

# Mark Scheme (Results)

## Summer 2009

GCE

GCE Mathematics (6663/01)

June 2009  
6663 Core Mathematics C1  
Mark Scheme

Question Number	Scheme	Marks
Q1 (a) $(3\sqrt{7})^2 = 63$ (b) $(8 + \sqrt{5})(2 - \sqrt{5}) = 16 - 5 + 2\sqrt{5} - 8\sqrt{5}$ $= 11, -6\sqrt{5}$		B1 (1) M1 A1, A1 (3) [4]
(a) (b)	<p>B1 for 63 only</p> <p>M1 for an attempt to expand <u>their</u> brackets with <math>\geq 3</math> terms correct.</p> <p>They may collect the <math>\sqrt{5}</math> terms to get <math>16 - 5 - 6\sqrt{5}</math></p> <p>Allow <math>-\sqrt{5} \times \sqrt{5}</math> or <math>-(\sqrt{5})^2</math> or <math>-\sqrt{25}</math> instead of the -5</p> <p>These 4 values may appear in a list or table but they should have minus signs included</p> <p><b>The next two marks should be awarded for the final answer but check that correct values follow from correct working. Do not use ISW rule</b></p> <p>1<sup>st</sup> A1 for 11 from <math>16 - 5</math> or <math>-6\sqrt{5}</math> from <math>-8\sqrt{5} + 2\sqrt{5}</math></p> <p>2<sup>nd</sup> A1 for <u>both</u> 11 and <math>-6\sqrt{5}</math>.</p> <p><u>S.C - Double sign error in expansion</u></p> <p>For <math>16 - 5 - 2\sqrt{5} + 8\sqrt{5}</math> leading to <math>11 + \dots</math> allow <u>one</u> mark</p>	

Question Number	Scheme	Marks
Q2	$32 = 2^5$ or $2048 = 2^{11}$ , $\sqrt{2} = 2^{1/2}$ or $\sqrt{2048} = (2048)^{1/2}$ $a = \frac{11}{2}$ (or $5\frac{1}{2}$ or 5.5)	B1, B1  B1  [3]
	<p>1<sup>st</sup> B1 for <math>32 = 2^5</math> or <math>2048 = 2^{11}</math>            This should be explicitly seen: <math>32\sqrt{2} = 2^a</math> followed by <math>2^5\sqrt{2} = 2^a</math> is OK            Even writing <math>32 \times 2 = 2^5 \times 2 (= 2^6)</math> is OK but simply writing <math>32 \times 2 = 2^6</math> is NOT</p> <p>2<sup>nd</sup> B1 for <math>2^{1/2}</math> or <math>(2048)^{1/2}</math> seen. This mark may be implied</p> <p>3<sup>rd</sup> B1 for answer as written. <b>Need</b> <math>a = \dots</math> so <math>2^{11/2}</math> is B0</p> <p><math>a = \frac{11}{2}</math> (or <math>5\frac{1}{2}</math> or 5.5) with no working scores full marks.</p> <p>If <math>a = 5.5</math> seen then award 3/3 unless it is clear that the value follows from totally incorrect work.</p> <p>Part solutions: e.g. <math>2^5\sqrt{2}</math> scores the first B1.</p> <p><u>Special case:</u>            If <math>\sqrt{2} = 2^{1/2}</math> is not explicitly seen, but the final answer includes <math>\frac{1}{2}</math>,            e.g. <math>a = 2\frac{1}{2}</math>, <math>a = 4\frac{1}{2}</math>, the second B1 is given by implication.</p>	

Question Number	Scheme	Marks
Q3 (a)	$\frac{dy}{dx} = 6x^2 - 6x^{-3}$	M1 A1 A1 (3)
(b)	$\frac{2x^4}{4} + \frac{3x^{-1}}{-1} (+C)$	M1 A1
	$\frac{x^4}{2} - 3x^{-1} + C$	A1 (3) [6]
(a)	<p>M1 for an attempt to differentiate <math>x^n \rightarrow x^{n-1}</math></p> <p>1<sup>st</sup> A1 for <math>6x^2</math></p> <p>2<sup>nd</sup> A1 for <math>-6x^{-3}</math> or <math>-\frac{6}{x^3}</math> Condone <math>+ -6x^{-3}</math> here. Inclusion of <math>+c</math> scores A0 here.</p>	
(b)	<p>M1 for some attempt to integrate an <math>x</math> term of the given <math>y</math>. <math>x^n \rightarrow x^{n+1}</math></p> <p>1<sup>st</sup> A1 for <b>both</b> <math>x</math> terms correct but unsimplified- as printed or better. Ignore <math>+c</math> here</p> <p>2<sup>nd</sup> A1 for both <math>x</math> terms correct and simplified and <math>+c</math>. Accept <math>-\frac{3}{x}</math> but <u>NOT</u> <math>+ -3x^{-1}</math></p> <p>Condone the <math>+c</math> appearing on the first (unsimplified) line but missing on the final (simplified) line</p> <p>Apply ISW if a correct answer is seen</p> <p>If part (b) is attempted first and this is clearly labelled then apply the scheme and allow the marks. Otherwise assume the first solution is for part (a).</p>	

Question Number	Scheme	Marks
Q4 (a)	$5x > 10, x > 2$ [Condone $x > \frac{10}{2} = 2$ for M1A1]	M1, A1 (2)
(b)	$(2x + 3)(x - 4) = 0$ , 'Critical values' are $-\frac{3}{2}$ and 4 $-\frac{3}{2} < x < 4$	M1, A1 M1 A1ft (4)
(c)	$2 < x < 4$	B1ft (1) [7]
(a)	M1 for attempt to collect like terms on each side leading to $ax > b$ , or $ax < b$ , or $ax = b$ Must have $a$ or $b$ correct so eg $3x > 4$ scores M0	
(b)	1 <sup>st</sup> M1 for an attempt to factorize or solve to find critical values. Method must potentially give 2 critical values 1 <sup>st</sup> A1 for $-\frac{3}{2}$ and 4 seen. They may write $x < -\frac{3}{2}$ , $x < 4$ and still get this A1 2 <sup>nd</sup> M1 for choosing the "inside region" for their critical values 2 <sup>nd</sup> A1ft follow through their 2 distinct critical values Allow $x > -\frac{3}{2}$ with "or" " , " " $\cup$ " " " $x < 4$ to score M1A0 but "and" or " $\cap$ " score M1A1 $x \in (-\frac{3}{2}, 4)$ is M1A1 but $x \in [-\frac{3}{2}, 4]$ is M1A0. Score M0A0 for a number line or graph only	
(c)	B1ft Allow if <b>a correct answer is seen</b> or follow through their answer to (a) and their answer to (b) but their answers to (a) and (b) <u>must be regions</u> . Do not follow through single values. If their follow through answer is the empty set accept $\emptyset$ or $\{ \}$ or equivalent in words If (a) or (b) are not given then score this mark for cao  NB You may see $x < 4$ (with anything or nothing in-between) $x < -1.5$ in (b) and empty set in (c) for B1ft <b>Do not award marks for part (b) if only seen in part (c)</b>  Use of $\leq$ instead of $<$ (or $\geq$ instead of $>$ ) loses one accuracy mark only, at first occurrence.	

Question Number	Scheme	Marks
Q5 (a)	$a + 9d = 2400 \quad a + 39d = 600$ $d = \frac{-1800}{30} \quad d = -60 \quad (\text{accept } \pm 60 \text{ for A1})$	M1 M1 A1 (3)
(b)	$a - 540 = 2400 \quad a = 2940$	M1 A1 (2)
(c)	$\text{Total} = \frac{1}{2}n\{2a + (n-1)d\} = \frac{1}{2} \times 40 \times (5880 + 39 \times -60) \quad (\text{ft values of } a \text{ and } d)$ $= \underline{70\,800}$	M1 A1ft A1cao (3) [8]
	<p><u>Note:</u> If the sequence is considered 'backwards', an equivalent solution may be given using <math>d = 60</math> with <math>a = 600</math> and <math>l = 2940</math> for part (b). This can still score full marks. <b>Ignore labelling of (a) and (b)</b></p> <p>(a) 1<sup>st</sup> M1 for an attempt to use 2400 and 600 in <math>a + (n-1)d</math> formula. Must use both values  i.e. need <math>a + pd = 2400</math> <u>and</u> <math>a + qd = 600</math> where <math>p = 8</math> or <math>9</math> and <math>q = 38</math> or <math>39</math> (any combination)  2<sup>nd</sup> M1 for an attempt to solve <u>their</u> 2 linear equations in <math>a</math> and <math>d</math> as far as <math>d = \dots</math>  A1 for <math>d = \pm 60</math>. Condone correct equations leading to <math>d = 60</math> or <math>a + 8d = 2400</math> and <math>a + 38d = 600</math> leading to <math>d = -60</math>. They should get penalised in (b) and (c).  <b>NB This is a "one off" ruling for A1. Usually an A mark must follow from their work.</b>  ALT 1<sup>st</sup> M1 for <math>(30d) = \pm (2400 - 600)</math>  2<sup>nd</sup> M1 for <math>(d =) \pm \frac{(2400 - 600)}{30}</math>  A1 for <math>d = \pm 60</math>  <math>a + 9d = 600, a + 39d = 2400</math> <b>only</b> scores M0 BUT if they solve to find <math>d = \pm 60</math> then use ALT scheme above.</p> <p>(b) M1 for use of <u>their</u> <math>d</math> in a <b>correct</b> linear equation to find <math>a</math> leading to <math>a = \dots</math>  A1 their <math>a</math> must be compatible with their <math>d</math> so <math>d = 60</math> must have <math>a = 600</math> and <math>d = -60, a = 2940</math>  So for example they can have <math>2400 = a + 9(60)</math> leading to <math>a = \dots</math> for M1 but it scores A0  Any approach using a list scores M1A1 for a correct <math>a</math> but M0A0 otherwise</p> <p>(c) M1 for use of a correct <math>S_n</math> formula with <math>n = 40</math> and at least one of <math>a, d</math> or <math>l</math> correct or correct ft.  1<sup>st</sup> A1ft for use of a correct <math>S_{40}</math> formula and both <math>a, d</math> or <math>a, l</math> correct or correct follow through  ALT <math>\text{Total} = \frac{1}{2}n\{a + l\} = \frac{1}{2} \times 40 \times (2940 + 600) \quad (\text{ft value of } a) \quad \text{M1 A1ft}</math>  2<sup>nd</sup> A1 for 70800 only</p>	

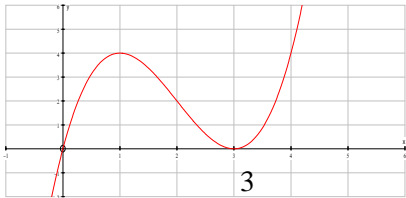

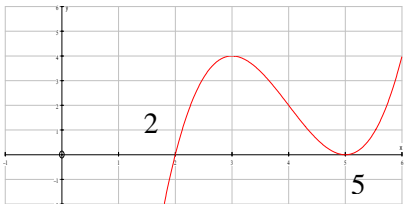
Question Number	Scheme	Marks
Q6	$b^2 - 4ac$ attempted, in terms of $p$ . $(3p)^2 - 4p = 0$ o.e. Attempt to solve for $p$ e.g. $p(9p - 4) = 0$ Must potentially lead to $p = k$ , $k \neq 0$ $p = \frac{4}{9}$ (Ignore $p = 0$ , if seen)	M1 A1 M1 A1cso [4]
	<p>1<sup>st</sup> M1 for an attempt to substitute into <math>b^2 - 4ac</math> or <math>b^2 = 4ac</math> with <math>b</math> or <math>c</math> correct                      Condone <math>x</math>'s in one term only.                      This can be inside a square root as part of the quadratic formula for example.  <b>Use of inequalities can score the M marks only</b></p> <p>1<sup>st</sup> A1 for any correct equation: <math>(3p)^2 - 4 \times 1 \times p = 0</math> or better</p> <p>2<sup>nd</sup> M1 for an attempt to factorize or solve their quadratic expression in <math>p</math>.                      Method must be sufficient to lead to their <math>p = \frac{4}{9}</math>.</p> <p>Accept factors or use of quadratic formula or <math>(p \pm \frac{2}{9})^2 = k^2</math> (o.e. eg) <math>(3p \pm \frac{2}{3})^2 = k^2</math> or equivalent work on <u>their</u> eqn.</p> $9p^2 = 4p \Rightarrow \frac{9p^2}{p} = 4 \text{ which would lead to } 9p = 4 \text{ is OK for this 2nd M1}$ <p>ALT <u>Comparing coefficients</u></p> <p>M1 for <math>(x + \alpha)^2 = x^2 + \alpha^2 + 2\alpha x</math> and A1 for a correct equation eg <math>3p = 2\sqrt{p}</math></p> <p>M1 for forming solving leading to <math>\sqrt{p} = \frac{2}{3}</math> or better</p> <p><u>Use of quadratic/discriminant formula (or any formula) Rule for awarding M mark</u>                      If the formula is quoted accept some correct substitution leading to a partially correct expression.                      If the formula is not quoted only award for a fully correct expression using their values.</p>	

Question Number	Scheme	Marks
Q7	<p>(a) <math>(a_2 =) 2k - 7</math></p> <p>(b) <math>(a_3 =) 2(2k - 7) - 7</math> or <math>4k - 14 - 7, = 4k - 21</math> (*)</p> <p>(c) <math>(a_4 =) 2(4k - 21) - 7 (= 8k - 49)</math></p> $\sum_{r=1}^4 a_r = k + "(2k - 7)" + (4k - 21) + "(8k - 49)"$ $k + (2k - 7) + (4k - 21) + (8k - 49) = 15k - 77 = 43 \quad k = 8$	<p>B1 (1)</p> <p>M1, A1cso (2)</p> <p>M1</p> <p>M1</p> <p>M1 A1 (4)</p> <p>[7]</p>
	<p>(b) M1 must see <math>2(\text{their } a_2) - 7</math> or <math>2(2k - 7) - 7</math> or <math>4k - 14 - 7</math>. Their <math>a_2</math> must be a function of <math>k</math>. A1cso must see the <math>2(2k - 7) - 7</math> or <math>4k - 14 - 7</math> expression and the <math>4k - 21</math> with no incorrect working</p> <p>(c) 1<sup>st</sup> M1 for an attempt to find <math>a_4</math> using the given rule. Can be awarded for <math>8k - 49</math> seen. <b>Use of formulae for the sum of an arithmetic series scores M0M0A0 for the next 3 marks.</b> 2<sup>nd</sup> M1 for attempting the sum of the 1<sup>st</sup> 4 terms. Must have "+" not just , or clear attempt to sum. Follow through their <math>a_2</math> and <math>a_4</math> provided they are linear functions of <math>k</math>. Must lead to linear expression in <math>k</math>. Condone use of their linear <math>a_3 \neq 4k - 21</math> here too. 3<sup>rd</sup> M1 for forming a linear equation in <math>k</math> using their sum and the 43 and attempt to solve for <math>k</math> as far as <math>pk = q</math> A1 for <math>k = 8</math> only so <math>k = \frac{120}{15}</math> is A0</p> <p><u>Answer Only</u> (e.g. trial improvement) Accept <math>k = 8</math> <u>only if</u> <math>8 + 9 + 11 + 15 = 43</math> is seen as well</p> <p><u>Sum</u> <math>a_2 + a_3 + a_4 + a_5</math> or <math>a_2 + a_3 + a_4</math></p> <p>Allow: M1 if <math>8k - 49</math> is seen, M0 for the sum (since they are not adding the 1<sup>st</sup> 4 terms) then M1 if they use their sum along with the 43 to form a linear equation and attempt to solve but A0</p>	



Question Number	Scheme	Marks
Q8 (a)	$AB: m = \frac{2-7}{8-6}, \left( = -\frac{5}{2} \right)$ Using $m_1 m_2 = -1: m_2 = \frac{2}{5}$ $y - 7 = \frac{2}{5}(x - 6), \quad 2x - 5y + 23 = 0 \quad (\text{o.e. with integer coefficients})$	B1 M1 M1, A1 (4)
(b)	Using $x = 0$ in the answer to (a), $y = \frac{23}{5}$ or 4.6	M1, A1ft (2)
(c)	Area of triangle = $\frac{1}{2} \times 8 \times \frac{23}{5} = \frac{92}{5}$ (o.e.) e.g. $\left( 18\frac{2}{5}, 18.4, \frac{184}{10} \right)$	M1 A1 (2)
		[8]
(a)	B1 for an expression for the gradient of $AB$ . Does not need the $= -2.5$ 1 <sup>st</sup> M1 for use of the perpendicular gradient rule. Follow through their $m$ 2 <sup>nd</sup> M1 for the use of (6, 7) and their changed gradient to form an equation for $l$ . Can be awarded for $\frac{y-7}{x-6} = \frac{2}{5}$ o.e. Alternative is to use (6, 7) in $y = mx + c$ to <u>find a value</u> for $c$ . Score when $c = \dots$ is reached.	
	A1 for a correct equation in the required form and must have “= 0” and integer coefficients	
(b)	M1 for using $x = 0$ in their answer to part (a) e.g. $-5y + 23 = 0$ A1ft for $y = \frac{23}{5}$ provided that $x = 0$ clearly seen <u>or</u> $C(0, 4.6)$ . Follow through their equation in (a) If $x=0, y = 4.6$ are clearly seen but $C$ is given as (4.6,0) apply ISW and award the mark. This A mark requires a simplified fraction or an exact decimal Accept their 4.6 marked on diagram next to $C$ for M1A1ft	
(c)	M1 for $\frac{1}{2} \times 8 \times y_C$ so can follow through their $y$ coordinate of $C$ . A1 for 18.4 (o.e.) but their $y$ coordinate of $C$ must be positive <u>Use of 2 triangles or trapezium and triangle</u> Award M1 when an expression for area of $OCB$ only is seen <u>Determinant approach</u> Award M1 when an expression containing $\frac{1}{2} \times 8 \times y_C$ is seen	

Question Number	Scheme	Marks
Q9 (a)	$\left[ (3-4\sqrt{x})^2 = \right] 9-12\sqrt{x}-12\sqrt{x}+(-4)^2 x$ $9x^{-\frac{1}{2}} + 16x^{\frac{1}{2}} - 24$	M1 A1, A1 (3)
(b)	$f'(x) = -\frac{9}{2}x^{-\frac{3}{2}}, + \frac{16}{2}x^{-\frac{1}{2}}$	M1 A1, A1ft (3)
(c)	$f'(9) = -\frac{9}{2} \times \frac{1}{27} + \frac{16}{2} \times \frac{1}{3} = -\frac{1}{6} + \frac{16}{6} = \frac{5}{2}$	M1 A1 (2)
		[8]
(a)	<p>M1 for an attempt to expand <math>(3-4\sqrt{x})^2</math> with at least 3 terms correct- as printed or better</p> <p><u>Or</u> <math>9-k\sqrt{x}+16x</math> (<math>k \neq 0</math>) . See also the MR rule below</p> <p>1<sup>st</sup> A1 for their coefficient of <math>\sqrt{x} = 16</math>. Condone writing <math>(\pm)9x^{(\pm)\frac{1}{2}}</math> instead of <math>9x^{-\frac{1}{2}}</math></p> <p>2<sup>nd</sup> A1 for <math>B = -24</math> or their constant term = -24</p>	
(b)	<p>M1 for an attempt to differentiate an <math>x</math> term <math>x^n \rightarrow x^{n-1}</math></p> <p>1<sup>st</sup> A1 for <math>-\frac{9}{2}x^{-\frac{3}{2}}</math> <u>and</u> their constant <math>B</math> differentiated to zero. NB <math>-\frac{1}{2} \times 9x^{-\frac{3}{2}}</math> is A0</p> <p>2<sup>nd</sup> A1ft follow through their <math>Ax^{\frac{1}{2}}</math> but can be scored without a value for <math>A</math>, i.e. for <math>\frac{A}{2}x^{-\frac{1}{2}}</math></p>	
(c)	<p>M1 for some correct substitution of <math>x = 9</math> in <u>their</u> expression for <math>f'(x)</math> including an attempt at <math>(9)^{\pm\frac{k}{2}}</math> (<math>k</math> odd) somewhere that leads to some appropriate multiples of <math>\frac{1}{3}</math> or 3</p> <p>A1 accept <math>\frac{15}{6}</math> or any exact equivalent of 2.5 e.g. <math>\frac{45}{18}, \frac{135}{54}</math> or even <math>\frac{67.5}{27}</math></p> <p><u>Misread (MR)</u> Only allow MR of the form <math>\frac{(3-k\sqrt{x})^2}{\sqrt{x}}</math> N.B. Leads to answer in (c) of <math>\frac{k^2-1}{6}</math></p> <p>Score as M1A0A0, M1A1A1ft, M1A1ft</p>	

Question Number	Scheme	Marks
Q10 (a)	$x(x^2 - 6x + 9)$ $= x(x - 3)(x - 3)$	B1 M1 A1 (3) B1
(b)	 <p>Shape </p> <p><u>Through</u> origin (<u>not</u> touching)          Touching <math>x</math>-axis only once          Touching at <math>(3, 0)</math>, or 3 on <math>x</math>-axis          [Must be on graph not in a table]</p>	B1 B1 B1ft (4)
(c)	 <p>Moved horizontally (either way)  <math>(2, 0)</math> and <math>(5, 0)</math>, or 2 and 5 on <math>x</math>-axis</p>	M1 A1 (2)
		[9]
(a)	<p>B1 for correctly taking out a factor of <math>x</math></p> <p>M1 for an attempt to factorize their 3TQ e.g. <math>(x + p)(x + q)</math> where <math> pq  = 9</math>.          So <math>(x - 3)(x + 3)</math> will score M1 but A0</p> <p>A1 for a fully correct factorized expression - accept <math>x(x - 3)^2</math>          If they "solve" use ISW</p>	
S.C.	<p>If the only correct linear factor is <math>(x - 3)</math>, perhaps from factor theorem, award B0M1A0</p> <p>Do not award marks for factorising in part (b)</p> <p><b><u>For the graphs</u></b></p> <p>"Sharp points" will lose the 1<sup>st</sup> B1 in (b) but otherwise be generous on shape          Condone <math>(0, 3)</math> in (b) and <math>(0, 2)</math>, <math>(0, 5)</math> in (c) if the points are marked in the correct places.</p>	
(b)	<p>2<sup>nd</sup> B1 for a curve that starts or terminates at <math>(0, 0)</math> score B0</p> <p>4<sup>th</sup> B1ft for a curve that touches (not crossing or terminating) at <math>(a, 0)</math> where their <math>y = x(x - a)^2</math></p>	
(c)	<p>M1 for their graph moved horizontally (only) <u>or</u> a fully correct graph          Condone a partial stretch if ignoring their values looks like a simple translation</p> <p>A1 for their graph translated 2 to the right <u>and</u> crossing or touching the axis at 2 and 5 only</p> <p><b>Allow a fully correct graph (as shown above) to score M1A1 whatever they have in (b)</b></p>	

Question Number	Scheme	Marks
Q11 (a) (b) (c)	$x = 2: y = 8 - 8 - 2 + 9 = 7 \quad (*)$ $\frac{dy}{dx} = 3x^2 - 4x - 1$ $x = 2: \frac{dy}{dx} = 12 - 8 - 1 (= 3)$ $y - 7 = 3(x - 2), \quad \underline{y = 3x + 1}$ $m = -\frac{1}{3} \quad \text{(for } -\frac{1}{m} \text{ with their } m)$ $3x^2 - 4x - 1 = -\frac{1}{3}, \quad 9x^2 - 12x - 2 = 0 \text{ or } x^2 - \frac{4}{3}x - \frac{2}{9} = 0 \text{ (o.e.)}$ $\left( x = \frac{12 + \sqrt{144 + 72}}{18} \right) (\sqrt{216} = \sqrt{36} \sqrt{6} = 6\sqrt{6}) \text{ or } (3x - 2)^2 = 6 \rightarrow 3x = 2 \pm \sqrt{6}$ $x = \frac{1}{3}(2 + \sqrt{6}) \quad (*)$	<p>B1 (1)</p> <p>M1 A1</p> <p>A1ft</p> <p>M1, <u>A1</u> (5)</p> <p>B1ft</p> <p>M1, A1</p> <p>M1</p> <p>A1cso (5)</p> <p>[11]</p>
(a) (b) (c) ALT	<p>B1 there must be a clear attempt to substitute <math>x = 2</math> leading to 7 e.g. <math>2^3 - 2 \times 2^2 - 2 + 9 = 7</math></p> <p>1<sup>st</sup> M1 for an attempt to differentiate with at least one of the given terms fully correct. 1<sup>st</sup> A1 for a fully correct expression 2<sup>nd</sup> A1ft for sub. <math>x = 2</math> in <u>their</u> <math>\frac{dy}{dx} (\neq y)</math> accept for a correct expression e.g. <math>3 \times (2)^2 - 4 \times 2 - 1</math> 2<sup>nd</sup> M1 for use of their “3” (provided it comes from their <math>\frac{dy}{dx} (\neq y)</math> and <math>x=2</math>) to find equation of tangent. Alternative is to use (2, 7) in <math>y = mx + c</math> to <u>find a value</u> for <math>c</math>. Award when <math>c = \dots</math> is seen. <b>No attempted use of <math>\frac{dy}{dx}</math> in (b) scores 0/5</b></p> <p>1<sup>st</sup> M1 for forming an equation from their <math>\frac{dy}{dx} (\neq y)</math> and their <math>-\frac{1}{m}</math> (must be changed from <math>m</math>) 1<sup>st</sup> A1 for a correct 3TQ all terms on LHS (condone missing =0) 2<sup>nd</sup> M1 for proceeding to <math>x = \dots</math> or <math>3x = \dots</math> by formula or completing the square for a 3TQ. Not factorising. Condone <math>\pm</math> 2<sup>nd</sup> A1 for proceeding to given answer with no incorrect working seen. Can still have <math>\pm</math>. <u>Verify (for M1A1M1A1)</u></p> <p>1<sup>st</sup> M1 for attempting to square need <math>\geq 3</math> correct values in <math>\frac{4+6+4\sqrt{6}}{9}</math>, 1<sup>st</sup> A1 for <math>\frac{10+4\sqrt{6}}{9}</math> 2<sup>nd</sup> M1 Dependent on 1<sup>st</sup> M1 in this case for substituting in all terms of their <math>\frac{dy}{dx}</math> 2<sup>nd</sup> A1cso for cso <u>with a full comment</u> e.g. “the <math>x</math> co-ord of <math>Q</math> is ...”</p>	