

Pages 26–27 Sequences

- 1** a 1 b 56 c $6n - 1$ d 8
2 -5
3 2, 5, 11, ... and -3, -5, -9, ...
4 1, 3, 5, ... (1 mark for first two correct)
5 a 1 b $3n$
6 $3n + 1$ (1 mark for $3n$)
7 7
8 $4n + 4$ (1 mark for $4n$)

Pages 28–29 Square numbers, primes and proof

- 1** 1, 2, 3, 4, 6, 8, 12, 24 (1 mark for 6 correct)
2 8
3 36
4 36
5 121 or 144
6 a 1, 4, 9 (1 mark for 2 correct) b 2, 3, 5, 7 (1 mark for 3 correct) c 1, 2, 5, 10
7 6, 12, 18
8 1, 2, 4
9 a Either b Either c Even d Even
10 a 2 x any number is even. b An even number plus 1 is odd.
c $2n(2m + 1) = 4nm + 2n = 2(2nm + n)$ which is a multiple of 2.
11 $n + n + 1 + n + 2 = 3n + 3 = 3(n + 1)$ which is a multiple of 3.
(1 mark for $3n + 3$, 1 mark for justification)

Pages 30–31 Algebraic manipulation 1

- 1** a $a(b + c)$, $ab + ac$ and $(c - b) \div a$
2 a $8x - 12$ b $15a^2$ c $11a + 2b$ d $5x + 25$
3 a $n + 7$ b $n + 2$ c 6
4 a $5x + 3$ b $2y + 2$
5 a $5x - 4$ b $4x$ c $x - 4$ d $x + 1$
6 a $3 + x$, $3 + 2x$, $6 + 3x$ b $2x + 3$, $4x - 8$, $4x - 11$
7 a Perimeter = $6x + 12$ b Area = $2x^2 + 6x + 9$

Pages 32–33 Algebraic manipulation 2

1 a $12a^3b^2$ **b** $10a^5b^5$ **c** $8ab^2$ **d** $4a^3b^3$

2 a $x^2 + x - 12$ **b** $x^2 + 8x + 15$ **c** $x^2 - 3x + 2$ **d** $x^2 - 2x - 8$

3 a $2x^2 + 5x - 4x - 10 = 2x^2 + x - 10$ **b i** $2x^2 + 11x + 12$ **ii** $6x^2 + x - 1$ **iii** $12x^2 - 10x - 8$

4 a $n^2, 5n, 3n, 15$ **b** $n^2 + 8n + 15$ (1 mark for $n^2 + 5n + 3n + 15$)

5 a $x^2 - 9$ **b** $x^2 - 25$ **c** $x^2 - 1$ **d** $x^2 - 16$

6 $\frac{1}{2}(2p + 10)(p + 1) = \frac{1}{2}(2p^2 + 12p + 10) = p^2 + 6p + 5$

7 Area = $2x^2 + (x + 3)(2x + 5) = 2x^2 + 2x^2 + 11x + 15 = 4x^2 + 11x + 15$

Pages 34–35 Factorisation

1 $18ab$ and $4b$

2 $5xy$ and $5xy^2$

3 $4(3a - 5)$ and $2(6a - 10)$

4 a $2xy(3xy + 12x^2)$ **b** $(x + 2)(x + 6)$

5 $2y(y^2 - 10)$, all the other expressions are the same.

6 a $5(x + 5)$ **b** $4x^2(3x - 1)$

7 a $ab(3a + 4)$ **b** $4a^2b^2(3a + b)$ **c** $2a^2b(3b^2 + 2)$ **d** $2a^2b^2(3b + 2a)$

8 a $(x - 4)(x + 3)$ **b** $(x - 5)(x - 3)$ **c** $(x + 1)(x + 2)$ **d** $(x + 6)(x - 4)$

9 a $(n + 2)$ and $(n + 5)$ **b** $(x + 4)(x - 1)$

Pages 36–37 Formulae

1 a Input 5, output 17 and Input 1, output 5

2 2.5

3 a 21 **b** 1

4 $3(x - 2)$

5 a £16 **b** £40

6 a 0.4 **b** 6 and 10

7 35 m (1 mark for $a = 7.5 \text{ ms}^{-2}$)

8 a Volume = $2360\pi \text{ cm}^3$, Area = $720\pi \text{ cm}^2$

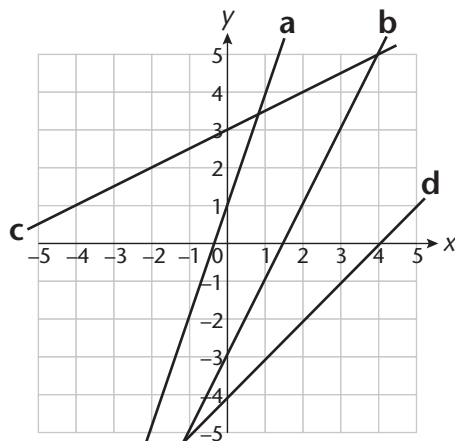
b Volume = 1610 cm^3 , Area = 795 cm^2

Pages 38–39 Graphs 1

- 1 **a** (7, 7) **b** (6, 7) **c** (21, 21) **d** (20, 21)
- 2 (0, 8), (–2, 10) and (10, –2)
- 3 (2, 3)
- 4 $y = 5$, $x + y = 2$ and $x = -3$
- 5 **a** $x = -3$ **b** $y = x$ **c** $y = 4$ **d** $x + y = -2$
- 6 **a i** $x = 1$ **ii** $y = 3$ **iii** $x + y = -2$ **b** 18 square units
- 7 $y = x - 1$
- 8 $y = 2x + 1$

Pages 40–41 Graphs 2

- 1 **a** $y = 2x + 1$ and $y = 2x - 3$ **b** $y = 2x + 1$ and $y = 4x + 1$
- 2 c, d, a, b
- 3 (3, 8) and (–2, –7)
- 4 $y = 2x - 2$
- 5



- 6 Graph C. A is unrealistic as items do not fall at a steady speed through the air. B is unrealistic as it implies that Jenny speeds up as she approaches the ground. D is unrealistic as it implies that Jenny does not descend at all.
- 7 **a** 6 km/h **b i** 3 km **ii** 10 min **c i** 5 min **ii** 12 km/h

Pages 42–43 Equations 1

1 27

2 13.5

3 a 23 **b** 27

4 a 5 **b** 21

5 a 27 **b** 15 **c** 5.4 **d** 1.8

6 a 10.5 **b** 18 **c** 17.5 **d** $3\frac{1}{3}$

7 a 14 **b** -1

8 $(2x - 5) \times 4 = (x - 4) \times 2$

$$8x - 20 = 2x - 8$$

$$8x - 2x = -8 + 20$$

$$6x = 12$$

$$6x \div 6 = 12 \div 6$$

$$x = 2 \quad (1 \text{ mark for 3 correct lines})$$

Pages 44–45 Equations 2

1 -10

2 6

3 a -7 **b** 2.5 **c** 2.7 **d** 2.25

4 a 1.5 **b** 2

5 a 2 **b** -5

6 a $x > -2$ **b** $-1 \leq x < 3$

7 $x < 14$

8 a $x \geq 4$ **b** $x > 9$

9 a $x > 2.5$ **b** $x \leq 0$

Pages 46–47 Trial and improvement

- 1** 64
2 30
3 25–30
4 14
5 26.368
6 $x(x + 3) = 40$, sides are 5 cm and 8 cm and perimeter is 26 cm.
7 4.6 (1 mark for testing a value between 4 and 5, 1 mark for testing 4.65)
8 2.3 (1 mark for testing a value between 2 and 3, 1 mark for testing 2.35)
9 a Area = $x(x + 2) = 16.64$ **b** 3.2 (1 mark for testing value above 2)

Pages 48–49 Simultaneous equations

- 1** $y = 2x - 1$ and $2y + x = 8$
2 a $2(2x + 3) + x = 11$ gives $5x + 6 = 11$ **b** $x = 1$ **c** $x = 1, y = 5$
3 a $2(2x - 1) + 2(3y + 1) = 20$ gives $2x + 3y = 10$ and $2(3x) + 2(3y - 2) = 20$ gives $x + y = 4$
b $x = 2, y = 2$
4 $x = 3, y = 5$
5 a 70p **b** 50p
6 a $2x + 1 = 4y + 5$ (1 mark), $2x - 4y = 4$ (1 mark)
b $2x + 1 + 4y + 5 + 3x + 2y = 20$ (1 mark), $5x + 6y + 6 = 20$ (1 mark)
c $x = 2.5, y = 0.25$
7 a $2x + 2y = 14, 3x + y = 16$ **b** $x = £4.50, y = £2.50$