Answers

Check in 0

Exercise 0.1

1 **a** $-3a+3b-2$ **b** $-m^2-n^2+2m$
c ab **d** $3p^2q^2-2pq$
e $9-2a-b$ **f** $5x^3-7$
g $-a-7b$ **h** $-4-4x$
i $a^2-2ab+b^2$ **j** a^2-b^2

2 **a** $x^2+8x+15$ **b** x^2-4x
c $x^2+2x-15$ **d** $2x^2-7x+3$
e x^3+4x^2-2x-8 **f** $10-9x+2x^2$

3 **a** $2(2-x)$ **b** $3x(x+2)$
c $(x+3)^2$ **d** $(x-3)(x-4)$
e $(x-1)(x+9)$ **f** $x(x-4)$
g $(x+4)(x-4)$ **h** $2(x+3)(x-3)$
i $(x-9)(x+4)$ **j** $(x+24)(x-2)$

4 **a** $(2x+1)(x+1)$ **b** $(3x+2)(x+1)$
c $(3x+1)(x-2)$ **d** $(3x+1)(2x+1)$
e $(6x-1)(x+3)$ **f** $(4x-1)(3x-2)$

5 **a** $2x+1$ **b** $1-x$ **c** $1+2x$
d $\frac{3+4x}{x}$ **e** $\frac{x(1-3x)}{2}$ **f** x^2+2x+3
g $\frac{x(2x+3)}{4}$ **h** x

6 **a** $x+1$ **b** $x-1$ **c** $x-3$
d $x+2$ **e** x **f** $2x-1$
g $\frac{3x+1}{x+1}$ **h** $\frac{x+2}{2x+1}$ **i** $\frac{x-3}{x-4}$

Exercise 0.2

1 **a** 21 **b** 1 **c** 5 **d** 6
e 78 **f** 10 **g** $\frac{4}{3}$ **h** $\frac{9}{2}$
i $\frac{11}{12}$ **j** 9

2 **a** 0.48 **b** 3 **c** 1.54 **d** 24
e 192 **f** 5 **g** 0.84 **h** 108
i $\frac{3}{2}$ **j** $\frac{1}{5}$

3 **a** $x=\frac{y+4}{3}$ **b** $x=3-2y$ **c** $x=\frac{y-c}{m}$
d $x=\frac{5-3y}{3}$ **e** $x=\frac{-by-c}{a}$ **f** $x=\frac{y+5}{y+2}$
g $x=\frac{y}{y-1}$ **h** $x=\pm\sqrt{\frac{4-y}{3}}$ **i** $x=\frac{2-y}{y}$
j $x=-\frac{1}{y}$

4 **a** $c=\frac{3}{2}$ **b** $y=12$ **c** $q=30$ **d** $p=\frac{4}{3}$
e $q=-\frac{19}{9}$ **f** $b=\frac{2}{3}$ **g** $n=3.25$ **h** $r=-4$

5 **a** $u=\frac{2s-at^2}{2t}$, 15 **b** $m=\frac{I}{v-u}$, 200

Exercise 0.3

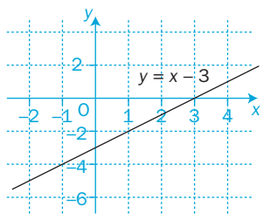
1 **a** $x=2$ **b** $x=3$ **c** $x=-\frac{5}{2}$
d $x=5$ **e** $x=-5$ **f** $x=-5$
g $x=4$ **h** $x=2$ **i** $x=-4$
j $x=\frac{6}{5}$ **k** $x=\frac{1}{7}$ **l** $x=-15$

2 **a** $t=4$ **b** $t=-2$ **c** $p=\frac{1}{3}$
d $y=\frac{4}{3}$ **e** $r=1$ **f** $x=\frac{7}{4}$
g $y=-8$ **h** $t=5$ **i** $t=-1$
j $r=1$ **k** $x=\frac{3}{20}$ **l** $x=\frac{1}{3}$

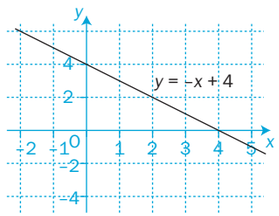
3 **a** $x=-30$ **b** $x=-5$ **c** $x=5$
d $x=3\frac{1}{7}$ **e** $x=\frac{6}{7}$ **f** $x=2\frac{1}{2}$
g $x=\frac{1}{2}$ **h** $x=\frac{1}{4}$

Exercise 0.4

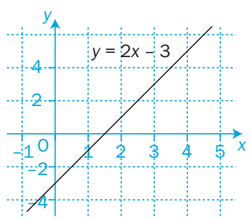
1 **a**



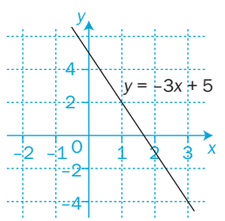
b



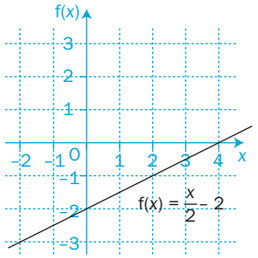
c



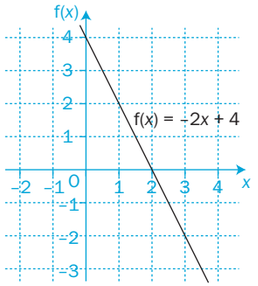
d



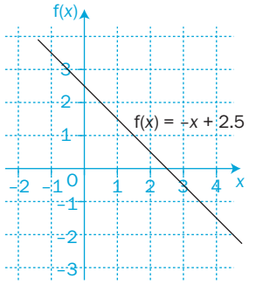
2 a



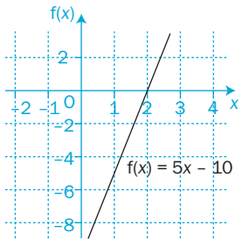
b



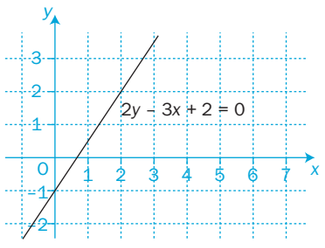
c



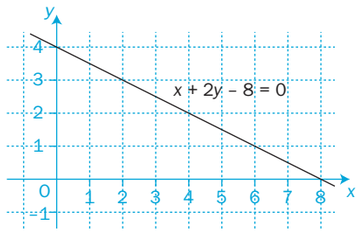
d



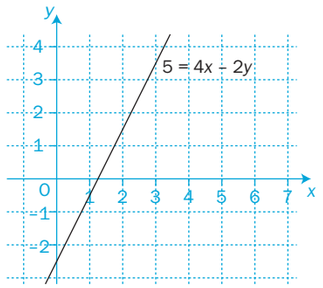
3 a



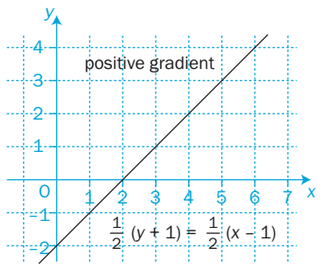
b



c

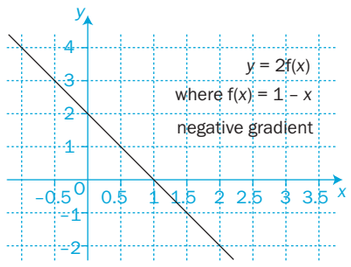


4 a



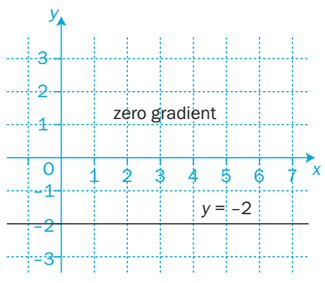
gradient = 1

b



gradient = −2

c



5 a

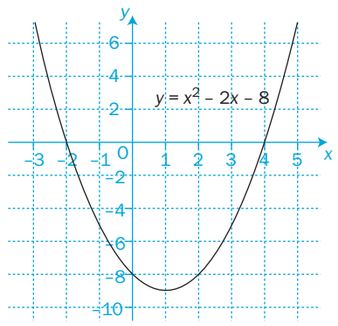
x	−1	0	1	2	3	4	5
y	5	0	−3	−4	−3	0	5

b i (0, 0)(4, 0) **ii** (0, 0)

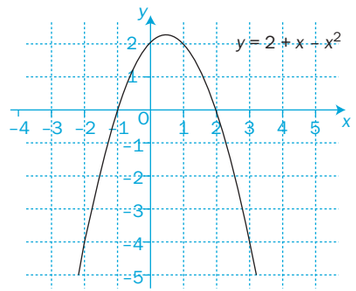
6 a

x	−3	−2	−1	0	1	2	3	4	5
y	7	0	−5	−8	−9	−8	−5	0	7

b

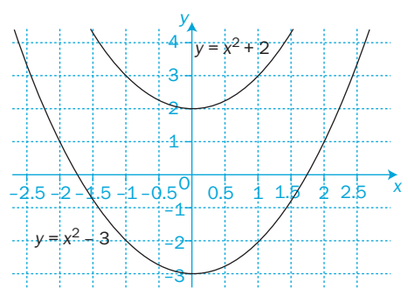


7 b



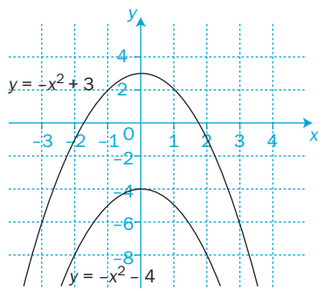
c i (−1, 0)(2, 0) **ii** (0, 2)

8 a



b 5 vertical units between the curves.

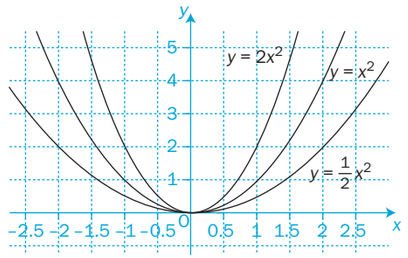
9 a



b Difference of 7 vertical units between the curves.

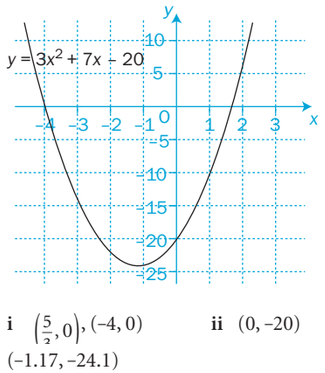
c These curves are upside down compared to those in question 8.

10 a



b All curves are U-shaped and pass through the origin.

11 a

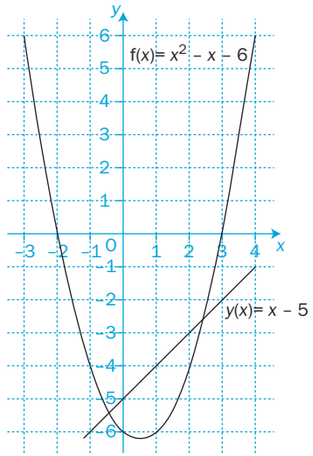


b i $\left(\frac{5}{2}, 0\right), (-4, 0)$ **ii** (0, −20)

c (−1.17, −24.1)

d −5

12 a, c



b $x = -2, x = 3$

d $x = 2.4, x = -0.4$

Exercise 0.5

1 a $\left(3, 3\frac{1}{2}\right)$ **b** $\sqrt{5}$ **c** $\left(3\frac{1}{2}, 4\frac{1}{2}\right)$

2 **a** **i** $\left(1, 1\frac{1}{2}\right)$ **ii** $\sqrt{13}$

b **i** $\left(2\frac{1}{2}, 1\frac{1}{2}\right)$ **ii** $\sqrt{10}$

c **i** $\left(3\frac{1}{2}, 2\right)$ **ii** $\sqrt{61}$

d **i** $\left(2, 1\frac{1}{2}\right)$ **ii** $\sqrt{17}$

e **i** $\left(-\frac{1}{2}, 2\frac{1}{2}\right)$ **ii** $3\sqrt{2}$

f **i** $\left(-\frac{1}{2}, 1\frac{1}{2}\right)$ **ii** $3\sqrt{2}$

3 **a** $(6, 2)$ **b** $(4, 4)$

Exercise 0.6

1 **a** $x = 1, y = 1$ **b** $x = 2, y = -1$

c $x = -1, y = 3$ **d** $x = 4, y = \frac{1}{2}$

e $x = -2, y = 3$ **f** $x = \frac{1}{2}, y = -1$

g $x = -3, y = 2\frac{1}{2}$ **h** $x = 4, y = 5$

i $x = -2, y = -3$ **j** $x = 3\frac{1}{2}, y = -2$

2 **a** $x = 1, y = 2$ **b** $x = 2, y = -1$

c $x = 4, y = -3$ **d** $x = -2, y = -2$

e $x = \frac{1}{2}, y = -2$ **f** $x = 0, y = 5$

g $x = 1\frac{1}{2}, y = 3$ **h** $x = -\frac{1}{4}, y = 2$

i $x = -3, y = -\frac{1}{2}$ **j** $x = 4\ y = -7$

3 **a** $x = 4, y = 2$ **b** $x = 5, y = -2$

c $x = 3, y = 2$ **d** $c = 1, d = 3$

e $p = \frac{32}{17}, q = \frac{11}{17}$ **f** $x = 8, y = 6$

4 **a** $x = 0, y = 1$ **b** $x = -2, y = 1$

c $x = 2, y = 2$ **d** $x = -1, y = -5$

5 **a** $x = -5, y = -3$ **b** $x = 1.7, y = 0.3$

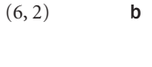
c $x = 1.4, y = 1.1$ **d** $x = 1, y = 2$

6 **a** $x = 8, y = 5$ **b** £1.70, 80p

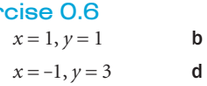
c £22, £15

Exercise 0.7

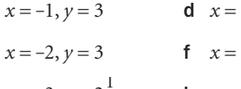
1 **a**



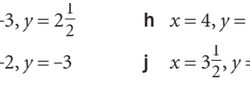
b



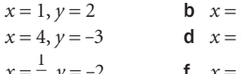
c



d



e

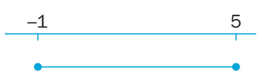


f

g

h

i



j

2 **a**

b

c

d

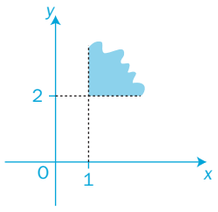
e

f

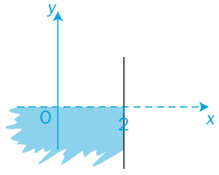
g

h

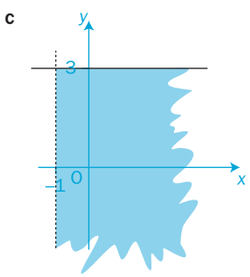
3 **a**



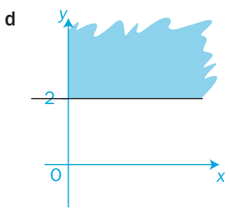
b



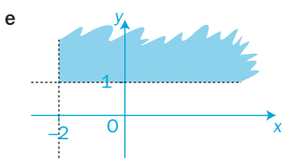
c



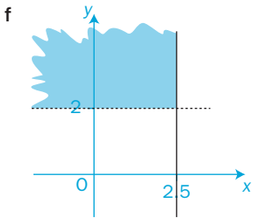
d



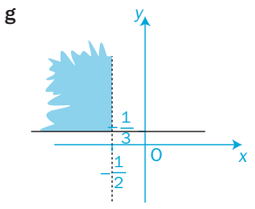
e



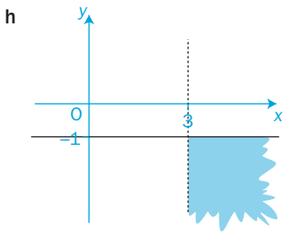
f



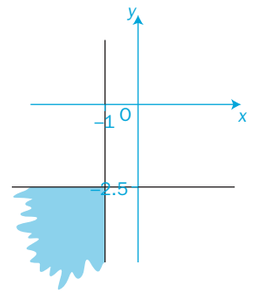
g



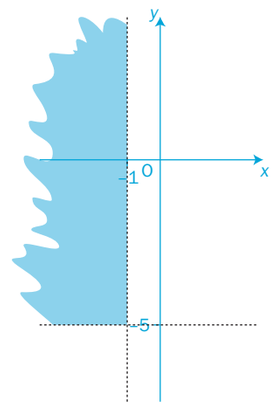
h



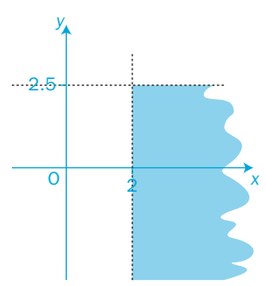
i



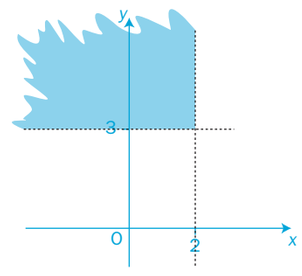
j



k



l



Exercise 0.8

1 **a** $a = 74°$ **b** $b = 125°$ **c** $c = 58°$

d $d = 105°, e = 72°$ **e** $f = 34°$

f $g = 43°, h = 74°, i = 63°$

2 **a** $a = 65°$ **b** $b = 67°, c = 23°, d = 23°$
c $e = 68°$ **d** $f = 52°, g = 35°, h = 52°$
e $i = 72°, j = 108°, k = 108°$
f $l = 88°, m = 46°$ **g** $n = 47°$ **h** $p = 18°$

3 **a** $COB = 118°$
b $DBA = 42°, BDC = 42°, BEC = 84°$
c $ACD = 33°, CDA = 114°, CBA = 66°, CAP = 114°$
d $BAD = 68°, ABC = 90°, BCD = 112°, CDA = 90°$

Exercise 0.9

1 **a** 5 cm **b** 13.6 m **c** 14.3 cm
d 4.06 cm **e** 22.2 mm **f** 22.4 m
g 7.52 m **h** 14.1 m

2 **a** 36.9° **b** 48.2° **c** 66.4°
d 45° **e** 48.2° **f** 30°
g 31.2° **h** 6°

3 **a** 57° **b** 110 m **c** 13 cm
d 6.38, 16.3 cm **e** 27.4 cm
f 58.2 cm **g** 345°

4 **a** 68.2° **b** 59.3° **c** 6.09h metres
d 54.39°, 14.76 cm **e** 7.71 m

Review 0

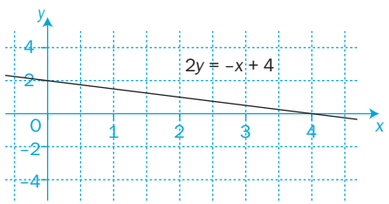
1 **a** $-b + 3c$ **b** $-4a - b$
c $2pq - p - q$ **d** $-a + 3b$
e $x^2 - 3x - 10$ **f** $4x^2 - 9$
g $3y^2 - 7y + 4$ **h** $6y^2 + 10y - 4$
i $x^4 + 2x^3 - 3x^2$ **j** $x^3 + 3x^2 - x - 3$
k $x^3 + 2x^2 - x - 2$ **l** $x^3 + 9x^2 + 26x + 24$

2 **a** 2 **b** 100 **c** $\frac{13}{10}$ **d** 3

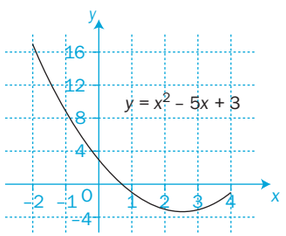
3 **a** $L = 2450$ **b** $r = 3$ **c** $R = 2$

4 **a** $t = \frac{1}{2}$ **b** $p = \frac{5}{4}$ **c** $r = 3$ **d** $y = -\frac{1}{15}$

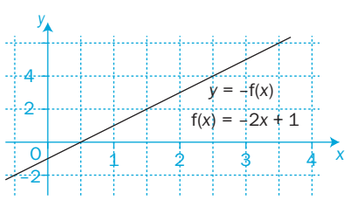
5 **a**



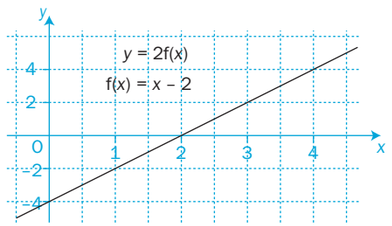
b



c



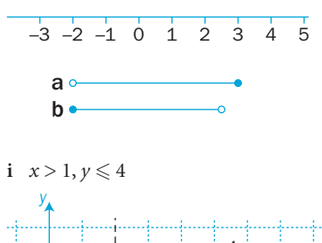
d



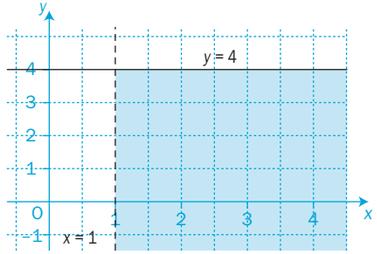
6 **a** $x = -1, y = 3$ **b** $x = -2, y = 2$
c $x = \frac{1}{2}, y = -2$ **d** $x = 4, y = 2\frac{1}{2}$
e $x = -23, y = -17$ **f** $x = 2, y = -2\frac{1}{2}$
g $x = -2, y = 5$ **h** $x = 1, y = 4$

7 **a** $x = 4, y = 2$ **b** $x = \frac{5}{4}, y = \frac{5}{2}$
c $x = \frac{1}{3}, y = 0$ **d** $x = 1, y = 1$

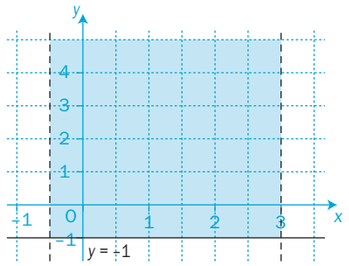
8 **a** **i** $-2 < x \leqslant 3$ **ii** $-2 \leqslant x < 2\frac{1}{2}$



b **i** $x > 1, y \leqslant 4$



ii $y \geqslant -1, -1 < x < 3$



9 **a** $x = 2, y = 3$ **b** $x = 1, y = 3$
c one solution is $a = 7, b = 5$
d region above $y = \frac{x}{2}$

10 **a** **i** 56° **ii** 112° **b** **i** 23° **ii** 65°

11 **a** 6.50 cm **b** 79.6°, 100.4°