All questions and sample answers in this material were written by the authors. In examinations, the way marks are awarded may be different. These worksheets have not been through the Cambridge Assessment International Education endorsement process.

1 Number and language

Exercises 1.1–1.8

1 83, 89, 97

2 a 1, 2, 3, 4, 6, 8, 12, 16, 24, 48

b 1, 2, 4, 5, 10, 20, 40, 50, 100, 200

3 a 52

b 24×3

4 a 17

b 36

5 a 48

b 48

6 a $\frac{5}{4}$

b $\frac{2}{5}$

Exercises 1.9–1.12

1 a Rational

b Rational

c Irrational

d Rational

e Rational

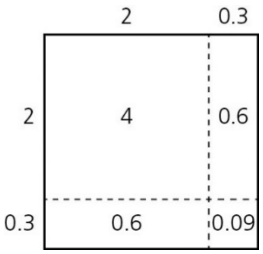
f Irrational

g Rational

2 a Examples may vary, but could include a square, rectangle and triangle. Other 2D shapes are possible.

3 a Student's shapes are likely to include a circle/semicircle.

4



Area = 5.29 units^2

Exercises 1.13–1.18

a 11

b 15

c 6

d −10

Exercise 1.19

1 a 880 m

b 970 m

2 2300 m

2 Accuracy

Exercises 2.1–2.3

1 a 50

b 1300

c 525 000

2 a 5.0

b 18.0

c 0.00

3 a 20

b 0.043

c 3.05

Exercise 2.4

1 a ≈ 100 000

b ≈ 400

c ≈ 10

d ≈ 3

2 ≈ 119 cm^2

3 Estimated area = 35 cm^2. Note: Student's answer may differ from this estimate.

Exercise 2.5

1 a LB = 14.5 UB = 15.5

b LB = 12.75 UB = 12.85

c LB = 99.95 UB = 100.05

d LB = 0.745 UB = 0.755

e LB = 2.245 UB = 2.255

2 a LB = 14.5 UB = 15.5

b LB = 12 UB = 12.2

c LB = 104.8 UB = 105

d LB = 0.745 UB = 0.755

e LB = 0.2 UB = 0.4

3 $35 \leqslant 2a < 37$

4 Side of 3.7 km: LB = 3.65; UB = 3.75

Side of 5.2 km: LB = 5.15; UB = 5.25

5 a UB = 1500 litres LB = 500 litres

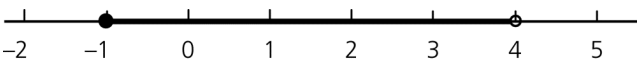
b UB = 1050 litres LB = 950 litres

c UB = 1005 litres LB = 995 litres

3 Calculations and order

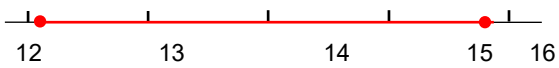
Exercises 3.1–3.4

1



2 a $12.1 \leq t \leq 15.8$

b



3 0.055, 0.5, 0.505, 0.550, 5.005, 5.500

4 $\frac{3}{5}$ $\frac{3}{8}$ $\frac{7}{20}$ $\frac{4}{15}$ $\frac{1}{4}$

5 205 mm, 21 cm, 2010 mm, 2.09 m, 2.4 m

Exercises 3.5–3.8

1 a 234

b 9

c –3

2 a no brackets needed

b $15 \div (3 + 2 \div 2) = 3.75$

c $15 \div (3 + 2) \div 2 = 1.5$

3 a 1

b $-\frac{3}{2}$

c 2

4 Integers, fractions, decimals and percentage,

Exercises 4.1–4.7

1 a 12

b 64

c 45.5

2 a $\frac{33}{5}$

b $\frac{53}{17}$

3 a $4\frac{2}{9}$

b $15\frac{2}{5}$

4 a 3.45

b 7.76

c 0.3125

5 a $\frac{3}{4}$; 75%

b 0.45; 45%

c $\frac{13}{200}$; 0.065

d $3\frac{2}{25}$; 308%

e $0.\dot{6}$; $66.\dot{6}\%$

Exercise 4.8

1 a 380.75

b 961.54

Exercises 4.9–4.13

1 a $\frac{6}{15}$ $\frac{2}{5}$ $\frac{16}{40}$ $\frac{5}{15}$ $\frac{4}{12}$ $\frac{9}{27}$ $\frac{3}{8}$ $\frac{27}{72}$ $\frac{9}{24}$ $\frac{12}{32}$

b Student's own fractions equivalent to each of the three groups above.

2 a $1\frac{17}{30}$

b $\frac{23}{72}$

3 a $\frac{22}{25}$

b $-2\frac{1}{30}$

4 a $3.\dot{4}$

b 5.375

5 Further percentages

Exercises 5.1–5.3

1 a 25%

b 60%

c 37.5%

d 87.5%

2 a 50

b 150

c 48

d $390

e $120

f 35

3 a 95%

b 5%

4 a i $\frac{4}{5}$

ii 80%

b i $\frac{3}{5}$

ii 60%

c i $\frac{2}{3}$

ii $66.\dot{6}\%$

5 Ahmet = 30%, Jo = 45%, Anna = 25%

6 77.7% (1 d.p.)

7 a $4.32

b 56.8%

Exercise 5.4

1 a 225

b 150

c 875

2 a 135

b 105

c 5

3 a $38

b 262

4 $428 640

5 670 625

6 Ratio and proportion

Exercise 6.1

1 50

2 240

Exercises 6.2–6.5

1 a $\frac{5}{9}$

b 1 kg

2 a 3 : 2

b $\frac{2}{5}$

c 18

3 2.5 kg

4 384 g

5 $30°$

6 64 cm and 36 cm

7 a $21\frac{1}{4}$ litres of petrol; $3\frac{3}{4}$ litres of oil

b $1416\frac{2}{3}$ ml

8 $750, $850, $900

9 $48°$, $192°$

10 $480

11

Speed (km/h)	60	30	22.5	120	90	240
Time (h)	1.5	3	4	0.75	1	0.375

12 25

13 a i $22\frac{1}{2}$ hours

ii 18 hours

b i 6 people
ii 2 people

14 4 hours

15 54 hours quicker

Exercise 6.6

1 a 100 g/cm^3

b 1562.5g

2 12.66 million

3 71.4 million km^2

7 Indices and standard form

Exercises 7.1–7.4

1 a $2^3 \times 3^2 \times 4^3$

b $2^4 \times 4^5 \times 5^2$

c $3^2 \times 4^3 \times 5^3$

d $2 \times 7^4 \times 11^2$

2 a 196

b 3 359 232

c 25 088

d 8 870 472

3 a $11^7 \times 6^{12}$

b $5^{11} \times 6^{11}$

c 12^4

d 13^3

4 a 9^4

b 17^{10}

c 2^8

d 8^6

5 a 9^2

b 7

c 16^{-1}

d 3^{-2}

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

b 0.7

c 0.03

d 1

7 a 4

b 2

c 4

d 0.1

Exercises 7.5–7.8

1 a 3.7×10^7

b 4.63×10^8

2 8.64×10^3

3 a 6.75×10^3 km

b 4.2×10^4km

4 a 4.5×10^{-5}

b 3.67×10^{-10}

5 a –5

b 5

8 Money and finance

Exercise 8.1

1 a €57.69

b €6.17

c NZ $93.75

Exercises 8.2–8.3

1 a $103.50

b $84.87

2 a Option 1: $1275 extra
Option 2: $4180

b For example, the customer may not be able to afford the initial deposit.

3 142%

4 5%

Exercises 8.4–8.7

1 1%

2 7 years

Exercises 8.8–8.10

1 $162 067.50

2 $66 550

3 $314.93

4 14.9%

5 20.6%

6 a $1.2^5 \neq 2$

b 4 years

Exercise 8.11

1 a 75%

b 25% / year

2 87.5%

3 16% / year

9 Time

Exercises 9.1–9.2

1 a 13 20

b 09 35

c 20 53

2 14 52

3 05 51

4 a 126 hours 40 minutes

b Monday

c 23 10

5

Departure	05 40	**08 15**	**14 50**	22 55
Arrival	**12 00**	14 35	21 10	**05 15**

6 5 05 am Wednesday

7 a 0 hrs, 21 mins and 36 seconds

b 4 hrs, 7 mins and 30 seconds

c 0 hrs, 2 mins and 24 seconds

10 Set notation and Venn diagrams

Exercise 10.1

1 a Capital cities

b Student's two capital cities

2 a Currencies

b Student's two currencies

3 Student's two European football teams

4 a Composers

b Student's two composers

Exercises 10.2–10.3

1 a Multiples of 2 up to 20

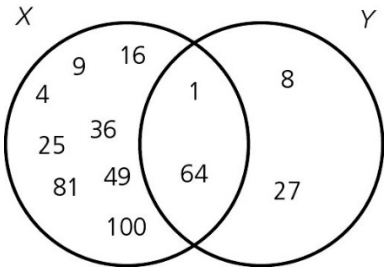
b Multiples of 3 up to 20

c i True

ii False

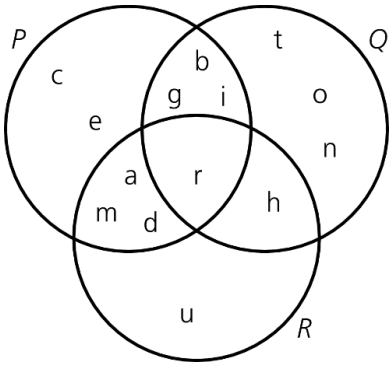
2 a $X = \{1, 4, 9, 16, 25, 36, 49, 64, 81, 100\}$
$Y = \{1, 8, 27, 64\}$

b



c $X \cap Y = \{1, 64\}$

3 a



b i {b, r, i, g, h, t, o, n, d, u, a, m}

ii {r}

Exercise 10.4

a i 6

ii 9

iii 5

b i 6

ii 27

11 Algebraic representation and manipulation

Exercises 11.1–11.4

1 a $-5x - 20$

b $-3y + 6$

c $8ab + 16a$

d $12c - 48$

2 a $-6a^3 + 9a^2b$

b 48

c $15a + 5$

3 a $10x + 14$

b $7x + 6y$

c $6x - 23y$

4 a $p - 21$

b $6q + 6r + 29qr$

c $-4xy + 6xz - 4yz + 4y^2$

d $3a + 8ab$

e $p - pq$

Exercise 11.5

a $a^2 + 12a + 32$

b $c^2 - 18c + 81$

c $jk - jm + k^2 - km$

d $6n^2 - 7n - 20$

e $12p^2 - 11p + 2$

f $b^2 - 9$

Exercise 11.6

a $3(a + 2b)$

b $-14(c + 2d)$

c $21x(2x - y^2)$

d $m(m^2 - mn - n^2)$

e Cannot be factorised

Exercises 11.7–11.8

a 0

b 20

c –12

d 24

e –124

Exercise 11.9

a $c = d - ab$

b $b = \frac{d + c}{a}$

c $m = 8(2r - 3)$

d $q = r(p - s)$

e $q = \frac{p}{r + s}$

12 Algebraic indices

Exercises 12.1–12.2

1 a $a^8 \times b^9 \times c^2$

b $p^7 \times q^9 \times r$

c m

d $a^5 \times b^5 \times e$

2 a a^2c^8

b m^2

c b

d $24b^9$

e 1

Exercise 12.3

1 a a^3

b p^{-6}

c 1

2 a p^{-5}

b t^{-12}

c $4r^{-2}$

13 Equations

Exercises 13.1–13.2

1 a $a = 12$

b $b = -3$

2 $c = -11$

3 a $d = 14$

b $e = 18$

c $f = 10$

d $g = 5$

e $h = 4$

4 a $j = 1$

b $k = 5$

Exercise 13.3

1 50°, 50°, 80°

2 40°, 80°, 60°

3 $x = 25$ cm

4 130°, 130°, 50°, 50°

5 12 cm, 36 cm

6 a 105°, 150°, 45°, 60°

b 48°, 112°

c 85°, 85°

d All 60°

e 92°, 92°, 122°

7 15°, 75°

8 220°, 90°, 100°, 20°, 110°

9 35°

Exercise 13.4

1 –7

2 –6

3 –68

4 ±15

5 a $x - 2, x + 3$

b Zach = 7 years, Leda = 5 years, Spot = 10 years

6 18°, 54°

7 160°, 140°, 60°

8 ±10

Exercise 13.5

a $a = 7$ $b = 5$

b $c = 3$ $d = 10$

c $e = 4$ $f = 7$

d $g = -5$ $h = -7$

e $p = 3$ $q = 3$

f $r = -3$ $s = -2$

g $w = 5$ $x = -5$

h $x = 1.5$ $y = 0.5$

Exercise 13.6

a $a = 3$ $b = 2$

b $c = 5$ $d = 1$

c $e = -1$ $f = -1$

d $g = 1$ $y = 0.5$

e $h = 2.5$ $j = 4$

f $k = 0.2$ $l = 4$

g $m = 4$ $n = -7$

h $p = 2$ $q = 1$

i $r = 10$ $s = 2$

j $t = 1$ $w = 0.25$

Exercise 13.7

1 24, 13

2 5, –7

3 10 and 8

4 $a = 7$ $b = 4$

5 a $x = 8$ $y = -3$

b 256 units^2

c 64 units

6 16 years and 64 years

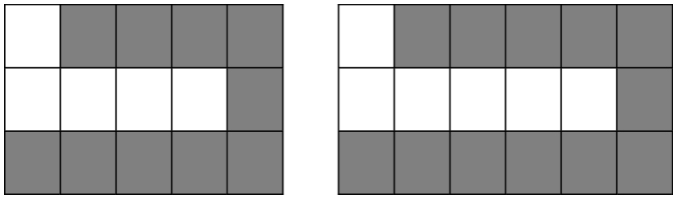
14 Sequences

Exercises 14.1–14.2

1 a 29, 32

b 26, 37

c 37, 45

2 a 

b

Number of white squares	2	3	4	5	6
Number of shaded squares	**4**	**6**	**8**	**10**	**12**

c $2n$

d 100

3 a 49, 64; square numbers

b 56, 72; the difference increases by two each time

4 a $4n + 3$

b $2n + 5$

c $n^2 + 2$

Exercises 14.3–14.4

1 a i 215, 342

ii $n^3 - 1$

b i 218, 345

ii $n^3 + 2$

2

n	1	2	3	4	5	6	7	8
n^2	**1**	**4**	**9**	**16**	**25**	**36**	**49**	**64**
n^3	**1**	**8**	**27**	**64**	**125**	**216**	**343**	**512**

3 a 21, 34

b each term is the sum of the previous two terms

4 a 28, 36

b the difference between consecutive terms is increasing by one each time.

c 1275

5 **a** **i** 34, 47

ii $n^2 - 2$

b **i** 20, 27

ii $\frac{n^2 + n}{2} - 1$

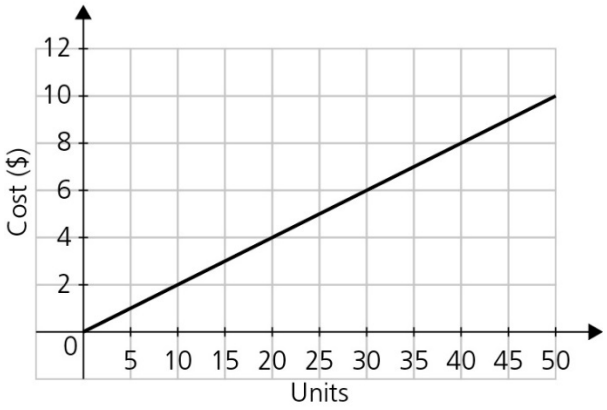
c **i** $54, 85\frac{3}{4}$

ii $\frac{1}{4}n^3$

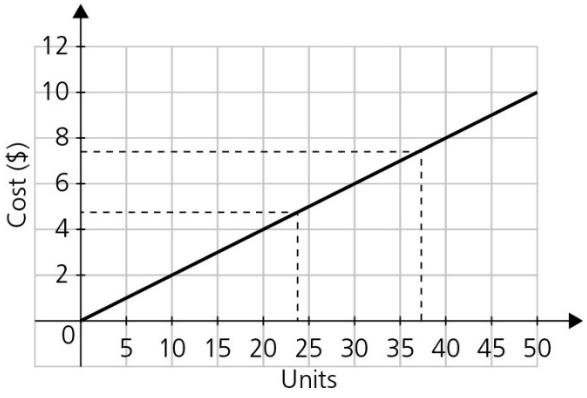
15 Graphs in practical situations

Exercise 15.1

1 **a**



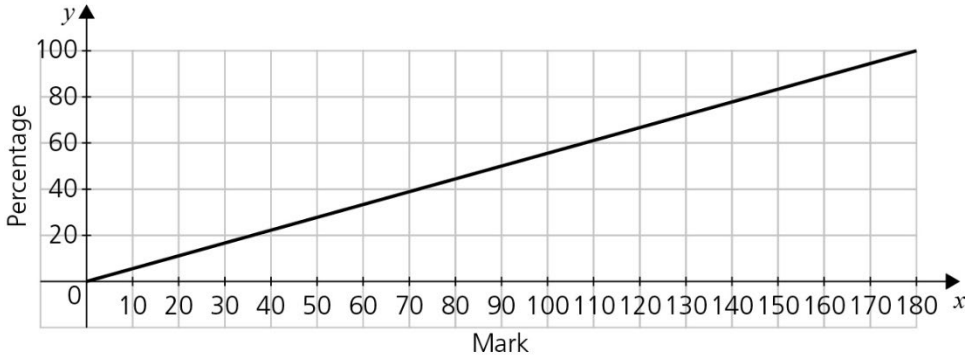
b, c The following method should be clearly seen in the student's work.



b ≈ \$4.60

c ≈ 37.5 units

2 **a**



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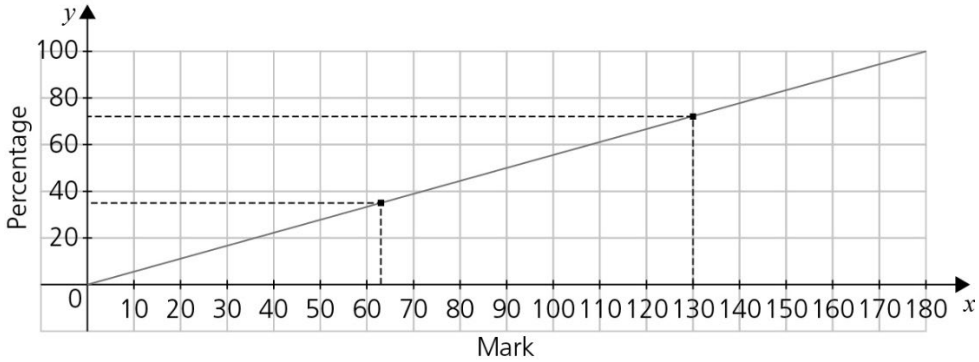


b ≈ 72%

c ≈ 63 marks

Exercise 15.2

1 a 5 m/s

b 105 km/h

2 a 800 m

b 124 200 m or 124.2 km

3 a 0.125 h or 7.5 min

b 100 s

Exercises 15.3–15.4

1 a 2 m/s

b 12.5 m/s

c The gradient of the line on a distance time graph is the speed. Person B is travelling fastest as their line is steeper.

d ≈ 175 m

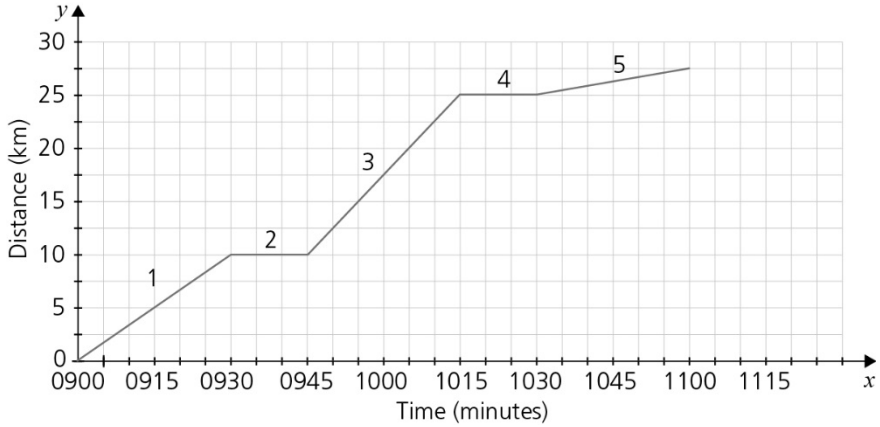
e stationary

f $8\frac{1}{3}$ m/s

2 **a** 11 00

b 10 km

c

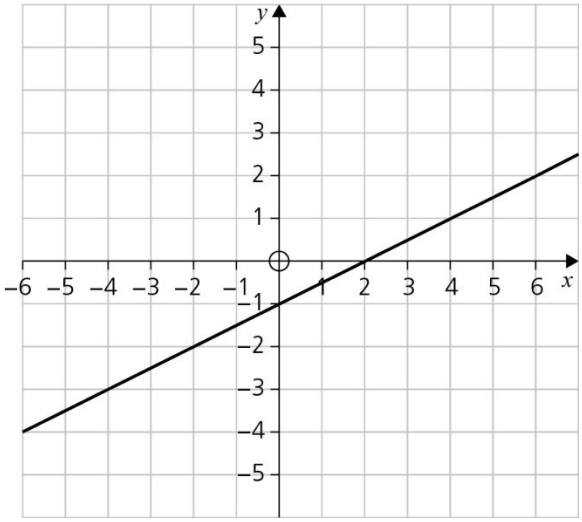


d 13.75 km/h

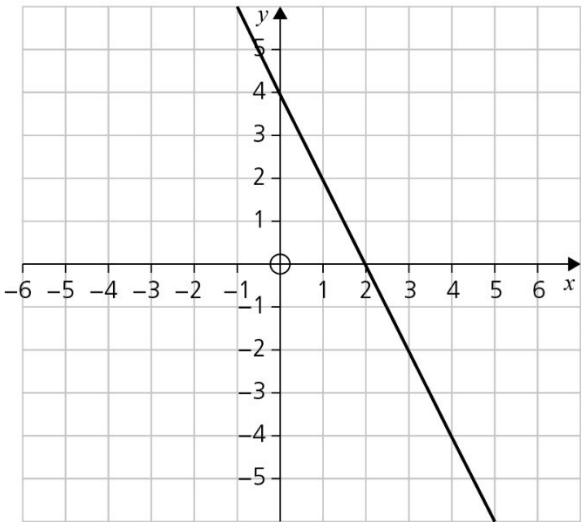
16 Graphs of functions

Exercise 16.1

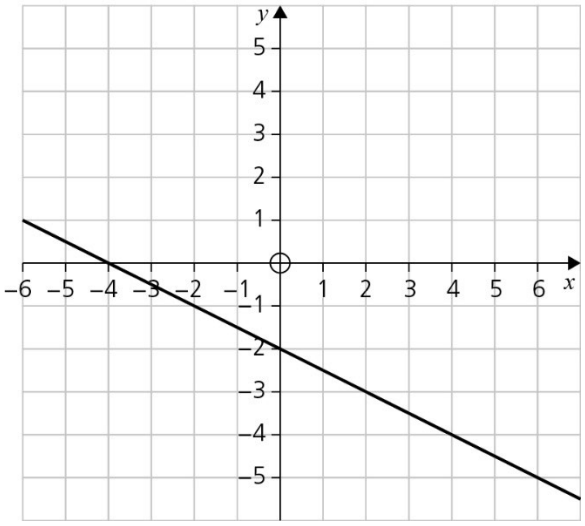
a



b

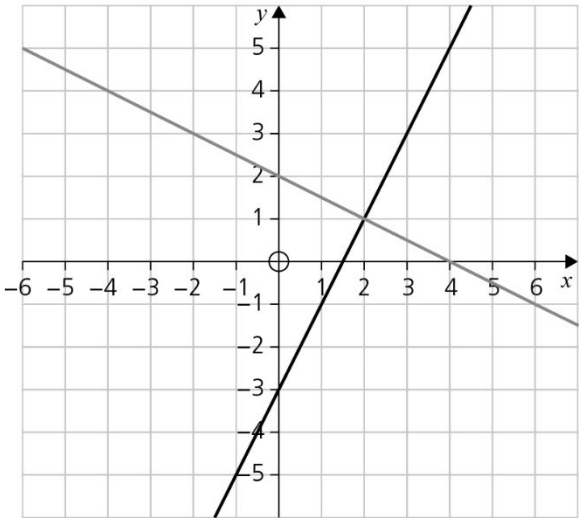


c



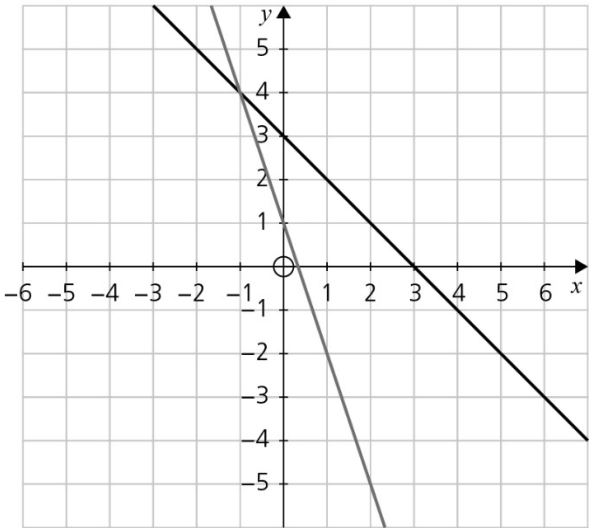
Exercise 16.2

a i



ii $x = 2$ $y = 1$

b i

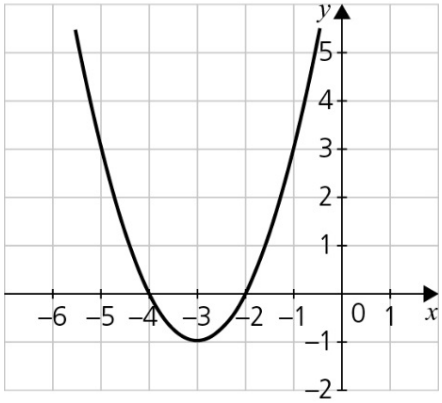


ii $x = -1$ $y = 4$

Exercise 16.3

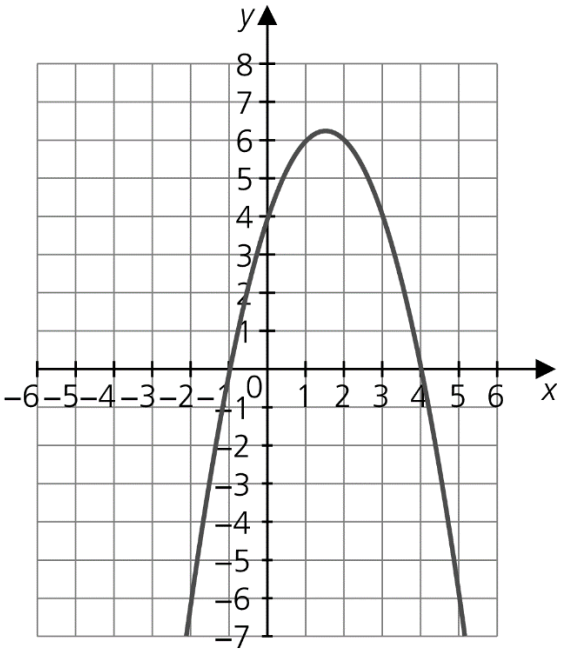
a

x	−5	−4	−3	−2	−1
y	3	0	−1	0	3



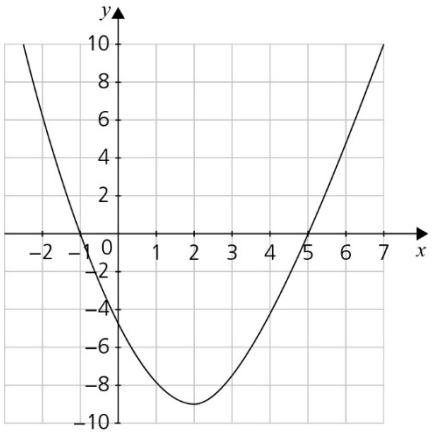
b

x	−2	−1	0	1	2	3	4	5
y	−6	0	4	6	6	4	0	−6



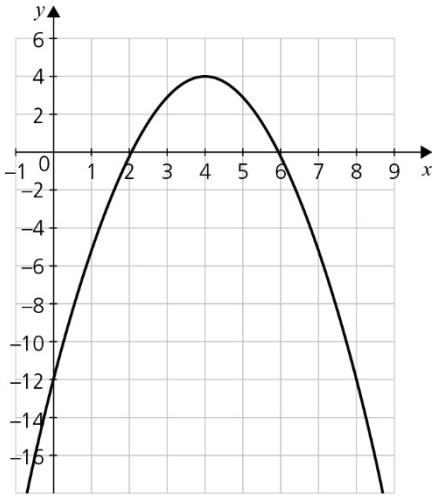
Exercise 16.4

a



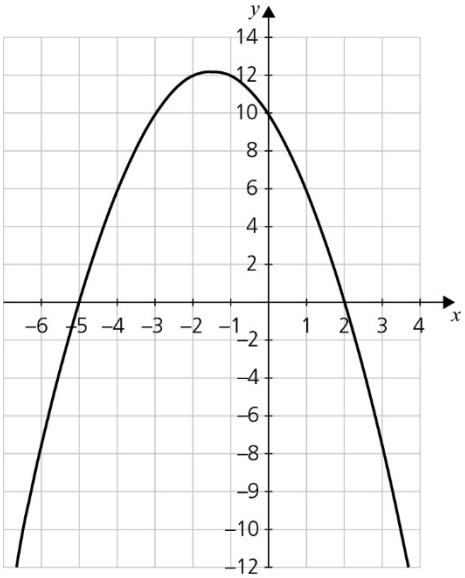
$x = -1$ and 5

b



$x = 2$ and 6

c



$x = -5$ and 2

Exercise 16.5

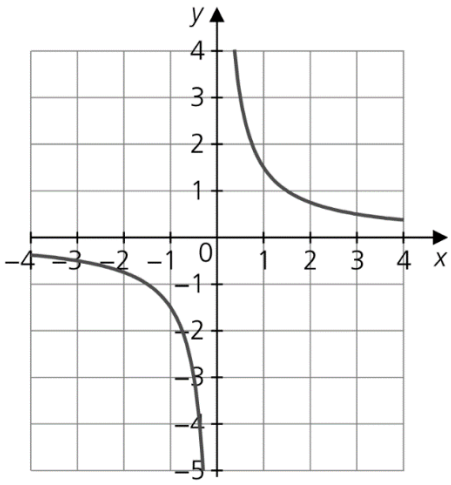
a $x \approx -2.1$ and 6.1

b $x = 0$ and 8

c $x \approx -5.5$ and 2.5

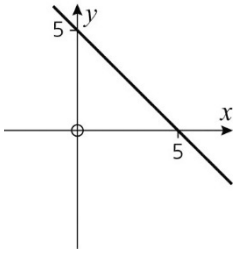
Exercise 16.6

x	−4	−3	−2	−1	0	1	2	3	4
y	-1	$-\frac{4}{3}$	-2	-4	-	4	2	$\frac{4}{3}$	1

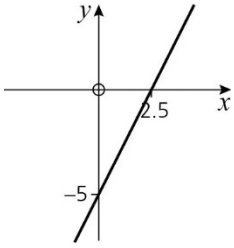


Exercise 16.7

a

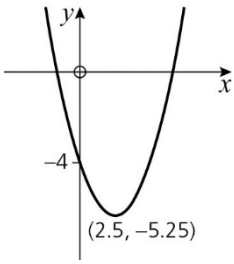


b



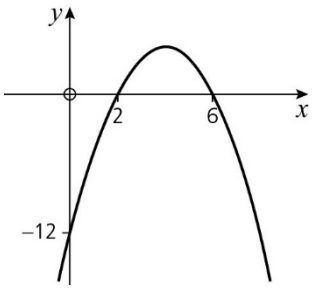
Exercise 16.8

1



2 a $y = -x^2 + 8x - 12$

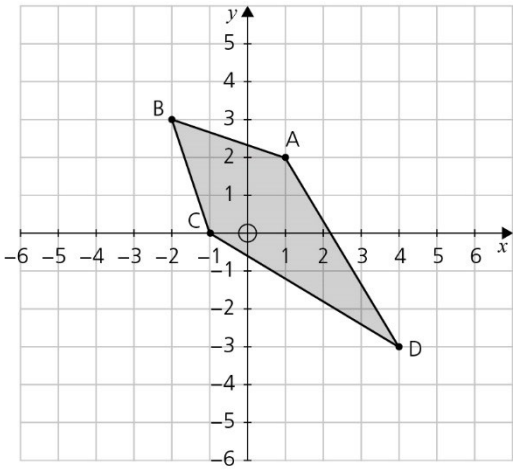
b



17 Coordinates and straight line graphs

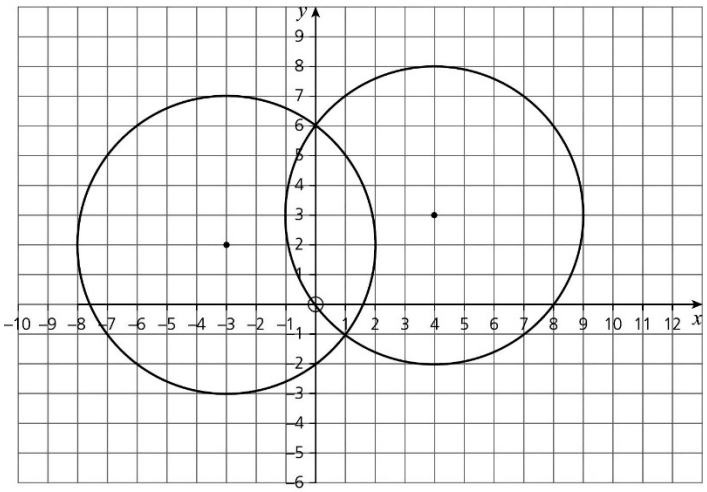
Exercises 17.1–17.3

1 a



b kite

2 a



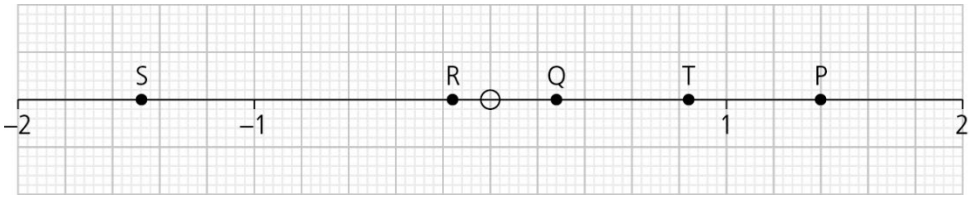
b (1, –1) and (0, 6)

Exercises 17.4–17.5

1 A = 20; B = 180; C = –40; D = –120

2 **a** P = 1.4; Q = 0.28; R = –0.16; S = –1.48

b **i**



ii T = 0.84

Exercises 17.6–17.8

1 **a** **i** gradient = 1

ii $y = x - 2$

b **i** gradient = 2

ii $y = 2x - 1$

c **i** gradient = 0

ii $y = 1$

d **i** gradient is infinite

ii $x = -3$

e **i** gradient $= -\frac{1}{2}$

ii $y = -\frac{1}{2}x + 1$

2 **a** $y = \frac{1}{3}x + 1$

b $y = \frac{1}{4}x - 1$

c $y = -2x - 3$

d $y = -\frac{1}{5}x$

e $y = \frac{2}{3}x + 1$

3 m represents the gradient of the straight line. c represents the intercept of the line with the y axis.

Exercise 17.9

a gradient = 4 y-intercept = –2

b gradient = –2 y-intercept = –6

c gradient $= -\frac{1}{2}$ y-intercept = 3

Exercises 17.10–17.11

1 i Any equation of the form $y = 4x + c$, where $c \neq 7$

ii Any equation of the form $y = 4x + c$, where $c \neq 7$; or the same as part i

2 $y = -2x + 9$

18 Geometrical vocabulary

Exercises 18.1–18.4

1 a an angle between 90° and 180°

b an angle between 180° and 360°

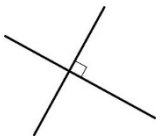
2 55°

3 a Student's diagram

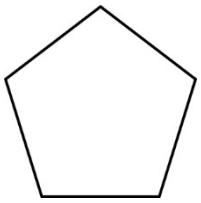
b angle PQR, angle PRQ, angle QPR (in each case the outer letters can be swapped)

4 a

b



5



Exercise 18.6–18.7

1 a The angles in both triangles are the same: 28°, 90° and 62°

b 2.5

c $x = 37.5$ cm

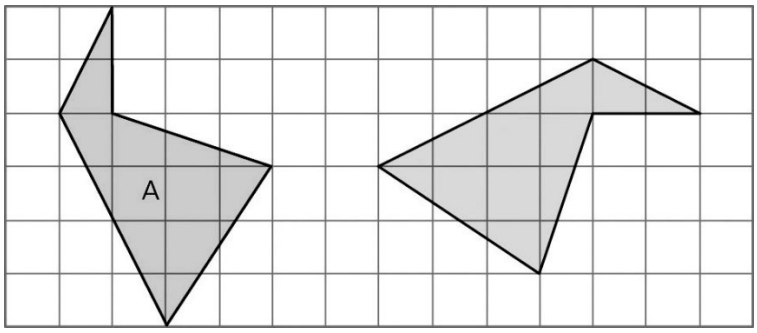
d $y = 20$ cm

2 a 9.524 cm

b 15.19 cm

3 $x = 2r$

Exercise 18.8



19 Geometrical constructions and scale drawings

Exercises 19.1–19.3

1 Angle $PQR = 137°$

Angle $QRP = 16°$

Angle $RPQ = 27°$

PQ = 32 mm

QR = 52 mm

RP = 78 mm

2 Student's construction

Exercise 19.4

1 a 2.4 km

b 40 cm

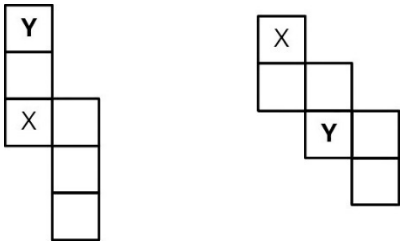
2 a 1 : 25

b 19.6 cm

Exercise 19.5

1 A and B can be folded to form a cube. Diagram C has 7 squares so is not a net of a cube.

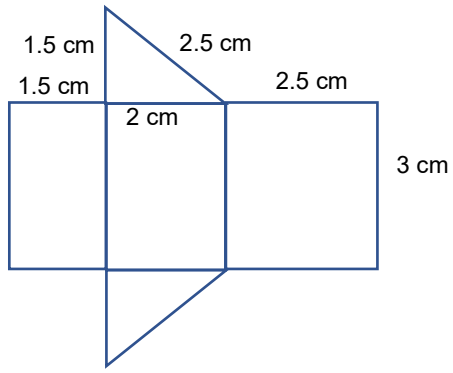
2



3 A and C

4 Student's construction.

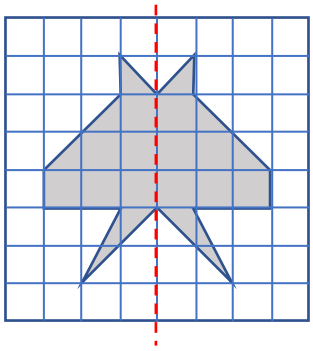
5 Different nets are possible. One option is given below.



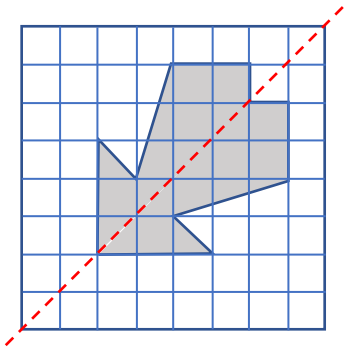
20 Symmetry

Exercises 20.1–20.2

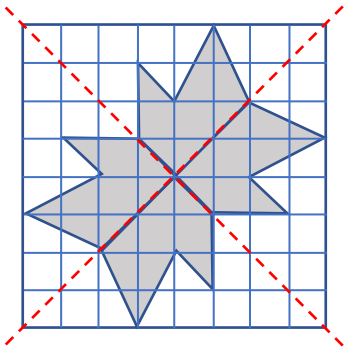
1 a



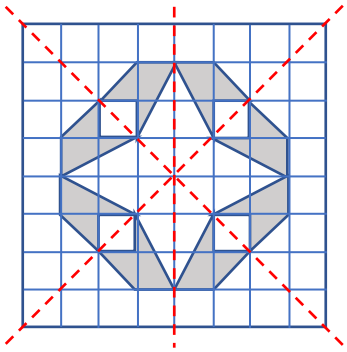
b



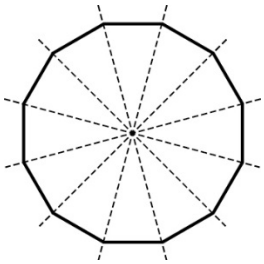
2 a



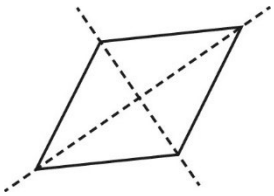
b



3 a



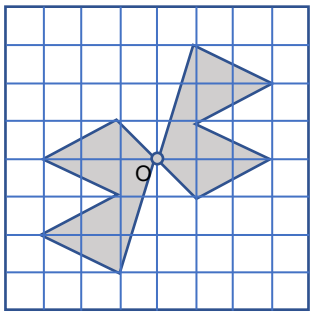
b



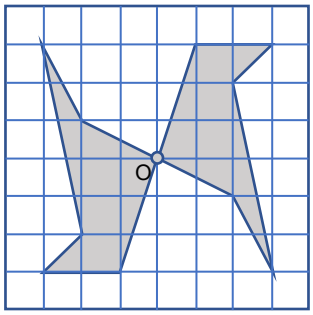
4 a order 12

b order 2

5 a



b



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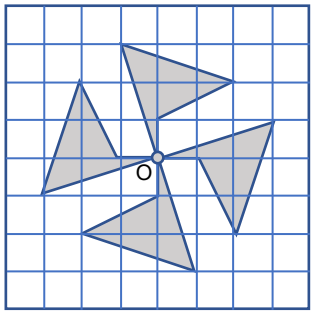

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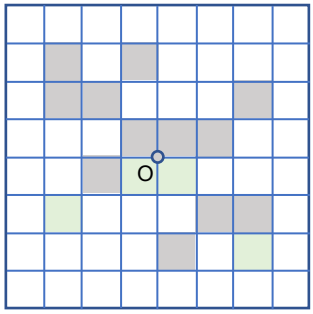

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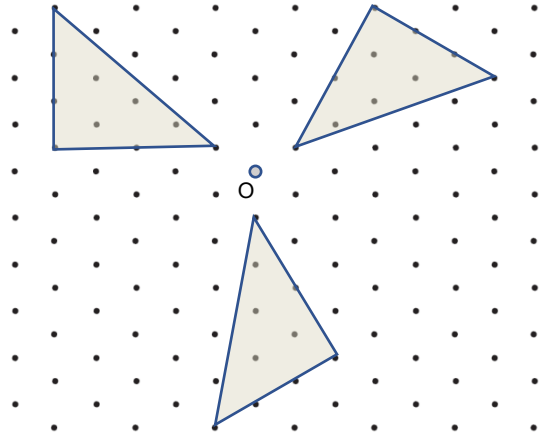


21 Angle properties

Exercise 21.1

1 a 131°

b 17°

2 16°

Exercises 21.2–21.7

1 a $a = 78°$

$b = 102°$

$c = 143°$

$d = 37°$

$e = 65°$

b **i** d & 37° or a & 78°

ii c & d or b & 78°

2 $p = 72°$

$q = 118°$

Exercise 21.8

	Rhombus	Parallelogram	Kite
Opposite sides equal in length	Yes	Yes	No
All sides equal in length	Yes	No	No
All angles right angles	No	No	No
Both pairs of opposite sides parallel	Yes	Yes	No
Diagonals equal in length	No	No	No
Diagonals intersect at right angles	Yes	No	Yes
All angles equal	No	No	No

Exercises 21.9–21.10

1 **a** 15°

b 24

2 **a** 168°

b 162°

3 10

4 **a** 540°

b 30°

c 30°, 240°, 120°, 60°, 90°

5 **a** $y = 360 - x$

b $1080 = x + \frac{7}{2}x + \frac{5}{2}x + \frac{5}{2}x + \frac{7}{2}x + 3x + 3x + 360 - x$

or $360 + 18x = 1080$

c 40°

d 320°

Exercise 21.11

$x = 110°$

Exercise 21.12

a $x = y = 45°$

b $p = 25°$; $q = 52°$; $r = 38°$

22 Measures

Exercises 22.1–22.4

1 a 72 mm

b 20.4 km

2 a 0.42 kg

b 1040 kg

3 a 0.012 litres

b 240 ml

Exercise 22.5

1 3.5 litres

2 a 3600000 cm^3

b i 3250000 mm^3

ii 0.00325 m^3

23 Perimeter, area and volume

Exercises 23.1–23.6

1 a Area = 15.75 cm^2
Perimeter = 16 cm

b Area = 1.5 cm^2
Perimeter = 6 cm

2 25.375 cm^2

3 $x = 14$ cm

Exercises 23.7–23.8

1 Circumference = 25.4 cm
Area = 51.5 cm^2

2 a 7 cm

b 22.0 cm

3 35.0 cm^2

4 1.9 cm

5 a 13 cm

b 10.6 cm^2

c 14.5 cm^2

6 5.3 cm

Exercises 23.9–23.12

1 4.2 cm

2 0.8 cm

3 a $10h + 12$

b $8\pi + 4\pi h$

c 0.15 cm (2 d.p.)

4 1426 cm^3

5 a 243π cm^3

b $270\pi x - 30\pi x^2$ or $30\pi x(9 - x)$

c 1.0 cm (1 d.p.)

Exercises 23.13–23.14

1 20°

2 $\frac{21}{\pi}$ cm

Exercises 23.15–23.16

1 a $\frac{64}{3}\pi$ cm^2

b $1: \frac{25}{16}$

2 a 40°

b $\frac{625}{9}\pi$ cm^2

c 841 cm^2

d $\frac{1250}{3}\pi$ cm^3

Exercises 23.17–23.18

1 49.2 cm

2 a 36π cm^3

b No, it does not spill over because the volume of empty space in the container before the sphere is added is 400 cm^3. 36π is less than 400.

c For example:

Volume of sphere $= \frac{4}{3}\pi r^3$

$\frac{4}{3}\pi r^3 = 10 \times 10 \times h$

$$h = \frac{4\pi r^3}{3\times 100}$$

$$h = \frac{\pi r^3}{75}$$

Exercise 23.19

1 a 25π cm^2

b 75π cm^2

2 a 100.5 cm^2

b 389.6 cm^2

Exercises 23.20–23.21

1 a 168 cm^3

b 205.8 cm^2

2 a 108 cm^3

b 4.5 cm

c 178.7 cm^2

Exercises 23.22–23.24

1 a 3 cm

b 50.3 cm^3

c 113.1 cm^2

2 a 48 cm^2

b 151 cm^3

c 199 cm^2

24 Bearings

Exercises 24.1–24.2

1 a Maya has measured the angle anticlockwise from North rather than clockwise.

b The bearing of B from A is 240°.

2 Accept student's answers to ± 5° to those given, except (c) which should be the exact value.

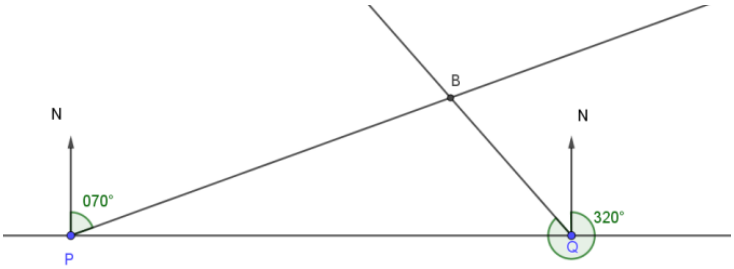
a 065°

b 170°

c 270°

d 350°

3



4 a Student's scale drawing

b i ≈ 6.8 km

ii ≈ 026°

c 130 + 180 = 310°
The bearing of A from B = 310°

5 a 230°

b A bearing and back bearing differ by 180°.

25 Right-angled triangles

Exercises 25.1–25.3

1 a 5.6 cm

b 17.3 cm

c 55.0°

d 12.7 cm

e 60.5°

f 9.5 cm

g 40.3°

h 7.5 cm

Exercises 25.4–25.5

1 a $a = 10.3$ cm

b $b = 11.3$ cm

c $c = 8.9$ cm

d $d = 12.2$ cm

2 MN = $6\sqrt{3}$ cm

3 a 68.0 km

b 96.2 km

4 a 7.1 km

b 27.1 km

c 34.9 km

d 039°

5 a 6.4 m

b 18.2 m

c 48.6°

6 a BC = 3.36 cm

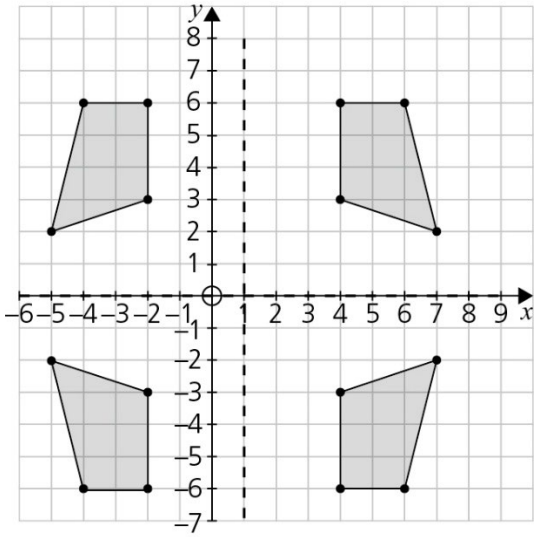
b $x = 9.3°$

c CD = 1.0 cm

26 Transformations

Exercises 26.1–26.2

1



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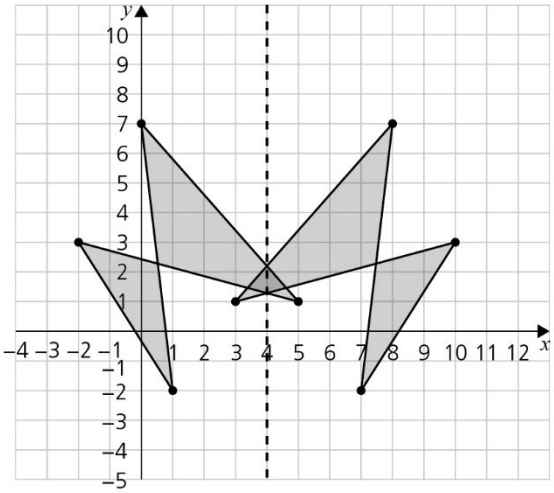
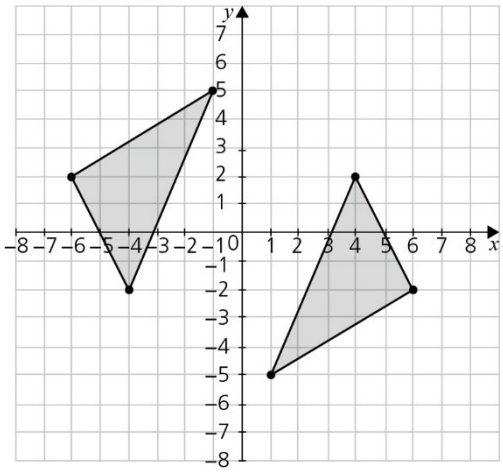
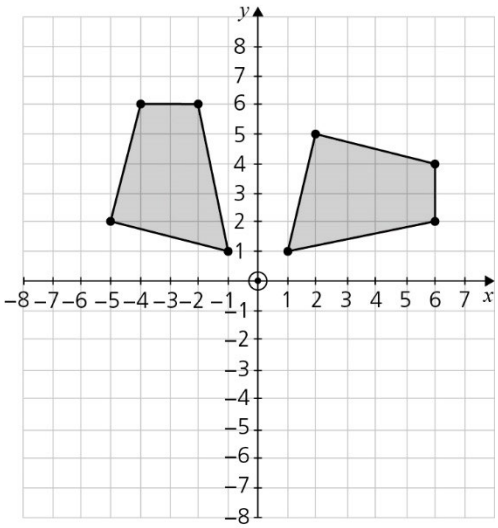


Exercises 26.3–26.4

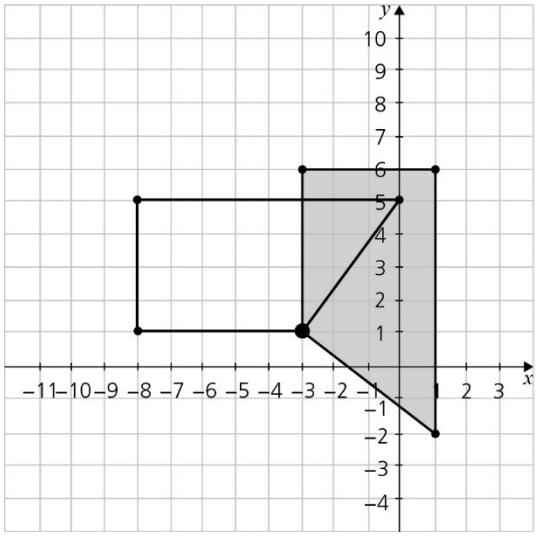
1 a



b

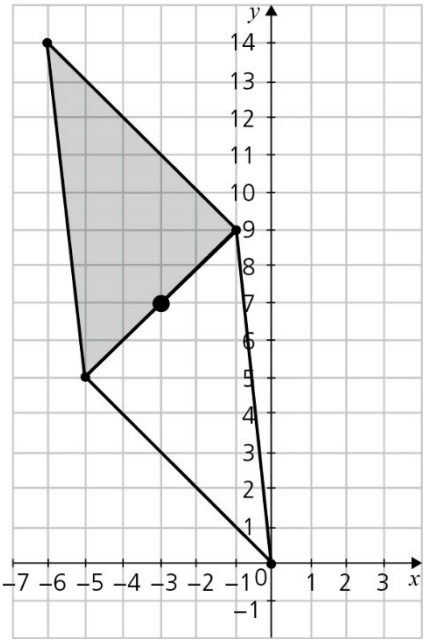


2 a



Centre of rotation is (–3, 1). Angle is either 90° clockwise or 270° anticlockwise

b



Centre of rotation is (–3, 7). Angle is 180°

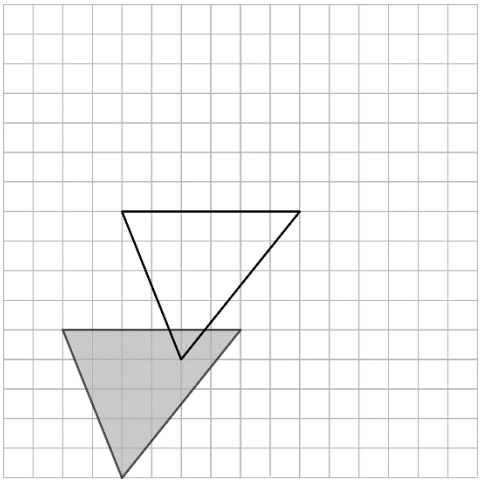
Exercises 26.5–26.6

1 $B = \begin{pmatrix} 0 \\ -6 \end{pmatrix}$

$C = \begin{pmatrix} -6 \\ -7 \end{pmatrix}$

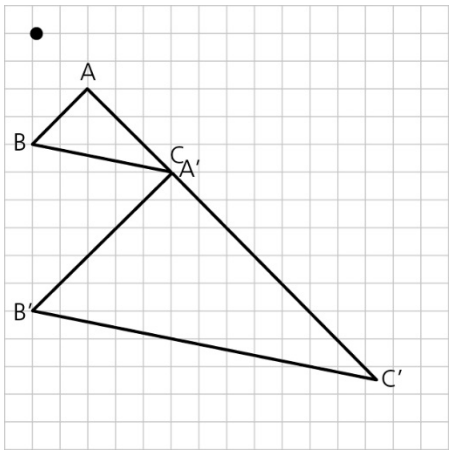
$D = \begin{pmatrix} -6 \\ 1 \end{pmatrix}$

2



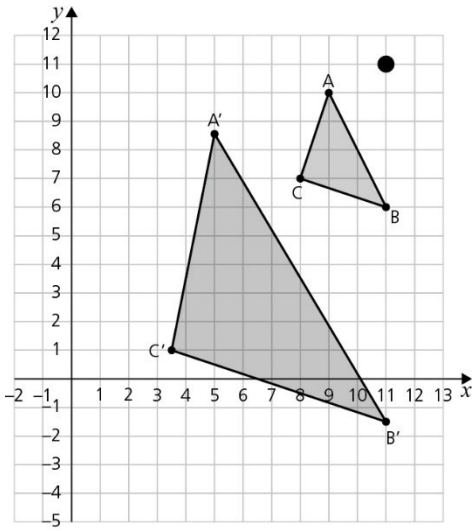
Exercises 26.7–26.8

1 a



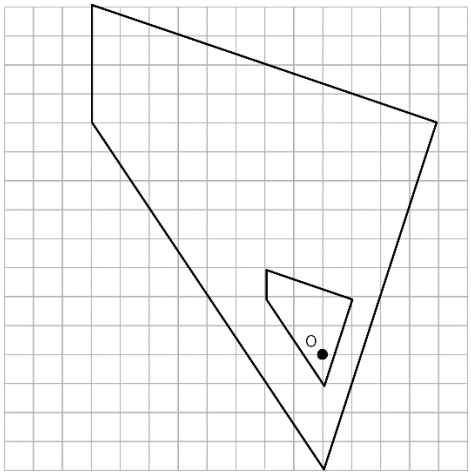
Scale factor of enlargement = 2.5

b



Scale factor of enlargement = $\times \frac{5}{2}$

2



27 Probability

Exercises 27.1–27.4

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

b $\frac{1}{4}$

c $\frac{1}{2}$

d 0

e $\frac{7}{8}$

f $\frac{7}{8}$

2 a 0.575

b 0.425

3 a $\frac{30}{365} = \frac{6}{73}$

b Not every month has the same number of days

c $\frac{67}{73}$

4 a $\frac{1}{27}$

b $\frac{1}{9}$

5 a $\frac{1}{750}$

b $\frac{2}{3}$

c $\frac{1}{5}$

d 1

6 a 200

b i 16%

ii 53.5%

iii 9%

7 a $\frac{1}{6}$

b $\frac{5}{24}$

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

b $\frac{1}{16}$

c 0

d $\frac{3}{4}$

Exercise 27.5

1 a i $\frac{8}{27}$

ii $\frac{7}{27}$

b It will depend on how good the opposition is.

2 a $\frac{1}{25}$

b $\frac{1}{5}$

Exercises 27.6

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

b $\frac{3}{4}$

c $\frac{1}{8}$

d $\frac{7}{8}$

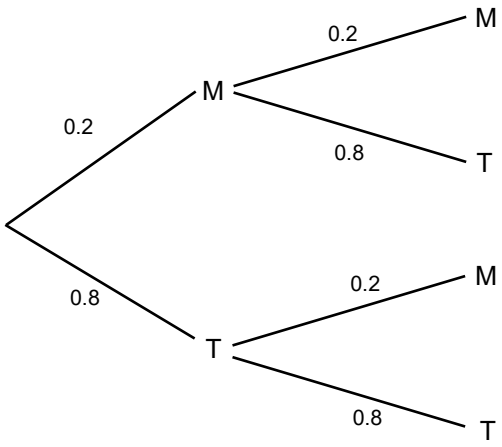
e Within the first three throws it is certain that a player will either start or not start.

2 a 0.36

b 0.288

c 0.648

3 a



b i $\frac{19}{495}$ **ii** $\frac{32}{99}$

Exercise 27.7

1 a 2000

b i $\frac{93}{400}$

ii $\frac{49}{50}$

iii $\frac{63}{100}$

Exercises 27.8–27.9

1 Yes, it is likely to be biased. Anita spun the coin more times, so her results are likely to be more reliable, and her results imply bias is probable.

2 500

28 Mean, median, mode and range

Exercises 28.1–28.3

1 a 6.1

b 6

c 8

d 6

2 94.5 kg

3 a 40

b 46

c 44.8 (1 d.p.)

d 45

e 6

4 a 3

b 3

c 2.83 (2 d.p.)

5 Several answers are possible

Check $x + y = 127$ kg, median = 73 kg and range = 51 kg

e.g. $x = 59$ kg and $y = 68$ kg

3 a $x = 19$ kg

b $x \geq 15$

c $x \geq 28$

d $x > 15$

Exercise 28.4

1 a Mathematically the statement is accurate as the mean salary of all seven people working in the company is £20000 and the mean is a type of average.

b Either the mode or median would be less misleading as each give an average salary of £15000.

29 Collecting, displaying and interpreting data

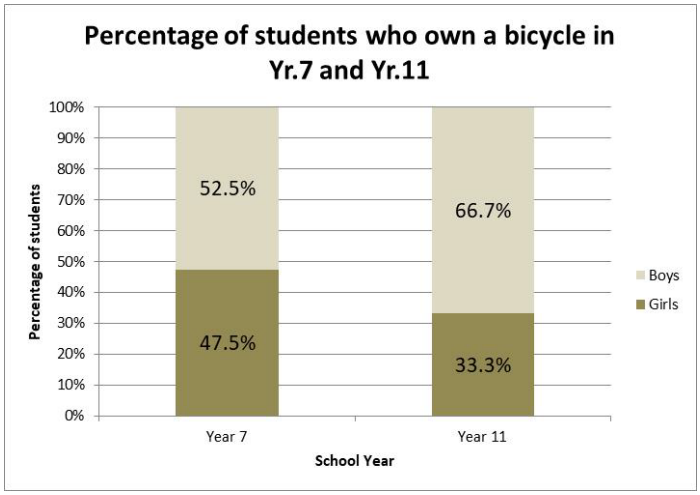
Exercises 29.1–29.4

1 a Student's valid statement e.g. The proportion of girls owning a bicycle decreased between Yr.7 and Yr.11.

b

	Year 7	Year 11
Girls	47.5%	33.3%
Boys	52.5%	67.7%
Total	100%	100%

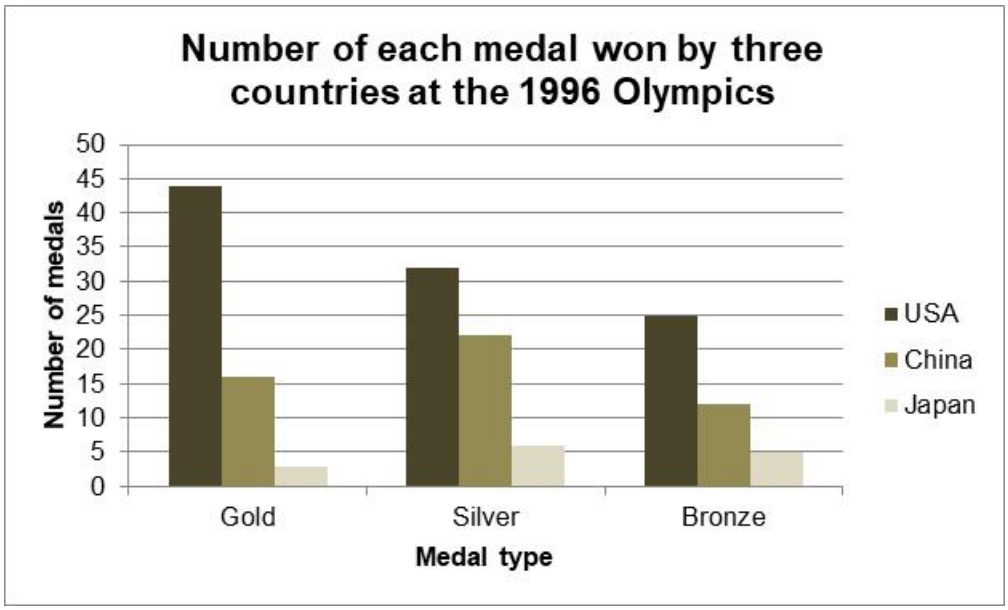
c



d i Student's valid answer e.g. You can see the actual number of students who own a bicycle.

ii Student's valid answer e.g. Easier to compare the proportion of girls and boys owning a bicycle in each year group.

2 a



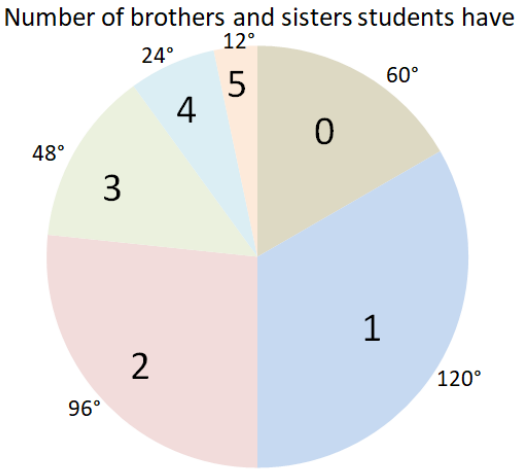
b **i** Student's valid statement e.g. The number of Chinese and Japanese athletes winning gold medals has increased since 1996.

ii Student's valid statement e.g. The distribution of USA medals in 2021 was roughly constant, whilst in 1996 it increased as the medal ranking increased..

3 **a**

Number of brothers and sisters	Frequency	Fraction of the class	Degrees of a circle
0	5	$\frac{5}{30}$	60°
1	10	$\frac{10}{30}$	120°
2	8	$\frac{8}{30}$	96°
3	4	$\frac{4}{30}$	48°
4	2	$\frac{2}{30}$	24°
5	1	$\frac{1}{30}$	12°

b



4 a

Girls				Boys			
			5	3			
9	5	5	**6**	1	2		
	2	1	**7**	4	6	8	9
	8	6	**8**	1	4	8	9
7	4	1	0	**9**	2	3	3
	4	0	**10**	2			
	5	1	**11**				

b i 65 seconds

ii 93 seconds

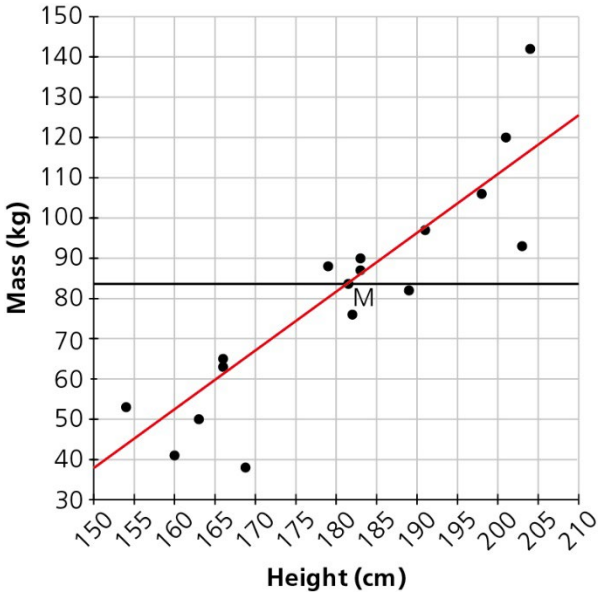
c i 90 seconds

ii 81 seconds

d The median, because the mode seems to imply that the girls were a lot faster than the boys, yet from the diagram, the boys were generally faster.

5 a Moderate positive correlation as taller people tend to be heavier.

b



c i 181.5 cm

ii 83.5 kg

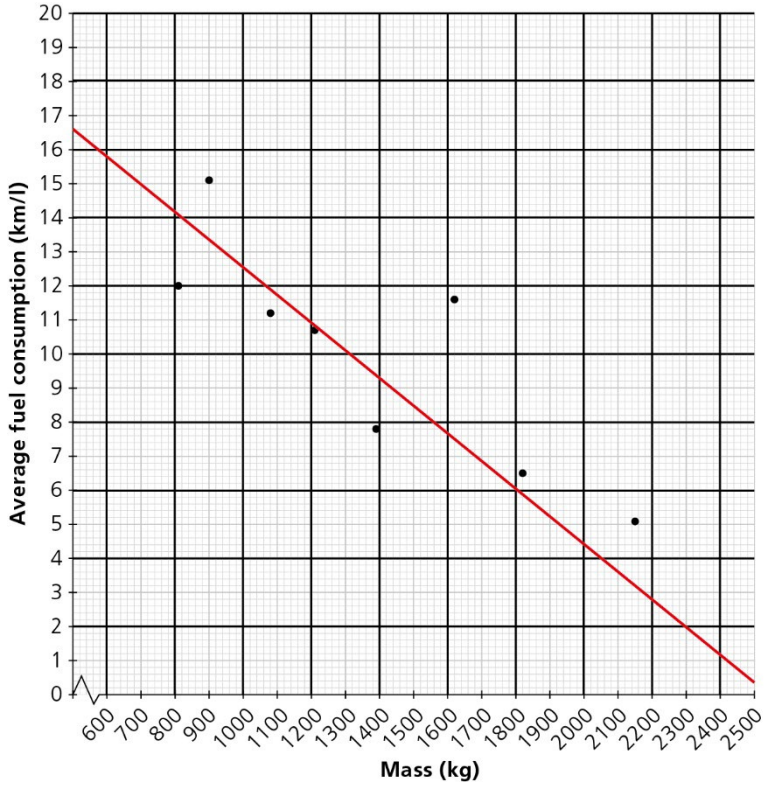
iii See graph for position of M

d See graph for line of best fit

e i Moderate positive correlation

ii Student's comparison

6 a



b Moderate negative correlation

c See graph for line of best fit

d ≈ 9 km/l

e ≈ 2000 kg

f 500 kg falls outside the data range for which the line of best fit was drawn. The relationship between mass and fuel consumption may not hold beyond the data collected.