CREST SECONDARY SCHOOL
SECONDARY FOUR
PRELIMINARY EXAMINATION

NA

Name: _____ ( ) Class: _____

MATHEMATICS (SYLLABUS A) 4045/01

Paper 1 **Wednesday 14 August 2024**

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** the 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 in the space below the question.
Omission of essential working will result in loss of marks.
The total number of 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 **15** printed pages and **1** blank page.

Setter: Ms Liew Jia Meng

[Turn over

Mathematical Formulae

Compound Interest

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

Measurement

Curved surface area of a cone = πrl

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

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

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

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

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

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

Trigonometry

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

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

Statistic

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

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

Answer **all** questions.

1 Write 0.002195

(a) correct to 3 significant figures,

Answer ……..…… [1]

(b) in standard form.

Answer ……..…… [1]

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2 Given that $2^5 \times 32 = 2^x$, find *x*.

Answer *x* = ….…… [2]

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3 Find the largest integer *y* satisfying $-3y > 15$.

Answer *y* = ….…… [2]

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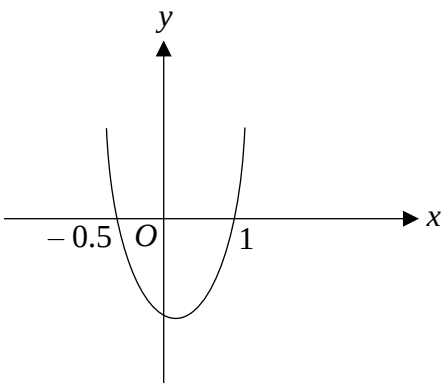
4 The diagram shows the sketch of $y = ax^2 + bx + c$.



(a) State the value of a.

Answer a = …… [1]

(b) Write down the equation of the line of symmetry.

Answer …… [1]

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5 In a sale, the price of a 10 kg sack of rice is reduced from \$35.90 to \$29.90.
Calculate the percentage decrease.

Answer …… % [2]

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6 Find the length of the straight line joining (0, 6) and (4, – 2).

Answer …… units [2]

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7 **(a)** Express 3780 in index notation.

Answer …… [1]

(b) Hence, find the smallest value of m such that $3780m$ is a perfect cube.

Answer …… [1]

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8 Three trains leave the depot every 3, 5 and 9 minutes respectively.
Given that the three trains left the depot at 07 30 at the same time, find the next time that they will leave the depot together again.

Answer …… [2]

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9 Solve these simultaneous equations.

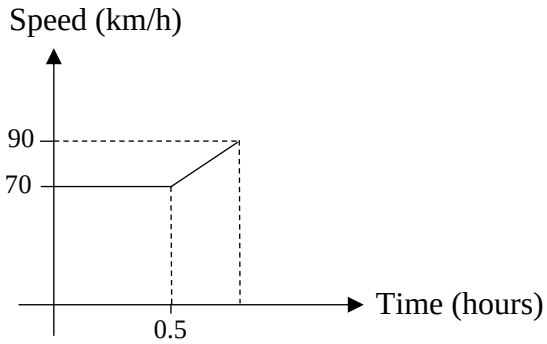
$$5x - 2y = 19$$
$$x + 3y = -3$$

Show your working.

Answer $x =$ ……

$y =$ …… [3]

10



The diagram shows the speed-time graph of a car for part of a journey. It moves at a constant speed of 70 km/h for a duration of 0.5 hour before accelerating to 90 km/h in the next t hours.

Give that the distance travelled is 51 km, find the total time taken for this part of the journey.

Answer …… hours [3]

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11 A map is drawn to a scale of 1 : 35 000.

(a) Two schools are 20 cm apart on the map.
Find the actual distance between the two schools, in kilometres.

Answer ……..…… km [1]

(b) A town has an area of 2.1 km^2.
Find the area of the town on the map.

Answer ……..…… cm^2 [2]

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12 Solve $\frac{7-5x}{3-2x} = x+1$.

Answer x = ….…… [3]

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13 In a science experiment, the growth rate R of a bacteria is inversely proportional to the square of the concentration of nutrient C.

(a) Given that $R = 10$ units when $C = 0.5$ units, write a formula for R in terms of C.

Answer $R =$ …… [2]

(b) Find C when $R = 40$.

Answer $C =$ …… [1]

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14 Elliot invested a sum of money in a bank that paid compound interest at 6% per annum. At the end of 2 years, he had a total of $1685.40.

What was his initial sum of investment?

Answer $ …… [3]

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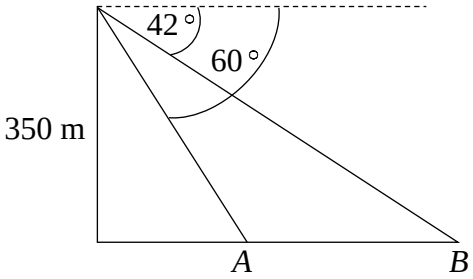
15 From the top of a cliff standing at 350 m high, Ted observes two boats, *A* and *B* whose angles of depression are 60° and 42° respectively.



Find the distance between the two boats.

Answer …… m [3]

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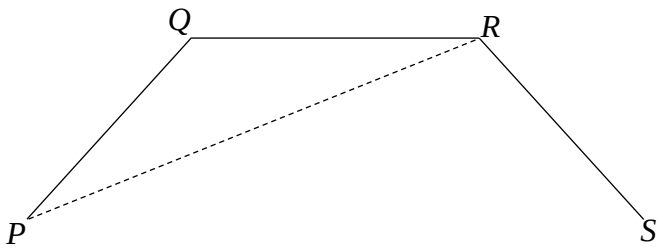
16 The diagram shows part of an 8-sided regular polygon.



Calculate

(a) angle PQR,

Answer …… [1]

(b) angle QPR,

Answer …… [1]

(c) the exterior angle of the polygon.

Answer …… [1]

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17 The ages of the members in a country club, in years, are shown in the stem-and-leaf diagram below.

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

Key: 2 | 1 represents 21 years old

(a) How many members are there?

Answer …… [1]

(b) Calculate the percentage of the members who are at least 50 years old.

Answer …… % [1]

(c) In the club, members who are under the age of 40 are categorised under the Junior membership.

Find the probability of members who are not under the Junior membership.

Answer …… [1]

18 Jen exchanges 750 dollars ($) for 89 250 Japanese Yen (¥).

(a) Complete the exchange rate.

Answer $1 = ……. ¥ [1]

(b) A luggage costs $349 in Singapore.
An identical luggage costs 33 201 ¥ in Japan.

Jen says that it is cheaper to buy the luggage in Singapore.
Do you agree? Explain your answer.

Answer ……

…… [3]

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19 A box contains apples, pears and oranges.
The ratio of apples to pears is 5 : 4.
The ratio of pears to oranges is 6 : 1.

(a) Find the ratio of apples to pears to oranges. Give your answer in its simplest form.

Answer …… : …… : …… [2]

(b) The box contains 6 oranges. Find the total number of fruits.

Answer …… [2]

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20 $x^2 + 4x + 3 = (x + a)^2 + b$

(a) Find the value of a and the value of b.

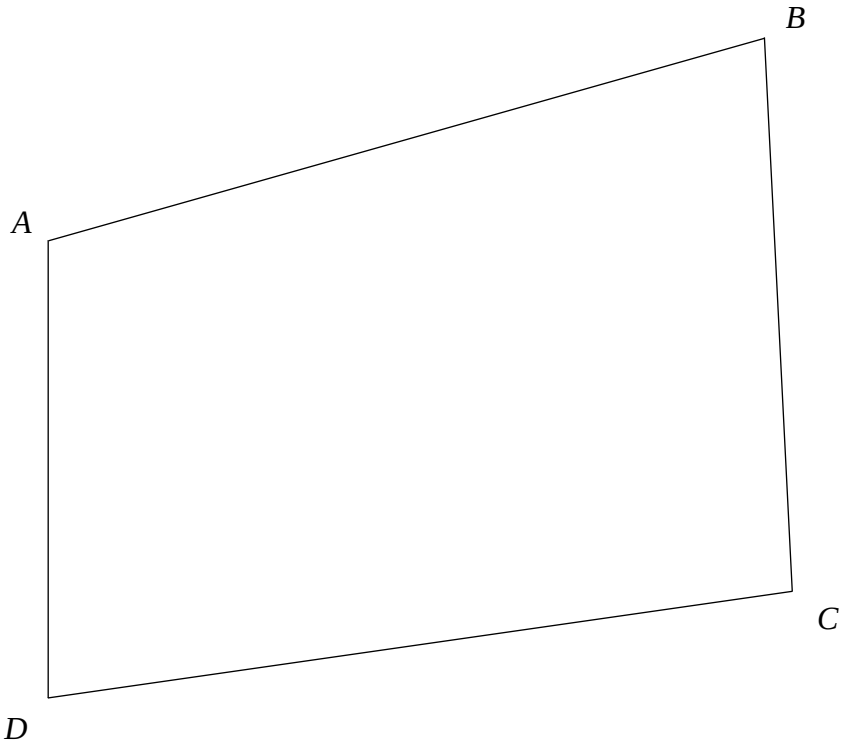
Answer a = ……

b = …… [2]

(b) Hence, solve $x^2 + 4x + 3 = 0$.

Answer x = …… or …… [2]

21 The diagram shows a quadrilateral *ABCD*.



(a) Construct the perpendicular bisector of *AB*. [1]

(b) The point *P* lies on the perpendicular bisector of *AB*. It is also on the bisector of angle *BCD*. Use construction to find this point and label itthank *P*. [2]

(c) Measure angle *APB*.

Answer ..... [1]

22 The table below shows the distance of students' residential places from the school.

Distance (km)	1	2	3	4	5
Frequency	3	10	8	x	4

(a) If the mode is 2, find the largest possible value of x.

Answer $x =$ …… [1]

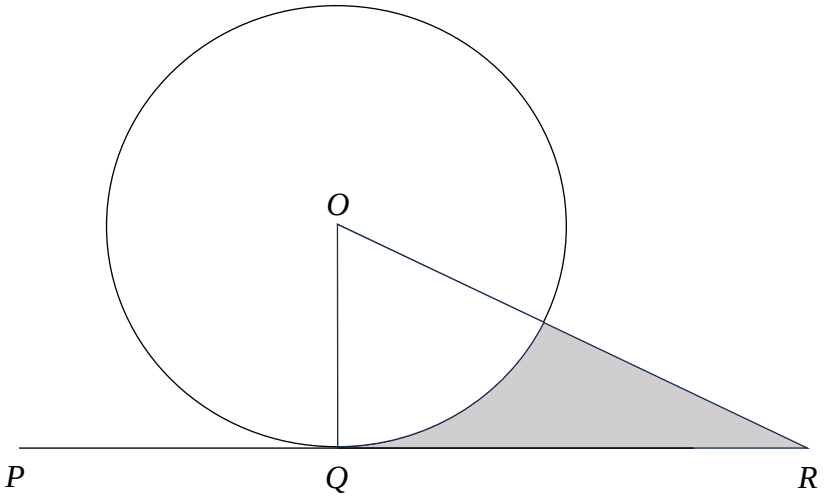
(b) If the median is 3, find the smallest possible value of x.

Answer $x =$ …… [1]

(c) If the mean is 3, find the value of x.

Answer $x =$ …… [2]

23 The radius of a circle, centre *O*, is 5 cm. *PR* is a straight line and is tangent to the circle at point *Q*.



Given than *OR* = 13 cm,

(a) show that angle *QOR* = 1.18 radians. [2]

Answer

(b) Calculate the perimeter of the shaded region.

Answer …… cm [3]

(c) Calculate the area of the shaded region.

Answer …… cm^2 [2]

END OF PAPER

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