{r} 2.24 \\ 21.56 \\ +\ 0.75 \\ \hline 24.55 \\ 1\ \ 1 \end{array}$$

b) $31 + 3.1 + 0.31 + 0.031 \approx 31 + 3 + 0 + 0 = 34$

$$\begin{array}{r} 31 \\ 3.1 \\ 0.31 \\ +\ 0.031 \\ \hline 34.441 \end{array}$$

c) $26.68 - 19.35 \approx 27 - 19 = 8$

$$\begin{array}{rrrrr} & & ^{10} & & \\ & 2 & 6 & . & 6 & 8 \\ - & 1_1 & 9 & . & 3 & 5 \\ \hline & & 7 & . & 3 & 3 \end{array}$$

d) $37.5 - 8.37 \approx 38 - 8 = 30$

$$\begin{array}{rrrrr} & & ^{10} & & ^{10} & \\ & 3 & 7 & . & 5 & \\ - & 1 & 8 & . & 3_1 & 7 \\ \hline & 2 & 9 & . & 1 & 3 \end{array}$$

5

Answer: There was 2.55 kg of melon left for dinner.

1

Estimate first by rounding to the nearest tenth, then do the calculations accurately.

a) $4.12 + 29.35 + 0.87$

$\approx 4.1 + 29.4 + 0.9 = 34.4$

	4	1	2
2	9	3	5
+	0	8	7
3	4	3	4
	1	1	1

b) $7.05 + 27.6 + 6.715 + 37.17$

$\approx 7.1 + 27.+6.7 + 37.2 = 78.6$

	7	0	5	
2	7	6		
	6	7	1	5
+ 3	7	1	1	
7	8	4	7	5
2	1			

c) $34.67 - 25.58$

$\approx 34.7 - 25.6 = 9.1$

	10		10
3	4	6	7
− 2₁	5	5₁	8
	9	0	9

d) $85.49 - 16$

$\approx 85.5 - 16 = 69.5$

	10		
8	5	4	9
− 1₁	6		
6	9	4	9

2

a)

5	6	3	
	2	8	4
+	0	9	1
6	0	0	5
1	2		

b)

	1	3	0	
	8	4	5	6
+		7	4	
1	0	4	9	6
1	1			

c)

5	0	0	
	0	7	
+	6	0	3
5	6	7	3

d)

1	0	5	6	
	0	0	4	
+		5	3	
1	5	9	0	
			1	

3

a)

	9	4	6	5
−	6	1	3	2
	3	3	3	3

	3	3	3	3
+	6	1	3	2
	9	4	6	5

b)

	10		10	
2	4	1	5	
− 1	9₁	8		
1	4	3	5	

1	4	3	5	
+	9	8		
2	4	1	5	✔
1	1			

c)

	10			
6	1	6	4	
− 3₁	4₁	8		
2	6	8	4	

2	6	8	4	
+	3	4	8	
6	1	6	4	✔
1	1			

d)

	10	10	10		
4	0	0			
− 2₁	5₁	3₁	5		
1	4	6	5		

1	4	6	5		
2	5	3	5		
4	0	0	0		✔
1	1	1			

4

Answer each question by writing an equation.

a) What should be added to 1.2 to get 1.7? 0.5

b) What should be subtracted from 3.5 to get 3.50? 0

c) What should be subtracted from 3.58 to get 3.08? 0.50

d) What should be added to 1.25 to get 1.35? 0.10

e) If I add 13.48 to a number, the sum is 72.25.
What is the number? 58.77

f) If I subtract 18.6 from a number, the result is 3.1.
What is the number? 21.7

1

Write the sums as decimals in the place-value table, then add them up.

a) $18 + \frac{7}{10} + \frac{3}{1000} = 18 + \frac{703}{1000} = 18.703$

b) $\frac{8}{100} + \frac{7}{1000} = \frac{87}{1000} = 0.087$

c) $70 + \frac{3}{10} + \frac{8}{1000} = 70 + \frac{308}{1000} = 70.308$

d) $8 + \frac{1}{100} + \frac{37}{1000} = 8 + \frac{47}{1000} = 8.047$

	T	U	t	h	th
a)	1	8	7	0	3
b)		0	0	8	7
c)	7	0	3	0	8
d)		8	0	4	7
Total	9	7	1	4	5
	1	1	1	2	

2

Compare the decimal numbers. Fill in the missing signs. (<, > or =)

a) 5.89 [<] 5.98 b) 0.03 [<] 0.3 c) 3.087 [<] 3.1 d) 1.45 [>] 1.145

e) 4.0 [=] 4 f) 0.699 [<] 0.7 g) 8.1 [=] 8.10 h) 7.099 [<] 7.1

3

Write these numbers in increasing order.

a) 0.008, 0.09, 0.08, 0.009, 0.89 — 0.008, 0.009, 0.08, 0.09, 0.89

b) 3.25, 3.205, 3.025, 3.502, 3.52 — 3.025, 3.205, 3.25, 3.502, 3.52

c) 4.386, 4.683, 4.638, 4.9, 4.099 — 4.099, 4.386, 4.638, 4.683, 4.9

4

Practise addition and subtraction. Check the subtractions in your exercise book.

a) $273 + 675 + 083 = 3488$ (carries: 1 1)

b) $270 + 627 + 89 = 1217$ (carries: 2 1)

c) $007 + 101 + 385 = 1402$ (carries: 1 1)

d) $200 + 099 + 455 = 2554$ (carries: 1 1)

e) $3763 - 2331 = 1432$

f) $14215 - 1316 = 13855$ (10 10)

g) $861 - 521 = 805$ (10 10)

h) $700 - 341 = 359$ (10 10 10)

5

Fill in the missing numbers.

a) 7.2 litres = [7] litres [20] cl = [720] cl = [7] litres [200] ml = [7200] ml

b) [2.803] km = [2] km [803] m = 2803 m = [280 300] cm

c) [2.047] kg = 2 kg 47 g = [2047] g

d) [11 700] sec = [195] min = [3] hours [15] min = 3.25 hours

1 A chemist was making up some medicine and measured out 3 different liquids very carefully in these quantities: 28 ml, 2.4 cl and 20.5 cl.

How much liquid did he measure out altogether?

Plan: 28 ml + 24 ml + 205 ml = 257 ml = 25.7 cl

or 2.8 cl + 2.4 cl + 20.5 cl = 25.7 cl

Answer: The chemist measured out 25.7 cl of liquid altogether.

2 Sally went shopping for an outfit for a wedding and made a list of what she had spent.

a) Write the amounts in the place-value table and grid. (£1 = 100 p)

1 hat: £38 99 p
1 dress: £40.50
1 pair of shoes: £26 70 p
1 handbag: £34.50

	H	T	U	t	h
		3	8	9	9
		4	0	5	0
		2	6	7	0
+		3	4	5	0
(£)	1	4	0	6	9
		2	2		

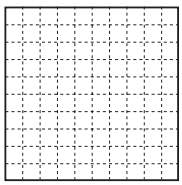
	3	8	. 9	9
	4	0	. 5	0
	2	6	. 7	0
+	3	4	. 5	0
(£) 1	4	0	. 6	9
	2	2		

b) How much did Sally spend altogether? Sally spent £140.69 altogether.

c) If Sally had £200 in her bank account at the start of her shopping trip, how much did she have left at the end?

Sally had £59.31 left at the end.

3 Use the diagram to help you do this addition in different ways.



$$\frac{1}{5} + 0.3 + \frac{17}{100} + \frac{1}{10} + 0.21$$

Calculate using:

a) fractions: $\frac{1}{5} + \frac{3}{10} + \frac{17}{100} + \frac{1}{10} + \frac{21}{100} = \frac{20 + 30 + 17 + 10 + 21}{100}$

$= \frac{98}{100}$

b) decimals: 0.2 + 0.3 + 0.17 + 0.1 + 0.21 = 0.6 + 0.38 = 0.98

c) percentages: 20% + 30% + 17% + 10% + 21% = 98%

4 a) A rectangular games court has sides of length 45.8 m and 15.6 m. How long is the fence around it if the gate is 2.2 m wide? 120.6 m

b) The price of a bottle of medicine is £11.80, which includes the cost of the bottle. If the bottle costs £5.20 less than the medicine, how much are you paying for:

i) the medicine £5.20 ii) the bottle? £3.30

1

Write each addition as a multiplication and calculate the result.

a) $0.3 + 0.3 + 0.3 + 0.3 + 0.3 + 0.3 + 0.3 + 0.3 + 0.3 + 0.3$

[$= 0.3 \times 10 = 3$]

b) $15.7 + 15.7 + 15.7 + 15.7 + 15.7 + 15.7 + 15.7 + 15.7 + 15.7 + 15.7$

[$15.7 \times 10 = 157$]

2

If a sheet of paper is 0.12 mm thick, what is the thickness in mm of these amounts of paper? Write the measures in the place-value table.

		Th	H	T	U	t	h
a 10 sheet notepad:	0.12 × 10 = 1.2 (mm)				1	2	
a 100 leaf exercise book:	0.12 × 100 = 12 (mm)			1	2		
a 1000 leaf encyclopaedia:	0.12 × 1000 = 120 (mm)		1	2	0		
a 10 000 sheet pack of paper:	0.12 × 10 000 = 1200 (mm)	1	2	0	0		

3

100 equal-sized pearls weigh 480 g. How much do 10 such pearls weigh? How much does 1 such pearl weigh? Write the weights in the table, then write divisions about them.

	H	T	U	t	h	
100 pearls:	4	8	0			480 ÷ 1 = 480 (g)
10 pearls:		4	8			480 ÷ 10 = 48 (g)
1 pearl:			4	8		480 ÷ 100 = 4.8 (g)

4

		10 times	100 times	1000 times
a) How many £s is:				
i)	70 p	£ 7	£ 70	£ 700
ii)	£2 70 p?	£ 27	£ 270	£ 2700
b) How many £s is:		1 tenth	1 hundredth	1 thousandth
i)	of £630	£ 63	£ 6..30	£ 0.63
ii)	of £47 50 p?	£ 4.75	£ 0.475	£ 0.0475

not possible in real life!

5

Practise calculation.

a) $0.3 \times 100 = 30$ b) $3.45 \times 10 = 34.5$ c) $605 \div 100 = 6.05$

d) $574 \div 10 = 57.4$ e) $0.87 \times 10 = 8.7$ f) $0.303 \times 100 = 30.3$

g) $1.39 \div 10 = 0.139$ h) $45.7 \div 100 = 0.457$ i) $0.07 \times 10 = 0.7$

j) $0.05 \times 100 = 5$ k) $0.81 \div 10 = 0.081$ l) $30.06 \div 10 = 3.006$

1

Write each operation in a shorter way and calculate the result.

a) e.g. $2.7 + 2.7 + 2.7 + 2.7 = 2.7 \times 4$ (or $= 2 \times 4 + 0.7 \times 4 = 8 + 2.8 = 10.8$)

b) e.g. $13.26 + 13.26 + 13.26 + 13.26 + 13.26 = 13.26 \times 5$

$= 13 \times 5 + 0.26 \times 5 = 65 + (\frac{26}{100} \times 5) = 65 + \frac{130}{100} = 66 + \frac{30}{100} = 66.3)$

c) e.g. $0.83 + 0.83 + 0.83 = 0.83 \times 3 = \frac{8}{10} \times 3 + \frac{3}{100} \times 3$

$= \frac{24}{10} + \frac{9}{100} = 2 + \frac{4}{10} + \frac{9}{100} = 2.49$

2

a) $P = 52.4\text{ cm} \times 4 = 209.6\text{ cm} = 2096\text{ mm} = 2.096\text{ m}$

b) $P = (6.42\text{ cm} + 12.84\text{ cm}) \times 2 = 19.26\text{ cm} \times 2 = 38.52\text{ cm}$

or $P = (a + b) \times 2 = 3a \times 2 = 6a = 6.42\text{ cm} \times 6 = 38.52\text{ cm}$

3

Calculate the products. Estimate the result mentally first.

E: $8 \times 3 = 24$ *E:* $6 \times 5 = 25$ *E:* $15 \times 7 = 105$ *E:* $102 \times 11 = 1122$

a)

	8	.	1
	×		3
2	4	.	3

b)

		5	.	6	2
				×	5
	2	8	.	0	0
		3		1	

c)

	1	5	.	0	6
				×	7
1	0	5	.	4	2
	3			4	

d)

	1	0	2	.	1	0
				×	1	1
1	1	2	3	.	1	0
		2	1			

or with multipliers in corresponding place-value columns:

a)

	8	.	1
×	3		
2	4	.	3

b)

		5	.	6	2
×	5				
2	8	.	0	0	
3	1				

c)

	1	5	.	0	6
×	7				
1	0	5	.	4	2
3	4				

d)

	1	0	2	.	1	0
×	1	1				
1	1	2	3	.	1	0
2	1					

4

Which is more? Calculate in your exercise book, then fill in the missing signs.

a) 43 times 2.5 m [<] 25 times 5.3 m

b) 0 times 197 kg [=] 197 times 0 kg

c) 12 times 4.8 litres [=] 48 times 1.2 litres

5

Solve the problems in your exercise book and write the answers in a sentence here.

a) Pete has £36 50 p. Olivia has twice as much and Sue has 3 times as much as Pete.

If they put all their money together, do they have enough to buy a television which costs £210? P + O + S: £36.50 + £73 + £109.50 = £219.00,

£219 > £210

Answer: Yes, they have enough to buy a television set.

b) The units of measure used when measuring angles are **degrees** (°) and **minutes** (').

If 1° = 60', how many degrees is 6 times 12° 30'?

Answer: Six times 12 degrees 30 minutes is 75 degrees.

1

Calculate the products.

E: $3 \times 3 = 9$

a)

	2	8
×	3	
	8	4

2

E: $4 \times 5 = 20$

b)

	4	3	6
×	5		
2	1	8	0

1 3

E: $20 \times 7 = 140$

c)

	2	0	3
	×	7	
1	4	2	1

2

E: $30 \times 60 = 1800$

d)

		2	8	1
	×	5	9	
	2	5	2	9
+	1	4	0	5	0
1	6	5	7	9

E: $0.1 \times 50 = 5$

e)

		0	0	6
×	5	4		
			2	4
+		3	0	0
		3	2	4

E: $24 \times 100 = 2400$

f)

		2	4	3	2
×	1	0	9		
	2	1	8	8	8
+	2	4	3	2	0	0
2	6	5	0	8	8

1

2

a) Calculate $\frac{3}{5}$ of 840 m. 504 m

b) Calculate 0.6 of 840 m. 504 m

c) Calculate 60% of 840 m. 504 m

3

Which number am I thinking of? Write a plan and do the calculation.

a) Half of the number I am thinking of is 2.3 more than 3.8.
What is my number?

Plan: $x \div 2 = 3.8 + 2.3 = 6.1$ or $(3.8 + 2.3) \times 2 = 12.2$

$x = 6.1 \times 2 = \underline{12.2}$

Check: Half of $\underline{12.2} = (12 + \frac{2}{10}) \div 2 = 6 + \frac{1}{10} = 6.1$

$6.1 - 2.3 = 3.8$ ✔

b) If I subtract 10.4 from the number I am thinking of, the difference is 3 times 1.2.
What is my number?

Plan: $y - 10.4 = 1.2 \times 3 = 3.6$ or $1.2 \times 3 + 10.4 = 14$

$y = 3.6 + 10.4 = \underline{14}$

Check: $14 - 10.4 = 3.6$, $3.6 \div 3 = 1.2$ ✔

c) If I add 4.3 to the number I am thinking of, the sum is 5 times 2.3.
What is my number?

Plan: $z + 4.3 = 2.3 \times 5 = 11.5$ or $2.3 \times 5 - 4.3 = 7.2$

$z = 11.5 - 4.3 = \underline{7.2}$

Check: $7.2 + 4.3 = 11.5$, $11.5 = 5 \times 2.3$ ✔

4

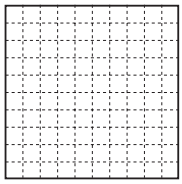
Find a rule and complete the table. Write the rule in different ways.

a	0.4	1	$\frac{1}{3}$	4	$\mathbf{\frac{1}{7}}$	$\frac{2}{9}$	**0.7**	10.1	0.9	$-\frac{1}{2}$
b	2.4	6	2	**24**	$\frac{6}{7}$	$\mathbf{\frac{12}{9}}$	4.2	**60.6**	**5.4**	**– 3**

$b = 6 \times a$, $a = b \div 6$, $b \div a = 6$, $a \div b = \frac{1}{6}$

1

Use the diagram to help you do this addition in different ways.



$$0.2 + \frac{1}{10} + \frac{37}{100} + 0.17 + \frac{3}{100}$$

a) fractions: $0.2 + \frac{1}{10} + \frac{37}{100} + 0.17 + \frac{3}{100}$

$$= \frac{2}{10} + \frac{1}{10} + \frac{37}{100} + \frac{17}{100} + \frac{3}{100}$$

$$= \frac{20 + 10 + 37 + 17 + 3}{100} = \frac{87}{100}$$

b) decimals: $0.2 + 0.1 + 0.37 + 0.17 + 0.03 = 0.87$

c) percentages: $20\% + 10\% + 37\% + 17\% + 3\% = 87\%$

2

Practise calculation.

a)	$0.4 \times 100 = 40$	b)	$5.62 \times 10 = 56.2$	c)	$684 \div 10 = 68.4$
d)	$68.4 \div 10 = 6.84$	e)	$0.09 \times 10 = 0.9$	f)	$0.37 \times 100 = 37$
g)	$14.3 \div 10 = 1.43$	h)	$20.5 \div 10 = 2.05$	i)	$0.49 \div 10 = 0.049$
j)	$0.06 \times 100 = 6$	k)	$4.274 \times 10 = 42.74$	l)	$0.037 \times 100 = 3.7$

3

a) Calculate $\frac{2}{5}$ of 760 km. 304 km

b) Calculate 20% of 760 km. 152 km

c) Calculate 0.6 of 760 km. 456 km

4

Find a rule and complete the table. Write the rule in different ways.

x	0.2	3	$\frac{2}{5}$	2	$\frac{3}{5}$	$\frac{1}{6}$	$\frac{1}{7}$	**0.7**	9.2	0.5	$-\frac{1}{20}$	**0.15**
y	1.0	15	2	**10**	**3**	$\frac{5}{6}$	$\frac{5}{7}$	3.5	**46**	**2.5**	$-\frac{1}{4}$	0.75

Rule: $x = y \div 5$, $y = 5 \times x$, $y \div x = 5$, $x \div y = \frac{1}{5}$

5

Compare each pair of numbers. Fill in the missing signs. (<, > or =)

a)	$\frac{47}{100}$	>	0.047	b)	0.205	>	$\frac{25}{1000}$	c)	$3\frac{3}{5}$	<	3.69
d)	$\frac{3}{5}$	>	0.065	e)	0.35	=	$\frac{35}{100}$	f)	0.87	>	$\frac{78}{100}$

6

Alan mixed 2.4 litres of *white* paint with 7 litres of *red* paint to make *pink* paint.
He used all the *pink* paint to paint 4 **identical** rooms.

How many litres of paint did he use for each room? 2.35 litres

1

Practise mental division.

a) i) $36 \div 9 = 4$ ii) $3.6 \div 9 = 0.4$ iii) $0.36 \div 9 = 0.04$

b) i) $56 \div 7 = 8$ ii) $5.6 \div 7 = 0.8$ iii) $0.56 \div 7 = 0.08$

c) i) $48 \div 6 = 8$ ii) $4.8 \div 6 = 0.8$ iii) $0.48 \div 6 = 0.08$

d) i) $96 \div 8 = 12$ ii) $9.6 \div 8 = 1.2$ iii) $0.96 \div 8 = 0.12$

2

Estimate the result, do the division in two ways and check with a multiplication.

Long division:

```
      1 8.5
  7 | 1 2 9.5
  –   7
      5 9
    – 5 6
        3 5
      – 3 5
          0
```

$129.5 \div 7 = 18.5$

E: $140 \div 7 = 20$ (known multiple of 7)

or $126 \div 7 = (70 + 56) \div 7 = 10 + 8 = 18$

Short division:

```
      1 8.5
  7 | 1 2 9.5
      5 3
```

Check:

```
    1 8.5
  × 7
  1 2 9.5
    5 3
```

3

Estimate the result, do the division in two ways and check with a multiplication.

Long division:

```
      1 8.5 (1)
  7 | 1 2 9.6 (0)
  –   7
      5 9
    – 5 6
        3 6
      – 3 5
          (1) 0
        –   7
            (3) ...
```

$129.6 \div 7 = 18.5$, r 1 tenth

or $129.6 \div 7 = 18.51$, r 3 hundredths

E: $140 \div 7 = 20$

or $126 \div 7 = (70 + 56) \div 7 = 10 + 8 = 18$

Short division:

```
      1 8.5 1
  7 | 1 2 9.6 0 ...
      5 3 1 (3)
```

Check:

```
    1 8.5 1
  × 7
  1 2 9.5 7
+     0.0 3
  1 2 9.6 0  ✔
```

4

Do the divisions in your exercise book. Continue each division until the result is 0.

a) i)
```
    474
  4 | 1896
      2 1
```
ii)
```
    47.4
  4 | 189.6
      2 1
```
iii)
```
    4.74
  4 | 18.96
      2 1
```
iv)
```
    0.474
  4 | 1.896
      2 1
```

b) i) $600 \div 8$
```
    75
  8 | 600
      4
```
ii) $60 \div 8$
```
    7.5
  8 | 60.0
      4
```
iii) $6 \div 8$
```
    0.75
  8 | 6.00
      4
```
iv) $0.6 \div 8$
```
    0.075
  8 | 0.600
      4
```

5

Write a plan, estimate, calculate, check and write the answer in a sentence.

A 2.88 m length of ribbon is cut into 3 equal parts. How long is each part?

e.g *Plan:* $2.88 \text{ m} \div 3 \approx 1$

```
      0.9 6 (m)
  3 | 2.8 8 (m)
      1
```
(or change to cm first)

Answer: Each part is 0.96 m long.

1

A group of 6 children weighed themselves and these were the results.

32.5 kg, 31.0 kg, 32.0 kg, 31.0 kg, 30.5 kg, 33 kg

What do they each weigh **on average**? Calculate the **mean** value to the nearest 10 g.

$$\text{Mean} = \frac{32.5 + 31.0 + 32.0 + 31.0 + 30.5 + 33}{6} = \frac{190.0}{6}$$

≈ 31.67 (kg)

2

A group of 5 pupils were asked their ages and these were the results in months.

110 months, 121 months, 113 months, 116 months, 117 months

What is the **mean** value of their ages?

$$\text{Mean age: } \frac{110 + 121 + 113 + 116 + 117}{5} = \frac{577}{5} \text{ (months)}$$

$= 115.4$ months ($\approx$ 115 months)

3

Calculate the **mean** age of each family and then compare them.

The Cabbage family:

$$\text{Mean age: } \frac{1 + 2 + 11 + 33 + 35 + 59 + 65}{7} = \frac{206}{7}$$

≈ 29.4 (years)

The Sprout family:

10 years, 11 years, 16 years, 19 years, 21 years, 42 years, 44 years

$$\text{Mean age: } \frac{10 + 11 + 16 + 19 + 21 + 42 + 44}{7} = \frac{163}{7}$$

≈ 23.3 (years)

Which family has more people able to work in their garden? The Sprout family

4

a) Find a rule and complete the table. Write the rule in different ways.

a	1	1	3	5	2	**6**	12	2.4	**20**	**16**	5
b	3	4	3	2	7	4	**8**	3.6	40	10	**5.2**
c	2	2.5	3	3.5	**4.5**	5	10	**3**	30	13	5.1

Rule: $c = \frac{a + b}{2}$; $a = 2 \times c - b$; $b = 2 \times c - a$

(or c is the mean of a and b)

b) In your exercise book, calculate the **mean** values for a, b and c.

Mean of $a = 6.672 \approx 6.67$ Mean of $b = 8.163 \approx 8.16$ Mean of $c = 7.418 \approx 7.42$

1

Calculate:

a) i) $\frac{1}{2}$ of 36 = 18 ii) $\frac{2}{2}$ of 36 = 36 iii) $\frac{3}{2}$ of 36 = 54

b) i) $\frac{1}{2}$ of 25 = 12.5 ii) $\frac{2}{5}$ of 25 = 10 iii) $\frac{7}{5}$ of 25 = 35

iv) $\frac{7}{10}$ of 25 = 17.5

2

a) Write the decimals as fractions.

i) $0.1 = \frac{1}{10}$ ii) $0.5 = \frac{1}{2}$ iii) $1.2 = 1\frac{1}{5}$ iv) $0.01 = \frac{1}{100}$

v) $0.35 = \frac{7}{20}$ vi) $3.05 = 3\frac{1}{20}$ vii) $0.001 = \frac{1}{1000}$

b) Express the quotient of 5 divided by 8 as a fraction and as a decimal.

$5 \div 8 = \frac{5}{8} = 0.625$

c) Express the quotient of 15 divided by 9 as a fraction and as a decimal.

$15 \div 9 = \frac{15}{9} = 1\frac{6}{9} = 1\frac{2}{3} = 1.666\ldots$ (to ∞)

3

Write the fractions as decimals. Do the divisions in the grids.

a) $\frac{1}{2} = 0.5$

	0 . 5	
2	1 0	

b) $\frac{7}{2} = 3.5$

	3 . 5	
2	7 . 0	
	1	

c) $\frac{3}{5} = 0.6$

	0 . 6	
5	3 0	
	3	

d) $\frac{11}{5} = 2.2$

		2 . 2
5	1 1 .	0
		1

e) $\frac{1}{4} = 0.25$

	0 . 2	5
4	1 . 0	0
	1 2	

f) $\frac{3}{4} = 0.75$

	0 . 7	5
4	3 . 0	0
	3 2	

g) $\frac{7}{4} = 1.75$

	1 . 7	5
4	7 . 0	0
	3 2	

4

Write the fractions as decimals. Do the divisions in the grids.

a) $\frac{1}{3} = 0.333\ldots = 0.\dot{3}$

	0 . 3	3	3	3	...
3	1 . 0	0	0	0	...
	1	1	1	1	

b) $\frac{2}{3} = 0.666\ldots = 0.\dot{6}$

	0 . 6	6	6	6	...
3	2 . 0	0	0	0	...
	2	2	2	2	

c) $\frac{5}{6} = 0.8333\ldots = 0.8\dot{3}$

	0 . 8	3	3	3	...
6	5 . 0	0	0	0	...
	5	2	2	2	

d) Decimals in which the last digit is repeated endlessly are called

recurring decimals.

1

Write the fractions as decimals. Do necessary calculations in your exercise book.

a) $\frac{3}{2} = 1.5$ b) $\frac{13}{5} = 2.6$ c) $\frac{6}{15} = 0.4$

d) $\frac{13}{20} = 0.65$ e) $\frac{9}{8} = 1.125$ f) $\frac{11}{50} = 0.22$

2

Write the fractions as decimals. Do necessary calculations in your exercise book.

a) $\frac{2}{3} = 0.\dot{6}$ b) $\frac{5}{13} = 0.\dot{3}84615\dot{}$ c) $\frac{15}{6} = 2.5$

d) $\frac{7}{15} = 0.46\dot{}$ e) $\frac{7}{11} = 0.\dot{6}\dot{3}$ f) $\frac{8}{9} = 0.\dot{8}$

3

Without doing divisions, circle the fractions which have a **finite** decimal form,

a) $\frac{7}{2}$ b) $\frac{4}{3}$ c) $\frac{20}{18}$ d) $\frac{18}{20}$ e) $\frac{12}{15}$

f) $\frac{21}{16}$ g) $\frac{15}{12}$ h) $\frac{17}{25}$ i) $\frac{80}{125}$ j) $\frac{10}{225}$

4

Fill in the missing numerators, denominators or numbers.

a) 3 minutes $= \frac{3}{60}$ hour $= \frac{1}{20}$ hour $= \frac{5}{100}$ hour $=$ 0.05 hour

b) 15 minutes $= \frac{15}{60}$ hour $= \frac{1}{4}$ hour $= \frac{25}{100}$ hour $=$ 0.25 hour

c) 63 minutes $= \frac{63}{60}$ hour $= \frac{21}{20}$ hour $= \frac{105}{100}$ hour $=$ 1.05 hours

d) 6 hours $= \frac{6}{24}$ day $= \frac{1}{4}$ day $=$ 0.25 day

e) 3 hours $= \frac{3}{24}$ day $= \frac{1}{8}$ day $=$ 0.125 day

f) 15 hours $= \frac{15}{24}$ day $= \frac{5}{8}$ day $=$ 0.625 day

1

Practise mental division.

a) i) $72 \div 8 = 9$ ii) $7.2 \div 8 = 0.9$ iii) $0.72 \div 8 = 0.09$

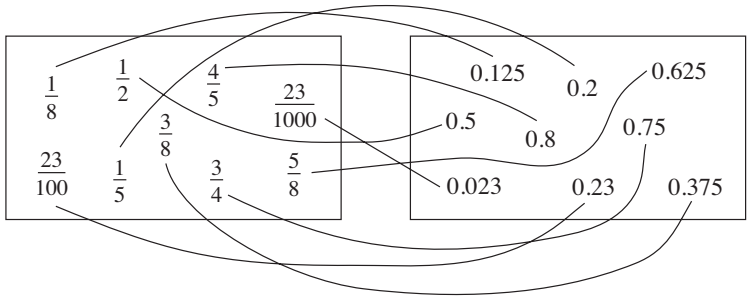
b) i) $49 \div 7 = 7$ ii) $4.9 \div 7 = 0.7$ iii) $0.49 \div 7 = 0.07$

c) i) $55 \div 5 = 11$ ii) $5.5 \div 5 = 1.1$ iii) $0.55 \div 5 = 0.11$

d) i) $63 \div 9 = 7$ ii) $6.3 \div 9 = 0.7$ iii) $0.063 \div 9 = 0.007$

2

Join up the fractions and decimals which have the same value.



List the numbers in decimal form in decreasing order.

0.8 > 0.75 > 0.625 > 0.5 > 0.375 > 0.23 > 0.2 > 0.125 > 0.023

3

One side of a rectangle is 2.35 m in length.

The **adjacent** side is twice as long.

What is the length of:

a) the adjacent side 4.7 m

b) the perimeter? 14.1 m

4

Solve these problems in your exercise book.

a) At 16:30 hours, Ben's temperature was 36.9 °C. It rose by 0.4 °C every hour. What was Ben's temperature at 20:00 hours? 38.3°C

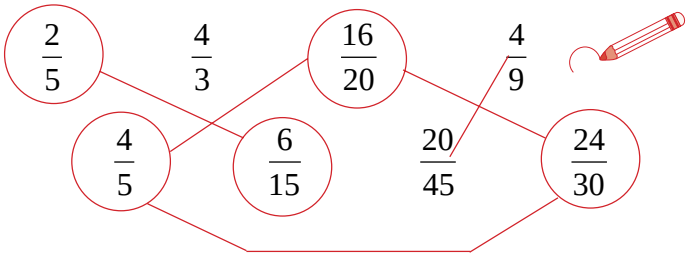
b) Suzy bought 10 apples and 8 pears. The apples cost £0.35 each and a pear cost twice as much as an apple. How much did Suzy pay altogether? £ 9.10

c) A 2.5 m length was cut from a ball of string of total length 13 m. The remaining string was cut into 6 equal pieces. How long was each piece? 1.75 m

5

Circle the fractions which have **finite** decimal form.

Join up any equal fractions.



1

In a group of children, there are 8 boys and 12 girls. Write the parts and ratios required.

a) What is the ratio of boys to girls?

B : G = 8 : 12 = 2 : 3

b) What part of the group is boys? $\frac{2}{5}$

c) What is the ratio of girls to boys?

G : B = 12 : 8 = 3 : 2

d) What part of the group is girls? $\frac{3}{5}$

2

Answer the questions by writing a ratio or a fraction, as required.

In a group of students at a youth camp, 3 are *Americans*, 4 are *British* and 1 is *Greek*.

a) What part of the group is:

American $\frac{3}{8}$ *British* $\frac{1}{2}$ *Greek* $\frac{1}{8}$ *British* **or** *Greek*? $\frac{5}{8}$

b) What is the ratio in the group of:

i) *American* students to *British* students 3 : 4

ii) *American* students to *Greek* students 3 : 1

iii) *British* students to *American* students 4 : 3

iv) *British* students to *Greek* students 4 : 1

v) *Greek* students to *American* students 1 : 3

vi) *Greek* students to *British* students? 1 : 4

c) The group is going on a trip in a minibus. They get on the bus in a random order. How certain are you of these events occurring?

If you think that it is **certain** to happen, write **C**, if you think that it is **possible but not certain**, write **P** and if you think that it is **impossible**, write **I**.

i) The first 4 students to get on the bus are *American*. I

ii) The last student to get on the bus is *American* or *British* or *Greek*. C

iii) The first student to get on the bus is *Greek*. P

iv) The first 4 students to get on the bus are an *American*, a *Greek*, an *American* and a *British* student in that order. P

v) Two *Americans*, a *British* and the *Greek* student are the first four to get on the bus. P

d) i) Which nationality is the most likely to get on the bus first? British

ii) Is the first student to get on the bus more likely to be *American* or *British*? British

1

Write the ratios between the shaded and *white* parts and the whole square.

a) ■ to □: 34 : 66 = 17 : 33 [= $\frac{17}{33}$ = $0.\dot{5}\dot{1}$ → 52%

b) □ to ■: 66 : 34 = 33 : 17 [= $\frac{33}{17}$ = $1\frac{16}{17}$ ≈ 1.9412

c) ■ to the whole: 34 : 100 = 17 : 50 [= $\frac{34}{100}$ = 0.34 → 34%]

d) □ to the whole: 66 : 100 = 33 : 50 [= $\frac{66}{100}$ = 0.66 → 66%]

2

How certain are you of these outcomes occurring? Write **C** for **certain**, **P** for **possible but not certain** or **I** for **impossible**.

a) The next Olympic Games will be in the year 2004. I

b) The next time I throw a dice I will get a 5. P

c) The next time I throw a dice I will get a 0. I

d) Next year, the number of boys born will be twice the number of girls. P

e) Next year, fewer boys than girls will be born. P

3

A group of children is visiting a museum. In the group, there are 12 girls and the ratio of girls to boys is 3 to 2.

a) How many boys are in the group? 8

b) How many children are in the group? 20

c) If the children enter the museum in a random order, underline the outcome which you think is more likely to occur.

i) A boy enters first. ii) A girl enters first.

d) What do you think is the **probability** of each of the outcomes in c) occurring?

i) A boy enters first. $\frac{2}{5}$ ii) A girl enters first. $\frac{3}{5}$

4

In a bag there are 50 marbles altogether. The marbles are either *black* or *white*. The ratio of *black* marbles to *white* marbles is 1 : 4.

a) How many marbles are there of each colour? *black* 10

white 40

b) If you take a marble out of the bag with your eyes shut, what is the **probability** that it will be *white*? $\frac{4}{5}$

1

Predict the result for each outcome first, then do the experiment.
Toss a coin 20 times and note how it lands in this table.

e.g.

Outcome	Prediction	Tosses 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20	Totals
Head	10	| | | | | | | | | | | | | | | | | | | |	9
Tail	10	| | | | | | | | | | | | | | | | | | | |	11

What fraction of your tosses resulted in: a) a *Head* $\frac{9}{20}$ b) a *Tail*? $\frac{11}{20}$

Collect the totals for the class and fill in this table.

e.g.

Outcome	Number of tosses	Totals (*frequency*)	Ratio (*relative frequency*) fraction	Ratio (*relative frequency*) percentage
Head	500	252	$\frac{252}{500}$	50.4%
Tail		248	$\frac{248}{500}$	49.6%

What do you think is the **probability** of tossing:

a) a *Head* $\frac{1}{2}$

b) a *Tail*? $\frac{1}{2}$

2

Predict the results for each outcome first, then do the experiment.
Throw a dice 20 times and note how it lands in this table.

e.g.

Outcome	Prediction	Tally of 20 throws	Totals (*frequency*)	Ratio (*relative frequency*) fraction	Ratio (*relative frequency*) percentage
⚀	2	| | | |	4	$\frac{4}{20}$	20%
⚂	4	| | |	3	$\frac{3}{20}$	15%
⚃	3	| | |	3	$\frac{3}{20}$	15%
⚄	3	| | |	3	$\frac{3}{20}$	15%
⚅	4	| | |	3	$\frac{3}{20}$	15%
⚅	4	| | | |	4	$\frac{4}{20}$	20%
	(20)		(20)	($\frac{20}{20}$)	(100%)

Collect the class data and fill in this table.

e.g.

Outcome	Number of throws	Totals (*frequency*)	Ratio (*relative frequency*) fraction	Ratio (*relative frequency*) percentage
⚀	500	81	$\frac{81}{500}$	16.2%
⚂		85	$\frac{85}{500}$	17.0%
⚃		82	$\frac{83}{500}$	16.4%
⚄		84	$\frac{84}{500}$	16.8%
⚅		83	$\frac{83}{500}$	16.6%
⚅		85	$\frac{85}{500}$	17.0%
		(500)	($\frac{500}{500}$)	(100%)

What do you think is the **probability** of throwing a:

1 $\frac{1}{6}$ 2 $\frac{1}{6}$

3 $\frac{1}{6}$ 4 $\frac{1}{6}$

5 $\frac{1}{6}$ 6 $\frac{1}{6}$?

Divide 100% by 6.
What does it have to do with the experiment?

$100\% \div 6 = 16\frac{2}{3}\% = 16.\dot{6}\%$ and $\frac{1}{6} \to 16.\dot{6}\%$

1

Four children tossed a coin several times and wrote their results in this table.
Write the answer to each question in the appropriate part of the table.

Outcome	Alan	Becky	Carol	David	**Totals** *frequency*	**Ratio** *relative frequency* fraction	decimal	percentage
Head	24	30	27		**101**	$\frac{101}{200}$	**0.505**	**50.5%**
Tail	25	28	31	15	**99**	$\frac{99}{200}$	**0.495**	**49.5%**
				Total tosses	**200**			

a) How many tosses were there altogether? 200

b) How many: i) *Heads* 101 ii) *Tails* were tossed altogether? 99

c) What is the ratio of each outcome to the total number of tosses:

i) as a fraction H : All $= \frac{101}{200}$; T : All $= \frac{99}{200}$

ii) as a decimal H: 0.505 T: 0.495 iii) as a percentage? H: 50.5%; T: 49.5%

2

Predict the result for each outcome first, then do the experiment.

Toss a 10 p coin and a £1 coin at the same time. Repeat the experiment 24 times and keep a tally of how they land in this table.

e.g. In a class of 30 pupils

Outcome (10p) (£1)		**Tally of 24 throws**	**Totals** *frequency* Pupil	Class	**Ratio** *relative frequency* fraction	decimal	%
H H	5	𝍸 ||	7	185	$\frac{185}{720}$	≈ 0.26	26%
H T	6	𝍸	5	176	$\frac{176}{720}$	≈ 0.24	24%
T H	5	𝍸 |	6	181	$\frac{181}{720}$	≈ 0.25	25%
T T	8	𝍸 |	6	178	$\frac{178}{720}$	≈ 0.25	25%
Prediction		**Total throws**	**720**		($\frac{720}{720}$)	(1)	(100%)

Collect the data for the class and complete the right-hand side of the table.

3

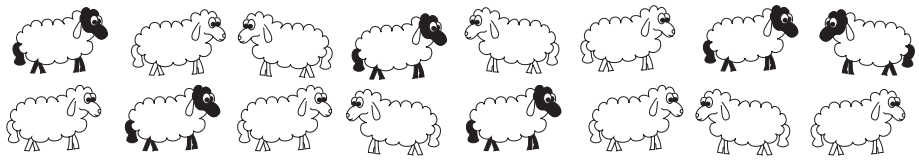
Repeat the experiment using 3 coins.

e.g. In a class of 30 pupils

Outcome (10p) (50p) (£1)		**Tally of 24 throws**	**Totals** *frequency* Pupil	Class	**Ratio** *relative frequency* fraction	decimal	%
H H H	3	||||	4	88	$\frac{88}{720}$	≈ 0.122	12.2%
H H T	3	||	2	89	$\frac{89}{720}$	≈ 0.124	12.4%
H T H	3	|||	3	91	$\frac{91}{720}$	≈ 0.126	12.6%
H T T	3	|||	3	90	$\frac{90}{720}$	≈ 0.125	12.5%
T H H	3	||	2	88	$\frac{88}{720}$	≈ 0.122	12.2%
T H T	3	𝍸	5	92	$\frac{92}{720}$	≈ 0.128	12.8%
T T H	3	||	2	90	$\frac{90}{720}$	≈ 0.125	12.5%
T T T	3	|||	3	92	$\frac{92}{720}$	≈ 0.128	12.8%
Prediction		**Total throws**	**720**		($\frac{720}{720}$)	(1)	(100%)

1

There are 6 *black*-faced and 10 *white*-faced sheep in a field. Write the parts and ratios required.



a) What is the ratio of *black*-faced to *white*-faced sheep? B : W = 6 : 10

b) What is the ratio of *white-faced* to *black-faced* sheep? W : B = 10 : 6

c) What fraction of the sheep have:

i) *white* faces $\frac{5}{8}$ ii) *black* faces? $\frac{3}{8}$

2

How certain are you of these outcomes occurring? Write **C** for **certain**, **P** for **possible but not certain** or **I** for **impossible**.

a) The final of the next *Football World Cup* will be in 2005. I

b) The next time I toss a coin I will get a *Head* or a *Tail*. C

c) The next time I throw two dice the total will be more than 6. P

d) The next time I throw two dice the total will be more than 12. I

e) It will rain next week in my home town. P

3

In a bag there are 40 marbles altogether. The marbles are either *red* or *blue*.
The ratio of *red* marbles to *blue* marbles is 1 : 3.

a) How many marbles are there of each colour? *red* 10 *blue* 30

b) If you take a marble out of the bag with your eyes shut, what is the **probability** that it will be:

i) *blue* $\frac{3}{4}$ ii) not *blue*? $\frac{1}{4}$

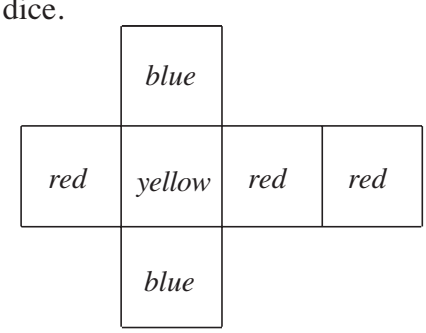
4

Imagine this net folded to make a cube and used as a dice.

If the dice is rolled, what is the probability that the square facing up is:

a) *red* $\frac{1}{2}$ b) *blue* $\frac{1}{3}$

c) *yellow* $\frac{1}{6}$ d) not *red*? $\frac{1}{2}$



1

Predict the result of each outcome first, then do the experiment.

Throw a *white* and a *red* dice at the same time and note how they land in this table.
Repeat the experiment 72 times. Collect the class data and complete the table.

e.g For a class of 20 pupils

Outcome *w*	*r*		**Tally of 72 throws**	**Totals** *frequency* Pupil	Class	**Ratio** *relative frequency* fraction	decimal	%
1	1	2		0	41	$\frac{41}{1440}$	0.0285	2.85%
1	2	2	|||	3	40	$\frac{40}{1440}$	0.0278	2.78%
1	3	2	|	1	37	$\frac{37}{1440}$	0.0257	2.57%
1	4	2		0	39	$\frac{39}{1440}$	0.0271	2.71%
1	5	1	|	1	42	$\frac{42}{1440}$	0.0292	2.92%
1	6	3	|||	3	40	$\frac{40}{1440}$	0.0278	2.78%
2	1	2		0	38	$\frac{38}{1440}$	0.0264	2.64%
2	2	2	||	2	41	$\frac{41}{1440}$	0.0285	2.85%
2	3	2		0	40	$\frac{40}{1440}$	0.0278	2.78%
2	4	2		0	42	$\frac{42}{1440}$	0.0292	2.92%
2	5	0		0	40	$\frac{40}{1440}$	0.0278	2.78%
2	6	2	||||	4	38	$\frac{38}{1440}$	0.0264	2.64%
3	1	4		0	41	$\frac{41}{1440}$	0.0285	2.85%
3	2	2		0	40	$\frac{40}{1440}$	0.0278	2.78%
3	3	2	|	1	41	$\frac{41}{1440}$	0.0285	2.85%
3	4	2		0	43	$\frac{43}{1440}$	0.0299	2.99%
3	5	3	||	2	41	$\frac{41}{1440}$	0.0285	2.85%
3	6	2	𝍸	5	39	$\frac{39}{1440}$	0.0271	2.71%
4	1	2	|	1	40	$\frac{40}{1440}$	0.0278	2.78%
4	2	2	|||	3	38	$\frac{38}{1440}$	0.0264	2.64%
4	3	0	|||	3	40	$\frac{40}{1440}$	0.0278	2.78%
4	4	1	||	2	39	$\frac{39}{1440}$	0.0271	2.71%
4	5	2		0	38	$\frac{38}{1440}$	0.0264	2.64%
4	6	2	𝍸 |	6	41	$\frac{41}{1440}$	0.0264	2.64%
5	1	2	||||	4	38	$\frac{38}{1440}$	0.0264	2.64%
5	2	2	||	2	40	$\frac{40}{1440}$	0.0278	2.78%
5	3	2	||||	4	40	$\frac{40}{1440}$	0.0278	2.78%
5	4	4	𝍸	5	44	$\frac{44}{1440}$	0.0306	3.06%
5	5	2	|||	3	40	$\frac{40}{1440}$	0.0278	2.78%
5	6	2	|	1	39	$\frac{39}{1440}$	0.0271	2.71%
6	1	2	||||	4	40	$\frac{40}{1440}$	0.0278	2.78%
6	2	0	||||	4	40	$\frac{40}{1440}$	0.0278	2.78%
6	3	2	||	2	38	$\frac{38}{1440}$	0.0264	2.64%
6	4	3	|	1	41	$\frac{41}{1440}$	0.0285	2.85%
6	5	3	||||	4	40	$\frac{40}{1440}$	0.0278	2.78%
6	6	2	|	1	41	$\frac{41}{1440}$	0.0285	2.85%
Prediction		(72)	**Total throws** (72)		1440	$(\frac{1440}{1440})$	(1)	(100%)

1

A dice was thrown 60 times. The number of times (**frequency**) each of the numbers 1 to 6 (**outcome**) was thrown is shown in the chart below.

Complete the table and answer the questions.

Outcome		1	2	3	4	5	6
Frequency		9	12	10	11	8	10
Ratio *relative frequency*	$\frac{a}{b}$	$\frac{9}{60}$	$\frac{12}{60}$	$\frac{10}{60}$	$\frac{11}{60}$	$\frac{8}{60}$	$\frac{10}{60}$
	%	15%	20%	$16\frac{2}{3}\%$	$18\frac{1}{3}\%$	$13\frac{1}{3}\%$	$16\frac{2}{3}\%$

a) Which outcome occurred: i) **most** frequently — 2

ii) **least** frequently? — 5

b) Which frequency exactly fits the expected frequency for each outcome? — 10

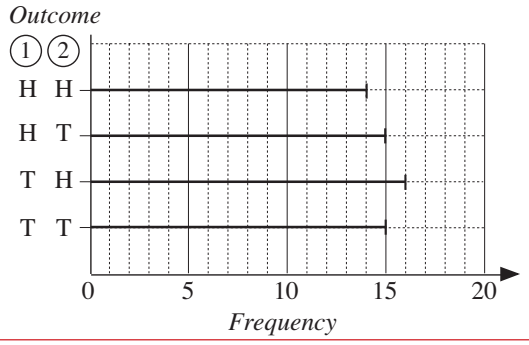
c) What was the frequency of the outcome *'less than 6'*? — 50

d) What was the frequency of the outcome *'odd'*? — 27

2

Two coins were tossed 60 times. The frequency of each outcome is shown in the table.

Outcome ① ②	Frequency	Ratio *relative frequency*
H H	14	$\frac{14}{60}$ ($\approx 23.3\%$)
H T	15	$\frac{15}{60}$ (25%)
T H	16	$\frac{16}{60}$ ($\approx 26.7\%$)
T T	15	$\frac{15}{60}$ (25%)



a) Complete the chart.

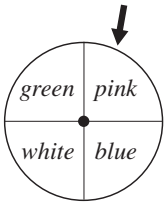
b) Calculate the ratio for each outcome and complete the table.

c) What is the frequency of tossing a *Head* **and** a *Tail*? — 31

3

A fortune teller spins her lucky colour wheel 100 times. Complete the table.

Outcome		*pink*	*blue*	*white*	*green*	*pink* or *blue*	*p* or *w* or *g*
Frequency		26	23	25	26	49	77
Ratio *relative frequency*	fraction	$\frac{26}{100}$	$\frac{23}{100}$	$\frac{25}{100}$	$\frac{26}{100}$	$\frac{49}{100}$	$\frac{77}{100}$
	decimal	0.26	0.23	0.25	0.26	0.49	0.77
	%	26%	23%	25%	26%	49%	77%

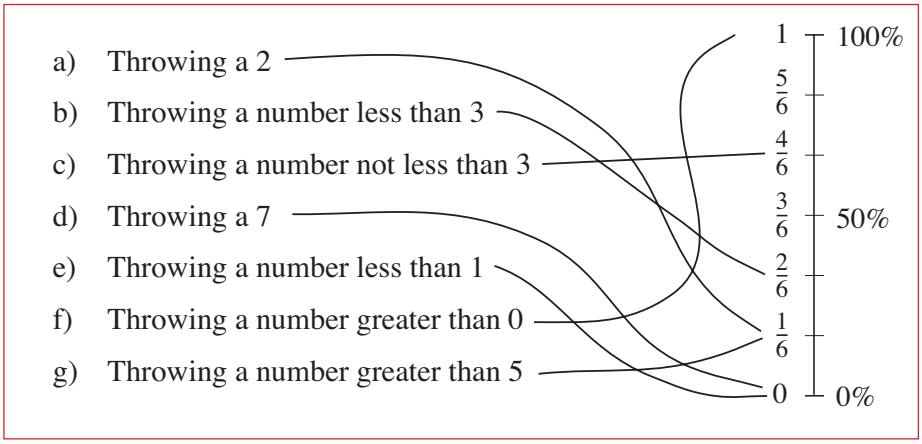


1

When we throw an **unbiased** dice, there are 6 possible outcomes, each equally likely:

1, 2, 3, 4, 5 or 6

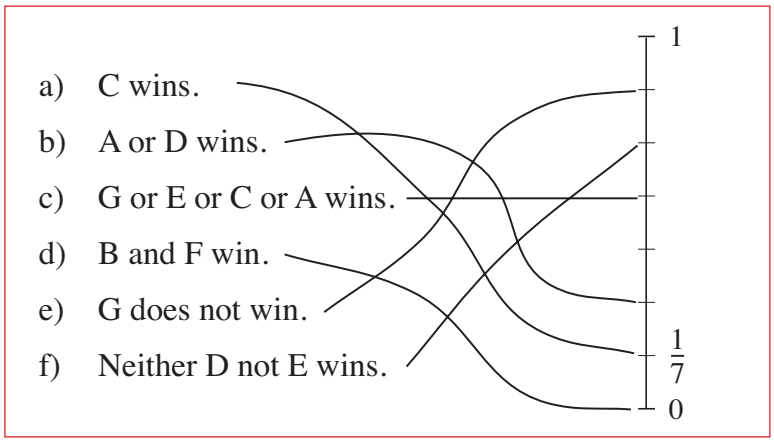
Show the probability of each of these outcomes by joining it to the correct point on the probability scale.



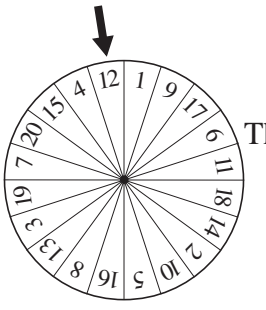
2

Seven children draw lots in the hope of winning a prize. If each child has an equal chance of winning, what is the probability of each of these outcomes happening?

Join the outcomes to the matching points on the probability scale.



3



The number is:

a) 17 $\frac{1}{20}$

b) less than 17 $\frac{16}{20}$

c) **not** greater than 17 $\frac{17}{20}$

d) **not** less than 17 $\frac{4}{20}$

e) even $\frac{10}{20}$

f) divisible by 4 $\frac{5}{20}$

g) **not** divisible by 4 $\frac{15}{20}$

h) either even **or** odd $\frac{20}{20}$

i) neither even **nor** odd $\frac{0}{20}$

1

In a lottery game, 2 numbers are drawn from the numbers 1, 2, 3 and 4.

Let's suppose that each number has an equal chance of being drawn.

a) List the possible outcomes if the order of the two numbers does not matter.

(1, 2), (1, 3), 1, 4), (2, 3), (2, 4), (3, 4) [6 outcomes]

b) What is the probability of these outcomes?

i) The numbers are1 **and** 3. $\frac{1}{6}$

ii) One of the numbers is 2. $\frac{1}{2}$

iii) One of the numbers is either 1 **or** 3. $\frac{5}{6}$

c) List the possible outcomes if the order of the two numbers **does** matter.

(1, 2), (1, 3), 1, 4); (2, 1); (2, 3), (2, 4);
(3, 1), (3, 2), (3, 4); (4, 1), (4, 2), (4, 3) (12 posssible outcomes)

2

This time the numbers 1, 2, 3 and 4 are written on cards and put into a bag.

A pupil takes out one card with his eyes shut, notes the number and puts it back into the bag again. Then the pupil takes out a 2nd card in the same way and notes the number.

a) List the possible outcomes if the order of the two numbers does not matter.

1, 1 2, 2 3, 3 4,4
1, 2 2, 3 3, 4
1, 3 2, 4
1, 4

(10 possible outcomes, but not equal probabilities)

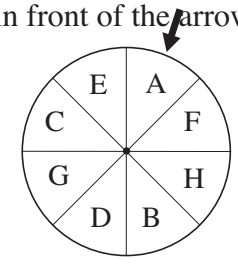
b) List the possible outcomes if the order of the two numbers **does** matter.

1, 1 2, 1 3, 1 4,1
1, 2 2, 2 3, 2 4, 2
1, 3 2, 3 3, 3 4, 3
1, 4 2, 4 3, 4 4, 4

(16 possible outcomes, with equal probabilities)

3

Eight children have written their names on a wheel of fortune. The fortune teller spins the wheel to see who is to be chosen to have their fortunes told.
Let's suppose that each letter has an equal chance of coming to rest in front of the arrow and that the wheel cannot stop on the lines between the letters.
What is the probability of each of these outcomes?



a) A wins. $\frac{1}{8}$

b) D wins. $\frac{1}{8}$

c) B **and** G win. 0

d) F does **not** win. $\frac{7}{8}$

e) C **or** H wins. $\frac{1}{4}$

f) Neither C **nor** H wins. $\frac{3}{4}$

g) The winning name's initial letter comes after C in the alphabet. $\frac{5}{8}$

h) The winning name's initial letter comes before C in the alphabet. $\frac{1}{4}$

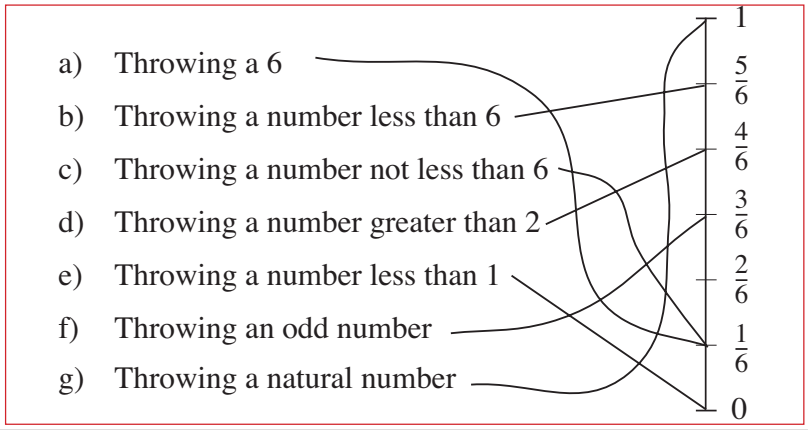
i) E either wins **or** doesn't win. 1

1

When we throw an **unbiased** dice, there are 6 equally likely outcomes:

1, 2, 3, 4, 5 or 6

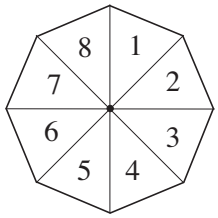
Show the probability of each of these outcomes by joining it to the correct point on the probability scale.



2

The diagram shows a spinner used in a board game.

When the spinner is spun, what is the probability that it lands on:



a) 1 $\frac{1}{8}$ b) 8 $\frac{1}{8}$

c) an even number $\frac{1}{2}$ d) a number less than 8 $\frac{7}{8}$

e) a number greater than 8 0 f) a number greater than 0? 1

3

In a lottery, 2 numbers are drawn from the numbers 1, 2, 3, 4 and 5. Each number has an equal chance of being drawn.

a) List all the possible outcomes if the order of the two numbers does not mattter.

1, 2 2, 3 3, 4 4, 5
1, 3 2, 4 3, 5
1, 4 2, 5
1, 5

(10 possible outcomes with equal probability)

b) What is the probability of each of these outcomes happening?

i) The numbers are 1 and 2. $\frac{1}{10}$ ii) One number is 1. $\frac{2}{5}$

iii) One of the numbers is either 1 **or** 2. $\frac{7}{10}$

4

In a box of 30 coloured pencils, there are *red*, *green* and *blue* pencils. The ratio of *red* to *green* to *blue* is 4 : 5 : 6. How many pencils of each colour are in the box?

red 8 *green* 10 *blue* 12