Exercise 5.1

1 $a=80$, $b=80$, $c=55$, $d=125$

2 **B** and **C**

3 $B=48$, $C=66$, $A=180-(48+66)=66$ so A and C are equal.

4 $a=100$, $b=105$, $c=25$

5 $a=49$, $b=49$, $c=48$

6 $x=30$

7 a, b Learner's own sketch showing the exterior angles 135°, 120°, 105°

8 $x=95$, $y=39$, $z=124$

9 $x=50$, $y=30$, $z=80$

10 Angles of the quadrilateral are 118°, 127°, 75°; $a=360-320=40°$

11 a Angles B and D are not equal.

b Using the exterior angle property, $A=122-59=63$ and $E=122-63=59$. The third angle is $180-122=58$, so both triangles have angles of the same size.

Exercise 5.2

1 a 360° b 1080° c 1800°

2 a Learner's own answer; divide pentagon into three triangles.

b 60°

c All the angles are 108°. The fifth angle is also 108 degrees. It is a regular polygon if all the sides are the same length but this may not be the case.

3 a 1260° b 140°

4 a 7 sides

b The sum must be a multiple of 180.

5 One of the angles marked is not inside the hexagon. The angle there is $360-90=270°$.

6 84

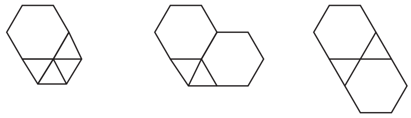
7 a 900° b 50°

8 $1800 \div 180=10$ so that is 12 sides. However, 180 is not a factor of 2000.

9 a Angles are $135°+135°+90°=360°$

b i $2\times 120°+2\times 60°=360°$ OR $120°+4\times 60°=360°$

ii There are three ways:



10 a 1440°

b Third angle $=360-108-108=144°$

11 30°

12 36°

13 It is correct. Substitute values of n. To show it algebraically requires factorising.

Exercise 5.3

1 $a=123$; $b=109$

2 a 90° b 120°

3 Two exterior angles are 74° and two are 106°.

4 60

5 72°

6 a 6 b 8 c 9 d 10

7 20, 30 and 40 are factors of 360. 50 is not a factor of 360.

8 a 10° b 36

9 12

10 36

11 12 sides; the interior angle is 150°, the exterior angle is 30°, $360 \div 30=12$.

12 55

13 142°

Exercise 5.4

All questions except questions **7**, **9** and **10** have the answer included for self-assessment.

1–6 Learner's own diagrams and checks.

7 Learner's own pattern. Assess by looking.

8 Learner's own diagrams and checks.

9 Learner's own pattern. Assess by looking.

10 a Learner's own diagram.

b 10 cm

Exercise 5.5

1 $a = 10$ cm; $b = 13$ cm; $c = 34$ cm

2 $a = 8.6$ cm; $b = 14.4$ cm; $c = 16.7$ cm

3 $a = 12$ cm; $b = 7.5$ cm; $c = 14$ cm

4 $a = 35.3$ cm; $b = 17.9$ cm; $c = 16.2$ cm

5 a 10.1 cm

b Learner's own diagram.

6 a i 4.2 cm ii 7.1 cm

iii 11.3 cm iv 14.1 cm

b Learner's own checks. Check with answers in part **a** and try other side lengths.

7 3.7 m OR 3.71 m

8 14.7 m OR 14.72 m

9 a 17.3 cm b 173 cm^2

10 a 12 cm b 15 cm

11 The calculator answer is 36.37… so 36.3 cm or 36.4 cm are acceptable answers.

12 a 24 cm

b 720 cm^2

Exercise 6.1

There are alternative answers to many questions in this unit.

1 a Learner's own answer. For example: Gender, other interests, availability of equipment.

b Learner's own questions. For example: Do girls spend the same amount of time playing computer games as boys? Do young children play on computer games less than older children? Does playing computer games affect the time spent doing homework?

c Learner's own predictions. For example: Girls spend less time playing computer games than boys. Learners who play sports spend less time playing computer games than learners who don't play sports.

d Learner's own answer. For example: Use random numbers or names from a hat or a number of learners from different year groups.

e Learner's own answer and explanation.

2 a Learner's own answer. For example: Time of day, size of car, reason for travel, day of the week.

b Learner's own questions. For example: Do larger cars have more passengers? Are there more passengers in cars early in the morning? Are cars likely to have more passengers at the weekend?

c Learner's own predictions. For example: During the rush hour cars are more likely to have only one passenger. Cars on Sundays will have more passengers than cars on Mondays.

d Learner's own answer. For example: Observing cars at different times of day or different days of the week.

e Learner's own answer and explanation.

3 a Learner's own questions. For example: Are young people faster using a keyboard than older people? Is there a difference between the speed of young people and old people writing on paper? Is there a difference between boys' speed and girls' speed?

b Learner's own predictions. For example: Girls can type more quickly than boys. Older people can write more quickly on paper than younger people.

c, d, e Learner's own answers. These will depend on the predictions in part b.

Exercise 6.2

1 a 34 b 26

2 a Teacher might not choose at random.

b Learner's own answer. For example: Using random numbers or names from a hat or particular positions in the register.

3 a People might be more likely to phone if they have a complaint.

b Learner's own answer.

4

	Advantage	Disadvantage
a Using social media	Easy to do	Some people do not use social media
b Sending letters to people	Can select who to ask	People might not reply
c Asking people in the street	Can choose a representative sample	Can be expensive and take a lot of time

5

Age	Under 18	18 to 55	Over 55
Sample	7	31	12

6 a No. Adults from a small sample said that vitamins gave them more energy but that is not the same thing as proving that they work.

b Learner's own questions. For example: How were the adults chosen? What age were the adults? What questions were the adults asked? How did the adults measure their energy levels?

c Sample size.

7 a Q1: People might say yes because they think they should. Q2: This question will encourage people to say no. Q3: This question asks people to say something they might feel uncomfortable about because it is being rude about people.

b Q1: How many portions of fruit or vegetables did you eat yesterday? Q2: How often do you eat meat in the main meal of the day? Q3: Why do you think people are overweight? This could be a multiple-choice question.

8 42

9 Learner's own answer. Any method should take account of the fact that parents might have more than one child in the school and you do not want to choose any parent twice.

Exercise 7.1

1 a $d = 6\,\text{cm}$

$C = \pi \times d = \pi \times 6$

$= 18.84\,\text{cm}$

b $d = 5\,\text{cm}$

$C = \pi \times d = \pi \times 5$

$= 15.7\,\text{cm}$

c $d = 9\,\text{cm}$

$C = \pi \times d = \pi \times 9$

$= 28.26\,\text{cm}$

2 radius, $r = 4\,\text{cm}$

diameter, $d = 2 \times 4 = 8\,\text{cm}$

$C = \pi \times d = \pi \times 8 = 25.14\,\text{cm}$

3 $C = \pi \times d = \pi \times 12 = 37.704\,\text{cm}$

$\frac{1}{2}$ of the circumference $= 37.704 \div 2 = 18.852\,\text{cm}$

Perimeter $= 12 + 18.852 = 30.85\,\text{cm}$

4 a $r = 4\,\text{cm}$

$A = \pi \times r^2 = \pi \times 4^2$

$= \pi \times 16$

$= 50.24\,\text{cm}^2$

b $r = 1\,\text{cm}$

$A = \pi \times r^2 = \pi \times 1^2$

$= \pi \times 1$

$= 3.14\,\text{cm}^2$

c $r = 6\,\text{cm}$

$A = \pi \times r^2 = \pi \times 6^2$

$= \pi \times 36$

$= 113.04\,\text{cm}^2$

5 diameter, $d = 6\,\text{cm}$

radius, $r = 6 \div 2 = 3\,\text{cm}$

$A = \pi \times r^2 = \pi \times 3^2$

$= \pi \times 9 = 28.28\,\text{cm}^2$

6 $A = \pi \times r^2 = \pi \times 5^2$

$= \pi \times 25 = 78.55\,\text{cm}^2$

Area of semicircle $= 78.55 \div 2 = 39.3\,\text{cm}^2$

7 a $12.6\,\text{cm}^2$ b $44.2\,\text{m}^2$

c $616\,\text{cm}^2$ d $8.04\,\text{m}^2$

8 a Learner's own answers and explanations.

For example: Dipti has the incorrect answer. She has not halved the diameter to get the radius.

For example: Gabir has the incorrect answer. He has used the formula for the circumference not for the area.

b Area $= \pi r^2$

$d = 2.4$, so $r = 2.4 \div 2 = 1.2$

$r^2 = 1.2^2 = 1.44$

Area $= \pi \times 1.44 = 4.5238\ldots$

Area $= 4.52\,\text{cm}^2$ (3 s.f.)

9 **a** **i** $A = 22.9\,\text{cm}^2$ **ii** $C = 17.0\,\text{cm}$

b **i** $A = 1590.4\,\text{mm}^2$ **ii** $C = 141.4\,\text{mm}$

10 **a** **i** $A = 113.5\,\text{cm}^2$ **ii** $P = 43.7\,\text{cm}$

b **i** $A = 904.8\,\text{mm}^2$ **ii** $P = 123.4\,\text{mm}$

c **i** $A = 402.1\,\text{cm}^2$ **ii** $P = 82.3\,\text{cm}$

d **i** $A = 88.4\,\text{m}^2$ **ii** $P = 38.6\,\text{m}$

11 Sofia is correct. Learner's own explanation and working. For example:

Area of semicircle

$= \frac{1}{2} \times \pi \times r^2 = \frac{1}{2} \times \pi \times 2^2 = 6.28\,\text{m}^2$

Area of quarter-circle $=$

$\frac{1}{4} \times \pi \times r^2 = \frac{1}{4} \times \pi \times 4^2 = 12.57\,\text{m}^2$

$12.57\,\text{m}^2 > 6.28\,\text{m}^2$

12 Marcus is incorrect. Learner's own explanation and working. For example:

Perimeter of semicircle $=$

$\frac{1}{2} \times \pi \times d + d = \frac{1}{2} \times \pi \times 8 + 8 = 20.57\,\text{m}$

Perimeter of three-quarter circle $=$

$\frac{3}{4} \times \pi \times d + r + r = \frac{3}{4} \times \pi \times 6 + 3 + 3 = 20.14\,\text{m}$

$20.57\,\text{m} > 20.14\,\text{m}$

13 **a, b** **A** and **v**, **B** and **ii**, **C** and **i**, **D** and **vi**, **E** and **iv**, **F** and **iii**

14 $1.4\,\text{cm} = 14\,\text{mm}$

15 $7.59\,\text{m} = 759\,\text{cm}$

16 $27\,\text{cm}^2$

17 **a** Area $= 9\pi\,\text{cm}^2$ Circumference $= 6\pi\,\text{cm}$

b Area $= 49\pi\,\text{m}^2$ Circumference $= 14\pi\,\text{m}$

c Area $= 100\pi\,\text{mm}^2$ Circumference $= 20\pi\,\text{mm}$

18 **a** Area $= \pi r^2 = \pi \times 4^2 = 16\pi\,\text{cm}^2$
Circumference $= \pi d = \pi \times 8 = 8\pi\,\text{cm}$

b Area $= \pi r^2 = \pi \times 8^2 = 64\pi\,\text{cm}^2$
Circumference $= \pi d = \pi \times 16 = 16\pi\,\text{cm}$

c

Circle A : Circle B	Radius (cm)	Circumference (cm)	Area (cm^2)
Ratio	4 : 8	$8\pi : 16\pi$	$16\pi : 64\pi$
Ratio in its simplest form	1 : 2	1 : 2	1 : 4

d Learner's own answers. For example: The ratios of the radius and circumference are the same.

e Learner's own answers. For example: The ratio of the areas is the square of the ratio of the radius.

f **i** 1 : 3 (the ratios of the radius and circumference are the same)

ii $1^2 : 3^2 = 1 : 9$ (the ratio of the areas is the square of the ratio of the radii)

19 Zara is incorrect.

Perimeter of semicircle $=$

$\frac{1}{2} \times \pi \times d + d = \frac{1}{2} \times \pi \times 6 + 6 = 3\pi + 6\,\text{m}$

not $6\pi + 6\,\text{cm}$

Exercise 7.2

1 **a** Area $=$ base $\times$ height

$= 6 \times 4$

$= 24\,\text{cm}^2$

b Area $= \frac{1}{2} \times$ base $\times$ height

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

$= 12\,\text{cm}^2$

c Area $= \frac{1}{2} \times \pi \times \text{radius}^2$

$= \frac{1}{2} \times \pi \times 3^2$

$= 14.14\,\text{cm}^2$

2 **a** Area $=$ rectangle $+$ triangle

$= 24 + 12$

$= 36\,\text{cm}^2$

b Area $=$ rectangle $+$ semicircle

$= 24 + 14.14$

$= 38.14\,\text{cm}^2$

c Area = semicircle + triangle
$= 14.14 + 12$
$= 26.14\,\text{cm}^2$

3 **a** Area A $= l \times w = 8 \times 10 = 80$
Area B $= l \times w = 12 \times 1 = 12$
Total area $= 80 + 12 = 92\,\text{cm}^2$

b Area A $= l \times w = 6 \times 6 = 36$
Area B $= \frac{1}{2} \times b \times h = \frac{1}{2} \times 6 \times 4 = 12$
Total area $= 36 + 12 = 48\,\text{mm}^2$

c Area A $= l \times w = 10 \times 3 = 30$
Area B $= \frac{1}{2}\pi r^2 = \frac{1}{2} \times \pi \times 5^2 = 39.27$
Total area $= 30 + 39.27 = 69.27\,\text{cm}^2$

d Area triangle $= \frac{1}{2} \times b \times h = \frac{1}{2} \times 2 \times 6 = 6$
Area circle $= \pi r^2 = \pi \times 4^2 = 50.26$
Shaded area $= 50.26 - 6 = 44.26\,\text{cm}^2$

4 **a** 5 cm and 3 cm

b Area A = base × height
$= 3 \times 7$
$= 21\,\text{cm}^2$

Area B = base × height
$= 5 \times 3$
$= 15\,\text{cm}^2$

Total area = Area A + Area B
$= 21 + 15 = 36\,\text{cm}^2$

5 **a** **i** 7 cm **ii** $135\,\text{cm}^2$
b **i** 3 cm, 6 cm **ii** $90\,\text{cm}^2$

6 **a** $104\,\text{cm}^2$ **b** $152.55\,\text{cm}^2$

7 **a** **i** Estimate $= 42\,\text{cm}^2$
ii $A = 39.44\,\text{cm}^2$
b **i** Estimate $= 49.5\,\text{m}^2$
ii $A = 47.7\,\text{m}^2$
c **i** Estimate $= 108\,\text{cm}^2$
ii $A = 120.7\,\text{cm}^2$
d **i** Estimate $= 3600\,\text{mm}^2$
ii $A = 4156.3\,\text{mm}^2$

8 Seb's method is incorrect. Learner's own explanation and working. For example: When he works out the area of the circle he doesn't use the correct radius. He actually uses the diameter of 11 cm rather than the radius of 5.5 cm. The answer should be:

Area of rectangle $= 10 \times 11 = 110$

The two semicircles make one circle, so:

Area of circle $= \pi r^2 = \pi \times 5.5^2 = 95.033\ldots$

Total area $= 110 + 95.033\ldots = 205\,\text{cm}^2$ (3 s.f.)

9 Chatri is not correct as the area of this compound shape is $83\,\text{cm}^2$ not $82\,\text{cm}^2$ (2 s.f.)

Area of large semicircle
$= \frac{1}{2}\pi r^2 = \frac{1}{2} \times \pi \times 4.6^2 = 33.24$
Area of small semicircle
$= \frac{1}{2}\pi r^2 = \frac{1}{2} \times \pi \times 3.4^2 = 18.16$
Area of triangle $= \frac{1}{2}bh = \frac{1}{2} \times 6.8 \times 9.2 = 31.28$
Total area $= 33.24 + 18.16 + 31.28 = 82.68$
$= 83\,\text{cm}^2$ (2 s.f.)

10 **a** $60\,\text{m}^2$
b $54.54\,\text{cm}^2$
c $59.69\,\text{m}^2$

11 $338\,\text{cm}^2$

12 Learner's own answers and explanations. For example: Arun is incorrect. The shaded area in Shape A is less than, not greater than, the shaded area in Shape B.

Shape A, shaded area $= 8^2 - \pi \times 4^2 = 13.73\,\text{cm}^2$

Shape B, shaded area $= \pi \times 4^2 - 5.66^2 = 18.23\,\text{cm}^2$

13 **a** When radius = 2 cm,
height of rectangle = 4 cm and
length of rectangle $= 3 \times 4 = 12$ cm.
Shaded area $= 4 \times 12 - \pi \times 2^2 = 48 - 4\pi$
$= 4(12 - \pi)\,\text{cm}^2$.

b **i** $12 - \pi\,\text{cm}^2$
ii $9(12 - \pi)\,\text{cm}^2$
iii $25(12 - \pi)\,\text{cm}^2$
iv $100(12 - \pi)\,\text{cm}^2$

c Learner's own answer and explanation. For example: The number outside the bracket is the radius squared, and inside the bracket is always $(12 - \pi)$.

d $r^2(12 - \pi)\,\text{cm}^2$

14 **a** 400 m **b** $10\,465\,\text{m}^2$
c 46.56 m **d** 461 m
e $14\,669\,\text{m}^2$ **f** $4204\,\text{m}^2$

15 8.8 cm

Exercise 7.3

1 a 1 hectometre = 100 metres

b 1 kilogram = 1000 grams

c 1 megatonne = 1 000 000 tonnes

d 1 gigalitre = 1 000 000 000 litres

2 a 1 centimetre = 0.01 metres OR 1 metre = 100 centimetres

b 1 milligram = 0.001 grams OR 1 gram = 1000 milligrams

c 1 microlitre = 0.000 001 litres OR 1 litre = 1 000 000 microlitres

d 1 nanometre = 0.000 000 001 metres OR 1 metre = 1 000 000 000 nanometres

3 a 3 nanolitres, 3 millilitres, 3 centilitres, 3 litres, 3 teralitres

b 3 nL, 3 mL, 3 cL, 3 L, 3 TL

4 a 9 micrograms, 9 milligrams, 9 grams, 9 kilograms, 9 gigagrams

b 9 µg, 9 mg, 9 g, 9 kg, 9 Gg

5 a A millimetre is a very small measure of length. It is represented by the letters mm.

1 millimetre = 0.001 metres which is the same as $1\,\text{mm} = 1 \times 10^{-3}\,\text{m}$.

You can also say that there are one thousand millimetres in a metre or that 1 millimetre is one thousandth of a metre.

b A microgram is a very small measure of mass. It is represented by the letters µg.

1 microgram = 0.000 001 grams which is the same as $1\,\mu\text{g} = 1 \times 10^{-6}\,\text{g}$.

You can also say that there are one million micrograms in a gram or that 1 microgram is one millionth of a gram.

6 a A kilometre is a very large measure of length. It is represented by the letters km.

1 kilometre = 1000 metres which is the same as $1\,\text{km} = 1 \times 10^3$ metres.

You can also say that there are one thousand metres in a kilometre or that 1 metre is one thousandth of a kilometre.

b A megatonne is a very large measure of mass. It is represented by the letters Mt.

1 megatonne = 1 000 000 tonnes which is the same as $1\,\text{Mt} = 1 \times 10^6$ t.

You can also say that there are one million tonnes in a megatonne or that 1 tonne is one millionth of a megatonne.

7 a 1 km = 1000 m, so 17.2 km = 17.2 × 1000 = 17 200 m

b 1 hL = 100 L, so 0.9 hL = 0.9 × 100 = 90 L

c 1 Gg = 1 000 000 000 g, so 1.5 Gg = 1.5 × 1 000 000 000 = 1 500 000 000 g

8 a 100 cm = 1 m, so 760 cm = 760 ÷ 100 = 7.6 m

b 1000 mL = 1 L, so 43 000 mL = 43 000 ÷ 1000 = 43L

c 1 000 000 µg = 1 g, so 900 000 µg = 900 000 ÷ 1 000 000 = 0.9 g

9

From the Sun to:	Distance in …
Venus	47.9 Mm
Earth	108 Mm
Jupiter	0.228 Gm
Uranus	1.4 Gm
Neptune	2.9 Gm

10 **A** and **iii**, **B** and **v**, **C** and **i**, **D** and **ii**, **E** and **iv**

11 a Marcus is incorrect. 1 MW = 1000 kW not 100 kW.

1 MW = 1 000 000 W and 1 kW = 1000 W, 1 000 000 ÷ 1000 = 1000, so 1 MW = 1000 kW

b 630 MW = 630 000 kW = 630 000 000 W

12

Name of star	Distance in ly	Distance in m
Wolf 359	7.78	7.36×10^{16}
Ross 154	9.68	9.16×10^{16}
YZ Ceti	12.13	1.15×10^{17}
Gliese 832	16.08	1.52×10^{17}

13 a 12 KB, 936 KB, 42.5 MB, 1.14 GB, 6.3 TB

b i 1 GB can store 178 photos, 16 GB can store 16 × 178 = 2848 photos.

ii 28 288 photos

iii 238 photos. Working: 1.8 MB can store 476 photos. 1.8 MB × 2 = 3.6 MB, so double the file size means half as many photos. So, 1 GB can store 476 ÷ 2 = 238 photos.

iv Learner's own working and answer. For example:

32 GB = 32 000 MB and 32 000 MB ÷ 13 000 photos = 2.46… MB per photo.

Suggest Sue uses a 2.4 MB file size for each photo as this will keep her just below the 32 GB limit.

14 140 kg

Exercise 8.1

1 **a** $\frac{1}{8} = 0.125$ which is a terminating decimal.

$\frac{2}{8} = 2 \times \frac{1}{8} = 2 \times 0.125 = 0.25$ which is a terminating decimal.

$\frac{3}{8} = 3 \times \frac{1}{8} = 3 \times 0.125 = 0.375$ which is a terminating decimal.

$\frac{5}{8} = 5 \times \frac{1}{8} = 5 \times 0.125 = 0.625$ which is a terminating decimal.

b $\frac{1}{20} = 0.05$ which is a terminating decimal.

$\frac{3}{20} = 3 \times \frac{1}{20} = 3 \times 0.05 = 0.15$ which is a terminating decimal.

$\frac{5}{20} = 5 \times \frac{1}{20} = 5 \times 0.05 = 0.25$ which is a terminating decimal.

$\frac{9}{20} = 9 \times \frac{1}{20} = 9 \times 0.05 = 0.45$ which is a terminating decimal.

2 **a** $0.1\dot{6}$

b recurring decimal

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

ii $\frac{3}{6} = 0.5$ terminating decimal

iii $\frac{4}{6} = 0.\dot{6}$ recurring decimal

iv $\frac{5}{6} = 0.8\dot{3}$ recurring decimal

3 **a** 0.04

b terminating decimal

c **i** $\frac{2}{25} = 0.08$ terminating decimal

ii $\frac{5}{25} = 0.2$ terminating decimal

iii $\frac{11}{25} = 0.44$ terminating decimal

iv $\frac{20}{25} = 0.8$ terminating decimal

d Learner's own answers.

4 **a** Terminating decimals. Learner's own explanations. For example: All the denominators will divide exactly into 10, 100, 1000 or 10 000.

b Yes. Learner's own explanations. For example: When a unit fraction is a terminating decimal then any multiple of a terminating decimal is also a terminating decimal.

c Yes. Learner's own explanations. For example: When a unit fraction is a terminating decimal then any multiple of a terminating decimal is also a terminating decimal.

5 **a** Sometimes true. Learner's own

explanations. For example: Apart from $\frac{7}{14} = \frac{1}{2} = 0.5$.

b Sometimes true. Learner's own explanations. For example: $\frac{1}{5}, \frac{1}{10}, \frac{1}{20}$ are terminating, but $\frac{1}{15}, \frac{1}{35}, \frac{1}{45}$ are recurring.

c Never true. Learner's explanations. For example: A denominator which is a multiple of 15 is also a multiple of 3, which is a recurring, not terminating, decimal.

d Always true. Learner's own explanations. For example: Even if the fraction can be simplified, the denominator will be a multiple of 3, so will be recurring.

6 **a** Recurring decimals. Learner's own explanations. For example: When they are all written in their simplest form, the denominators are multiples of 3, so recurring.

b **B** and **D** can be simplified. Learner's own explanations. For example: They can both be simplified to $\frac{1}{6}$. It doesn't change the answer to part **a**, because the denominators are still multiples of 3, so recurring.

c Any fraction which has a denominator which is a multiple of 9, <u>when it is written in its simplest form</u>, is a recurring decimal.

7 **a** $\frac{1}{4}$ terminating **b** $\frac{4}{5}$ terminating

c $\frac{8}{15}$ recurring **d** $\frac{1}{5}$ terminating e $\frac{1}{6}$ recurring f $\frac{7}{10}$ terminating

8 a recurring b terminating

c recurring d terminating

9 a, b

Number of days off work due to illness					
Abi	$\frac{8}{30}=\frac{4}{15}$	Bim	$\frac{5}{30}=\frac{1}{6}$	Caz	$\frac{3}{30}=\frac{1}{10}$
Dave	$\frac{6}{30}=\frac{1}{5}$	Enid	$\frac{2}{30}=\frac{1}{15}$	Fin	$\frac{9}{30}=\frac{3}{10}$

Learner's own decisions on how to group the students.

For example: **A** and **F** are not unit fractions; **B**, **C**, **D** and **E** are unit fractions.

OR

A, **B** and **E** are recurring decimals; **C**, **D** and **F** are terminating decimals.

10 a For example:

i $\frac{1}{6}+\frac{2}{3}=\frac{5}{6}$ ii $\frac{3}{5}+\frac{2}{9}=\frac{37}{45}$

iii $\frac{1}{6}+\frac{1}{3}=\frac{1}{2}$ iv $\frac{2}{5}+\frac{1}{4}=\frac{13}{20}$

b i $\frac{5}{18}+\frac{2}{3}=\frac{17}{18}$ ii $\frac{3}{5}+\frac{2}{9}=\frac{37}{45}$

iii $\frac{1}{6}+\frac{1}{3}=\frac{1}{2}$ iv $\frac{2}{5}+\frac{1}{4}=\frac{13}{20}$

c No. Learner's own examples. For example: $\frac{1}{2}+\frac{1}{4}=\frac{3}{4}$ (terminating), $\frac{2}{5}+\frac{3}{8}=\frac{31}{40}$ (terminating), $\frac{3}{10}+\frac{4}{25}=\frac{23}{50}$ (terminating).

Exercise 8.2

1 a $2\frac{1}{8}+\left(1\frac{1}{2}-\frac{1}{4}\right)$ Brackets: $1\frac{1}{2}-\frac{1}{4}=1\frac{2}{4}-\frac{1}{4}=1\frac{1}{4}$

Addition: $2\frac{1}{8}+1\frac{1}{4}=2\frac{1}{8}+1\frac{2}{8}=3\frac{3}{8}$

b $3+\frac{2}{3}\times\frac{4}{5}$ Multiplication: $\frac{2}{3}\times\frac{4}{5}=\frac{2\times4}{3\times5}=\frac{8}{15}$

Addition: $3+\frac{8}{15}=3\frac{8}{15}$

c $2^2\div\frac{3}{5}-1\frac{5}{6}$ Indices: $2^2=4$

Division: $4\div\frac{3}{5}=4\times\frac{5}{3}=\frac{20}{3}$

Subtraction: $\frac{20}{3}-1\frac{5}{6}=\frac{40}{6}-\frac{11}{6}=\frac{29}{6}=4\frac{5}{6}$

2 a $4\frac{3}{4}$ b $2\frac{2}{5}$

c $2\frac{3}{4}$ d 5

3 **A** and **ii**, **B** and **iii**, **C** and **i**

4 a–d i Learner's own estimates.

a ii $6\frac{1}{4}$ b ii $11\frac{7}{18}$

c ii $40\frac{5}{8}$ d ii $15\frac{13}{14}$

5 a $25\frac{49}{50}-\left(4\frac{2}{5}+12\frac{7}{25}\right)$ or equivalent.

b Learner's own answer and explanation. For example: He cannot be correct because if you round both sides up and add them to 6 you get $6+5+13=24$. This is nearly 2 m less than the perimeter, so the third side must be at least 2 m more than 6 m.

c $9\frac{3}{10}$ m. Learner's own answer and explanation.

6 $56\frac{7}{10}$ kg

7 Division: $\frac{2}{3}\div\frac{3}{7}=\frac{2}{3}\times\frac{7}{3}=\frac{14}{9}$

Multiplication: $6\frac{1}{2}\times7=\frac{13}{2}\times7=\frac{91}{2}$

Addition: $\frac{14}{9}+\frac{91}{2}=\frac{28}{18}+\frac{819}{18}=47\frac{1}{18}$

8 $16\frac{29}{36}\text{ m}^2$

9 a $15\frac{3}{4}$ b $35\frac{7}{16}$ c $910\frac{4}{5}$

10 a $\left(1\frac{5}{6}\right)^2+1\frac{5}{6}\times3\frac{1}{3}$ or equivalent.

b $9\frac{17}{36}\text{ m}^2$

11 a $8\frac{5}{9}\text{ cm}^2$ b 12 cm

Exercise 8.3

1 a $\frac{2}{3}\times12=\frac{2}{3}\times3\times4=2\times4=8$

b $\frac{3}{5}\times20=\frac{3}{5}\times5\times4=3\times4=12$

c $\frac{5}{6}\times18=\frac{5}{6}\times6\times3=5\times3=15$

d $\frac{4}{9}\times27=\frac{4}{9}\times9\times3=4\times3=12$

e $\frac{3}{4}\times32=\frac{3}{4}\times4\times8=3\times8=24$

f $\frac{5}{8}\times48=\frac{5}{8}\times8\times6=5\times6=30$

g $\frac{4}{7}\times35=\frac{4}{7}\times7\times5=4\times5=20$

2 a 6 b 18 c 28

3 a $\frac{1}{8}\times20=\frac{1}{4\times2}\times4\times5=\frac{1\times5}{2}=\frac{5}{2}=2\frac{1}{2}$