International G	CSE Maths			
Apart from qu	estions 16, 21, 23, 24 and 25 (where the mark sche	eme states otherwise	e) the corr	rect answer, unless clearly obtained by an
incorrect meth	nod, should be taken to imply a correct method			
Q	Working	Answer	Mark	Notes
<b>1</b> (a)	25 ±		2	M1 for either 25 or $-12$ in the correct
	or			place or the correct substitution shown
	12			with brackets around –5
	or			
	$(-5)^2 - 4 \times 3$ or $(-5)^2 - 4(3)$ or			
	$-5 \times -5 - 4 \times 3 \text{ or } -5 \times -5 - 4(3)$			
	Correct answer scores full marks (unless from	13		A1
	obvious incorrect working)			(M0A0 for -37 without any working)
(b)	$x^{2}+5x-7x-35$		2	M1 for any 3 correct terms <b>or</b> for 4 out of
				4 correct terms ignoring signs or
				for $x^2 - 2x$ or
				for $-2x - 35$
	Correct answer scores full marks (unless from	$x^2 - 2x - 35$		A1 oe
	obvious incorrect working)			Ignore solutions/roots if correct expansion
				seen
				Total 4 marks

2	9, 18, 27, 36 and 12, 24, 36		4	M1 for at least two multiples of 9 and 12
	<b>or</b> 36			or
	or a multiple of 36			36
	or			or
	$(9 \times 12 =) 108$			a multiple of 36
	or			
	$3^2 \times 4$ (= 36) (from Venn diagram or table)			
	"4" × 7.6(0) or "3" × 4.8(0) or			M1 for a correct method to find the cost
	"30.4" or "14.4" <b>or</b>			of 4 or 8 or 12 etc of packets of pens
	" $4n$ " × 7 6(0) or " $3n$ " × 4 8(0)			or
				3 or 6 or 9 etc packets of pencils
	$"4" \times 7.6(0) + "3" \times 4.8(0)$			M1 for a correct combination of
	or			number of packets of pens $\times$ 7.6(0) +
	"30.4" + "14.4"			number of packets of pencils $\times$ 4.8(0)
	or			with an intention to add
	$(4n)^{2} \times 7.6(0) + (2n)^{2} \times 4.8(0)$			eg
	$4n \times 7.0(0) + 3n \times 4.8(0)$			pens pencils
				$4 \times 7.60 + 3 \times 4.8 = 44.8(0)$
				$8 \times 7.60 + 6 \times 4.8 =$ 89.6(0)
				$12 \times 7.60 + 9 \times 4.8 = 134.4(0)$
				$16 \times 7.60 + 12 \times 4.8 = 179.2(0)$
				$36 \times 7.60 + 27 \times 4.8 = 403.2(0)$
				$48 \times 7.60 + 36 \times 4.8 = 537.6(0)$
	Correct answer scores full marks (unless from	44.8(0)		A1 allow 45 if 44.8(0) seen
	obvious incorrect working)			allow 4480 p or pence if £ sign crossed
				out
				M3A0 for $44.8n$ where <i>n</i> is an integer (eg
				134.4(0))
				Total 4 marks

3	3.3 or $\frac{33}{10}$ or $3\frac{3}{10}$ or $3\frac{18}{60}$ oe or $180 + 18$ or 198 oe		3	B1 for working out the time in hours or minutes
	$515 \div 3.3 \text{ or } 515 \div \frac{33}{10} \text{ or } 515 \div 3\frac{3}{10} \text{ or}$ $\frac{515}{"198"} \times 60 \text{ oe}$			M1 Units must be consistent
	Correct answer scores full marks (unless from obvious incorrect working)	156		A1 allow 156 – 156.1 SCM1 for 515 ÷ 3.18 (= 161.9 or 162)
				Total 3 marks

4			2	M1 for $-7n + k$ ( $k \neq 45$ ) or $-7 \times n + k$ ( $k \neq 45$ ) or $n \times -7 + k$ ( $k \neq 45$ ) ( $k$ may be zero or absent or negative)
		45 – 7 <i>n</i>		A1 oe eg $45 - 7 \times n$ oe or $-7 \times n + 45$ oe or $U_n = 45 - 7n$ oe or 38 - 7(n - 1) oe NB: award full marks for eg x = 45 - 7n oe or $n$ th term $= -7 \times n + 45$ oe or but only M1 for $n = 45 - 7n$ oe
	Correct answer scores full marks (unless from obvious incorrect working)			Total 2 marks

5	$\frac{1}{2}(330+170) \times 240 \ (= 60\ 000) \ \text{oe or}$ $\left(\frac{80\times240}{2}\right) + (170\times240) + \left(\frac{80\times240}{2}\right) \ (= 60\ 000) \ \text{oe or}$ $(2\times9600) + 40\ 800 \ (= 60\ 000) \ \text{oe}$		4	M1 for working out the area of the trapezium
	[60 000] ÷ 10 000 (= 6) or 10 000 × 6 (= 60 000)			M1 ft their area (must come from a two dimensional area) Allow $\frac{\text{their area}}{10000}$
	49 650 ÷ [6]			M1 dep on either previous M1 ft their number of hectares Allow $\frac{49650}{\text{their number of hectares}}$
	Correct answer scores full marks (unless from obvious incorrect working)	8275		A1
				Total 4 marks

<b>6</b> (a)	$7 \times 5 \times 14 \ (= 490)$ oe <b>or</b>		4	M1 for working out the pay per week or
	$7 \times 14 \ (= 98)$ and $400 \div 5 \ (= 80)$			pay per day
	"490" – 400 (= 90) <b>or</b>			M1
	"98" – "80" (= 18) <b>or</b>			
	"98" ÷ "80" oe or "490" ÷ 400 oe or 1.225 oe			
	$\frac{"90"}{400} (\times 100) (= 0.225) \text{ oe or}$			M1 dep on M2
	$\frac{18^{\circ}}{80^{\circ}} (\times 100) (= 0.225)$ oe or			
	$\frac{"98"}{"80"} \times 100 (= 122.5)$ oe or			
	$\frac{"490"}{400} \times 100 (= 122.5)$ oe or			
	"1.225" – 1 (= 0.225)			
	Correct answer scores full marks (unless from	22.5		A1 oe allow 23% with M3 awarded
	obvious incorrect working)			
(b)	E.g. $1 - 0.06 (= 0.94)$ or		3	M1
	100(%) - 6(%) (= 94(%)) or			
	$\frac{23030}{94}$ (= 245) oe			
	E.g. 23 030 ÷ "0.94" or			M1
	$23\ 030 \div "94" \times 100 \text{ or}$			
	$23\ 030 \times 100 \div "94"$ or			
	"245" × 100			
	Correct answer scores full marks (unless from obvious incorrect working)	24 500		A1
	<u>,</u>			Total 7 marks

<b>7</b> (a)	1	1	B1 cao
(b)	-6	1	B1 Allow $3^{-6}$
			Total 2 marks

<b>8</b> (a)	-4x > 17 - 9  or  -4x > 8  or 9-17 > 4x or -8 > 4x or $\frac{9}{4} - x > \frac{17}{4} \text{ oe or } -\frac{9}{4} + x < -\frac{17}{4} \text{ oe}$		2	M1 for a correct first step Condone = rather than > or any other sign for this mark.
	Correct answer scores full marks (unless from obvious incorrect working)	<i>x</i> < -2		A1 oe eg $-2 > x$ (sight of correct answer in working space and just ( $x =$ ) $-2$ on answer line gains M1 only)
(b)		$y \ge 2$ $x \le 6$ $y \le x$	3	B3 for all 3 correct Allow $2 \le y, 6 \ge x$ and $x \ge y$ B2 for 2 correct B1 for 1 correct Allow < and > signs SCB2: $y \le 2, y \ge x$ and $x \ge 6$ (for all 3) Allow < and > signs
	<i>Correct answer scores full marks (unless from obvious incorrect working)</i>			Total 5 marks

9	$\sin 32 = \frac{(BC)}{50} \text{ or } \cos 32 = \frac{(CD)}{50} \text{ or }$		6	M1
	$\frac{(BC)}{\sin 32} = \frac{50}{\sin 90}$ oe or $\frac{(CD)}{\sin (90 - 32)} = \frac{50}{\sin 90}$ oe			
	$(BC =)50\sin 32(=26.4(959))$ or			M1 for finding <i>BC</i> or <i>AD</i> Can be written on the diagram
	$(BC =)\sqrt{50^2 - (50\cos 32)^2} (= 26.4(959))$ or			
	$(BC =)\sqrt{50^2 - "42.4"^2} (= 26.4(998))$ or			
	$(BC =)\frac{50}{\sin 90} \times \sin 32  \mathrm{oe}$			
	$(CD =)50\cos 32 (= 42.4(024))$ or			M1 for finding <i>CD</i> or <i>BA</i>
	$(CD =)\sqrt{50^2 - (50\sin 32)^2} (= 42.4(024))$ or			Can be written on the diagram
	$(CD =)\sqrt{50^2 - "26.4"^2} (= 42.4(622))$ or			
	$(CD =)\frac{50}{\sin 90} \times \sin(90 - 32)$			
	$(r =)$ "42.4(024)" ÷ 2 $\pi$ (= 6.74(855))			M1 for finding the radius of the cylinder
	$(V =) \pi \times "6.74(855)"^2 \times "26.4(959)"$			M1 dep on previous M mark for the use of $\pi r^2 h$
	Correct answer scores full marks (unless from	3790		A1 allow answers in the range
	obvious incorrect working)			3737 – 3794
				Accept answers in standard form
				Total 6 marks

10	$104 \times 5 (= 520)$ or $127 \times 7 (= 889)$ or		3	M1
	$\frac{m+tu+w+th+f}{m+tu+w+th+f}$ – 104 oe			
	5			
	"889" – "520" – 132 or "369" – 132 or			M1 ( $x =$ Sunday)
	$\frac{"520"+132+x}{7} = 127 \text{ oe or } \frac{132+x}{2} = \frac{369}{2} \text{ oe}$			
	$652 + x = 127 \times 7$			
	Correct answer scores full marks (unless from obvious incorrect working)	237		A1
				Total 3 marks

11	$m^9k^{15}$	2	B2 oe for all 3 correct $eg 125^{-1}m^9k^{15}$ or
	125		$\frac{1}{2}m^9k^{15}$
			125 <sup><i>m K</i></sup>
			Accept $a = 9, b = 15$ and $c = 125$
			B1 for a quotient in the form of $\frac{m^p k^q}{r}$ or
			a product in the form $r^{-1}m^{p}k^{q}$ where 2
			from $p$ or $q$ or $r$ are correct
			eg $\frac{m^9 k^{15}}{25}$ or $125m^9 k^{15}$
			Allow $m^9 k^{15}$ or $\frac{m^9}{125}$ or $125^{-1}m^9$ or $\frac{k^{15}}{125}$ or
			$125^{-1}k^{15}$ so long as not added to any other
			terms
			Accept two from $a = 9$ or $b = 15$ or
			<i>c</i> = 125
			Accept $y_{125^{-1}}m^9k^{15}$ or $\frac{ym^9k^{15}}{125}$ where y is
			constant
			Total 2 marks

<b>12</b> (a)	D	1	B1 allow d
(b)	С	1	B1 allow c
(c)	В	1	B1 allow b
			Total 3 marks

13	$80000 \times \left(\frac{100+x}{100}\right)^3 = 80000 + 6151.25$ oe or		5	M1
	$80000 \times \left(1 + \frac{x}{100}\right)^3 = 80000 + 6151.25$ oe or			
	$80000 \times (1 + x\%)^3 = 80000 + 6151.25$ oe or			
	$80000 \times y^3 = 80000 + 6151.25$ oe or			
	$\frac{80000+6151.25}{80000}(=1.076)\text{ oe or}$			
	$\frac{86151.25}{80000} (= 1.076) \text{ oe}$			
	$\sqrt[3]{\frac{80000+6151.25}{80000}}$ (= 1.025) oe <b>or</b>			M1
	$\sqrt[3]{"1.076"} (= 1.025) \text{ or } \left(1 + \frac{x}{100} = \right) \frac{41}{40} (= 1.025)$			
	Correct answer scores full marks (unless from obvious incorrect working)	2.5		A1 Accept answers in the range 2.4 – 2.6 from correct working NB Do not allow an answer in the range 2.4 – 2.6 if it comes from awrt 7.6% oe or 7.7% oe divided by 3 Do not accept an answer if it is in the range that comes from a simple interest method
				Total 3 marks

<b>14</b> (a)	20 20 22 23 25 26 26 27 28 29 29		3	M1 for ordering the numbers
				Allow one omission or error in the list
	22 and 28 identified for LQ and UQ			M1 for identifying 22 and 28
	eg 20 20 <u>22</u> 23 25 26 26 27 <u>28</u> 29 29			(22 and 28 implies the first M1)
	Correct answer scores full marks (unless from	6		A1
	obvious incorrect working)			
(b)		Akari and reason	1	B1 ft from part (a)
		using IQR		Akari as the IQR is lower/smaller oe
				(IQR must be part of the statement)
				Must have a value in (a) to compare the
				IQRs
				Total 4 marks

15	$\sqrt[3]{\frac{27}{64}} \left( = \frac{3}{4} = 0.75 \right)$		3	M1 for finding the probability of a head
	$\left(1 - \frac{3}{4}\right)^3$ or $\left(\frac{1}{4}\right)^3$ or $0.25^3$			M1 for a complete method
	Correct answer scores full marks (unless from obvious incorrect working)	$\frac{1}{64}$		A1 oe Accept 0.015(625) or 1.55(625)%
	obvious incorrect working)	04		truncated or rounded
				Total 3 marks

16	$\frac{2\sqrt{3}}{\sqrt{3}-1} \times \frac{\sqrt{3}+1}{\sqrt{3}+1} \text{ or}$ $\frac{2\sqrt{3}}{\sqrt{3}-1} \times \frac{-\sqrt{3}-1}{-\sqrt{3}-1}$		3	M1 for explicitly multiplying the numerator and the denominator by $\sqrt{3}+1$ or $-\sqrt{3}-1$
	$\frac{2 \times 3 + 2\sqrt{3}}{3 - 1} \text{ or } \frac{6 + 2\sqrt{3}}{3 - 1} \text{ or } \frac{6 + 2\sqrt{3}}{2} \text{ oe}$ $\frac{-2 \times 3 - 2\sqrt{3}}{-3 + 1} \text{ or } \frac{-6 - 2\sqrt{3}}{-3 + 1} \text{ or } \frac{-6 - 2\sqrt{3}}{-2} \text{ oe}$			M1 dep on M1 (numerator expanded for 2 terms which need to be all correct and denominator may be 4 terms which need to be all correct)
	Working required	$3+\sqrt{3}$		A1 allow $\sqrt{3} + 3$ (dep on M2)
				Total 3 marks

17	$y^3 = \frac{6+5x}{2}$		4	M1 for removing cube root
	<sup>5</sup> x+4			
	$xy^3 + 4y^3 = 6 + 5x$ oe			M1 for multiplying by denominator and
				expanding in a <b>correct</b> equation
	or			or
	5x 6			for gathering x terms on one side and the
	$x - \frac{1}{y^3} = \frac{1}{y^3} - 4$			equation in fractional form
	$xy^3 - 5x = 6 - 4y^3$			M1 for gathering terms in <i>x</i> on one side
				and other terms the other side in a <b>correct</b>
				equation
				or
				for removing all fractions
	Correct answer scores full marks (unless from	$r = \frac{6 - 4y^3}{1 + 1}$		A 1 or $r = \frac{4y^3 - 6}{4y^3 - 6}$
	obvious incorrect working)	$x = \frac{1}{y^3 - 5}$		$\frac{1}{5-y^3}$
				$\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$
				SCB2 for $x = \frac{6-4y^3}{1}$ or $x = \frac{4y^3-6}{1}$
				$y^{\frac{1}{3}}-5$ $5-y^{\frac{1}{3}}$
				$\int v^{\frac{1}{3}}$ can also be $v^{2}$
				Total 4 marks

18	$DP \times 12 = 30 \times 14$ or		3	M1
	$DP \times 12 = 420$ or			
	$(DC + 12) \times 12 = 30 \times 14$ or			
	$(DC + 12) \times 12 = 420$ or			
	12DC + 144 = 420 or			
	DC + 12 = 35 or			
	$(DP) = \frac{30 \times 14}{12} (= 35)$			
	" $35$ " – 12 or 23 + 12 = 35 or			M1
	$(DC =) \frac{"420" - "144"}{12}$ or			
	$(DC =) \frac{"276"}{12}$			
	Correct answer scores full marks (unless from	23		A1
	obvious incorrect working)			
				Total 3 marks

19	(19+15+4) - 30 or $38 - 30$ or $19 + 15 - 26$		4	M1 for a	M1A1 for a fully correct
	or $\boxed{19 - x  x  15 - x}_{4}$ or			method to find the number of people booking breakfast and dinner	or for $\frac{8}{30}$
	19 - x + x + 15 - x + 4 = 30 oe			Al con he	
	δ			A I can be shown in a Venn diagram or a valid calculation	
	$\frac{\frac{8}{30} \times \frac{7}{29} \text{ or}}{\frac{8}{30} \times \frac{8}{30} = \frac{64}{900} \text{ or } \frac{16}{225} \text{ oe}}$			M1 for the use of or $\frac{"8"}{n} \times \frac{"8"-1}{n-1} w$	of $\frac{k}{30} \times \frac{k-1}{29}$ where $k < 30$ where $n > 8$
	Correct answer scores full marks (unless from obvious incorrect working)	$\frac{28}{435}$		A1 oe awrt 0.06	4 or awrt to 6.4%
					Total 4 marks

20	180 - 78 - 78 oe or $(90 - 78) \times 2$ oe		2	M1 for a complete <b>correct</b> method to find angle <i>ABC</i> . This is not awarded if the angles are incorrectly labelled unless they have clearly started again (Ignore incorrect angles on the diagram if a student shows a correct method leading to the required answer)
	Correct answer scores full marks (unless from obvious incorrect working)	24		A1 award full marks if 24 is seen in the correct place on the diagram unless contradicted on the answer line
				Total 2 marks

21	Eg	eg	5	M1 for substitution of $y = \pm 2x \pm 1$ (or
	$(2x+1)^2 + x(2x+1) = 7$	$y^2 + \left(\frac{y-1}{2}\right)y = 7$		$x = \frac{\pm y \pm 1}{2}$ ) into $y^2 + xy = 7$ to obtain an
				equation in x only (or y only)
	E.g. $6x^2 + 5x - 6(=0)$ $6x^2 + 5x = 6$	E.g. $3y^2 - y - 14(=0)$ $3y^2 - y = 14$		M1ft dep on previous M1 for multiplying out and collecting terms, forming a three term quadratic in any form of $ax^2 + bx + c$ (= 0) where at least 2 coefficients ( <i>a</i> or <i>b</i> or <i>c</i> ) are correct
	E.g.	E.g.		M1ft dep on first M1 method to solve
	(2x+3)(3x-2)(=0)	(y+2)(3y-7)(=0)		their 3 term quadratic using any correct
	or	or		simplification allow as far as eq
	$x = \frac{-5 \pm \sqrt{5^2 - 4 \times 6 \times -6}}{2 \times 6}$	$y = \frac{-(-1) \pm \sqrt{(-1)^2 - 4 \times 3 \times -14}}{2 \times 3}$		$\frac{-5 \pm \sqrt{25 + 144}}{12} \text{ or } \frac{1 \pm \sqrt{1 + 168}}{6} \text{ or if}$
	or	or		factorising allow brackets which
	$\left(x + \frac{5}{12}\right)^2 - \left(\frac{5}{12}\right)^2 = 1$	$\left(y - \frac{1}{6}\right)^2 - \left(\frac{1}{6}\right)^2 = \frac{14}{3}$		expanded give 2 out of 3 terms correct) or correct values for x or
	$\left(x = -\frac{3}{2} \text{ and } x = \frac{2}{3}\right)$	$\left(y = -2 \text{ and } y = \frac{7}{3}\right)$		Accept $(x =) 0.6(66)$ rounded or truncated or $(y =) 2.3(33)$
	$y = 2\left("-\frac{3}{2}"\right) + 1(=-2)$	$-2 = 2x + 1$ or $x = -\frac{3}{2}$		M1ft dep on previous M1 for substituting <b>their</b> 2 found values of <i>x</i> or <i>y</i> into one of
	and	and		the two given equations
	$y = 2\left("\frac{2}{3}"\right) + 1\left(=\frac{7}{3}\right)$	$\frac{7}{3} = 2x + 1$ or $x = \frac{2}{3}$		variable (correct labels for $x / y$ )

	$ \begin{pmatrix} -\frac{3}{2}, -2 \\ \\ \left(\frac{2}{3}, \frac{7}{3}\right) $	A1 oe dep on M2 allow $x = -1.5$ , $y = -2$ x = 0.66(6), $y = 2.33(3)$ truncated or rounded
Working required		Total 5 marks

<b>22</b> (a)	$\sqrt{4^2 + 9^2 + 15^2} \left( = \sqrt{322} = 17.9(443) \right) \text{ or }$		2	M1
	$\sqrt{13^{+}+4^{+}} = \sqrt{241} = 13.3(241)$ and $\sqrt{9^{2} + ("\sqrt{241}")^{2}} = \sqrt{322} = 17.9(443)$			
		17.9		A1 awrt 17.9
(b)	$(UR =)$ 42 tan 30 (= 14 $\sqrt{3}$ = 24.2(487)) or		3	M1
	$(UR =) \frac{42 \times \sin 30}{\sin (90 - 30)} (= 14\sqrt{3} = 24.2(487))$			
	$\tan\left(UMR\right) = \left(\frac{"24.248"}{42 \div 2}\right) \text{ or }$			M1
	$\tan\left(UMR\right) = \left(\frac{"24.248"}{21}\right) \text{ or }$			
	$\tan\left(UMR\right) = \left(\frac{"14\sqrt{3}"}{21}\right)$ or			
	$(UM =)\sqrt{\left(\frac{42}{2}\right)^2 + \left("14\sqrt{3}"\right)^2} \left(=7\sqrt{21} = 32.0(780)\right)$			
	and $\sin(UMR) = \left(\frac{"14\sqrt{3}"}{"7\sqrt{21}"}\right)$ or $\cos(UMR) = \left(\frac{21}{"7\sqrt{21}"}\right)$			
	<i>Correct answer scores full marks (unless from obvious incorrect working)</i>	49.1		A1 awrt 49.1
				Total 5 marks

23	(7p-3)-(8p)=(4p+2)-(7p-3) oe or		5	M1 for using $U_2 - U_1 = U_3 - U_2$ or
	-p-3 = -3p+5 oe or			$U_1 - U_2 = U_2 - U_3$
	(p =) 4			Condone missing brackets around $7p - 3$
	$\begin{array}{c} a = 32 \text{ or } d = -7 \text{ or} \\ 32 \ 25 \ 18 \end{array}$			A1 dep on M1 (32 and $-7$ may be embedded in the $S_n$ formula or embedded in $U_n$ formula)
	$\frac{n}{2} \Big[ 2(32) + (n-1)(-7) \Big] = -1914$			M1 The values of <i>a</i> and <i>d</i> must be correct Condone missing brackets around $n - 1$
	$7n^2 - 71n - 3828(=0)$ oe			A1 (can be implied by $n = 29$ and/or $n = -\frac{132}{7}$ )
	Working required	29		A1 dep on M2
				Total 5 marks

23 ALT	7p - 3 = 8p + d4p + 2 = 8p + 2d4p + 2 = 7p - 3 + d	$ \begin{array}{r} -3 = p + d \\ 2 = 4p + 2d \\ 5 = 3p + d \end{array} $		5	M1 for using $U_n = a + (n-1)d$ to set up 2 equations for $U_2$ and $U_3$
	a = 32 or $d = -7$ or 32 25 18	· · · ·			A1 dep on M1 (32 and $-7$ may be embedded in the $S_n$ formula or embedded in $U_n$ formula)
	$\frac{n}{2} [2(32) + (n-1)(-7)] = -19$	914			M1 The values of <i>a</i> and <i>d</i> must be correct Condone missing brackets around $n - 1$
	$7n^2 - 71n - 3828(=0)$ oe				A1 (can be implied by $n = 29$ and/or $n = -\frac{132}{7}$ )
	Working required		29		A1 dep on M2
					Total 5 marks

4	eg		5	M1	M2 for
	$4\pi R^2 = 9 \times 4\pi r^2$ oe or				(vol SF =) 27 or $\frac{1}{27}$ or
	R = 3r oe or			M1 ( a correct	$3^3 \text{ or } \frac{1}{3}$
	1:3 or 3:1 or 3 or $\frac{1}{2}$			scale factor of 5 or $R = 3r$ oe	33
	5			implies the first	
	eg			M1) M1 for a correct	equation based on
	$4 (2)^3 4 3 117$			volumes with onl	y one variable eg R or r
	$\frac{-\pi}{3}(3r) - \frac{\pi}{3}\pi r^3 = 11/\pi$ oe or			or x	, C
	$4_{-3}^{3} 4_{-}(1_{-3})^{3}$ 117 - or			(M3 for	
	$\left[\frac{-\pi r}{3}, \frac{-\pi r}{3}, \frac{-r}{3}\right] = 11/\pi \text{ or}$			$26 \times \frac{4}{3}\pi r^3 = 117\pi$	r oe or
	$27 \times \frac{4}{3}\pi r^3 - \frac{4}{3}\pi r^3 = 117\pi$ oe or			$26 \times (Vol)_{B} = 117$	$\pi$ or
	$\frac{4}{3}\pi r^3 - \frac{1}{27} \times \frac{4}{3}\pi r^3 = 117\pi$ oe or			$\frac{26}{27} \times \frac{4}{3} \pi r^3 = 117.$	$\pi$ oe or
	oe			$\frac{26}{27} \times (Vol)_A = 117$	$1\pi$
	$(r=)\sqrt[3]{\frac{117\times3}{104}} \left(=\sqrt[3]{\frac{27}{8}}\right)$ or			M1 dep on previo	ous M mark
	$\left(R=\right)\sqrt[3]{\frac{117\times81}{104}}\left(=\sqrt[3]{\frac{729}{8}}=\frac{9}{2}\right)$				
	Working required	3		A1 oe dep on M2	
		2			
					Total 5 marks

25	(gradient of $AB =$ ) " $-\frac{1}{2}$ " or "2" $m = -1$		6	M1 for the use of $m_1 \times m_2 = -1$ or
				for " $-\frac{-}{2}$ " embedded in a linear equation
				eg $y = "-\frac{1}{2}"x + c$
	(gradient of $AB =$ ) $\frac{k-7}{c}$ oe			M1 for a correct expression for the gradient which may be seen in an
	o-j			equation
	(midmoint of $AB \rightarrow (j+6, k+7)$ or			or
	$(\text{Indpoint of } AB =)\left(\frac{1}{2}, \frac{1}{2}\right)^{\text{de}}$			which may be seen in an equation.
	$\frac{k-7}{k-1} = -\frac{1}{2}$ oe or $2k - j = 8$ oe			M1 for setting up a <b>correct</b> equation for
	6-j 2			or
	or $\left(\frac{k+7}{2}\right) - 2\left(\frac{j+6}{2}\right) = 7 \text{ oe or } k-2j = 19 \text{ oe}$			for setting up a <b>correct</b> equation for the line given and the midpoint
	$\frac{k-7}{6-j} = -\frac{1}{2}$ oe or $2k-j = 8$ oe			A1 for 2 <b>correct</b> equations
	and			
	$\left(\frac{k+7}{2}\right) - 2\left(\frac{j+6}{2}\right) = 7 \text{ oe or } k-2j = 19 \text{ oe}$			
	k = -1 and $j = -10$			A1 for a correct value of <i>k</i> and a correct value of <i>j</i>
	Working required	(-2, 3)		A1 dep on previous M1
				Total 6 marks

<b>26</b> (a)	2	1	B1 cao
(b)	3	1	B1 cao
(c)	1	1	B1 cao
			Total 3 marks