

Question	Answer	Marks	Guidance
1	$\frac{3x}{(2-x)(4+x^2)} = \frac{A}{2-x} + \frac{Bx+C}{4+x^2}$ $\Rightarrow 3x = A(4+x^2) + (Bx+C)(2-x)$ $x=2 \Rightarrow 6 = 8A, A = \frac{3}{4}$ $x^2 \text{ coeffs: } 0 = A - B \Rightarrow B = \frac{3}{4}$ $\text{constants: } 0 = 4A + 2C \Rightarrow C = -1\frac{1}{2}$	<p>M1</p> <p>M1</p> <p>A1</p> <p>A1</p> <p>A1</p> <p>[5]</p>	<p>correct form of partial fractions (condone additional coeffs eg $\frac{Ax+B}{2-x} + \frac{Cx+D}{4+x^2}$ * for M1 BUT $\frac{A}{2-x} + \frac{B}{4+x^2}$ ** is M0)</p> <p>Multiplying through oe and substituting values or equating coeffs at LEAST AS FAR AS FINDING A VALUE for one of their unknowns (even if incorrect) Can award in cases * and ** above Condone a sign error or single computational error for M1 but not a conceptual error Eg $3x = A(2-x) + (Bx+C)(4+x^2)$ is M0 $3x(2-x)(4+x^2) = A(4+x^2) + (Bx+C)(2-x)$ is M0 Do not condone missing brackets unless it is clear from subsequent work that they were implied. Eg $3x = A(4+x^2) + Bx + C(2-x) = 4A + Ax^2 + Bx + 2C - Cx$ is M0 $= 4A + Ax^2 + 2Bx - Bx^2 + 2C - Cx$ is M1</p> <p>oe www [SC B1 $A = 3/4$ from cover up rule can be applied, then the M1 applies to the other coefficients] NB $\frac{A}{2-x} + \frac{B}{4+x^2} \Rightarrow A = 3/4$ is A0 ww (wrong working)</p> <p>oe www</p> <p>oe www [In the case of * above, all 4 constants are needed for the final A1] Ignore subsequent errors when recompiling the final solution provided that the coeffs were all correct</p>

4754A

Mark Scheme

June 2014

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2	$(4+x)^{\frac{3}{2}} = 4^{\frac{3}{2}} \left(1 + \frac{1}{4}x\right)^{\frac{3}{2}}$ $= 8 \left(1 + \frac{3}{2} \left(\frac{1}{4}x\right) + \frac{3}{2} \cdot \frac{1}{2} \cdot \frac{1}{2!} \left(\frac{1}{4}x\right)^2 + \dots\right)$ $= 8 + 3x$ $+ 3/16 x^2$ <p>Valid for $-4 < x < 4$ or $x < 4$</p>	<p>M1</p> <p>M1</p> <p>A1</p> <p>A1</p> <p>B1</p> <p>[5]</p>	<p>dealing with the '4' to obtain $4^{3/2} \left(1 + \frac{x}{4}\right)^{3/2}$</p> <p>(or expanding as $4^{3/2} + \frac{3}{2} 4^{1/2} x + \left(\frac{3}{2}\right) \left(\frac{1}{2}\right) 4^{-1/2} \frac{x^2}{2!} + \dots$ and having all the powers of 4 correct)</p> <p>correct binomial coeffs for $n = 3/2$ ie 1, 3/2, 3/2.1/2.1/2! Not nCr form Indep of coeff of x Indep of first M1</p> <p>8 + 3x www</p> <p>... + 3/16 x^2 www</p> <p>Ignore subsequent terms</p> <p>accept \leq s or a combination of $<$ and \leq, but not $-4 > x > 4$, $x > 4$, or say $-4 < x$ condone $-4 < x < 4$ Indep of all other marks</p> <p>Allow MR throughout this question for $n = m/2$ where $m \in \mathbb{N}$, and m odd and then -1 MR provided it is at least as difficult as the original.</p>

4754A

Mark Scheme

June 2014

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3	(i)	<table border="1"> <tr> <td>x</td> <td>0</td> <td>0.1963</td> <td>0.3927</td> <td>0.5890</td> <td>0.7854</td> </tr> <tr> <td>y</td> <td>0</td> <td>0.4493</td> <td>0.6792</td> <td>0.9498</td> <td>1.3254</td> </tr> </table> $A = (\pi/32) [(0 + 1.3254) + 2(0.4493 + 0.6792 + 0.9498)]$ $= 0.538$	x	0	0.1963	0.3927	0.5890	0.7854	y	0	0.4493	0.6792	0.9498	1.3254	B2,1,0 M1 A1 [4]	For values 0.4493,0.6792,0.9498 (4dp or better soi) [accept truncated to 4 figs after dec point] [cannot assume values of form $(\pi/16)^3 + \sqrt{(\sin \pi/16)}$ are correct unless followed by correct total at some later stage as some will be in degree mode] Use of the trapezium rule. Trapezium rule formula for 4 strips must be seen, with or without substitution seen. Correct h must be soi. [accept separate trapezia added] 0.538 www 3dp only (NB using 1.325 is ww) SC B0 0.538 without any working as no indication of strips or method used SC B1 0.538 with some indication of 4 strips but no values seen Correct values followed by 0.538 scores B2 B0 Correct values followed by correct formula for 4 strips, with or without substitution seen, then $A=0.538$ scores 4/4. Correct formula for 4 strips and values of form $((\pi/16)^3 + \sqrt{(\sin \pi/16)})...$ followed by correct answer scores 4/4 (or $\frac{3}{4}$ with wrong dp) NB Values given in the table to only 3dp give apparently the correct answer, but scores B0,M1A0 ww
x	0	0.1963	0.3927	0.5890	0.7854											
y	0	0.4493	0.6792	0.9498	1.3254											
3	(ii)	Not possible to say, eg some trapezia are above and some below curve oe.	B1	Need a reason. Must be without further calculation.												
			[1]													

4754A

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June 2014

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4 (i)	<p>EITHER Use of $\cos = 1/\sec$ (or $\sin = 1/\operatorname{cosec}$)</p> <p>From RHS</p> $\frac{1 - \tan \alpha \tan \beta}{\sec \alpha \sec \beta}$ $= \frac{1 - \sin \alpha / \cos \alpha \cdot \sin \beta / \cos \beta}{1 / \cos \alpha \cdot 1 / \cos \beta}$ $= \cos \alpha \cos \beta \left(1 - \frac{\sin \alpha \sin \beta}{\cos \alpha \cos \beta}\right)$ $= \cos \alpha \cos \beta - \sin \alpha \sin \beta$ $= \cos(\alpha + \beta)$	<p>B1</p> <p>M1</p> <p>A1</p>	<p>Must be used</p> <p>Substituting and simplifying as far as having no fractions within a fraction</p> <p>[need more than $\frac{1-tt}{\sec \sec} = cc - ss$ ie an intermediate step that can lead to cc-ss]</p> <p>Convincing simplification and correct use of $\cos(\alpha + \beta)$</p> <p>Answer given</p>
	<p>OR From LHS, $\cos = 1/\sec$ or $\sin = 1/\operatorname{cosec}$ used</p> $\cos(\alpha + \beta)$ $= \cos \alpha \cos \beta - \sin \alpha \sin \beta$ $= \frac{1}{\sec \alpha \sec \beta} - \sin \alpha \sin \beta$ $= \frac{1 - \sec \alpha \sin \alpha \sec \beta \sin \beta}{\sec \alpha \sec \beta}$ $= \frac{1 - \tan \alpha \tan \beta}{\sec \alpha \sec \beta}$	<p>B1</p> <p>M1</p> <p>A1</p> <p>[3]</p>	<p>Correct angle formula and substitution and simplification to one term</p> <p>OR eg $\cos \alpha \cos \beta - \sin \alpha \sin \beta$ $= \cos \alpha \cos \beta (1 - \tan \alpha \tan \beta)$</p> <p>Simplifying to final answer www</p> <p>Answer given</p> <p>Or any equivalent work but must have more than cc-ss = answer.</p>

4754A

Mark Scheme

June 2014

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4	(ii)	$\beta = \alpha$ $\cos 2\alpha = \frac{1 - \tan^2 \alpha}{\sec^2 \alpha}$ $= \frac{1 - \tan^2 \alpha}{1 + \tan^2 \alpha}$	M1	$\beta = \alpha$ used, Need to see $\sec^2 \alpha$
		A1	Use of $\sec^2 \alpha = 1 + \tan^2 \alpha$ to give required result Answer Given	
		OR, without Hence, $\cos 2\alpha = \cos^2 \alpha \left(1 - \frac{\sin^2 \alpha}{\cos^2 \alpha}\right)$ $= \frac{1}{\sec^2 \alpha} (1 - \tan^2 \alpha)$ $= \frac{1 - \tan^2 \alpha}{1 + \tan^2 \alpha}$	M1	Use of $\cos 2\alpha = \cos^2 \alpha - \sin^2 \alpha$ soi Simplifying and using $\sec^2 \alpha = 1 + \tan^2 \alpha$ to final answer Answer Given Accept working in reverse to show RHS=LHS, or showing equivalent
			[2]	
4	(iii)	$\cos 2\theta = \frac{1}{2}$ $2\theta = 60^\circ, 300^\circ$ $\theta = 30^\circ, 150^\circ$	M1	Soi or from $\tan^2 \theta = 1/3$ oe from $\sin^2 \theta$ or $\cos^2 \theta$
			A1	First correct solution
			A1	Second correct solution and no others in the range SC B1 for $\pi/6$ and $5\pi/6$ and no others in the range
			[3]	

4754A

Mark Scheme

June 2014

Question		Answer	Marks	Guidance
5	(i)	EITHER $x = e^{3t}, y = te^{2t}$ $dy / dt = 2te^{2t} + e^{2t}$ $\Rightarrow dy/dx = (2te^{2t} + e^{2t})/3e^{3t}$ when $t = 1, dy/dx = 3e^2/3e^3 = 1/e$	B1 M1 A1 A1	soi Their $dy / dt \div dx / dt$ in terms of t oe cao allow for unsimplified form even if subsequently cancelled incorrectly ie can isw cao www must be simplified to $1/e$ oe
		OR $3t = \ln x, y = \frac{\ln x}{3} e^{2/3 \ln x} = \frac{x^{2/3} \ln x}{3}$ $dy / dx = \frac{1}{3} x^{2/3} \frac{1}{x} + \ln x \frac{2}{9} x^{-1/3}$ $= \frac{1}{3e^t} + \frac{2t}{3e^t}$ $dy/dx = 1/3e + 2/3e = 1/e$	B1 M1 A1 A1 [4]	Any equivalent form of y in terms of x only Differentiating their y provided not eased ie need a product including $\ln kx$ and x^p and subst $x = e^{3t}$ to obtain dy/dx in terms of t oe cao www cao exact only must be simplified to $1/e$ or e^{-1}
5	(ii)	$3t = \ln x \Rightarrow t = (\ln x)/3$ $y = (\ln x) / 3e^{(2 \ln x)/3}$ $y = \frac{1}{3} x^{\frac{2}{3}} \ln x$	B1 M1 A1 [3]	Finding t correctly in terms of x Subst in y using their t Required form $ax^b \ln x$ only NB If this work was already done in 5(i), marks can only be scored in 5(ii) if candidate specifically refers in this part to their part (i).

4754A

Mark Scheme

June 2014

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6	$y = (1 + 2x^2)^{\frac{1}{3}} \Rightarrow y^3 = 1 + 2x^2$ $\Rightarrow x^2 = \frac{1}{2}(y^3 - 1)$ $V = \int_1^2 \pi x^2 dy = \frac{1}{2} \pi \int_1^2 (y^3 - 1) dy$ $= \frac{1}{2} \pi \left[\frac{1}{4} y^4 - y \right]_1^2 = \frac{1}{2} \pi \left(2 + \frac{3}{4} \right)$ $= \frac{11}{8} \pi$	<p>M1</p> <p>M1</p> <p>A1</p> <p>B1</p> <p>M1</p> <p>A1</p> <p>[6]</p>	<p>finding x^2 (or x) correctly in terms of y</p> <p>For M1 need $\int \pi x^2 dy$ with substitution for their x^2 (in terms of y only)</p> <p>Condone absence of dy throughout if intentions clear. (need π)</p> <p>www For A1 it must be correct with correct limits 1 and 2, but they may appear later</p> <p>$1/2[y^4/4 - y]$ independent of π and limits</p> <p>substituting both their limits in correct order in correct expression, condone a minor slip for M1 (if using $y = 0$ as lower limit then '-0' is enough)</p> <p>condone absence of π for M1</p> <p>oe exact only www ($1\frac{3}{8} \pi$ or 1.375π)</p>

4754A

Mark Scheme

June 2014

Question	Answer	Marks	Guidance
7 (i)	$AB = \sqrt{5^2 + (-2)^2} = \sqrt{29}$ $AC = \sqrt{3^2 + 4^2} = 5$ $\cos \theta = \frac{\begin{pmatrix} 5 \\ 0 \\ -2 \end{pmatrix} \cdot \begin{pmatrix} 3 \\ 4 \\ 0 \end{pmatrix}}{\sqrt{29} \cdot 5} = \frac{15 + 0 + 0}{5\sqrt{29}} = 0.5571$ $\Rightarrow \theta = 56.15^\circ$ $\text{Area} = \frac{1}{2} \times 5 \times \sqrt{29} \times \sin \theta$ $= 11.18$	<p>B1</p> <p>B1</p> <p>M1</p> <p>A1</p> <p>A1</p> <p>M1</p> <p>A1</p> <p>[7]</p>	<p>5.39 or better (condone sign error in vector for B1)</p> <p>Accept $\sqrt{25}$ (condone sign error in vector for B1)</p> <p>$\cos \theta = \frac{\text{scalar product of AB with AC}}{ AB \cdot AC }$ (accept BA/CA)</p> <p>with substitution condone a single numerical error provided method is clearly understood [OR Cosine Rule, as far as $\cos \theta =$ correct numerical expression]</p> <p>$\text{www} \pm 0.5571, 0.557, 15/5\sqrt{29}, 15/\sqrt{25}\sqrt{29}$ oe or better soi (\pm for method only)</p> <p>www Accept answers that round to 56.1° or 56.2° or 0.98 radians (or better)</p> <p>NB vector $5\mathbf{i}+0\mathbf{j}+2\mathbf{k}$ leads to apparently correct answer but loses all A marks in part(i)</p> <p>Using their AB, AC, $\angle CAB$. Accept any valid method using trigonometry</p> <p>Accept $5\sqrt{5}$ and answers that round to 11.18 or 11.19 (2dp) www or SCA1 for accurate work soi rounded at the last stage to 11.2 (but not from an incorrect answer, say from an incorrect angle or from say 11.17 or 11.22 stated and rounded to 11.2) We will not accept inaccurate work from over rounded answers for the final mark.</p>

4754A

Mark Scheme

June 2014

Question			Answer	Marks	Guidance
7	(ii)	(A)	$\overline{AB} \cdot \begin{pmatrix} 4 \\ -3 \\ 10 \end{pmatrix} = \begin{pmatrix} 5 \\ 0 \\ -2 \end{pmatrix} \cdot \begin{pmatrix} 4 \\ -3 \\ 10 \end{pmatrix} = 5 \cdot 4 + 0 \cdot (-3) + (-2) \cdot 10 = 0$ $\overline{AC} \cdot \begin{pmatrix} 4 \\ -3 \\ 10 \end{pmatrix} = \begin{pmatrix} 3 \\ 4 \\ 0 \end{pmatrix} \cdot \begin{pmatrix} 4 \\ -3 \\ 10 \end{pmatrix} = 3 \times 4 + 4 \times (-3) + 0 \times 10 = 0$	<p>B1</p> <p>B1</p> <p>[2]</p>	<p>Scalar product with one vector in the plane with numerical expansion shown.</p> <p>Scalar product, as above, with evaluation, with a second vector. NB vectors are not unique</p> <p>SCB2 finding the equation of plane first by any valid method (or using vector product) and then clearly stating that the normal is proportional to the coefficients.</p> <p>SC For candidates who substitute all three points in the plane $4x-3y+10z = c$ and show that they give the same result, award M1 If they include a statement explaining why this means that $4\mathbf{i}-3\mathbf{j}+10\mathbf{k}$ is normal they can gain A1.</p>
7	(ii)	(B)	$4x - 3y + 10z = c$ $\Rightarrow 4x - 3y + 10z + 12 = 0$	<p>M1</p> <p>A1</p> <p>[2]</p>	<p>Required form and substituting the co-ordinates of a point on the plane</p> <p>oe If found in (A) it must be clearly referred to in (B) to gain the marks. Do not accept vector equation of the plane, as 'Hence'.</p> <p>$4\mathbf{i}-3\mathbf{j}+10\mathbf{k} = -12$ is M1A0</p>

4754A

Mark Scheme

June 2014

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7	(iii)	$\mathbf{r} = \begin{pmatrix} 0 \\ 4 \\ 5 \end{pmatrix}$ $+ \lambda \begin{pmatrix} 4 \\ -3 \\ 10 \end{pmatrix}$ <p>Meets $4x - 3y + 10z + 12 = 0$ when $16\lambda - 3(4 - 3\lambda) + 10(5 + 10\lambda) + 12 = 0$ $\Rightarrow 125\lambda = -50, \lambda = -0.4$ So meets plane ABC at $(-1.6, 5.2, 1)$</p>	B1 B1 M1 A1 A1 [5]	Need $\mathbf{r} = \begin{pmatrix} x \\ y \\ z \end{pmatrix}$ oe Subst their $4\lambda, 4 - 3\lambda, 5 + 10\lambda$ in equation of their plane from (ii) $\lambda = -0.4$ (NB not unique) cao www (condone vector)
7	(iv)	$\text{height} = \sqrt{(1.6^2 + (-1.2)^2 + 4^2)} = \sqrt{20}$ $\text{volume} = 11.18 \times \sqrt{20} / 3 = 16.7$	B1ft B1cao [2]	ft their (iii) 50/3 or answers that round to 16.7 www and not from incorrect answers from (iii) ie not from say (1.6, 2.8, 9)

4754A

Mark Scheme

June 2014

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8	(i)	<p>Either $h = (1 - \frac{1}{2} At)^2 \Rightarrow dh/dt = -A(1 - \frac{1}{2} At)$ $= -A\sqrt{h}$ when $t = 0, h = (1 - 0)^2 = 1$ as required OR $\int \frac{dh}{\sqrt{h}} = \int -A dt$ $2h^{1/2} = -At + c$ $h = \left(\frac{-At + c}{2}\right)^2$ at $t=0, h = 1, 1 = (c/2)^2 \Rightarrow c = 2, h = (1 - At/2)^2$</p>	<p>M1 A1 B1 M1 A1 B1 [3]</p>	<p>Including function of a function, need to see middle step AG Separating variables correctly and integrating Including c. [Condone change of c.] Using initial conditions AG</p>
8	(ii)	<p>When $t = 20, h = 0$ $\Rightarrow 1 - 10A = 0, A = 0.1$ When the depth is 0.5 m, $0.5 = (1 - 0.05t)^2$ $\Rightarrow 1 - 0.05t = \sqrt{0.5}, t = (1 - \sqrt{0.5})/0.05 = 5.86s$</p>	<p>M1 A1 M1 A1 [4]</p>	<p>Subst and solve for A cao substitute $h = 0.5$ and their A and solve for t www cao accept 5.9</p>

4754A

Mark Scheme

June 2014

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8 (iii)	$\frac{dh}{dt} = -B \frac{\sqrt{h}}{(1+h)^2}$ $\Rightarrow \int \frac{(1+h)^2}{\sqrt{h}} dh = - \int B dt$	M1	separating variables correctly and intend to integrate both sides (may appear later) [NB reading $(1+h)^2$ as $1+h^2$ eases the question. Do not mark as a MR] In cases where $(1+h)^2$ is MR as $1+h^2$ or incorrectly expanded, as say $1+h+h^2$ or $1+h^2$, allow first M1 for correct separation and attempt to integrate and can then score a max of M1M0A0A0A1 (for $-Bt+c$) A0A0, max 2/7.
	EITHER, LHS		
	$\int \frac{1+2h+h^2}{\sqrt{h}} dh$ $= \int (h^{-1/2} + 2h^{1/2} + h^{3/2}) dh$	M1 A1	expanding $(1+h)^2$ and dividing by \sqrt{h} to form a one line function of h (indep of first M1) with each term expressed as a single power of h eg must simplify say $1/\sqrt{h}+2h/\sqrt{h}+h^2/\sqrt{h}$, condone a single error for M1 (do not need to see integral signs) $h^{-1/2} + 2h^{1/2} + h^{3/2}$ cao dep on second M only -do not need integral signs
	OR, LHS, EITHER		
	$(1+2h+h^2)2h^{1/2} - \int 2h^{1/2}(2+2h)dh$ <p>OR</p> $h^{1/2} + h^{3/2} + \frac{h^{5/2}}{3} + \int \frac{1}{2} h^{-3/2} (h+h^2 + \frac{h^3}{3}) dh$	M1 A1	using $\int u dv = uv - \int v du$ correct formula used correctly, indep of first M1 condone a single error for M1 if intention clear cao oe
	$2h^{1/2} + \frac{4h^{3/2}}{3} + \frac{2h^{5/2}}{5}$ $= -Bt + c$ $\Rightarrow 2h^{1/2} + 4h^{3/2}/3 + 2h^{5/2}/5 = -Bt + c$ <p>When $t = 0, h = 1 \Rightarrow c = 56/15$</p> $\Rightarrow h^{1/2}(30 + 20h + 6h^2) = 56 - 15Bt \quad *$	A1 A1 A1 A1 [7]	cao oe, both sides dependent on first M1 mark cao need $-Bt$ and c for second A1 but the constant may be on either side from correct work only (accept 3.73 or rounded answers here but not for final A1) or $c = -56/15$ if constant on opposite side. NB AG must be from all correct exact work including exact c.

4754A

Mark Scheme

June 2014

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8	(iv)	$h = 0$ when $t = 20$ $\Rightarrow B = 56/300 = 0.187$ When $h = 0.5$ $56 - 2.8t = 29.3449\dots$ $\Rightarrow t = 9.52s$	M1 A1 M1 A1 [4]	Substituting $h = 0, t = 20$ Accept 0.187 Subst their $h = 0.5$, ft their B and attempt to solve Accept answers that round to 9.5s wwww.

4754B

Mark Scheme

June 2014

Question		Answer					Marks	Guidance
1	(i)						B1	for all three entries 30,60,45 correct
		Group	P	Q	R	S	B1	for all three entries 1.5, 3, 9 correct
		Number of people	15	30	60	45	B1	for 3000,4500 both correct
		Average number of accidents in a year	1.5	4.5	3	9		SC B2 for all entries in any three columns correct
		Average cost of accidents per year	£7500	£9000	£3000	£4500	[3]	
1	(ii)	$\pounds 24000 \div 150$ $=\pounds 160$					M1 A1 [2]	Adding their bottom row (7500 + 9000 + '3000' + '4500' = '24000' and dividing by 150 soi (and not divided or multiplied by any additional values) ft their 24000 ÷ 150 (corr to 2dp if inexact)
1	(iii)	The 45 members of Group S pay $1.5 \times \pounds 4500 = \pounds 6750$. So each pays $\pounds 6750 \div 45$ $=\pounds 150$.					M1 A1 [2]	their 4500 × 1.5 oe soi as part of solution cao www (must be from correct final column)

4754B

Mark Scheme

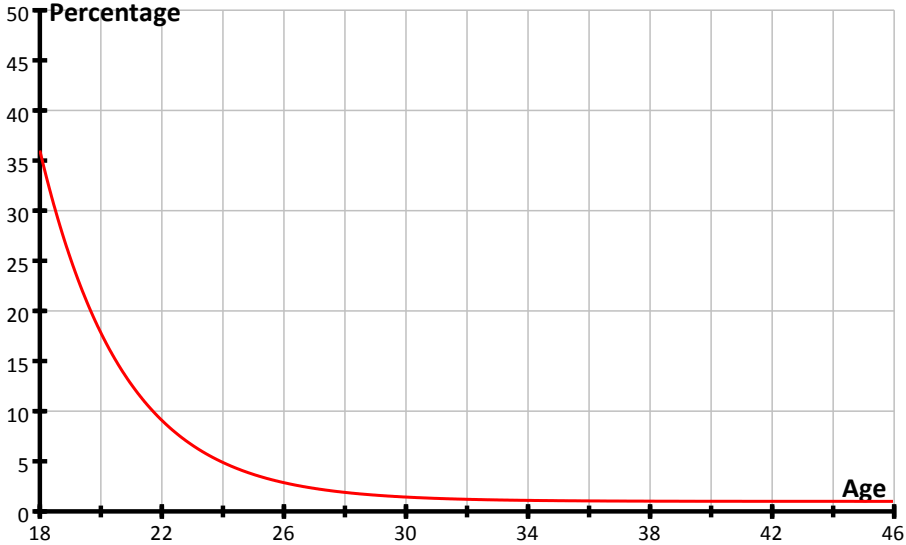
June 2014

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2	Basic premium = 35% of driver's premium Drivers premium = Basic premium \div 0.35 = 2.86 Basic premium $\Rightarrow k = 2.86$	M1 A1 [2]	use of 35% or 0.35 oe [not 65, 0.65 unless 1– 0.65] accept 2.86 or better ($k = 2.85714\dots$ or $2\frac{6}{7}$ oe) [$k = 2.9, k = 1/0.35$ scores M1A0]																		
3	<table border="1" data-bbox="416 448 801 911"> <thead> <tr> <th>Year</th> <th>% discount</th> </tr> </thead> <tbody> <tr> <td>2007</td> <td>0</td> </tr> <tr> <td>2008</td> <td>30</td> </tr> <tr> <td>2009</td> <td>40</td> </tr> <tr> <td>2010</td> <td>50</td> </tr> <tr> <td>2011</td> <td>60</td> </tr> <tr> <td>2012</td> <td>65</td> </tr> <tr> <td>2013</td> <td>65</td> </tr> <tr> <td>Total</td> <td>310</td> </tr> </tbody> </table> <p data-bbox="353 938 721 970">310% of the premium is £3875</p> <p data-bbox="353 983 698 1054">The premium is $\frac{£3875 \times 100}{310}$</p> <p data-bbox="544 1193 640 1225">=£1250</p>	Year	% discount	2007	0	2008	30	2009	40	2010	50	2011	60	2012	65	2013	65	Total	310	 B1 M1 A1 [3]	 obtaining 310 or 3.1 oe [from adding all relevant terms ie $0+30+40+50+60+65+65=310$ or $0 +0.3+0.4+0.5+0.6+0.65+0.65= 3.1$ soi (with or without first zero term) or from $700- 100- 70- 60- 50- 40- 2 \times 35$ oe] 3875 \div their 3.1 even if one term was missing from addition but must come from attempt at the appropriate addition [ie an error in adding to 310 or an omission of one term, an inclusion of say an extra 65, or an addition of 100,70,60,...etc with subsequent subtraction from 700] £1250 cao
Year	% discount																				
2007	0																				
2008	30																				
2009	40																				
2010	50																				
2011	60																				
2012	65																				
2013	65																				
Total	310																				

4754B

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Question	Answer	Marks	Guidance
4 (i)		<p>B1</p> <p>[1]</p>	<p>A sketch. Must be at least for values of x between 18 and 45. Must be correct shape ie descending curve, does not curve up at end, does not cross the horizontal axis (even if extended) ie must $\rightarrow 1$.</p> <p>Does not need to go through points exactly as a sketch.</p>
4 (ii)	<p>For large values of x, $be^{-k(x-17)} \rightarrow 0$, and so $y \rightarrow a$ which is 1 in this case.</p>	<p>B1</p> <p>[1]</p>	<p>Need x becoming large or $\rightarrow \infty$, exponential term $\rightarrow 0$ oe and $y \rightarrow a$, $a = 1$ or $y = 1, a = 1$ oe</p> <p>NOT just at $x = 45, y = 1$</p>
4 (iii)	<p>Substituting $x = 23 \Rightarrow y = 6.6$</p> <p>This is quite close to the observed value of $y = 6$.</p>	<p>M1</p> <p>A1</p> <p>[2]</p>	<p>subst $x = 23$ and finding $y = 6.6$ (6.60115...)</p> <p>(or subst $y = 6$ and finding $x = 23.3$ (23.3097...))</p> <p>Only accept comparing x or y, not coefficients</p> <p>(or close to $x = 23$)</p> <p>Accept say, $y = 6.6 \approx 6$.</p> <p>But not say at $x = 23, y \approx 6$ with no evaluation seen</p> <p>Accept if states, say, $y = 6.6$ which is not consistent with $y = 6$ oe</p>

4754B

Mark Scheme

June 2014

Question		Answer	Marks	Guidance
5	(A)	With no more than 3 points on his licence the driver's premium is not altered: £520	B1	£520
	(B)	The driver now has $3 + 6 = 9$ points. The new premium is $£520 \times 2^{\frac{9}{6}} = £1470.78$	B1 [2]	£1470.78 or £1471 [but not £1470.80]