Question		Working	Answer	Mark	Notes
7	(a)		5	1	B1 cao no other numbers must be given
	(b)	2,3,5,5,5,7,8,9,10,11		2	M1 place numbers in order (at least 6 with none missing) or sight of $\frac{5+7}{2}$ May be seen in part (a) or in question. Allow with signs eg + between
		Correct answer scores full marks (unless from obvious incorrect working)	6		A1 cao
					Total 3 marks

Question		Working	Answer	Mark	Notes
8		$360 \div 24$ [= 15] oe or $24 \times 180 - 360$ [= 3960] or $(2 \times 24 - 4) \times 90$ [= 3960] or $(24-2) \times 180 [= 3960]$ oe		3	M1 for a correct method to find an exterior angle or total of the interior angles. Implied by seeing 15 or 3960 or 165
		$180 - "15"$ or $\frac{"3960"}{24}$ oe			M1 dep on M1 correct method to find one interior angle. This may be implied by seeing 165
		Correct answer scores full marks (unless from obvious incorrect working)	165		A1 cao do **not** ISW This must be the answer on the answer line or if no answer on the answer line their final answer which may be shown for example by circling or underlining.
					Total 3 marks

Question		Working	Answer	Mark	Notes
9		$T^2 = \frac{2r}{g}$ or $T^2 g = 2r$ or $\sqrt{g} = \frac{\sqrt{2r}}{T}$		2	M1 correctly remove square root sign or make root g the subject.
		Correct answer scores full marks (unless from obvious incorrect working)	$g = \frac{2r}{T^2}$		A1 cao Condone missing "$g =$" on answer line if fully correct expression seen in working. Allow $g = \left(\frac{\sqrt{2r}}{T}\right)^2$ or $g = 2rT^{-2}$
					Total 2 marks

Question		Working	Answer	Mark	Notes
10		$\left[x^2(3x+1)=\right]3x^3+x^2$		3	M1 correct expansion of brackets before differentiating. eg $3x^3+1x^2$
		$\left[\frac{dy}{dx}=\right]20x^3+9x^2+2x$			M1 at least one correct term
		Correct answer scores full marks (*unless from obvious incorrect working*)	$20x^3+9x^2+2x$		A1 oe eg $20x^3+9x^2+2x^1$
					Total 3 marks

Question		Working	Answer	Mark	Notes
11		$\frac{120}{360}\pi r^2=48\pi\left[\Rightarrow r=12\right]$		3	M1 for forming an equation involving the radius using the given area. eg $\frac{1}{3}\pi r^2=48\pi$ or $\frac{1}{3}r^2=48$
		$\left[\text{Arc length}=\right]\frac{120}{360}\times2\pi\times\text{"12"}\left[=8\pi\right]$			M1 Find an expression for the arc length *ABC*, ft their radius. Allow awrt 25.1 May be seen as part of working eg $\frac{1}{3}\times2\times\pi\times\text{"12"}+2\times\text{"12"}$ where 12 is their radius
		Correct answer scores full marks (*unless from obvious incorrect working*)	$8\pi+24$		A1 oe eg $8(3+\pi)$ **allow** awrt 15.6π (need not be simplified) eg $\frac{120}{360}\times2\pi\times12+12+12$ **ISW**
					Total 3 marks

Question		Working	Answer	Mark	Notes
12		eg $2(x+2)+3(x-3)=60$ or $4(x+2)+6(x-3)=120$ or $\frac{2(x+2)}{12}+\frac{3(x-3)}{12}[=5]$ or $\frac{4(x+2)}{24}+\frac{6(x-3)}{24}[=5]$ or $\frac{x}{6}+\frac{1}{3}+\frac{x}{4}-\frac{3}{4}[=5]$ oe		3	M1 Clear intention to multiply all terms by a multiple of 12 If correct expression with brackets in is not seen allow a maximum of one incorrect term if the brackets are expanded **or** express the LHS as two fractions over a multiple of 12 or as a single fraction with a denominator which is a multiple of 12 eg $\frac{2(x+2)+3(x-3)}{12}=5$ If correct expression with brackets in is not seen allow a maximum of one incorrect term if the brackets are expanded No need for = 5 **or** expressing the LHS as 4 fractions. No need for = 5
		$5x=60-4+9$ or $10x=120-8+18$ $\frac{5x}{12}=5-\frac{1}{3}+\frac{3}{4}$ oe			M1 indep for a correct equation with the terms in x combined eg $\frac{5x-5}{12}=5$ or $5x=65$ or $\frac{5}{12}x=\frac{65}{12}$
		Working required	$x = 13$		A1 dependent on at least one M mark being awarded
					Total 3 marks

Question		Working	Answer	Mark	Notes
13			$p = 15$	3	B1 cao
		$-5-2p$ or $-5-2\times"15"$ **or** $-5\mathbf{b}-2p\mathbf{b}=q\mathbf{b}$ **or** $2p+q=-5$ oe			M1 compare coefficients of **b** Allow one sign error in $-5-2p$ eg $-5+2p$ or allow ft of their p value and one sign error ie $5-2\times"15"$ or $-5+2\times"15"$ or $-5\mathbf{b}+2p\mathbf{b}=q\mathbf{b}$ or $5\mathbf{b}-2p\mathbf{b}=q\mathbf{b}$ or $-5\mathbf{b}-2p\mathbf{b}=-q\mathbf{b}$ oe Allow $p =$ "15" subst
		Correct answer scores full marks (*unless from obvious incorrect working*)	$q = -35$		A1
					SC if p and q are correct but not written on the answer line, at least one must be labelled in their working to award full marks. If both values are correct but neither labelled or they are on the wrong answer lines they get 2/3 marks
					Total 3 marks

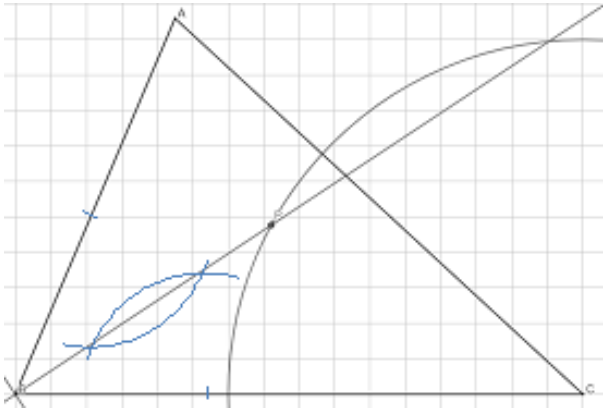
Question		Working	Answer	Mark	Notes
14	**(a)**		$0.07y$	1	B1 cao oe $\left(\frac{7}{100}y\right)$
	(b)	number bottle $B = 0.12y$ increase $= 0.05y$ or 5%		1	M1 for sight of $0.12y$ or $\frac{12}{100}y$ or $0.05y$ or $\frac{5}{100}y$ or 5% $12\%-7\%$ or $12\%y-7\%y$
		$0.12y-"0.07y"=60$ or $0.05y=60$ or $60\div5\times100$ or $5\% = 60$ or $5\%y=60$ or $12\%-7\%=60$ or $12\%y-7\%y=60$		1	M1 oe follow through their result from part (a)
			1200	1	A1 cao Must come from a correct equation Correct answer with no working gains full marks
					Total 4 marks

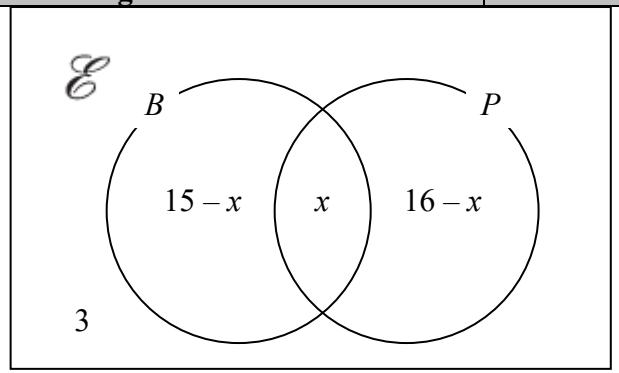
Question		Working	Answer	Mark	Notes
15		$20x + 7y = 4$ $\quad$ $40x + 14y = 8$ $\underline{20x - 20y = -50}$ $\quad$ $\underline{14x - 14y = -35}$ $27y = 54$ $\quad$ $54x = -27$ or $20\left(\frac{2y-5}{2}\right)+7y=4$ or $20x+7\left(\frac{2x+5}{2}\right)=4$ or $2\left(\frac{4-7y}{20}\right)-2y=-5$ or $2x-2\left(\frac{4-20x}{7}\right)=-5$ oe		4	M1 eliminating either x or y (equate coefficient and use correct operation) Allow 1 error either one incorrect term in equating the coefficients eg –4 instead of 8 **or** one error when eliminating either x or y **or** substitute for x or y to form an equation in only one variable. Allow 1 sign slip only
			$x = -\frac{1}{2}$ or $y = 2$		A1 dep on M1
		$20 \times "-\frac{1}{2}" + 7y = 4$ or $20x + 7 \times "2" = 4$ or $2 \times "-\frac{1}{2}" - 2y = -5$ or $2x - 2 \times "2" = -5$ oe			M1dep on previous method mark For repeating first method (allow one sign error) or substitute their x or y into a correct equation
		Working required	$x = -\frac{1}{2}$ and $y = 2$		A1 dep on M1 M1
					Total 4 marks

Question		Working	Answer	Mark	Notes
16		Let t = total number of students and c = number of students who travel by car Allow any letters for t and c			
		$[t =]\frac{208}{0.104}$ **or** $[t =]718+0.896t-510$ **or** $\frac{208}{208+510+c}=0.104$ **or** $[c =]\frac{208}{0.104}$ – 208 – 510 **or** $[c =]0.896\times\frac{208}{0.104}-510$ **or** $[c =]\frac{208}{0.104}-718$ **or** $0.896\times(718+c)=510+c$ **or** $\frac{510}{208}\times 10.4$		4	M1 correct method to find t or c **or** correct equation (any form) in terms of t or c **or** correct method to find the % that represents 510 students May be implied by seeing 25.5 or 1282 or 2000
		[t =] 2000 or [c =] 1282 or 25.5			A1 correct value for t **or** c **or** percentage
		$\frac{"1282"}{2000}\times 100$ or $\frac{"1282"}{"1282"+208+510}\times 100$ or $\frac{1282}{"2000"}\times 100$ or 100 – 10.4 – "25.5" or 100 – 10.4 – $\frac{510}{"2000"}\times 100$			M1 For an attempt at a correct method to find the percentage. Allow $\frac{n}{2000}\times 100$ **or** $\frac{n}{n+718}\times 100$ where $n<2000$ **or** $\frac{1282}{m}\times 100$ where $m>1282$ **or** $\frac{r-718}{r}\times 100$ where $r>718$ **or** $100 - 10.4 - \frac{510}{"p"}\times 100$ where $p>510$ or $100-10.4-q$ where $20<q<30$ may be implied by 64.1 Condone rounded figures.
		Correct answer scores full marks (*unless from obvious incorrect working*)	64.1		A1 cao Allow 64 Do **not** ISW This must be the answer on the answer line or if no answer on the answer line their final answer which may be shown for example by circling or underlining.
					Total 4 marks

Question		Working	Answer	Mark	Notes	
17	**(a)**	eg $\frac{16.1}{48}$ [= 0.335] or $\frac{1610}{48}$ or $\frac{16.1}{12/25}$ or $\frac{x}{16.1}=\frac{1}{48}$ or $\frac{x}{1610}=\frac{1}{48}$ or $\frac{x}{16.1}=\frac{25}{12}$ oe		2	M1 correct method or equation to find length in m or cm. Implied by 0.335	
		Correct answer scores full marks (unless from obvious incorrect working)	33.5		A1 awrt 33.5	
	(b)	48^3 [= 110 592] or 0.48^3 [= 0.110 592]		3	M1 Consideration of cube of scale factor seen. eg $\left(\frac{16.1}{(a)}\right)^3$ or $\left(\frac{1610}{(a)}\right)^3$ or $\frac{995}{V}=\frac{(a)^3}{1610^3}$	M2 for $\frac{995}{100^3}\times 48^3$
		$\frac{995}{100^3}$ [= 0.000995] or [995×"110 592"]÷100^3 0.48^3 [= 0.110 592]			M1 for unit conversion by dividing by 100^3	
		Correct answer scores full marks (unless from obvious incorrect working)	110		A1 awrt 110	
						Total 5 marks

Question		Working	Answer	Mark	Notes
18			angle bisector constructed accurately	4	B2 for a line within the limits and a pair of suitable arcs. One arc centred on a point D on BC and one centred on the point E on AB such that $BE = BD$ **or** 2 arcs centred at B with the cross to find the middle. (B1 for a line within the limits (Can be any length - does not need to cross AC but should remain within the guidelines if it were to be extended) **or** a pair of suitable arcs
			Accurate arc drawn from C		B1 for an arc within the limits indicated. It does not need to cross AC or BC
			P correctly labelled		B1ft dependent on at least B1 for the angle bisector and B1 for the arc. Must clearly identify it is the point.
					Total 4 marks



Question		Working	Answer	Mark	Notes
19	**(a)**			2	B2 $15-x$, $16-x$ and 3 in correct regions on Venn diagram B1 2 of $15-x$, $16-x$ and 3 in correct regions or all 3 values correct, one in correct region. Allow 11 for $15-x$ and 12 for $16-x$ **SC** B1 x is replaced with a number $x \neq 4$ and they use this incorrect value, to find $15-x$ and $16-x$
	(b)	$3+"15-x"+x+"16\ -x"=\ 30$ oe		2	M1 Correct equation formed, in x, ft their values for $B' \cap P$ and $B \cap P'$ May see only one of these values used eg $3+15+"16\ -x"=30$
		Correct answer scores full marks (*unless from obvious incorrect working*)	4		A1 cao
	(c)		$\frac{11}{30}$	1	B1 ft follow through their answer to part (b), if 0 < part(b) < 15 only ie $\frac{15-"their(b)"}{30}$ with numerator a single number. Allow awrt 0.367
					Total 5 marks

Question	Working	Answer	Mark	Notes	
20	**Throughout this question condone mis-labelling. eg if they label the volume of the cone as being the hemisphere**				
	$\frac{2}{3}\pi\times10^3\left[=\frac{2000\pi}{3}=2094.395...\right]$		5	M1 Allow for $\frac{4}{3}\pi\times10^3\left[=\frac{4000\pi}{3}=4188.790\ldots\right]$ Allow sight of 4189, awrt 4190 or awrt 2090 or exact fraction May be embedded within other working. Ignore labelling	
	$\frac{1}{3}\pi\times10^2x\left[=\frac{100\pi}{3}x=104.719\ldots x\right]$			M1 or $\frac{1}{3}\pi10^2(h-10)$ Allow sight of 104, awrt 105 or exact fraction. Allow any letter for x. (Condone h for x) Ignore labelling	
	$\frac{1}{3}\pi\times10^2x=\frac{3}{4}\times\left(\frac{2}{3}\pi\times10^3\right)$ or $"\frac{100\pi}{3}"x=\frac{3}{4}\times\left("\frac{2000\pi}{3}"\right)$ or $\frac{\frac{1}{3}\pi\times10^2x}{\frac{2}{3}\pi\times10^3}=\frac{3}{4}$ oe			M1 using $V_{cone}=\frac{3}{4}\times V_{hemisphere}$ oe with at least one of the volumes correct Allow $h-10$ or any letter for x (condone h) You may ft their values eg $"2094"x=\frac{3}{4}\times"105"$ **NB** x = 15 **NB useful number** $\frac{3}{4}\times\left(\frac{2}{3}\pi\times10^3\right)=1570.795...$	M2 for $\frac{\frac{1}{3}\pi10^2(h-10)}{\frac{2}{3}\pi\times10^3}=\frac{3}{4}$ or $\frac{\frac{100\pi}{3}(h-10)}{\frac{2000\pi}{3}}=\frac{3}{4}$ oe
	"15"+10			M1 For using $h-10$ anywhere **OR** if all 3 previous method marks awarded allow for "their x" + 10	
	Correct answer scores full marks (*unless from obvious incorrect working*)	25		A1 awrt 25	
	SC r = 10 not substituted could get **M1 M1 M0 M1 A0** 1st M1 for $\frac{\frac{1}{3}\pi r^2x}{\frac{2}{3}\pi r^3x}=\frac{3}{4}$ (allow sphere) 2nd M1 $\frac{x}{2\times r}=\frac{3}{4}$ or $\frac{x}{4\times r}=\frac{3}{4}$ 4th M1 for using $h-10$ or adding 10 A0				
					Total 5 marks