

Mark Scheme (Pre-Standardisation)

June 2010

GCE

GCE Core Mathematics C1 (6663/01)

General Marking Guidance

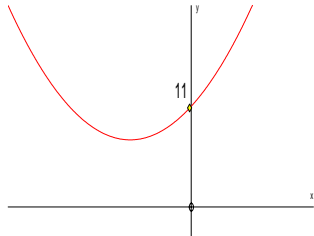
- All candidates must receive the same treatment. Examiners must mark the first candidate in exactly the same way as they mark the last.
- Mark schemes should be applied positively. Candidates must be rewarded for what they have shown they can do rather than penalised for omissions.
- Examiners should mark according to the mark scheme not according to their perception of where the grade boundaries may lie.
- There is no ceiling on achievement. All marks on the mark scheme should be used appropriately.
- All the marks on the mark scheme are designed to be awarded. Examiners should always award full marks if deserved, i.e. if the answer matches the mark scheme. Examiners should also be prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme.
- Where some judgement is required, mark schemes will provide the principles by which marks will be awarded and exemplification may be limited.
- When examiners are in doubt regarding the application of the mark scheme to a candidate's response, the team leader must be consulted.
- Crossed out work should be marked UNLESS the candidate has replaced it with an alternative response.

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Core Mathematics C1 6663
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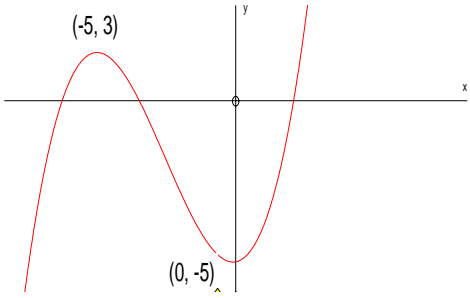
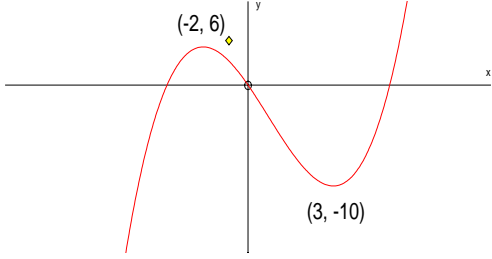
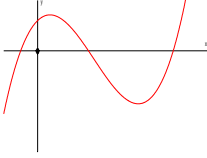
Question Number	Scheme	Marks
1	$(\sqrt{75} - \sqrt{27}) = 5\sqrt{3} - 3\sqrt{3}$ $= 2\sqrt{3}$	M1 A1 2
	M1 for $5\sqrt{3}$ or $3\sqrt{3}$ seen A1 for $2\sqrt{3}$; allow $\sqrt{12}$ or $k = 2, x = 3$ allow $k = 1, x = 12$	

Question Number	Scheme	Marks
2	$\frac{8x^4}{4} + \frac{6x^{\frac{3}{2}}}{\frac{3}{2}} - 5x + c$ $= 2x^4 + 4x^{\frac{3}{2}} - 5x + c$	M1A1 A1, A1 4
	M1 for some attempt to integrate: $x^n \rightarrow x^{n+1}$ 1 st A1 for correct, un-simplified x^4 or $x^{\frac{3}{2}}$ term 2 nd A1 for both x^4 and $x^{\frac{3}{2}}$ terms correct and simplified 3 rd A1 for a fully correct integral including $+c$	

Question Number	Scheme	Marks
3	<p>(a) $3x - 6 < 8 - 2x \rightarrow 5x < 14$</p> <p style="text-align: center;">$x < 2.8$ or $\frac{14}{5}$ or $2\frac{4}{5}$</p> <p>(b) Critical values are $x = \frac{7}{2}$ or -1</p> <p>Choosing “inside” $-1 < x < \frac{7}{2}$</p> <p style="text-align: center;"><u>$-1 < x < 2.8$</u></p> <p>(c)</p>	<p>M1</p> <p>A1 (2)</p> <p>B1</p> <p>M1A1 (3)</p> <p>B1ft (1)</p> <p style="text-align: right;">6</p>
	<p>(a) M1 for attempt to rearrange to $kx < m$</p> <p>(b) B1 for both correct critical values M1 ft their values and choose the “inside” region A1 for fully correct inequality e.g. $x > -1, x < \frac{7}{2}$ scores M1A0 use of “or” is M1A0 BUT allow $x > -1$ and $x < \frac{7}{2}$ to score M1A1 Allow 3.5 instead of $\frac{7}{2}$</p> <p>(c) B1ft ft their answers to part (a) and part (b). If their set is empty allow a suitable description in words or the symbol \emptyset.</p>	

Question Number	Scheme	Marks
4	<p>(a) $(x+3)^2 + 2$ or $p = 3$ or $\frac{6}{2}$ or $q = 2$</p> <p>(b) </p> <p>U shape with min in 2nd quad</p> <p>U shape crossing @(0, 11) only</p> <p>(c) $b^2 - 4ac = 6^2 - 4 \times 11$ $= \underline{\underline{-8}}$</p>	<p>B1</p> <p>B1 (2)</p> <p>B1</p> <p>B1 (2)</p> <p>M1</p> <p>A1 (2)</p> <p>6</p>
	<p>(b) (-3, 2) is not required on the sketch</p> <p>(c) M1 for some correct substitution into $b^2 - 4ac$</p>	

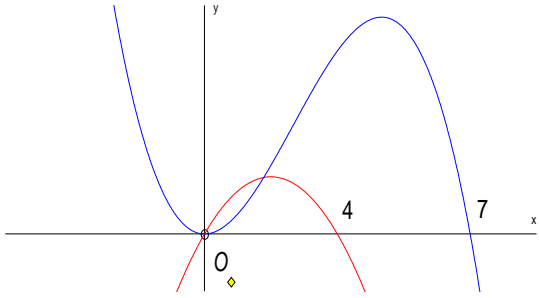
Question Number	Scheme	Marks
5	<p>(a) $a_2 = (\sqrt{4+3}) = \sqrt{7}$ $a_3 = \sqrt{\text{"their 7"}+3} = \sqrt{10}$</p> <p>(b) $a_4 = \sqrt{13}$ $a_5 = \sqrt{13+3} = 4$ *</p>	<p>B1 B1ft (2)</p> <p>M1 A1 cso (2)</p> <p style="text-align: right;">4</p>
	<p>(a) 1st B1 for $\sqrt{7}$ only 2nd B1ft follow through their "7" in correct formula provided they have \sqrt{n}, where n is an integer.</p> <p>(b) M1 for an attempt to find a_4 A1cso for a correct solution - no incorrect working seen</p>	

Question Number	Scheme	Marks
6	<p>(a) </p> <p>(b) </p> <p>(c) $(a =) \underline{5}$</p>	<p>M1 B1 A1 (3)</p> <p>B1 B1 B1 (3)</p> <p>B1 (1)</p> <p>7</p>
(a)	<p>M1 for a horizontal translation of ± 3 so accept  i.e max in 1st quad</p>	

Question Number	Scheme	Marks
7	$\frac{3x^2 + 2}{x} = 3x + 2x^{-1}$ $(y' =) 24x^2, -4 \times \frac{1}{2} x^{-\frac{1}{2}}, +3 - 2x^{-2}$ $\left[24x^2 - 2x^{-\frac{1}{2}} + 3 - 2x^{-2} \right]$	M1 A1 M1 A1 A1 A1 6
	1 st M1 for attempting to divide (one term correct) 1 st A1 for both terms correct, accept $\frac{2}{x}$ for $2x^{-1}$ 2 nd M1 for an attempt to differentiate $x^n \rightarrow x^{n-1}$ for at least one term 2 nd A1 for $24x^2$ 3 rd A1 for $-4 \times \frac{1}{2} x^{-\frac{1}{2}}$ or $2x^{-\frac{1}{2}}$ allow $\frac{1}{\sqrt{x}}$ for $x^{-\frac{1}{2}}$ 4 th A1 for $3 - 2x^{-2}$ allow $\frac{1}{x^2}$ for x^{-2} . Both terms needed.	

Question Number	Scheme	Marks
8	<p>(a) $m_{AB} = \frac{4-0}{7-2} \left(= \frac{4}{5} \right)$</p> <p>Equation of AB is: $y-0 = \frac{4}{5}(x-2)$ $\underline{5y - 4x + 8 = 0}$</p> <p>(b) $AB = \sqrt{(7-2)^2 + (4-0)^2}$ $= \sqrt{41}$</p> <p>(c) Using isos triangle with $AB = AC$ then $t = 2 \times y_A = 2 \times 4 = 8$</p> <p>(d) Area of triangle $= \frac{1}{2}t \times (7-2)$ $= \underline{20}$</p>	<p>M1</p> <p>M1</p> <p>A1 (3)</p> <p>M1</p> <p>A1 (2)</p> <p>B1 (1)</p> <p>M1</p> <p>A1 (2)</p> <p>8</p>
	<p>(a) 1st M1 for attempt at gradient of AB. Some correct substitution in correct formula. 2nd M1 for an attempt at equation of AB. Follow through their gradient. A1 requires integer form.</p> <p>(b) M1 for an expression for AB or AB^2</p> <p>(d) M1 for an expression for the area of the triangle - follow through their t.</p>	

Question Number	Scheme	Marks
9	<p>(a) $a + 29d = 40.75$</p> <p>(b) $S_{30} = \frac{30}{2}(a+l)$ or $\frac{30}{2}(2a+29d)$ So $1005 = 15[a + 40.75]$ *</p> <p>(c) $67 = a + 40.75$ so $a = \underline{\underline{\pounds 26.25}}$</p> <p>$29d = 40.75 - 26.25$ $= 14.5$ so $d = \underline{\underline{\pounds 0.50}}$ or 50p</p>	<p>M1A1 (2)</p> <p>M1</p> <p>A1cso (2)</p> <p>M1 A1</p> <p>M1 A1 (4)</p> <p>8</p>
	<p>(a) M1 for attempt to use $a + (n - 1)d$ with $n = 30$ A1 as written</p> <p>(b) M1 for an attempt to use an S_n formula with $n = 30$ A1 for forming an equation with 1005 and S_n and simplifying to printed answer.</p> <p>(c) 1st M1 for an equation for a 2nd M1 for an equation for d, can follow through their a</p>	

Question Number	Scheme	Marks
10	<p>(a) </p> <p>(i) \cap shape Passing through origin and (4,0)</p> <p>(ii) correct shape (-ve cubic) with minimum on x-axis Minimum at (0,0) Passes through (7,0)</p> <p>(b) $x(4-x) = x^2(7-x)$ $0 = x[7x - x^2 - (4-x)]$ o.e. $0 = x(x^2 - 8x + 4)$ *</p> <p>(c) $(0 = x^2 - 8x + 4 \Rightarrow) x = \frac{8 \pm \sqrt{64 - 16}}{2}$ $= \frac{8 \pm 4\sqrt{3}}{2}$ $x = 4 \pm 2\sqrt{3}$ From sketch A is $x = 4 - 2\sqrt{3}$ So $y = (4 - 2\sqrt{3})(4 - [4 - 2\sqrt{3}])$ $= -12 + 8\sqrt{3}$</p>	<p>B1 B1 B1 B1 (5) M1 B1 A1cso (3) M1A1 B1 A1 M1 M1 A1 (7) 15</p>
	<p>(b) M1 for forming a suitable equation B1 for a factor of x taken out correctly. A1cso no incorrect working seen</p> <p>(c) 1st M1 for some use of the correct formula or full attempt to solve leading to $x =$ 1st A1 for a fully correct expression - condone + instead of \pm B1 for simplifying $\sqrt{48} = 4\sqrt{3}$. Can be scored independently of this expression 2nd A1 for correct answer - can be \pm or + or - 2nd M1 for selecting their answer in the interval (0,4) 3rd M1 for attempting $y = \dots$ using their x 3rd A1 for correct answer only</p>	

Question Number	Scheme	Marks
11	<p>(a) $(y =) \frac{3x^2}{2} - \frac{5x^{\frac{1}{2}}}{\frac{1}{2}} - 2x \quad (+c)$</p> <p>$f(4) = 5 \Rightarrow 5 = \frac{3}{2} \times 16 - 10 \times 2 - 8 + c$</p> <p style="text-align: right;">$c = 9$</p> <p>$\left[f(x) = \frac{3}{2}x^2 - 10x^{\frac{1}{2}} - 2x + 9 \right]$</p> <p>(b) $m = 3 \times 4 - \frac{5}{2} - 2 \left(= 7.5 \text{ or } \frac{15}{2} \right)$</p> <p>Equation is: $y - 5 = \frac{15}{2}(x - 4)$</p> <p style="text-align: center;"><u>$2y - 15x + 50 = 0$</u> o.e.</p>	<p>M1A1A1</p> <p>M1 A1 (5)</p> <p>M1</p> <p>M1A1</p> <p>A1 (4)</p> <p style="text-align: right;">9</p>
	<p>(a) 1st M1 for an attempt to integrate $x^n \rightarrow x^{n+1}$ 1st A1 for at least 2 correct terms in x 2nd A1 for all 3 terms in x correct (condone missing $+c$ at this point) 2nd M1 for using the point (4, 5) to form a linear equation for c. Must use $x = 4$ and $y = 5$ 3rd A1 for $c = 9$. The final expression is not required.</p> <p>(b) 1st M1 for an attempt to evaluate $f'(4)$ 2nd M1 for using their value of m to form an equation of the line through (4,5) 1st A1 for any correct expression for the equation of the line 2nd A1 for any correct equation with integer coefficients</p>	