

Subject-Based Strategies for Mathematics

Preparation before Examination

Practice, Practice, Practice

To do well for Mathematics, you must make sure you do ample practice daily.

As you do the practice papers, take note of your weak topics that you have problems in getting the correct answers and then make a point to go back to your textbooks to do topical practice on those weak topics. Seek help from a teacher or tutor if you still have problems with the topic.

Make Notes on the formulas to memorise on Flash Cards

Write those formulas that will not be provided for you on a flash card so that you can refer to them when you do your practice daily.

Prior to the day of examinations, the flash cards will serve as a good quick 5-mins revision for you to memorise them. However, do make sure you have applied those formulas during your practice sessions so that it is easier for you to remember them.

Make sure you have all the necessary Mathematical Instruments

1. Calculator(s) of approved models
2. Black or blue ball point pens
3. Working mechanical pencils with lead
4. Ruler
5. Eraser
6. Compass with sharp pencil
7. Protractor
8. Set Squares
9. Curve ruler

Rest early the night before

Have a good night rest the night before the Mathematics papers so that you have a clear mind to tackle those non-routine and real-world context questions which require more thinking and analysis.

Time Management

Bring a watch or a small clock and keep track of the time as you do your paper. For the Mathematics papers, you should not spend more than 1.5 minute for each mark. Skip the difficult questions and come back to them later. Aim is to complete the paper as soon as you can so you have ample time to check your work.

Analysis of Questions

Standard Questions

Paper 1 Question 4: Inverse Proportion

- 4* Working at equal rates of speed, 10 men takes 84 days to complete a job. If the number of men is increased by 5, and assuming all men work at the same rate as the 10 men, find the number of days it would take to complete the same job.

To solve this type of questions, students must first find the total number of days required to complete the job by multiplying the number of men by the number of days. After which, they can find the number of days required by dividing the total number of days by the new number of men.

Paper 1 Question 8: Maps & Scales

- 8* A map is drawn to a scale of $1 : 200\,000$.
- (a) A river on the map measures 4.5 cm. Find the actual length of the river in kilometres.
- (b) The area of a plantation is 36 km^2 . Calculate the area, in cm^2 , on the map which represents the plantation.

To solve a map scale question, for part (a), students must be able to change the scale from $1:200\,000$ to $1\text{ cm} : 200\,000\text{ cm}$ (adding units) and then change $200\,000\text{ cm}$ to 2 km , to get the linear scale of $1\text{ cm} : 2\text{ km}$.

To solve part (b), students must be able to convert 1 cm^2 to $1\text{ cm} \times 1\text{ cm}$ to $2\text{ km} \times 2\text{ km}$ which is equals to 4 km^2 . Hence, obtaining the area scale of 1 cm^2 to 4 km^2 for easy conversion of 36 km^2 .

Paper 1 Question 14: Compound Interest

- 14* Jazz invested \$50 000 in a bank that pays a compound interest of 3% per annum. Calculate the total interest Jazz will have at the end of the third year. Give your answer correct to the nearest cent.

To solve this question, student simply need to apply the compound interest formula

$P\left(1 + \frac{r}{100}\right)^n$. However, as question asked for the total interest and not the total amount, students must remember to subtract the Principal sum of \$50 000 from the answer.

Moderate Questions

Paper 1 Question 6: Algebraic Fractions

6* Express $\frac{5x}{(x+2)(3x-2)} - \frac{3}{3x-2}$ as a single fraction in its simplest form.

When expressing to a single fraction, students must multiply both the numerator and denominator of $\frac{3}{3x-2}$ by $(x+2)$ in order to obtain the common denominator of $(x+2)(3x-2)$. And when simplifying the numerator of $5x - 3(x+2)$, students must be careful when expanding. When -3 is multiplied to $(x+2)$, there will be a sign change to become $-3x - 6$.

Common misconception: $\frac{5x - 3(x+2)}{(x+2)(3x-2)}$; student must not cancel the common factor $(x+2)$ in this case.

Paper 1 Question 7: Factorisation

7* Factorise

(a) $6x^2 - 28x - 10$,

(b) $2pr + 4qr - p - 2q$.

When solving 7(a), students should take out the common factor 2 first before proceeding with the cross-factorizing step.

When solving 7(b), students must change the sign when grouping the terms, i.e. $(2pr + 4qr) - (p + 2q)$ before taking out the common factors.

Common misconception:

$2r(p + 2q) - (p + 2q) = (p + 2q)(2r -)$ the space should be filled up with 1.

$2r(p + 2q) - 1(p + 2q) = (p + 2q)^2(2r - 1)$ there should be a power of 2 for $(p + 2q)$ as $(p + 2q)$ is a common factor that was taken out like $2ra - 1a = a(2r - 1) \neq a^2(2r - 1)$.

Paper 2 Question 4: (a) Laws of Indices (b) Changing Subject of Formula (c) Simultaneous Equations

4* (a) Simplify $\frac{(\sqrt{x})^3 \times 2x^2}{2x^0}$. [2]

(b) Given that $\frac{b}{2} = \frac{3b+ac}{a}$, express a in terms of b and c . [3]

(c) Solve the simultaneous equations [3]

$$6x + y - 5 = 0,$$

$$8x + 3y = -5.$$

For (a), students must be familiar with the Laws of Indices in order to solve the questions correctly. The law of indices includes:

Indices Laws		
(1) $a^m \times a^n = a^{m+n}$	(6) $\left(\frac{a}{b}\right)^m = \frac{a^m}{b^m}$	
(2) $a^m \div a^n = a^{m-n}$	(7) $(a^m)^n = a^{mn}$	($mn = m \times n$)
(3) $a^0 = 1$	(8) $a^{\frac{1}{n}} = \sqrt[n]{a}$	
(4) $a^{-n} = \frac{1}{a^n}$	(9) $a^{\frac{m}{n}} = (\sqrt[n]{a})^m$	
(5) $(ab)^m = a^m b^m$		

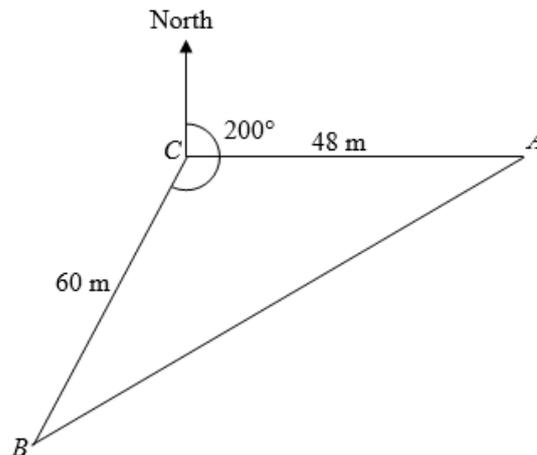
For (b), students must be apply cross-multiplication of the terms and then factorizing the subject a in order to make a as the subject of the formula.

For (c), students should learn how to use the equation mode on their calculators to get their answers for simultaneous equations. Do ensure that all the necessary workings must be shown in order to be awarded the full marks for this questions. The calculator answers should only serve as a mode of checking your answers.

Challenging Questions

Paper 2 Question 10: Trigonometry & Bearings with Real World Context

- 10* (a) There are 3 houses, A , B and C on a horizontal field. House A is due East of House C . House B is at a bearing of 200° from House C . The distance of House A to House C is 48 m while the distance of House C to House B is 60 m.



- (i) Find angle BCA . [1]
- (ii) Calculate the distance between House A and House B . [2]
- (iii) Given that the height of House C is 8 m and the height of House A is 12 m, find the angle of elevation of the roof of House A from the roof of House C . [2]

The last question of Paper 2, Mathematics Syllabus A (4045), will focus specifically on applying mathematics to a real-world scenario. This question will most likely come from the newly added syllabus content on solving problems based on real-world context (including floor plans, surveying, navigation, etc.) using geometry. Students are expected to interpret the solution in the context of the problem. To tackle this type of problems, it'll be good if we can imagine the context of the problem. We then write the dimensions given onto the diagram of the model if it had not been done.

The key is to construct a diagram to better visualize the problem in order to solve it.