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

3		$1500 + (36 \times 450)$ (= 17 700)		4	M1
		"17 700" – 12 500 (= 5200) oe or $\dfrac{"17\,700"}{12\,500}$ (=1.416) oe			M1
		$\dfrac{"5200"}{12\,500}$ (× 100) oe or 0.416 (× 100) or $\left(\dfrac{"17\,700"}{12\,500} \times 100\right)(- 100)$ 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) $0.58 + 2x + x = 1$ 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 $\dfrac{7}{50}$ 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 $\dfrac{145}{250}$
		Working not required, so correct answer scores full marks (unless from obvious incorrect working)	145		A1 cao
					Total 4 marks

5	$\pi \times 20\left(= 20\pi = 62.8(31...)\right)$ oe or $2 \times \pi \times (20 \div 2)\left(= 20\pi = 62.8(31...)\right)$ oe or $0.5 \times \pi \times 20\left(= 10\pi = 31.4(15...)\right)$ 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 $r = 20 \div 2 \ (= 10)$
	$3 \times ("62.8" \div 2) + 20 \div 2 + 20 \div 2$ oe or $1.5 \times ("62.8") + 20 \div 2 + 20 \div 2$ 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

6	eg $1 - \dfrac{1}{6}\left(= \dfrac{5}{6} \div \right)$ 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 , $"\dfrac{5}{6}"$ (= 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 , $"\dfrac{5}{6}"$ (= 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

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

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 $\leq$ or any other sign for this mark.
		Working not required, so correct answer scores full marks (unless from obvious incorrect working)	$x^3 - \dfrac{6}{5}$		A1 oe eg $-\dfrac{6}{5} \pounds \ x$ 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 $\geq$
			$x \leq 7$		B1 oe eg $x - 7 \leq 0$ allow $<$ in place of $\leq$
			$y \leq x$		B1 oe eg $y - x \leq 0$ allow $<$ in place of $\leq$
					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 $\leq$ or vice versa
					Total 5 marks

9	(a)		0.000 587	1	B1 allow 0.000 587(000…) or .000 587
	(b)		8.4×10^7	1	B1 allow $8.4(000…) \times 10^7$
	(c)	$8.5 \times 10^{10} \div 1.47 \times 10^9 \ (= \dfrac{8500}{147})$ or $85\ 000\ 000\ 000 \div 1\ 470\ 000\ 000 \ (= \dfrac{8500}{147})$		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

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

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

12	(a)	x	−2	−1	0	1	2		Correct y values	2	B2 for all correct
		y	**−1**	**3**	**1**	(−1)	**3**				(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

13	(a)		25	1	B1 Allow 25 – 25.5
	(b)	80 – [74, 76] (= [4, 6]) or 80 – (their value from a correct method) $\dfrac{"[74,76]"}{80} \times 100 \left(=[92.5, 95]\right)$		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
		$\dfrac{"[4,6]"}{80} \times 100$ (=[5, 7.5]) oe or $100 - \left(\dfrac{"[74, 76]"}{80} \times 100\right)$ 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

14	$(AOC =)180 - (2 \times 52) \ (= 76)$		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 180º **or** angles in a triangle sum to 180°
				Total 3 marks

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 <u>alternate segment</u> theorem **and** angle between <u>radius</u>/diameter and <u>tangent</u> = 90
				Total 3 marks

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)	$n = \dfrac{3p + 4x}{3x - 1}$		A1 oe $n = \dfrac{-3p - 4x}{1 - 3x}$ oe (must see "$n =$"… on answer line or in working)
				Total 3 marks

16	$\left(\dfrac{dy}{dx} = \right) 3 \times 4x^2 - 8 \ (= 12x^2 - 8)$		4	B2 for $3 \times 4x^2 - 8$ or $12x^2 - 8$ (with no other terms) (B1 for one term, ie $3 \times 4x^2$ or $12x^2$ or -8)
	$"12x^2 - 8" = \dfrac{1}{3}$			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)	$\pm \dfrac{5}{6}$		A1oe Ignore y values Allow $\pm 0.83(333\ldots)$ or $\pm\sqrt{\dfrac{25}{36}}$ oe
				Total 4 marks

17	$24 \div 20 \ (= 1.2)$ or a correct value on the FD scale or 10 small squares = 1 orange or 25 small squares (1 large square) = $24 \div 9.6 = 2.5$ oranges oe **or** 9 or 18 or 27 correctly assigned **or** $\dfrac{3x}{4} + \dfrac{y}{3}$ where x is their frequency of 3$^{\text{rd}}$ bar and y is their frequency of 4$^{\text{th}}$ bar		3	M1 for use of area to represent frequency **or** one correct frequency from the $\dfrac{1}{3}$ of 4$^{\text{th}}$ bar (9) or $\dfrac{2}{3}$ of 4$^{\text{th}}$ bar (18) or The 4th bar (27) [NOT 3$^{\text{rd}}$ bar = 44] or A method to show the student is finding $\dfrac{3}{4}$ of 3$^{\text{rd}}$ bar + $\dfrac{1}{3}$ of 4$^{\text{th}}$ bar (frequencies to be seen on diagram or identified in working)
	eg $(15 \times 2.2) + (5 \times 1.8)$ oe or $33 + 9$ or $44 + 27 - 11 - 18$ or $(330 + 90) \div 10$ oe or $(13.2 + 3.6) \times 2.5$ 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

18	(angle ABC =) 54 + (180 − 132) (= 102)		5	M1 for finding angle ABC
	$\left(AC^2 =\right)3.6^2 + 8.4^2 - 2 \times 3.6 \times 8.4 \times \cos[102]$			M1 for applying the cosine rule correctly ft *their* 102 provided less than 180 and not 90
	$\left(AC =\right)\sqrt{3.6^2 + 8.4^2 - 2 \times 3.6 \times 8.4 \times \cos[102]}$ 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

19	$a = 3$ and $d = 4$			6	M1 for a and d (can be embedded in the formula for S_n)
	$\dfrac{n}{2}\left[2(3)+(n-1)4\right]=7260$ or $\dfrac{n}{2}(2+4n)=7260$ oe	$\dfrac{n}{2}(3+x)=7260$ 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 $(n=)\dfrac{-1\pm\sqrt{1^2-4\times2\times-7260}}{4}$ eg $2\left[\left(n+\dfrac{1}{4}\right)^2-\left(\dfrac{1}{4}\right)^2\right]=7260$	eg $(x-239)(x+243)(=0)$ eg $(x=)\dfrac{-4\pm\sqrt{4^2-4\times1\times-58077}}{2}$ 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 $\dfrac{-1\pm\sqrt{1+58080}}{4}$ or $\dfrac{-4\pm\sqrt{16+232308}}{2}$
	$(n=)\ 60$ (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

20	$\sqrt{\dfrac{49}{121}}\left(=\dfrac{7}{11}=0.63\left(63...\right)\right)$		4	M1 Accept 0.63(63…) or 63(.6363…)% rounded or truncated
	$1-"\dfrac{7}{11}"\left(=\dfrac{4}{11}=0.36\left(36...\right)\right)$			M1 Accept 0.36(36…) or 36(.3636…)% rounded or truncated
	$2\times\dfrac{7}{11}\times"\dfrac{4}{11}"$ or $1-\left(\dfrac{49}{121}+"\left(\dfrac{4}{11}\right)^{2}"\right)$ 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)	$\dfrac{56}{121}$		A1 oe Allow 0.46(280…) or 46(.280)%
				Total 4 marks

21	$(FE=)28\sin 30(=14)$ **or** $(FE=)28\cos 60(=14)$ **or** $(DE=)28\cos 30\left(=14\sqrt{3}=24.2(48...)\right)$ **or** $(DE=)28\sin 60\left(=14\sqrt{3}=24.2(48...)\right)$		5	M1 for a method to find *FE* **or** *DE*
	$(FE=)28\sin 30(=14)$ **or** $(FE=)28\cos 60(=14)$ **or** $(FE=)\sqrt{28^2-"24.2..."}\left(=\sqrt{196}=14\right)$ **and** $(DE=)28\cos 30\left(=14\sqrt{3}=24.2(48...)\right)$ **or** $(DE=)28\sin 60\left(=14\sqrt{3}=24.2(48...)\right)$ **or** $(DE=)\sqrt{28^2-"14"^2}\left(=\sqrt{588}=14\sqrt{3}=24.2(48...)\right)$			M1 for a method to find *FE* **and** *DE* (can now use their *FE* or *DE* found for first M1)
	$(AF=)\sqrt{53^2-28^2}\left(=\sqrt{2809-784}=\sqrt{2025}=45\right)$			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

22	$\dfrac{-10-0}{8-0}\left(=-\dfrac{10}{8}=-\dfrac{5}{4}\right)$ oe		6	M1 for the gradient of the radius
	$\left[-\dfrac{5}{4}\right] \times m = -1$ oe or $(m=)\,"\dfrac{4}{5}"$ oe			M1ft for finding the gradient of the line perpendicular to the gradient of *their* radius for the gradient of **L**
	$-10 = "\dfrac{4}{5}"(8) + c$ or $(c=)\ -\dfrac{82}{5} = -16.4$ or $y - -10 = "\dfrac{4}{5}"(x-8)$			M1ft for substitution to find 'c' which is the y intercept (R)
	$0 = "\dfrac{4}{5}"x + "-\dfrac{82}{5}"$ oe or $10 = "\dfrac{4}{5}"(x-8)$ oe or $(x=)\dfrac{41}{2} = 20.5$			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

22 ALT	$(\text{radius} =)\ \sqrt{8^2 + 10^2}\ \left(= 2\sqrt{41} = 12.8...\right)$		6	M1 for finding the radius of the circle
	$\tan^{-1}\left(\dfrac{10}{8}\right)(= 51.3...)$ **or** $\tan^{-1}\left(\dfrac{8}{10}\right)(= 38.7...)$			M1 for finding the angle between the x-axis and the radius **or** the angle between the y-axis and radius
	$(x =)\dfrac{"12.8"}{\cos"51.3"}(= 20.4(7205...))$ or $(y =)\dfrac{"12.8"}{\cos"38.7"}(= 16.4(0120...))$ $(PQ =)"12.8" \times \tan"51.3"(= 15.9(7701...))$ 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*
	$(x =)\dfrac{"12.8"}{\cos"51.3"}(= 20.4(7205...))$ and $(y =)\dfrac{"12.8"}{\cos"38.7"}(= 16.4(0120...))$ $(PQ =)"12.8" \times \tan"51.3"(= 15.9(7701...))$ 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

23	$\sqrt{\dfrac{7776}{486}}$ or $\sqrt{16}$ or 4 oe or $\sqrt{\dfrac{486}{7776}}$ or $\sqrt{\dfrac{1}{16}}$ or $\dfrac{1}{4}$ oe	<u>Alternative for M2</u> a correct equation linking area and volume $\left(\dfrac{486}{7776}\right)^3 = \left(\dfrac{2^{x+4}}{8^x}\right)^2$ oe or $\left(\dfrac{7776}{486}\right)^3 = \left(\dfrac{8^x}{2^{x+4}}\right)^2$ oe		5	M1 for a correct linear scale factor
	$8^x = {}"\left(\sqrt{\dfrac{7776}{486}}\right)^3{}" \times 2^{x+4}$ oe eg $8^x = 4^3 \times 2^{x+4}$ oe or $\dfrac{1}{8^x} = {}"\left(\sqrt{\dfrac{486}{7776}}\right)^3{}" \times \dfrac{1}{2^{x+4}}$ oe				M1 for setting up a correct equation for volume
	eg $2^{3x} = 2^6 \times 2^{x+4}$ or $(4^{\frac{3}{2}})^x = 4^3 \times 4^{\frac{1}{2}(x+4)}$ $\dfrac{1}{2^{3x}} = \dfrac{1}{2^6} \times \dfrac{1}{2^{x+4}}$ oe or $3x = 6 + x + 4$ oe or $x = 5$	$\dfrac{1}{2^{12}} = \dfrac{2^{2x+8}}{2^{6x}}$ oe or $2^{12} = \dfrac{2^{6x}}{2^{2x+8}}$ 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 $3^5 \times \dfrac{1}{4}$ 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

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