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YIO CHU KANG SECONDARY SCHOOL
O-LEVEL PRELIMINARY EXAMINATION 2025
SECONDARY FOUR EXPRESS
SECONDARY FIVE NORMAL (ACADEMIC)



MATHEMATICS
 Paper 1

4052/01
 2 hours 15 minutes

1 September 2025 (Monday)

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.
 DO **NOT** WRITE ON ANY BARCODES.

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 with the answer.
 Omission of essential working will result in loss of marks.
 The total of the marks for this paper is 90.

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. Gives answers in degrees to one decimal place.
 For π , use either your calculator value or 3.142.

For Examiner's Use
90

Mathematical Formulae*Compound interest*

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

Mensuration

$$\text{Curved surface area of a cone} = \pi r l$$

$$\text{Surface area of sphere} = 4\pi r^2$$

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

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

$$\text{Area of } \triangle ABC = \frac{1}{2}bc \sin A$$

$$\text{Arc length} = r\theta, \text{ where } \theta \text{ is in radian}$$

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

Trigonometry

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

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

Statistics

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

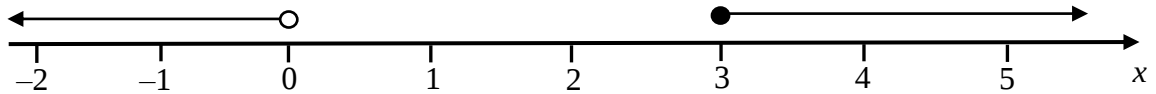
$$\text{Standard deviation} = \sqrt{\frac{\sum fx^2}{\sum f} - \left[\frac{\sum fx}{\sum f}\right]^2}$$

Answer **all** the questions.

- 1 Simplify $5p - 4 - (3 + 2p) + p - 6$.

Answer [2]

2



- (a) Write down the inequalities that represent the numbers indicated on the number line.

Answer [1]

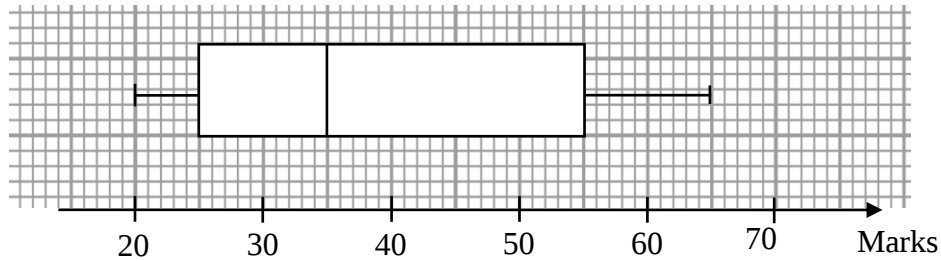
- (b) State the smallest prime number that satisfies the number line shown.

Answer [1]

- 3 Express as a single fraction in its simplest form $\frac{3x-2}{12} - \frac{5x-3}{8} - \frac{7(x+1)}{6}$.

Answer [3]

4



The box-and-whisker plot gives information about the marks of 40 students in a class who sat for a Mathematics examination.

- (a) Use the box-and-whisker plot to find the median mark.

Answer [1]

- (b) Layla says, “There are twice as many students who scored more than 35 marks as those who scored less than 35 marks”.

Is Layla correct?

Give a reason for your answer.

.....

 [1]

5 Factorise.

(a) $24pq^2 + 15pq - 9p^2q$

Answer [1]

(b) $5 + 2a^2bc - 5ac - 2ab$

Answer [2]

- 6** A map of Singapore has a scale of 1 : 125000.
- (a)** The length of the longest river in Singapore, Kallang River, is 10 km.
Calculate the length of Kallang River on the map.

Answer cm [2]

- (b)** The area of Pulau Ubin island on the map is 6.56 cm^2 .
Calculate the area, in square kilometres, of Pulau Ubin island.

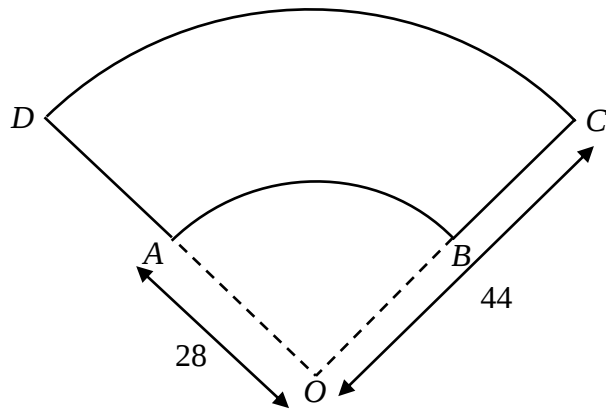
Answer km^2 [2]

- 7** In this sequence, the difference between any two consecutive terms is the same number.

$w \quad x \quad y \quad 23 \quad z \quad \dots$

The sum of the first five terms is 80. Find the values of w , x , y and z .

Answer $w = \dots \quad x = \dots \quad y = \dots \quad z = \dots$ [2]



The diagram shows the coverage of a car windscreen wiper $ABCD$. AB and DC are arcs of circles centre O with radii 28 cm and 44 cm respectively. The perimeter of $ABCD$ is $72\pi - 76$ cm.

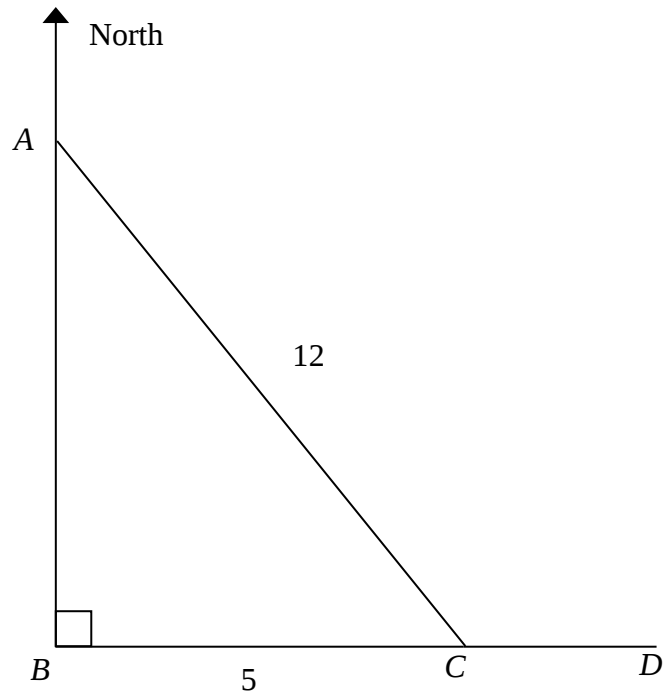
- (a) Calculate angle AOB in radians, leaving your answer in terms of π .

Answer [2]

- (b) Calculate the area of the windscreen that the car wiper wipes through.

Answer cm^2 [2]

9



A , B , C and D are four points on horizontal ground.
 $AC = 12$ km and $BC = 5$ km.

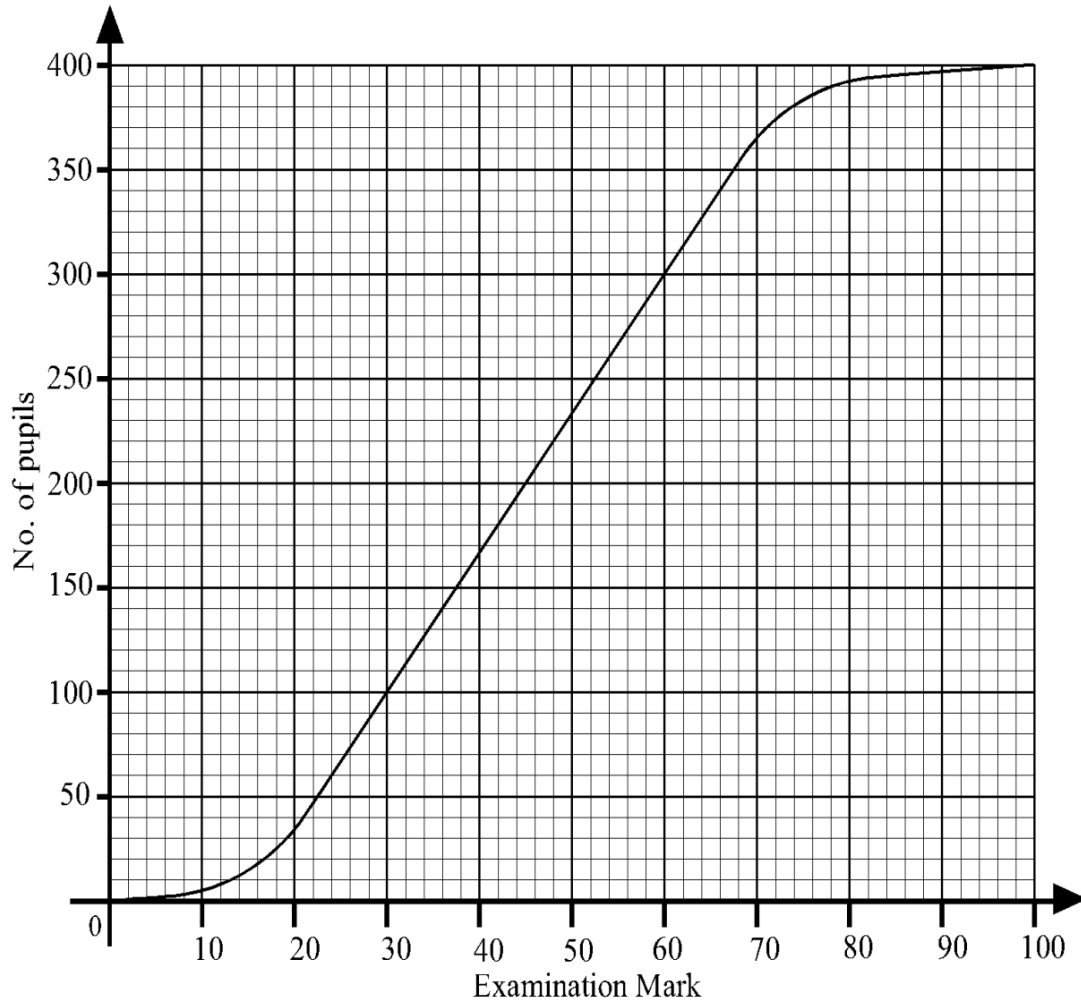
(a) Calculate angle ACD .

Answer angle $ACD = \dots\dots\dots^\circ$ [2]

(b) Find the bearing of A from C .

Answer $\dots\dots\dots^\circ$ [1]

- 10** The cumulative frequency curve shows the marks of 400 pupils who sat for a Mathematics Paper 1 examination.



- (a) Use the diagram to find
- the interquartile range of the marks,
 - the 35th percentile.

Answer [2]

Answer [1]

- (b) One of the students is chosen at random.
Find the probability that this student's estimated mark is between 42 and 78.

Answer [2]

11 $P = 2w - \frac{x^2 y}{w}$

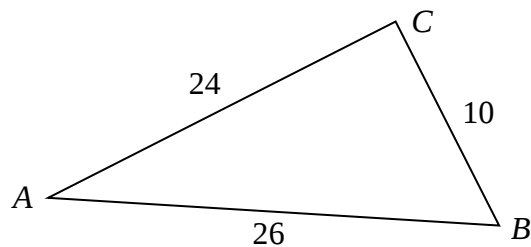
- (a) Find P when $w = 86.3$, $x = 21.41$ and $y = 0.872$.
Give your answer correct to 4 significant figures.

Answer $P = \dots\dots\dots$ [1]

- (b) Rearrange the formula to make x the subject.

Answer $x = \dots\dots\dots$ [3]

12



The diagram shows a triangle ABC such that $AB = 26$ cm, $BC = 10$ cm and $AC = 24$ cm.

When a circle is drawn, it passes through A , B and C .

Explain, with reasons, why AB is the diameter of the circle.

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.....

.....

..... [3]

- 13 Solve the simultaneous equations.

$$8x - 3y = 25$$

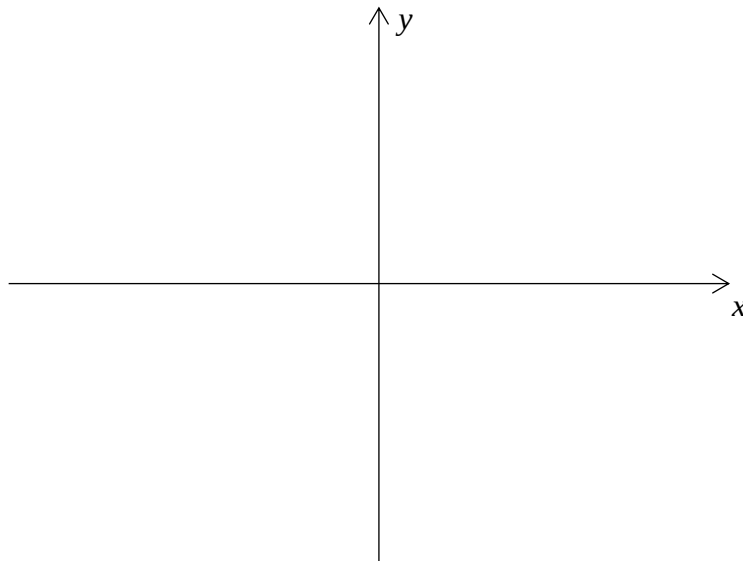
$$12x + 5y = 9$$

You must show your working.

Answer $x = \dots\dots\dots$ $y = \dots\dots\dots$ [3]

- 14 **Sketch** the graph of $y = -(x - 2)^2 + 16$ on the axes below.

Indicate clearly the coordinates of the points where the graph crosses the axes and the maximum point on the curve.

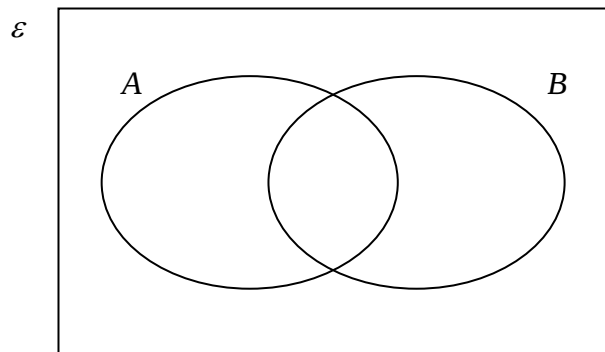


[3]

- 15 Aamon invested \$50000 into an account paying 3.6% per year compound interest, compounded monthly for 3 years.
Calculate the amount of interest Aamon earned at the end of 3 years.

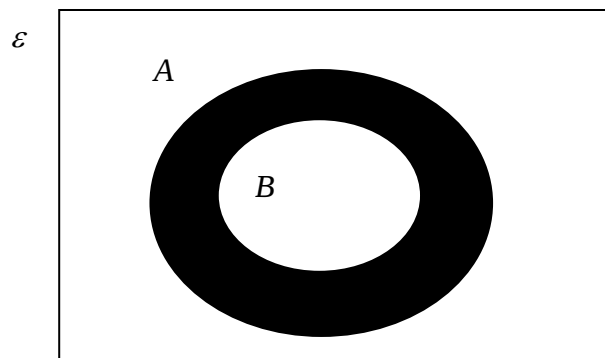
Answer \$ [3]

- 16 (a) On the Venn diagram, shade the region which represents $A' \cup B'$.



[1]

- (b) Write down the set represented by the shaded region.



Answer [1]

- 17 (a) Write 0.00728 in standard form.

Answer [1]

- (b) (i) Write 8.17×10^{501} in the form $A \times 10^{500}$.

Answer [1]

- (ii) Work out $(6.3 \times 10^{500}) + (8.17 \times 10^{501})$.
Give your answer in standard form.

Answer [2]

- 18 Written as a product of its prime factors, $84 = 2^2 \times 3 \times 7$.

- (i) Write 504 as a product of its prime factors.

Answer $504 = \dots\dots\dots$ [1]

- (ii) The highest common factor (HCF) of two numbers is 84.
The lowest common multiple (LCM) of the two numbers is 504.
Both numbers are greater than 100.
Find the two numbers.

Answer and [2]

19

$$\sin x^\circ = 0.427$$

Find two possible values of x in the range $0^\circ < x < 180^\circ$.

Answer $x = \dots\dots\dots$ or $\dots\dots\dots$ [2]

20

The cash price of a laptop is \$1800.

The hire-purchase price of the laptop is \$1944.

The hire-purchase price is a deposit plus 24 equal monthly payments of \$66.

(a) Calculate the amount of deposit to be paid.

Answer \$ $\dots\dots\dots$ [2]

(b) Calculate the interest rate per annum.

Answer $\dots\dots\dots$ % [2]

21 7 $6t$ 28 25 13 $8t^2$ 12

The list shows information about the total number of hours Kalea studied each week for 7 weeks.
The mean number of hours she studied per week is 16 hours.

(a) Show that $t = 1.5$.

Answer

[3]

(b) The standard deviation for Kalea's data is 7.41.

For the same 7 weeks, Kalea's brother also studied each week.

For his data, the mean is 13 hours and the standard deviation is 5.23.

By commenting on (1.) the means and (2.) the standard deviations, compare the distributions for the number of hours studied by Kalea and her brother.

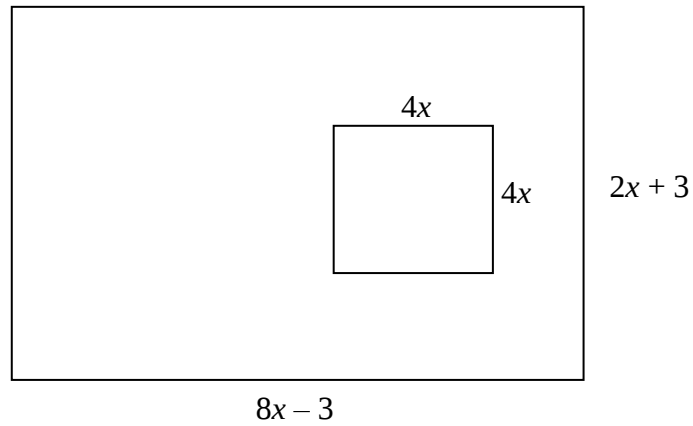
1.
.....
2.
.....

[2]

22 Expand $(2x^2 - 5x + 3)(5x - 4)$.

Answer [2]

23



A rectangular cardboard has length and breadth $(8x - 3)$ cm and $(2x + 3)$ cm respectively.

A square of length $4x$ cm is removed from the cardboard.

The area of the remaining cardboard is y cm².

(a) Show that y is an odd number.

Answer

[3]

(b) Find a possible value of y and the corresponding value of x .

Answer $x = \dots\dots\dots$ $y = \dots\dots\dots$ [1]

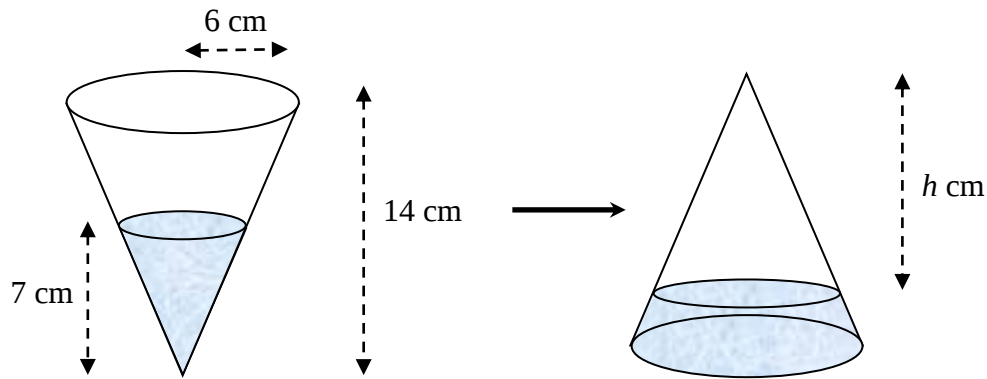
24 Simplify $\frac{5x^2 - 15x}{x^4 - 81}$.

Answer [3]

- 25 Solve the equation $x^2 + 16x + 18 = 0$ by **completing the square**.
Give your solutions correct to 2 decimal places.

Answer $x = \dots\dots\dots$ or $\dots\dots\dots$ [3]

- 26 An inverted cone with base radius 6 cm and height 14 cm is filled with water to a depth of 7 cm.



Find, in terms of π ,

- (i) the capacity of the cone,

Answer cm^3 [1]

- (ii) the volume of the water inside the cone.

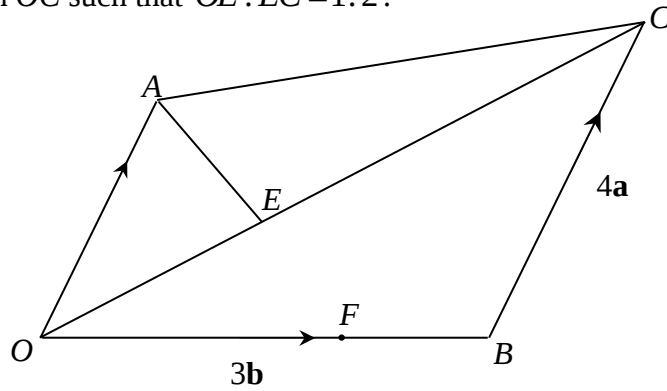
Answer cm^3 [2]

The cone is then turned upside down and the height of the empty space becomes h cm.

- (iii) Find the value of h .

Answer $h =$ [2]

- 27 In the diagram below, $\overrightarrow{BC} = 4\mathbf{a}$, $\overrightarrow{OB} = 3\mathbf{b}$, $\overrightarrow{OA} = \frac{3}{4}\overrightarrow{BC}$.
 E is a point on OC such that $OE : EC = 1 : 2$.



- (a) Show that $\overrightarrow{AE} = -\frac{5}{3}\mathbf{a} + \mathbf{b}$.

Answer

[2]

It is given that F is a point on OB such that $\overrightarrow{OF} = \frac{3}{5}\overrightarrow{OB}$.

- (b) Express vector $\overrightarrow{AF}$ in terms of $\mathbf{a}$ and/or $\mathbf{b}$, as simply as possible.

Answer $\overrightarrow{AF} = \dots\dots\dots$ [2]

- (c) Determine if points A , E and F lie on a straight line.
Justify your answer using vectors.
Answer

[2]

- (d) The area of triangle AEC is 30 cm^2 .
Find the area of triangle OAE .

Answer cm^2 [1]

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