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Pearson Edexcel

Mark Scheme (Results)

November 2023

Pearson Edexcel International GCSE

In Mathematics A (4MA1)
Paper 1H

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General Marking Guidance

- All candidates must receive the same treatment. Examiners must mark the first candidate in exactly the same way as they mark the last.
- Mark schemes should be applied positively. Candidates must be rewarded for what they have shown they can do rather than penalised for omissions.
- Examiners should mark according to the mark scheme not according to their perception of where the grade boundaries may lie.
- There is no ceiling on achievement. All marks on the mark scheme should be used appropriately.
- All the marks on the mark scheme are designed to be awarded. Examiners should always award full marks if deserved, i.e. if the answer matches the mark scheme. Examiners should also be prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme.
- Where some judgement is required, mark schemes will provide the principles by which marks will be awarded and exemplification may be limited.
- When examiners are in doubt regarding the application of the mark scheme to a candidate's response, the team leader must be consulted.
- Crossed out work should be marked UNLESS the candidate has replaced it with an alternative response.

Types of mark

- M marks: method marks
- A marks: accuracy marks
- B marks: unconditional accuracy marks (independent of M marks)

Abbreviations

- cao – correct answer only
- ft – follow through
- isw – ignore subsequent working
- SC - special case
- oe – or equivalent (and appropriate)
- dep – dependent
- indep – independent
- eeoo – each error or omission

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- **No working**
  If no working is shown then correct answers normally score full marks
  If no working is shown then incorrect (even though nearly correct) answers score no marks.
- **With working**
  If there is a wrong answer indicated on the answer line always check the working in the body of the script (and on any diagrams), and award any marks appropriate from the mark scheme.
  If it is clear from the working that the "correct" answer has been obtained from incorrect working, award 0 marks.
  If a candidate misreads a number from the question. Eg. Uses 252 instead of 255; method marks may be awarded provided the question has not been simplified. Examiners should send any instance of a suspected misread to review.
  If there is a choice of methods mark the one that leads to the answer on the answer line. If there is no answer given then mark the method that gives the lowest mark and award this mark.
  If there is no answer on the answer line then check the working for an obvious answer.
- **Ignoring subsequent work**
  It is appropriate to ignore subsequent work when the additional work does not change the answer in a way that is inappropriate for the question: eg. Incorrect cancelling of a fraction that would otherwise be correct.
  It is not appropriate to ignore subsequent work when the additional work essentially makes the answer incorrect eg algebra.
  Transcription errors occur when candidates present a correct answer in working, and write it incorrectly on the answer line; mark the correct answer.
- **Parts of questions**
  Unless allowed by the mark scheme, the marks allocated to one part of the question CANNOT be awarded in another.

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International GCSE Maths

Apart from questions 2b, 10, 13b, 19 where the mark scheme states otherwise the correct answer, unless clearly obtained by an incorrect method, should be taken to imply a correct method

Q	Working	Answer	Mark	Notes
1 (a)		5 7 9 11 13 15	1	B1 all numbers must be present with no repeats. Numbers can be in any order
(b)		5 15	1	B1
(c)		6 8 12 14 16	1	B1
				Total 3 marks

2 (a)		$6p(2q-3)$	2	B2 If not B2 then award B1 for any **correct** partial factorisation with 2 factors taken out ($2p$ or $3p$ or 6 (2×3)) outside of the bracket $2p(6q-9)$ or $3p(4q-6)$ or $6(2pq-3p)$ or allow $6p$ and one error inside the bracket eg $6p(2q-a)$ or $6p(b-3)$ oe eg $6p(2q+3)$			
(b)	$y + (3y + 7) + (2y - 5)$ ($= 6y + 2$) oe or $56 - 7 + 5$ ($= 54$)		4	M1	M2 for $y + (3y + 7) + (2y - 5) = 56$ oe or $6y = 54$ oe	M3 for $(56 - 7 + 5) \div 6$ ($= 9$) or $54 \div 6$ ($= 9$)	
	$y + (3y + 7) + (2y - 5) = 56$ or "$6y + 2$" $= 56$ oe eg $6y = 54$			M1			
	$(y =)\dfrac{56-2}{6}(=9)$ oe			M1 for a correct method to find the value of y or the correct value of y			
		13		A1 (or for 9 (gold), 34 (silver) and 13 (zinc) seen) dep on sight of ($y =$) 9 SCB2 for 16.6 (17 if rounded 16.6 seen) (if no other marks awarded) SCB1 for $5y + 2 = 56$ oe (if no other marks awarded)			
				Total 6 marks			

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3	1500 + (36 × 450) (= 17 700)		4	M1
	"17 700" – 12 500 (= 5200) oe or $\frac{\text{"17 700"}}{12\,500}$ (=1.416) oe			M1
	$\frac{\text{"5200"}}{12500}$ (× 100) oe or 0.416 (× 100) or $\left(\frac{\text{"17 700"}}{12\,500} \times 100\right)$ or 141.6 (– 100)			M1
	Working not required, so correct answer scores full marks (unless from obvious incorrect working)	41.6		A1 allow 42 from correct working
				Total 4 marks

4 (a)	1 – 0.58 (= 0.42) or 100 – 58 (= 42) 0.58 + 2*x* + *x* = 1 oe		2	M1
	Working not required, so correct answer scores full marks (unless from obvious incorrect working)	0.14		A1 oe eg 14% (must have % sign) or $\frac{7}{50}$ etc SCB1 for an answer of 14 if no other marks are awarded
(b)	250 × 0.58 oe or 58 + 58 + (58 ÷ 2) oe		2	M1 or for $\frac{145}{250}$
	Working not required, so correct answer scores full marks (unless from obvious incorrect working)	145		A1 cao
				Total 4 marks

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5	$\pi \times 20 \left(= 20\pi = 62.8 \left(31...\right)\right)$ oe or $2 \times \pi \times \left(20 \div 2\right) \left(= 20\pi = 62.8 \left(31...\right)\right)$ oe or $0.5 \times \pi \times 20 \left(= 10\pi = 31.4 \left(15...\right)\right)$ oe or		3	M1 for use of $\frac{1}{2}\pi d$ or πr or πd or $2\pi r$ oe with $d = 20$ or $r = 20 \div 2$ (= 10)
	3 × ("62.8" ÷ 2) + 20 ÷ 2 + 20 ÷ 2 oe or 1.5 × ("62.8") + 20 ÷ 2 + 20 ÷ 2 oe			M1 for a complete method
	Working not required, so correct answer scores full marks (unless from obvious incorrect working)	114		A1 114 – 115 SCB1 for awrt 471
				Total 3 marks

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6	eg $1-\frac{1}{6}=\frac{5}{6}$ or 1 – 0.16(666…) (= 0.83(333…) oe or 100(%) – 16(.666…)(%) (= 83(.333…)(%)) oe or 1 − 0.2 (= 0.8) oe or 100(%) − 20(%) (= 80(%))		4	M1 Allow eg 1 – 0.16 (= 0.84) (= 84(%)) 1 – 0.17 (= 0.83) (= 83(%)) rounded or truncated
	140 ¸ "$\frac{5}{6}$" (= 168) oe or 140 ÷ "0.83(333…)" (= 168) oe eg 140 ÷ 83.33 × 100 (=168) **or** 136 ÷ "0.8" (= 170) oe eg 136 ÷ 80 × 100 (= 170)			M1 Allow eg 140 ÷ "0.84" = 166(.666…) 140 ÷ "0.83" = 168(.674…) rounded or truncated
	140 ¸ "$\frac{5}{6}$" (= 168) oe or 140 ÷ "0.83(333…)" (= 168) oe **and** 136 ÷ "0.8" (= 170) oe			M1 Allow eg 140 ÷ "0.84" = 166(.666…) 140 ÷ "0.83" = 168(.674…) rounded or truncated
	Working not required, so correct answer scores full marks (unless from obvious incorrect working)	2		A1 Allow –2
				Total 4 marks

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7		$5^3 \times 7^2 \times 11^4$	2	B2 Accept 5^3 . 7^2 . 11^4 allow 89 676 125 with $5^3 \times 7^2 \times 11^4$ seen If not B2 then award B1 for $5^p \times 7^q \times 11^r$ with two of $p = 3$, $q = 2$ and $r = 4$ (or omission of one with others fully correct) or for 89 676 125 without $5^3 \times 7^2 \times 11^4$ seen or for $5 \times 5 \times 5 \times 7 \times 7 \times 11 \times 11 \times 11 \times 11$ or for an answer of $5^3 + 7^2 + 11^4$ or 5^3 , 7^2 , 11^4
				Total 2 marks

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8	(a)	$8x-3x\geq -10+4$ or $5x\geq -6$ or $10-4\geq -8x+3x$ or $6\geq -5x$		2	M1 for x terms on one side and numbers on the other. Condone = rather than ≤ or any other sign for this mark.
		Working not required, so correct answer scores full marks (unless from obvious incorrect working)	$x^3 - \frac{6}{5}$		A1 oe eg $-\frac{6}{5}$£ x Must have correct sign on answer line (sight of correct answer in working space and just −1.2 on answer line gains M1 only)
	(b)		$y\geq 2$	3	B1 oe eg $y-2\geq 0$ allow > in place of ≥
			$x\leq 7$		B1 oe eg $x-7\leq 0$ allow < in place of ≤
			$y\leq x$		B1 oe eg $y-x\leq 0$ allow < in place of ≤
					SCB1 for $y=2$, $x=7$ and $y=x$ SCB2 for $y\leq 2$, $x\geq 7$ and $y\geq x$ or $y<2, x>7$ and $y>x$ Allow < in place of ≤ or vice versa
					Total 5 marks

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9	(a)		0.000 587	1	B1 allow 0.000 587(000…) or **.**000 587
	(b)		8.4×10^{7}	1	B1 allow $8.4(000\ldots)\times10^{7}$
	(c)	$8.5\times10^{10}\div1.47\times10^{9}\ (=\frac{8500}{147})$ or $85\ 000\ 000\ 000\div1\ 470\ 000\ 000\ (=\frac{8500}{147})$		2	M1
		Working not required, so correct answer scores full marks (unless from obvious incorrect working)	57.8		A1 oe eg 5.78×10 awrt 57.8 allow 58 or 5.8×10 with correct working seen
					Total 4 marks

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10	$\tan 40 = \frac{8}{(AD)}$ or $\frac{(AD)}{\sin(90-40)} = \frac{8}{\sin 40}$ oe or $(AC =) \frac{8}{\sin 40} (= 12.4(457\ldots)$ (D = foot of the perpendicular line)		5	M1
	$(AD =) \frac{8}{\tan 40}$ (= 9.5(3…)) or $(AD =) \frac{8}{\sin 40} \times \sin(90-40)$ (= 9.5(3…)) oe or $(AD =) \sqrt{"12.4"^2 - 8^2} = \sqrt{90.8(977...)}$ (= 9.5(3…)) oe or $(BC^2 =) "12.4"^2 + 22^2 - 2 \times "12.4" \times 22 \times \cos 40$ (= 219.4…) oe			M1
	(DB =) 22 – "9.5(3…)" (= 12.4(659…= 12.5) or $(BC =) \sqrt{"12.4"^2 + 22^2 - 2 \times "12.4" \times 22 \times \cos 40}$ (= $\sqrt{219.4...}$ = 14.8) oe or $(BC =) \sqrt{8^2 + (22 - 9.5(3...))^2}$ (= 14.8) oe			M1
	$\tan x = \frac{8}{"12.5"}$ or $\cos x = \frac{"12.5"}{"14.8"}$ or $\sin x = \frac{8}{"14.8"} (\times \sin 90)$ oe or $\sin x = \frac{\sin 40}{"14.8"} \times "12.4"$ oe or $\cos x = \frac{22^2 + "14.8"^2 - "12.4"^2}{2 \times 22 \times "14.8"}$ oe			M1
	Working required	32.7		A1 Allow 32.3 – 32.8 dep on a correct method shown
				Total 5 marks

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11	$\frac{9x}{12x}+\frac{2(5-x)}{12x}$ oe or or $\frac{3(6x)}{24x}+\frac{4(5-x)}{24x}$ oe or $\frac{3(6x)}{4(6x)}+\frac{4(5-x)}{4(6x)}$ oe or or $\frac{18x}{24x}+\frac{20-4x}{24x}$ oe or $\frac{3\times 3x+2(5-x)}{12x}$ oe		3	M1 for two correct fractions with common denominator with the intention to add **or** a single correct fraction
	$\frac{9x+10-2x}{12x}$ oe or $\frac{18x+20-4x}{24x}$ oe or $\frac{14x+20}{24x}$ oe or			M1 for a correct numerator over a single denominator with brackets expanded and correct signs Allow $\frac{7x}{12x}+\frac{10}{12x}$
	Working not required, so correct answer scores full marks (unless from obvious incorrect working)	$\frac{7x+10}{12x}$		A1 oe $\frac{10+7x}{12x}$
				Total 3 marks

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12 (a)	x | −2 | −1 | 0 | 1 | 2 y | **−1** | **3** | **1** | (−1) | **3**	Correct y values	2	B2 for all correct (B1 for 2 or 3 correct)
(b)			2	M1 ft their table dep on B1 scored in (a) for 4 or 5 points plotted correctly (tolerance within or on the circles on the overlay)
Tol				A1 for a fully correct graph – points plotted correctly (within or on the circles on the overlay) and intention to join with a smooth curve (be generous if intention is clearly a smooth curve through all points) Ignore curve drawn for $x < -2$ and $x > 2$
(c)		D	1	B1
				Total 5 marks

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13	(a)		25	1	B1 Allow 25 – 25.5
	(b)	80 – [74, 76] (= [4, 6]) or 80 – (their value from a correct method) $\frac{"[74,76]"}{80}\times 100\left(=[92.5,95]\right)$		3	M1 Allow a clear method to read off from cf diagram at 50 seconds and subtract this value from 80 **or** read the value and use a method to find this as a percentage of 80
		$\frac{"[4,6]"}{80}\times 100$ (=[5, 7.5]) oe or $100-\left(\frac{"[74,76]"}{80}\times 100\right)$ oe or "[4, 6]" ÷ 0.8 oe			M1ft if previous M1 awarded
		Working required	6.25		A1 dep on M1 Allow range 5 – 7.5
					Total 4 marks

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14	(*AOC* =)180 – (2 × 52) (= 76)		3	M1 must not be contradicted on diagram
	Working not required, so correct answer scores full marks (unless from obvious incorrect working)	38		A1 If labelled on the diagram then it must be in the correct place
		2 correct reasons		B1 dep on M1for at least 2 valid reasons for their method including a correct circle property angle at the centre is 2 × (double/twice) angle at circumference or angle at circumference is ½ (half) angle at centre **and one from** (i) Base angles in an isosceles triangle (are equal) (ii) Angles in a triangle sum to 180° **or** angles in a triangle sum to 180°
				Total 3 marks

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14 **ALT**	tangent drawn at A with a right angle shown **or** 38° shown between the line AC and the tangent at A		3	M1 for a correct tangent drawn with right angle shown **or** 38° shown between the line AC and the tangent at A
	Working not required, so correct answer scores full marks (unless from obvious incorrect working)	38		A1 If labelled on the diagram, then it must be correct
		38 and correct reason		B1 dep on M1 for 38 and alternate segment theorem **and** angle between radius/diameter and tangent = 90
				Total 3 marks

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15	$3nx-4x=3p+n$		3	M1 for removing the denominator and expanding in a correct equation
	$3nx-n=3p+4x$ or $-4x-3p=n-3nx$			M1ft for gathering terms in n on one side and other terms the other side in an equation ft their equation dep on 2 terms in n and 2 other terms
	Working not required, so correct answer scores full marks (unless from obvious incorrect working)	$n=\frac{3p+4x}{3x-1}$		A1 oe $n=\frac{-3p-4x}{1-3x}$ oe (must see "$n=$"… on answer line or in working)
				Total 3 marks

16	$\left(\frac{dy}{dx}=\right)3\times4x^2-8\ (=12x^2-8)$		4	B2 for $3\times4x^2-8$ or $12x^2-8$ (with no other terms) (B1 for one term, ie $3\times4x^2$ or $12x^2$ or -8)
	$"12x^2-8"=\frac{1}{3}$			M1 for equating their initial derivative with the given gradient. Derivative must be a **quadratic** (dep on B1)
	Working not required, so correct answer scores full marks (unless from obvious incorrect working)	$\pm\frac{5}{6}$		A1oe Ignore y values Allow $\pm0.83(333…)$ or $\pm\sqrt{\frac{25}{36}}$ oe
				Total 4 marks

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17	24 ÷ 20 (= 1.2) or a correct value on the FD scale or 10 small squares = 1 orange or 25 small squares (1 large square) = 24 ÷ 9.6 = 2.5 oranges oe **or** 9 or 18 or 27 correctly assigned **or** $\frac{3x}{4}+\frac{y}{3}$ where x is their frequency of 3rd bar and y is their frequency of 4th bar		3	M1 for use of area to represent frequency **or** one correct frequency from the $\frac{1}{3}$ of 4th bar (9) or $\frac{2}{3}$ of 4th bar (18) or The 4th bar (27) [NOT 3rd bar = 44] or A method to show the student is finding $\frac{3}{4}$ of 3rd bar + $\frac{1}{3}$ of 4th bar (frequencies to be seen on diagram or identified in working)
	eg (15 × 2.2) + (5 × 1.8) oe or 33 + 9 or 44 + 27 – 11 – 18 or (330 + 90) ÷ 10 oe or (13.2 + 3.6) × 2.5 oe			M1 for a complete method
	Working not required, so correct answer scores full marks (unless from obvious incorrect working)	42		A1
				Total 3 marks

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18	(angle ABC =) 54 + (180 – 132) (= 102)		5	M1 for finding angle ABC
	$\left(AC^2 =\right)3.6^2 + 8.4^2 - 2\times 3.6\times 8.4\times\cos\left[102\right]$			M1 for applying the cosine rule correctly ft ***their*** 102 provided less than 180 and not 90
	$\left(AC =\right)\sqrt{3.6^2 + 8.4^2 - 2\times 3.6\times 8.4\times\cos\left[102\right]}$ or $\sqrt{96.094...}$ or 9.8(02…)			M1 for finding AC ft ***their*** 102 provided less than 180 and not 90
	$\left([9.8]+8.4+3.6\right)\div 6$ (= 3.63(3…)) or 21.8(02…) ÷ 6 (= 3.63(3…)) oe			M1 dep on previous M1M1 for finding the time taken to complete the journey (may be done in parts)
	Working not required, so correct answer scores full marks (unless from obvious incorrect working)	3 hours and 38 minutes		A1 Allow 3 hours and (37 – 38) minutes
				Total 5 marks

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19	$a = 3$ and $d = 4$			6	M1 for a and d (can be embedded in the formula for S_n)
	$\frac{n}{2}\left[2(3)+(n-1)4\right] = 7260$ or $\frac{n}{2}(2+4n) = 7260$ oe	$\frac{n}{2}(3+x) = 7260$ and $x = 3+(n-1)4$			M1 Allow $n = x$
	eg $4n^2 + 2n = 14520$ oe $2n^2 + n - 7260(=0)$ oe $8n^2 + 4n - 29040(=0)$ oe	eg $x^2 + 4x - 58077 = 0$ oe $x^2 + 4x = 58077$			M1ft dep on previous M1 for forming a three term quadratic in any form of $ax^2 + bx + c$ (= 0) where at least 2 coefficients (a or b or c) are correct
	eg $(2n+121)(n-60)(=0)$ eg $(n=)\ \frac{-1\pm\sqrt{1^2-4\times2\times-7260}}{4}$ eg $2\left[\left(n+\frac{1}{4}\right)^2-\left(\frac{1}{4}\right)^2\right] = 7260$	eg $(x-239)(x+243)(=0)$ eg $(x=)\ \frac{-4\pm\sqrt{4^2-4\times1\times-58077}}{2}$ eg $(x+2)^2-(2)^2 = 58077$			M1ft dep on previous M1 for a method to solve **their** 3 term quadratic using any correct method Allow one sign error and some simplification – allow as far as eg $\frac{-1\pm\sqrt{1+58080}}{4}$ or $\frac{-4\pm\sqrt{16+232308}}{2}$
	(n =) 60 (and (n =) −60.5)	(x =) 239 (and (x =) −243)			A1 dep on M3 Ignore negative values
	Working required		239		A1 cao dep on M3 SCB2 if not shown clear algebraic working but give an answer of 239 (with method shown involving $a = 3$ and $d = 4$) as question asks for algebraic working. 239 alone gains zero marks
					Total 6 marks

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20	$\sqrt{\frac{49}{121}}\left(=\frac{7}{11}=0.63(63...)\right)$		4	M1 Accept 0.63(63…) or 63(.6363…)% rounded or truncated
	$1-"\frac{7}{11}"\left(=\frac{4}{11}=0.36(36...)\right)$			M1 Accept 0.36(36…) or 36(.3636…)% rounded or truncated
	$2\times\frac{7}{11}\times"\frac{4}{11}"$ or $1-\left(\frac{49}{121}+"\left(\frac{4}{11}\right)^2"\right)$ or 2 × "0.63" × "0.36" or 1 – (0.40(49…) + ("0.36")^2)			M1 for a complete method
	Working not required, so correct answer scores full marks (unless from obvious incorrect working)	$\frac{56}{121}$		A1 oe Allow 0.46(280…) or 46(.280)%
				Total 4 marks

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21	$(FE=)\,28\sin 30\,(=14)$ **or** $(FE=)\,28\cos 60\,(=14)$ **or** $(DE=)\,28\cos 30\,(=14\sqrt{3}=24.2(48...))$ **or** $(DE=)\,28\sin 60\,(=14\sqrt{3}=24.2(48...))$		5	M1 for a method to find *FE* **or** *DE*
	$(FE=)\,28\sin 30\,(=14)$ **or** $(FE=)\,28\cos 60\,(=14)$ **or** $(FE=)\,\sqrt{28^2-"24.2..."}\,(=\sqrt{196}=14)$ **and** $(DE=)\,28\cos 30\,(=14\sqrt{3}=24.2(48...))$ **or** $(DE=)\,28\sin 60\,(=14\sqrt{3}=24.2(48...))$ **or** $(DE=)\,\sqrt{28^2-"14"^2}\,(=\sqrt{588}=14\sqrt{3}=24.2(48...))$			M1 for a method to find *FE* **and** *DE* (can now use their *FE* or *DE* found for first M1)
	$(AF=)\,\sqrt{53^2-28^2}\,(=\sqrt{2809-784}=\sqrt{2025}=45)$			M1 (indep) for finding *AF*
	$\frac{1}{2}\times"14"\times"14\sqrt{3}"\times"45"$ oe or $\frac{1}{2}\times"14"\times"24.2"\times"45"$			M1 for finding the volume of the prism
	Working not required, so correct answer scores full marks (unless from obvious incorrect working)	7638		A1 allow in the range 7623 – 7639
				Total 5 marks

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22	$\frac{-10-0}{8-0}\left(=-\frac{10}{8}=-\frac{5}{4}\right)$ oe		6	M1 for the gradient of the radius
	$\left[-\frac{5}{4}\right]\times m=-1$ oe or $(m=)"\frac{4}{5}"$ oe			M1ft for finding the gradient of the line perpendicular to the gradient of *their* radius for the gradient of **L**
	$-10="\frac{4}{5}"(8)+c$ or $(c=)\ -\frac{82}{5}=-16.4$ or $y--10="\frac{4}{5}"(x-8)$			M1ft for substitution to find '*c*' which is the *y* intercept (*R*)
	$0="\frac{4}{5}"x+"-\frac{82}{5}"$ oe or $10="\frac{4}{5}"(x-8)$ oe or $(x=)\frac{41}{2}=20.5$			M1ft for substitution to find *x* intercept (*Q*)
	$\sqrt{("-16.4")^2+("20.5")^2}$ or $\sqrt{("16.4")^2+("20.5")^2}$			M1ft for a complete method to find *RQ*
	Working not required, so correct answer scores full marks (unless from obvious incorrect working)	26.3		A1 allow 26.2 – 26.64
				Total 6 marks

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22 **ALT**	(radius =) $\sqrt{8^2+10^2}\left(=2\sqrt{41}=12.8...\right)$		6	M1 for finding the radius of the circle
	$\tan^{-1}\left(\frac{10}{8}\right)(=51.3...)$ **or** $\tan^{-1}\left(\frac{8}{10}\right)(=38.7...)$			M1 for finding the angle between the *x*-axis and the radius **or** the angle between the *y*-axis and radius
	$(x=)\frac{"12.8"}{\cos"51.3"}(=20.4(7205...))$ or $(y=)\frac{"12.8"}{\cos"38.7"}(=16.4(0120...))$ $(PQ=)"12.8"\times\tan"51.3"(=15.9(7701...))$ or $(PR=)"12.8"\times\tan"38.7"(=10.2(5473...))$			M1ft For finding one of the lengths *x (OQ)* **or** *y (OR)* **or** *PQ* or *PR*
	$(x=)\frac{"12.8"}{\cos"51.3"}(=20.4(7205...))$ and $(y=)\frac{"12.8"}{\cos"38.7"}(=16.4(0120...))$ $(PQ=)"12.8"\times\tan"51.3"(=15.9(7701...))$ and $(PR=)"12.8"\times\tan"38.7"(=10.2(5473...))$			M1ft finding both of the lengths *x* and *y* **or** both of the lengths *PQ* and *PR*
	$\sqrt{("20.4...")^2+("16.4...")^2}$ or 15.9(7701...) + 10.2(5473...)			M1ft for a complete method to find *RQ*
	Working not required, so correct answer scores full marks (unless from obvious incorrect working)	26.3		A1 allow 26.2 – 26.64
				Total 6 marks

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23	$\sqrt{\frac{7776}{486}}$ or $\sqrt{16}$ or 4 oe or $\sqrt{\frac{486}{7776}}$ or $\sqrt{\frac{1}{16}}$ or $\frac{1}{4}$ oe	<u>Alternative for M2</u> a correct equation linking area and volume $\left(\frac{486}{7776}\right)^3 = \left(\frac{2^{x+4}}{8^x}\right)^2$ oe or $\left(\frac{7776}{486}\right)^3 = \left(\frac{8^x}{2^{x+4}}\right)^2$ oe		5	M1 for a correct linear scale factor
	$8^x = "\left(\sqrt{\frac{7776}{486}}\right)^3" \times 2^{x+4}$ oe eg $8^x = 4^3 \times 2^{x+4}$ oe or $\frac{1}{8^x} = "\left(\sqrt{\frac{486}{7776}}\right)^3" \times \frac{1}{2^{x+4}}$ oe				M1 for setting up a correct equation for volume
	eg $2^{3x} = 2^6 \times 2^{x+4}$ or $(4^{\frac{3}{2}})^x = 4^3 \times 4^{\frac{1}{2}(x+4)}$ $\frac{1}{2^{3x}} = \frac{1}{2^6} \times \frac{1}{2^{x+4}}$ oe or $3x = 6 + x + 4$ oe or $x = 5$	$\frac{1}{2^{12}} = \frac{2^{2x+8}}{2^{6x}}$ oe or $2^{12} = \frac{2^{6x}}{2^{2x+8}}$ oe or $12 = 6x - 2x - 8$ oe or $x = 5$			M1 for a correct equation using just powers of 2 or powers of 4 (or 8 or 16) or a correct linear equation in x or the correct value for x
	$3^5 \div 4$ oe or $3^5 \times \frac{1}{4}$ oe				M1 a correct calculation for the height of solid **B**
			60.75		A1 oe accept 60.8 or 61 (from correct working)
					Total 5 marks

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24	(a)		(a =) −4 (b =) 6	2	B1 for (a =) −4 B1 for (b =) 6
	(b)		(p =) 3 (q =) 45	2	B1 for (p =) 3 B1 for (q =) 45
					Total 4 marks

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