2007 HSC Notes from the Marking Centre Mathematics Extension 1

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2007 HSC NOTES FROM THE MARKING CENTRE
MATHEMATICS EXTENSION 1

Introduction

This document has been produced for the teachers and candidates of the Stage 6 course in Mathematics Extension 1. It contains comments on candidate responses to the 2007 Higher School Certificate examination, indicating the quality of the responses and highlighting their relative strengths and weaknesses.

This document should be read along with the relevant syllabus, the 2007 Higher School Certificate examination, the marking guidelines and other support documents which have been developed by the Board of Studies to assist in the teaching and learning of Mathematics Extension 1.

Question 1

(a) Candidates either attempted to use the binomial theorem or attempted to expand $(1+\sqrt{5})^2(1+\sqrt{5})$. Of those using the binomial theorem, most candidates were able to identify the coefficients 1, 3, 3, 1. Some had difficulty in expressing $(\sqrt{5})^3$ as $5\sqrt{5}$.

Of those candidates who attempted to expand $(1+\sqrt{5})^2(1+\sqrt{5})$, some had difficulty in expanding $(1+\sqrt{5})^2$. A common error was for candidates to attempt to apply the result $a^3+b^3=(a+b)(a^2+ab+b^2)$.

(b) Better responses obtained the correct result either by using ratios and a diagram or by applying the correct formula: $x=\dfrac{k\times x_2+l\times x_1}{k+l}$ and similar for *y*. Weaker responses made the mistake of substituting *k* and *l* in the wrong position in the formula, and some mistakenly made *k* or *l* negative.

(c) Many candidates recognised that the answer included the expression $\dfrac{1}{1+x^8}$. However, a number of candidates failed to multiply by $4x^3$ to obtain the correct solution.

(d) Better responses obtained the correct gradient of the line and gradient of the tangent to the curve. Weaker responses did not substitute into the correct formula: $\tan\theta=\dfrac{m_1-m_2}{1+m_1m_2}$.

Candidates are reminded to find the exact value, in radians, of the acute angle.

(e) A wide variety of responses were given for this part. While most candidates were able to obtain the new limits $u = 9$ and 16, a significant number did not place these limits in the correct position in the integral as a function of u. Some candidates omitted the negative sign and/or the square root sign in the integral as a function of u. Of those who were able to obtain the correct expression $-\int u^{-\frac{1}{2}}du$, some were unable to obtain the correct coefficient of $u^{\frac{1}{2}}$ in the integral.

Question 2

(a) Better responses either included the t-results or derived them by using Pythagoras's theorem and correct trigonometry. Careless errors were the greatest contributor to loss of marks in this section with $1-t^2$ in the denominator of both $\sin\theta$ and $\cos\theta$ being the most common. Candidates also recognised that it was a 'show' question and therefore gave an appropriate number of lines of working to demonstrate they knew the algebraic manipulation required.

(b) (i) In better responses, candidates knew the shape of the curve required, but in the weaker responses candidates did not find the correct domain and range and therefore did not position the graph correctly on the number plane. The most common mistake was to halve the range and double the domain. It is also important to remember that graphs need to be drawn a certain size (at least half a page) to help with clarity.

(ii) Some candidates were still able to get the range of $0 \le y \le 2\pi$ even if their graph was incorrect. Weaker responses indicated the range was $-1 \le x \le 1$.

(c) The majority of the mistakes made by candidates were in the process of solving the simultaneous equations. The more successful process for establishing the equations to solve for a and b was to use both the factor and remainder theorems. The candidates who used long division of polynomials to establish the equations were more prone to make mistakes. Letting $P(-2) = 0$ or $P(-1) = 0$ were also common errors.

(d) (i) Candidates who expanded the expression for $v = 50 - 50e^{-0.2t}$ and then proceeded to differentiate were generally more successful than those who used other methods of differentiation such as the product rule.

(ii) The candidates who were most successful in obtaining the correct answer established the origin at the balloon and not the ground. The most common incorrect answer was 2284 m and it was interesting to note that even though this answer did not make sense, many candidates did not reflect on their solution to see where their mistake lay.

Question 3

Some candidates through careless transcription errors were unable to attain marks in some parts. Candidates are reminded to transcribe the question from the paper. Correctly applied formulas and familiarity with the standard integral tables assisted many candidates in this question.

(a) Better responses in this part indicated familiarity with the formula for finding the volume of a solid of revolution and efficient use of the standard integral tables. Careless transcriptions, neglecting to square the function, omission of π, incorrect limits, rotating the region about *y*-axis marred many solutions. Candidates need to be reminded to show the substitution of the limits when evaluating their primitive and to evaluate inverse trigonometric expressions, particularly exact values. Most candidates evaluated the primitive function using radians, although some candidates continue to evaluate their primitive inappropriately using degrees. Some candidates unnecessarily complicated their solutions by using the methods of slices or cylindrical shells. Again unnecessarily, some candidates successfully used substitutions such as $x = 3\tan\theta$ to find the primitive.

(b)(i) Better responses in this part indicated familiarity with good graphing techniques, although many other responses were unable to graph the rectangular hyperbola successfully. Candidates need to be reminded to use a ruler, to mark a scale, to find essential features including intercepts and to ensure that their hyperbola behaves asymptotically. A number of candidates failed to attempt the graph although they had found the asymptotes correctly. Other candidates unnecessarily used calculus to find stationary points. Typical responses found the vertical asymptote x = 4 successfully, but had difficulties finding the horizontal asymptote. Responses that were most successful in finding the horizontal asymptote used long division, showing that $\frac{x-2}{x-4} = 1 + \frac{2}{x-4}$. Most responses considered the limiting behaviour of f(x) as $x \to \infty$. However, there was obvious confusion about the connection between the limit and the asymptote. Many responses confused the intercepts with the asymptotes, sometimes giving multiple asymptotes. There was also confusion among a number of candidates as to whether $x = 4$ and $y = 1$ were horizontal or vertical.

(ii) A number of candidates omitted this part seemingly because they misinterpreted the structure of the question by stating the asymptotes as their solution to (b)(i) and graphing the rectangular hyperbola as their solution to (b)(ii). Candidates must be careful in multiple answer parts to ensure that they do not omit a section through carelessness. The candidates who attempted this part mostly used algebraic approaches to solve the inequality. The most common method used was to multiply by the square of the denominator. Many candidates had difficulty solving their inequality due to poor algebraic techniques. Candidates are advised to leave their expression in factored form rather than expanding and re-factorising their expressions. Many candidates were unable to solve a quadratic inequality successfully and there was obvious confusion as to the meaning of less than and greater than signs. Candidates who used the critical points method, testing the regions defined by $x = 4$ and the point of intersection $x = 5$ were generally successful. A number of better responses efficiently used a graphical approach and simply stated the answer. Many responses were often awarded at least one mark by showing the point of intersection (5, 3) on their graph. Responses using an algebraic approach often failed to check the solution against the graph.

(c)(i) Typical responses stated that $\frac{d}{dx}\left(\frac{1}{2}(\dot{x})^2\right) = -e^{-2x}$ or its equivalent. Most candidates neglected to consider the two cases that $v = \pm e^{-x}$ and to resolve these cases using the initial conditions. There were a number of multiple attempts at this part and candidates are advised to cross out previous incorrect attempts. Candidates were often careless in their notation omitting differentials, omitting to show calculation of the constant of integration and omitting $\pm$ signs when taking the square root of v^2.

(ii) Some candidates need to be reminded that 'show that' questions require all steps of working to be justified fully and that careful checking backwards through their solution should point out any errors. When amending a solution be careful to correct each line in the working. Many candidates were able to gain a mark by stating that $\frac{dt}{dx} = \frac{1}{e^{-x}}$ but were unable to note that. $\frac{1}{e^{-x}} = e^{x}$.

Question 4

(a)(i) Two common errors were assuming selection without replacement from a population of 100, or attempting to use the binomial theorem with ${}^{n}\mathrm{C}_{2}(0.1)^{2}(0.9)^{n-2}$.

(ii) Many responses did not convert from a correct binomial expression to a correct decimal.

(iii) Candidates usually recognised the need for complementary events, but many did not state the correct complementary event.

(b) Most responses established the statement true for $n = 1$ and made a correct assumption. A number of candidates could not manipulate the indices correctly. Substitutions of the form $5 = 12\mathrm{M} - 7^{2k-1}$ were often not successful.

(c) Many candidates did not copy the diagram and this frequently led to confusion when naming angles. Confusion between P, D and B was a significant difficulty when interpreting solutions. Responses that labelled angles with a symbol (x or α) proved the results more efficiently. Responses that attempted a similar triangle proof often failed to establish similarity correctly. Weaker responses often failed to justify statements (or gave an incorrect reason).

Question 5

Weaker responses contained an incorrect approach in some parts of the question, which did not allow them to reach the correct solution. Candidates are reminded to show all necessary working, particularly when substituting into expressions.

(a)(i) Many candidates failed to attempt this question or had the incorrect formula for the area of a sector. The candidates who tried to use circle geometry properties or Pythagoras's theorem did not make much progress. Those candidates using area of triangle = $\frac{1}{2} \times TP \times r$ were more successful than those using $\frac{1}{2}ab\sin C$. Candidates needed to make it clear that the area of the sector was $\frac{1}{2}r^2\theta$ rather than $r^2\theta$ since the area was doubled and it was unclear whether candidates understood this or had the incorrect formula.

(ii) Often candidates knew the correct formula for Newton's method and could differentiate $2\theta - \tan\theta$ but found the calculation of $2 - \sec^2 1.15$ difficult.

(b) A number of candidates calculated the correct number of arrangements but did not calculate a probability. Most candidates knew that there were 4! ways of sitting the children, or 6! total number of arrangements, but only the better responses obtained the correct answer.

(c) The responses that used the method of elimination rather than substitution were far more likely to be successful. A number of responses were careless with the exact values or candidates did not know them. Stating that if $4\sin^{-1} x = \pi$ then $\sin^{-1} x = 4\pi$ or losing the π altogether were common errors. A few candidates tried to bring in $\sin^{-1} x + \cos^{-1} x = \dfrac{\pi}{2}$ without success.

(d) (i) Many candidates spent time on this part trying a number of different methods without success. It is important for candidates to look at the mark value of the question to assess the nature of the answer expected. Responses that found the gradient of the chord as $\dfrac{p+q}{2}$ and $\dfrac{-1}{p}$, then equated them were far more likely to be successful than those who substituted in the point.

(ii) A number of candidates got correct initial gradients but made careless errors simplifying. For example, $\dfrac{p}{2} \times \dfrac{q}{2} = -1$, so $pq = -2$ was the most common error which was then used incorrectly to show $p^2 = 2$. Some candidates did not realise that parts (i) and (ii) were related.

Question 6

(a)(i) Candidates found the derivatives but some made errors with the signs, or in keeping the constant. Fewer candidates made errors by integrating instead of differentiating. Some candidates expressed the displacement in the form $x = 2\sin\left(2t - \dfrac{\pi}{6}\right) + 3$ from the start.

Candidates who simply quoted $n = 2$ and then stated the given result for acceleration were not successful.

(ii) This was probably the most correctly answered part of the question but some responses contained the wrong value of n.

(iii) Many candidates did not demonstrate that they knew the expansion of $A\cos(nt \pm \alpha)$ by writing it down and simply went straight into the question. The most common error was stating that $\tan^{-1}\dfrac{1}{\sqrt{3}} = \dfrac{\pi}{3}$. It is recommended that candidates have more practice in using radian measure.

(iv) Many candidates ignored/missed the part of the question asking for‘either direction’, consequently finding only two solutions. Even those candidates who did consider both directions usually gave only two solutions. Most candidates were able to demonstrate their ability to solve an equation of the type $A\cos(nt+\alpha)=\pm 2$, even if they could not obtain the correct answer. Candidates are advised to write π more clearly as these were often very difficult to read.

(b) (i) Weaker responses found an incorrect first derivative, the most common error being $f'(x)=e^x+e^x$. Others were not able to demonstrate that they knew that $f'(x)>0$ for an increasing function. Many responses referred to both the first and second derivatives being positive or even just the second.

(ii) Weaker responses made a start by swapping the *x* and *y* but did not make any significant progress beyond this. Better responses approached this question by swapping *x* and *y* then solving the resulting quadratic. This was usually successful but many responses did not justify why they rejected one of the solutions. Many gave the reason for rejecting the negative as being ‘because the function is increasing’. Other candidates successfully used the given inverse function to either show that $f^{-1}[f(x)]=x$ or they started with $x=e^y-e^{-y}$ and by squaring both sides worked towards building the required function.

(iii) Some candidates did not see the link between this and the previous part and started from the beginning by solving the quadratic. Surprisingly, many candidates who had not recognised the quadratic in the previous part did this. Weaker responses demonstrated very poor calculator skills in trying to evaluate the log expression.

Question 7

Candidates are reminded to take care with algebra, negative signs and setting out. In part (a), it was important that candidates indicated which part of the question they were answering. A diagram assisted some candidates with their working in part (b).

(a)(i) Most candidates attempting this part correctly differentiated both functions. To gain the mark, the derivatives also needed to be equated at $x = a$.

(ii) This part caused the most difficulty for many candidates. Although some equated the functions at $x = a$, the vast majority of those attempting to express *k* as a function of *n* had difficulty eliminating *a*.

(b)(i) Better responses expressed *x* in terms of *t* and then substituted this expression into the equation for *y*. In a part where candidates are required to ‘show’ a given result, it was important to provide sufficient working to convince markers that they arrived at the result from correct reasoning.

(ii) This part required candidates to solve a quadratic equation for *m* through substitution of $x = 10$ and $y = h$. While most candidates used the quadratic formula, those correctly using the ‘completing the square’ method often gained the result with less working required. A second mark in this part was gained for calculating the maximum height of *h*. Some responses made no attempt to find this maximum height, indicating the need to read the question carefully.

(iii) Candidates who attempted this part of the question often indicated the use of 3.9 and 5.9 in their attempt to find the other two values for m. A correct second interval of $0.8 \leq m \leq 1.2$ needed to be substantiated by appropriate working. Responses that unnecessarily substituted $m = \tan\theta$ often made mistakes.

(iv) The first mark was given for a correct expression for the range, x, through substitution of $y = 0$ or use of the maximum range formula. To gain the second mark, candidates were required to calculate the correct width of one interval, usually involving the values for m given in (b) (iii). The best responses realised the significance of $m = 1$ (ie $\theta = 45°$), giving a maximum range of 20 metres in the second interval found in (b) (iii).

Mathematics Extension 1

2007 HSC Examination Mapping Grid

Question	Marks	Content	Syllabus outcomes
1 (a)	2	17.1	P3, HE3
1 (b)	2	6.7E	PE2
1 (c)	2	8.9, 15.5	HE4, HE5
1 (d)	3	6.6E, 13.1	PE2, HE7
1 (e)	3	11.5	HE6
2 (a)	2	5.8	PE3
2 (b) (i)	2	15.1, 15.2, 15.3	HE4, HE7
2 (b) (ii)	1	15.1, 15.2, 15.3	HE4, HE7
2 (c)	3	16.2	PE3
2 (d) (i)	2	14.3	HE3, HE5
2 (d) (ii)	2	14.3	HE3, HE5
3 (a)	3	11.4, 15.5	H8, HE4
3 (b) (i)	3	1.4, 10.5E	P5, HE7
3 (b) (ii)	2	4.4, 1.4E	PE6
3 (c) (i)	2	14.3E	HE5
3 (c) (ii)	2	12.4, 12.5, 14.3, 15.1	HE5
4 (a) (i)	1	18.2	HE3
4 (a) (ii)	1	3.3, 18.2	HE3
4 (a) (iii)	2	3.3, 13.1, 18.2	HE3
4 (b)	3	7.4	HE2
4 (c) (i)	3	2.8E, 2.10E	PE3
4 (c) (ii)	2	2.10E	PE3
5 (a) (i)	2	13.1	H5, HE7
5 (a) (ii)	2	16.4	HE4, HE7
5 (b)	2	18.1	PE3
5 (c)	3	1.4, 15.2	HE4
5 (d) (i)	1	9.6E	PE3, PE4
5 (d) (ii)	2	9.6E	PE4
6 (a) (i)	2	14.4	HE3
6 (a) (ii)	1	14.4	HE3
6 (a) (iii)	2	5.9, 14.3, 14.4	HE3
6 (a) (iv)	2	5.9, 14.3, 14.4	HE3
6 (b) (i)	1	10.1	HE4
6 (b) (ii)	3	15.1	HE4, HE7
6 (b) (iii)	1	9.4	HE4, HE7
7 (a) (i)	1	10.1	HE4
7 (a) (ii)	2	12.2, 12.4	HE7
7 (b) (i)	2	14.3E	HE3
7 (b) (ii)	2	1.4, 14.3	HE3
7 (b) (iii)	2	5.3, 14.3	HE3
7 (b) (iv)	3	14.3	HE3

BOARD OF STUDIES
NEW SOUTH WALES

2007 HSC Mathematics Extension 1
Marking Guidelines

Question 1 (a)

Outcomes assessed: P3, HE3

MARKING GUIDELINES

Criteria	Marks
• Correct answer	2
• Applies the binomial theorem	1

Question 1 (b)

Outcomes assessed: PE2

MARKING GUIDELINES

Criteria	Marks
• Correct answer	2
• Shows some understanding of internal division	1

Question 1 (c)

Outcomes assessed: HE4, HE5

MARKING GUIDELINES

Criteria	Marks
• Correct answer	2
• Applies the chain rule or equivalent merit	1

Question 1 (d)

Outcomes assessed: PE2, HE7

MARKING GUIDELINES

Criteria	Marks
• Correct solution	3
• Attempts to use the correct gradients to calculate the angle between the lines	2
• Finds the gradient of the cubic at $x = 1$ or equivalent merit	1

Question 1 (e)

Outcomes assessed: HE6

MARKING GUIDELINES

Criteria	Marks
• Correct solution	3
• Makes substantial progress	2
• Displays some understanding of the method of substitution	1

Question 2 (a)

Outcomes assessed: PE3

MARKING GUIDELINES

Criteria	Marks
• Correct solution	2
• Shows some understanding of the t formula	1

Question 2 (b) (i)

Outcomes assessed: HE4, HE7

MARKING GUIDELINES

Criteria	Marks
• Correct solution	2
• Correct shape or equivalent merit	1

Question 2 (b) (ii)

Outcomes assessed: HE4, HE7

MARKING GUIDELINES

Criteria	Marks
• Correct answer	1

Question 2 (c)

Outcomes assessed: PE3

MARKING GUIDELINES

Criteria	Marks
• Correct solution	3
• Obtains two correct equations for a and b	2
• Attempts to apply the remainder theorem	1

Question 2 (d) (i)

Outcomes assessed: HE3, HE5

MARKING GUIDELINES

Criteria	Marks
• Correct solution	2
• Correct derivative	1

Question 2 (d) (ii)

Outcomes assessed: HE3, HE5

MARKING GUIDELINES

Criteria	Marks
• Correct solution	2
• Correct primitive	1

Question 3 (a)

Outcomes assessed: H8, HE4

MARKING GUIDELINES

Criteria	Marks
• Correct solution	3
• Correct primitive or equivalent merit	2
• Correct integrand or equivalent merit	1

Question 3 (b) (i)

Outcomes assessed: P5, HE7

MARKING GUIDELINES

Criteria	Marks
• Correct solution	3
• Correct horizontal and vertical asymptotes	2
• Correct horizontal or vertical asymptote	1

Question 3 (b) (ii)

Outcomes assessed: PE6

MARKING GUIDELINES

Criteria	Marks
• Correct answer	2
• Finds the x-coordinate of the point of intersection or equivalent merit	1

Question 3 (c) (i)

Outcomes assessed: HE5

MARKING GUIDELINES

Criteria	Marks
• Correct solution	2
• Attempts to apply $\ddot{x} = \dfrac{d}{dx}\left(\dfrac{1}{2}v^2\right)$	1

Question 3 (c) (ii)

Outcomes assessed: HE5

MARKING GUIDELINES

Criteria	Marks
• Correct solution	2
• Writes $\dfrac{dt}{dx} = e^x$ or equivalent merit	1

Question 4 (a) (i)

Outcomes assessed: HE3

MARKING GUIDELINES

Criteria	Marks
• Correct answer	1

Question 4 (a) (ii)

Outcomes assessed: HE3

MARKING GUIDELINES

Criteria	Marks
• Correct answer	1

Question 4 (a) (iii)

Outcomes assessed: HE3

MARKING GUIDELINES

Criteria	Marks
• Correct solution	2
• Identifies the complementary event or equivalent merit	1

Question 4 (b)

Outcomes assessed: HE2

MARKING GUIDELINES

Criteria	Marks
• Correct solution	3
• Correctly proves the inductive step OR • Verifies the case $n = 1$ and attempts to use the induction assumption	2
• Verifies the case $n = 1$ or equivalent merit	1

Question 4 (c) (i)

Outcomes assessed: PE3

MARKING GUIDELINES

Criteria	Marks
• Correct proof. Justifications (abbreviated or otherwise) which indicate the appropriate geometric fact are acceptable	3
• Proof with insufficient justification or equivalent merit	2
• Shows that $\angle DAC = \angle DBC$ with justification or equivalent merit	1

Question 4 (c) (ii)

Outcomes assessed: PE3

MARKING GUIDELINES

Criteria	Marks
• Correct proof. Justifications (abbreviated or otherwise) which indicate the appropriate geometric fact are acceptable	2
• Shows $BQ = QX$ or equivalent merit	1

Question 5 (a) (i)

Outcomes assessed: H5, HE7

MARKING GUIDELINES

Criteria	Marks
• Correct solution	2
• Correct expression in terms of r and θ for the area of the sector or the triangle	1

Question 5 (a) (ii)

Outcomes assessed: HE4, HE7

MARKING GUIDELINES

Criteria	Marks
• Correct solution	2
• Shows some understanding of Newton's method	1

Question 5 (b)

Outcomes assessed: PE3

MARKING GUIDELINES

Criteria	Marks
• Correct solution	2
• Treats the children as a single block or equivalent merit	1

Question 5 (c)

Outcomes assessed: HE4

MARKING GUIDELINES

Criteria	Marks
• Correct solution	3
• Finds $\sin^{-1} x$ or $\cos^{-1} y$	2
• Attempts to eliminate either $\sin^{-1} x$ or $\cos^{-1} y$	1

Question 5 (d) (i)

Outcomes assessed: PE3, PE4

MARKING GUIDELINES

Criteria	Marks
• Correct solution	1

Question 5 (d) (ii)

Outcomes assessed: PE4

MARKING GUIDELINES

Criteria	Marks
• Correct solution	2
• Correctly calculates the product of the gradients of OP and OQ	1

Question 6 (a) (i)

Outcomes assessed: HE3

MARKING GUIDELINES

Criteria	Marks
• Correct solution	2
• Calculates the velocity correctly or equivalent merit	1

Question 6 (a) (ii)

Outcomes assessed: HE3

MARKING GUIDELINES

Criteria	Marks
• Correct answer	1

Question 6 (a) (iii)

Outcomes assessed: HE3

MARKING GUIDELINES

Criteria	Marks
• Correct solution	2
• Calculates A or expands $A\cos(2t-\alpha)$ correctly or equivalent merit	1

Question 6 (a) (iv)

Outcomes assessed: HE3

MARKING GUIDELINES

Criteria	Marks
• Correct solution	2
• Obtains one solution of $4\cos\left(2t-\frac{\pi}{6}\right)=\pm 2$ or equivalent merit	1

Question 6 (b) (i)

Outcomes assessed: HE4

MARKING GUIDELINES

Criteria	Marks
• Correct solution	1

Question 6 (b) (ii)

Outcomes assessed: HE4, HE7

MARKING GUIDELINES

Criteria	Marks
• Correct solution	3
• Finds the valid solution of the quadratic	2
• Recognises that $e^{2x} - ye^{x} - 1 = 0$ is a quadratic OR • Writes $x = e^{y} - e^{-y}$	1

Question 6 (b) (iii)

Outcomes assessed: HE4, HE7

MARKING GUIDELINES

Criteria	Marks
• Correct answer	1

Question 7 (a) (i)

Outcomes assessed: HE4

MARKING GUIDELINES

Criteria	Marks
• Correct solution	1

Question 7 (a) (ii)

Outcomes assessed: HE7

MARKING GUIDELINES

Criteria	Marks
• Correct solution	2
• Equates the values of the functions at $x = a$	1

Question 7 (b) (i)

Outcomes assessed: HE3

MARKING GUIDELINES

Criteria	Marks
• Correct solution	2
• Attempts to eliminate t	1

Question 7 (b) (ii)

Outcomes assessed: HE3

MARKING GUIDELINES

Criteria	Marks
• Correct solution	2
• Solves the quadratic or uses the given result to find the maximum height	1

Question 7 (b) (iii)

Outcomes assessed: HE3

MARKING GUIDELINES

Criteria	Marks
• Correct solution	2
• Finds the values of m for which $h = 3.9$ or 5.9	1

Question 7 (b) (iv)

Outcomes assessed: HE3

MARKING GUIDELINES

Criteria	Marks
• Correct solution	3
• Computes the range and the width of one interval	2
• Sets $y = 0$ to compute the range or equivalent merit	1