2007 HSC Notes from the Marking Centre General Mathematics

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GPO Box 5300
Sydney 2001
Australia

Tel: (02) 9367 8111
Fax: (02) 9367 8484
Internet: http://www.boardofstudies.nsw.edu.au

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Contents

2007 HSC NOTES FROM THE MARKING CENTRE GENERAL MATHEMATICS

Introduction

This document has been produced for the teachers and candidates of the Stage 6 General Mathematics course. 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 syllabuses, the 2007 Higher School Certificate examinations, the marking guidelines and other support documents which have been developed by the Board of Studies to assist in the teaching and learning of General Mathematics.

General Comments

One of the main difficulties that markers continue to have is marking responses that involve an incorrect answer with little or no working shown. In these cases it is not possible to give part marks, since markers have no indication of candidates' thinking towards their solution. Candidates are advised to write their working down so that part marks can be awarded for some correct steps towards their answer. A simple example of this occurs when candidates have to round their answer to a certain degree of accuracy. Candidates should always write their calculator display before rounding their answer, and only round their answer in the last step of working, not in an earlier step. Markers can then see that candidates have rounded correctly, even if the answer is not correct.

Some questions required candidates to explain their answer and/or justify their result in words and/or by using calculations. This presented a problem for a significant number of candidates. They need to become familiar with appropriate terminology and read their answers after writing them to ensure that the answers make sense.

Candidates need to pay attention to the number of marks allocated to each part of a question so that they know the expected extent of their answers. Candidates should pay particular attention to the situation where a question asks them to justify with calculations or examples, and ensure that they provide an appropriate response.

Candidates should bring a ruler to the General Mathematics HSC examination in order to draw graphs and diagrams accurately. Candidates should also take note of diagrams where 'Not to scale' is indicated since in these cases measuring lines or angles to obtain a result is not going to be awarded any marks.

This year, for the first time, candidates used a pre-printed booklet as an answer booklet with their student number and centre number already printed on the cover for each question number.

In the better responses, candidates:

- showed a clear, concise and appropriate method to solve each problem. Those who worked in a logical manner, stated what they were doing clearly and showed all necessary working were at an advantage compared to those who showed poor or no working, or who did not indicate where they were heading

- referred correctly to the formulae sheet, were familiar with it and used it carefully where necessary
- drew large, clear, well-labelled diagrams and included given information as well as information calculated while doing the question
- did not round off too early in their calculations
- were able to articulate their explanations, either with the support of calculations or in clear, written form
- considered the reasonableness of their answers within the context of the question.

Section I

Question	Correct Response
1	B
2	A
3	D
4	A
5	C
6	A
7	D
8	C
9	A
10	B
11	B

Question	Correct Response
12	C
13	C
14	B
15	A
16	D
17	C
18	C
19	A
20	D
21	D
22	B

Section II

Question 23

(a) (i) Typical responses stated the correct intercept – $5000. Incorrect answers given were $500 and $21 000, ie the value of Rose's investment at the end of the sixteenth year.

(ii) Reading vertically up from 6 on the horizontal axis clearly showed that Rose's graph was above that of Lily's, and hence Rose's account was worth more. This was suggested by most responses as was the correct difference, $2000. A set square is an essential tool for accurate graph reading and should be included in the equipment taken into the General Mathematics HSC examination.

Candidates should be reminded that measurements can only be correct to the smallest unit on the scale and the scale clearly indicated 1 unit = $1000. Answers should have been in 'thousands' only.

(iii) The common correct response was 'one year', indicating that many candidates were able to interpret a horizontal difference. As in part (ii), the use of a set square may have avoided responses which indicated time either more than or less than one year. There were some responses which interpreted the question as 'how long will it take Rose's investment to reach $20 000?'. A number of candidates thought it necessary to write a small composition in which the answer was embedded.

(b) (i) To answer this question, candidates needed to select the correct formula for the volume of the cylinder, obtain the correct radius from the diagram, calculate the volume of soil and round the answer (up) to the nearest m^3. Some candidates evaluated the volume correctly as 143.56… but rounding was ignored or taken to one decimal place. Common errors were:

- selecting an incorrect radius $r = 3.78$ for the tank only, $r = 5.78$, taking the 1 m out to the hole's walls on both sides
- calculating incorrectly, eg forgetting to square the radius used or ignoring multiplication by 2 (the height).

Some candidates used an incorrect formula, ie $\pi(R^2 - r^2)$, ie the area of an annulus, which was multiplied by the height (usually in the form of the difference in volume of two cylinders with radii selected from 5.78, 4.78, 3.78 and 2.78). Other formulas selected and worked through were $\frac{1}{3}\pi r^2 h$ and $2\pi rh \pm 2\pi r^2$.

(ii) Typical responses included the correct answer, which required the division of a large number by a smaller number.

(iii) In contrast to part (ii), this part was very poorly completed. The number of non-attempts was significantly more than in any other part of the question. Better responses obtained a correct volume in cubic units and then correctly converted to a capacity in litres.

For two marks, candidates should have realised that there was more to this question than a simple $400(\text{m}^2) \times 20(\text{mm}) = 8000(\text{L})$. Most attempts to work in millimetres failed. $400 \times 1000 \times 20$ instead of $400 \times 1\,000 \times 1000 \times 20\ \text{mm}^3$, as did working in centimetres: $400 \times 100 \times 2$ was used when it should have been $400 \times 100 \times 100 \times 2\ \text{cm}^3$. On the rare occasion that a correct volume in mm^3 or cm^3 was obtained, conversion to litres was usually unsuccessful. Other incorrect responses were $400 \times 0.2 = 80\,\text{L}$ and $400 \times 0.2 = 8\,\text{L}$. The conversion, $1\,\text{m}^3$ to $1000\,\text{L}$, was applied in only the better responses. Another incorrect approach was to square 400 (from $400\,\text{m}^2$) so that the calculation and answer became $400^2 \times 20 = 3\ 200\ 000$ litres (or no indication of units).

(c)(i) Better responses obtained the correct answer, 45 crocodiles. The best responses demonstrated a good knowledge of the unitary method, ie 40% *is* 18 *so* 1% *is* $\frac{18}{40} \therefore 100\% = \frac{18}{40} \times 100 = 45$. There were many variations of the form: $40\% = 18$ *so* $20\% = 9$ *so* $60\% = 27, 18 + 27 = 45.$

(ii) Candidates were less successful using 45 or their incorrect answer in part (i) to obtain 60 or a correct answer from their previous error as an estimate of the population. Popular incorrect answers were of the form $24 + 27 = 51$, $6 + 45 = 51$, $45 + 24 = 69$. The traditional approach, ie solving a proportion, was attempted by some candidates but often unsuccessfully.

$\frac{18}{45}=\frac{24}{N}$ was written as $\frac{18}{45}=\frac{N}{24}$ or $\frac{18}{24}=\frac{45}{N}$. Often 24 or 45 was replaced with 40 (from 40%). An attempt to cross-multiply often gave 45×24 = 1018, with division by 18 neglected. The most successful attempts using proportion gave calculations like:

$\frac{45}{18}\times 24=60$ or $\frac{24}{18}\times 45=60$.

In fact, many successful candidates bypassed the use of 45 altogether. The proportion of tagged crocodiles in the second sample was given as 40%, so the original 24 crocodiles tagged must have been 40% of the population so $\frac{24}{40}\times 100=60$, by the unitary method again. Similarly, $40\% = 24$, so $80\% = 48$ and $20\% = 12 \therefore 100\% = 60$. Two other approaches were:

- The 6 originally tagged, but not re-caught, must be 40% of the population not caught in the second stage so $\frac{6}{40}\times 100=15$, added to the 45 caught gives 60.
- 18 of the 24 tagged crocodiles were re-caught, ie 75%, so 45 is 75% of the population so 100% is 60.

Even though the question said 'calculate the estimate' there were some candidates who thought that the word 'estimate' meant that they could take a guess rather than use the result of a specific calculation based on sampling.

Question 24

This question required candidates to interpret situations and describe effects rather than just complete calculations. Candidates are advised to write clearly and succinctly.

(a) (i) Typical responses calculated the correct mean, or gave a correct numerical expression for the mean. Common errors resulted from incorrect order of operations, eg 3 + 5 + 5 + 6 + 8 + 8 + 9 + 10 + 40 + 50 /10.

(ii) Many responses stated the new mean and median, after the outlier was removed, without stating the actual effect of removing the outlier. Many responses had reasons correct but made errors in their calculation of the mean and median. A common error was removing a number from both ends (as outliers), ie 3 and 50. A common answer was 6.4 for the mean (removing the outlier but still dividing the total by 10 instead of 9).

(b) Weaker responses substituted into the formula correctly but did not provide the correct answer. A common error was to divide 1.2 by 3 instead of multiplying, giving a common incorrect answer of 0.4.

(c) (i) Typical responses gained some or most of the available marks for this part, particularly those showing working. A significant number of responses did not take accurate reference points from the graph (ignoring the accurate reference lines on the graph). Failure to show full working and rounding off numbers prematurely caused problems. Many could convert A$600 to €360 but could not convert US$150 to €120. Many could not convert US$150 to A$ but could correctly convert A$ to €. Most knew that A$100 = €60.

(ii) Weaker responses did not say what happened to the line, just what happened in terms of the currency exchange. Many knew that the Australian dollar would be worth more in comparison to the euro but stated that the gradient would decrease. A common error was that 'the gradient will decrease'.

(d) (i) There were many correct comparisons backed up with poor calculations. Descriptors such as positive and negative skew, when used, were used correctly. Responses often provided the answer written in such a way that it was ambiguous, incomplete, or omitted key descriptive words. Many gave wordy answers making many comparisons, answering the question correctly, and then frequently making an incorrect comparison. Many wrong answers included correlation. Responses indicated candidates seemed to be grasping at any statistical term to try to describe the distribution.

(ii) Weaker responses found the mode for males = 22 and females = 64 and then did not find the mode for the entire group. A common error was the mode = 22 (male side only). Nearly all responses demonstrated an understanding of the mode.

(iii) Weaker responses often did not find the class centre. Many found the frequency, many found the class centre but could not multiply, or did not know that there was another step to complete their answer. Weaker responses indicated that many candidates did not know what 'product' meant. Addition was commonly used.

(iv) A common error was restating the question with many contradictions. There were a large variety of attempts to convey idea that class centre was a major contributor of the difference in the two answers.

Candidates need to become more familiar with the language of mathematics and use specific words to describe what they are trying to say, eg class centre. Many responses did not include correct terminology and, instead, resorted to wordy attempts to describe the class centre as the mean of means of each class.

Question 25

(a) The most common correct answer used the example of choosing a red marble from a bag containing 3 red marbles and 1 blue marble (or the equivalent). Common errors were to state that 'was the probability associated with drawing 3 marbles from a bag containing 3 red marbles and 1 blue marble' (or the equivalent) or to give an example involving 3 red marbles and 1 blue marble (or the equivalent), but failing to specify the 'event' (drawing the red marble). Some responses gave complicated scenarios and then often got the numbers wrong. It was much better to keep the example simple. Some candidates, obviously aware of the range of probabilities, correctly interpreted $\frac{3}{4}$ as indicating an event which was 'likely' to occur and proceeded to choose something from their personal experience such as 'Mum making me tidy my room'. Some candidates showed a lack of understanding of 'equally likely' outcomes, using races or competitions as examples. 'Coming first, second or third in a 4 horse race' was a common response. It was pleasing to see the number of responses that correctly used the example of tossing two coins and getting at least one head.

(b) Weaker responses did not recognise the need to use the sine rule in triangle *JMK*. Many assumed triangle *JMK* was right angled and either used Pythagoras' Theorem or right-angled triangle trigonometry to find sides and angles. Others assumed *JL* was 20 m. Solutions were often complicated and a lot of time may have been wasted in this part of

the question. Frequently solutions were difficult to follow as a large number of responses used only two letters to identify angles. The requirement for three letters to specify an angle should be stressed by teachers. Some responses calculated $\angle JMK$ correctly but did not subtract it from 750, perhaps not understanding which angle was the angle of elevation. Another common error was 90 – 75 = 25 for $\angle JMK$. A scale diagram was successfully used in a few responses and this would have been a suitable alternative solution for those who did not know where to start.

(c) (i) Most candidates obtained the correct probability.

(ii) Weaker responses indicated uncertainty about what they were being asked to do in this part. Some omitted the 1st choice probabilities but then correctly identified the 2nd choice probabilities. Others simply wrote the products of the probabilities at the end of each of the 9 branches. Others tried to add more branches to their tree. Many responses indicated a failure to recognise that this was an example of 'sampling without replacement' and hence did not reduce the denominators to 9 in the 2nd branch. Others thought that the outcomes were all equally likely and wrote $\frac{1}{3}$ on all the 1st branches and/or $\frac{1}{9}$ on all the 2nd branches even though they may have had part (i) correct.

(iii) A large number of responses ignored their probability tree from part (ii) and treated all combinations as equally likely, writing $\frac{3}{9}=\frac{1}{3}$ as their answer. Candidates should be encouraged to look for connections between parts of a question and to look at the mark allocation before proceeding. Even candidates who knew how to use the tree correctly seemed to expect the answer must be $\frac{1}{3}$ and wrote $\frac{5}{10}\times\frac{4}{9}+\frac{3}{10}\times\frac{2}{9}+\frac{2}{10}\times\frac{1}{9}=\frac{1}{3}$. Multiplying along branches and adding the relevant products presented difficulties for many candidates, many just adding or multiplying all fractions. Some responses correctly gave the three individual probabilities associated with two DVDs the same, but then forgot to add them.

(d) (i) Many responses failed to justify their answer using appropriate calculations. Other responses were difficult to follow due to poor language skills and poor use of terminology. Responses with justifications on the basis of *z*-score calculations were generally the most successful. Those who attempted to justify their conclusion on the basis of relative proportions of 1 standard deviation away from the mean or the comparative proximity to 1 standard deviation away from the mean often had difficulty completing their argument. Some responses successfully used diagrams to justify their answer, but scores had to be placed relatively in the correct positions to gain full marks.

(ii) Weaker responses indicated little understanding that percentages from the normal distribution were required. Unfortunately, a large number of those attempting to use the relevant percentages omitted the 0.15% and found 83.85% of 150. Others were unable to remember the correct percentages. Many candidates thought that a percentage was an appropriate response to 'how many candidates would you expect…' and did not calculate the actual number of candidates based on their percentage.

Question 26

In this question, candidates were required to demonstrate strong calculation skills. A large number of responses simply contained bald answers, without the support of working, for two- and four-mark questions. In this question, candidates who showed full working and calculations had a greater chance of being awarded full or part marks. In some parts, candidates who did set work out clearly were able to gain marks for correct numerical expressions.

(a) (i) Typical responses were successful in calculating the correct speed in this part. Common errors included the incorrect conversion of 2 hours and 48 minutes to 2.48 hours and answers for speed given in different units, eg metres per minute.

(ii) Typical responses correctly identified that the Cosine Rule would be helpful, although some did forget to find the square root, evaluating AB^2 rather than AB. A small number of responses incorrectly used Pythagoras' theorem or right-angled triangle trigonometry instead.

(iii) Better responses often drew a diagram and then used knowledge of alternate angles and parallel lines. Unsuccessful attempts often involved long, complicated trigonometric calculations or incorrect use of geometrical facts.

(b) (i) Responses that showed clear calculations of the amount of yearly depreciation before calculating the percentage were generally more successful. A significant number of incorrect responses resulted from use of the declining balance formula, incorrect evaluation of D after substitution into the straight-line formula or incorrect denominators in the subsequent calculation of the percentage.

(ii) Typically, responses indicated confusion about which value from (b) (i) should be subtracted from \$41 600 as the annual deductions, eg \$455, \$1365, \$3635 or \$5000. Other responses incorrectly applied their percentage from (b) (i) to \$41 600 to calculate the value of the deductions. Some responses also failed to use a correct number of weeks in the year (such as 52.18 or 52), instead using values such as 48, 36, 54 or 56.

(iii) A large number of responses answered part (ii) and part (iii) together. Other responses failed to recognise the connection between these two parts and correctly calculated the tax payable on \$41 600, for example, despite quoting a different taxable income in part (ii).

(c) Some responses did not answer the first part of the question, which required an expression for the value of the investment immediately after Mina's 21st birthday. A large number of responses correctly identified the future value formula as being useful, although most of these incorrectly used a value of $n = 21$, rather than $n = 22$. A number of responses did not demonstrate an understanding that the future value formula is derived from payments being made at the end of the period. This resulted in them incorrectly adding \$100 to the end of their future value expression. For this particular question, the initial \$100 gains

21 years worth of interest, the second \$100 gains 20 years worth of interest and the last \$100 gains no interest. So the total value of the investment is:

$$\begin{aligned}&100(1.06)^{21}+100(1.06)^{20}+...+100\\&=100(1.06^{21}+1.06^{20}+...1.06^{1}+1)\\&=100\times\left(\frac{1.06^{22}-1}{0.06}\right)\end{aligned}$$

which is the future value formula as presented on the formula sheet. Incorrect responses often involved the use of simple interest, compound interest or the present value formula to calculate the value of the investment.

Question 27

(a) (i) Typical responses successfully gave an example of a length and width that differed by 6, though some gave a length that was 6 times larger than the width. Some responses mistakenly gave an example of a playing surface such as a football field or basketball court.

(ii) Weaker responses did not write the equation in terms of length l only. The introduction of extra pronumerals, typically *w*, was a common error. Another common error was restating the area formula $A = l \times b$.

(iii) When giving the explanation as to why lengths of 0 metres to 6 metres were impossible, candidates often rephrased the question and/or previously stated information, ie 'lengths must be more than 6 metres so that the length is 6 metres more than the width'. Weaker responses simply commented on the graph, such as 'the graph only starts from 6'. Better responses were able to make a correct statement regarding the effect on an attribute such as the area, width or playing surface shape.

(iv) This question required the candidates to obtain a value for the length and width of the playing surface. The value of the length should have been read accurately from the graph and then the process of the width being 6 metres less applied. Candidates who misread the graph could still obtain a mark by stating a width being 6 metres less than the length.

Weaker responses did not make the connection that the graph would help solve this question and tried random combinations that would multiply to give $135\ \text{m}^2$ (with occasional success to get 15 metres and 9 metres). Also, a common method was to divide $135\ \text{m}^2$ by 6 to obtain the width. Candidates who tried to solve their equation from part (ii) had minimal success.

(v) Candidates should use a ruler to draw accurate graphs. The graph required two sections: a horizontal line up to $150\ \text{m}^2$ joined by a diagonal line with gradient $\$300/\text{m}^2$ to the $200\ \text{m}^2$. Often only one correct section was completed. Axes were often drawn with a ruler but the linear function required was completed by hand by joining the dots. A poor scale drawn on the axes influenced many attempts with the graph not fitting on the page, the gradient of the slope too difficult to determine or the plotted points not forming a straight line.

(vi) Correct calculations were required to justify the conclusion and the actual company identified for the mark.

(b) (i) The equation needed to be $\$c$ in terms of d, and required purchase cost as well as the running cost of the 4 globes for a year. Weaker responses did not collect all the information from the question and form the appropriate equation.

Typical responses did not account for the 4 globes, missed the 5 hours per night, did not know there are 365 days in a year (using 356, 360, 24 or similar) or ran the purchase and running costs together in a long multiplication. The incorporation of the d into their equation caused concern in weaker responses whether to put it as a power or as the subject of the equation. Numerical expressions, an expression only or a range of values were also common mistakes.

(ii) This question could be solved by working through the calculations per day, then per hour, then per globe to obtain the correct answer, or by correctly solving the equation from the previous part.

(iii) There was a difficulty understanding the concept of the 'd', with numerous candidates believing this to be the total cost and proceeding to compare d values. Rounding of d values was also an issue when used within an equation, as then costs were slightly away from the expected result. Responses that compared d values had limited success due to some not doubling the \$250 to \$500, and also due to an unclear conclusion 'it doesn't double'. Unfortunately, some worded responses that explained the effect of the purchase price not doubling within the total cost were not justified with calculations.

(iv) Typical responses had the concept of the normal distribution with the correct percentages but were unable to interpret the meaning of the 97.5% on their graph. Many responses gave 97.5% of 5000. Weaker responses chose 3 standard deviations away from the 5000 hours or gave a range and did not recognise it was a z-score question.

Question 28

(a) Responses indicated that many candidates were unaware that the table of dice outcomes and the financial expectation payouts were related to each other. Many responses indicated an attempt to answer a second, unrelated question. Candidates should label parts of a question clearly.

(i) The common incorrect answer of $\frac{5}{36}$ suggested that candidates did not grasp completely the 'difference of one' outcome. The denominator of 36 indicated that most candidates had some basic probability understanding.

(ii) Weaker responses showed little understanding of financial expectation. Many regarded the single outcome with the highest probability as the financial expectation. There was a common tendency to write lengthy 'wordy' solutions, when the answer lay completely in a mathematical expression. Many weaker responses missed the point that each outcome, on rolling two dice, has a different probability. A common incorrect answer was 'There is a financial expectation of \$2.80'.

(iii) As above, many candidates felt the need to give a long 'wordy' answer. Weaker responses failed to recognise the link to the previous part of the question. Many failed to score this mark because they did not commit to the word 'gain' or the word 'loss' despite the fact

that they clearly had the right idea. Teachers are advised to emphasise that Return = financial expectation – outlay.

(b) Whether to use H or H^2 caused great confusion. Nearly all responses did not observe that $(\sqrt{8})^2 = 8$ and, as a consequence, made the question more unwieldy. Many weaker responses gained their only mark by correctly identifying the area of the triangle, while for many others it was disregarded. Many others did not use the area of a triangle formula or thought that ½ × 2 × 2 = 1 × 2 = 3. Continued loss of accuracy was significant in responses that rounded at each step.

(c) (i) Many responses did not transpose Simpson's rule correctly from the formulae sheet. Subsequent errors were prevalent. Despite being clearly asked to use two applications, many responses used only one. A small number used three. Difficulty emerged in finding the value of h. Surprisingly, many correctly identified the fifth ordinate as 0, though many thought it was 2, the third dimension.

(ii) Metric conversions were poorly completed in weaker responses.

General Mathematics

2007 HSC Examination Mapping Grid

Question	Marks	Content	Syllabus outcomes
Section I			
1	1	AM3: Algebraic skills and techniques	H7
2	1	PB2: Relative frequency and probability	P2, P10
3	1	FM1: Earning money	P2
4	1	M3: Similarity of two-dimensional figures	P2, P6
5	1	M2: Applications of area and volume	P2
6	1	FM3: Taxation	P2
7	1	FM1: Earning money	P2, P8
8	1	M4: Right-angled triangles	P2, P6
9	1	DA7: Correlation	H5
10	1	PB3: Multi-stage events	H10
11	1	M7: Spherical geometry	H6
12	1	FM6: Depreciation	H5
13	1	PB3: Multi-stage events	H3
14	1	AM1: Basic algebraic skills	P2
15	1	AM4: Modelling linear and non-linear relationships	H3
16	1	DA5: Interpreting sets of data	H4
17	1	DA2: Data collection and sampling	P9
18	1	AM1: Basic algebraic skills	P3
19	1	AM3: Algebraic skills and techniques	H3
20	1	M7: Spherical geometry	H6, H7
21	1	DA3: Displaying single data sets AM1: Basic algebraic skills	P3, P9
22	1	DA3: Displaying single data sets	P7, P4

Question	Marks	Content	Syllabus outcomes
Section II			
23 (a) (i)	1	FM2: Investing money	P2
23 (a) (ii)	2	FM2: Investing money	P2, P8
23 (a) (iii)	1	FM2: Investing money AM4: Modelling linear and non-linear relationships	P2, P8, H5
23 (b) (i)	3	M2: Application of area and volume M1: Units of measurement	P6, P7
23 (b) (ii)	1	M1: Units of measurement	P2
23 (b) (iii)	2	M2: Application of area and volume	P2, P6
23 (c) (i)	1	M1: Units of measurement	P2
23 (c) (ii)	2	DA2: Data collection and sampling	P9
24 (a) (i)	1	DA5: Interpreting sets of data	H9
24 (a) (ii)	2	DA5: Interpreting sets of data	H4
24 (b)	1	AM1: Basic algebraic skills	P3
24 (c) (i)	3	AM2: Modelling linear relationships	P3
24 (c) (ii)	1	AM2: Modelling linear relationships	P4, P5
24 (d) (i)	1	DA5: Interpreting sets of data	H4
24 (d) (ii)	1	DA4: Summary statistics DA5: Interpreting sets of data	P2, H2, H9
24 (d) (iii)	2	DA4: Summary statistics DA5: Interpreting sets of data	P2, P4, H4
24 (d) (iv)	1	DA4: Summary statistics DA5: Interpreting sets of data	P11, H11
25 (a)	1	PB1: The language of chance	P11
25 (b)	3	M4: Right-angled triangles M6: Applications of trigonometry	P6, H2, H6
25 (c) (i)	1	PB2: Relative frequency and probability	P10
25 (c) (ii)	2	PB3: Multi-stage events	H3, H4
25 (c) (iii)	2	PB3: Multi-stage events	H3, H4, H10
25 (d) (i)	2	DA6: The normal distribution	H4, H5, H9, H11
25 (d) (ii)	2	DA6: The normal distribution	H4, H5, H9
26 (a) (i)	1	M1: Units of measurements	P2, P5, P7

Question	Marks	Content	Syllabus outcomes
26 (a) (ii)	2	M6: Applications of trigonometry	H6
26 (a) (iii)	1	M6: Applications of trigonometry	H2, H6
26 (b) (i)	2	FM6: Depreciation	H2, H5
26 (b) (ii)	1	FM3: Taxation FM6: Depreciation	P2, P7, H2, H5
26 (b) (iii)	2	FM3: Taxation	P2
26 (c)	4	FM5: Annuities and loan repayments	H5, H8, H11
27 (a) (i)	1	AM4: Modelling linear and non-linear relationships	H5
27 (a) (ii)	1	AM4: Modelling linear and non-linear relationships	H2, H3
27 (a) (iii)	1	AM4: Modelling linear and non-linear relationships	H5
27 (a) (iv)	2	AM4: Modelling linear and non-linear relationships	H5, H11
27 (a) (v)	2	AM4: Modelling linear and non-linear relationships	H2, H5
27 (a) (vi)	1	AM4: Modelling linear and non-linear relationships	H11
27 (b) (i)	2	AM4: Modelling linear and non-linear relationships	H3
27 (b) (ii)	1	AM4: Modelling linear and non-linear relationships	H2
27 (b) (iii)	1	AM4: Modelling linear and non-linear relationships	H2, H11
27 (b) (iv)	1	AM4: Modelling linear and non-linear relationships DA6: The normal distribution	H2, H5
28 (a) (i)	1	PB3: Multi-stage events	H3, H4, H10
28 (a) (ii)	3	PB4: Applications of probability	H4, H10, H11
28 (a) (iii)	1	PB4: Applications of probability	H2, H10, H11
28 (b)	3	AM3: Algebraic skills and techniques	H2
28 (c) (i)	3	M5: Further applications of area and volume	H6
28 (c) (ii)	2	M5: Further applications of area and volume	H2, H3, H7

BOARD OF STUDIES
NEW SOUTH WALES

2007 HSC General Mathematics
Marking Guidelines

Section II

Question 23 (a) (i)

Outcomes assessed: P2

MARKING GUIDELINES

Criteria	Marks
• Correct answer	1

Question 23 (a) (ii)

Outcomes assessed: P2, P8

MARKING GUIDELINES

Criteria	Marks
• Correct answer	2
• Correctly stating Lilly's AND Rose's investment but no comparison made • Correct difference of $2000 without indication of who's investment is worth the most	1

Question 23 (a) (iii)

Outcomes assessed: P2, P8, H5

MARKING GUIDELINES

Criteria	Marks
• Correct answer	1

Question 23 (b) (i)

Outcomes assessed: P6, P7

MARKING GUIDELINES

Criteria	Marks
• Correct answer, correctly rounded	3
• Correct answer, incorrectly or not rounded OR • Numerical expression (with incorrect radius), correctly evaluated and rounded	2
• Numerical expression (with incorrect radius), not rounded or incorrectly rounded	1

Question 23 (b) (ii)

Outcomes assessed: P2

MARKING GUIDELINES

Criteria	Marks
• Correct answer OR correct numerical expression	1

Question 23 (b) (iii)

Outcomes assessed: P2, P6

MARKING GUIDELINES

Criteria	Marks
• Correct answer in litres	2
• Correct volume in m^3 OR • Correct answer in mm^3 OR • Incorrect volume in m^3 correctly converted to litres	1

Question 23 (c) (i)

Outcomes assessed: P2

MARKING GUIDELINES

Criteria	Marks
• Correct answer	1

Question 23 (c) (ii)

Outcomes assessed: P9

MARKING GUIDELINES

Criteria	Marks
• Correct answer or correct from part (c) (i)	2
• Progress towards correct answer	1

Question 24 (a) (i)

Outcomes assessed: H9

MARKING GUIDELINES

Criteria	Marks
• Correct answer OR correct numerical expression	1

Question 24 (a) (ii)

Outcomes assessed: H4

MARKING GUIDELINES

Criteria	Marks
• Correct effect on both mean and median	2
• Correct effect on mean OR • Correct effect on median OR • Correct calculation of mean and median	1

Question 24 (b)

Outcomes assessed: P3

MARKING GUIDELINES

Criteria	Marks
• Correct answer	1

Question 24 (c) (i)

Outcomes assessed: P3

MARKING GUIDELINES

Criteria	Marks
• Correct answer in Euros	3
• Significant progress towards correct answer eg Correct conversion of US$150 to €120 OR • Incorrect conversion of US$ to Euros and correctly added to correct conversion of A$600	2
• Progress towards correct answer eg Correct conversion of A$600 to €360	1

Question 24 (c) (ii)

Outcomes assessed: P4, P5

MARKING GUIDELINES

Criteria	Marks
• Correct answer	1

Question 24 (d) (i)

Outcomes assessed: H4

MARKING GUIDELINES

Criteria	Marks
• One correct comparison	1

Question 24 (d) (ii)

Outcomes assessed: P2, H2, H9

MARKING GUIDELINES

Criteria	Marks
• Correct answer	1

Question 24 (d) (iii)

Outcomes assessed: P2, P4, H4

MARKING GUIDELINES

Criteria	Marks
• Correct answer	2
• One correct value	1

Question 24 (d) (iv)

Outcomes assessed: P11, H11

MARKING GUIDELINES

Criteria	Marks
• Correct answer	1

Question 25 (a)

Outcomes assessed: P11

MARKING GUIDELINES

Criteria	Marks
• Correct answer	1

Question 25 (b)

Outcomes assessed: P6, H2, H6

MARKING GUIDELINES

Criteria	Marks
• Correct answer (ignore rounding)	3
• Significant progress towards correct answer eg Correct calculation of $\angle JMK$ eg Correct numerical expression	2
• Progress towards correct answer eg Correct substitution into sine rule	1

Question 25 (c) (i)

Outcomes assessed: P10

MARKING GUIDELINES

Criteria	Marks
• Correct answer	1

Question 25 (c) (ii)

Outcomes assessed: H3, H4

MARKING GUIDELINES

Criteria	Marks
• Must have decrease in denominator from 1st choice to 2nd choice of 10 to 9. AND • No more than 3 missing or incorrect probabilities	2
• Evidence of decrease in denominators from 10 to 9 OR • No decrease in denominators but appropriate decrease in numerators	1

Question 25 (c) (iii)

Outcomes assessed: H3, H4, H10

MARKING GUIDELINES

Criteria	Marks
• Correct answer OR • Correct numerical expression OR • correct from tree diagram in part (c) (ii)	2
• Progress towards correct answer eg one error in numerical expression	1

Question 25 (d) (i)

Outcomes assessed: H4, H5, H9, H11

MARKING GUIDELINES

Criteria	Marks
• Correct answer	2
• Progress towards correct answer eg attempt at justification containing reference to the z-score	1

Question 25 (d) (ii)

Outcomes assessed: H4, H5, H9

MARKING GUIDELINES

Criteria	Marks
• Correct answer	2
• Progress towards correct answer eg 84%	1

Question 26 (a) (i)

Outcomes assessed: P2, P5, P7

MARKING GUIDELINES

Criteria	Marks
• Correct answer OR • Correct numerical expression (with time either in hours, minutes or hours and minutes)	1

Question 26 (a) (ii)

Outcomes assessed: H6

MARKING GUIDELINES

Criteria	Marks
• Correct answer (ignore rounding)	2
• Correct substitution into cosine rule	1

Question 26 (a) (iii)

Outcomes assessed: H2, H6

MARKING GUIDELINES

Criteria	Marks
• Correct answer	1

Question 26 (b) (i)

Outcomes assessed: H2, H5

MARKING GUIDELINES

Criteria	Marks
• Correct answer	2
• Progress towards correct answer eg Amount of depreciation for 1 year	1

Question 26 (b) (ii)

Outcomes assessed: P2, P7, H2, H5

MARKING GUIDELINES

Criteria	Marks
• Correct answer OR • Correct answer using the value of 1 year depreciation from part (b) (i)	1

Question 26 (b) (iii)

Outcomes assessed: P2

MARKING GUIDELINES

Criteria	Marks
• Correct answer or correct from previous answer	2
• Progress towards correct answer eg Correct numerical expression eg Correct procedure using incorrect line in tax table	1

Question 26 (c)

Outcomes assessed: H5, H8, H11

MARKING GUIDELINES

Criteria	Marks
• Correct expression AND $4339.23 AND correct calculation of interest	4
• Correct expression AND $4339.23 OR • Expression using incorrect value of n AND consistent calculation of interest OR • Correct expression incorrectly evaluated AND consistent calculation of interest	3
• Correct expression ONLY OR • Correct interest (bald) OR • Expression using incorrect value of n correctly evaluated	2
• $4339.23 (bald or with incorrect expression) OR • Expression using incorrect value of n OR • Incorrect total evaluation of investment with subtraction of total deposits	1

Question 27 (a) (i)

Outcomes assessed: H5

MARKING GUIDELINES

Criteria	Marks
• Correct answer	1

Question 27 (a) (ii)

Outcomes assessed: H2, H3

MARKING GUIDELINES

Criteria	Marks
• Correct answer (Must be an equation)	1

Question 27 (a) (iii)

Outcomes assessed: H5

MARKING GUIDELINES

Criteria	Marks
• Correct answer	1

Question 27 (a) (iv)

Outcomes assessed: H5, H11

MARKING GUIDELINES

Criteria	Marks
• Correct answer (ie length AND width)	2
• Progress towards correct answer eg 15 or 9 (ie length OR width)	1

Question 27 (a) (v)

Outcomes assessed: H2, H5

MARKING GUIDELINES

Criteria	Marks
• Correct graph in correct position	2
• Progress towards correct answer	1

Question 27 (a) (vi)

Outcomes assessed: H11

MARKING GUIDELINES

Criteria	Marks
• Correct answer with working out shown for Company *B*	1

Question 27 (b) (i)

Outcomes assessed: H3

MARKING GUIDELINES

Criteria	Marks
• Correct answer	2
• Progress towards correct answer eg working out for 1 globe	1

Question 27 (b) (ii)

Outcomes assessed: H2

MARKING GUIDELINES

Criteria	Marks
• Correct answer OR • Correct from equation in part (b) (i)	1

Question 27 (b) (iii)

Outcomes assessed: H2, H11

MARKING GUIDELINES

Criteria	Marks
• Correct answer with appropriate calculations	1

Question 27 (b) (iv)

Outcomes assessed: H2, H5

MARKING GUIDELINES

Criteria	Marks
• Correct answer OR • Correct numerical expression	1

Question 28 (a) (i)

Outcomes assessed: H3, H4, H10

MARKING GUIDELINES

Criteria	Marks
• Correct answer or equivalent	1

Question 28 (a) (ii)

Outcomes assessed: H4, H10, H11

MARKING GUIDELINES

Criteria	Marks
• Correct answer	3
• Correct numerical expression	2
• Numerical expression with ONE error	1

Question 28 (a) (iii)

Outcomes assessed: H2, H10, H11

MARKING GUIDELINES

Criteria	Marks
• Correct answer with conclusion OR • Correct from previous part (a) (ii)	1

Question 28 (b)

Outcomes assessed: H2

MARKING GUIDELINES

Criteria	Marks
• Correct answer OR • Correct numerical expression	3
• Calculation of area of triangle + hexagon and attempted addition with computation error OR • Calculation of area of hexagon	2
• Calculation of area of triangle OR • Calculation of H^2 or H	1

Question 28 (c) (i)

Outcomes assessed: H6

MARKING GUIDELINES

Criteria	Marks
• Correct answer	3
• Correct numerical expression	2
• Correct use of Simpson's rule once	1

Question 28 (c) (ii)

Outcomes assessed: H2, H3, H7

MARKING GUIDELINES

Criteria	Marks
• Correct answer OR • Correct from previous answer part (c) (i)	2
• Progress towards correct answer	1