

# Mark Scheme (Results) January 2009

GCE

GCE Mathematics (6666/01)

**January 2009**  
**6666 Core Mathematics C4**  
**Mark Scheme**

Question Number	Scheme	Marks	
<b>1</b>	<p>(a) C: <math>y^2 - 3y = x^3 + 8</math></p> <p><del><math>\left\{ \frac{dy}{dx} \right\}</math></del> <math>2y \frac{dy}{dx} - 3 \frac{dy}{dx} = 3x^2</math></p> <p><math>(2y-3) \frac{dy}{dx} = 3x^2</math></p> <p><math>\frac{dy}{dx} = \frac{3x^2}{2y-3}</math></p>	<p>Differentiates implicitly to include either <math>\pm ky \frac{dy}{dx}</math> or <math>\pm 3 \frac{dy}{dx}</math>. (Ignore <math>\left( \frac{dy}{dx} = \right)</math>.)</p> <p>Correct equation.</p> <p>A correct (condoning sign error) attempt to combine or factorise their '<math>2y \frac{dy}{dx} - 3 \frac{dy}{dx}</math>'.</p> <p>Can be implied.</p> <p><math>\frac{3x^2}{2y-3}</math></p>	<p>M1</p> <p>A1</p> <p>M1</p> <p>A1 oe</p> <p>(4)</p>
(b)	<p><math>y = 3 \Rightarrow 9 - 3(3) = x^3 + 8</math></p> <p><math>x^3 = -8 \Rightarrow \underline{x = -2}</math></p> <p><math>(-2, 3) \Rightarrow \frac{dy}{dx} = \frac{3(4)}{6-3} \Rightarrow \frac{dy}{dx} = 4</math></p>	<p>Substitutes <math>y = 3</math> into C.</p> <p>Only <math>\underline{x = -2}</math></p> <p><math>\frac{dy}{dx} = 4</math> from correct working.</p> <p>Also can be ft using their 'x' value and <math>y = 3</math> in the correct part (a) of <math>\frac{dy}{dx} = \frac{3x^2}{2y-3}</math></p>	<p>M1</p> <p>A1</p> <p>A1 <math>\sqrt{\quad}</math></p> <p>(3)</p>
<p><b>1(b) final A1 <math>\sqrt{\quad}</math>.</b> Note if the candidate inserts their x value and <math>y = 3</math> into <math>\frac{dy}{dx} = \frac{3x^2}{2y-3}</math>, then an answer of <math>\frac{dy}{dx} =</math> their <math>x^2</math>, <b>may</b> indicate a correct follow through.</p>		<b>[7]</b>	

Question Number	Scheme	Marks
<p>2 (a)</p> <p>Area(<math>R</math>) = <math>\int_0^2 \frac{3}{\sqrt{1+4x}} dx = \int_0^2 3(1+4x)^{-\frac{1}{2}} dx</math></p> <p><math>= \left[ \frac{3(1+4x)^{\frac{1}{2}}}{\frac{1}{2} \cdot 4} \right]_0^2</math></p> <p><math>= \left[ \frac{3}{2}(1+4x)^{\frac{1}{2}} \right]_0^2</math></p> <p><math>= \left( \frac{3}{2}\sqrt{9} \right) - \left( \frac{3}{2}(1) \right)</math></p> <p><math>= \frac{9}{2} - \frac{3}{2} = \underline{3} \text{ (units)}^2</math></p> <p>(Answer of 3 with no working scores M0A0M0A0.)</p> <p>(b) Volume = <math>\pi \int_0^2 \left( \frac{3}{\sqrt{1+4x}} \right)^2 dx</math></p> <p><math>= (\pi) \int_0^2 \frac{9}{1+4x} dx</math></p> <p><math>= (\pi) \left[ \frac{9}{4} \ln 1+4x  \right]_0^2</math></p> <p><math>= (\pi) \left[ \left( \frac{9}{4} \ln 9 \right) - \left( \frac{9}{4} \ln 1 \right) \right]</math></p> <p>Note that <math>\ln 1</math> can be implied as equal to 0.</p> <p>So Volume = <math>\frac{9}{4} \pi \ln 9</math></p> <p>Note the answer must be a one term exact value. Note, also you can ignore subsequent working here.</p>	<p><i>Integrating</i> <math>3(1+4x)^{-\frac{1}{2}}</math> to give <math>\pm k(1+4x)^{\frac{1}{2}}</math>.</p> <p><u>Correct integration.</u> Ignore limits.</p> <p>Substitutes limits of 2 and 0 into a changed function and subtracts the correct way round.</p> <p>Use of <math>V = \pi \int y^2 dx</math>. Can be implied. Ignore limits and <math>dx</math>.</p> <p><math>\pm k \ln 1+4x </math> <math>\frac{9}{4} \ln 1+4x </math></p> <p>Substitutes limits of 2 and 0 and subtracts the correct way round.</p> <p><math>\frac{9}{4} \pi \ln 9</math> or <math>\frac{9}{2} \pi \ln 3</math> or <math>\frac{18}{4} \pi \ln 3</math></p> <p>Note that = <math>\frac{9}{4} \pi \ln 9 + c</math> (oe.) would be awarded the final A0.</p>	<p>M1</p> <p>A1</p> <p>M1</p> <p><u>3</u> A1</p> <p>(4)</p> <p>B1</p> <p>M1</p> <p>A1</p> <p>dM1</p> <p>A1 oe isw</p> <p>(5)</p> <p>[9]</p>

Question Number	Scheme	Marks
3 (a)	$27x^2 + 32x + 16 \equiv A(3x+2)(1-x) + B(1-x) + C(3x+2)^2$ $x = -\frac{2}{3}, \quad 12 - \frac{64}{3} + 16 = \left(\frac{5}{3}\right)B \Rightarrow \frac{20}{3} = \left(\frac{5}{3}\right)B \Rightarrow B = 4$ $x = 1, \quad 27 + 32 + 16 = 25C \Rightarrow 75 = 25C \Rightarrow C = 3$ <p>Equate <math>x^2</math>: <math>27 = -3A + 9C \Rightarrow 27 = -3A + 27 \Rightarrow 0 = -3A \Rightarrow A = 0</math></p> $x = 0, \quad 16 = 2A + B + 4C$ $\Rightarrow 16 = 2A + 4 + 12 \Rightarrow 0 = 2A \Rightarrow A = 0$	<p>Forming this identity M1</p> <p>Substitutes either <math>x = -\frac{2}{3}</math> or <math>x = 1</math> into their identity or equates 3 terms or substitutes in values to write down three simultaneous equations. M1</p> <p>Both <math>B = 4</math> and <math>C = 3</math> A1</p> <p><b>(Note the A1 is dependent on both method marks in this part.)</b></p> <p>Compares coefficients or substitutes in a third <math>x</math>-value or uses simultaneous equations to show <math>A = 0</math>. B1</p> <p>(4)</p>
3 (b)	$f(x) = \frac{4}{(3x+2)^2} + \frac{3}{(1-x)}$ $= 4(3x+2)^{-2} + 3(1-x)^{-1}$ $= 4\left[2\left(1 + \frac{3}{2}x\right)^{-2}\right] + 3(1-x)^{-1}$ $= 1\left(1 + \frac{3}{2}x\right)^{-2} + 3(1-x)^{-1}$ $= 1\left\{1 + (-2)\left(\frac{3x}{2}\right) + \frac{(-2)(-3)}{2!}\left(\frac{3x}{2}\right)^2 + \dots\right\}$ $+ 3\left\{1 + (-1)(-x) + \frac{(-1)(-2)}{2!}(-x)^2 + \dots\right\}$ $= \left\{1 - 3x + \frac{27}{4}x^2 + \dots\right\} + 3\left\{1 + x + x^2 + \dots\right\}$ $= 4 + 0x + \frac{39}{4}x^2$	<p>Moving powers to top on any one of the two expressions M1</p> <p>Either <math>1 \pm (-2)\left(\frac{3x}{2}\right)</math> or <math>1 \pm (-1)(-x)</math> from either first or second expansions respectively dM1;</p> <p>Ignoring 1 and 3, any one correct {.....} expansion. A1</p> <p>Both {.....} correct. A1</p> <p><math>4 + (0x) + \frac{39}{4}x^2</math> A1; A1</p> <p>(6)</p>

Question Number	Scheme	Marks
(c)	<p>Actual = <math>f(0.2) = \frac{1.08 + 6.4 + 16}{(6.76)(0.8)}</math>  <math>= \frac{23.48}{5.408} = 4.341715976... = \frac{2935}{676}</math></p> <p>Or</p> <p>Actual = <math>f(0.2) = \frac{4}{(3(0.2) + 2)^2} + \frac{3}{(1 - 0.2)}</math>  <math>= \frac{4}{6.76} + 3.75 = 4.341715976... = \frac{2935}{676}</math></p> <p>Estimate = <math>f(0.2) = 4 + \frac{39}{4}(0.2)^2</math>  <math>= 4 + 0.39 = 4.39</math></p> <p>%age error = <math>\frac{ 4.39 - 4.341715976... }{4.341715976...} \times 100</math>  <math>= 1.112095408... = 1.1\% (2sf)</math></p>	<p>Attempt to find the actual value of <math>f(0.2)</math> or seeing awrt 4.3 and believing it is candidate's actual <math>f(0.2)</math>.</p> <p>Candidates can also attempt to find the actual value by using <math>\frac{A}{(3x + 2)} + \frac{B}{(3x + 2)^2} + \frac{C}{(1 - x)}</math> with their <math>A, B</math> and <math>C</math>.</p> <p>Attempt to find an estimate for <math>f(0.2)</math> using their answer to (b)</p> <p><math>\left  \frac{\text{their estimate} - \text{actual}}{\text{actual}} \right  \times 100</math></p> <p>1.1%</p> <p>M1</p> <p>M1 <math>\sqrt{\quad}</math></p> <p>M1</p> <p>A1 <b>cao</b> (4)</p> <p><b>[14]</b></p>

Question Number	Scheme	Marks
4	<p>(a) <math>\mathbf{d}_1 = -2\mathbf{i} + \mathbf{j} - 4\mathbf{k}</math> , <math>\mathbf{d}_2 = q\mathbf{i} + 2\mathbf{j} + 2\mathbf{k}</math></p> <p>As <math>\left\{ \mathbf{d}_1 \bullet \mathbf{d}_2 = \begin{pmatrix} -2 \\ 1 \\ -4 \end{pmatrix} \bullet \begin{pmatrix} q \\ 2 \\ 2 \end{pmatrix} \right\} = \frac{(-2 \times q) + (1 \times 2) + (-4 \times 2)}</math></p> <p><math>\mathbf{d}_1 \bullet \mathbf{d}_2 = 0 \Rightarrow -2q + 2 - 8 = 0</math>  <math>-2q = 6 \Rightarrow \underline{q = -3}</math> AG</p> <p>(b) Lines meet where:</p> $\begin{pmatrix} 11 \\ 2 \\ 17 \end{pmatrix} + \lambda \begin{pmatrix} -2 \\ 1 \\ -4 \end{pmatrix} = \begin{pmatrix} -5 \\ 11 \\ p \end{pmatrix} + \mu \begin{pmatrix} q \\ 2 \\ 2 \end{pmatrix}$ <p style="text-align: center;"> <math>\mathbf{i}: 11 - 2\lambda = -5 + q\mu</math> (1)  First two of <math>\mathbf{j}: 2 + \lambda = 11 + 2\mu</math> (2)  <math>\mathbf{k}: 17 - 4\lambda = p + 2\mu</math> (3) </p> <p>(1) + 2(2) gives: <math>15 = 17 + \mu \Rightarrow \mu = -2</math></p> <p>(2) gives: <math>2 + \lambda = 11 - 4 \Rightarrow \lambda = 5</math></p> <p>(3) <math>\Rightarrow 17 - 4(5) = p + 2(-2)</math>  <math>\Rightarrow p = 17 - 20 + 4 \Rightarrow \underline{p = 1}</math></p> <p>(c) <math>\mathbf{r} = \begin{pmatrix} 11 \\ 2 \\ 17 \end{pmatrix} + 5 \begin{pmatrix} -2 \\ 1 \\ -4 \end{pmatrix}</math> or <math>\mathbf{r} = \begin{pmatrix} -5 \\ 11 \\ 1 \end{pmatrix} - 2 \begin{pmatrix} -3 \\ 2 \\ 2 \end{pmatrix}</math></p> <p>Intersect at <math>\mathbf{r} = \begin{pmatrix} 1 \\ 7 \\ -3 \end{pmatrix}</math> or <math>\underline{(1, 7, -3)}</math></p>	<p>Apply dot product calculation between two direction vectors, ie. <math>\underline{(-2 \times q) + (1 \times 2) + (-4 \times 2)}</math></p> <p>M1</p> <p>Sets <math>\mathbf{d}_1 \bullet \mathbf{d}_2 = 0</math> and solves to find <math>\underline{q = -3}</math></p> <p>A1 cso</p> <p>(2)</p> <p>Need to see equations (1) and (2). Condone one slip. (Note that <math>q = -3</math>.)</p> <p>M1</p> <p>Attempts to solve (1) and (2) to find one of either <math>\lambda</math> or <math>\mu</math></p> <p>Any one of <math>\underline{\lambda = 5}</math> or <math>\underline{\mu = -2}</math></p> <p>Both <math>\underline{\lambda = 5}</math> and <math>\underline{\mu = -2}</math></p> <p>Attempt to substitute their <math>\lambda</math> and <math>\mu</math> into their <math>\mathbf{k}</math> component to give an equation in <math>p</math> alone.</p> <p>ddM1</p> <p><math>\underline{p = 1}</math></p> <p>A1 cso</p> <p>(6)</p> <p>Substitutes their value of <math>\lambda</math> or <math>\mu</math> into the correct line <math>l_1</math> or <math>l_2</math>.</p> <p>M1</p> <p><math>\begin{pmatrix} 1 \\ 7 \\ -3 \end{pmatrix}</math> or <math>\underline{(1, 7, -3)}</math></p> <p>A1</p> <p>(2)</p>

Question Number	Scheme	Marks
(d)	<p>Let <math>\overline{OX} = \mathbf{i} + 7\mathbf{j} - 3\mathbf{k}</math> be point of intersection</p> $\overline{AX} = \overline{OX} - \overline{OA} = \begin{pmatrix} 1 \\ 7 \\ -3 \end{pmatrix} - \begin{pmatrix} 9 \\ 3 \\ 13 \end{pmatrix} = \begin{pmatrix} -8 \\ 4 \\ -16 \end{pmatrix}$ <p>Finding vector <math>\overline{AX}</math> by finding the difference between <math>\overline{OX}</math> and <math>\overline{OA}</math>. Can be ft using candidate's <math>\overline{OX}</math>.</p> $\overline{OB} = \overline{OA} + \overline{AB} = \overline{OA} + 2\overline{AX}$ $\overline{OB} = \begin{pmatrix} 9 \\ 3 \\ 13 \end{pmatrix} + 2 \begin{pmatrix} -8 \\ 4 \\ -16 \end{pmatrix} \qquad \begin{pmatrix} 9 \\ 3 \\ 13 \end{pmatrix} + 2 \begin{pmatrix} \text{their } \overline{AX} \end{pmatrix}$ <p>Hence, <math>\overline{OB} = \begin{pmatrix} -7 \\ 11 \\ -19 \end{pmatrix}</math> or <math>\overline{OB} = \underline{-7\mathbf{i} + 11\mathbf{j} - 19\mathbf{k}}</math> <math>\begin{pmatrix} -7 \\ 11 \\ -19 \end{pmatrix}</math> or <math>\underline{-7\mathbf{i} + 11\mathbf{j} - 19\mathbf{k}}</math> or <math>\underline{(-7, 11, -19)}</math></p>	<p>M1 <math>\sqrt{\pm}</math></p> <p>dM1 <math>\sqrt{\phantom{x}}</math></p> <p>A1</p> <p>(3)</p> <p><b>[13]</b></p>

Question Number	Scheme	Marks
5	<p>(a) Similar triangles <math>\Rightarrow \frac{r}{h} = \frac{16}{24} \Rightarrow r = \frac{2h}{3}</math></p> <p><math>V = \frac{1}{3}\pi r^2 h = \frac{1}{3}\pi \left(\frac{2h}{3}\right)^2 h = \frac{4\pi h^3}{27}</math> <b>AG</b></p> <p>(b) From the question, <math>\frac{dV}{dt} = 8</math></p> <p><math>\frac{dV}{dh} = \frac{12\pi h^2}{27} = \frac{4\pi h^2}{9}</math></p> <p><math>\frac{dh}{dt} = \frac{dV}{dt} \div \frac{dV}{dh} = 8 \times \frac{9}{4\pi h^2} = \frac{18}{\pi h^2}</math></p> <p>When <math>h = 12</math>, <math>\frac{dh}{dt} = \frac{18}{144\pi} = \frac{1}{8\pi}</math></p> <p>Note the answer must be a one term exact value. Note, also you can ignore subsequent working after <math>\frac{18}{144\pi}</math>.</p>	<p>Uses similar triangles, ratios or trigonometry to find either one of these two expressions oe. <b>M1</b></p> <p>Substitutes <math>r = \frac{2h}{3}</math> into the formula for the volume of water <math>V</math>. <b>A1</b></p> <p><b>(2)</b></p> <p><math>\frac{dV}{dt} = 8</math> <b>B1</b></p> <p><math>\frac{dV}{dh} = \frac{12\pi h^2}{27}</math> or <math>\frac{4\pi h^2}{9}</math> <b>B1</b></p> <p>Candidate's <math>\frac{dV}{dt} \div \frac{dV}{dh}</math>; <b>M1</b>;</p> <p><math>8 \div \left(\frac{12\pi h^2}{27}\right)</math> or <math>8 \times \frac{9}{4\pi h^2}</math> or <math>\frac{18}{\pi h^2}</math> oe <b>A1</b></p> <p><math>\frac{18}{144\pi}</math> or <math>\frac{1}{8\pi}</math> <b>A1</b> oe isw</p> <p><b>(5)</b></p> <p><b>[7]</b></p>



Question Number	Scheme	Marks
6	<p>(a) <math>\int \tan^2 x \, dx</math></p> <p>[NB: <u><math>\sec^2 A = 1 + \tan^2 A</math></u> gives <u><math>\tan^2 A = \sec^2 A - 1</math></u>]</p> <p><math>= \int \sec^2 x - 1 \, dx</math></p> <p><math>= \underline{\tan x - x} (+ c)</math></p> <p>(b) <math>\int \frac{1}{x^3} \ln x \, dx</math></p> <p><math>\left\{ \begin{array}{l} u = \ln x \Rightarrow \frac{du}{dx} = \frac{1}{x} \\ \frac{dv}{dx} = x^{-3} \Rightarrow v = \frac{x^{-2}}{-2} = -\frac{1}{2x^2} \end{array} \right\}</math></p> <p><math>= -\frac{1}{2x^2} \ln x - \int -\frac{1}{2x^2} \cdot \frac{1}{x} \, dx</math></p> <p><math>= -\frac{1}{2x^2} \ln x + \frac{1}{2} \int \frac{1}{x^3} \, dx</math></p> <p><math>= \underline{-\frac{1}{2x^2} \ln x + \frac{1}{2} \left( -\frac{1}{2x^2} \right)} (+ c)</math></p>	<p>The correct <u>underlined identity</u>. M1 oe</p> <p>Correct integration with/without + c A1</p> <p>(2)</p> <p>Use of ‘integration by parts’ formula in the correct direction. M1</p> <p>Correct direction means that <math>u = \ln x</math>.</p> <p>Correct expression. A1</p> <div style="border: 1px solid black; padding: 5px; margin: 10px 0;"> <p>An attempt to multiply through <math>\frac{k}{x^n}, n \in \mathbb{Z}, n \neq 2</math> by <math>\frac{1}{x}</math> and an attempt to ...</p> <p>... “integrate”(process the result); M1</p> </div> <p><u>correct solution</u> with/without + c A1 oe</p> <p>(4)</p>

Question Number	Scheme	Marks
(c)	$\int \frac{e^{3x}}{1+e^x} dx$ $\left\{ u = 1 + e^x \Rightarrow \frac{du}{dx} = e^x, \frac{dx}{du} = \frac{1}{e^x}, \frac{dx}{du} = \frac{1}{u-1} \right\}$ $= \int \frac{e^{2x} \cdot e^x}{1+e^x} dx = \int \frac{(u-1)^2 \cdot e^x}{u} \cdot \frac{1}{e^x} du$ <p>or <math display="block">= \int \frac{(u-1)^3}{u} \cdot \frac{1}{(u-1)} du</math></p> $= \int \frac{(u-1)^2}{u} du$ $= \int \frac{u^2 - 2u + 1}{u} du$ $= \int u - 2 + \frac{1}{u} du$ $= \frac{u^2}{2} - 2u + \ln u (+c)$ $= \frac{(1+e^x)^2}{2} - 2(1+e^x) + \ln(1+e^x) + c$ $= \frac{1}{2} + e^x + \frac{1}{2}e^{2x} - 2 - 2e^x + \ln(1+e^x) + c$ $= \frac{1}{2} + e^x + \frac{1}{2}e^{2x} - 2 - 2e^x + \ln(1+e^x) + c$ $= \frac{1}{2}e^{2x} - e^x + \ln(1+e^x) - \frac{3}{2} + c$ $= \frac{1}{2}e^{2x} - e^x + \ln(1+e^x) + k \quad \mathbf{AG}$	<p>Differentiating to find any one of the <u>three underlined</u></p> <p>Attempt to substitute for <math>e^{2x} = f(u)</math>,  their <math>\frac{dx}{du} = \frac{1}{e^x}</math> and <math>u = 1 + e^x</math>  or <math>e^{3x} = f(u)</math>, their <math>\frac{dx}{du} = \frac{1}{u-1}</math> and <math>u = 1 + e^x</math>.</p> <p><math display="block">\int \frac{(u-1)^2}{u} du</math></p> <p>An attempt to multiply out their numerator to give at least three terms and divide through each term by <math>u</math></p> <p>Correct integration with/without <math>+c</math></p> <p>Substitutes <math>u = 1 + e^x</math> back into their integrated expression with at least two terms.</p> <p><math display="block">\frac{1}{2}e^{2x} - e^x + \ln(1+e^x) + k</math>  must use a <math>+c</math> and "<math>-\frac{3}{2}</math>" combined.</p> <p><b>B1</b></p> <p><b>M1*</b></p> <p><b>A1</b></p> <p><b>dM1*</b></p> <p><b>A1</b></p> <p><b>dM1*</b></p> <p><b>A1 cso</b></p> <p><b>(7)</b></p> <p><b>[13]</b></p>

Question Number	Scheme	Marks
7	<p>(a) At A, <math>x = -1 + 8 = 7</math> &amp; <math>y = (-1)^2 = 1 \Rightarrow A(7,1)</math> <span style="float: right;"><math>A(7,1)</math></span></p> <p>(b) <math>x = t^3 - 8t</math>, <math>y = t^2</math>,</p> <p><math>\frac{dx}{dt} = 3t^2 - 8</math>, <math>\frac{dy}{dt} = 2t</math></p> <p><math>\therefore \frac{dy}{dx} = \frac{2t}{3t^2 - 8}</math> <span style="float: right;">Their <math>\frac{dy}{dt}</math> divided by their <math>\frac{dx}{dt}</math></span></p> <p>At A, <math>m(\mathbf{T}) = \frac{2(-1)}{3(-1)^2 - 8} = \frac{-2}{3-8} = \frac{-2}{-5} = \frac{2}{5}</math> <span style="float: right;">Correct <math>\frac{dy}{dx}</math></span></p> <p><math>\mathbf{T}: y - (\text{their } 1) = m_T(x - (\text{their } 7))</math> <span style="float: right;">Substitutes for <math>t</math> to give any of the four underlined oe:</span></p> <p>or <math>1 = \frac{2}{5}(7) + c \Rightarrow c = 1 - \frac{14}{5} = -\frac{9}{5}</math> <span style="float: right;">Finding an equation of a tangent with their point and their tangent gradient or finds <math>c</math> and uses <math>y = (\text{their gradient})x + "c"</math>.</span></p> <p>Hence <math>\mathbf{T}: y = \frac{2}{5}x - \frac{9}{5}</math></p> <p>gives <math>\mathbf{T}: \underline{2x - 5y - 9 = 0}</math> <b>AG</b> <span style="float: right;"><math>\underline{2x - 5y - 9 = 0}</math></span></p> <p>(c) <math>2(t^3 - 8t) - 5t^2 - 9 = 0</math> <span style="float: right;">Substitution of both <math>x = t^3 - 8t</math> and <math>y = t^2</math> into <math>\mathbf{T}</math></span></p> <p><math>2t^3 - 5t^2 - 16t - 9 = 0</math></p> <p><math>(t+1)\{(2t^2 - 7t - 9) = 0\}</math> <span style="float: right;">A realisation that <math>(t+1)</math> is a factor.</span></p> <p><math>(t+1)\{(t+1)(2t-9) = 0\}</math></p> <p><math>\{t = -1 \text{ (at A)}\} t = \frac{9}{2} \text{ at B}</math> <span style="float: right;"><math>t = \frac{9}{2}</math></span></p> <p><math>x = (\frac{9}{2})^2 - 8(\frac{9}{2}) = \frac{729}{8} - 36 = \frac{441}{8} = 55.125</math> or awrt 55.1 <span style="float: right;">Candidate uses their value of <math>t</math> to find either the <math>x</math> or <math>y</math> coordinate</span></p> <p><math>y = (\frac{9}{2})^2 = \frac{81}{4} = 20.25</math> or awrt 20.3 <span style="float: right;">One of either <math>x</math> or <math>y</math> correct.</span></p> <p>Hence <math>B(\frac{441}{8}, \frac{81}{4})</math> <span style="float: right;">Both <math>x</math> and <math>y</math> correct.</span></p> <p style="text-align: right;">awrt</p>	<p>B1</p> <p>(1)</p> <p>M1</p> <p>A1</p> <p>dM1</p> <p>A1 <b>cso</b></p> <p>(5)</p> <p>M1</p> <p>dM1</p> <p>A1</p> <p>ddM1</p> <p>A1</p> <p>A1</p> <p>(6)</p> <p>[12]</p>