

Name:	Class:	Class Register Number:
-------	--------	------------------------



中正中學

CHUNG CHENG HIGH SCHOOL (MAIN)

Chung Cheng High School Chung Cheng High School Chung Cheng High School Chung Cheng High School Chung Cheng High School
 Chung Cheng High School Chung Cheng High School Chung Cheng High School Chung Cheng High School Chung Cheng High School
 Chung Cheng High School Chung Cheng High School Chung Cheng High School Chung Cheng High School Chung Cheng High School
 Chung Cheng High School Chung Cheng High School Chung Cheng High School Chung Cheng High School Chung Cheng High School

**PRELIMINARY EXAMINATION 2026
SECONDARY 4**

MATHEMATICS

4052/01

Paper 1

Thursday 20 August 2026

2 hours 15 minutes

Candidates answer on the Question Paper.

READ THESE INSTRUCTIONS FIRST

Write your name, class and index number 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 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. Give answers in degrees to one decimal place.

For π , use either your calculator value or 3.142.

For Examiner's Use	
Total	/ 90

This document consists of **21** printed pages and **1** blank page.

[Turn over

Mathematical Formulae

Compound interest

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

Mensuration

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

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

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

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

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

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

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

Trigonometry

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

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

Statistics

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

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

Answer **all** the questions.

- 1 (a) Factorise $4p^2 - 2q - 8pq + p$.

Answer [2]

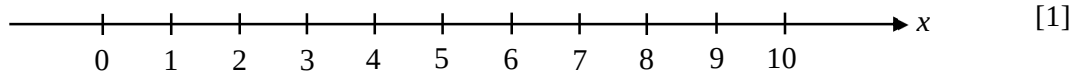
(b) Simplify $\frac{x^2 y^3}{\sqrt{z}} \div \frac{(xy)^2}{z^{\frac{3}{2}}}$.

Answer [3]

- 2 (a) Solve the inequalities $x + 7 < 4x - 2 \leq 3x + 8$.

Answer [2]

- (b) Illustrate your answer to part (a) on the number line below.



- 3 Solve the equation $\frac{1}{3^{2x}} \div 4^x = 36$.

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

- 4 Expand $(4x-3)(x+1)$.

Answer [2]

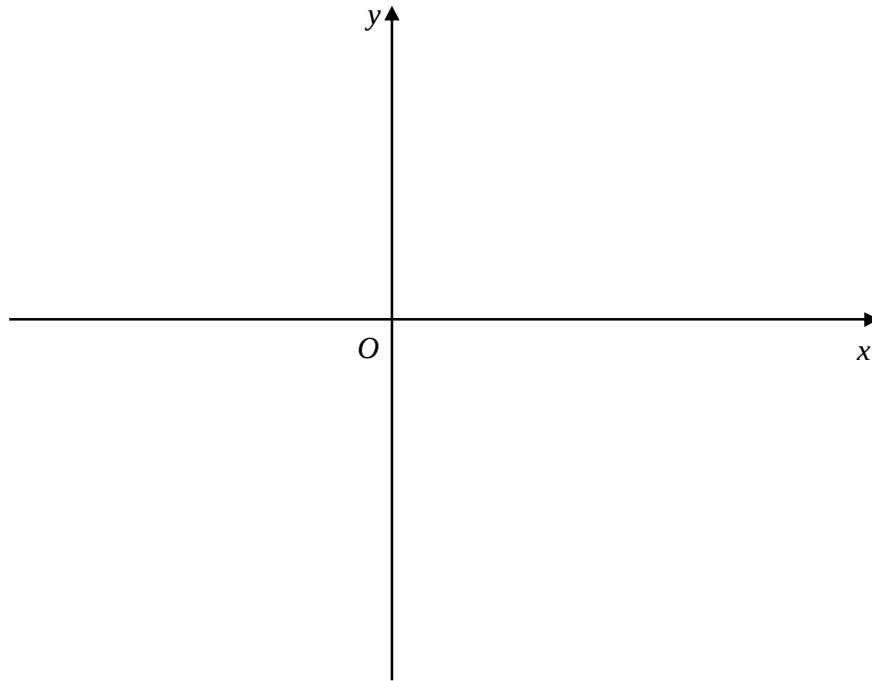
- 5 Light takes approximately 8 minutes to travel 150 million kilometres.
(a) Find the average speed of light, in metres per second. Give your answer in standard form.

Answer m/s [2]

- (b) The star Proxima Centauri is 4×10^{13} km from Earth.
Find the time, in years, it takes for light to travel from Proxima Centauri to Earth.
[Assume 1 year = 365 days]

Answer years [2]

- 6 (a) Sketch the graph of $y = -(x-2)^2 + 4$ on the axes below. Indicate clearly the turning point and the points where the graph crosses the axes.



[2]

- (b) On the same graph in (a), draw and label the line of symmetry of the graph. [1]

-
- 7 In a regular n -sided polygon, the interior angle is 3 times that of the exterior angle. Find the value of n .

Answer $n = \dots\dots\dots$ [2]

8 Solve the following equations.

(a) $\frac{x+4}{3} = \frac{3}{x-4},$

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

(b) $\frac{x+3}{7} + \frac{x-1}{2} = 3.$

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

- 9 Solve these simultaneous equations.

$$x - 2y = 5$$

$$2x + y = 0$$

Answer $x = \dots\dots\dots$

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

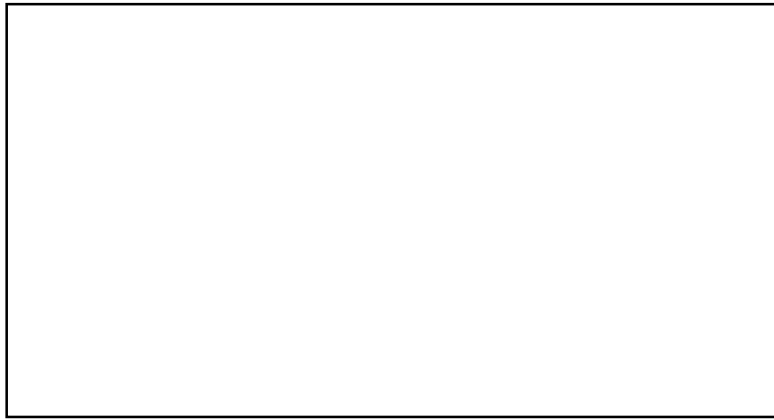
- 10 (a)** $\xi = \{x : x \text{ is an integer, } 0 < x < 10\}$
 $P = \{x : x \text{ is a prime number}\}$
 $S = \{x : x \text{ is a perfect square}\}$
 $E = \{x : x \text{ is an even number}\}$

(i) Write down the relationship between set P and set S using set notation.

Answer [1]

(ii) Complete the Venn Diagram below to represent set P , set S and set E .

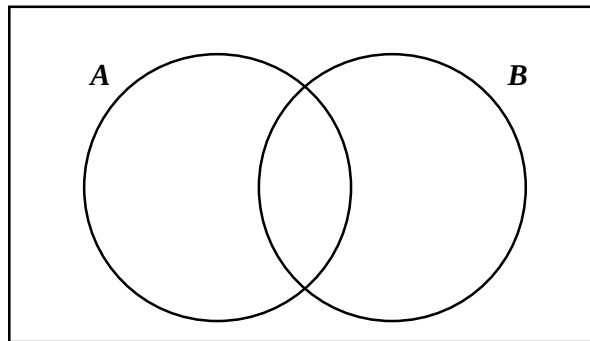
ξ



[2]

(b) On the Venn diagram, shade the region which represents $A \cap B'$.

ξ



[1]

- 11** The drink stall at a hawker centre sells tea, coffee and Milo.
 In one week, the drink stall sells 500 cups of tea (T), 1200 cups of coffee (C) and 800 cups of Milo (M).
 The next week, the drink stall sells 400, 900 and 700 cups of tea, coffee and Milo respectively.
(a) Represent this information in a 2×3 matrix, **P**.

$$\text{Answer } \mathbf{P} = \begin{matrix} & \begin{matrix} \text{T} & \text{C} & \text{M} \end{matrix} \\ \begin{pmatrix} & & \end{pmatrix} & \begin{matrix} \text{Week 1} \\ \text{Week 2} \end{matrix} \end{matrix} \quad [1]$$

- (b)** The cost of a cup of tea, coffee and Milo are \$1.00, \$1.10 and \$1.70 respectively.
 Represent this information in a 3×1 matrix **R**.

$$\text{Answer } \mathbf{R} = \dots\dots\dots [1]$$

- (c)** Evaluate the matrix **PR**.

$$\text{Answer } \mathbf{PR} = \dots\dots\dots [2]$$

- (d)** Explain what each of the elements in the matrix **PR** represent.

.....

 [1]

12 When written as products of their prime factors,

$$p = 2^3 \times 3^6$$

$$q = 2 \times 3^2 \times 7$$

$$r = 2^2 \times 3 \times 5$$

Find

(a) the value of the cube root of p ,

Answer [1]

(b) the lowest common multiple of p , q and r , giving your answer as a product of its prime factors.

Answer [1]

(c) the greatest positive integer that divides p , q and r exactly.

Answer [1]

- 13** A weather forecast gives the probabilities of rain on three consecutive days. The probabilities that it will rain on the first, second or third day are 0.2, 0.2 and 0.3 respectively.
The occurrence of rain on each day is independent of the day before.

(a) Find the probability that it rains on all 3 days.

Answer [1]

(b) Given that it rains on the third day, find the probability it will rain on exactly one of the first two days.

Answer [2]

- 14** A cake shop recorded the number of boxes of cakes sold each day over a period of 30 days.

Number of boxes sold, n	Frequency
$100 \leq x < 120$	4
$120 \leq x < 140$	6
$140 \leq x < 160$	12
$160 \leq x < 180$	8

- (a)** Calculate an estimate of
(i) the mean daily number of boxes sold,

Answer [1]

(ii) the standard deviation of the daily number of boxes sold.

Answer [1]

- (b) There was an error in the recording. The shop had actually sold 30 fewer boxes of cakes each day than recorded. A correction was made to the number of boxes recorded.

Explain how this correction will affect the mean and standard deviation calculated in (a).

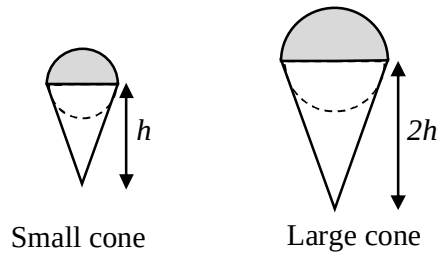
Answer

[2]

.....

- 15 The diagram shows two geometrically similar coned-shaped wafers, each holding a spherical scoop of ice-cream. Each scoop fits exactly into the circular opening of the cone, with half the scoop inside the cone.

The ratio of the height of the smaller cone to the larger cone is 1 : 2.



- (a) Tom claims that the larger scoop contains twice as much ice-cream as the smaller scoop. Determine whether Tom is correct. Justify your answer with appropriate working.

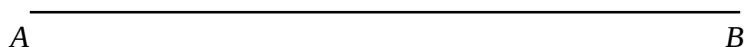
Answer

[2]

- (b) The volume of ice-cream in the larger scoop is 0.4 litres. Calculate the volume of the ice-cream in the smaller scoop. Give your answer in cubic centimetres.

Answer cm^3 [2]

- 16 (a)** In the diagram, $AB = 10$ cm. Given that $\angle BAC = 70^\circ$ and $AC = 8$ cm, construct the triangle ABC in the space given below.



[2]

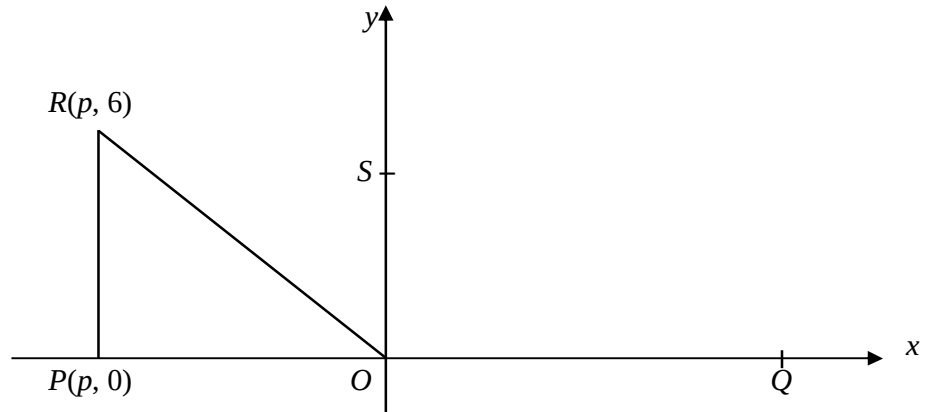
- (b)** On the same diagram, construct the

(i) perpendicular bisector of BC , [1]

(ii) angle bisector of $\angle ABC$. [1]

- (c)** Mark and label on the diagram, the point P such that P is equidistant from point B and point C and is nearer to AB than BC . [1]

- 17 The points $P(p, 0)$ and $R(p, 6)$ are shown in the diagram. Point Q lies on the x -axis while point S lies on the y -axis.



- (a) Explain clearly why triangle OPR is a right-angled triangle.

.....

[1]

- (b) It is given that $\cos \angle ROQ = -\frac{4}{5}$.
 Without using a calculator, find
- (i) the value of p ,

- (ii) the value of $\tan \angle ROS$.

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

Answer $\tan \angle ROS = \dots\dots\dots$ [1]

18 The line l_1 passes through the points $A(3, -1)$ and $B(7, 2)$.

(a) the point $(2, a)$ lies on the line l_1 , find the value of a .

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

(b) The line l_2 passes through the point $D(0, 8)$.

Let S_1 and S_2 be the sets of all points lying on l_1 and l_2 respectively.

Given that $S_1 \cap S_2 = \emptyset$, find the equation of the line l_2 .

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

- 19** Given that $A = (-1, 2)$ and $B(2, 3)$.
(a) Find the length of AB .

Answer [2]

Point B is translated by the vector $\begin{pmatrix} 5 \\ -1 \end{pmatrix}$ to point C .

- (b)** Find $\overrightarrow{OC}$.

Answer [2]

20 A map is drawn to a scale of 1 : 50 000.

- (a)** On the map, the distance between two towns is 40 cm.
Find the actual distance, in kilometres, between the two towns.

Answer km [1]

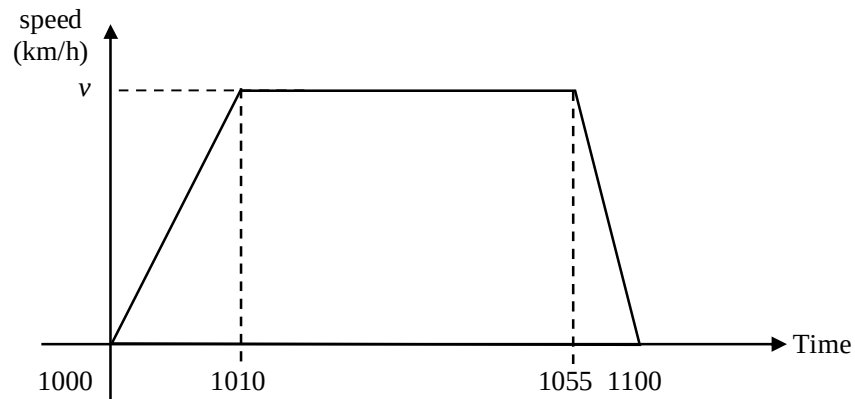
- (b)** A plantation has an actual area of 3.6 km^2 .
Find the area, in square centimetres, representing the plantation on the map.

Answer cm^2 [2]

- (c)** On a second map, the same plantation in part **(b)** is represented by an area of 6.4 cm^2 .
The scale of the second map is 1 : k . Find the value of k .

Answer $k =$ [2]

- 21 The diagram shows the speed-time graph of a train travelling from Town P to Town Q . The train left Town P at 1000 hrs and accelerated at a constant rate before reaching a maximum speed of v km/h after 10 minutes. It then travels at a uniform speed for 45 minutes before decelerating at a uniform rate. The train arrived at town Q at 1100 hrs.



- (a) The area under the speed-time graph represents the distance travelled by the train. Given that the train travelled a total of 70 km, show that $v = 80$.

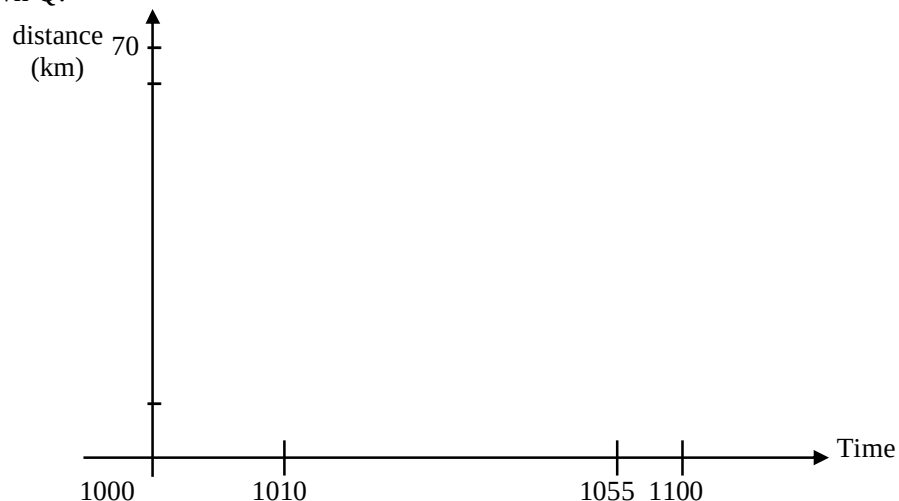
Answer

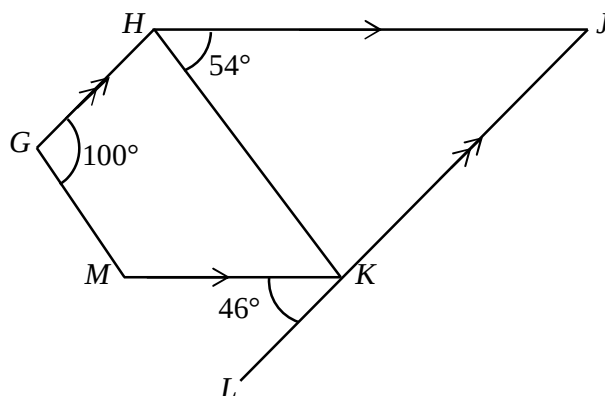
[2]

- (b) Calculate the acceleration of the train during the first 10 minutes of its journey.

Answer km/h² [1]

- (c) Sketch the distance-time graph for the train during its journey from Town P to Town Q . [2]





In the diagram, GH is parallel to LKJ and HJ is parallel to MK .
 $\angle JHK = 54^\circ$, $\angle LKM = 46^\circ$ and $\angle HGM = 100^\circ$.

(a) Find

(i) angle HJK ,

Answer [1]

(ii) angle GHK ,

Answer [2]

(iii) angle GMK .

Answer [2]

(b) Explain why GM is parallel to HK .

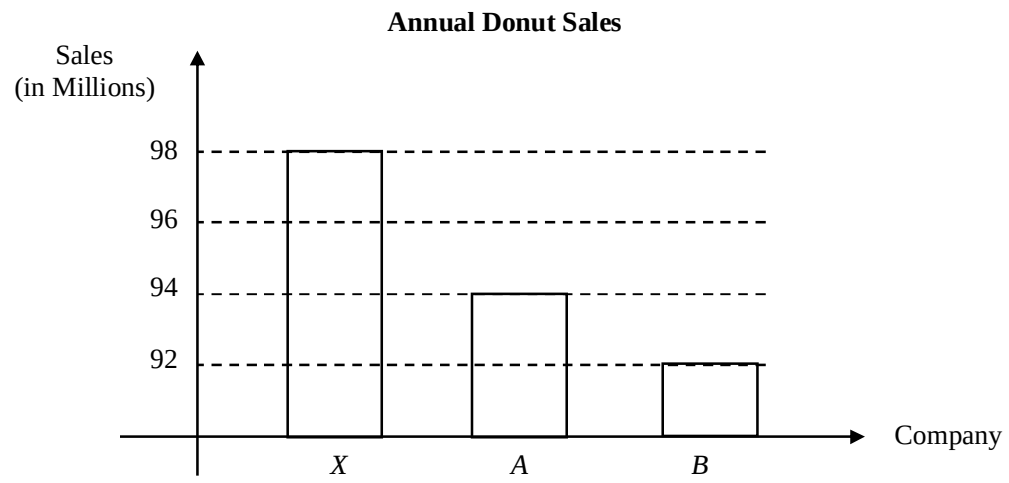
Answer

GM is parallel to HK because

.....

..... [1]

- 23 Companies X , A and B sell donuts. The CEO of company X used the following graph to compare the sale of company X 's donuts with those of companies A and B .



State one aspect of the graph that may be misleading and how this can lead to a misinterpretation of the graph.

Answer

.....

[2]

BLANK PAGE