1.

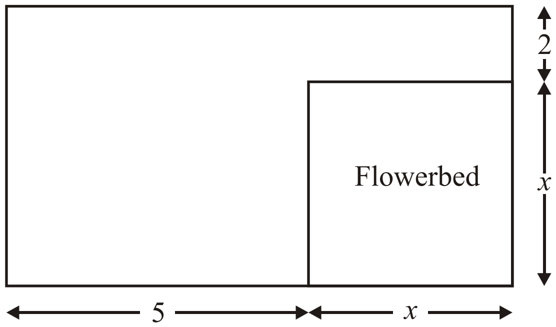


Diagram **NOT** accurately drawn

The diagram represents a garden in the shape of a rectangle.
All measurements are given in metres.
The garden has a flowerbed in one corner.
The flowerbed is a square of side x.

(a) Write down an expression, in terms of x, for the shortest side of the garden.

....

(1)

(b) Find an expression, in terms of x, for the perimeter of the garden.
Give your answer in its simplest form.

....

(2)

The perimeter of the garden is 20 metres.

(c) Find the value of x.

....
(2)
(Total 5 marks)

2. (a) Solve $7p + 2 = 5p + 8$

p = ...
(2)

(b) Solve $7r + 2 = 5(r - 4)$

r = ...
(2)
(Total 4 marks)

3. Solve $7r + 2 = 5(r - 4)$

r = ...
(Total 2 marks)

4. (a) Solve $7x + 18 = 74$

$x =$ ....

(2)

(b) Solve $4(2y - 5) = 32$

$y =$ ....

(2)

(c) Solve $5p + 7 = 3(4 - p)$

$p =$ ....

(3)

(Total 7 marks)

T□**5.** Nassim thinks of a number.
When he multiplies his number by 5 and subtracts 16 from the result, he gets the same answer as when he adds 10 to his number and multiplies that result by 3.

Find the number Nassim is thinking of.

……………………………
(Total 4 marks)

6. Martin cleaned his swimming pool.
He hired a cleaning machine to do this job.
The cost of hiring the cleaning machine was

£35.50 for the first day,
then £18.25 for each extra day.

Martin's total cost of hiring the machine was £163.25

For how many days did Martin hire the machine?

.... days
(Total 3 marks)

7. (a) Solve $20y - 16 = 18y - 9$

$y =$ ....

(3)

(b) Solve $\dfrac{40 - x}{3} = 4 + x$

$x =$ ....

(3)

(Total 6 marks)

8. Jo buys 8 cups and 8 mugs.

A cup costs £x.

A mug costs £$(x + 2)$

(a) Write down an expression, in terms of x, for the total cost, in pounds, of 8 cups and 8 mugs.

£.............................

(2)

The total cost of 8 cups and 8 mugs is £72

(b) (i) Express this information as an equation in terms of x.

....

(1)

(ii) Solve your equation to find the cost of a cup and the cost of a mug.

Cost of a cup £ ....

Cost of a mug £ ....

(4)
(Total 7 marks)

9. (a) Solve $4(2x + 1) = 2(3 - x)$

x = ...

(3)

(b) Factorise fully

$$2p^2 - 4pq$$

....

(2)

(Total 5 marks)

10. (a) Solve $4(x + 3) = 6$

x = ...

(3)

(b) Make t the subject of the formula $v = u + 5t$

t = ...

(2)

(Total 5 marks)

11. (a) Solve $5 - 3x = 2(x + 1)$

$x =$ ………………….

(3)

(b) $-3 \leq y < 3$

y is an integer.

Write down all the possible values of y.

……………………

(2)

(Total 5 marks)

12.

Cinema Ticket Prices	
Adults	£4
Child	£3

An adult ticket costs £4.
A child ticket costs £3.

(a) Write down a formula for the total cost, £T, for n adult tickets and c child tickets.

....

(3)

Hina spends £47 on cinema tickets.
She buys 8 adult tickets.

(b) Work out how many child tickets she buys.

....

(3)
(Total 6 marks)

13. Solve $5(2y + 3) = 20$

$y =$ ....
(Total 3 marks)

ìá**14.**

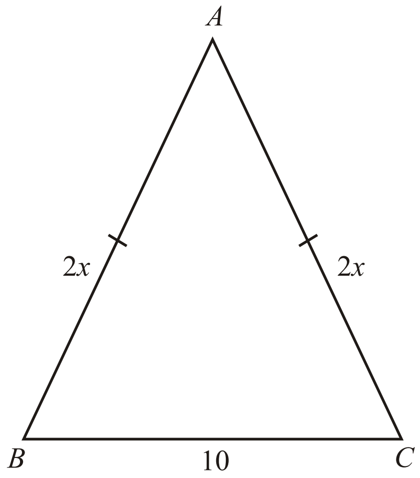


Diagram **NOT** accurately drawn

In the diagram, all measurements are in centimetres.

ABC is an isosceles triangle.
$AB = 2x$
$AC = 2x$
$BC = 10$

(a) Find an expression, in terms of x, for the **perimeter** of the triangle.
Simplify your expression.

....

(2)

The perimeter of the triangle is 34 cm.

(b) Find the value of x.

x = ...

(2)

(Total 4 marks)

15. Solve

$4y + 1 = 2y + 8$

y = ...

(Total 2 marks)

16. Solve $4x + 3 = 19$

x = ...

(Total 2 marks)

17.

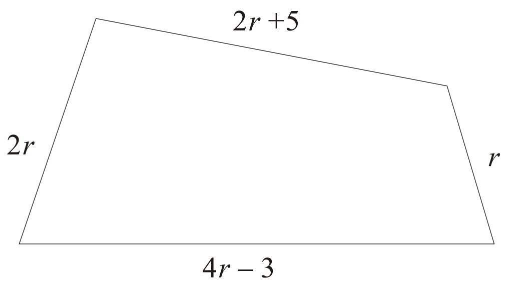


Diagram **NOT** accurately drawn

In the diagram, all measurements are in centimetres.

The lengths of the sides of the quadrilateral are

$2r + 5$
$2r$
$4r - 3$
r

(a) Find an expression, in terms of r, for the perimeter of the quadrilateral.
Give your expression in its simplest form.

....

(2)

The perimeter of the quadrilateral is 65 cm.

(b) Work out the value of r.

r = ...

(2)

(Total 4 marks)

18. Solve $6x - 5 = 2x + 9$

x = ...

(Total 3 marks)

19. (a) Solve $3(x - 4) = x + 24$

x = ...

(3)

(b) Simplify fully $(2x^3y)^4$

....

(2)
(Total 5 marks)

20. Solve $6x - 7 = 38$

x = ...

(Total 2 marks)

21. (a) Solve $6x - 7 = 38$

x = ...

(2)

(b) Solve $4(5y - 2) = 40$

$y =$ ....

(3)
(Total 5 marks)

22.

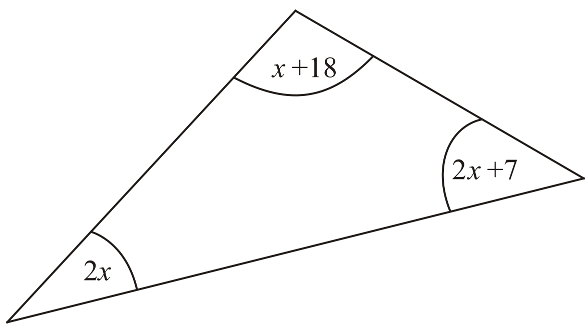


Diagram **NOT** accurately drawn

The sizes of the angles, in degrees, of the triangle are

$2x + 7$
$2x$
$x + 18$

(a) Use this information to write down an equation in terms of x.

....

(2)

(b) Use your answer to part (a) to work out the value of x.

x = ...

(2)
(Total 4 marks)

23. Solve $4y + 3 = 2y + 8$

y = ...

(Total 2 marks)

24. (a) Solve $x + x + x = 15$

x = ...

(1)

(b) Solve $4y + 1 = 12$

y = ...

(2)

(c) Simplify $cd + 2cd$

....

(1)

(d) Simplify $4p + 3q - p - 4q$

....

(2)
(Total 6 marks)

25. (a) Solve $4y + 3 = 2y + 9$

y = ...

(2)

(b) Solve $5(t - 3) = 8$

t = ...

(2)
(Total 4 marks)

26. (a) Simplify $4a + 3c - 2a + c$

....

(1)

(b) $S = \frac{1}{2}at^2$

Find the value of S when $t = 3$ and $a = \frac{1}{4}$

$S =$ ....

(2)

(c) Factorise $x^2 - 5x$

....

(2)

(d) Solve $7x - 19 = 3(x - 3)$

$x =$ ....

(3)

(Total 8 marks)

27.

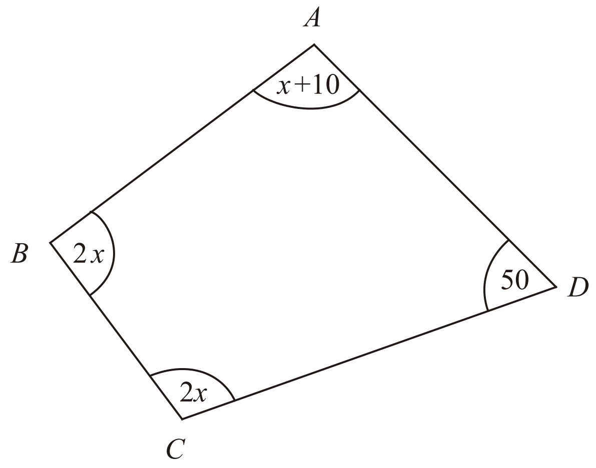


Diagram **NOT** accurately drawn

In this quadrilateral, the sizes of the angles, in degrees, are

$x + 10$
$2x$
$2x$
50

(a) Use this information to write down an equation in terms of x.

....

(2)

(b) Work out the value of x.

x = ...

(3)

(Total 5 marks)

28.

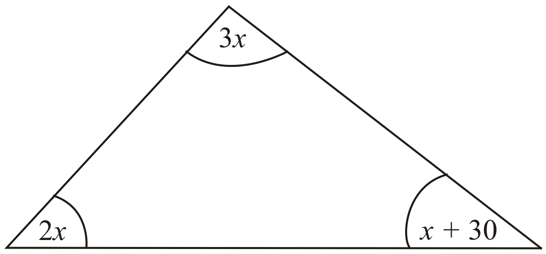


Diagram **NOT** accurately drawn

The diagram shows a triangle.
The sizes of the angles, in degrees, are

$3x$
$2x$
$x + 30$

Work out the value of x.

x = ...
(Total 3 marks)

29. (a) Solve $2x = 10$

x = ...
(1)

(b) Solve $y - 3 = 8$

y = ...

(1)

(c) Solve $4t + 1 = 19$

t = ...

(2)

(d) Solve $4w + 8 = 2w + 7$

w = ...

(2)

(Total 6 marks)

30. (a) Expand $4(x - 3)$

....

(1)

(b) Solve $4t + 1 = 19$

t = ...

(2)
(Total 3 marks)

31. (a) Solve $4x + 1 = 9$

x = ...

(2)

(b) Solve $2y - 1 = 12$

y = ...

(2)
(Total 4 marks)

32.

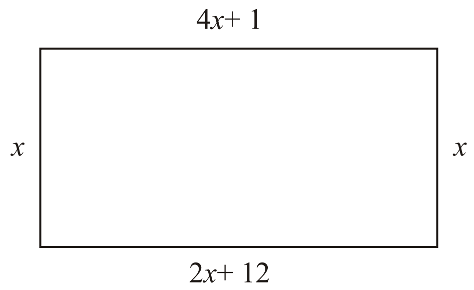


Diagram **NOT** accurately drawn

The diagram shows a rectangle.
All the measurements are in centimetres.

(a) Explain why $4x + 1 = 2x + 12$

....

(1)

(b) Solve $4x + 1 = 2x + 12$

x = ...

(2)

(c) Use your answer to part (b) to work out the perimeter of the rectangle.

.... cm

(2)
(Total 5 marks)

33. (a) Simplify

$$8x + 5y - 3x + y$$

....
(2)

(b) Solve

$$2x - 5 = 4$$

$x =$ ....
(2)
(Total 4 marks)

34. (a) Factorise

$m^2 - m$

....
(1)

(b) Solve

$7(p - 2) = 3p + 4$

$p =$ ……………………………

(3)
(Total 4 marks)

35.

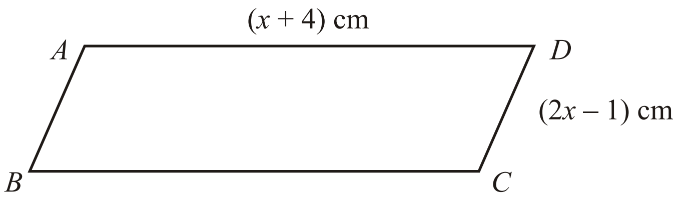


Diagram **NOT** accurately drawn

ABCD is a parallelogram.
$AD = (x + 4)$ cm,
$CD = (2x - 1)$ cm.
The perimeter of the parallelogram is 24 cm.

(i) Use this information to write down an equation, in terms of x.

……………………………………………………

(ii) Solve your equation.

$x =$ ……………………………

(Total 3 marks)

36. The perimeter of this triangle is 19 cm.
All lengths on the diagram are in centimetres.

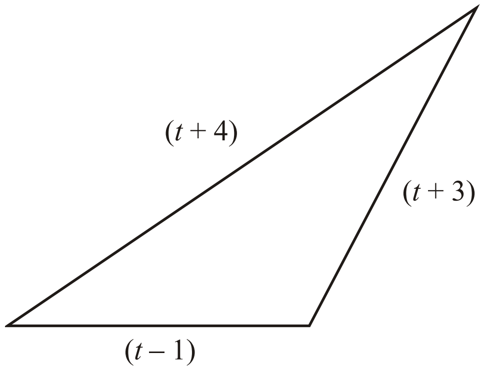


Diagram **NOT** accurately drawn

Work out the value of t.

t = ...

(Total 3 marks)

37. Solve $5x - 3 = 2x + 15$

$x =$ ……………………………..

(Total 2 marks)

38. (a) Solve $4 = \frac{22}{p}$

$p =$ ....

(2)

(b) Solve $7r + 2 = 5(r - 4)$

$r =$ ....

(2)

(Total 4 marks)

39. Solve $2(5x + 3) = 3x - 22$

$x =$ ……………..

(Total 3 marks)

40. Solve $6y + 5 = 2y + 17$

$y =$ ……………

(Total 3 marks)

41.

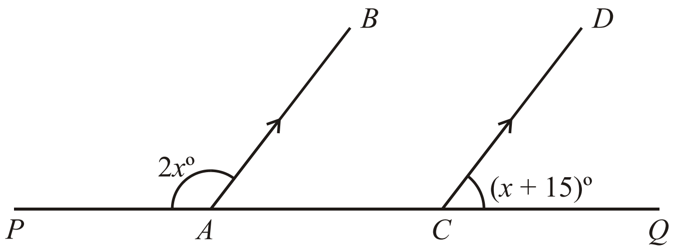


Diagram NOT accurately drawn

PACQ is a straight line.
AB and *CD* are parallel.
Angle *PAB* = $(2x)°$.
Angle *QCD* = $(x + 15)°$.

Work out the value of x.

x = ………………
(Total 3 marks)

42. (a) Solve $w - 3 = 9$

w = …………..
(1)

(b) Solve $8x = 56$

$x =$ …………..

(1)

(c) Solve $5y + 3 = 3y + 10$

$y =$ …………..

(3)

(Total 5 marks)

43. (a) Expand $t(t-2)$

....

(1)

(b) Factorise $3y - 12$

....
(1)

(c) Solve $4w + 5 = w - 7$

$w =$ ....
(3)
(Total 5 marks)

44. Solve $20y - 16 = 18y - 9$

$y =$ ....
(Total 3 marks)

45. Solve $2x + 7 = 6(x + 3)$

$x =$ ....

(Total 3 marks)

46. Solve

$4 - x = 2(3x - 1)$

$x =$ ....

(Total 3 marks)

47. The number of diagonals, D, of a polygon with n sides is given by the formula

$$D = \frac{n^2 - 3n}{2}$$

A polygon has 20 sides.
Work out the number of diagonals of this polygon.

....

(Total 2 marks)

48. Solve the equation

$5(x - 3) = 2x - 22$

x = ...

(Total 3 marks)

49. Solve $5y + 1 = 3y + 13$

y =.....................................

(Total 3 marks)

50. (a) Factorise $7y + 14$

……………………….

(1)

(b) Solve $5(x - 2) = 40$

$x =$ ……………………

(3)
(Total 4 marks)

51. (a) Solve $4x + 3 = 19$

$x =$……………………

(2)

(b) Simplify $2(t + 5) + 13$

……………………

(2)
(Total 4 marks)

52. (a) Solve $p + 6 = 9$

$p =$ ....

(1)

(b) Solve $x + x = 8$

$x =$ ....

(1)

(c) Solve $2q + 7 = 1$

$q =$ ....

(2)

(d) Solve $5t - 4 = 3t + 6$

t = ...

(2)

(Total 6 marks)

53. Solve $7x - 19 = 3(x - 3)$

x = ...

(Total 3 marks)

54. (a) Solve $2q + 7 = 1$

q = ...

(2)

(b) Solve $5t - 4 = 3t + 6$

t = ...

(2)

(Total 4 marks)

55. Solve $2(x - 3) = 5$

x = ...

(Total 3 marks)

56. Solve

$$4t + 1 = 19$$

t = ...

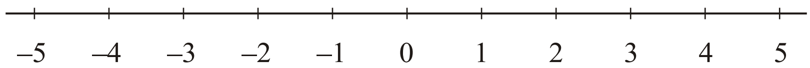
(Total 2 marks)

$t =$ ....

(2)
(Total 4 marks)

57. (a) $x < -2$

Show this inequality on the number line.



(2)

(b) Solve $5(y + 2) = 4 - 7y$

$y =$ ....

(3)
(Total 5 marks)

58. (a) Solve $2(y - 3) = 8$

$y =$ ....

(2)

(b) Solve $4x + 1 = 2x + 12$

$x =$ ....

(2)

(Total 4 marks)

1. (a) $x + 2$ 1

B1 accept 2 + x but not x = x + 2

(b) $4x + 14$ 2

$x + 5 + x + 5 + x + 2 + x + 2$

M1 adding 4 sides, two of which are 'x + 2' (all sides to be linear expressions in x)

***SC** x + 5 + x + 2 × 2 gets M1*

A1 for correct simplified answer or (20 – 14) ÷ 4 oe gets M1

(c) 1.5 oe 2

'$4x + 14$' = 20

M1 for equation

A1 cao

[5]

2. (a) $p = 3$ 2

$2p = 6$

M1 for $7p - 5p = 8 - 2$ or $2p$ or 6
A1 cao

(b) -11 2

$7r - 5r = -20 - 2$

M1 for $7r + 2 = 5r - 20$ or $\frac{7r}{5} + \frac{2}{5} = r - 4$ or

$7r - 5r = 20 - 2$ or $\frac{7r}{5} - r = 4 - \frac{2}{5}$

A1 cao

[4]

3. -11 2

$7r - 5r = -20 - 2$

M1 for $7r + 2 = 5r - 20$ or $\frac{7r}{5} + \frac{2}{5} = r - 4$

or $7r - 5r = -20 - 2$ or $\frac{7r}{5} - r = 4 - \frac{2}{5}$

A1 cao

[2]

4. (a) 8 2

$7x = 56$

M1 for $7x = 56$, $7x = 74 - 18$
A1 cao

(b) 6.5 2

$8y - 20 = 32$ or $2y - 5 = 8$

$8y = 52$ $2y = 13$

M1 for $8y - 20 = 32$ or $2y - 5 = 8$ or $2y - 5 = \frac{32}{4}$

A1 cao

(c) $\frac{5}{8}$ 3

$8p + 7 = 12$ or $5p = 5 - 3p$

$8p = 5$ $8p = 5$

M1 for 12 – 3p
M1 for 8p + 7 = 12 ***or*** *5p = 5 – 3p or 8p = 5 (ft) at least letters or numbers simplified*
A1 cao oe

[7]

5. 23 4

$5x - 16 = 3(x + 10)$
$5x - 16 = 3x + 30$
$5x - 3x = 30 + 16$
$2x = 46$

B1 for either 5x – 16 or 3(x + 10) or 3x + 30 or $\frac{5x}{3} - \frac{16}{3}$ *seen*
(accept letters /symbols other than x)
M1 for 5x –16 = 3(x + 10) oe
M1 for isolating terms correctly; ft on ax + b = cx + d, a,b,c and d not zero
A1 cao

[4]

6. 8 3

$163.25 - 35.50 = 127.75$
$127.75 \div 18.25 = 7$

M1 163.25 – 35.50 (or sight of 127.75)
M1 (dep) "127.75" ÷ 18.25
A1 cao
SC: M2 for 7 days

[3]

7. (a) 3½ oe — 3

$20y - 18y = 16 - 9$ oe
$2y = 7$

M1 20y – 18y = 16 – 9 oe
M1 2y = 7
A1 cao

(b) 7 — 3

$40 - x = 3(4 + x)$
$40 - x = 12 + 3x$
$40 - 12 = x + 3x$
$4x = 28$

M1 multiplying through by 3: $3 \times \frac{40 - x}{3} = 3 \times 4 + 3 \times x$
A1 $40 - 12 = x + 3x$
A1 cao

[6]

8. (a) $8x + 8(x + 2)$ — 2

M1 for 8x or 8(x + 2) oe or 16x seen as single terms;
8x(x + 16) gets M0
A1 oe eg 16x + 16 or 16(x + 1) or 8(2x + 2)
NB x = 8x + 8(x + 2) gets M1 A0

(b) (i) $8x + 8(x + 2) = 72$ — 5

B1 for "(a)"=72 or 8x + 8(x + 2) = 72

(ii) £3.50
£5.50

$8x + 8x + 16 = 72$
$16x = 72 - 16$

M1 for bringing xs, or numbers, together (eg sight of 16x in (a) or (b) or 72-16), not necessary in an equation
M1 for correct rearrangement of the equation (eg 16x = 72 – 16)
A1 for 3.50 or 3.5
A1 for 5.50 or 5.5
SC: B1 if M0 and one answer correct

[7]

9. (a) 0.2 — 3

$8x + 4 = 6 - 2x$
$8x + 2x = 6 - 4$

M1 for at least one correct expansion
A1 ft for "+ 2x" and "– 4" oe
A1 0.2 oe

(b) $2p(p - 2q)$ — 2

M1 for p or 2p as a common factor with (two terms) and at least one term that is algebraic eg in working
A1 cao
SC B1 p-2q or 2p-4q or (2p + 0)(p × 2q)

[5]

10. (a) – 1.5 — 3

$4x + 12 = 6$
$4x = -6$

B1 for 4x + 12 or $x + 3 = \frac{6}{4}$
M1 for a correct re-arrangement of their 3 terms to isolate 4x or x
A1 for –1.5 oe

(b) $\frac{v-u}{5}$ — 2

$v - u = 5t$

M1 for isolating ± 5t or ± t or for dividing through by 5
A1 oe

[5]

11. (a) $\frac{3}{5}$ — 3

$5 - 3x = 2x + 2$
$5 - 2 = 2x + 3x$

B1 for 2x + 2 seen OR 2.5 – 1.5x = x + 1
M1 for correct rearrangement of 4 terms
A1 for $\frac{3}{5}$ *oe*

(b) – 3, – 2, – 1, 0, 1, 2 — 2

B2 (B1 for 5 correct and not more than one incorrect integers)

[5]

12. (a) $T = 4n + 3c$ — 3

M1 sight of 4n
M1 sight of 3c
A1 cao

(b) $47 = 4 \times 8 + 3c$
$3c = 47 - 32$
$3c = 15$
5 — 3

M1 sight of 4 × 8 or 32 (could be in an equation)
M1 (dep) 3c = 47–"32" or 3c = 15 or 47 –"32" or 15
A1 cao

[6]

13. $10y + 15 = 20$
$10y = 20 - 15$
$y = 5/10$
$= 0.5$ — 3

B1 for 10y + 15 or 2y + 3 = 20/5
M1 for correct rearrangement of their 3 terms to isolate 10y or 2y
A1 for 0.5 oe

[3]

14. (a) $2x + 2x + 10$
$4x + 10$ — 2

B2 for 4x + 10
(B1 for 2x + 2x + 10 oe)

(b) $4x + 10 = 34$
6 — 2

M1 for "4x + 10" = 34 or 34 – 10 ÷ 4
A1 cao

[4]

15. $4y - 2y = 8 - 1$
3.5 — 2

M1 for $4y - 2y = 8 - 1$
A1 cao

[2]

16. $4x = 16$
4 — 2

M1 for $4x = 19 - 3$ oe or $19 - 3 \div 4$
A1 cao

[2]

17. (a) $r + 2r + 5 + 2r + 4r - 3 = 9r + 2$ — 2

M1 for intent to add the 4 terms, can be implied by sight of 9r
A1 cao

(b) $9r + 2 = 65 = 7$ — 2

M1 ft for "9r + 2" = 65 or for correct inverse operations
A1 cao
NB: algebra seen in (b) can attract marks in (a) if (a) left blank

[4]

18. $6x - 2x = 9 + 5$ — 3
$4x = 14$
$= 3\frac{1}{2}$

M1 for correct rearrangement: $6x - 2x = 9 + 5$ or intent shown (correct signs)
M1 $4x = 14$
A1 for $3\frac{1}{2}$ oe accept $\frac{14}{4}$

[3]

19. (a) $3x - 12 = x + 24$ 3

$2x = 36$

$= 18$

M1 for $3 \times (x - 4) = x + 24$ *or* $\frac{3(x-4)}{3} = \frac{x+24}{3}$

M1 for $3x - x = 24 + 12$ *or* $x - \frac{x}{3} = \frac{24}{3} + 4$ *oe*

A1 cao

(b) $16x^{12}y^4$ 2

B2 cao

(B1 for $2^4\, x^{3\times 4}\, y^4$*, with one error allowed in powers)*

[5]

20. $6x - 7 + 7 = 38 + 7$

$6x = 45$

$= 7.5$ 2

M1 $6x = 45$ *or + 7 both sides*

A1 7.5 oe; accept 45/6 oe

[2]

21. (a) $6x - 7 + 7 = 38 + 7$

$6x = 45$

$= 7.5$ 2

M1 $6x = 45$ *or +7 both sides*

A1 7.5 oe; accept 45/6

(b) $5y - 2 = 10$ or $20y - 8 = 40$

$5y = 12$ $20y = 48$

$2\frac{2}{5}$ 3

M1 $20y - 8(= 40)$ *or* $\frac{4(5y-2)}{4} = \frac{40}{4}$ *or* $5y - 2 = 10$

M1 (indep) for correct rearrangement into the form $ay = b + c$ *or better (eg* $20y = 40 + 8$ *or* $5y = 10 + 2$*, using own terms)*

A1 for $2\frac{2}{5}$*, 2.4 oe*

[5]

22.	(a)	$(x + 18) + 2x + (2x + 7) = 180$ Equation		2
			B2 for (x + 18) + 2x+ (2x + 7) = 180 oe *(B1 for (x + 18) + 2x + (2x + 7))*	
	(b)	$5x + 25 = 180$ $5x = 155 = 31$		2
			M1 for simplifying to at least 5x + 25 = 180 or 360 (may be earned in (a)) *A1 for x = 31*	
				[4]
23.	$2y = 5$ $= 2.5$			2
			M1 for 2y + 3 = 8 or 4y = 2y + 5 oe *A1 2.5 oe*	
				[2]
24.	(a)	5		1
			B1 cao	
	(b)	$4y = 11$ $= 2.75$		2
			M1 Movement of a term eg 4y = 12 – 1 *A1 2.75 or* $2\frac{3}{4}$ *or* $\frac{11}{4}$ *oe*	
	(c)	$3cd$		1
			B1 cao	
	(d)	$3p - q$		2
			B2 for 3p – q *(B1 for 3p or ± q or 3p ± q)*	
				[6]
25.	(a)	$4y - 2y = 9 - 3 = 3$		2
			M1 Attempts to move both y and number term *eg 4y – 2y = 9 – 3* *A1 cao*	

(b) $5t - 15 = 8$ 2

$= 4.6$

$5t = 23$

M1 $5t - 15 = 8$ *or* $t - 3 = \frac{8}{5}$

A1 $4.6, 4\frac{3}{5}, \frac{23}{5}$

[4]

26. (a) $2a + 4c$ 1

B1 cao Accept $2(a + 2c)$

(b) $\frac{1}{2} \times \frac{1}{4} \times (3)^2 = \frac{1}{2} \times \frac{1}{4} \times 9 = 1.125$ 2

M1 for substitution: $\frac{1}{2} \times \frac{1}{4} \times 3^2$ *oe*

A1 $1.125, 1\frac{1}{8}, \frac{9}{8}$ *oe*

(c) $x(x - 5)$ 2

B2 Accept $x(x + -5)$

(B1 for x(linear expression in x) or x-5 seen)

(d) $7x - 19 = 3x - 9$

$7x - 3x = -9 + 19$

$4x = 10$

2.5 3

M1 for expansion of brackets: $3x - 9$

M1 for rearrangement of their two terms eg $7x - 3x = -9 + 19$ *or an indication of how this should be done for both variable and number term.*

A1 for 2.5 Accept $\frac{5}{2}, \frac{10}{4}$ *oe*

[8]

27. (a) $2x + 2x + x + 10 + 50 = 360$

$5x + 60 = 360$ 2

M1 3 or 4 out of 2x, 2 x, x + 10, 50 added together

A1 $2x + 2x + x + 10 + 50 = 360$ *oe including* $x = 60$

(b) $5x + 60 = 360$
$5x = 300$
60 — 3

M1 for isolating their terms in x
M1 for dividing their numerical term by the coefficient of their x term
A1 cao
All the marks in (b) may be given for work done in answering (a) providing there is no contradiction
Candidates can score full marks in (b) independent of their answer in (a) (e. g. by starting again)

[5]

28. $x + 30 + 2x + 3x = 180$
$6x + 30 = 180$
$6x = 150$

25 — 3

M1 for x + 30 + 2x + 3x or 6x + 30 seen or 180 – 30 or 150 seen
M1 (dep) for 6x + 30 = 180 or better
or $\dfrac{\text{"}180-30\text{"}}{6}$
A1 cao

[3]

29. (a) 5 — 1

B1 cao

(b) 11 — 1

B1 cao

(c) $4t = 18$

4.5 — 2

M1 for subtracting 1 from both sides (or dividing by 4)
A1 for 4.5 oe

(d) $2w + 8 = 7$

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

M1 for an intention to take 2w from both sides or take 8 from both sides

A1 for $-\frac{1}{2}$ oe

[6]

30. (a) $4x - 12$ 1

B1 cao

(b) $4t = 18$

4.5 2

M1 for subtracting 1 from both sides seen or implied or division of all 3 terms by 4

A1 4.5 oe

[3]

31. (a) $4x = 9 - 1$

$\frac{4x}{4} + \frac{1}{4} = \frac{9}{4}$

2 2

M1 for $4x = 9 - 1$ or $\frac{4x}{4} + \frac{1}{4} = \frac{9}{4}$ or a clear intention to either subtract 1 from both sides of the equation or to divide each term by 4

A1 for 2 (accept $\frac{8}{4}$)

(b) $2y = 12 + 1$

$\frac{2y}{2} - \frac{1}{2} = \frac{12}{2}$

6.5 2

M1 $2y = 12 + 1$ or $\frac{2y}{2} - \frac{1}{2} = \frac{12}{2}$ or a clear intention to either add 1 to both sides of the equation or divide each term by 2

A1 6.5 oe (accept $\frac{13}{2}$)

[4]

32. (a) opp sides are equal — 1

B1 for a correct explanation

(b) $4x - 2x = 12 - 1$

5.5 — 2

M1 for $4x + 1 - 1 - 2x = 2x + 12 - 1 - 2x$ oe
A1 for 5.5 or 11/2 or 5½

(c) ‘5.5’ × 2 + 4 × ‘5.5’ + 1 + 2 × ‘5.5’+ 12~

57 — 2

M1 for correct substitution of x = ‘5.5’ into the four expressions to find the sum of FOUR sides or $8x + 13$ seen
A1 ft

[5]

33. (a) $5x + 6y$ — 2

B2 cao
B1 for either 5x or 6y seen

(b) $x = 4.5$ oe — 2

$2x = 9$

M1 for $2x = 4 + 5$ or better
A1 cao

[4]

34. (a) $m(m - 1)$ — 1

B1 cao

(b) 4.5oe — 3

$7p - 14 = 3p + 4$
$7p - 3p = 4 + 14$
$4p = 18$

*M1 for $7p - 14 = 3p + 4$ **OR** $p - 2 = 3/7p + 4/7$*
M1 for isolating p and non-p terms correctly (ft on one earlier error if demands are equivalent)
A1 cao

[4]

35. (i) $2(x + 4) + 2(2x - 1) = 24$ 1

B1 for 2(x + 4) + 2(2x − 1) = 24 oe

(ii) $x = 3$ 2

$2x + 8 + 4x - 2 = 24$
$6x + 6 = 24$
$6x = 18$

M1 (ft) for correctly multiplying out brackets (or dividing by 2) and isolating x terms (can be unsimplified)
A1 cao

[3]

36. $t = 4\frac{1}{3}$ 3

$3t + 6 = 19$
$3t = 13$

M1 for perimeter = t − 1 + t + 3 + t + 4 or better
M1 for 3t + 6 = 19
[Alt: M1 for 19 −(4 + 3 − 1) or 13 seen
M1 for "13" ÷ 3]
A1 for 4.33 or better (accept 13/3)

[3]

37. $x = 6$ 2

$5x - 2x = 15 + 3$

M1 for 5x − 2x = 15 + 3 oe
A1

[2]

38. (a) 5.5oe — 2

$4p = 22$

M1 for $4p = 22$ *OR* $\frac{1}{4} = \frac{p}{22}$

A1 cao

(b) −11 — 2

$7r - 5r = -20 - 2$

M1 for $7r + 2 = 5r - 20$ *OR* $\frac{7r}{5} + \frac{2}{5} = r - 4$ *OR*

$7r - 5r = -20 - 2$ *OR* $\frac{7}{5}r - r = -4 - \frac{2}{5}$

A1 cao

[4]

39. – 4 — 3

$10x + 6 = 3x - 22$

M1 for $10x + 6 = 3x - 22$ *or* $5x + 3 = \frac{3}{2}x - \frac{22}{2}$

M1 for correct process to separate x and non -x terms, ft
$ax + b = cx + d$ $(a, b, c, d \neq 0)$
A1 cao

[3]

40. 3 — 3

$6y - 2y = 17 - 5$
$4y = 12$

M1 for $6y - 2y$ *or* $17 - 5$ *seen*
A1 for $4y = 12$
A1 cao

[3]

41. 55 — 3

$2x + x + 15 = 180$
$3x = 165$

M1 for a correct equation
M1 for rearranging the equation
A1 cao

[3]

42. (a) 12 — 1

B1

(b) 7 — 1

B1

(c) 3.5 oe — 3

$5y - 3y = 10 - 3$
$2y = 7$

*M1 for correctly collecting like terms together or sight of 2y **and** 7*
A1 for 2y = 7
A1 (Note: trial and improvement scores 3 or 0)

[5]

43. (a) $t^2 - 2t$ — 1

B1 oe

(b) $3(y - 4)$ — 1

B1 Accept 3(y – 4)

(c) – 4 — 3

M1 for 4w – w = –7 – 5 oe
*M1 for 3w = –12 **or** 12 = –3w*
A1 cao

[5]

44. $3\frac{1}{2}$ — 3

$20y - 18y = 16 - 9$ oe
$2y = 7$

M1 20y – 18y = 16 – 9 oe
M1 2y = 7
A1 for $3\frac{1}{2}$ *oe*

[3]

45. $-11/4$ oe 3

$2x + 7 = 6x + 18$
$7 - 18 = 6x - 2x$

M1 for $2x + 7 = 6x + 18$ *or* $\frac{2x}{6} + \frac{7}{6} = x + 3$
M for isolating terms correctly, ft on $ax + b = cx + d$ *a, b, c and d not zero*
A1 for $\frac{-11}{4}$ *oe*

[3]

46. $\frac{6}{7}$ 3

$4 - x = 6x - 2$
$4 + 2 = 6x + x$
$6 = 7x$
$\frac{6}{7} = x$

M1 for $4 - x = 2 \times 3x - 2 \times 1$ *or* $\frac{4}{2} - \frac{x}{2} = 3x - 1$
M1 for correct process to separate x and non-x terms
ft $ax + b = cx + d$ $(a, b, c, d \neq 0)$
A1 cao

[3]

47. 170 2

$\frac{20^2 \quad 3 \times 20}{2}$

M1 for sub into formula
A1 cao

[2]

48. $5x - 15 = 2x - 22$
$5x - 2x = -22 + 15$
$3x = -7$
$x = -\frac{7}{3}$ oe — 3

M1 for $5x - 15 = 2x - 22$ *or* $x - 3 = \frac{2}{5}x - \frac{22}{5}$
M1 (ft from $ax + b = cx + d$ $a,b,c,d \neq 0$*) for correct method to isolate the terms in x*
A1 for $-\frac{7}{3}$ *oe to 2dp or better*

[3]

49. $5y - 3y = 13 - 1$
$2y = 12$
6 — 3

M1 for $5y - 3y$ *or* $3y - 5y$ *or* $13 - 1$ *or* $1 - 13$ *oe seen*
M1 for $5y - 3y = 13 - 1$ *oe*
A1 cao

[3

50. (a) $7(y + 2)$ — 1

B1

(b) $5x - 10 = 40$
or $x - 2 = 40 \div 5$
$5x = 40 + \text{“}10\text{”}$
or $x = \text{“}40 \div 5\text{”} + 2$ — 3

M1 for correctly removing brackets or $40 \div 5$ *or 8 seen*
M1 for correctly moving constant terms to one side
A1 cao

[4]

51. (a) $4x = 16$
4 — 2

M1 for $4x = 19 - 3$ *oe or* $19 - 3 \div 4$
A1 cao

(b) $2t + 10 + 13$
$2t + 23$ — 2

M1 for 2t + 10
A1 cao

[4]

52. (a) 3 — 1

B1 for 3 cao

(b) 4 — 1

B1 for 4 cao

(c) $2q + 7 - 7 = 1 - 7 = -6$ — 2
-3

M1 for 2q =
A1 for –3 oe. (Accept $\frac{-6}{2}$ *oe)*

(d) $5t - 3 = 6 + 4$ — 2
5

M1 for 5t –3 = 6 + 4 or – 4 – 6 = 3t – 5t oe
A1 for 5 cao

[6]

53. $7x - 19 = 3x - 9$
$7x - 3x = -9 + 19$
$4x = 10$
2.5 — 3

M1 for expansion of brackets: 3x – 9
M1 for rearrangement of their two terms
e.g. 7x – 3x = –9 + 19 or an indication how this might be done for both variable and numbers
A1 for $2.5, \frac{5}{2}, \frac{10}{4}$ *oe*

[3]

54. (a) $2q + 7 - 7 = 1 - 7 = -6$ 2
-3

M1 for $2q + 7 - 7 = 1 - 7$ or $- 7$ on both sides
A1 for -3 oe (Accept $\frac{-6}{2}$ oe)

(b) $5t - 3t = 6 + 4$ 2
5

M1 for $5t - 3t = 6 + 4$ or $- 4 - 6 = 3t - 5t$ oe
A1 for 5 cao

[4]

55. $2x - 6 = 5$
$2x = 5 + 6 = 11$
5.5 3

M1 for $2x - 6$ (= 5), or $x - 3 = 5 \div 2$
M1 ft for $2x = 5 +$ "6" or $x = \frac{5}{2} + "3"$ or clear intention to add "6" or "3" to both sides of the equation
A1 for 5.5 or $\frac{11}{2}$ oe

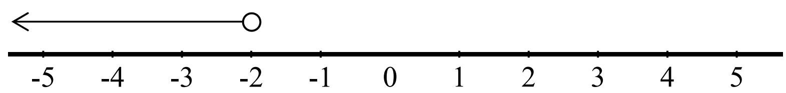
[3]

56. $4t = 18$ 2
4.5

M1 for subtracting 1 from both sides (or dividing by 4)
A1 for 4.5 oe

[2]

57. (a)



2

B2 for correct directed line from -2, ± 2 mm and an empty circle
(B1 for only one of these correct)

(b) $5y + 10 = 4 - 7y$
$12y + 10 = 4$
$12y = -6$
$y = -\frac{1}{2}$ 3

B1 for 5y + 10
M1 for 5y + 7y = 4 – "10" oe
A1 for –½ oe
OR
M1 for $y + 2 = \frac{4-7y}{5}$ *oe*
M1 for $y +$ "$\frac{7y}{5}$" $=$ "$\frac{4}{5}$" $- 2$ *oe*
A1 for –½ oe

[5]

58. (a) 7 2

M1 for $2y - 6 = 8$ *or* $y - 3 = \frac{8}{2}$
A1 cao

(b) $4x - 2x = 12 - 1$
5.5 2

M1 4x – 2x = 12 – 1 oe
A1 5.5 oe

[4]

1. Mathematics A

Paper 2

The vast majority of candidates did not understand this question. Many made no attempt at this question. In part (a) $2x$ was often seen rather than $x + 2$. Little attempt was made on part (b). A very small minority managed to gain the correct answer in part (c), even though they had not completed part (a) and (b).

Paper 4

This question proved a good discriminator. Parts (a) and (b) highlighted weaknesses in algebra. $2x$ and x^2 were often seen instead of $x + 2$ and $4x$ was confused with x^4. Few candidates gave a correct expression in part (b) and a large proportion of those who did failed to simplify it correctly. Incorrect methods seen included finding the area, $(x + 2) \times (x + 5)$, and finding half the perimeter, $2x + 7$. Many candidates gained full marks in part (c), even when they had been unable to write correct algebraic expressions in the previous two parts of the question.

Mathematics B

Paper 15

This was beyond the ability of most candidates. There was an odd assortment of conclusions seen on the answer line, which bore little relation to the original question. If one part had greater success it has to be part (c) which, in going back to the diagram and relating the perimeter to the lengths, occasionally gave '1.5' without having to do any algebra.

Paper 17

The first two parts of this, which demanded the use of algebra, were poorly done. Again many candidates gave an equation instead of an expression with answers such as $x = x + 2$.
The length of the sides were often written as $2x$ and $5x$. Many candidates confused area with perimeter and gave answers of $(x + 2) \times (x + 5)$ or $2x \times 5x$ and a few in doubling x wrote x^2 which resulted in non-linear expressions.
Part (c) achieved greater success by candidates ignoring previous work and resorting to trial and improvement methods to evaluate x. (20 – 14) divided by 2 instead of 4 was a common error here.

2. Weaker candidates attempted to use trial and improvement methods; inevitably these failed to lead to a correct answer. Those candidates who could perform some manipulation of algebra gained some credit, and usually arrived at the correct answer. In part (b) some credit was gained when candidates multiplied out the bracket, but the majority then failed to perform the correct manipulation, usually giving $2r = 22$, or $2r = \pm 18$. Negative signs were frequently lost in the course of the manipulation. There was little evidence that candidates took the time to check their answers to the equations.

3. The vast majority of candidates successfully expanded the bracket but then a significant minority failed to carry out the rearrangement of the terms correctly. Common wrong answers are illustrated as follows:
"$2r = –18$, $r = –9$"; "$2r + 2 = –20$, $2r = 18$, $r = 9$"; "$7r = 5r –22$, $2r = 22$, $r =11$".

4. Throughout this question it was encouraging to see the majority of candidates adopting algebraic, rather than numerical methods, and staying clear of trial and improvement methods which inevitably led to the wrong answer. Most candidates answered parts (a) and (b) correctly. A common error in part (c) was the movement of terms before the expansion of the brackets. Poor manipulation in part (c) frequently led to the incorrect answer. A significant number spoilt their solution at the final stage from $8p = 5$ by incorrectly stating the answer as 1.6 or 8/5.

5. Those candidates who used 'trial and improvement' frequently failed to obtain the correct answer. Those who built up an algebraic equation in one variable usually obtained the correct answer, although a common error was to omit the brackets in the second expression which led to the wrong answer of 13. This error may have been spotted if the check "$13 \times 5 - 16 \neq 3 \times (13 + 10)$" had been carried out. Candidates who started by writing down two simultaneous equations rarely obtained the correct number.

6. **Mathematics A**

Many candidates scored either all 3 marks in this question or 2 marks for an answer of 7, the result of failing to take the first day into account.

Mathematics B

Very few candidates attempted this question by subtracting £35.50 from £163.25 and then dividing the result by £18.25 to give the number of days. Many found the cost for the first two days (35.50 + 18.25) and then tried dividing 163.25 by this total scoring no marks. Others forgot about the £35.50 for the first day, giving a final answer of 7 days rather than 8 days.

7. This question proved challenging to many candidates, and was less well attempted than in recent years. The fact that candidates found it difficult was demonstrated by an increase in the number of Trial and Improvement attempts, which usually resulted in no marks being awarded. In part (a) many knew that rearrangement was necessary, and attempted to perform it, but usually failed to account for both negative signs. In part (b) there were some attempts to multiply some terms by 3, but again this was not well organised, and rarely were any marks gained as a result.

8. This question revealed the inability of many candidates to form algebraic expressions and develop them into equations. In part (a) $8(x + 2)$ was sometimes written as $8x + 2$, and there were many other cases of correct expressions incorrectly simplified. In part (b) many candidates failed to realise that all that was required was to take their expression from part (a) and put it equal to 72. Few attempted to solve the equation by algebraic techniques, but in this question trial and improvement methods appeared to offer success for a small number of students. It was disappointing the number of students who obtained the correct answers, but then gave them as decimals instead of using the correct money notation.

9. Paper 4

The recent deterioration in algebraic manipulative skills was clear in the poor solutions to this question. Few candidates gained any marks in part (b), as there was little understanding of what was meant by “factorise”. As a result many candidates failed to attempt the question. In part (a) the only significant marked gained was the first, for expanding one of the brackets. Most candidates who did this then went on to make errors in manipulating the terms, usually with incorrect minus signs. It was disappointing to see some candidates reach $10x = 2$, only to spoil their solution by writing $x = 5$.

Paper 6

(a) The initial stage in solving this equation is to expand both sides. The usual method is then applied to reach $10x = 2$, with the solution $x = 0.2$. Errors included poor expansion of brackets, adding $2x$ instead of subtracting $2x$ and vice versa with the numerical terms and surprisingly going from $10x = 2$ to $x = 5$.

(b) There is a common factor of $2p$ which has to be extracted from the two terms. This, most candidates were able to do. A minority cancelled the $2p$ to leave $2p – q$.

10. Over 40% of candidates obtained the correct solution to the equation in part (a) with the better candidates using an algebraic approach. Many candidates were able to multiply out the bracket correctly to give $4x + 12$ although some obtained $4x + 3$. Some did not know how to proceed beyond this first step and those that did frequently made mistakes when attempting to isolate $4x$. A significant number of candidates attempted to solve the equation by substitution and many of these attempts were unsuccessful. Part (b) was not answered well and many candidates had little idea how to change the subject of the formula. Terms were moved from one side to the other regardless of order and a surprising number of attempts involved addition or multiplication rather than the inverse operations. Some of those candidates who scored no marks might have gained one mark if they had shown two distinct stages rather than trying to do the complete re-arrangement in one step.

11. Specification A

Higher Tier

The majority of candidates did well in this question. In part (a), many expanded the brackets successfully but then made mistakes rearranging the terms. A common error was to obtain $x = \frac{5}{3}$ from $3 = 5x$. Most of the candidates got full marks in part (b). Common errors were to omit the 0, include a 3, or to list only the positive integers.

Intermediate Tier

Again it was encouraging to see far fewer attempts at trial and improvement, and far more evidence of attempts at algebraic manipulation. This was frequently rewarded with at least one mark for the first step, but many candidates then failed to correctly rearrange terms. $x = 7$ was seen regularly. Many candidates reached $3 = 5x$, but were confused by the fact that the x was on the right hand side, to the point where they then undertook $\frac{5}{3}$ instead of $\frac{3}{5}$. Candidates were very successful in part (b), with most gaining full marks. The only common error was the omission of a number from the list, usually –3, but sometimes the 2 or the 0.

Specification B

Part (a) Many candidates earned one mark in this question for a correct expansion of the brackets; although $2x + 1$ and $2x + 3$ were common errors. Correctly isolating the terms in x and the number terms proved more demanding and sign errors accounted for the greatest loss of the remaining marks. Candidates should be encouraged to show their working when rearranging equations, often $5 - x = 2$ was seen, without clear indication from where the $-x$ had been derived (sight of $-3x - 2x$ equated to $-x$ could have gained one more mark).
A significant number of candidates correctly rearranged the equation to $5x = 3$ and then proceeded to divide 5 by 3 for their answer. This is a notable change from previous years.
In part (b) predictable errors of omitting the zero and/or including 3 were made.

12. In part (a) many candidates found the algebraic manipulation quite difficult. The most common answer seen was $T = n + c$. Some spoilt a correct answer by simplifying incorrectly to $T = 7nc$ or $7T = 4n + 3c$.
Part (b) was well answered, but with many taking a numerical rather than an algebraic route. It was surprising how many wrote 4 × 8 as 24.

13. This question proved more difficult and just under one half of the candidates answered it correctly. Even those who multiplied out the brackets correctly and went on to write $510y = 5$ often gave an answer of $y = 2$. In both parts of this question many candidates used a trial and improvement method.

14. **Specification A**

Foundation Tier

Candidates generally struggle with algebra in context and this year was no exception. 90% of the candidates were not able to show that they needed to find the sum of $2x$, $2x$ and 10 in part (a). Others showed some recognition by providing an answer of 14 or $2x2 + 10$ but, without showing where this came from, they were unable to score any marks. Others wrote $4x \times 10$. There was marginally greater success in part (b) with 10% of the candidates obtaining the correct answer of 6 for two marks, generally without solving an algebraic equation. Few saw the connection between parts (a) and (b). Many wrote $34 - 10 \div 2 = 12$ to score no marks.

Intermediate Tier

Most candidates realised that they had to add together the three terms shown on the diagram. About half put these together and successfully simplified their expression. The most common error was incorrectly assuming that $2x+2x$ was $2x^2$ or $4x^2$. Many did so without any other form of working, and therefore gained no marks. In part (b) candidates saw an opportunity to move from algebra back into number work, including those who had given an algebraic expression in part (a), though many who failed to attempt part (a) still had a go at part (b). Most methods were of a reversing type. A common error was to subtract 10 then divide by 2, rather than 4, getting the answer 12.

Specification B

Foundation Tier

Disappointingly few candidates attempted to write down an unsimplified expression for the perimeter of the triangle and as a result most failed to earn any marks in part (a) of the question. The incorrect expressions $14x$ and $2x^2 + 10$ were commonly seen without working and could not be awarded any credit. This is a pity as they are likely to have resulted from candidates realising the need to add together the lengths of the three sides of the triangle. Under 10% of candidates were able to find the correct value of x in (b). Where successful, this was usually done by a trial and improvement method.

15. Similarly to question 22, this was a question that either candidates made no attempt at or, as in nearly 30% of the scripts, got fully correct. Candidates were unable to cope with algebraic equations of this kind. Nearly all candidates did not recognise that they needed to show $4y – 2y$ and 8 – 1 or an equivalent, with many candidates adding to obtain $6y = 9$ instead. Only 2% of the candidates were able to solve the equation correctly.

16. The proportion of candidates using trial and improvement methods to solve equations appears to have increased gain this year. Numerical methods were common, and frequently resulted in the wrong answer. These methods are *not* credited in terms of working. This question was answered correctly by most candidates; some gave 16 on the answer line or 19 – 4 – 3 = 12.

17. A good proportion of candidates made a reasonable attempt at part (a). Most understood that they needed to add the lengths of the four sides to find the perimeter but there was evidence of much confusion over the collection of like terms. It was not uncommon to see ‘$2r + 5 = 7r$’ and terms in r^4 abounded. Surprisingly, many of the more successful candidates did not simplify the numerical part of the expression and gave an answer of ‘$9r + 5 – 3$’. Possible method marks were often lost when candidates did not write down the sum of the four sides before simplifying the expression. In part (b), many candidates failed to identify that they needed to equate the expression found in part (a) to 65. Many started again or carried out numerical trials.

18. This was another good discriminator. Only a few candidates attempted a solution by a trial and improvement approach. Predictably candidates had difficulty in rearranging terms, confusing signs in the process. Arriving at $4x = 4$ was a common error. A very small number of candidates spoiled a correct rearrangement by dividing 4 by 14 and giving their answer as 0.28

19. Part (a) was done well by most candidates. When errors occurred these were most often seen in the expansion of the brackets, where candidates often forgot to multiply the 4 by the 3. Many candidates had difficulty with part (b). 2, 8, 32 or 2^4 were frequently seen in place of 16, and x^4 or x^7 were seen in place of x.

20. Only a very small proportion (about 10%) of candidates were able to give a correct answer to this question. There was evidence that of those who did, most had used a trial and improvement method. As the solution was not an integer many candidates who used this method failed to obtain the correct answer and so gained no credit.

21. The most common error in part (a) was the incorrect rearrangement of the equation to $6x=38-7$. It was encouraging to see far fewer trial and improvement methods, and far more attempts at algebraic manipulation. In part (b) many candidates were not able to carry out much manipulation here. Incorrect expansion of the bracket to $20y-2$ was uncommon, with many gaining a mark for the correct expansion. However, the subsequent manipulation of terms to each side was rarely done correctly.

22. This was generally well answered, with most candidates almost automatically giving a simplified left hand side of a correct equation. A few candidates set the right hand side = 360. In addition there was a minority of students who either overlooked or misunderstood the need to produce an equation and left the answer to part (a) as an expression. Some of these candidates went on to solve the correct equation but others set $5x + 25 = 0$, which is clearly nonsensical.

23. Whilst candidates usually gave an answer to this question, it was invariably incorrect and any working seen was wrong. Less than 1% of candidates were awarded any credit for their answers to this question. Candidates had often added the expressions on each side of the equation to give the answer “$6y + 11$” or recorded “17” (4 + 3 + 2 + 8) on the answer line.

24. Part (a) was well answered. In part (b) the common error was to add the 1 to 12 getting 13. Many were confused with part (c), with attempts to multiply the terms very common. In part (d) $3p$ was usually seen, but problems occurred with the q. These usually concerned the 3 – 4, where these were added to give 7, or left unprocessed as $+-3q$, $+-4q$, or $+-q$.

25. Many scored full marks in part (a). Some rearranged the equation and wrote $6y = 12$ which led to an answer of 2 which was the most common incorrect answer seen. The main failing was an inability to manipulate the algebra correctly, which was the same error in part (b). Here the expansion of the brackets to $5t - 3$ or $5t - 8$ was the failing of many.

26. In part (a) many candidates were able to combine one of the letters, but rarely both. Weaker candidates frequently spoilt their answer by incorrect simplification, for example $4a + 2a = 6a$, and $2a + 4c = 6ac$. In part (b) there was little understand of formulae. Many added the three pats of the formulae, whilst squaring was almost arbitrary. Weaker candidates did not know what to do with the $\frac{1}{2}$. Even with an answer as short as 1.125 there were instances of candidates rounding off this answer to 1 d.p. Part (c) was done well by those candidates who understood what was meant by "factorise". A few candidates gained a mark for multiplying out the bracket in part (d), but most failed to gain any marks. Algebraic methods were very confused, with few manipulating the terms correctly.

27. This was a linked question in which in part (a) candidates had to derive an equation and then solve the equation in part (b). Many candidates did in fact produce the equation $5x + 60 = 360$ as their answer. These candidates usually went on to solve the equation correctly. A few candidates did simplify the expression $x + 2x + 2x + 10 + 50$ as $4x^2 + 60$

Of those candidates who could not do part (a), a sizable number were still able to find the value of x in part (b) by judicious use of the calculator. They earned the marks available for part (b). Many candidness put down an incomplete answer to part (a) by just writing the expression $5x + 60$. Many of them went on to find the value of x as 60 in part (b) but sadly a minority then made up and solved the equation $5x + 60 = 0$

28. **Foundation**

This question was successfully attempted by about one third of candidates. Usually, successful candidates had used a trial and improvement approach or subtracted 30 from 180 then divided by 6. Symbolism in the form of constructing and solving an equation was not often seen. Common errors included dividing 150º by 5 rather than 6. Many candidates mistakenly assumed one angle (the angle marked 3x) was a right angle and so divided 90º by 3 to get their answer.

Higher

The correct answer to this question was often found by trial and improvement methods as opposed to an attempt at an algebraic approach. This method therefore usually gained full marks or no marks at all. Some candidates tried to develop an algebraic equation but made errors in their sum of $3x$, $2x$ and x or ignored the '30' in the '$x + 30$' giving an answer of 30° (180 ÷ 6).

29. Part (a) was mostly correct. The most common incorrect response was writing '8'. Others left the answer embedded in the equation, writing '2 × 5' or '2 × 5 = 10'. No marks could be scored for these unless the 5 was clearly indicated as their answer.

Part (b) was also mostly correct although 5 was seen every so often where candidates had subtracted 3 rather than add it on to 8.

In part (c) over 60% of the candidates scored both marks for a correct answer, many of these coming from a numerical rather than an algebraic approach or on many occasions without any working shown at all. A common incorrect answer was 14 when candidates subtracted 1 and then subtracted 4 instead of dividing by 4.

In part (d) it was clear that the majority of candidates lacked an understanding of algebraic methods with over 80% of the candidates not scoring any marks at all. A considerable number of candidates made no attempt at all. The most common errors were to reach 6w or 15, often both. Many failed to set out their work as a series of equations. Some showed $4w - 2w = 2w$ and $7 - 8 = -1$ but then failed to equate these two value. Others attempted trial and improvement but seldom got the correct answer from this method.

30. Part (a) was answered correctly by just over three quarters of candidates. The most common error was to multiply just the numerical term by 4 Part (b) was answered more successfully with approximately 85% of candidates solving the equation correctly.

31. Very many candidates employed trial and improvement methods in their attempt to solve these two linear equations. In part (a), this lead to many embedding the answer of 2 in their working and giving an answer of '9' on the answer line. This often gained one mark.

In part (b) such methods were less successful with the answer being a fraction. Incorrect answers of 6 or 7 or 6r1 were commonplace.

Many candidates are clearly unaware of the meaning of $2x$ and $2y$, using them as $2 + x$ and $2 + y$ respectively, giving answer of (a) 4 and (b) 11. (a) 8, (b) 13 were also common wrong answers.

32. Foundation

In part (a), candidates often failed to gain the mark when their explanation was unclear. For example, comments like “because the are the same” are ambiguous. To gain the mark, explanations needed to refer to the sides of the rectangle and not the equation.

As in question 24, algebraic methods were few and far between, many attempts leading to an answer of 6.5 ($2x = 12 + 1$) Some candidates correctly found x to be 5.5 and then tried to use this result to answer part (a). Again, in this question, trial and improvement methods were common.

Having found a value for x in part (b), many failed to use it in an attempt to find the perimeter in part (c). Often just the lengths of two sides were calculated leading to incorrect answers of 11 (5.5 + 5.5) or 46, the sum of the two longer sides.

Higher

In part (a) the majority of candidates were able to give a correct explanation although some gave parallel sides rather than equal sides as the reason. Another common error was for candidates to substitute $x = 5.5$ into both expressions instead of using the properties of a rectangle. Only the weakest candidates failed to gain any marks in part (b). The most common errors resulted from incorrect manipulation and often led to $2x = 13$ (instead of $2x = 11$). Some candidates failed to divide 11 by 2 correctly. Those who resorted to trial and improvement were rarely successful. Although there were many fully correct answers in part (c) some candidates struggled to substitute correctly into each of the four expressions. Many made calculation errors. Only a small number of candidates stated that the total perimeter was $8x + 13$ and then made just the one substitution.

33. Full marks were rarely seen in this question, many candidates showing a definite weakness in manipulative algebra. In part (a) the majority of candidates scored either 1 or 2 marks. 11 was a popular coefficient of x and $-6y$, $+4y$ and even $5y^2$ appeared regularly as the second term.
In part (b) many candidates solved the equation correctly, often employing trial and improvement methods.

34. Part (a) was poorly answered. A number of candidates attempted to factorise into two brackets with $(m + m)(m - 1)$ being a popular incorrect answer.
The majority of candidates were successful in expanding the brackets in part (b). Mistakes were then frequently made in transposing the terms. Those candidates who could isolate the x terms correctly then often made arithmetic errors.

35. In part(i) candidates frequently wrote down an expression for the perimeter rather than an equation in terms of x as required. It is important that candidates do understand the difference between an expression and an equation. Despite failing to gain marks in (i), the majority of candidates went onto find the value of x correctly in part (ii). A significant minority of candidates used trial and improvement methods to find the value of x.

36. It was rare to see an algebraic method used to answer this question; most candidates electing to use Trial and Improvement which often resulted in no better than 4.3
A significant number of candidates attempted to remove the numerical elements of the algebraic expressions (+ 4, + 3 and –1), often incorrectly, and then subtracted from 19 and in some cases going on to divide by 3.

37. The more able had an idea about solving the equation but the execution of their ideas was not error free; so there were few candidates producing $x = 6$. Sign errors in the transposition of terms sometimes led to $3x = 12$ while the desperate offered $2x + 15 = 17$ or $17x$ as their solution. The word *solve* was not always understood with an algebraic expression given in the answer space.

38. Part (a) was generally well done although 88 coming from 22 × 4 was a frequently seen incorrect answer. Of those candidates who were able to get as far as 4p = 22, a number were then unable to complete the solution. Candidates were less successful in part (b). The brackets were generally removed correctly but then errors in arithmetic, (– 20 – 2 being evaluated as – 18 being the most popular mistake) frequently lead to the wrong answer.

39. The majority of candidates were able to start solving this linear equations by removing the brackets correctly. Once this process had taken place arithmetic errors were made in isolating the terms in x, a popular error was to evaluate –22 – 6 as –16. A significant number of candidates either left their answer as $\frac{-28}{7}$ or were unable to perform this final calculation correctly.

40. Solving algebraic equations is never a strong point with Foundation Level candidates but it was encouraging to find that at so many were at least prepared to have a try. Many used trial and improvement methods.
The notion of collecting like terms together was evident but not always correctly written.
$6y + 2y$, 17 + 5 or $8y = 22$ often appeared in the working.

41. Only a quarter of the candidates realised that the sum of the angles $2x$ and $x + 15$ was equal to 180°, many equating the two algebraic expressions to give x =15. Of those who did derive a correct equation, 90% completed the solution to give $x = 55$. Others either failed to attempt a solution or tried a trial and improvement method which succeeded occasionally but not often.

42. Parts (a) and (b) proved to be straightforward for most candidates. Solving $w - 3 = 9$ generally gave 12 (80% of candidates) although 6 was the common incorrect response. Finding the value of x in $8x = 56$ was successfully handled by nearly 60% of the candidates.
Part (c) proved to be more troublesome to nearly all the candidates with fewer than 5% scoring all 3 marks. There generally was a realisation that the like terms had to be combined together but that was as far as most candidates got. Many simply added the like terms reaching $8y$ and 13 whilst others reached $2y$ and 13. From these points on logic gave way to panic and rather than reviewing the equation they continued to process the incorrect statement and get deeper into trouble.
The method of trial and improvement to solve an equation is still popular. Candidates need to be warned that such a method either scores full marks for the correct answer or no marks at all for an incorrect answer.
It was unusual to see a correct method leading to a correct answer but there were some correct answers without any visible means of how they achieved it.

43. Candidates' algebraic skills at this level are not much in evidence. It was rare to see any correct or even partially correct responses to this question.
In part (c) only a handful of candidates were able to correctly transpose the terms in w to one side of the equation with the constant terms on the other side of the equation. Attempts to solve the equation by trial and improvement failed as nearly all trials were using positive integers.

44. Many candidates did not attempt to solve these equations using algebraic manipulation, preferring to use methods of trial and improvement. Rearranging of the terms was often poorly done and $38y = 25$ and $2y = 25$ were often seen.

45. The majority of candidates were generally successful in answering this question and showed all relevant working. A minority left their final answer as $\frac{11}{-4}$ and so lost a mark for not carrying out the final stage of the evaluation. A number of weaker candidates failed to gain marks due to arithmetical errors.

46. 85% of candidates were able to gain some credit for their answer to this question with 40% of candidates able to obtain full marks. The most common error seen was to give an answer of $\frac{7}{6}$ following correct working leading to $7x = 6$. This seemed to indicate that candidates were less happy with the variable appearing on the right hand side of the equation. The incorrect expansion of $2(3x - 1)$ as $6x - 1$ was also frequently seen. Arithmetic errors in attempting to isolate x often led to incorrect stages in the working $5x = 6$ and $5x = 2$ being those most frequently seen.

47. Many candidates gained one mark for a correct substitution but then failed to get the correct answer through inaccuracies in squaring 20; 40 and 200 being the most common incorrect responses. 320 was often seen instead of 3 × 20 and poor arithmetic skills accounted for many errors.

48. The vast majority of candidates were able to gain some credit in this question by expanding the bracket correctly. A fully correct solution was seen from approximately 50% of candidates. The fact that a negative sign appeared on both sides of the equation caused difficulties for a substantial number of candidates. There was plenty of evidence of incorrect arithmetic –22 + 15 was frequently given as –37. Another frequent error was to lose the – sign in front of the –22 when the $2x$ was subtracted from both sides. Candidates who got as far as $3x = –7$ were sometimes unsure how to proceed and so ignored the negative sign and simply gave the answer as $^7/_3$ instead of the correct $–^7/_3$. On a more positive note, although the incorrect answer of $–^3/_7$ was seen occasionally, this error was not seen as frequently as in recent examination series. Those candidates who chose to give their answer as a decimal generally indicated that the 3 was recurring in some way although a small minority of candidates did give their answer as –2.3; this lost the final accuracy mark unless a previously correct unrounded answer was seen.

49. It was encouraging to see how many candidates did try to show some working. Over 10% of the candidates scored all 3 marks with many of these using trial and improvement methods. Nearly 20% of the candidates were able to access at least one of the marks by writing ‘$2y$’ or 12, however the majority of the candidates went for adding ($8y$ to 14 or writing 22). Some candidates attempted use ‘operation flow charts’ but did not get anywhere.

50. Despite the fact that factorising has been a regular feature on many of the modular papers, only 1% of the candidates were able to score a mark in part (a). Part (b) had a higher success rate with a quarter of the candidates being able to score at least one mark for recognising that $x – 2 = 8$ or, more commonly, removing the bracket correctly by multiplying each term inside the bracket by 5. Although over 15% of the candidates scored all 3 available marks, it was rare to see formal algebraic methods used to obtain the final answer.

51. In part (a) very few failed to solve this simple equation correctly. Many successfully used trial and improvement methods, however embedded answers, for example 4 × 4 + 3 = 19 were often contradicted on the answer line with answers of 19 or 16. In these cases no marks were scored. In part (b), many candidates failed to expand the bracketed term correctly being distracted by the additional term of 13. Common wrong answers included $2t + 18$ and $2t + 36$

52. Candidates were not put off by seeing an equation and it was encouraging to note that 96% solved part (a) correctly and 92% got part (b) correct. A common incorrect response to part (b) was to write 4 + 4 which did not score the mark. There was less success in part (c) with 12% scoring one mark, generally for sight of −6, and a further 30% writing the correct answer of −3.

It was rare to see the correct answer in part (d) with only 19% reaching an answer of 5. Most of these candidates showed very little algebraic working with many using a trial and improvement method. Trial and improvement is fine if you get the correct answer but if not, no method marks can be scored.

53. This question was not very well understood by candidates on this Foundation paper. Only 5% of candidates obtained full marks but some candidates did pick up some marks for expanding the bracket correctly or for dealing with both the variable and the constant terms. A small minority of candidates were successful in obtaining the correct answer of 2.5 from trial and improvement methods. 86% of candidates scored no marks in this question.

54. Most candidates found the correct solution of $x = -3$ in part (a) either by formal algebraic manipulation or by trial and improvement. Those failing to get this answer often gained one mark for their attempts to subtract 7 from both sides of the equation, although $2x = 6$ was a common error. Part (b) was less well done. Errors of $2t = 2$ (giving $t = 1$) and $8t = 2$ (or 10) were often seen. Candidates should be encouraged to check their solutions when solving equations.

55. A fully correct solution was seen from just over three quarters of candidates. The most successful approach was an algebraic one. A number of candidates used a trial and improvement method; this either resulted in full marks or no marks. The most popular incorrect answer was 4 which candidates arrived at by adding 3 to 5 and then dividing by 2 rather than carrying out these operations in the reverse order. A number of candidates successfully used an inverse method to calculate the answer, i.e. 5 ÷ 2 + 3. One of the most frequent errors seen was an incorrect attempt at expanding the bracket which often resulted in $2x$ - 3. If the bracket was expanded correctly, a common mistake in calculation was to subtract 6 instead of adding.

56. Not surprisingly, the majority of the candidates were able to solve the equation correctly. Some used an algebraic approach whereas others started with 19 and used inverse operations.

57. Showing the inequality on the number line was not done well with the majority unable to gain either of the two marks. An open circle was needed to be drawn on the line, or close to it, at the position indicated by –2. A line with an arrow was then required to show the direction in which the valid values lay. Lack of attention to detail in drawing both was a contributory factor in the loss of marks.

Solving the algebraic equation in part (b) did allow students with a flair for algebra to demonstrate their ability and there were some exceptionally good correct solutions. However many students still struggle with trying to solve equations. Many scored the first mark by correctly expanding $5(y + 2)$ but then failed to complete their solution correctly. The most common error was to write $5y – 7y$ or $7y –5y$ which resulted in no more marks being scored. A few used flow diagrams which were not appropriate for this type of equation.

Overall, 67% failed to score any marks on this question with a further 18% scoring just 1 mark.

58. Part (a) was generally well done with the majority of candidates expanding the bracket correctly and then going on to solve the equation

Part (b) was also dealt with correctly by most candidates, although again a small number were let down by the arithmetic and could not go correctly from $2x = 11$ to a final answer.