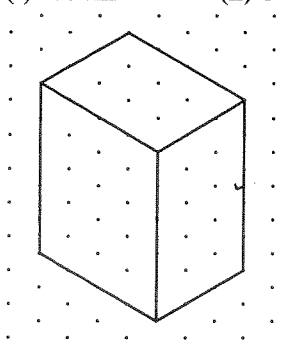
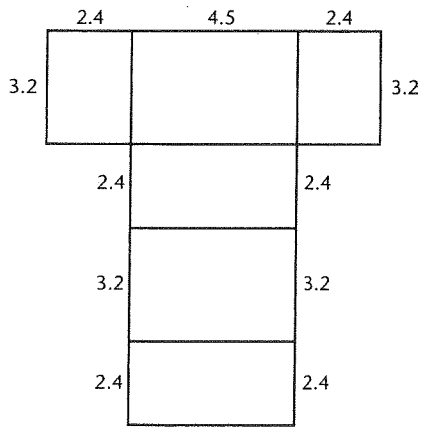
11 **a)** Area = 12 **b)** Area = 27
c) Area = 50
12 **a)** C = £7 **b)** C = £11·60
13 **a)** **i)** $T = 130$ **ii)** $T = 90$
b) 136 minutes = 2 hours 16 minutes
14 **a)** $S = 85$ **b)** 55 sandwiches
15 **a)** 100 minutes **b)** 180 minutes
c) 160 minutes
16 **a)** $A = 12{\cdot}5$ **b)** $A = 15{\cdot}7$
c) $A = 10{\cdot}5$
17 **a)** 4·7 **b)** 7·4
c) 12·5
18 **a)** $C = 4{\cdot}76$ **b)** $C = 0{\cdot}44$
c) $C = 11{\cdot}25$
19 **a)** 4 **b)** 32·7
c) 20·4
20 **a)** $E = 90$ **b)** $E = 52{\cdot}49$
c) $E = 9{\cdot}25$
21 **a)** 16 **b)** 14·976
c) 14
22 **a)** $G = 24$ **b)** $G = 28{\cdot}32$
c) $G = 5{\cdot}38$
23 **a)** Area = 10·5 **b)** Area = 7·8
c) Area = 3·2
24 **a)** $t = 3{\cdot}5$ **b)** $t = 8$
25 **a)** $v = 18$ **b)** $v = 22{\cdot}5$
26 Cost = £31
27 28 mm^2

Revision exercise A1 (page 38)

1 **a)** **(i)** 60 cm^3 **(ii)** 34·56 cm^3
b)



c) The net is not drawn to size but lengths are marked.
Other nets are possible.

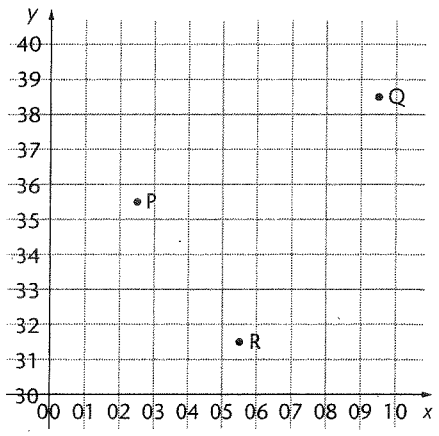


2 **a)** 7·90 **b)** 13·12
c) 0·24 **d)** 0·68
3 **a)** 130 **b)** 540
c) 1000 **d)** 1240
4 **a)** 7900 **b)** 9800
c) 8900 **d)** 100
5 **a)** 149·812 **b)** 149·8
6 **a)** 3 **b)** 100
c) 9000 **d)** 2
e) 70 **f)** 10
g) 600 **h)** 0·5
i) 0·03 **j)** 800 000
7 **a)** 900 ÷ 30 = £30
b) Takings = 600 × 70 = 42 000p = £420
8 **a)** 64 **b)** 729
c) 15 625 **d)** 4·096
e) 625 **f)** 233
9 **a)** 42·5 **b)** 19·7
c) 135·2 **d)** 40·8
e) 3·6 **f)** 300·8
10 **a)** $T = 12$ **b)** $T = 13{\cdot}4$
c) $T = 5$
11 **a)** $S = 46$ **b)** $S = 24{\cdot}3$

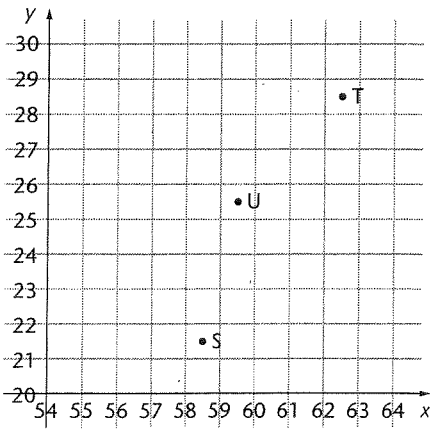
5 Maps, bearings and scale drawings

Exercise 5.1 (page 41)

1 **a)** 1522 **b)** 1820 **c)** 1918
2 **a)** 2712 **b)** 2914 **c)** 3211
3



4



9 Cold meal 73, packed lunch 85, chip shop 110, home 24 (all ±2)

10 **a)** Pie chart with angles of 93·6°, 72°, 54°, 115·2° and 25·2° (all ±1°)
b) In the actual election, Labour gained a little, Conservatives stayed about the same, Lib-Dems dropped and S.N.P. gained considerably.

11 **a)** Pie chart with angles of 144°, 100·8°, 86·4°, 14·4° and 14·4° (all ±1°)
b) In final exam the number of A grades increased by 2, the number of Bs increased by 2, the number of Cs fell by 3, there were no Ds and there was still 1 E grade.

12 **a)** 28 **b)** 16 (both ±1)

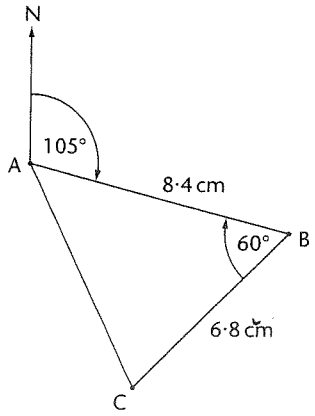
Revision exercise B1 (page 75)

1 **a)** **i)** 4918 **ii)** 5116
b) South-east **c)** Right

2 **a)** 67° + 180° = 247°
b) 247° − 93° = 154°
c) 197° − 180° = 017°

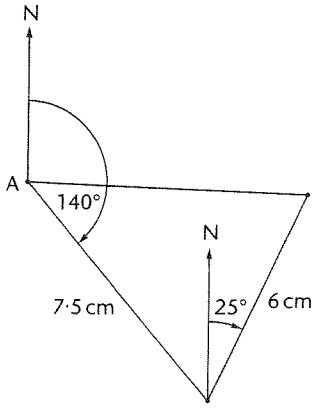
The diagrams given for questions **3** and **4** are not full-size.
The measurements given are corrected for the suggested scale.

3



Distance of A from C is 7·8 cm, which represents 390 m.
The bearing of A from C is 335°.

4



The distance from the start is 7·3 cm, which represents 14·6 miles.
The bearing from the start is 092°.

5 317°

6 **a)** $x = 1$ **b)** $x = 3$
c) $x = 2$ **d)** $x = 1$
e) $x = 2$ **f)** $x = -1$
g) $x = 2$ **h)** $x = -3$

7 400 km²

8 **a)** 950 to 1050 cm or 9·5 to 10·5 m
b) 67 500 to 77 500 cm² or 6·75 to 7·75 m²

9 Pie chart with angles of 72° (barley), 54° (maize), 90° (corn) and 144° (wheat)

10 Carbon dioxide 55%, CFCs 23%, methane 14%, nitrous oxide 8% (all ±2%)

9 Fractions

Exercise 9.1 (page 79)

1 **a)** $\frac{1}{4} = \frac{2}{8} = \frac{3}{12} = \frac{5}{20}$ **b)** $\frac{1}{5} = \frac{2}{10} = \frac{4}{20} = \frac{7}{35}$
c) $\frac{2}{5} = \frac{4}{10} = \frac{10}{25} = \frac{12}{30}$ **d)** $\frac{2}{9} = \frac{4}{18} = \frac{8}{36} = \frac{6}{27}$
e) $\frac{1}{7} = \frac{2}{14} = \frac{5}{35}$ **f)** $\frac{4}{9} = \frac{16}{36} = \frac{32}{72}$
g) $\frac{1}{6} = \frac{4}{24} = \frac{2}{12}$ **h)** $\frac{2}{3} = \frac{4}{6} = \frac{12}{18} = \frac{16}{24}$

2 **a)** $\frac{9}{12}$ **b)** $\frac{5}{8}$ **c)** $\frac{9}{18}$
d) $\frac{3}{5}$ **e)** $\frac{6}{9}$ **f)** $\frac{10}{35}$
g) $\frac{24}{30}$ **h)** $\frac{1}{7}$ **i)** $\frac{6}{27}$
j) $\frac{12}{44}$ **k)** $\frac{3}{7}$ **l)** $\frac{4}{10}$

3 **a)** $\frac{2}{3}$ **b)** $\frac{3}{5}$ **c)** $\frac{1}{3}$
d) $\frac{2}{3}$ **e)** $\frac{3}{8}$ **f)** $\frac{3}{7}$
g) $\frac{2}{3}$ **h)** $\frac{2}{3}$ **i)** $\frac{3}{4}$
j) $\frac{4}{5}$ **k)** $\frac{1}{2}$ **l)** $\frac{2}{9}$
m) $\frac{1}{2}$ **n)** $\frac{3}{5}$ **o)** $\frac{2}{5}$
p) $\frac{4}{5}$

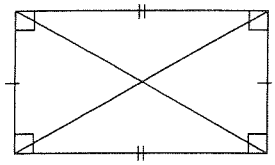
4 **a)** $\frac{4}{5}$ **b)** $\frac{1}{6}$ **c)** $\frac{5}{7}$
d) $\frac{3}{4}$ **e)** $\frac{2}{3}$ **f)** $\frac{5}{6}$
g) $\frac{1}{2}$ **h)** $\frac{3}{5}$ **i)** $\frac{2}{3}$
j) $\frac{1}{2}$ **k)** $\frac{1}{6}$ **l)** $\frac{1}{2}$
m) $\frac{4}{5}$ **n)** $\frac{8}{9}$ **o)** $\frac{5}{7}$
p) $\frac{2}{3}$

Exercise 9.2 (page 81)

1 **a)** $1\frac{3}{8}$ **b)** $1\frac{7}{8}$ **c)** $2\frac{1}{4}$
d) $3\frac{1}{2}$ **e)** $2\frac{1}{7}$ **f)** $2\frac{3}{4}$
g) $2\frac{1}{2}$ **h)** $1\frac{4}{5}$ **i)** $2\frac{1}{3}$
j) $4\frac{1}{9}$

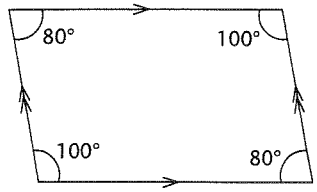
2 **a)** $2\frac{1}{5}$ **b)** $1\frac{3}{7}$ **c)** $3\frac{1}{3}$
d) $6\frac{1}{2}$ **e)** $4\frac{2}{3}$ **f)** $1\frac{5}{6}$
g) $2\frac{3}{8}$ **h)** $2\frac{6}{7}$ **i)** $5\frac{3}{4}$
j) $3\frac{3}{10}$

9 a)



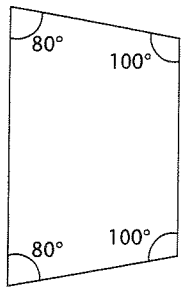
b) Diagonals are the same length and bisect, but not at 90°.

10 a)



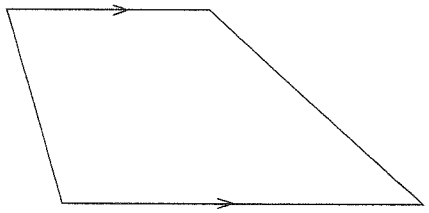
b) Parallelogram

11 a)



b) Isosceles trapezium

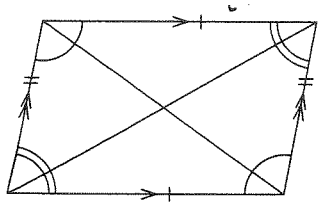
12 a)



b) All the angles are usually different (or two pairs of adjacent angles add up to 180°).

13 Square, rhombus, kite

14 a)



b) Diagonals are of different lengths and bisect, but not at right angles.

15 Square, rectangle, isosceles trapezium

16 Square, rectangle, parallelogram, rhombus

17 **a)** Rhombus **b)** Trapezium
c) Parallelogram **d)** Kite
e) Parallelogram **f)** Square
g) Rectangle

12 Simplifying algebra

Exercise 12.1 (page 104)

1 $5x$ **2** $3y + 2z$
3 $2x + 2y$ **4** $3a + 2b$
5 $5p$ **6** $7a$
7 $5x$ **8** $4c$
9 $7p$ **10** $6b$
11 $3p$ **12** $4s$
13 a^3 **14** $a^2 + b^2$
15 $4p + 3q$ **16** $3a + 3b$
17 $4m + 3n$ **18** $7p + 5q$
19 $m + 2n$ **20** $2x + y$
21 $3p - 3q$ **22** $x^2 - 2x - 15$
23 $12pq$ **24** $13xy$
25 $2a + a^2$ **26** $5b$
27 $6b^2$ **28** $2ab$
29 $9xy$ **30** $9a$
31 $5a$ **32** $a^2 - a - 6$
33 x^2y^3 **34** $2y^2 - 2x^2$
35 $5ab$ **36** $6a - 2b$
37 $8b - 4a$ **38** $P = 8a$
39 $A = 6ab$ **40** $P = 6a + 9b$
41 $9x$ **42** $6xy$

Exercise 12.2 (page 106)

1 $6a + 9b$ **2** $6a + 2b$
3 $2m + 11n$ **4** $8b$
5 $13p + 7q$ **6** $3m - 2n$
7 $3x - y$ **8** $4ab$
9 $2ac + 6ab$ **10** 0
11 $5a + b$ **12** $5a - 6b$
13 $6ab - 4ac$ **14** $2b^2 - a^2$
15 $2x^2 - 4xy + y^2$ **16** $2b^2 - a^2$
17 $9a^2 + 2ab - 6b^2$ **18** $ab + bc$
19 $pq - 3p^2$ **20** Cannot be simplified
21 $2ab + bc$ **22** $-2a^3$
23 Cannot be simplified **24** $3a^3 + 7a^2$
25 $14abc$ **26** $3ab^2 + 3a^2b$
27 $2x^2$ **28** 0
29 $13a^3 - 6a^2$ **30** abc

Revision exercise C1 (page 107)

1 **a)** $\frac{1}{4} = \frac{2}{8} = \frac{4}{16} = \frac{6}{24}$ **b)** $\frac{3}{5} = \frac{6}{10} = \frac{15}{25} = \frac{18}{30}$

2 **a)** $\frac{1}{3}$ **b)** $\frac{3}{7}$
c) $\frac{2}{3}$ **d)** $\frac{1}{3}$

3 **a)** 3 **b)** $7\frac{1}{2}$
c) $\frac{1}{6}$ **d)** $\frac{1}{8}$
e) $\frac{2}{15}$

4 **a)** **(i)** $1\frac{1}{3}$ **(ii)** $1\frac{5}{7}$ **(iii)** $3\frac{3}{4}$
b) **(i)** $\frac{7}{3}$ **(ii)** $\frac{13}{8}$ **(iii)** $\frac{13}{4}$

5 a)

First course	Second course
Fish & Chips	Chocolate ice-cream
Fish & Chips	Fruit Salad
Fish & Chips	Ginger Sponge
Ham Salad	Chocolate ice-cream
Ham Salad	Fruit Salad
Ham Salad	Ginger Sponge
Vegetable Curry	Chocolate ice-cream
Vegetable Curry	Fruit Salad
Vegetable Curry	Ginger Sponge

b) (i) $\frac{1}{9}$ **(ii)** $\frac{2}{3}$

6

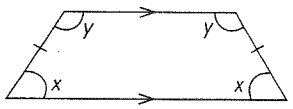
2nd dice \ 1st dice	1	2	3	4	5	6
6	6	12	18	24	30	36
5	5	10	15	20	25	30
4	4	8	12	16	20	24
3	3	6	9	12	15	18
2	2	4	6	8	10	12
1	1	2	3	4	5	6

a) $\frac{1}{36}$ **b)** $\frac{4}{36} = \frac{1}{9}$

c) $\frac{3}{36} = \frac{1}{12}$ **d)** $\frac{11}{12}$

7 a) Rectangle **b)** Rhombus

8



9 Square, rectangle, rhombus, parallelogram

10 a) $3a$ **b)** $2p + 2q$
c) $2a$ **d)** $12a^2$
e) $3pq$ **f)** a^3b^3

11 a) $2x + y$ **b)** $4a^2b + ab$
c) $24yz$ **d)** p^3q^2
e) $6x^3y$

12 a) $5a$ **b)** $ab^2 + a^2b$
c) $4ab + 2ac$ **d)** $4x^2 + yx$

13 Constructing triangles

Exercise 13.1 (page 109)

For measurements from the diagrams, accept ±0·2 cm and ±2° throughout.

1 Check students' drawings.

2 a) 3·0 cm, 94°, 56° **b)** 6·7 cm, 72°, 43°
c) 6·7 cm, 27°, 63° **d)** 9·1 cm, 30°, 20°

3 Check students' drawings.

4 a) 5·3 cm, 83°, 35° **b)** 2·9 cm, 76·5°, 76·5°
c) 9·7 cm, 20°, 42° **d)** 2·8 cm, 114°, 33°

5 Check students' drawings.

6 a) 3·0 cm, 5·7 cm **b)** 2·7 cm, 5·2 cm
c) 4·6 cm, 5·6 cm **d)** 1·9 cm, 5·0 cm
e) 2·7 cm, 4·5 cm

7 a) Check students' drawings.
b) (i) 9·6 cm, 22°, 40° **(ii)** 48 m

8 a) Check students' drawings.
b) Lengths on drawing 4·9 cm, 8·5 cm
Lengths of garden 9·8 m, 17 m

Exercise 13.2 (page 112)

For measurements from the diagrams, accept ±0·2 cm and ±2° throughout.

1 a) Check students' drawings.
b) It is a right-angled triangle.

2 a) Check students' drawings.
b) 59°, 35°, 86°

3 Check students' drawings.

4 a) 26°, 37°, 117° **b)** 65°, 65°, 50°
c) 36°, 63°, 81°

5 Check students' drawings.

6 a) 25°, 96°, 58° **b)** 5·0 cm, 1·9 cm, 86°
c) 132°, 23°, 24° **d)** 124°, 31°, 25°

7 Check students' drawings.

8 3·6 cm

9 a) Check students' drawings.
b) 123°, 23°, 34°

10 a) Check students' drawings.
b) 15 cm

14 Interpreting statistical data and measures

Exercise 14.1 (page 116)

For many of the questions, the answers given here are just examples of the type of comment expected.

1 a) Mean = 5·4, median = 5, mode = 5
b) Mean = 14·5, median = 14·5, mode = 15
c) Mean = 5·5, median = 6, mode = 8
d) Mean = 16·9, median = 17, mode = 19
e) Mean = 246·5, median = 237, No mode

2 The mean shows that on average the class scored 36·5 out of 50. The range shows that there was a big difference (42 marks) between the highest and the lowest marks.

3 a) Tom: mean = 6, median = 7, mode = 7, range = 5
Freya: mean = 5, median = 3, mode = 3, range = 9
b) On average Tom scored higher than Freya. Tom was more consistent than Freya.

4 Brian had a lower mean and mode than Les, suggesting that he is the better player. Les had a smaller range; this shows that his spread of scores was less than Brian's, but not that he was any better.

6 For example $\frac{3}{5}$, $\frac{6}{10}$ and $\frac{60}{100}$

7 David (0·875 km) walks further than Paula (0·87 km).

8 35%, $\frac{3}{8}$, $\frac{2}{5}$, $\frac{5}{12}$, 0·45

9 30%, $\frac{3}{5}$, $\frac{2}{3}$, 0·7, $\frac{3}{4}$

10 $\frac{4}{7}$ = 0·57; 45% = 0·45
There is a higher proportion of boys in Josh's class.

11 $\frac{1}{3}$ = 0·333... , not 0·3.

12 $\frac{3}{8}$ = 0·375; 35% = 0·35
The order is Handsworth Rovers (0·4), Intake United (0·375), Darnall Players (0·35).

Exercise 16.2 (page 132)

1 **a)** 32 **b)** 4·5 **c)** 4 m
d) £32 **e)** 35 cm **f)** £9
g) 7·2

2 £1·60

3 54

4 £3·25

5 £1·44

6 £96

7 **a)** 285 **b)** 20·25 **c)** £432
d) 351·5 m **e)** 110·7 **f)** £163·40
g) 2·25

8 £295·32

9 £157·50

10 4800 ml

11 70

12 46 seats (45·05)

Exercise 16.3 (page 135)

1 **a)** £480 **b)** £580 **c)** £424
d) £720

2 **a)** £140 **b)** £170 **c)** £194
d) £80

3 £30 000

4 £12 480

5 £3·24

6 £10·40

7 68 kg

8 £1290

9 £13 200

10 1·68 m

11 £173·90

12 £329

Revision exercise D1 (page 137)

1 **a)** Check students' drawings.
b) **(i)** PR = 3·8 cm, RQ = 5·4 cm
(ii) PQ = 3·3 cm, RQ = 3·9 cm

2 **a)** Check students' drawings.
b) $A = 59°$, $B = 35°$, $C = 86°$

3 **a)** Mean = 7·4, median = 7, mode = 7, range 7
b) Mean = 24·5, median = 25, mode = 25, range 9
c) Mean = 14·5, median = 15, mode = 17, range = 8

4 Machine A is slightly nearer to the aim of 200 paper clips on average, but Machine B gives you more paper clips. Machine A has the smaller range, showing that the numbers of paper clips in its boxes were less spread out than those from Machine B.

5 **a)** 3 **b)** $^-3$ **c)** 6
d) 1 **e)** $^-2$ **f)** $^-5$

6 **a)** 12 **b)** $^-8$ **c)** 12
d) $^-2$ **e)** $^-12$ **f)** $^-20$
g) $^-5$

7 $\frac{9}{16}$, 0·74, $\frac{7}{9}$, $\frac{4}{5}$, 82%

8 **a)** £8 **b)** £12

9 417

10 153

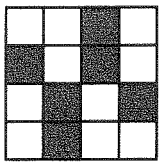
11 £179·20

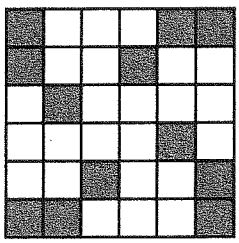
17 Rotations

Exercise 17.1 (page 140)

1 **a)** 6 **b)** 6

2 Equilateral triangle

3 

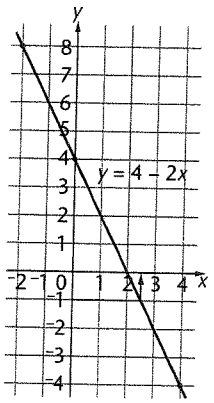
4 

5 Check students' drawings.

6 

7 a) Table with three values, e.g.

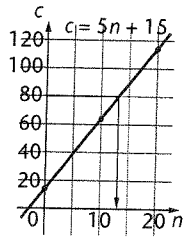
x	$^-2$	0	4
4	4	4	4
$-2x$	4	0	$^-8$
$y = 4 - 2x$	8	4	$^-4$



b) $x = 2{\cdot}5$

8 a) Table with three values, e.g.

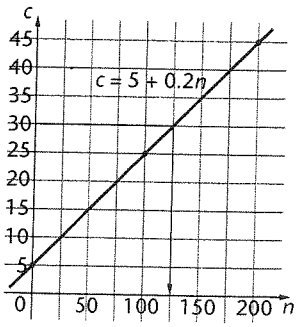
n	0	10	20
$5n$	0	50	100
+ 15	15	15	15
$C = 5n + 15$	15	65	115



b) $n = 13$

9 a) Table with three values, e.g.

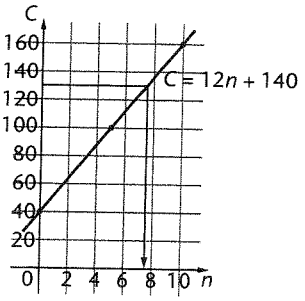
n	0	100	200
5	5	5	5
$+ 0{\cdot}2n$	0	20	40
$C = 5 + 0{\cdot}2n$	5	25	45



b) $n = 125$

10 a) Table with three values, e.g.

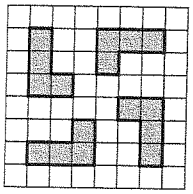
n	0	5	10
$12n$	0	60	120
+ 40	40	40	40
$C = 12n + 40$	40	100	160



b) He works for $7\frac{1}{2}$ hours.

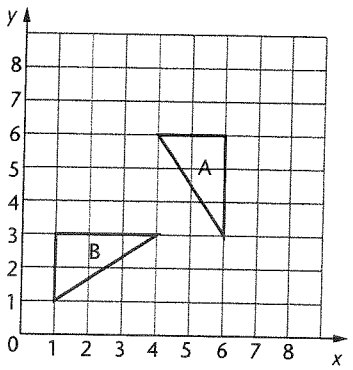
Revision exercise E1 (page 162)

1



2 Quadrilaterals B, E and F

3 a), b)



c) 90° anticlockwise

4 $\frac{3}{5}$

5 a) 40% **b)** 12% **c)** 5%

6 8%

7 13·3%

8 7·5%

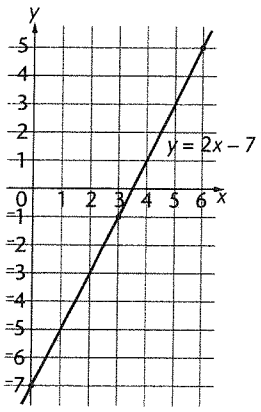
9 1·6 %

10

x	$^-1$	0	1	2	3	4	5
4	4	4	4	4	4	4	4
$-2x$	2	0	$^-2$	$^-4$	$^-6$	$^-8$	$^-10$
$y = 4 - 2x$	6	4	2	0	$^-2$	$^-4$	$^-6$

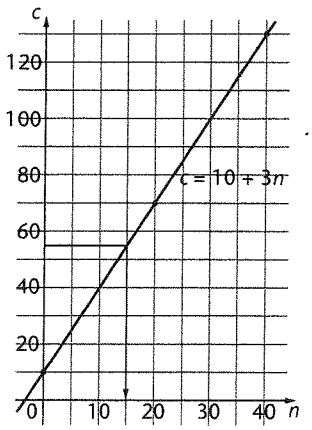
11 Table with three values, e.g.

x	0	3	6
$2x$	0	6	12
-7	-7	-7	-7
$y = 2x - 7$	-7	-1	5



12 a) Table with three values, e.g.

n	0	20	40
10	10	10	10
$3n$	0	60	120
$C = 10 + 3n$	10	70	130



b) $n = 15$