Candidate Name	Form Class	Index Number

ANG MO KIO SECONDARY SCHOOL
PRELIMINARY EXAMINATION 2023
SECONDARY FOUR NORMAL ACADEMIC

MATHEMATICS SYLLABUS A **4045/01**
Paper 1 **02 August 2023**
2 hours

Candidates answer on the Question Paper.

READ THESE INSTRUCTIONS FIRST

Write your class, index number and name on all the work you hand in.
Write in dark blue or black pen.
You may use an HB pencil for any diagrams or graphs.
Do not use staples, paper clips, glue or correction fluid.

Answer **all** questions.
The number of marks is given in brackets [ ] at the end of each question or part question.

If working is needed for any question it must be shown with the answer.
Omission of essential working will result in loss of marks.
The total of the marks for this paper is 70.

The use of an approved scientific calculator is expected, where appropriate.
If the degree of accuracy is not specified in the question, and if the answer is not exact, give the answer to three significant figures. Give answers in degrees to one decimal place.
For π, use either your calculator value or 3.142.

For Examiner's Use
70

This document consists of **16** printed pages.

Mathematical Formulae

Compound interest

$$\text{Total amount} = P\left(1+\frac{r}{100}\right)^n$$

Mensuration

Curve surface area of a cone = πrl

Surface area of a sphere = $4\pi r^2$

$$\text{Volume of a cone} = \frac{1}{3}\pi r^2 h$$

$$\text{Volume of a sphere} = \frac{4}{3}\pi r^3$$

$$\text{Area of triangle } ABC = \frac{1}{2}ab\sin C$$

Arc length = $r\theta$, where θ is in radians

$$\text{Sector Area} = \frac{1}{2}r^2\theta, \text{ where } \theta \text{ is in radians}$$

Trigonometry

$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

$$a^2 = b^2 + c^2 - 2bc\cos A$$

Statistics

$$\text{Mean} = \frac{\sum fx}{\sum f}$$

$$\text{Standard deviation} = \sqrt{\frac{\sum fx^2}{\sum f} - \left(\frac{\sum fx}{\sum f}\right)^2}$$

1 Write these numbers in order of size, starting with the largest.

$$73\% \qquad \frac{3}{7} \qquad \frac{\sqrt{3}}{2} \qquad \frac{\pi}{3} \qquad 0.63$$

Answer ....., ..., ..., ..., ... [2]
largest

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2 Calculate $\dfrac{309.6^3}{18.57 - 6.43}$.

(a) Write your answer correct to 4 significant figures.

Answer ..... [1]

(b) Write your answer to **part (a)** in standard form.

Answer ..... [1]

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3 The result obtained from an experiment was 9.5036 m/s.
How many significant figures did a student correct the result to if he reported it as 9.50 m/s?

Answer ..... [1]

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4 $\dfrac{p}{x^2-25}+\dfrac{q}{x+5}=\dfrac{7x-33}{x^2-25}$

Find p and q.

Answer $p =$ .....

$q =$ ..... [3]

---

5 $x^2+10x-5=(x+a)^2+b$

(a) Find a and b.

Answer $a =$ .....

$b =$ ..... [2]

(b) Hence solve $x^2+10x-5=0$, give your answer correct to 2 decimal places.

Answer $x =$ ..... or ..... [2]

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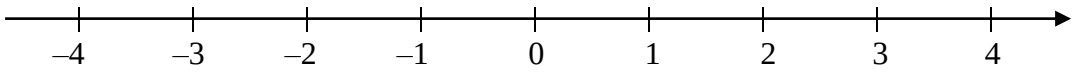
6 **(a)** Represent $-3 \leq x < 4$ on the number line.



[1]

(b) Find the smallest integer value of y satisfying $-3y + 1 < 15$.

Answer ..... [2]

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7 The quantities x and y are in the ratio $9 : 4$.
The quantities y and z are in the ratio $12 : 7$

Write down the ratio $x : y : z$ in its simplest form.

Answer ..... : ..... : ..... [2]

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8 **(a)** Find the lowest common multiple (LCM) of 168 and 540.

Answer ..... [2]

(b) Find the smallest positive integer value of a such that $540a$ is a perfect cube.

Answer $a =$ ..... [1]

---

9 y is inversely proportional to the cube of x.

Given that $y = 3$ when $x = 2$, find y when $x = 4$.

Answer $y =$ ..... [2]

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10 The first five terms of a sequence are 1, – 4 , – 9, – 14, – 19.

(a) Write down the next two terms of the sequence.

Answer ..... , ... [1]

(b) Find an expression, in terms of n , for the nth term of the sequence.

Answer ..... [1]

(c) Is – 110 a term of this sequence? Explain you answer.

Answer .....

..... [1]

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11 The stem-and-leaf diagram shows the score of students for the examination.

4	0	0	1			
5	1	2	2	2	3	
6	2	2	4	6		
7	1	4				
8	0	3	3	8	9	9

Key		
2	1	represents 21 marks

(a) What is the highest score?

Answer ..... [1]

(b) Find the median score.

Answer ..... [1]

(c) Find the modal score.

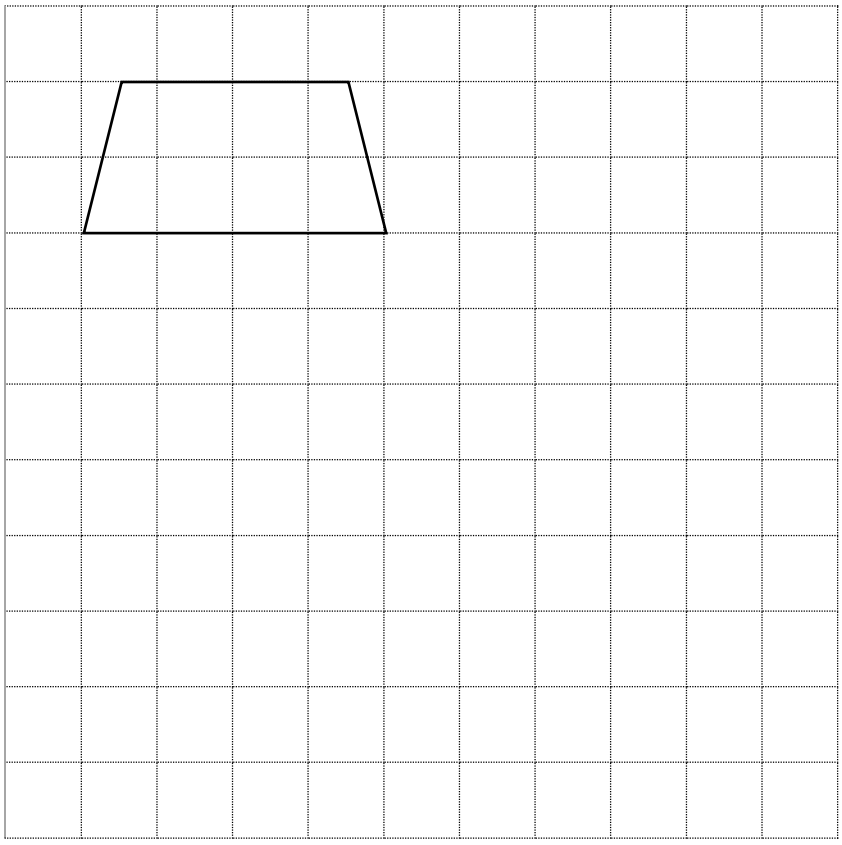
Answer ..... [1]

(d) Student *A* told his friends that 35% of the students failed the examination.
Given that the passing mark was 53, is Student *A*'s statement correct?
Give a reason for your answer.

Answer .....

..... [1]

12 In the grid below, draw an enlargement of the given figure using a scale factor of 2. [2]



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13 $u = \sqrt{v^2 - 2t}$

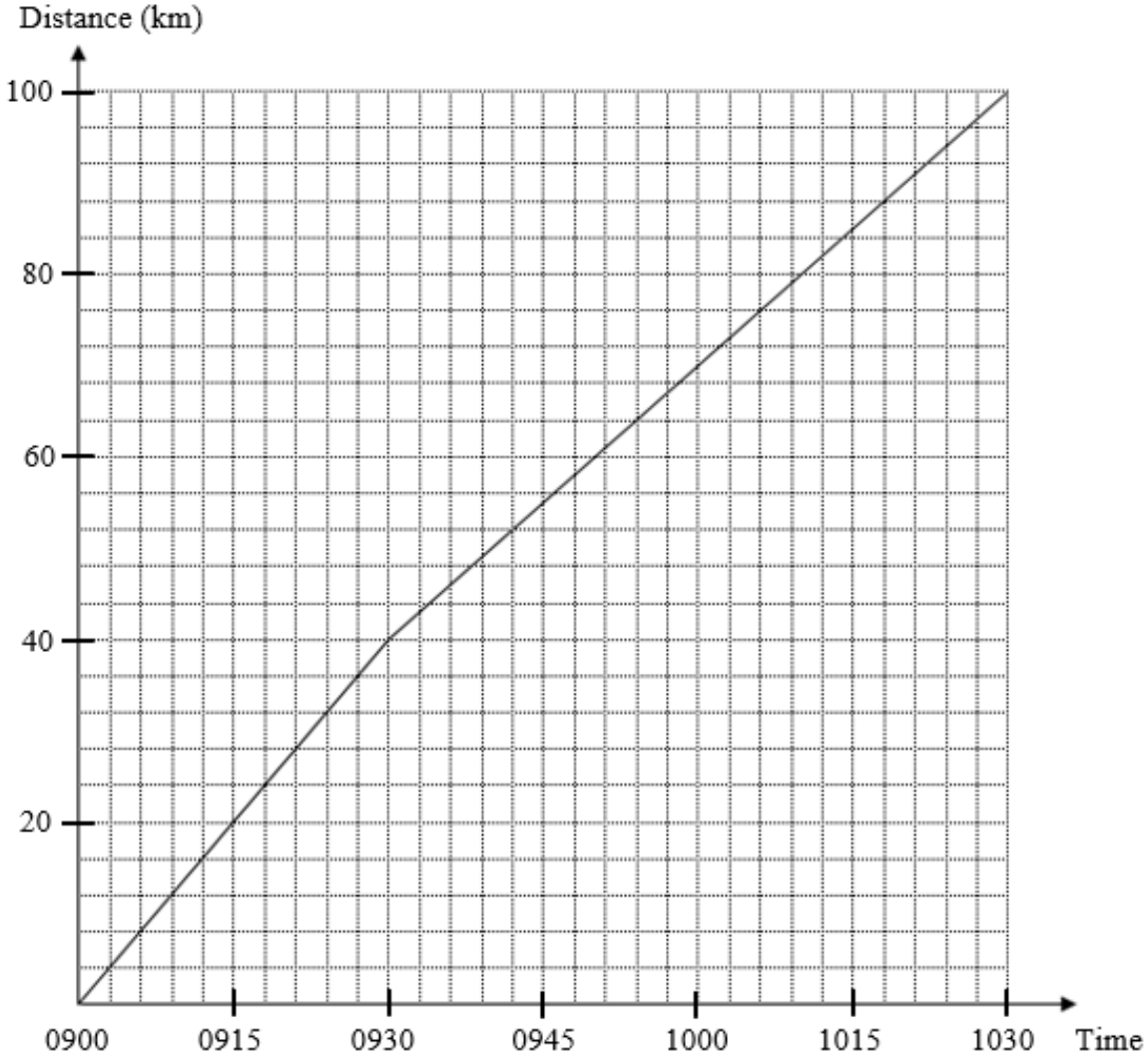
(a) Find the value of u when $v = 4$ and $t = -10$.

Answer $u =$ ..... [1]

(b) Rearrange the formula to make t the subject.

Answer $t =$ ..... [2]

14 The diagram shows the distance-time graph of a vehicle.



(a) How far did the vehicle travel for the first half an hour?

Answer ..... km [1]

(b) At what interval did the vehicle move at a slower average speed? Explain your answer.

Answer .....

..... [1]

(c) Calculate the average speed of its whole journey.

Answer ..... km/h [2]

15 Regina did a survey and recorded the following information.

Type of food ordered via delivery platform	**% of participants in survey**
Hawker Food	48%
Restaurant	8%
Fast Food	35%
Others	9%

(a) Explain why is it not possible to calculate the number of participants who ordered food from restaurant.

Answer .....

..... [1]

(b) Find the angle of the sector representing the participants who ordered fast food if she wants to present her results in a pie chart.

Answer ..... [2]

16 **(a)** Mrs Tan exchanges 500 dollars ($) for 53 250 Japanese Yen (JPY).
Complete the exchange rate.

Answer $1 = ... JPY [1]

(b) $1 AUD = $0.90
$1 = €0.68

A wallet costs $1080 AUD in Australia.
An identical wallet costs €620 in Spain.

Mr Tan has an Australian friend and a Spanish friend visiting him this month.

Mr Tan thinks that it is cheaper to ask his Spanish friend to buy the wallet.
Do you agree? Explain your answer.

Answer

[3]

17 One of the angles of a triangle measures $x°$.
Given that $\sin x = 0.723$, find the two possible values of $x°$.

Answer $x =$ ..... or ..... [2]

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18 **(a)** Simplify $\frac{3xy^3}{10} \div \left(\frac{-2y}{5x}\right)^2$.

Answer ..... [2]

(b) Expand and simplify $-2(3x+7)^2$.

Answer ..... [2]

(c) Factorise $2x^2 - 5x - 12$.

Answer ..... [1]

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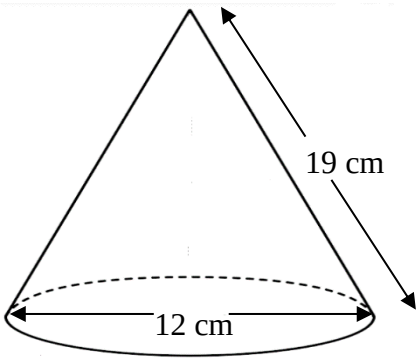
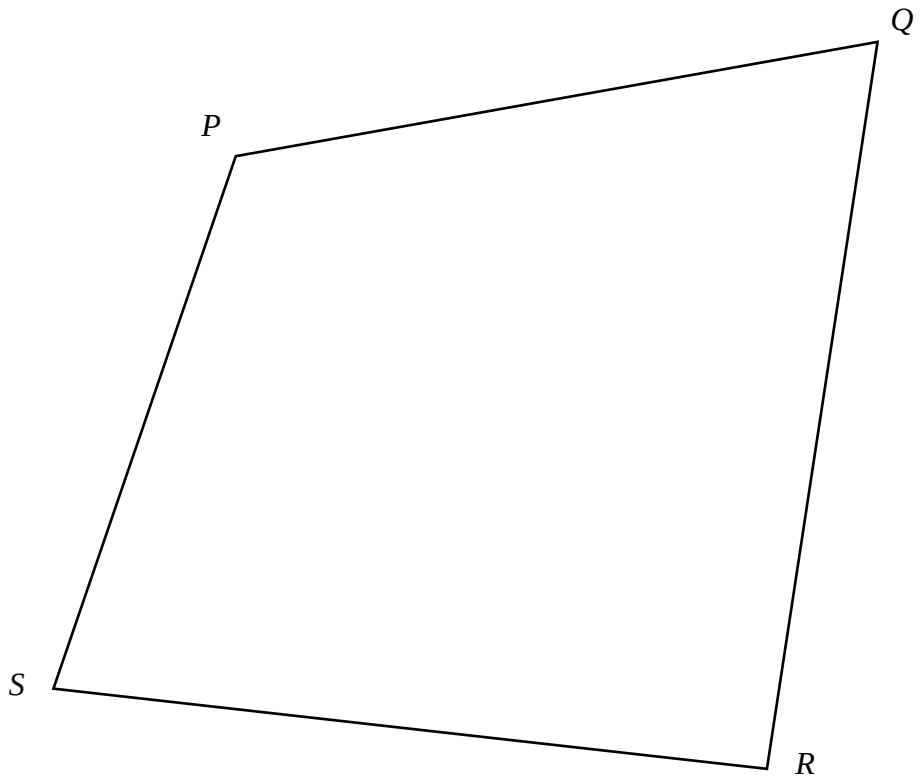
19 A solid cone has a circular base of diameter 12 cm and a slant height of 19 cm.
Calculate its total surface area.



Answer ..... cm^2 [3]

20 X is the intersection of the angle bisector of angle QRS and the perpendicular bisector of PS.

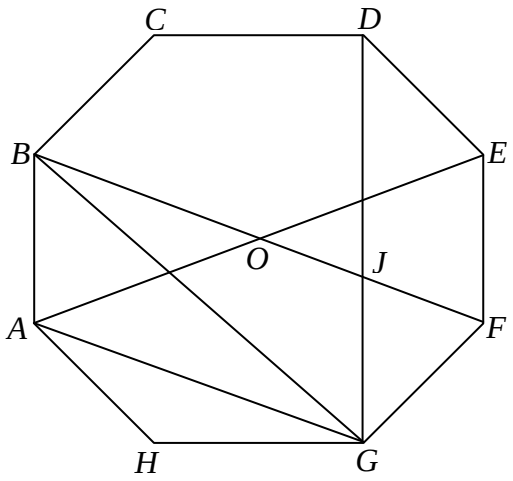


(a) By using constructions, find and label X. [3]

(b) Measure the shortest possible distance of X from a vertex.

Answer ..... cm [1]

21 The diagram shows a regular octagon *ABCDEFGH*. The line *DG* cuts the line *BF* at *J*.



(a) Find

(i) angle *BCD*,

Answer Angle *BCD* = ... [2]

(ii) angle *BOA*,

Answer Angle *BOA* = ... [2]

(iii) angle *BAG*.

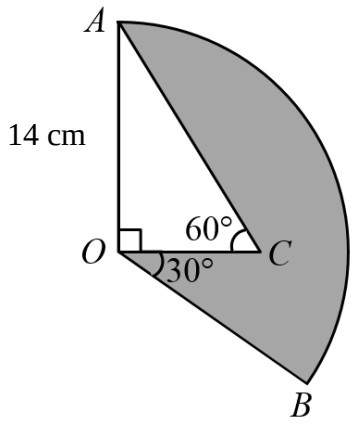
Answer Angle *BAG* = ... [2]

(b) Write down the name of the special quadrilateral *BAGJ*.

Answer ..... [1]

22 *AOB* is a sector of a circle, centre *O*, of radius 14 cm.
AOC is a right-angled triangle. Angle *ACO* = 60° and angle *BOC* = 30°.

Find the area of the shaded region.



Answer ..... cm^2 [4]

END OF PAPER