



GCSE Foundation/Higher 11

Algebra



Mark scheme



93 minutes



82 marks

Equations

M1. (a) $12 - x = 15$ or $12 - x = 5 \times 3$

oe $4 - \frac{x}{3} = 5$

M1

$-x = \text{their } 15 - 12$ or $x = 12 - \text{their } 15$

or $4 - 5 = \frac{x}{3}$

$-1 = \frac{x}{3}$

or $5 - 4 = \frac{-x}{3}$

M1

-3

A1

(b) $3t = s - 4$ or $\frac{s}{3} = t + \frac{4}{3}$

oe

M1

$(t =) \frac{s-4}{3}$ or $(t =) \frac{s}{3} - \frac{4}{3}$ or $(t =) \frac{4-s}{-3}$

oe

SC1 $(t =) \frac{4-s}{3}$ or $(t =) \frac{s+4}{3}$

A1

[5]

M2. (a) $(5x + 3 =) 3x + 6$

B1

$5x - \text{their } 3x = \text{their } 6 - 3$ or $2x = 3$

oe

M1

1.5

oe

ft for linear equation if B0 scored

A1 ft

(b) $2x + 32$ or $4x - 20$

Accept $ax + ab$ for M1

M1

$6x + 12$ or $6(x + 2)$

A1

$a = 6$ and $b = 2$

ft from their $6x + 12$ if M1 earned

SC2 $a = 6$ and $b = 12$

SC1 $a = 6$

A1 ft

[6]

M3. $\Sigma x = 50$

B1

$\Sigma x = 50$ with 2 numbers the same

B1

B2 For $2a + b = 50$

$\Sigma x = 50$ with 2 numbers with a difference of 8

$b - a = 8$ **and** $3a = 42$ or $3b = 66$

B1

14, 14, 22

B1

[4]

M4. $4x - 2 = 2x + 5$

or $4x - 2 = 6x - 9$

or $6x - 9 = 2x + 5$

oe $4x - 2 = 2x + 5 = 6x - 9$

M1

$4x - 2x = 5 + 2$

or $4x - 6x = -9 + 2$

or $6x - 2x = 5 + 9$

oe

M1

$(x =) 3.5$

oe

A1

$$4 \times 3.5 - 2 = 12$$

$$\text{and } 2 \times 3.5 + 5 = 12$$

$$\text{and } 6 \times 3.5 - 9 = 12$$

Solving two of the equations and obtaining 3.5 for each solution

Must show all sides = 12

or solving all three pairs of equations and getting 3.5 for each.

T&I is M0 unless all 3 equations 'checked' to be equal to 12, then award 3 marks out of 4.

A1

[4]

M5. (a) 42

B1

(b) $x + 1 = 6 - 9x$

M1

$$x + 9x = 6 - 1$$

oe Allow one error

M1

$$0.5$$

$$\text{SC2 } (x =) 1.25$$

$$\text{SC1 } 4x = 5$$

A1

[4]

M6. (a) $8t = 19 + 5$

M1

$$3$$

A1

(b) $3x + 5y$

*oe Allow $3 \times x + 5 \times y$ **not** $x3 + y5$*

B1 For one term correct

Do not ignore fw

B2

(c) $8w + 12 - 15w - 35$

Allow one term incorrect

M1

$-7w - 23$

A1

[6]

M7. (a) -80

B1

(b) $8w - 3w$ or $1 + 5$

Or better

M1

$5w = 6$

A1

$\frac{6}{5}$ or 1.2

oe

A1 ft

(c) $y + 2y^2$

or $y(1 + 2y)$

Allow $y + 2 \times y^2$

B0 fw eg, $y + 2y^2 = 3y^2$

B1

(d) $5(3t + 5)$

Allow $5 \times (3t + 5)$ or $(3t + 5) \times 5$

Condone missing final bracket

B1

(e) $z(z + 8)$

Allow $z \times (z + 8)$ or $(z + 8) \times z$

Condone missing final bracket

B1

[7]

M8. *All values can be rounded or truncated to nearest whole number*

Testing integers until solution between $x = 3$ and $x = 4$ found

$x = 3$ gives 30, $x = 4$ gives 72

M1

Testing 1 dp values until a solution between $x = 3.2$ and $x = 3.3$ found

$x = 3.2$ gives 36.608, $x = 3.3$ gives 40.227

M1

Testing a value between 3.25 and 3.3 to confirm answer

$x = 3.25$ gives 38.39 3.26 gives 38.75

3.27 gives 39.12 3.28 gives 38.46

M1

$x = 3.3$

$3.29 \Rightarrow 39.9$, $3.3 \Rightarrow 40.3$

so $x = 3.3$ is 4 marks

A1

[4]

M9. (a) Complete explanation

eg, Quadrilateral can be divided
into 2 triangles **and** 2×180

Use of $(n - 2) \times 180$ with $n = 4$

or Using Σ (external angles) = 360

eg, Σ (internal angles + external angles)

= 4×180

Σ (internal angles) = $4 \times 180 - 360$

B for partial explanation

B0 for 2×180 only

B2

(b) (i) $3x - 12 + x - 6 + 2x + 90 = 360$

or better eg, $6x + 72 = 360$

B0 for $3x - 12 + x - 6 + 2x + 90 = 180$

B1

(ii) $6x = 288$ or $6x = 360 - 72$ or

$x = (\text{Their } 288) \div 6$

ft M1 for $6x = 108$ or $6x = 180 - 72$

or (Their 108) $\div 6$

M1

$x = 48$

ft A1 for $x = 18$

A1

132

$3 \times (\text{Their } x) - 12$ for $35 \leq x \leq 63$

SC1 48 with no working or using T & I

SC2 (48 and) 132 with no working or using T & I

B1 ft

[6]

M10. (a) $6x - 4 + 4x + 20$

Allow one error

M1

$10x + 16 (= 2(5x + 8))$

Ignore fw that does not contradict, but do not award A1 for fw such as $= 26x$

A1

(b) $10x + 16 = 4x - 8$

Allow 1 error

ft Their answer for (a)

ie, Their (a) $= 4x - 8$

M1

$10x - 4x = -8 - 16 (6x = -24)$

-4

*ft on **one error** only for A1*

Errors can be in expansion (1 error)

Collecting terms to $ax = b$

Solving equation

A2 ft

[5]

M11. (a) $2x - 1 + 2x - 1 + x + 2 + x + 2$

oe

B1

(b) $(6x + 2 =) 2x + 8$

Allow $(6x + 2 =) x - 1 + x - 1 + 5 + 5$ oe

B1

$6x - 2x = 8 - 2$

oe Allow one error in signs

M1

$4x = 6$

*ft **Only** from **Their** $(2x + 8)$*

A1 ft

$1\frac{1}{2}$

ft Their $(2x + 8)$ or Their $(4x = 6)$ oe

B1 ft

(c) (Their 3.5) \times (Their 2)

$$2x^2 + 3x - 2$$

M1

7

From Their x

A1 ft

[7]

M12. (a) $6x + 5$

B1 $6x$ or $+ 5$ eg $6x - 5$ scores B1

B2

(b) 15

B1

(c) (i) $1 \times 3 + 4$ or $1 \times (3 + 4)$
or $3 + 4$ or 1×7

M1

$1 \times 3 + 4$ and $1 \times (3 + 4)$
or $3 + 4$ and 1×7

M1

7 (must see both methods and answers)

SC1 7 with no working

A1

(c) (ii) $a(b + c) = ab + ac$, or
Comparison of add b to c then multiply by a with multiply
 a by b then add c

oe

*or complete counter example (showing both expressions have
different values when $a \neq 1$ or $c \neq 0$)*

B1 incomplete comparisons or counter examples

B2

[8]

M13.	Trial above 2.8796 2 gives 6, 3 gives 24	M1	
	Trial below 2.8796 2.9 gives 21.489, all values to at least 1 dp rounded or truncated	M1	
	Testing a value that justifies 2.9 as answer 2.5 → 13.125, 2.6 → 14.976, 2.7 → 16.983 2.8 → 19.152, 2.85 gives 20.299	DM1	
	$x = 2.9$ Dep on any M mark	A1	[4]
M14.	$w = 6$	B1	
	$x = 8$	B1 ft	
	$y = 5$	B1 ft	
	$z = 4$	B1 ft	[4]
M15.	Trial between 2 and 3	B1	
	Trial between 2.3 and 2.4 inclusive that “bracket” the answer	B1	
	Trial at 2.35 or 2.36 or 2.37 <u>and</u> 2.4 stated as answer	DB1	
	<i>In this question final answer on its own will not get any marks Working must be seen. All trials must be correctly evaluated either rounded or truncated to a degree of accuracy that allows comparison.</i>		
			[3]

- M16.** (a) $23 - 2x = 15$
 $4.6 - 0.4x = 3$ gets M1 allow one error
M1
- $23 - 15 = 2x$
 $1.6 = 0.4x$ A1
A1
- 4
f.t. if M1 awarded.
A1 ft
- (b) $3x < 21$
 $3x = 21$ gets M1 iff recovered
M1
- $x < 7$
Must have inequality in answer.
Accept \leq .
A1
- [5]

- M17.** Trial at 8.8 or 8.9 (or between)
 $690(.272)$ or $713(.869)$
B1
- Trials at 8.85 (702) and 8.8
or any 2 trials for $8.8 \leq x \leq 8.85$
which bracket 700
Note: These 2 trials score first B1
also
B1
- 8.8 or Kate
Dependent on second B1
Alternative method:
Trial at 8.85 M1
702 A1
8.8 A1
B1 dep
- [3]

