

## N Level Math strategies

The following tips on selected topics will help you through some questions in the sample papers for the N Level Mathematics Syllabus A Examination.

### Standard Questions

9. (a) Simplify  $\frac{(2x)^3}{(3x)^2} \div \frac{18x}{27}$ .

Answer (a) ..... [2]

(b) Expand and simplify  $3(2-5y)-4(y-1)$ .

Answer (b) ..... [2]

### Paper 1 Question 9. Topic: Algebra.

When simplifying Algebraic expressions like  $(2x)^3$  and  $(3x)^2$  in Q9a, remember to “distribute” the power to each factor within the brackets. Hence  $(2x)^3 = 8x^3$ . Do not forget to “give the power” to the coefficient.

Similarly, for Q9b, remember to “distribute” factor  $-4$  to every term within the brackets. Hence,  $-4(y-1) = -4y + 4$ .

12. On a particular map of Singapore, 2 cm represents 0.18 km on actual ground.

(a) Express the scale of the map in the form  $1 : n$ .

Answer (a)  $1 : \dots\dots\dots$  [1]

(b) A playground occupies an area of 50 m<sup>2</sup>.

Find its area as represented in the same map in square centimetres.

Answer (b)  $\dots\dots\dots$  cm<sup>2</sup> [2]

### Paper 1 Question 12. Topic: Scale and Map

For Scale and Map questions and more, students are expected to know how to convert between millimetres, centimetres, metres and kilometres.

To answer Q12a, we first write the ratio with what is given, that is 2 cm : 0.18 km. Then convert to the same unit (usually the smaller unit, cm, in this case) then simplify the ratio to 1 : n.

When it comes to area in Scale and Maps, as required in Q12b, students often make

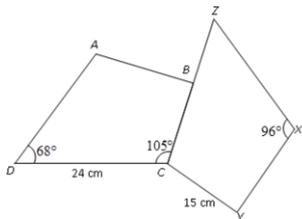
the mistake of using the scale for distance to calculate area. Instead, students should remember that due to similarity,  $\frac{\text{Area}_1}{\text{Area}_2} = \left(\frac{\text{length}_1}{\text{length}_2}\right)^2$ . Hence, we need to first the scale for area by squaring the ratio for length.

i.e.  $(2 \text{ cm})^2 : (0.18 \text{ km})^2$

So scale for area =  $4 \text{ cm}^2 : 0.18^2 \text{ km}^2$ .

Using this scale for area, we can then calculate the required area.

14.



In the diagram, quadrilaterals  $ABCD$  and  $XYZ$  are congruent.

Find

(a)  $\angle BAD$ ,

Answer (a)  $\angle BAD = \dots\dots\dots^\circ$  [1]

(b)  $\angle ABC$ ,

Answer (b)  $\angle ABC = \dots\dots\dots^\circ$  [1]

(c) the length of  $BZ$ .

Answer (c)  $BZ = \dots\dots\dots \text{ cm}$  [1]

### Paper 1 Question 14. Congruency and Similarity

For Congruency and Similarity questions, it is important to remember that the order of the vertices is not trivial. It is also advisable for students to write the names of two congruent or similar figures one on top of the other like this  $\begin{matrix} ABCD \\ XYZ \end{matrix}$ , so that it is easy to see which angles and which sides are corresponding. For example, in Q14a, by looking at the position of the vertices angle  $BAD$ , position 2-1-4 in the name of the first figure, is corresponding to angle  $YXZ$ , also position 2-1-4 in the name of the second figure.

6 (a) Make  $r$  the subject of the formula  $V = \frac{4}{3}\pi r^3$ . [2]

(b) Solve the following simultaneous equations.

$$\begin{aligned} 2x &= 5y + 10 \\ x + 2y &= 23 \end{aligned} \quad [3]$$

### Paper 2 Question 6b. Topic: Algebra, Simultaneous Equations

For Simultaneous Equations and Quadratic Equations, students should learn how to use the equation mode on their calculators to get the answers. Key in the equations at the start and write down the answers before starting on the working for the problem. This will give your working a direction and ensure that you get the correct answers. Do note that if you only write down the answers from your calculators and not the working, you may not get any marks at all as marks for answer are awarded only if you have earned the marks for correct working.

### Moderate Questions

10. (a) Write the following numbers in order of size, starting from the **smallest**.

$$0.74^2, -\frac{7}{4}, -0.\dot{7}4, \sqrt{0.74}$$

Answer (a) ....., ....., ....., ..... [1]

(b) Given that  $243^y = 2187$ , find  $y$ .

Answer (b)  $y = \dots\dots\dots$  [2]

### Paper 1 Question 10b. Topic: Indices

For the topic of Indices, students must be familiar with the Laws of Indices. As with other subtopics in Algebra, practice with immediate feedback is important so I'd suggest using an online Mathematics portal which most schools will subscribe to for drill and practice. If you do not subscribe to a Mathematics portal, there are plenty of free online drills with immediate feedback which you can use.

In Q10b, we see that the unknown,  $y$ , which we need to find, is in the powers, so we

need to express both sides of the equation in index form of the same base, 3 in this case. After that, we can compare the powers to find the value of  $y$ .

19. (a) The  $n$ th term of a sequence is given by  $13 - 4n$ .  
Write down the first 3 terms of the sequence

*Answer (a)* ..... [2]

- (b) The first 4 terms of a different sequence are

5, 12, 19, 26

- (i) Find an expression for the  $n$ th term of this sequence.

*Answer (b)(i)* ..... [1]

- (ii) Find the 14th term.

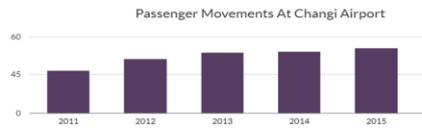
*Answer (b)(ii)* ..... [1]

### Paper 1 Question 19. Topic: Number Patterns.

To find the  $n^{\text{th}}$  term of the number pattern in Q19b, look out for the difference between each term. We then realise that we keep adding a constant, 7 in this case, to get the next term. That is, the pattern is to add the constant, 7,  $n$  times to some number,  $a$ . Hence the formula is  $7n + a$ . To find the value of  $a$ , we equate the formula to the first term,  $7(1) + a = 5$ , and solve for  $a$ .

### Challenging Questions

15. The graph shows yearly passenger movements in Changi Airport, Singapore.



Explain one way in which the graph is misleading.

Answer .....

.....

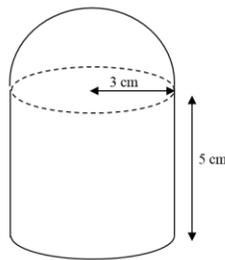
..... [2]

Paper 1 Question 15. Topic: Misleading Statistical Diagrams

In the new syllabus 4045 for Mathematics Syllabus A, students are expected to explain why a given statistical diagram leads to misinterpretation of data. One can get some clues on how to answer questions on misleading Statistical Diagrams by look at the axis-labels and scale of the axes. For diagrams without axes like pictogram and pie chart, perhaps even for dot diagrams, you may like to look at the size of the icons, dots or sectors in relation to the value they represent.

Also, the construction of statistical charts is no longer required. Yes! So do not spend time perfecting skills on how to draw the charts. Instead, students should focus on interpretation of data and be familiar with the purposes and uses, advantages and disadvantages of the different forms of statistical representations.

10 The diagram below shows Chinese stone seal which is shaped like a cylinder, 5 cm in height, with a hemispherical top of radius 3 cm.



- (a) Calculate the total surface area of the seal excluding its base. Leave your answer in terms of  $\pi$ . [2]
- (b) Express the volume of the seal in terms of  $\pi$ . [3]
- (c) The seal must not have a mass greater than 650 grams

Three types of stone are available  
The table shows these stones and their densities.

Stone	Agate	Shoushan	Jade
Density ( $\text{g}/\text{cm}^3$ )	2.64	3.34	3.25

Which of these stone(s) could be used to make the seal?  
Show your working. [2]

Paper 2 Question 10. Topic: Applying mathematics to a real-world scenario

The last question of Paper 2 Section A, 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 link all information given by looking at their units. For example, to answer Q10c, we need to know that we are comparing mass (grams), and we have the volume ( $\text{cm}^3$ ) from part (b), so we should calculate mass based on the given densities ( $\text{g}/\text{cm}^3$ ).

## **Preparation for exam day**

### **1. Practice makes Perfect**

To do well for Mathematics, we not only need to practise, but we need to get feedback to ensure that what we practise is correct. Hence, it is important to check your answers against the solutions and correct your mistakes.

During daily practice, many N level students prefer working on Paper 1 over Paper 2. This is strongly discouraged as each mark in Paper 2 actually carries a higher weightage (0.833%) than each mark in Paper 1 (0.625%) in the entire Mathematics Syllabus A Examination. Students should practise Paper 2, get their teachers to mark and grade their work and work on the feedback given.

### **2. 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.

### **3. Bring your Mathematical Instruments**

Pack your pencil case the day before the examination, making sure that you have the following:

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

### **4. 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.

5. Paper Management for Paper 2

You should begin answering each question on a new page for Paper 2 so that you do not have to worry about how much space to leave if you need to skip certain parts of the question and yet have ample space when you come back later.

With that, all the best to all candidates sitting for the new syllabus O Level Elementary Mathematics Examinations.