

# Exam Strategies

## A. Exam Format

### Paper 1 (Conventional questions)

Duration: 2 hours; Percentage: 60%

Section	Marks	Number of questions	Other details
A(1)	33	8 – 10	Compulsory short elementary questions from the foundation part of the syllabus.
A(2)	33	4 – 5	Compulsory harder questions from the foundation part of the syllabus.
B	33	3 out of 4	Structural questions from the whole syllabus.

### Paper 2 (Multiple-choice questions with 4 options)

Duration: 1 hour 30 minutes; Percentage: 40%

Section	Number of questions	Other details
A	36	Questions from the foundation part of the syllabus.
B	18	Question from the whole syllabus.

## B. More about the Exam

In paper 1, the questions in section A(1) are easy and simple. They are usually extracted from the junior forms mathematics and most candidates can handle this part. For section A(2), each question is usually divided into several parts and they are inter-related. The candidates are required to make use of the results in the earlier parts of a question to finish the latter parts. For section B, the questions are harder and each question may require knowledge in more than one topics.

In paper 2, the questions in section A is easier than those in section B.

## C. Marking Scheme

Marks will be awarded in the following conditions:

“A” marks: Awarded for the accuracy of the answer. However, if the correct answer is deduced from previous erroneous answers or from an incorrect method, no marks will be given.

“M” marks: Awarded for correct methods being used, no matter the answer is correct or not.

Other marks: Awarded for correctly completing a proof or arriving at an answer given in a question.

provided, it is better to circle the answers in the question paper so that the answers can be rechecked in the last few minutes. For those questions require more time, candidates should write the answers randomly on the answer book and go on to the next one. When there is time remaining, candidates can go back to those questions. In the last minute, candidates should randomly write the answers on the answer sheet for those have not finished.

### 3. Non-foundation part of the syllabus

For those candidates who want to concentrate on foundation part of the syllabus, they should notice that the following topics are not in foundation part of the syllabus.

Related topic	Details
1. Polynomials	Factorization of $a^3 \pm b^3$ .
	Remainder theorem, division algorithm and factorization of polynomials up to degree 3.
2. Sequence	Arithmetic and geometric sequences.
3. Equations	To reduce and solve equations that can be transformed to quadratic equations.
	Solving a pair of simultaneous linear and quadratic equations.
4. Functions and graphs	Method of completing the square and transformations of functions.
5. Linear inequalities	Compound linear inequalities connected by “and”. Solve system of linear inequalities.
6. Exponential and logarithmic functions	Simplify expressions with rational indices. Solve linear programming problems. Manipulation of surd, including rationalization of surd. Conversion between simple binary/hexadecimal numbers to decimal number. Exponential and logarithmic functions.
7. Geometry	Intercept theorem, mid-point theorem, triangle inequality, in-centre, circumcentre, orthocentre and centroid.
8. Quadrilaterals	Proof related to quadrilaterals.
9. Circle	All properties related to circle.
10. Coordinates geometry	Section formula, equation of a circle. Coordinates of centre and the length of radius.
11. Trigonometry	Sine, cosine and tan functions in the interval $90^\circ$ to $360^\circ$ and their graphs. Simplify expressions involving $180^\circ \pm A$ and $360^\circ - A$ . Solve trigonometric equations in the interval $0^\circ$ to $360^\circ$ . The formula $\frac{1}{2}ab \sin C$ , Heron’s formula, sine and cosine formulas. Angle between two intersecting lines, angle between a line and a plane and angle between two intersecting planes. Three-dimensional problems.
12. Probability	Addition law and multiplication law of probability and conditional probability.
13. Statistics	Abuses of Statistics. Sampling and data collecting method. Analysis and interpretation on the data.

18.  $V$  is the top of a hill with height  $h$  m where  $A$  is vertically below  $V$ .  $A$ ,  $B$  and  $C$  are points on the same horizontal plane. The angles of elevation of  $V$  from  $B$  and  $C$  are  $45^\circ$  and  $30^\circ$  respectively.  $B$  and  $C$  are 500 m apart.

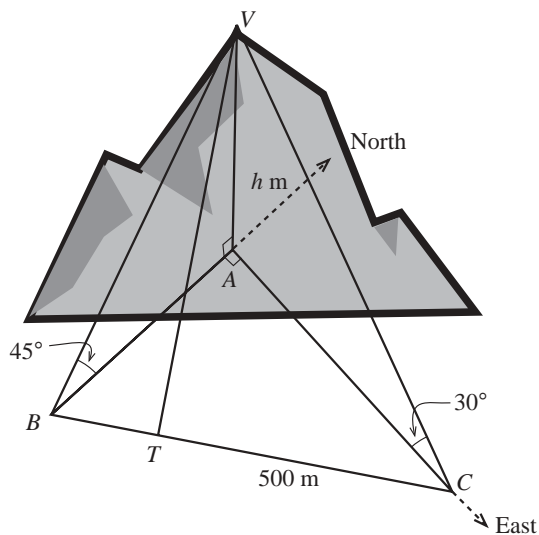


Figure 13

- (a) Find the value of  $h$ . (3 marks)
- (b) Find the bearing of  $C$  from  $B$ . (2 marks)
- (c) A traffic light  $T$  is on the road  $BC$ . The angle of elevation  $\theta$  of  $V$  from  $T$  is maximum. Find the value of  $\theta$ . (2 marks)
- (d) A person moves from  $B$  to  $T$  at a speed of 5 km/h. And then he moves from  $T$  to  $V$  at a speed of 2 km/h immediately. Find the average speed of this person moving from  $B$  to  $V$  via  $T$ . (4 marks)

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17. Several students want to conduct a survey about the reading habit of different forms. The following shows the questionnaire they designed.

**Questionnaire**

Topic: The habit of reading newspaper in Heng To School

Question 1: How much time do you usually spend on reading newspaper each day?

A. Nil (Finish the survey)  
 B. 1 – 30 minutes  
 C. 31 – 60 minutes  
 D. 61 – 90 minutes  
 E. 91 minutes or more

Question 2: Which newspaper do you read usually?

\_\_\_\_\_

Figure 9

- (a) Suggest a way to conduct this survey. (1 mark)
- (b) (i) Do you think simple random sampling is the most suitable sampling method for this survey? If not, what method would you suggest? Explain your answer.  
 (ii) According to the result in (b) (i), what additional question should be asked in the above questionnaire? (4 marks)
- (c) Table 3(a) shows the time spent on reading newspaper (in minutes) of 20 students.

1 – 30	31 – 60	31 – 60	1 – 30
1 – 30	31 – 60	61 – 90	31 – 60
31 – 60	61 – 90	61 – 90	31 – 60
61 – 90	31 – 60	1 – 30	31 – 60
1 – 30	1 – 30	61 – 90	31 – 60

Table 3(a)

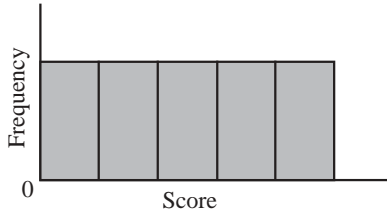
Complete the frequency distribution table.

Time (minutes)	Tally	Frequency
1 – 30		
31 – 60		
61 – 90		
91 or more		

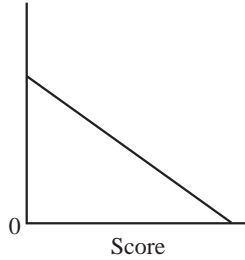
Table 3(b)

(2 marks)

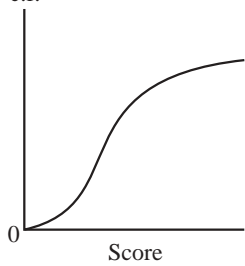
35. The figure is the histogram of the distribution of scores. Which of the following can be the frequency curve of this distribution?



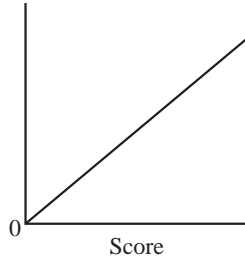
A. c.f.



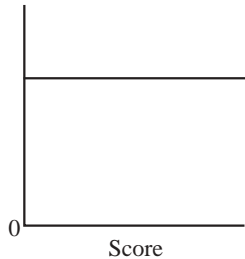
B. c.f.



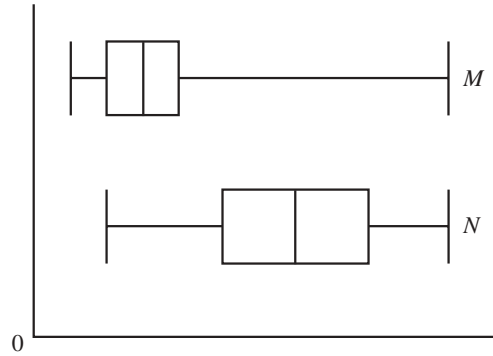
C. c.f.



D. c.f.



36. The box-and-whisker diagrams show the body temperatures of two groups of people  $M$  and  $N$ . Which of the following must be true?



- I. inter-quartile range of  $M <$  inter-quartile range of  $N$
- II. median of  $M <$  median of  $N$
- III. maximum body temperature of  $M =$  maximum body temperature of  $N$

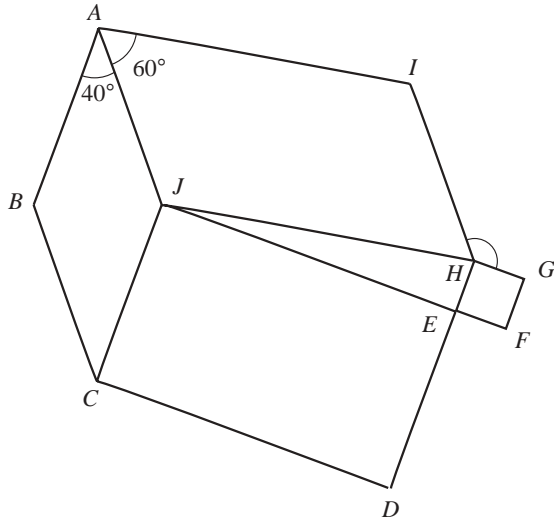
- A. I and II only
- B. I and III only
- C. II and III only
- D. I, II and III

### Section B

37. If  $3^{x-1} + 3^{x-2} = 36$ , then  $x =$

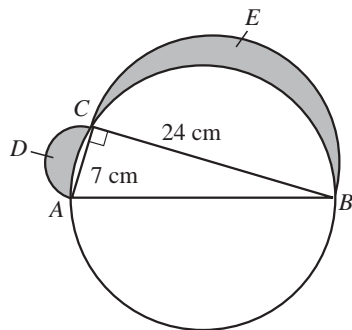
- A. 3.
- B. 4.
- C. 5.
- D. 6.

47. In the figure,  $ABCJ$ ,  $CDEJ$ ,  $EFGH$ ,  $AIHJ$  and  $EHJ$  are rhombus, rectangle, square, parallelogram and isosceles triangle respectively.  $\angle BAJ = 40^\circ$  and  $\angle JAI = 60^\circ$ . Find  $\angle GHI$ .



- A.  $95^\circ$   
 B.  $120^\circ$   
 C.  $125^\circ$   
 D.  $140^\circ$

48. The figure shows 2 semicircles  $ADC$  and  $CEB$  with  $AC$  and  $CB$  as their diameters respectively.  $AB$  is the diameter of the largest circle.  $AC = 7$  cm and  $CB = 24$  cm. Find the perimeter of the shaded region.

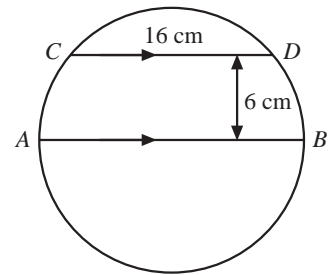


- A.  $14\pi$  cm  
 B.  $28\pi$  cm  
 C.  $156.25\pi$  cm  
 D.  $240.25\pi$  cm

49. A fair die is rolled twice. Let event  $E$  be the product of the two numbers that are multiples of 2 and event  $F$  be the sum of the two numbers that are multiple of 3. Find the probability that event  $E$  occurs given event  $F$  occurred.

- A.  $\frac{1}{4}$   
 B.  $\frac{3}{10}$   
 C.  $\frac{1}{3}$   
 D.  $\frac{3}{4}$

50. In the figure,  $AB$  is a diameter of the circle.  $AB \parallel CD$ . The perpendicular distance between  $AB$  and  $CD$  is 6 cm and  $CD = 16$  cm. Find the diameter of the circle.




- A. 10 cm  
 B. 15 cm  
 C. 20 cm  
 D. 25 cm

51. A point  $P$  is moving along a path that passing through point  $X$  and is equidistant from two lines  $XY$  and  $XZ$ . The locus of  $P$  is

- A. a line parallel to  $YZ$ .  
 B. the altitude of  $\triangle XYZ$ .  
 C. the angle bisector of  $\angle YXZ$ .  
 D. the median of  $\triangle XYZ$ .

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**Mock Exam 8**

1.  $\tan a^\circ = \frac{\cos 30^\circ}{\cos 60^\circ}$   
 $\tan a^\circ = \frac{\sqrt{3}}{\frac{1}{2}}$  1A  
 $\tan a^\circ = \sqrt{3}$  1A  
 $a = \underline{60}$  1A  
 (3)

 **Reminder**

We may also apply  $\cos \theta = \sin(90^\circ - \theta)$  for  $\cos 30^\circ$ . As a result, we have  $\tan a^\circ = \tan 60^\circ$ .

2.  $\frac{a^{-2}b^3}{a^2b} = a^{-4}b^2$  1A + 1A  
 $= \frac{b^2}{a^4}$  1A  
 (3)

 **Reminder**

The answer should be expressed with positive indices.

3. (a)  $pqr + pqs = \underline{pq(r + s)}$  1A  
 (b)  $ax + ay - bx - by$   
 $= a(x + y) - b(x + y)$   
 $= \underline{(x + y)(a - b)}$  1A  
 (c)  $x^2 - (y + z)^2$   
 $= [x + (y + z)][x - (y + z)]$   
 $= \underline{(x + y + z)(x - y - z)}$  1A  
 (3)

4. (a)

		First Die					
		1	2	3	4	5	6
Second Die	1	✓	✓		✓		✓
	2	✓		✓		✓	
	3		✓		✓		
	4	✓		✓			
	5		✓				✓
	6	✓				✓	

2A

 **Reminder**

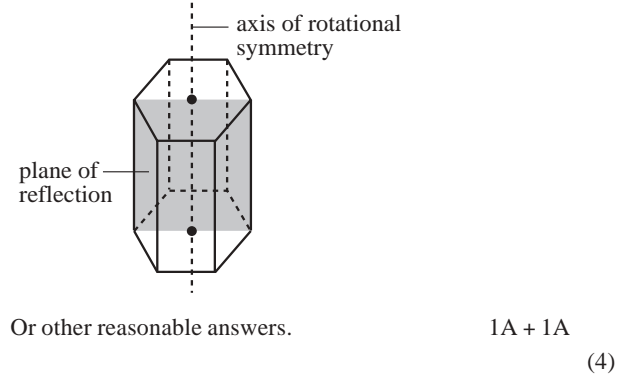
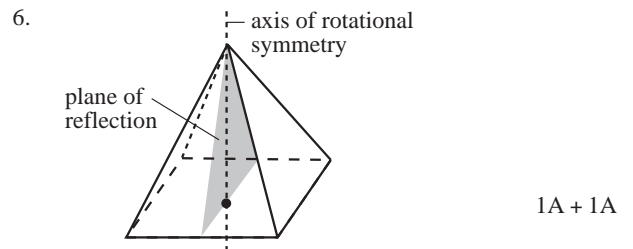
From 1 to 12, the prime numbers are 2, 3, 5, 7 and 11.

(b)  $P(\text{sum of two numbers is a prime})$   
 $= \frac{15}{36}$   
 $= \frac{5}{12}$  1A  
 (3)

5.

Daily Expenses (\$)	10 – 19	20 – 29	30 – 39	40 – 49	50 – 59
Class mark (\$)	14.5	24.5	34.5	44.5	54.5
Frequency	18	10	3	4	5

(a) Mean =  $\frac{14.5 \times 18 + 24.5 \times 10 + 34.5 \times 3 + 44.5 \times 4 + 54.5 \times 5}{18 + 10 + 3 + 4 + 5}$  1M  
 $= \underline{\$26.5}$  1A  
 (b) Modal class = \$10 – \$19 1A  
 (c) By calculator,  
 standard deviation = \$14.2 (correct to 3 significant figures) 1A  
 (4)




$$\begin{aligned}
 7. \quad y &= \frac{x-1}{x+1} && 1A \\
 y(x+1) &= x-1 && 1A \\
 xy+y &= x-1 && 1A \\
 y+1 &= x-xy && 1A \\
 y+1 &= x(1-y) && 1A \\
 x &= \frac{y+1}{1-y} && 1A
 \end{aligned}$$

(4)

8. (a) Coordinates of  $D$

$$\begin{aligned}
 &= \left( \frac{0+4}{2}, \frac{2+4}{2} \right) \\
 &= \underline{(2, 3)} && 1A
 \end{aligned}$$

(b)  **Thinking Process**

Since  $C$  is a point on the  $x$ -axis, its  $y$ -coordinate must be 0. Set up an equation by using the fact that  $AB$  is perpendicular to  $CD$ .

$$\begin{aligned}
 \text{Slope of } AB &= \frac{4-2}{4-0} \\
 &= \frac{1}{2} \\
 \text{Let } (x, 0) &\text{ be the coordinates of } C. \\
 \text{Slope of } CD &= \frac{0-3}{x-2} \\
 &= \frac{-3}{x-2} \\
 \therefore AB \perp CD & \\
 \therefore \left( \frac{1}{2} \right) \left( \frac{-3}{x-2} \right) &= -1 && 1M \\
 -3 &= -2(x-2) \\
 -3 &= -2x+4 \\
 2x &= 7 \\
 x &= \frac{7}{2} \\
 \therefore \text{Coordinates of } C &\text{ are } \left( \frac{7}{2}, 0 \right). && 1A
 \end{aligned}$$


(4)

 **Reminder**

Since  $AB \perp CD$ , the product of their slopes is  $-1$ .

9. (a)  $2\pi(5)\left(\frac{\angle AOB}{360^\circ}\right) = \frac{25}{6}\pi$  1A


$$\begin{aligned}
 10\pi\left(\frac{\angle AOB}{360^\circ}\right) &= \frac{25}{6}\pi \\
 \frac{\angle AOB}{360^\circ} &= \frac{5}{12} \\
 \angle AOB &= \underline{150^\circ} && 1A
 \end{aligned}$$

(b)  **Thinking Process**

Use the fact that the perimeter of the sector is the same as the circumference of the circle.

$$\begin{aligned}
 \text{Circumference} &= \frac{25}{6}\pi + 2 \times 5 \\
 &= \left( \frac{25}{6}\pi + 10 \right) \text{ cm} && 1A \\
 \text{Radius of the circle} &= \frac{\frac{25}{6}\pi + 10}{2\pi} \\
 &= \underline{3.67 \text{ cm}} \text{ (correct to 3 significant figures)} && 1A
 \end{aligned}$$

(5)

10. (a)  **Thinking Process**

Find the height of the smaller cone by applying the properties of similar triangles.

