

UNIT 7 ANSWERS

UNIT 7: NUMBER 7

EXERCISE 1

- 1 ▶ $\frac{9}{16}$ 2 ▶ $\frac{5}{32}, \frac{3}{8}$ 3 ▶ $\frac{3}{20}, \frac{5}{64}$
 4 ▶ $\frac{3}{40}, \frac{7}{80}, \frac{9}{25}, \frac{9}{24}$ 5 ▶ $\frac{1}{3}$ 6 ▶ $\frac{4}{9}$
 7 ▶ $\frac{5}{9}$ 8 ▶ $\frac{2}{3}$ 9 ▶ $\frac{7}{9}$ 10 ▶ 1
 11 ▶ $\frac{7}{90}$ 12 ▶ $\frac{1}{90}$ 13 ▶ $\frac{1}{30}$ 14 ▶ $\frac{1}{45}$
 15 ▶ $\frac{1}{18}$ 16 ▶ $\frac{1}{15}$ 17 ▶ $\frac{73}{99}$ 18 ▶ $\frac{5}{3}$

EXERCISE 1*

- 1 ▶ $\frac{8}{33}$ 2 ▶ $\frac{38}{99}$ 3 ▶ $\frac{10}{33}$ 4 ▶ $\frac{31}{33}$
 5 ▶ $9\frac{19}{990}$ 6 ▶ $8\frac{29}{990}$ 7 ▶ $\frac{3}{110}$ 8 ▶ $\frac{2}{55}$
 9 ▶ $\frac{412}{999}$ 10 ▶ $\frac{101}{999}$ 11 ▶ $\frac{128}{333}$ 12 ▶ $\frac{158}{333}$
 13 ▶ $\frac{11}{90}$ 14 ▶ $\frac{13}{15}$ 15 ▶ $\frac{28}{495}$ 16 ▶ $\frac{31}{198}$
 17 ▶ $0.0\dot{3}7$ 18 ▶ $0.01\dot{6}$

EXERCISE 2

- 1 ▶ 7.47 2 ▶ 4.35 3 ▶ 49.6
 4 ▶ 6.89×10^{-4} 5 ▶ 0.266
 6 ▶ 2 200 000 7 ▶ 1.29 8 ▶ 5.83
 9 ▶ 24.7 10 ▶ 0.0305 11 ▶ 31 000
 12 ▶ 0.377 13 ▶ 145 14 ▶ 4.93
 15 ▶ 2.38
 16 ▶ a 82.4°F b $C = \frac{5F - 160}{9}$ c 40°C

EXERCISE 2*

- 1 ▶ 0.170 2 ▶ 1.55×10^{-12} 3 ▶ 115
 4 ▶ 2.00 5 ▶ 2.39 6 ▶ 3.47
 7 ▶ 6.04 8 ▶ 0.0322 9 ▶ 2.74
 10 ▶ 0.997 11 ▶ 12.1 12 ▶ 1.46
 13 ▶ $x = 0.211$ or 2.07
 14 ▶ a 11 180 m/s b 5016 m/s
 15 ▶ a $r = \sqrt{\frac{Gm_1m_2}{F}}$ b 1.5×10^{11} m
 16 ▶ 13.3

ACTIVITY 1

- 1 ▶ a 120 b 720 c 5040
 d 5 e 90 f 9900
 2 ▶ a 6 b 1 728 000 000 c 27
 d π e 6.72 f 2.67
 3 ▶ a $x = 10$ b $x = 3$ or 4
 c $x = 4$ d $x = 8$

$$\begin{aligned} 4 \triangleright \frac{n!}{(n-2)!} &= \frac{n(n-1)(n-2)!}{(n-2)!} \\ &= n(n-1) \\ &= n^2 - n \end{aligned}$$

EXERCISE 3

REVISION

- 1 ▶ a $\frac{2}{9}$ b $\frac{7}{90}$ c $\frac{23}{99}$
 2–4 ▶ Students' own answers
 5 ▶ a 9.11 b 79 500 c 12.4
 6 ▶ $v = 12$
 7 ▶ a $T = \frac{D}{S}$ b 192 seconds
 8 ▶ a 4654 m b 179 107 m

EXERCISE 3*

REVISION

- 1 ▶ a $\frac{7}{9}$ b $\frac{1}{90}$ c $\frac{67}{99}$ d $3\frac{1}{22}$
 2–4 ▶ Students' own answers
 5 ▶ a 0.991 b 404 c 3.30
 6 ▶ 8.28
 7 ▶ a £950 b $P = \frac{10(D-B)}{N}$ c £700
 8 ▶ £1478.18

EXAM PRACTICE: NUMBER 7

- 1 ▶ a $\frac{8}{9}$ b $\frac{85}{99}$ c $\frac{754}{999}$
 d $\frac{79}{3330}$ e $\frac{11}{15}$ f $3\frac{7}{330}$
 2 ▶ a 0.464 b 0.0752 c 13.2
 3 ▶ 26.0
 4 ▶ Students' own answers

UNIT 7: ALGEBRA 7

EXERCISE 1

- 1 ▶ -1, -2 2 ▶ 2, -3
 3 ▶ -2, -5 4 ▶ 5, -3
 5 ▶ 3, 3 6 ▶ 2, -6
 7 ▶ 0, -1 8 ▶ 4, 0
 9 ▶ 2, -2 10 ▶ 7, -12

EXERCISE 1*

- 1 ▶ -1, -5 2 ▶ 4, 1
 3 ▶ -7, -8 4 ▶ 9, -5
 5 ▶ 7, 7 6 ▶ 8, -5
 7 ▶ 13, 0 8 ▶ 0, -17
 9 ▶ 13, -13 10 ▶ 11, -13

EXERCISE 2

- 1 ▶ $-\frac{9}{4}, \frac{9}{4}$ 2 ▶ 0, -2
 3 ▶ 1, 0 4 ▶ 3, 2
 5 ▶ $2, \frac{1}{2}$ 6 ▶ -1, -2
 7 ▶ $\frac{5}{3}, 0$ 8 ▶ 3, -2
 9 ▶ $-\frac{2}{3}, -2$ 10 ▶ $\frac{2}{3}, -4$

EXERCISE 2*

1 ► $-2\frac{2}{3}, 2\frac{2}{3}$

3 ► $2, \frac{3}{2}$

5 ► $-\frac{1}{4}, -\frac{1}{2}$

7 ► $7, -\frac{4}{3}$

9 ► $7, \frac{1}{4}$

2 ► $\frac{3}{2}, 0$

4 ► $\frac{3}{2}, -\frac{1}{3}$

6 ► $5, \frac{2}{5}$

8 ► $-5, -5$

10 ► $\frac{5}{3}, \frac{5}{3}$

EXERCISE 3

1 ► $(x+1)^2 + 2$

3 ► $(x-2)^2 - 2$

5 ► $(x+\frac{3}{2})^2 - \frac{5}{4}$

7 ► $(x-\frac{7}{2})^2 - \frac{53}{4}$

2 ► $(x+3)^2 - 13$

4 ► $(x-5)^2 - 28$

6 ► $(x+\frac{5}{2})^2 - \frac{37}{4}$

8 ► $(x-\frac{9}{2})^2 - \frac{73}{4}$

EXERCISE 3*

1 ► $(x-3)^2 - 8$

3 ► $(x+\frac{5}{2})^2 - \frac{73}{4}$

5 ► $(x-\frac{9}{2})^2 - \frac{85}{4}$

7 ► $(x+\frac{15}{2})^2 - \frac{257}{4}$

2 ► $(x-6)^2 - 33$

4 ► $(x-\frac{7}{2})^2 - \frac{101}{4}$

6 ► $(x-\frac{11}{2})^2 - \frac{33}{4}$

8 ► $(x+p)^2 - (p^2 - 3)$

EXERCISE 4

1 ► $3(x+1)^2 - 8$

3 ► $6(x-1)^2 - 14$

5 ► $-(x-1)^2 + 5$

2 ► $2(x+\frac{3}{2})^2 - \frac{7}{2}$

4 ► $2(x-\frac{5}{2})^2 - \frac{15}{2}$

6 ► $-(x+\frac{3}{2})^2 + \frac{21}{4}$

EXERCISE 4*

1 ► $2(x+4)^2 - 28$

3 ► $5(x-\frac{6}{5})^2 - \frac{11}{5}$

5 ► $-4(x+2)^2 + 19$

2 ► $2(x+\frac{5}{4})^2 + \frac{81}{8}$

4 ► $-(x-3)^2 + 14$

6 ► $-6(x-\frac{3}{2})^2 + \frac{45}{2}$

EXERCISE 5

1 ► 1.45, -3.45

3 ► 1.46, -5.46

5 ► 0.791, -3.79

7 ► 6.90, -2.90

9 ► -0.184, -1.82

2 ► $1 + \sqrt{7}, 1 - \sqrt{7}$

4 ► $-5 + \sqrt{10}, -5 - \sqrt{10}$

6 ► $\frac{7}{2} + \sqrt{\frac{29}{4}}, \frac{7}{2} - \sqrt{\frac{29}{4}}$

8 ► $-\frac{3}{2} + \sqrt{\frac{17}{4}}, -\frac{3}{2} - \sqrt{\frac{17}{4}}$

10 ► $\frac{5}{2} + \sqrt{\frac{35}{4}}, \frac{5}{2} - \sqrt{\frac{35}{4}}$

EXERCISE 5*

1 ► 5.83, 0.172

3 ► 1.77, -6.77

5 ► 9.11, -0.110

7 ► 3.39, -0.886

9 ► 1.09, -0.522

2 ► $6 + \sqrt{33}, 6 - \sqrt{33}$

4 ► $\frac{7}{2} + \sqrt{\frac{101}{4}}, \frac{7}{2} - \sqrt{\frac{101}{4}}$

6 ► $4 + \sqrt{14}, 4 - \sqrt{14}$

8 ► $-\frac{6}{5} + \sqrt{\frac{11}{25}}, -\frac{6}{5} - \sqrt{\frac{11}{25}}$

10 ► No solutions

EXERCISE 6

1 ► -1, -2

3 ► 5.45, 0.551

5 ► 1.46, -5.46

7 ► 3.33, -2

9 ► 1.35, 0.524

2 ► 1.45, -3.45

4 ► 4.45, -0.449

6 ► 8.16, 1.84

8 ► 0.643, -1.24

10 ► 0.402, -0.210

EXERCISE 6*

1 ► 5.65, 0.354

3 ► 1.46, -5.46

5 ► 9, -2.5

7 ► 2.85, -3.85

9 ► 1.12, -1.42

2 ► 1.77, -6.77

4 ► 4.44, 0.564

6 ► 1.85, -0.180

8 ► 5.37, 0.105

10 ► 1.16, -2.16

ACTIVITY 1

$ax^2 + bx + c = 0$

$x^2 + \frac{b}{a}x + \frac{c}{a} = 0$ (Divide both sides by a)

$(x + \frac{b}{2a})^2 - (\frac{b}{2a})^2 + \frac{c}{a} = 0$ (Completing the square)

$(x + \frac{b}{2a})^2 = (\frac{b}{2a})^2 - \frac{c}{a}$ (Rearranging)

$(x + \frac{b}{2a})^2 = \frac{b^2}{4a^2} - \frac{c}{a}$ (Squaring the fraction)

$(x + \frac{b}{2a})^2 = \frac{b^2 - 4ac}{4a^2}$ (Simplifying)

$x + \frac{b}{2a} = \pm \sqrt{\frac{b^2 - 4ac}{4a^2}}$ (Square rooting both sides)

$x + \frac{b}{2a} = \pm \frac{\sqrt{b^2 - 4ac}}{2a}$ (Square rooting fraction)

$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ (Rearranging and simplifying)

EXERCISE 7

1 ► **a** 2 s and 5s **c** 7 s

2 ► 12 and 18, -12 and -18

3 ► 4.18 cm by 7.18 cm

4 ► 2.32

5 ► 14 or -15

6 ► 5.41 cm, 8.41 cm

7 ► 3 cm

8 ► **b** 7 and 8, -8 and -7

9 ► 25.9 cm²

10 ► **a** 1414

b $\frac{n(n+1)}{2} = 1\,000\,000$ doesn't have an integer solution.

EXERCISE 7*

1 ► **a** 0.517 s, 3.48 s

b 4.05 s

2 ► 4 cm

3 ► **b** 7 and 9, -9 and -7

4 ► 14

5 ► 4.5 m by 6 m

6 ► 4.86 m

7 ► 4.83 m

8 ► 32 s

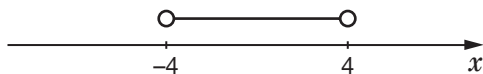
9 ► **a** 38

b $\frac{n(n-3)}{2} = 406$ doesn't have an integer solution.

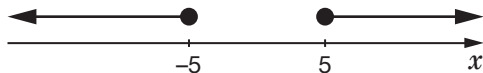
10 ► 6 days

EXERCISE 8

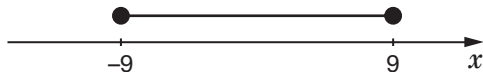
1 ▶ $-4 < x < 4$



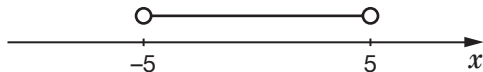
2 ▶ $x \leq -5$ or $x \geq 5$



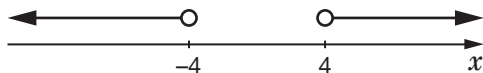
3 ▶ $-9 \leq x \leq 9$



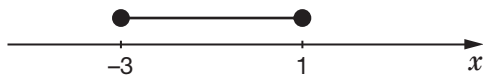
4 ▶ $-5 < x < 5$



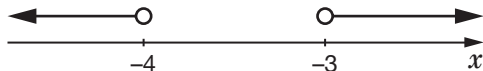
5 ▶ $x < -4$ or $x > 4$



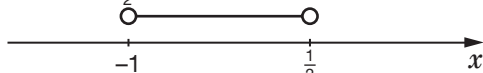
6 ▶ $-3 \leq x \leq 1$



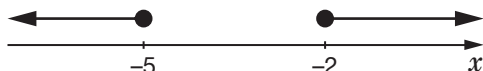
7 ▶ $x < -4$ or $x > -3$



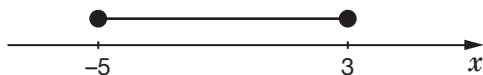
8 ▶ $-1 < x < \frac{1}{2}$



9 ▶ $x \leq -5$ or $x \geq -2$



10 ▶ $-5 \leq x \leq 3$



EXERCISE 8*

1 ▶ $x \leq -2$ or $x \geq 2$



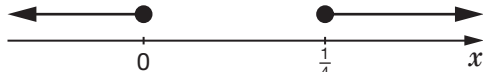
2 ▶ $x < 3$ or $x > 7$



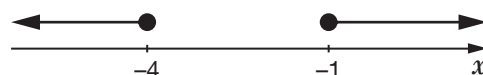
3 ▶ $x \leq -\frac{5}{3}$ or $x \geq 4$



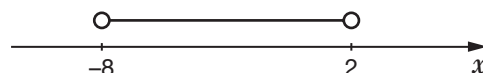
4 ▶ $x \leq 0$ or $x \geq \frac{1}{4}$



5 ▶ $x \leq -4$ or $x \geq -1$



6 ▶ $-8 < x < 2$



7 ▶ $-13 < \text{smaller number} < 6$

8 ▶ $x < \frac{1}{2}$ or $x > 1$



9 ▶ $6 < \text{width} < 8$

10 ▶ $0 < \text{width} < 3$ or $\text{width} > 4$

EXERCISE 9

REVISION

1 ▶ a $x = -5$ or $x = 5$

b $x = -4$ or $x = 0$

2 ▶ a $x = 3$ or $x = -4$

b $x = 3$ or $x = -2$

c $x = \frac{2}{3}$ or $x = -1$

3 ▶ a $-2 + \sqrt{7}$, $-2 - \sqrt{7}$

b $2 + \sqrt{5}$, $2 - \sqrt{5}$

c $-3 - \sqrt{13}$, $-3 + \sqrt{13}$

4 ▶ a $x = -1.24$ or $x = 3.24$

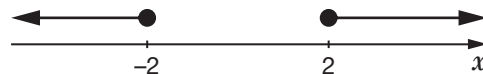
b $x = 0.232$ or $x = 1.43$

5 ▶ 1.70

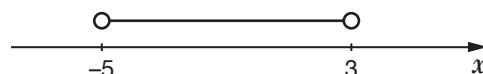
6 ▶ b 8 and 9, -9 and -8

7 ▶ 11.13 cm and 18.87 cm (to 2 d.p.)

8 ▶ a $x \leq -2$ or $x \geq 2$



b $-5 < x < 3$



EXERCISE 9*

REVISION

1 ▶ a $x = -4.47$ or $x = 4.47$

b $x = 0$ or $x = 9$

2 ▶ a $x = -9$ or $x = 8$

b $x = -4$ or $x = 6$

c $x = -2.5$ or $x = 0.75$

3 ▶ a $3 - \sqrt{11}, 3 + \sqrt{11}$

b $\frac{-5 + \sqrt{21}}{4}, \frac{-5 - \sqrt{21}}{4}$

c $\frac{7 + \sqrt{53}}{2}, \frac{7 - \sqrt{53}}{2}$

4 ▶ a $x = -0.573$ or $x = 2.91$

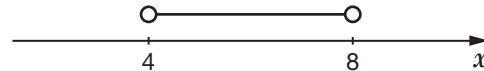
b $x = -4.46$ or $x = 0.459$

5 ▶ width 5, length 6

6 ▶ 3.68

7 ▶ 14.8 cm

8 ▶ a $4 < x < 8$



b $x \leq -2.32$ or $x \geq 4.32$



EXAM PRACTICE: ALGEBRA 7

1 ▶ a $x = 5$ or -5

b $x = \frac{2}{3}$ or -1

c $x = -\frac{1}{2}$ or 3

2 ▶ a $(x - 4)^2 - 5$

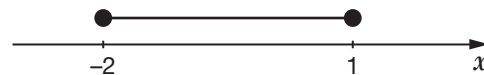
b $x = 4 + \sqrt{5}$ or $4 - \sqrt{5}$

3 ▶ a $x = 0.618$ or $x = -1.62$ (3 s.f.)

b $x = 1.71$ or $x = 0.293$ (3 s.f.)

4 ▶ a $x > 3$ or $x < -3$

b $-2 \leq x \leq 1$



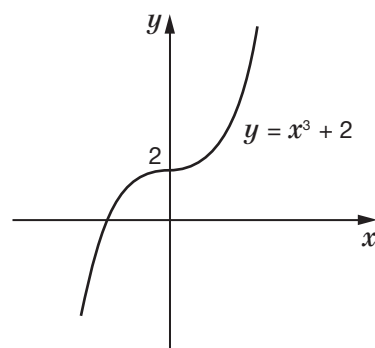
5 ▶ a $x(x + 2) = 6$ b $x = 1.65$

6 ▶ 6.79 cm

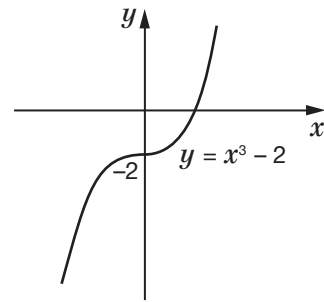
UNIT 7: GRAPHS 6

EXERCISE 1

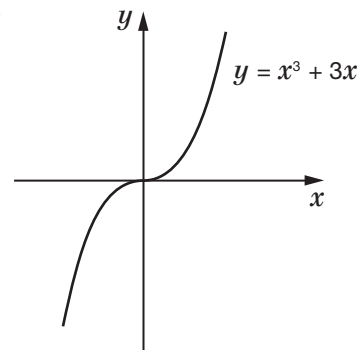
1 ▶



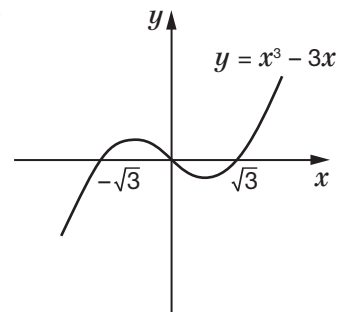
2 ▶



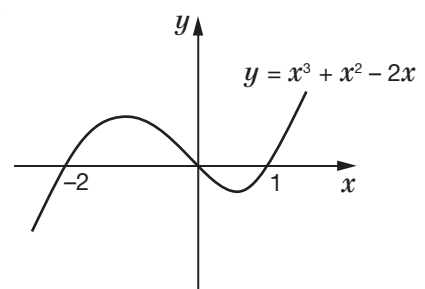
3 ▶



4 ▶

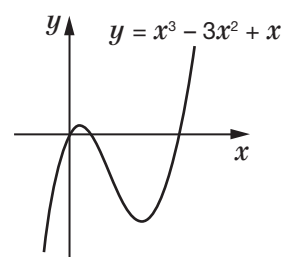


5 ▶



6 ▶

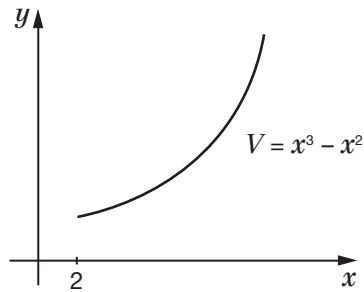
x	-2	-1	0	1	2	3
y	-22	-5	0	-1	-2	3



7 ▶ a $V = x^2(x - 1) = x^3 - x^2$

b

x	2	2.5	3	3.5	4	4.5	5
V	4	9.4	18	30.6	48	70.9	100



c 48 m^2

d 4.6 m by 4.6 m by 3.6 m

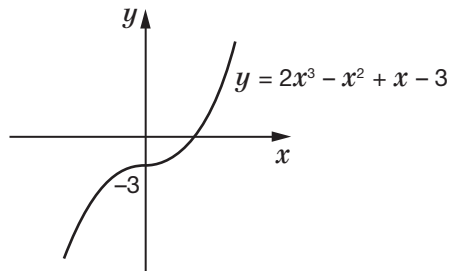
8 ▶ a

x	0	1	2	3	4	5
y	8	17	16	11	8	13

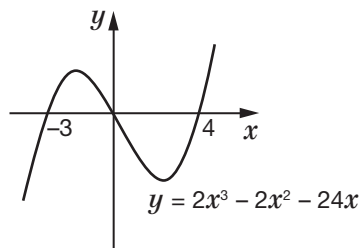
b 9.5 m

EXERCISE 1*

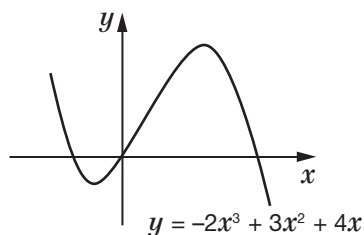
1 ▶



2 ▶

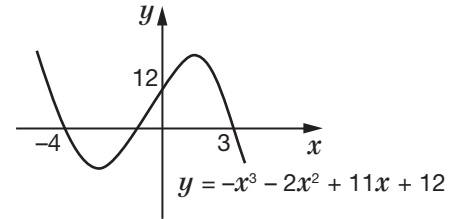


3 ▶



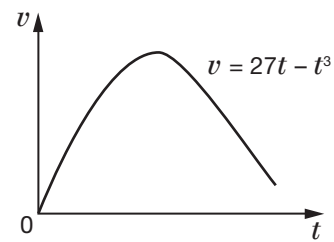
4 ▶

x	-4	-3	-2	-1	0	1	2	3	4
y	0	-12	-10	0	12	20	18	0	-40



5 ▶

v	0	1	2	3	4	5
t	0	26	46	54	44	10



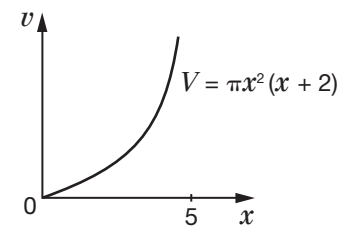
b $v_{\max} = 54 \text{ m/s}$ and occurs at $t = 3 \text{ s}$

c $v \geq 30 \text{ m/s}$ when $1.2 \geq t \geq 4.5$ so for about 3.3 s

6 ▶ a $V = \pi x^3 + \frac{1}{3}\pi x^2 \times 6 = \pi x^3 + 2\pi x^2 = \pi x^2(x + 2)$

b

x	0	1	2	3	4	5
V	0	3π	16π	45π	96π	175π



c When $x = 3.5 \text{ cm}$, $V \approx 212 \text{ cm}^3$

d When $V = 300 \text{ cm}^3$, $x \approx 4 \text{ cm}$
 $\Rightarrow A \approx 100.5 \text{ cm}^3$

7 ▶ a $A = 100\pi = 2\pi r^2 + 2\pi r h$

$\Rightarrow 100\pi - 2\pi r^2 = 2\pi r h$

$\Rightarrow \frac{50}{r} - r = h$

$\Rightarrow V = \pi r^2 h = \pi r^2 \left(\frac{50}{r} - r \right) = 50\pi r - \pi r^3$

b

r	0	1	2	3	4	5	6	7
V	0	153.9	289.0	386.4	427.3	392.7	263.9	22.0

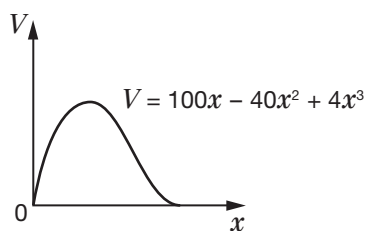
c $V_{\max} \approx 428 \text{ cm}^3$

d When $V = 428 \text{ cm}^3$, $r \approx 4 \text{ cm}$
 $\Rightarrow d \approx 8 \text{ cm}$ and $h \approx 8.5 \text{ cm}$

8 ► b $V = (10 - 2x)(10 - 2x)x$
 $= 100x - 40x^2 + 4x^3$

c

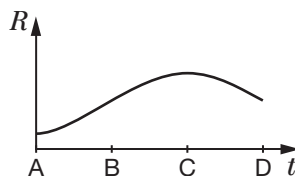
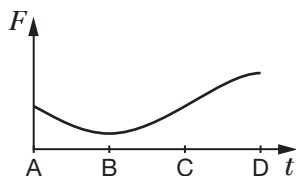
x	0	1	2	3	4	5
y	0	64	72	48	16	0



d $V_{\max} \approx 74 \text{ cm}^3$, 1.6 cm by 6.66 cm by 6.66 cm

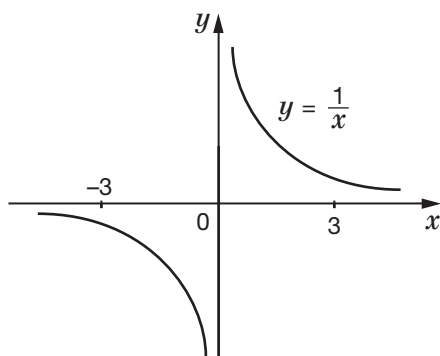
ACTIVITY 1

Year interval	Fox numbers	Rabbit numbers	Reason
A–B	Decreasing	Increasing	Fewer foxes to eat rabbits
B–C	Increasing	Increasing	More rabbits attract more foxes into the forest
C–D	Increasing	Decreasing	More foxes to eat rabbits so rabbit numbers decrease
D–A	Decreasing	Decreasing	Fewer rabbits to be eaten by foxes so fox numbers decrease



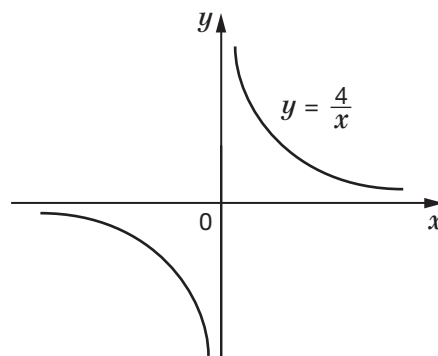
ACTIVITY 2

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

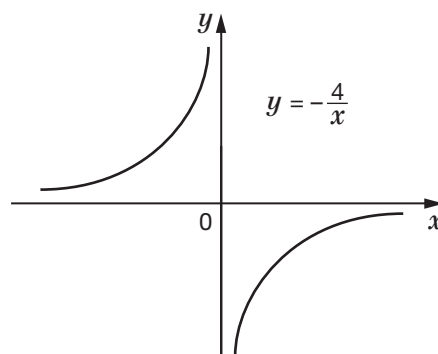


EXERCISE 2

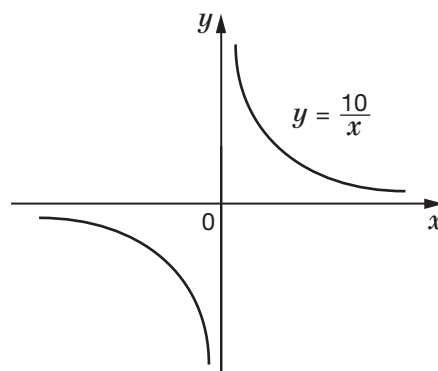
1 ►



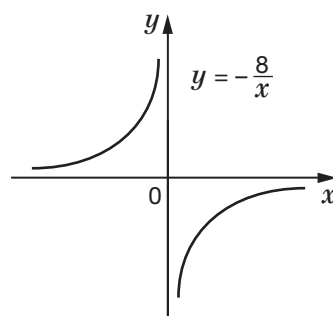
2 ►



3 ►

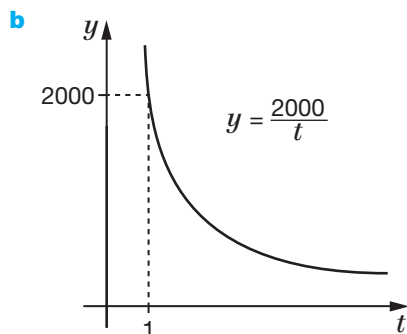


4 ►



5 ► a

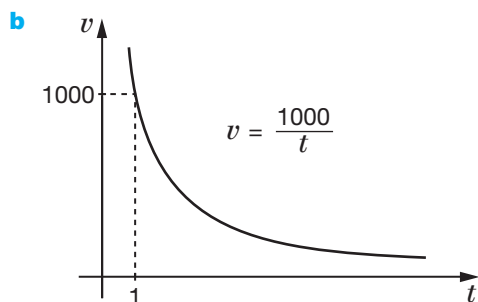
t (months)	1	2	3	4	5	6
y	2000	1000	667	500	400	333



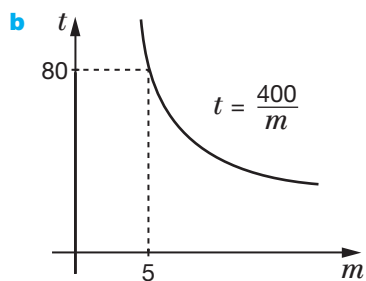
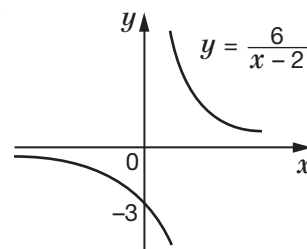
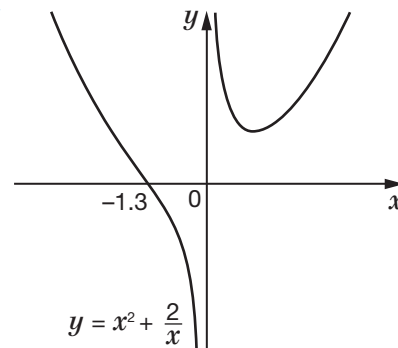
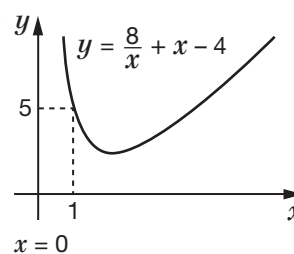
Hyperbola

c 3.3 months**d** When $3.3 < t \leq 4$, so about 2.7 months**6 ▶ a**

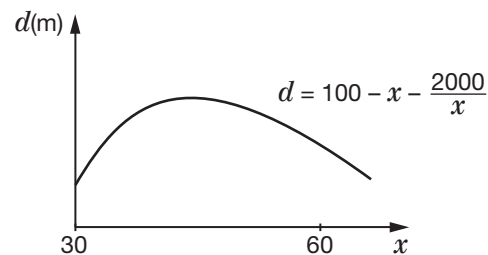
t (hours)	1	5	10	15	20
v (m ³)	1000	200	100	67	50

**c** 4 hours**d** 62.5 m³**7 ▶ a** $k = 400$

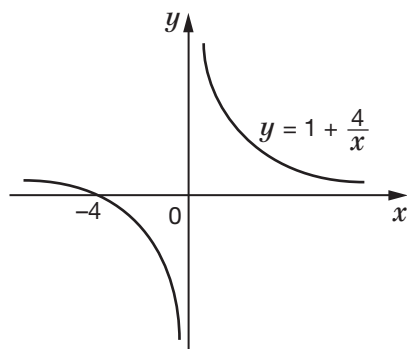
m (min)	5	6	7	8	9	10
t (°C)	80	67	57	50	44	40

**c** 53 °C**d** 6 min 40 s**e** $5.3 \leq m \leq 8$ **2 ▶** $x = 2$ **3 ▶** $x = 0$ **4 ▶** $x = 0$ **5 ▶ a**

x (°)	30	35	40	45	50	55	60
d (m)	3.3	7.9	10	10.6	10	8.6	6.7

b**c** 10.6 m at $x \approx 45^\circ$ **d** $37^\circ \leq x \leq 54^\circ$

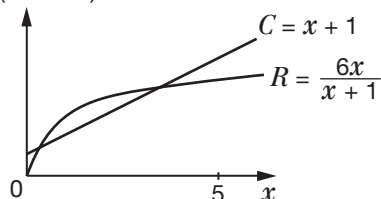
EXERCISE 2*

1 ▶ $x = 0$

6 ▶ a

x	0	1	2	3	4	5
R	0	3	4	4.5	4.8	5

x	1	3	5
C	2	4	6

 R, C (£1000's)

b $P > 0$ when $0.27 < x < 3.7$ so between 27 and 370 boards per week

c £1100 when $x = 1.45$ so 145 boards hired out

7 ▶ a Volume = $\pi r^2 h$

$$50 = \pi r^2 h$$

$$\frac{50}{\pi r^2} = h$$

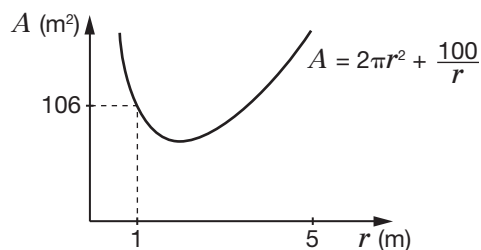
$$\text{Area} = 2\pi r^2 + 2\pi r h$$

$$A = 2\pi r^2 + 2\pi r \frac{50}{\pi r^2}$$

$$A = 2\pi r^2 + \frac{100}{r}$$

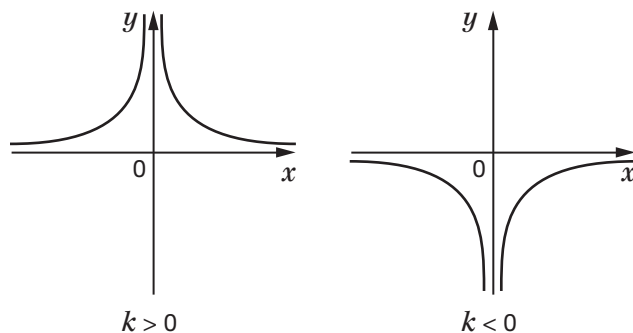
b

r (m)	1	2	3	4	5
A (m ²)	106	75	90	126	177



c $A \approx 75 \text{ m}^2$ at $r \approx 2.0 \text{ m}$

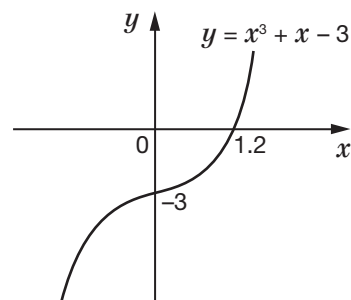
ACTIVITY 3



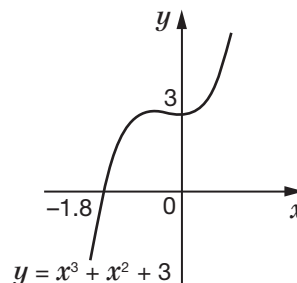
EXERCISE 3

REVISION

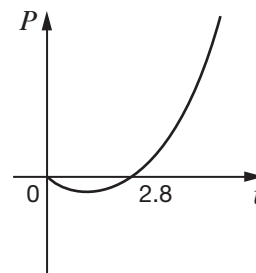
1 ▶



2 ▶



3 ▶ a



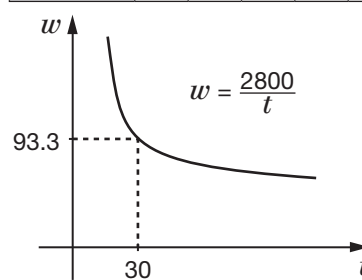
b 2.8 years

c 5.2 years

4 ▶ a $k = 2800$

t (weeks)	30	32	34	36	38	40
w (kg)	93	88	82	78	74	70

b



c 35 weeks

d Clearly after 500 weeks, for example, Nick cannot weigh 5.6 kg. So there is a domain over which the equation fits the situation being modelled.

5 ▶ a

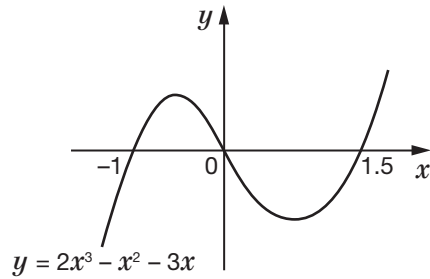
m	5	6	7	8	9	10
t	85	70.8	60.7	53.1	47.2	42.5

b $6 < m < 8.5$

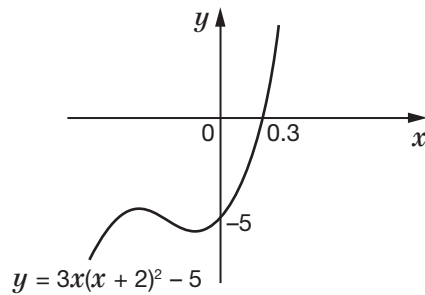
EXERCISE 3*

REVISION

1 ►



2 ►

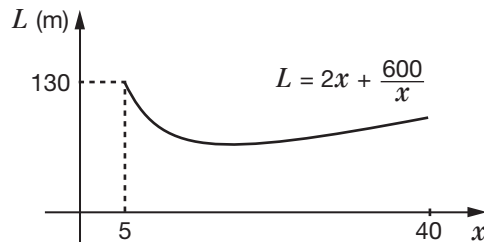


- 3 ► A: Linear B: Linear C: Quadratic
D: Reciprocal (Hyperbola) E: Cubic F: Linear

4 ► a $\frac{600}{x}$

c

x	5	10	15	20	25	30	35	40
L	130	80	70	70	74	80	87	95



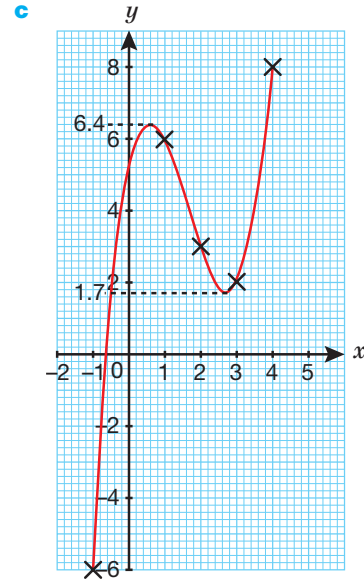
d 69.3 m at $x = 17.3$ m

e $11.6 < x < 25.9$

- 5 ► a When $x = 0$, $y = 5$
 $0 - 0 + 0 + b = 5$
 $b = 5$
 When $x = 1$, $y = 6$
 $1 - 5 + a + 5 = 6$
 $a = 5$

b

x	-1	0	1	2	3	4
y	-6	5	6	3	2	9

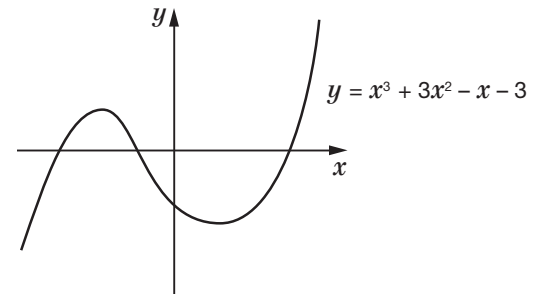


d R(0.6, 6.4), S(2.7, 1.7)

EXAM PRACTICE: GRAPHS 6

1 ► a

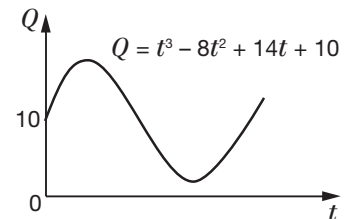
x	-5	-4	-3	-2	-1	0	1	2	3
y	-48	-15	0	3	0	-3	0	15	48



b $x = -3, -1, 1$

2 ► a

t	0	1	2	3	4	5
Q	10	17	14	7	2	5

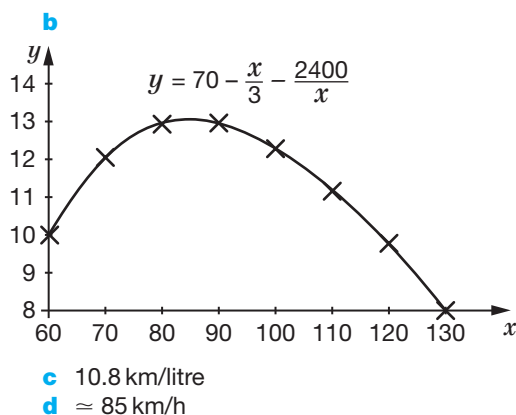


b $Q_{\max} = 17.1 \text{ m}^3/\text{s}$ at 01:06

c Between midnight and 02:35

3 ► a

x	60	70	80	90	100	110	120	130
$-\frac{x}{3}$	-20	-23.3	-26.7	-30	-33.3	-36.7	-40	-43.3
$-\frac{2400}{x}$	-40	-34.3	-30	-26.7	-24	-21.8	-20	-18.5
y	10	12.4	13.3	13.3	12.7	11.5	10	8.2



UNIT 7: SHAPE AND SPACE 7

EXERCISE 1

- 1 ▶ 20.6 cm, 25.1 cm²
- 2 ▶ 33.6 cm, 58.9 cm²
- 3 ▶ 22.3 cm, 30.3 cm²
- 4 ▶ 50.8 cm, 117 cm²
- 5 ▶ 46.8 cm, 39.5 cm²
- 6 ▶ 34.3 cm, 42.4 cm²
- 7 ▶ Radius 0.955 cm; Area 2.86 cm²
- 8 ▶ Radius 2.11 cm; Circumference 13.3 cm
- 9 ▶ 6.03 m
- 10 ▶ 7960

EXERCISE 1*

- 1 ▶ 47.0 cm, 115 cm²
- 2 ▶ 37.7 cm, 92.5 cm²
- 3 ▶ 43.7 cm, 99.0 cm²
- 4 ▶ 66.8 cm, 175 cm²
- 5 ▶ 37.7 cm, 56.5 cm²
- 6 ▶ 37.7 cm, 62.8 cm²
- 7 ▶ $r = 3.19$ cm, $P = 11.4$ cm
- 8 ▶ 16.0 m
- 9 ▶ 2 cm
- 10 ▶ **a** 40 100 km **b** 464 m/s
- 11 ▶ 6.28 km
- 12 ▶ $r = 2.41$ cm, $A = 32.3$ cm²

EXERCISE 2

- 1 ▶ 8.62 cm 2 ▶ 25.6 cm
- 3 ▶ 38.4 cm 4 ▶ 63.6 cm
- 5 ▶ 34.4° 6 ▶ 115°
- 7 ▶ 14.3 cm 8 ▶ 10.6 cm

EXERCISE 2*

- 1 ▶ 11 cm 2 ▶ 38.3 cm
- 3 ▶ 25.1° 4 ▶ 121°
- 5 ▶ 13.4 cm 6 ▶ 117 cm
- 7 ▶ 33.0 cm 8 ▶ 15.5 cm
- 9 ▶ 4.94 cm

EXERCISE 3

- 1 ▶ 12.6 cm² 2 ▶ 61.4 cm²
- 3 ▶ 170 cm² 4 ▶ 11.9 cm²
- 5 ▶ 76.4° 6 ▶ 129°
- 7 ▶ 5.86 cm 8 ▶ 8.50 cm

EXERCISE 3*

- 1 ▶ 15.8 cm² 2 ▶ 625 cm²
- 3 ▶ 53.3° 4 ▶ 103°
- 5 ▶ 4.88 cm 6 ▶ 19.7 cm
- 7 ▶ 11.5 cm² 8 ▶ 5.08 cm
- 9 ▶ 1.45 cm² 10 ▶ 6.14 cm
- 11 ▶ 2.58 cm²

EXERCISE 4

- 1 ▶ 120 cm³
- 2 ▶ 48 cm³, 108 cm²
- 3 ▶ Volume = 452 cm³ (3 s.f.);
Area = 358 cm² (3 s.f.)
- 4 ▶ 800 m³
- 5 ▶ 0.785 m³
- 6 ▶ 9.9 cm (1 d.p.)

EXERCISE 4*

- 1 ▶ 4800 cm³
- 2 ▶ 1.2×10^5 cm³, 1.84×10^4 cm²
- 3 ▶ 229 cm³, 257 cm²
- 4 ▶ 1.18 cm³, 9.42 cm²
- 5 ▶ 405 cm³, 417 cm²
- 6 ▶ 0.04 mm

EXERCISE 5

- 1 ▶ 8779 m³
- 2 ▶ 9817 cm³, 2407 cm²
- 3 ▶ Volume = 7069 cm³; Surface area = 1414 cm²
- 4 ▶ 25.1 cm³
- 5 ▶ 396 m³, 311 m²
- 6 ▶ $r = 3.5$ cm; Surface area = 154 cm² (3 s.f.)
- 7 ▶ 61 cm
- 8 ▶ 0.47 m

EXERCISE 5*

- 1 ▶ $83\frac{1}{3}$ mm³ 2 ▶ 98.2 cm³
- 3 ▶ 2150 cm³, 971 cm²
- 4 ▶ 2.92×10^5 m³ 5 ▶ 1089 cm³
- 6 ▶ 5.12×10^8 km² 7 ▶ 0.417 cm
- 8 ▶ 12 cm 9 ▶ 4.5×10^{-4} mm

EXERCISE 6

- 1 ▶ 163 cm²
- 2 ▶ **a** Angles are the same **b** 8.55 cm²
- 3 ▶ 213 cm² 4 ▶ 84.4 cm²
- 5 ▶ 6 cm 6 ▶ 3 cm
- 7 ▶ 3 cm 8 ▶ 24 cm

EXERCISE 6*

- 1 ► 675 cm² 2 ► 45 cm²
 3 ► 7.5 cm 4 ► 10 cm
 5 ► 1000 cm² 6 ► 44%
 7 ► 19% 8 ► 75 cm²
 9 ► 280 cm²

EXERCISE 7

- 1 ► 54 cm³ 2 ► 23.4 cm³
 3 ► 222 cm³ 4 ► 25.3 cm³
 5 ► 15.1 cm 6 ► 9.9 mm
 7 ► 5.06 cm 8 ► 50 cm²

EXERCISE 7*

- 1 ► 86.4 cm³ 2 ► 31.25 cm³ 3 ► 33.4 cm
 4 ► 18.6 cm 5 ► 72.8% 6 ► \$40
 7 ► a 270 g b 16 cm
 8 ► a 25 cm b 48 g
 9 ► a 270 g b 180 cm²
 10 ► a 2000 quills b 22.5 m
 c 810 cm² d 240 g

ACTIVITY 2

1 kg, 800 kg, 400 cm², 2 kg, 4 m

EXERCISE 8

REVISION

- 1 ► Area = 11.1 cm²; Perimeter = 15.1 cm
 2 ► 22.3 cm², 21.6 cm
 3 ► Volume = 288 cm³; Area = 336 cm²
 4 ► 132 m³
 5 ► 98 cm²
 6 ► 27 litres

EXERCISE 8*

REVISION

- 1 ► Area = 15.3 cm²; Perimeter = 29.7 cm
 2 ► Area = 6.98 cm²; Perimeter = 11 cm
 3 ► Volume = 453 cm³; Area = 411 cm²
 4 ► 335 cm³, 289 cm²
 5 ► 54 cm
 6 ► a \$6.75
 b 12 cm

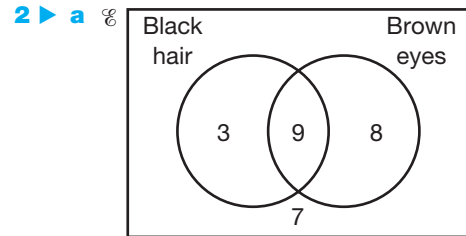
EXAM PRACTICE: SHAPE AND SPACE 7

- 1 ► 49.1 cm, 146 cm²
 2 ► Area = 133 cm², perimeter = 51.9 cm
 3 ► 1.4 m³ (1 d.p.)
 4 ► a 45 cm²
 b 7.11 cm³
 5 ► a 12.0 cm
 b 360 cm²

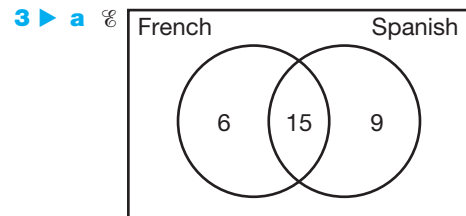
UNIT 7: SETS 3

EXERCISE 1

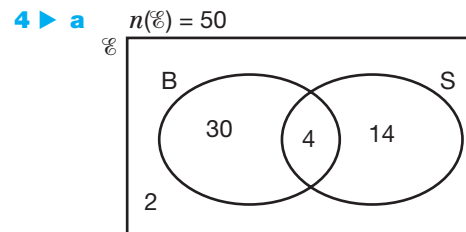
- 1 ► a $\frac{3}{35}$ b $\frac{15}{35} (= \frac{3}{7})$ c $\frac{2}{35}$



- b $\frac{9}{27} (= \frac{1}{3})$ c $\frac{3}{27} (= \frac{1}{9})$ d $\frac{7}{27}$



- b i $P(S) = \frac{24}{30} (= \frac{4}{5})$ ii $P(F \cap S) = \frac{15}{30} (= \frac{1}{2})$
 iii $P(F \cup S) = 1$ iv $P(F' \cap S) = \frac{9}{30} (= \frac{3}{10})$

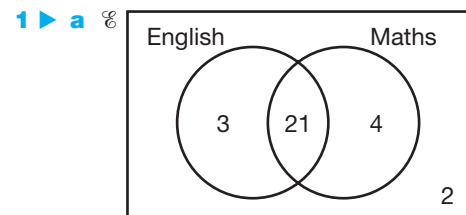


- b i $\frac{2}{25}$ ii $\frac{23}{25}$

- 5 ► a 30 b 9

- c i $\frac{1}{3}$ ii $\frac{1}{5}$ iii $\frac{2}{15}$

EXERCISE 1*

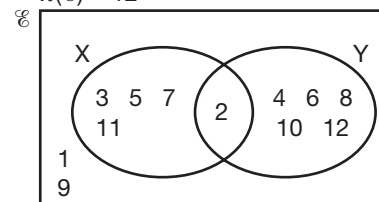


- b i $\frac{4}{5}$ ii $\frac{7}{10}$ iii $\frac{14}{15}$ iv $\frac{2}{15}$

- c Probability of failing English and passing mathematics

- 2 ► $\frac{27}{45}$

- 3 ► a $n(\mathcal{E}) = 12$



- b i $\frac{1}{6}$ ii $\frac{1}{2}$ iii $\frac{2}{3}$

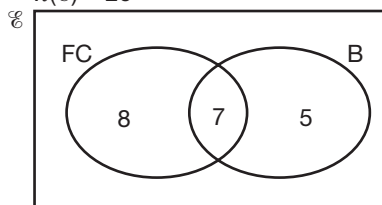
4 ► a $\frac{6}{7}$

b $\frac{1}{7}$

5 ► a $\frac{1}{3}$

EXERCISE 2

1 ► a $n(\mathcal{E}) = 20$

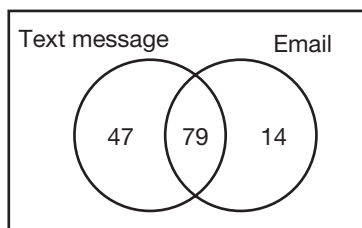


b $\frac{7}{20}$

c $\frac{2}{5}$

d $\frac{7}{15}$

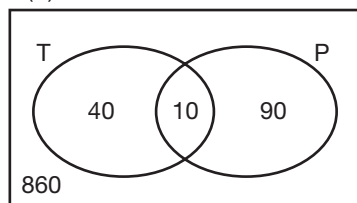
2 ► a \mathcal{E}



b $\frac{93}{140}$

c $\frac{79}{126}$

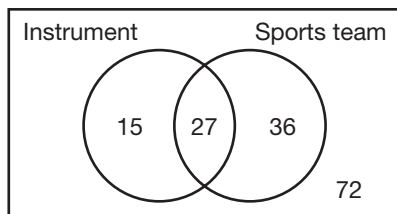
3 ► a $n(\mathcal{E}) = 1000$



b i 0.01

ii 0.1

4 ► a \mathcal{E}



b $\frac{7}{25}$

c $\frac{3}{7}$

5 ► a 7

b 40

c i $\frac{7}{40}$

ii $\frac{11}{40}$

iii $\frac{11}{13}$

EXERCISE 2*

1 ► a 12

b i $\frac{35}{70}$

ii $\frac{12}{70} (= \frac{6}{35})$

iii $\frac{27}{38}$

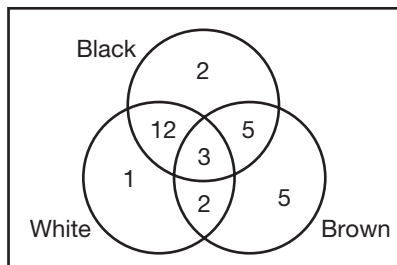
2 ► a 120

b i $\frac{31}{60}$

ii $\frac{7}{24}$

iii $\frac{10}{29}$

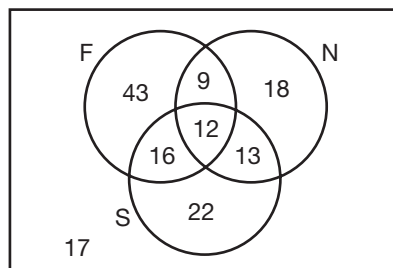
3 ► a \mathcal{E}



b $\frac{10}{30} (= \frac{1}{3})$

c $\frac{8}{22} (= \frac{4}{11})$

4 ► a \mathcal{E}



b $\frac{38}{150} (= \frac{19}{75})$

c $\frac{28}{63} (= \frac{4}{9})$

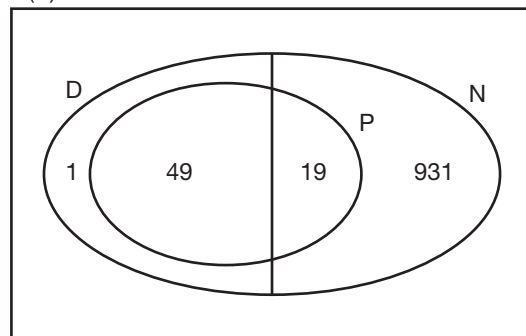
5 ► a $\frac{1}{15}$

b $\frac{1}{2}$

c $\frac{17}{31}$

ACTIVITY 1

$n(\mathcal{E}) = 1000$



Probability $(N|P) = \frac{9}{19+49} = \frac{19}{68} \approx 28\%$.

Not fair.

EXERCISE 3

REVISION

1 ► a 6 people

b 5 people

c 2 people

d 17 people

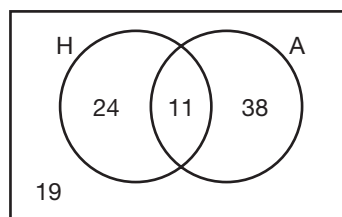
e $\frac{9}{17}$

f $\frac{4}{17}$

2 ► a $\frac{10}{21}$

b $\frac{8}{9}$

3 ► a \mathcal{E}



b $\frac{49}{92}$

c $\frac{11}{35}$

4 ► a $\frac{42}{80} (= \frac{21}{40})$

b $\frac{6}{22} (= \frac{3}{11})$

5 ► a 4

b 29

c i $\frac{4}{29}$

ii $\frac{4}{29}$

iii $\frac{6}{15} (= \frac{2}{5})$

EXERCISE 3*

REVISION

1 ► a $\frac{5}{26}$

b $\frac{19}{26}$

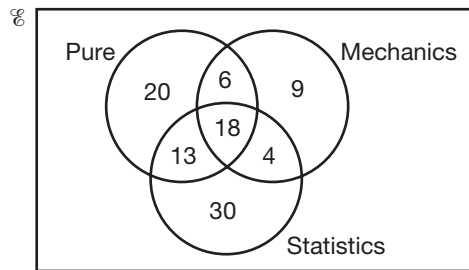
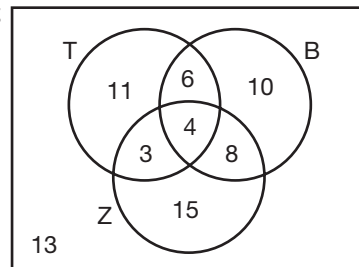
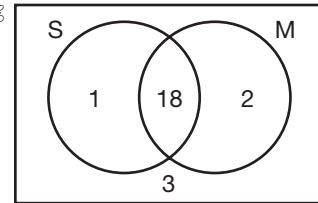
c Only sing

2 ► a $\frac{1}{10}$

b $\frac{7}{10}$

c $\frac{8}{10}$

d 0

3 ▶ a 0.35**b** 0.875**4 ▶ a****b** $\frac{33}{100}$ or 33% or 0.33**c** $\frac{22}{65}$ **5 ▶ a****b i** $\frac{57}{70}$ **ii** $\frac{12}{28} (= \frac{3}{7})$ **iii** $\frac{16}{40} (= \frac{2}{5})$ **EXAM PRACTICE: SETS 3****1 ▶ a****b i** $\frac{19}{24}$ **ii** $\frac{18}{24} (= \frac{3}{4})$ **iii** $\frac{21}{24} (= \frac{7}{8})$ **iv** $\frac{2}{24} (= \frac{1}{12})$ **2 ▶ a** $\frac{2}{7}$ **b** $\frac{5}{7}$ **3 ▶ a** 0.7**b** $\frac{4}{15}$ **4 ▶ a** 48**b i** $\frac{16}{48} (= \frac{1}{3})$ **ii** $\frac{1}{16}$ **iii** $\frac{5}{16}$ **5 ▶ a** $\frac{1}{8}$ **b** $\frac{2}{7}$