

General Mathematics

Mastering the language of mathematics

It is always helpful, and often less painful, to try to learn from the mistakes of others. In preparing for the General Mathematics examination, why not follow the strategies shown by successful students in past HSC exams.

Show working in your answers and check that they make sense

Last year's HSC question on calculating a plane's flying time from London to Manila was worth 3 marks. Those students who wrote a single wrong answer did not gain any marks while those who gave a wrong answer but showed some correct working scored 1 or 2 marks. Examiners usually award a mark for each correct step in a solution so try to set out your work neatly and logically. If you are using a formula, record the values being substituted.

It is easy to misread a question, not answer it or leave out part of the answer under the pressure of a timed exam. In last year's probability question on listing the possible combinations of 50 cents, \$1 and \$2 coins to pay a \$2.50 bridge toll, many students no doubt thought that they were answering the question when they wrote the *number* of combinations (4) rather than the actual combinations. Also beware of 'double-barrelled' questions such as 'What is the maximum amount she can borrow, and how many years will she have to repay the loan?' where you must give *two* answers.

Always check that your answer appears reasonable. It is possible to calculate a flying time from London to Manila of 240 hours but it really doesn't look correct! When calculating an unknown length or angle, use the diagram to judge whether your answer seems practical. For example, the length of a hypotenuse must be wrong if it is shorter than one of the other two sides of the triangle.

Really know your work (don't cram!)

General Mathematics is an applied course covering five different areas of study, so learn the important ideas, skills and language of each topic. Examiners are always impressed by students who write clear and concise answers that demonstrate a good understanding. Like the judges on reality TV shows, mathematics teachers know instinctively when a student has no idea and is trying to bluff his or her way through. Last year's exam tested 'skewness, declining balance depreciation, the cumulative frequency polygon, the mean of data in class intervals, offset surveys and correlation'. How well do you know each of these topics?

Learn the language of General Mathematics and be prepared to write answers in words

Include a personal glossary in your study notes. Do you know the meanings of these terms: *random sample*, *angle of depression*, *compounded monthly*, *interest-free period*, *positive test result*, *ignore time zones*? They were from last year's exam. If you don't know their meaning, start your personal glossary today.

HSC questions often seek to test deep knowledge by asking students to explain their thinking in words:

- List TWO ways in which this graph is misleading.
- Martha thinks she has a better deal than Paul. Do you agree?

The first question referred to a sales graph of two brands of washing powder and was worth only two marks. Some students missed the point of the question and the number of marks allocated and wrote 'creative mini-essays' comparing the sizes, weights or prices of the brands. Students who over-interpret a question often unwittingly contradict themselves in their explanations. Simply answer the question using the facts rather than personal

opinion. Learn to describe, explain, interpret and justify your answers using correct terminology. Practise with past HSC questions.

Choose the simplest and quickest method

In last year's exam, instead of simply using cosine to find the angle a garden rake made with the ground, some students used Pythagoras' theorem to calculate the length of the third side of the triangle, before using trigonometry to find the angle. Such methods still work but take longer and have a greater chance of error. Always look for the most straightforward solution, using the number of marks in the question as a guide. Consider using a diagram or table, the formula sheet or the answer to a previous part of the question. Decide whether trigonometry or Pythagoras' theorem is faster, and don't choose the sine and cosine rules for right-angled triangles.

Use a ruler and draw clear diagrams

All students must bring a ruler to the exam for drawing and measuring. Those who don't produce graphs and diagrams drawn freehand that are too small, messy or without scales. Many of last year's students could not accurately graph the depreciation of a car, showing inadequate detail, shape or size. Successful students draw big, neat graphs with labels and axes marked accurately. For a demonstration on constructing a median regression line, visit the *NSW HSC Online* website (http://hsc.csu.edu.au/maths/general/hsc/data_analysis/da7/).

Brush up on drawing diagrams involving bearings (in trigonometry) and tree diagrams (in probability) accurately, as these skills are tested often. If a diagram is labelled 'not to scale,' then you must do some mathematics to find a missing length or angle and not try to measure with a ruler or protractor.

Know your financial mathematics

Develop a good understanding of the concepts, formulas, graphs and tables associated with compound interest, annuities and depreciation. Remember that in the formulas, r must be entered as a decimal and n may be in months or years depending upon the problem. Also, the compound interest and depreciation formulas give the *final value* of an investment or asset rather than the amount of interest or depreciation.

Be familiar with your calculator, especially for financial mathematics and statistics, and know how to evaluate long expressions like $\frac{1.005^{108} - 1}{0.005 \times 1.005^{108}}$. Make sure your calculator is set in degrees mode for trigonometry. Finally, check that your answers look reasonable and realistic.

Robert Yen teaches at Hurlstone Agricultural High School. He is an author and co-edits *Reflections*, the journal of the Mathematical Association of NSW.