

Question 1

Marking scheme

(a)

$$4^2 - 2(4) - 8 = 16 - 16 = 0$$

Scale 10C (0, 3, 7, 10)*Low Partial Credit:*

- Any partial substitution into equation
- $f(4)$ or equivalent written
- Quadratic formula written
- Attempt at factorising
- $(x - 4)$

High Partial Credit:

- $f(4)$ fully substituted and not equated to 0
- $(x - 4)$ and $(x + 2)$
- Quadratic formula fully substituted

(b)

$$f(5) = 25 + 5a + b = 0$$

$$f(-2) = 4 - 2a + b = 0$$

$$5a + b = -25$$

$$2a - b = 4$$

$$7a = -21$$

$$a = -3$$

$$\Rightarrow b = -10$$

or

$$(x - 5)(x + 2) = 0$$

$$x^2 - 3x - 10 = 0$$

$$a = -3 \Rightarrow b = -10$$

Scale 10D (0, 3, 5, 8, 10)*Low Partial Credit:*

- $f(5)$
- $f(-2)$
- Any relevant equation in a and b (without x)
- Either factor
- Mention of Sum and/or Product of Roots mentioned

Mid Partial Credit:

- Both equations in a and b
- Both factors
- Sum or Product of roots found

High Partial Credit:

- a or b found
- $x^2 - 3x - 10$ without further relevant work
- Sum and Product of roots found

(c)

$$\frac{2 \pm \sqrt{(-2)^2 - 4(5)(-9)}}{(2)(5)}$$

$$= \frac{2 \pm \sqrt{184}}{10}$$

$$x = 1.56 \text{ or } x = -1.16$$

Scale 10C (0, 3, 7, 10)*Low Partial Credit:*

- Correct quadratic formula
- a or b or c explicitly identified
- Correct answer without work

High Partial Credit:

- Fully correct substitution into formula

Q2	Model Solution – 25 Marks	Marking Notes
(a)	$12\left(\frac{9x-6}{2}\right) = 12\left(\frac{3x-14}{3}\right) + 12\left(\frac{9x}{4}\right)$ $6(9x-6) = 4(3x-14) + 3(9x)$ $54x - 36 = 12x - 56 + 27x$ $x = \frac{-20}{15} \text{ or } -\frac{4}{3}$	<p>Scale 10C (0, 4, 8, 10)</p> <p><i>Low Partial Credit:</i> 12 identified as common denominator Some relevant multiplication $4(3x-14) = 3(9x)$ without CD</p> <p><i>High Partial Credit:</i> $54x - 36 = 12x - 56 + 27x$ or equivalent</p>
(b)	$y = 3x - 4$ $4x^2 - 3x(3x - 4) = 4$ $4x^2 - 9x^2 + 12x - 4 = 0$ $-5x^2 + 12x - 4 = 0$ $5x^2 - 12x + 4 = 0$ $(5x - 2)(x - 2) = 0$ $x = \frac{2}{5} \text{ and } x = 2$ $y = 3\left(\frac{2}{5}\right) - 4 = \frac{-14}{5}$ $y = 3(2) - 4 = 2$ $\left(\frac{2}{5}, -\frac{14}{5}\right) \text{ and } (2, 2)$	<p>Scale 15D (0, 5, 7, 11, 15)</p> <p><i>Low Partial Credit:</i> x or y isolated</p> <p><i>Mid Partial Credit:</i> $4x^2 - 3x(3x - 4) = 4$ or equivalent equation in one variable</p> <p><i>High Partial Credit:</i> 1 relevant value (root) found from quadratic</p>

Q6	Model Solution – 25 Marks	Marking Notes
(a)	$(x + 5)(3x - 4) - 3(x^2 + 2) + 4 = 0$ $3x^2 - 4x + 15x - 20 - 3x^2 - 6 + 4 = 0$ $11x = 22$ $x = 2$	<p>Scale 10C (0, 3, 8, 10)</p> <p><i>Low Partial Credit:</i></p> <ul style="list-style-type: none"> any correct multiplication correct answer without work <p><i>High Partial Credit:</i></p> <ul style="list-style-type: none"> multiplication fully correct error in expanding brackets but finishes correctly
(b)	$(2x)(x + 3) \left(\frac{5}{x + 3} - \frac{1}{x} \right)$ $= \frac{1}{2}(2x)(x + 3)$ $10x - 2(x + 3) = x(x + 3)$ $x^2 - 5x + 6 = 0$ $x = 2 \quad \text{and} \quad x = 3$	<p>Scale 15D (0, 3, 7, 13, 15)</p> <p><i>Low Partial Credit:</i></p> <ul style="list-style-type: none"> common denominator identified $5x - (x + 3)$ or similar correct answer without work, 2 and/or 3 writes $\frac{-b \pm \sqrt{(b)^2 - 4ac}}{2a}$ <p><i>Mid Partial Credit:</i></p> <ul style="list-style-type: none"> $10x - 2(x + 3) = x(x + 3)$ or similar <p><i>High Partial Credit:</i></p> <ul style="list-style-type: none"> $x^2 - 5x + 6 = 0$ or equivalent

Question 4

Marking scheme

(b)

(ii)

$$\begin{array}{rcl} l: & 3x - 4y = 5 \\ h: & -8x + 4y = -40 \\ \hline & -5x = -35 \\ & x = 7 \end{array}$$

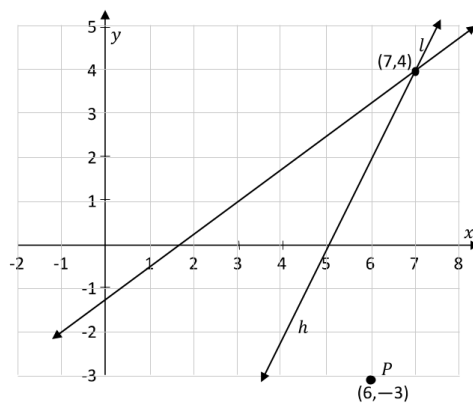
$$\begin{aligned} \Rightarrow -8(7) + 4y &= -40 \\ 4y &= 56 - 40 \\ 4y &= 16 \\ y &= 4 \end{aligned}$$

$$l \cap k = (7, 4)$$

or

Graphical Method

Line h : (5, 0), (6, 2) or (3, -4)



Scale 10C (0, 3, 7, 10)

Low Partial Credit:

Work of merit

- Effort to equate coefficients of x or y
- Effort at isolating one variable
- Effort at drawing line h
- Correct answer without work

High Partial Credit:

Significant Work

- One variable found
- One error and finishes correctly

or

Scale 10C (0, 3, 7, 10)

Low Partial Credit:

Work of merit

- Finds one point on h

High Partial Credit:

Significant Work

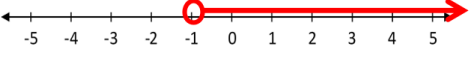
- Draws h

Full Credit:

- $l \cap k = (7, 4)$

Question 5

Marking scheme

(a)	$6 - 2x < 8$ $2x > -2$ $x > -1$ 	<p>Scale 10D (0, 3, 5, 8, 10)</p> <p><i>Low Partial Credit:</i></p> <ul style="list-style-type: none"> Any correct multiplication <p><i>Mid Partial Credit:</i></p> <ul style="list-style-type: none"> Correct transposing from correct work <p><i>High Partial Credit:</i></p> <ul style="list-style-type: none"> $x > -1$ but no plot or incorrectly plotted $x < -1$ and correctly plotted
(b)	$2^{2x-1} = 2^6$ $\Rightarrow 2x - 1 = 6$ $2x = 7$ $x = \frac{7}{2}$	<p>Scale 15C (0, 5, 10, 15)</p> <p><i>Low Partial Credit:</i></p> <ul style="list-style-type: none"> 2^6 List of powers of 2 Correct answer no work <p><i>High Partial Credit:</i></p> <ul style="list-style-type: none"> Equation in x, $2x - 1 = 6$ <p><i>Zero Credit:</i></p> <ul style="list-style-type: none"> $4x - 2 = 64$

Q9	Model Solution – 60 Marks	Marking Notes
(a)	3, 7, 11, 15, 19, 23	Scale 10C (0, 4, 8, 10) <i>Low Partial Credit:</i> One correct or consistent table entry <i>High Partial Credit:</i> Three correct or consistent table entries
(b) (i)	39	Scale 10B (0, 5, 10) <i>Partial Credit:</i> Evidence of counting beyond T_6 Note: Accept correct answer without work
(b) (ii)	$T_n = 3 + (n - 1)4$ $T_n = 4n - 1$	Scale 5C (0, 3, 4, 5) <i>Low Partial Credit:</i> T_n formula written <i>High Partial Credit:</i> Formula with some substitution
(b) (iii)	$4n - 1 = 147$ $n = 37$	Scale 5C (0, 3, 4, 5) <i>Low Partial Credit:</i> T_n formula written <i>High Partial Credit:</i> Formula fully substituted

<p>(c) (i)</p>	$S_n = \frac{n}{2} [6 + (n - 1)4]$ $= \frac{n}{2} [4n + 2]$ $S_n = 2n^2 + n$	<p>Scale 10C (0, 4, 8, 10) <i>Low Partial Credit:</i> S_n formula written</p> <p><i>High Partial Credit:</i> Formula with some substitution</p>
<p>(c) (ii)</p>	$2n^2 + n = 820$ $2n^2 + n - 820 = 0$ $(2n + 41)(n - 20) = 0$ $n = 20 \text{ patterns}$	<p>Scale 5C (0, 3, 4, 5) <i>Low Partial Credit:</i> S_n formula written $S_n = 820$ Evidence of counting of sums</p> <p><i>High Partial Credit:</i> Quadratic equation factorised</p> <p>Note: Accept correct answer without work</p>
<p>(d) (i)</p>	<p>1, 3, 5, 7, 9, 11</p>	<p>Scale 10C (0, 4, 8, 10) <i>Low Partial Credit:</i> One correct or consistent table entry</p> <p><i>High Partial Credit:</i> Three correct or consistent table entries</p>
<p>(d) (ii)</p>	$4\sqrt{3} + 3(4\sqrt{3}) + 5(4\sqrt{3}) + 7(4\sqrt{3}) + \dots$ $= 4\sqrt{3}(1 + 3 + 5 + 7 + \dots)$ $= 4\sqrt{3}(S_{15}) \text{ where } a = 1 \text{ and } d = 2$ $= 4\sqrt{3} \left[\frac{15}{2} (2 + 14 \times 2) \right]$ $= 4\sqrt{3} [7 \cdot 5 \times 30]$ $= 1558.845727 = 1559 \text{ cm}^2$	<p>Scale 5C (0, 3, 4, 5) <i>Low Partial Credit:</i> At least 3 terms of AP identified S_n formula written</p> <p><i>High Partial Credit:</i> Formula fully substituted</p>

Q5	Model Solution – 30 Marks	Marking Notes
(a)	$\frac{3(2) + 5}{10} - \frac{1}{2 + 3}$ $\left[\frac{11}{10} - \frac{1}{5} \right]$ $= \frac{9}{10}$	<p>Scale 5C (0, 2, 3, 5)</p> <p><i>Low Partial Credit</i></p> <ul style="list-style-type: none"> • Some correct substitution • Work towards a single fraction <p><i>High Partial Credit</i></p> <ul style="list-style-type: none"> • Fully correct substitution <p><i>Full Credit -1</i></p> <ul style="list-style-type: none"> • Apply a * for incorrect form