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Mark scheme

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Key to mark types and abbreviations

M	Method marks are awarded for a correct method which could lead to a correct answer.
A	Accuracy marks are awarded when following on from a correct method. It is not necessary to always see the method. This can be implied.
B	Marks awarded independent of method.
ft	Follow through marks. Marks awarded for correct working following a mistake in an earlier step.
SC	Special case. Marks awarded for a common misinterpretation which has some mathematical worth.
M dep	A method mark dependent on a previous method mark being awarded.
B dep	A mark that can only be awarded if a previous independent mark has been awarded.
oe	Or equivalent. Accept answers that are equivalent. eg accept 0.5 as well as $\frac{1}{2}$
[a, b]	Accept values between a and b inclusive.
[a, b)	Accept values $a \leq \text{value} < b$
3.14 ...	Accept answers which begin 3.14 eg 3.14, 3.142, 3.1416
Use of brackets	It is not necessary to see the bracketed work to award the marks.

Q	Answer	Mark	Comments
1	4	B1	

Q	Answer	Mark	Comments
2(a)	$x^3 + 2x$	B1	

Q	Answer	Mark	Comments
2(b)	$6a^2 + 2a$	B1	

Q	Answer	Mark	Comments
3	$y = x^2 - 3$	B1	

Q	Answer	Mark	Comments
4(a)	68 600 000	B1	allow 68.6 million
	Additional Guidance		
	Allow any commas or spaces eg 6,86000,00		B1
	Using decimal points		B0

Q	Answer	Mark	Comments
4(b)	$(1.56 \times 10^8) \div (7.8(0) \times 10^7)$ or 2 or $(7.8(0) \times 10^7) \div (1.56 \times 10^8)$ or 0.5	M1	oe eg $15.6 \div 7.8$ implied by ratio equivalent to 1 : 2 up to 78 : 156
	1 : 2	A1	SC1 2 : 1 or 1 : 0.5 or $1 : \frac{1}{2}$
	Additional Guidance		
	Must be using Atlantic and Pacific		

Q	Answer	Mark	Comments
5	$\frac{0-6}{3-0}$ or $-\frac{6}{3}$ or -2 or $y = mx + 6$ or $y = -2x + c$	M1	oe
	$y = -2x + 6$	A1	oe
	Additional Guidance		
	$y = -2x + 6$ seen in working, Answer $-2x + 6$		M1A1
	Answer only $-2x + 6$		M1A0
	$y = 2x + 6$		M1A0

Q	Answer	Mark	Comments
6	4 000 000	B1	

Q	Answer	Mark	Comments
7(a)	Valid description	B1	eg as the time increases the mark increases
	Additional Guidance		
	As one increases the other increases		B1
	The more you revise the better mark you get		B1
	The less time spent, the lower the mark		B1
	More revision = higher marks so they are (directly) proportional		B1
	Positive correlation because as time goes up the mark goes up		B1
	The mark is (directly) proportional to the time spent		B0
	Positive correlation		B0

Q	Answer	Mark	Comments
7(b)	Straight line of best fit through (2, [16, 26]) and (7, [49, 59])	B1	accept if clear intention to draw a straight line ignore anything either side of the gates
	Correct reading $\pm \frac{1}{2}$ square for their straight line of best fit	B1ft	ft straight line with positive gradient accept if clear intention to draw a straight line
	Additional Guidance		
	Ignore working lines on the graph		
	Two lines of best fit, mark the line that leads to their answer		
	$\pm \frac{1}{2}$ square means half a small square horizontally and vertically		
	Line of best fit seen, but not used		B1B0
	Short straight line with positive gradient that covers at least 3 large squares and correct reading $\pm \frac{1}{2}$ square for their line		B0B1ft
	No line drawn		B0B0

Q	Answer	Mark	Comments
8	Alternative method 1 – Using the probability of the intersection		
	$85 + 35 - 100$ or 20 or $x + 85 - x + 35 - x = 100$	M1	oe eg $0.85 + 0.35 - 1$ or 0.2 x may be any letter
	their 20% equated to 28 or $28 \div \text{their } 20$ or 1.4 or 91 and 21 or 119 and 49	M1dep	oe implied by eg 28×5 or $28 \div \text{their } 0.2$
	140	A1	
	Alternative method 2 – Forming an equation using the total number of visitors		
	$0.85y - 28 + 0.35y - 28 + 28 = y$	M1	oe y may be any letter
	$0.2y = 28$	M1dep	oe equation of the form $ay = b$
	140	A1	
	Additional Guidance		
	Up to M2 may be awarded for correct work with no answer, or incorrect answer, even if this is seen amongst multiple attempts		
	Percentages or numbers may be on the Venn Diagram		
	$28 = 20\%$		M1M1

Q	Answer	Mark	Comments
9	Never true Never true Sometimes true	B3	B1 for each
	Additional Guidance		
	Only a cross in a row – mark the cross		
	A tick and a cross in a row – mark the tick		
	More than one tick in a row scores B0 for that row		

Q	Answer	Mark	Comments
10	20	B2	B1 $\frac{1}{20}$ or 0.05 or 16.5 or $16\frac{1}{2}$ oe B1ft reciprocal of their value
	Additional Guidance		
	$\frac{100}{5}$ or $\frac{20}{1}$		B2
	$\frac{330}{16.5}$		B1
	$\frac{16.5}{330}$		B1
	$\frac{16.25}{330}$ Answer $\frac{264}{13}$		B1ft
	$\frac{16.25}{330}$ Answer $\frac{330}{16.25}$		B0

Q	Answer	Mark	Comments
11	2×3 or 6 or 5×3 or 15 or 2×5 or 10	M1	implied by 12 or 30 or 20 or $2 \times 2 \times 3$ or $2 \times 5 \times 3$ or $2 \times 2 \times 5$
	2×3 or 6 and 5×3 or 15 and 2×5 or 10 or 31	M1dep	implied by 12 and 30 and 20 or $2 \times 2 \times 3$ and $2 \times 5 \times 3$ and $2 \times 2 \times 5$
	62	A1	SC1 30
	Additional Guidance		
	2×3 only seen embedded in a product eg $2 \times 3 \times 5 \times 3 \times 2 \times 5$		M0

Q	Answer	Mark	Comments
12(a)	$4x - 20 > 32$ or $4x > 52$ or $x - 5 > 8$	M1	oe
	$x > 13$ or $13 < x$	A1	SC1 $x \geq 13$ or $13 \leq x$ or $x < 13$ or $13 > x$ or $x = 13$ or answer of 13
	Additional Guidance		
	$x > 13$ seen in working, Answer 13		M1A1
	Allow use of other symbols (eg $\geq$ or $=$ etc) if recovered to $x > 13$		M1A1
	$x = > 13$		M1A0
	Embedded answer $4(13 - 5) > 32$		M1A0
	Answer only $x \geq 14$		M0A0

Q	Answer	Mark	Comments
12(b)	$-12 \leq 3y \leq 3$	B1	

Q	Answer	Mark	Comments
13	$y = \frac{x}{2} + 5$ or $y - 5$	M1	oe equation eg $2y = x + 10$
	$2(y - 5)$ or $2y - 10$	A1	oe eg $2 \times (y - 5)$ SC1 $y - 5 \times 2$ or $2 \times y - 5$ or $2y - 5$ or $2(y + 5)$ or $2y + 10$
	Additional Guidance		
	$2(y - 5)$ followed by incorrect expansion		M1A1

Q	Answer	Mark	Comments
14	34×6 or 204	M1	
	their $204 - (27 + 28 + 34 + 40)$ or 75	M1dep	oe M2 implied by two numbers with total 75
	36 and 39	A1	either order SC1 36 and n where n is an integer ≥ 36 and not 39
	Additional Guidance		
	Up to M2 may be awarded for correct work with no answer, or incorrect answer, even if this is seen amongst multiple attempts		
	36 and 39 with any or no working		M2A1
	35 and 40		M2A0
	37.5 and 37.5		M2A0
	36 and 40 with no other creditworthy work		SC1
	34 and 36 with no other creditworthy work		Zero
	34 and 47 with no other creditworthy work		Zero

Q	Answer	Mark	Comments
15	Alternative method 1		
	(X) 1, 6 2, 5 or (Y) 1, 7 2, 6 3, 5	M1	
	(X) 1, 6 2, 5 or 2 (outcomes) or $\frac{2}{12}$ and (Y) 1, 7 2, 6 3, 5 or 3 (outcomes) or $\frac{3}{12}$ and X	A1	oe fractions, decimals or percentages
	Alternative method 2		
	(X) $\frac{1}{3} \times \frac{1}{4} + \frac{1}{3} \times \frac{1}{4}$ or $\frac{2}{12}$ or (Y) $\frac{1}{3} \times \frac{1}{4} + \frac{1}{3} \times \frac{1}{4} + \frac{1}{3} \times \frac{1}{4}$ or $\frac{3}{12}$	M1	oe fractions, decimals or percentages
	(X) 2 (outcomes) or $\frac{2}{12}$ and (Y) 3 (outcomes) or $\frac{3}{12}$ and X	A1	oe fractions, decimals or percentages
	Additional Guidance		
	Up to M1 may be awarded for correct work with no answer, or incorrect answer, even if this is seen amongst multiple attempts		
	Correct outcomes with incorrect probabilities that lead to the answer		M1A0
	Accept decimals to 2 dp or better, rounded or truncated		
	Accept percentages to 2 sf or better, rounded or truncated		
	Correct working and Y is more likely		M1A1

Q	Answer	Mark	Comments
16	Arc, centre A, radius [3, 3.4]cm	B1	must be at least one sixth of a circle may be dashed or dotted
	Pair of intersecting arcs, equal radii > half BC , above and below BC	M1	± 2 mm
	Perpendicular bisector of BC drawn with correct construction	A1	± 2 mm arcs required may be dashed or dotted
	Correct region shaded with arc and perpendicular bisector in tolerance	B1	no construction arcs for bisector required
	Additional Guidance		
	Ignore shading outside of the rectangle		

Q	Answer	Mark	Comments
17	Alternative method 1 – eliminating y		
	$2y = 6x - 3$	M1	oe pair of equations with matching coefficients of y
	$2x - 6x = 17 - -3$ or $8x = 20$	M1dep	oe eliminates y
	$x = 2.5$	A1	oe
	$y = 6$	A1	
	Alternative method 2 – eliminating x		
	$2y = 6x - 3$ and $6x + 6y = 51$	M1	oe pair of equations with matching coefficients of x
	$2y + 6y = -3 + 51$ or $8y = 48$	M1dep	oe eliminates x
	$y = 6$	A1	
	$x = 2.5$	A1	oe

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17 cont	Alternative method 3 – substituting for y		
	$2x + 2(3x - 1.5) = 17$	M1	oe substitutes for y
	$2x + 6x - 3 = 17$ or $8x - 3 = 17$ or $8x = 20$	M1dep	oe with brackets expanded eg $3x - 1.5 = 8.5 - x$
	$x = 2.5$	A1	oe
	$y = 6$	A1	
	Alternative method 4 – substituting for x		
	$\frac{y + 1.5}{3} = \frac{17 - 2y}{2}$	M1	oe substitutes for x
	$2y + 3 = 51 - 6y$ or $8y = 48$	M1dep	oe with fractions eliminated
	$y = 6$	A1	
	$x = 2.5$	A1	oe
	Additional Guidance		
	For misreads deduct one A mark		
	Answer only $x = 2.5$ and $y = 6$		M2A2
	Answer only $x = 2.5$ or $y = 6$		Zero

Q	Answer	Mark	Comments
18	B	B1	
	Valid reason	B1	eg negative gradient or not an increasing graph or there is a section of the graph that goes downhill or there is a section where the y -value decreases
	Additional Guidance		
	Ignore non-contradictory statements		

Q	Answer	Mark	Comments
19	Alternative method 1		
	$\frac{91}{35}$ or 2.6 or $\frac{35}{91}$ or 0.38... or $\frac{42}{35}$ or 1.2 or $\frac{35}{42}$ or 0.83...	M1	oe
	$42 \times \frac{91}{35}$ or $42 \div \frac{35}{91}$ or $\frac{42}{35} \times 91$ or $91 \div \frac{35}{42}$ or 109.2	M1dep	oe
	$\frac{\text{their } 109.2 - 42}{2}$	M1dep	oe
	33.6	A1	oe eg $\frac{2352}{70}$ or $\frac{168}{5}$

Mark scheme continues on the next page

19 cont	Alternative method 2		
	$\frac{91}{35}$ or 2.6 or $\frac{35}{91}$ or 0.38... or $\frac{42}{35}$ or 1.2 or $\frac{35}{42}$ or 0.83...	M1	oe
	$\frac{91}{35} = \frac{42 + 2x}{42}$ or $91 \times 42 = 35 \times 42 + 35 \times 2x$	M1dep	oe equation eg $\frac{35}{42} = \frac{91}{42 + 2x}$ or $3822 = 35(42 + 2x)$
	$\frac{91 \times 42 - 35 \times 42}{35 \times 2}$	M1dep	oe eg $\frac{3822 - 1470}{70}$
	33.6	A1	oe eg $\frac{2352}{70}$ or $\frac{168}{5}$

Q	Answer	Mark	Comments
20	m/s ²	B1	

Q	Answer	Mark	Comments
21(a)	$2^{200} \times 5^{200}$	B1	

Q	Answer	Mark	Comments
21(b)	11^{150}	B2	oe single power of 11 11^{200} or 11^{50} or 11^{300}
	Additional Guidance		
	$11^{\frac{300}{2}}$		B2
	$\sqrt{11^{300}}$		B1

Q	Answer	Mark	Comments
22	angle $BCD = x$ alternate angles and angle $CBD = \text{angle } BCD$ (base angles of) isosceles triangle	B3	B2 angle $BCD = x$ alternate angles and angle $CBD = \text{angle } BCD$ $BD = CD$ or angle $BCD = x$ AB parallel to CD and angle $CBD = \text{angle } BCD$ (base angles of) isosceles triangle
			B1 angle $BCD = x$ AB parallel to CD and angle $CBD = \text{angle } BCD$ $BD = CD$ or angle $BCD = x$ alternate angles or angle $CBD = \text{angle } BCD$ (base angles of) isosceles triangle
			Additional Guidance
			Allow equivalent informal reasons for AB parallel to CD and $BD = CD$
			Allow equivalent unambiguous notation eg allow angle DCB or angle C for angle BCD
			Do not allow angle B for angle CBD

Q	Answer	Mark	Comments
23	$\sqrt{25 \times 2}$ or $\sqrt{25} \times \sqrt{2}$ or $5 \times \sqrt{2}$ or $\sqrt{9 \times 2}$ or $\sqrt{9} \times \sqrt{2}$ or $3 \times \sqrt{2}$	M1	oe eg $5\sqrt{2}$ or $3\sqrt{2}$ may be implied eg $12\sqrt{2}$
	$\sqrt{25 \times 2}$ or $\sqrt{25} \times \sqrt{2}$ or $5 \times \sqrt{2}$ and $4 \times \sqrt{9 \times 2}$ or $4 \times \sqrt{9} \times \sqrt{2}$ or $4 \times 3 \times \sqrt{2}$ or $\sqrt{144} \times \sqrt{2}$ or $12 \times \sqrt{2}$	M1dep	oe eg $5\sqrt{2}$ and $12\sqrt{2}$
	$17\sqrt{2}$ with M2 seen	A1	
	Additional Guidance		
	Answer only $17\sqrt{2}$ or with no valid working		M0M0A0
	$17\sqrt{2}$ with only first M mark seen		M1M0A0

Q	Answer	Mark	Comments
24	Alternative method 1 – using the exterior angle		
	$180 \div (8 + 1)$ or 20	M1	oe
	$\frac{360}{n} = \text{their } 20$ or $360 \div \text{their } 20$	M1dep	oe
	18	A1	
	Alternative method 2 – using the interior angle		
	$180 \div (8 + 1) \times 8$ or 160	M1	oe
	$\frac{180(n - 2)}{n} = \text{their } 160$	M1dep	oe
	18	A1	

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24 cont	Alternative method 3 – using the sum of the interior angles		
	360×8 or 2880 or $\frac{180(n-2)}{360} = \frac{8}{1}$	M1	oe
	$180(n-2) = \text{their } 2880$ or $\text{their } 2880 \div 180 + 2$ or $16 + 2$	M1dep	oe equation with fractions eliminated
	18	A1	
	Alternative method 4 – equating interior or exterior angles		
	$180 - \frac{360}{n} = \frac{8}{1} \times \frac{360}{n}$ or $\frac{1}{8} \times \frac{180(n-2)}{n} = 180 - \frac{180(n-2)}{n}$	M1	oe
	$180n - 360 = 2880$ or $1440n - 1440(n-2) = 180(n-2)$	M1dep	oe equation with fractions eliminated
	18	A1	
	Additional Guidance		
	Up to M2 may be awarded for correct work with no answer, or incorrect answer, even if this is seen amongst multiple attempts		
	Trial and improvement leading to answer 18		M2A1
	Trial and improvement without answer 18		Zero

Q	Answer	Mark	Comments
25	At least 3 frequency densities seen	M1	0.4, 1.2, 2.6, 0.9 and 0.3
	Fully correct histogram	A2	A1 for at least 3 bars correct $\pm \frac{1}{2}$ small square
	Additional Guidance		
	Correct frequency densities may be implied by at least 3 points correctly plotted $\pm \frac{1}{2}$ small square eg in a frequency polygon		
	Frequency polygon and histogram drawn – mark the histogram		
			M1A2

Q	Answer	Mark	Comments
26	Alternative method 1		
	$8.4^2 = 38^2 + 46^2 - 2 \times 38 \times 46 \cos x$ or $\cos x = \frac{38^2 + 46^2 - 8.4^2}{2 \times 38 \times 46}$ or $\cos x = 0.998(1\dots)$	M1	oe eg $70.56 = 1444 + 2116 - 3496 \cos x$ or $\cos x = \frac{1444 + 2116 - 70.56}{3496}$ or $\cos x = \frac{3489.44}{3496}$
	$\cos^{-1} \frac{38^2 + 46^2 - 8.4^2}{2 \times 38 \times 46}$ or $\cos^{-1} 0.998(1\dots)$ or [3.5, 3.62431]	M1dep	oe
	[3.5, 3.62431] and Yes	A1	
	Alternative method 2		
	$38^2 + 46^2 - 2 \times 38 \times 46 \cos 4.8$ or [76.26, 76.3]	M1	oe eg $1444 + 2116 - 3496 \cos 4.8$
	$\sqrt{38^2 + 46^2 - 2 \times 38 \times 46 \cos 4.8}$ or $\sqrt{[76.26, 76.3]}$ or [8.7, 8.735]	M1dep	oe
	[8.7, 8.735] and Yes	A1	

Q	Answer	Mark	Comments
27	Alternative method 1		
	$2x + 4$	M1	oe
	$2(2x + 4) + 4$ or $4x + 12$	M1dep	oe
	$x^2 = 2(2x + 4) + 4$ or $x^2 = 4x + 12$ or $x^2 - 4x - 12 = 0$	A1	oe implied by -2 and 6
	$(x + 2)(x - 6) (= 0)$ or $\frac{- -4 \pm \sqrt{(-4)^2 - 4 \times -12}}{2 \times 1}$ or $\frac{4 \pm \sqrt{64}}{2}$ or $2 \pm \sqrt{16}$	M1	oe correct factorisation or correct use of quadratic formula or correct use of completing the square for their 3-term quadratic equation
	-2 and 6	A1	

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27 cont	Alternative method 2		
	$(x^2 - 4) \div 2$ or $\frac{1}{2}x^2 - 2$	M1	oe
	$(\frac{1}{2}x^2 - 6) \div 2$ or $\frac{1}{4}x^2 - 3$	M1dep	oe
	$\frac{1}{4}x^2 - 3 = x$ or $x^2 - 12 = 4x$ or $x^2 - 4x - 12 = 0$	A1	oe implied by -2 and 6
	$(x + 2)(x - 6) (= 0)$ or $\frac{- -4 \pm \sqrt{(-4)^2 - 4 \times -12}}{2 \times 1}$ or $\frac{4 \pm \sqrt{64}}{2}$ or $2 \pm \sqrt{16}$	M1	oe correct factorisation or correct use of quadratic formula or correct use of completing the square for their 3-term quadratic equation
	-2 and 6	A1	
	Additional Guidance		
	Up to M3 may be awarded for correct work with no answer, or incorrect answer, even if this is seen amongst multiple attempts		
	Use of quadratic formula for their quadratic may be implied by ft solutions correct to 1 dp or better		
	For first mark condone $2n + 4$ or $2y + 4$ or $x = 2x + 4$ or $(2x + 4)^2$		
	Second mark may be seen embedded in an equation in terms of x		
	-2 and 6 only		5 marks
	-2 or 6 only		Zero

Q	Answer	Mark	Comments
28	Alternative method 1		
	$\frac{1}{2} \times 8 \times 12 \times \sin y$ or $48 \sin y$	M1	oe any letter for y
	$\sin y = \frac{38.4}{\frac{1}{2} \times 8 \times 12}$ or $\sin y = \frac{4}{5}$ or $\sin^{-1} \frac{4}{5}$	M1dep	oe eg $\sin y = 0.8$ or $\sin^{-1} 0.8$ any letter for y
	53.1(...)	A1	accept 53 with M2 seen
	Alternative method 2		
	$38.4 \div \left(\frac{1}{2} \times 12 \right)$ or $38.4 \div 6$ or 6.4	M1	
	$\sin y = \frac{\text{their } 6.4}{8}$ or $\sin^{-1} \frac{\text{their } 6.4}{8}$	M1dep	oe any letter for y
	53.1(...)	A1	accept 53 with M2 seen

Q	Answer	Mark	Comments
29	Alternative method 1 – working with $\frac{35}{99}$		
	$\frac{35}{99} \div 10$ or $\frac{35}{990}$	M1	
	$\frac{629}{990}$	A1	oe fraction working for M1 must be shown
	Alternative method 2 – working with 0.635...		
	$10x = 6.35(35\dots)$ and $1000x = 635.35(35\dots)$ and $1000x - 10x = 635.35(35\dots) - 6.35(35\dots)$ or $990x = 629$ with $1000x = 635.35(35\dots)$ and $10x = 6.35(35\dots)$ seen	M1	oe multiplication by a power of 10 and subtraction to eliminate recurring digits eg $100x = 63.53(53\dots)$ and $100x - x = 63.53(53\dots) - 0.635(35\dots)$ or $99x = 62.9$ with $100x = 63.53(53\dots)$ seen
	$\frac{629}{990}$	A1	oe fraction working for M1 must be shown
	Additional Guidance		
	Alt 2 Use of x may be implied eg $100 \times 0.635 = 63.53$ $99 \times 0.635 = 62.9$		M1
	$\frac{62.9}{99}$ with working for M1		M1A0

Q	Answer	Mark	Comments
30	$12x^2$ or -10	M1	oe eg $3 \times 4x^{3-1}$ or $-10x^0$
	$x^2 = \frac{27}{12}$ or $x^2 = \frac{9}{4}$ or $(3)(2x + 3)(2x - 3)$	M1dep	oe equation of the form $x^2 =$ or $x =$ implied by $\sqrt{\frac{9}{4}}$ or $\frac{3}{2}$
	$\frac{3}{2}$ and $-\frac{3}{2}$	A1	oe eg ± 1.5 surds must be processed
	Additional Guidance		
	Up to M2 may be awarded for correct work with no answer, or incorrect answer, even if this is seen amongst multiple attempts		

Q	Answer	Mark	Comments
31(a)	$-13 \leq f(x) \leq 15$ or $15 \geq f(x) \geq -13$	B2	B1 $-13 \leq f(x) < 15$ or $-13 < f(x) \leq 15$ or $-13 < f(x) < 15$ or $f(x) \geq -13$ or $f(x) \leq 15$ or $-13 \leq f(x) \leq k$ or $p \leq f(x) \leq 15$ SC1 $-13 \leq x \leq 15$
	Additional Guidance		
	Condone $f(x)$ replaced by eg y or f or fx or $7 - 4x$ in B2 or B1 responses		
	Invalid statements may score B1 for one side of inequality correct eg $-13 \leq f(x) \geq 15$ eg $-13 \geq f(x) \geq 15$		B1 B0
	$[-13, 15]$		B2
	$(-13, 15]$		B1
	$-13 \leq f(x) \leq 15$ in working with list of integers on answer line		B1
	Only list of integers		B0
	-13 to 15		B0

Q	Answer	Mark	Comments
31(b)	Alternative method 1		
	$2y = 3x - 7$	M1	any letter for y
	$2y + 7 = 3x$ or $x = \frac{2y + 7}{3}$	M1dep	
	$\frac{2x + 7}{3}$	A1	oe
	Alternative method 2		
	$2x = 3y - 7$	M1	
	$2x + 7 = 3y$	M1dep	
	$\frac{2x + 7}{3}$	A1	oe
	Additional Guidance		
	Answer eg $y = \frac{2x + 7}{3}$ or $g(x) = \frac{2x + 7}{3}$ or $x = \frac{2x + 7}{3}$		M2A0

Q	Answer	Mark	Comments
32	Sight of 4.75 or 4.25	B1	accept $4.74\dot{9}$
	$152 = \text{their } 4.75 \times (\text{their } 4.75 + l)$	M1	oe allow their 4.75 in (4.5, 5]
	$\frac{152}{\text{their } 4.75} - \text{their } 4.75$	M1dep	oe eg $(152 - (\text{their } 4.75)^2) \div \text{their } 4.75$ allow their 4.75 in (4.5, 5]
	27.25 with 4.75 used	A1	accept use of $4.74\dot{9}$
	Additional Guidance		
	Working for both M marks may be implied by ft answer correct to 2 dp or better for their 4.75 in (4.5, 5]		

Q	Answer	Mark	Comments
33	Alternative method 1		
	$2^3(n+1)^3$ or $8(n+1)^3$	M1	
	$8n^3 + 8(n+1)^3$	M1dep	
	$8(n^3 + (n+1)^3)$ or both terms multiples of 8 and therefore whole expression is a multiple of 8	A1	oe
	Alternative method 2		
	$4n^2 + 4n + 4n + 4$ or $4n^2 + 8n + 4$	M1	
	$8n^3 + (2n+2)(4n^2 + 4n + 4)$ or $8n^3 + (2n+2)(4n^2 + 8n + 4)$ or $8n^3 + 8n^3 + 24n^2 + 24n + 8$ or $16n^3 + 24n^2 + 24n + 8$	M1dep	oe
	$8(2n^3 + 3n^2 + 3n + 1)$ or all terms multiples of 8 and therefore whole expression is a multiple of 8	A1	oe

Q	Answer	Mark	Comments
34	$-2a + 3b$	B1	

Q	Answer	Mark	Comments	
35	$\frac{32}{35}$	B2	B1 $b = 5$ and $c = 7$ or $\frac{5}{7}$ or $7a + 5^2$ or $7a + 25$ or $7 + 5^2$ or $7 + 25$ or 32	
	Additional Guidance			
	$\frac{7a + 25}{35}$		B1	
	$b = 5$ and $c = 7$ and $b = 7$ and $c = 5$ is B0 unless recovered			

Q	Answer	Mark	Comments
36	Alternative method 1		
	$(x-5)^2 - 5^2$ or $(x-5)^2 - 25$	M1	ignore any terms in c
	$(x-5)^2 = 5^2 - \frac{c}{2}$ or $(x-5)^2 = 25 - \frac{c}{2}$	M1dep	oe equation of the form $(x-5)^2 =$ or $x-5 =$ eg $x-5 = (\pm)\sqrt{5^2 - \frac{c}{2}}$ or $x-5 = (\pm)\sqrt{25 - \frac{c}{2}}$
	$5 \pm \sqrt{25 - \frac{c}{2}}$ or $5 + \sqrt{25 - \frac{c}{2}}$ and $5 - \sqrt{25 - \frac{c}{2}}$ with M2 awarded	A1	oe
	Alternative method 2		
	$2(x-5)^2 - 50$	M1	ignore any terms in c
	$2(x-5)^2 = 50 - c$ or $x-5 = (\pm)\sqrt{\frac{50-c}{2}}$	M1dep	oe equation of the form $2(x-5)^2 =$ or $x-5 =$
	$5 \pm \sqrt{\frac{50-c}{2}}$ or $5 + \sqrt{\frac{50-c}{2}}$ and $5 - \sqrt{\frac{50-c}{2}}$ with M2 awarded	A1	oe

Additional Guidance is on the next page

36 cont	Additional Guidance	
	$2[(x-5)^2 + \frac{c}{2} - 25]$ or $2(x-5)^2 + c - 50$	M1
	$5 + \sqrt{25 - \frac{c}{2}}$ with full method seen	M2A0
	Both solutions (with full method) in the working but $5 + \sqrt{25 - \frac{c}{2}}$ chosen as the answer	M2A0
	Any method other than completing the square	M0
	Accept surds in the denominator	

Q	Answer	Mark	Comments
37	45 and 225	B2	B1 45 or 225 or 45 and 225 and one extra value
	Additional Guidance		
	Ignore y-coordinates given for B2 or B1		
	Both 45 and 225 embedded		B1