



MINISTRY OF EDUCATION, SINGAPORE  
in collaboration with  
CAMBRIDGE ASSESSMENT INTERNATIONAL EDUCATION  
General Certificate of Education Normal (Academic) Level

CANDIDATE  
NAME

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CENTRE  
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INDEX  
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## MATHEMATICS (SYLLABUS A)

**4045/01**

Paper 1

**For examination from 2023**

SPECIMEN PAPER

**2 hours**

Candidates answer on the Question Paper.

### READ THESE INSTRUCTIONS FIRST

Write your Centre number, 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 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  $\pi$ , use either your calculator value or 3.142.

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



Singapore Examinations and Assessment Board



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

*Mathematical Formulae**Compound interest*

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

*Mensuration*

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

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

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

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

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

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

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

*Trigonometry*

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

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

*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                       $\frac{3}{4}$       0.738       $\frac{11}{15}$        $\frac{\pi}{4}$       0.7

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

*Answer* ..... , ..... , ..... , ..... , ..... [2]  
smallest

---

2 Find the largest integer satisfying  $4x < -19$ .

*Answer* ..... [2]

---

3 (a) A bag contains only red balls and white balls.

$\frac{5}{8}$  of the balls are white.

Write the ratio red balls : white balls in its simplest form.

*Answer* ..... : ..... [1]

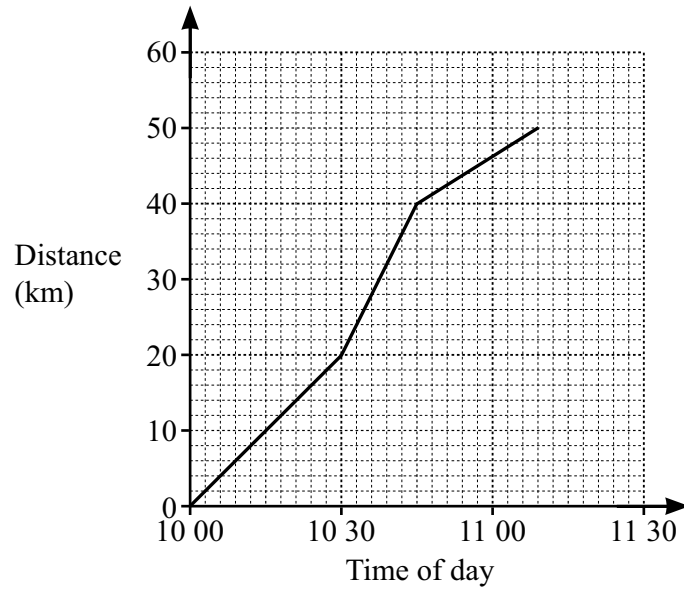
(b) Tian mixes 150 ml of lime syrup with 1.2 litres of water.

Write the ratio lime syrup : water in its simplest form.

*Answer* ..... : ..... [1]

---

4



The distance-time graph shows part of a car journey.

'Based on the graph, the speed for the fastest part of the journey is 55 km/h faster than the slowest part of the journey.'

Is this statement correct? Explain your answer.

*Answer*

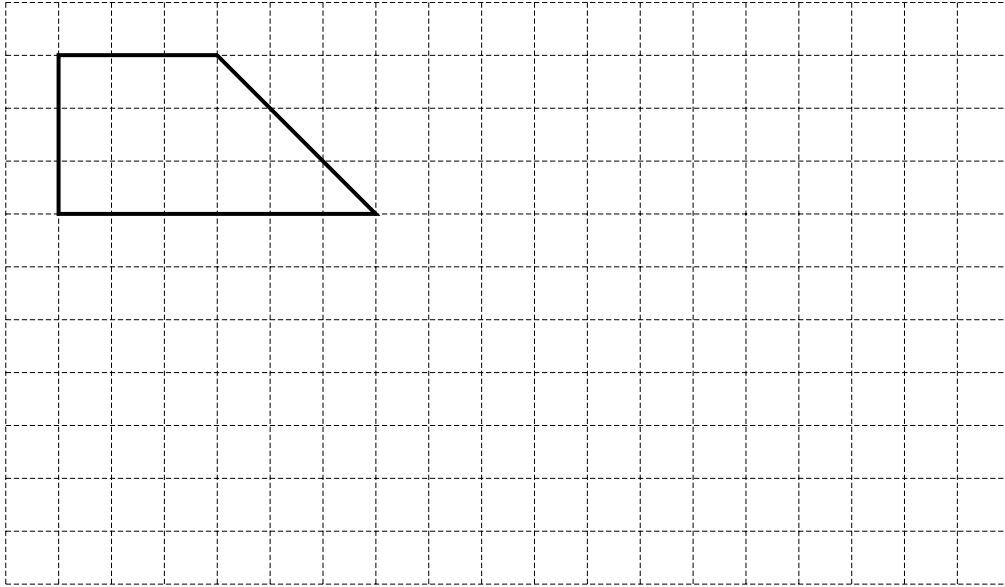
[2]

5 The square root of  $x$  is equal to the cube root of  $2^3 \times 3^{6n}$ , where  $n$  is a positive integer.

Write  $x$  as the product of its prime factors.

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

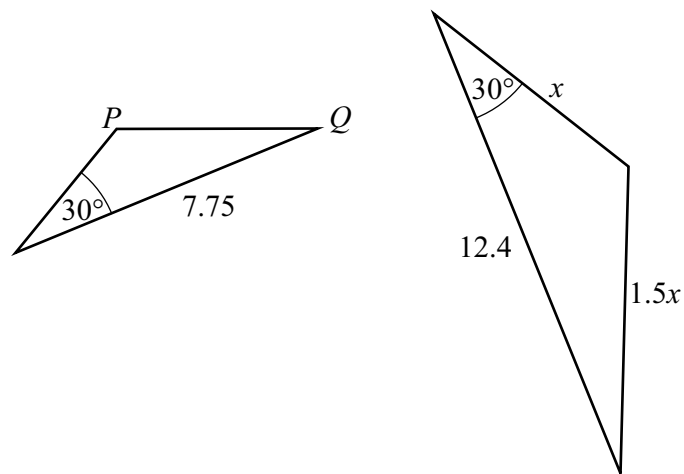
6



Draw an enlargement of this trapezium using a scale factor of  $\frac{4}{3}$ .

[2]

7



These triangles are similar.  
All the lengths are in centimetres.

Find an expression, in terms of  $x$ , for the length  $PQ$ .

Answer  $PQ = \dots\dots\dots$  cm [2]

8 One of the angles of a triangle measures  $x^\circ$ .

Given that  $\sin x^\circ = 0.7$ , find the two possible values of  $x$ .

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

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9 The first four terms of a sequence are 17, 13, 9 and 5.

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

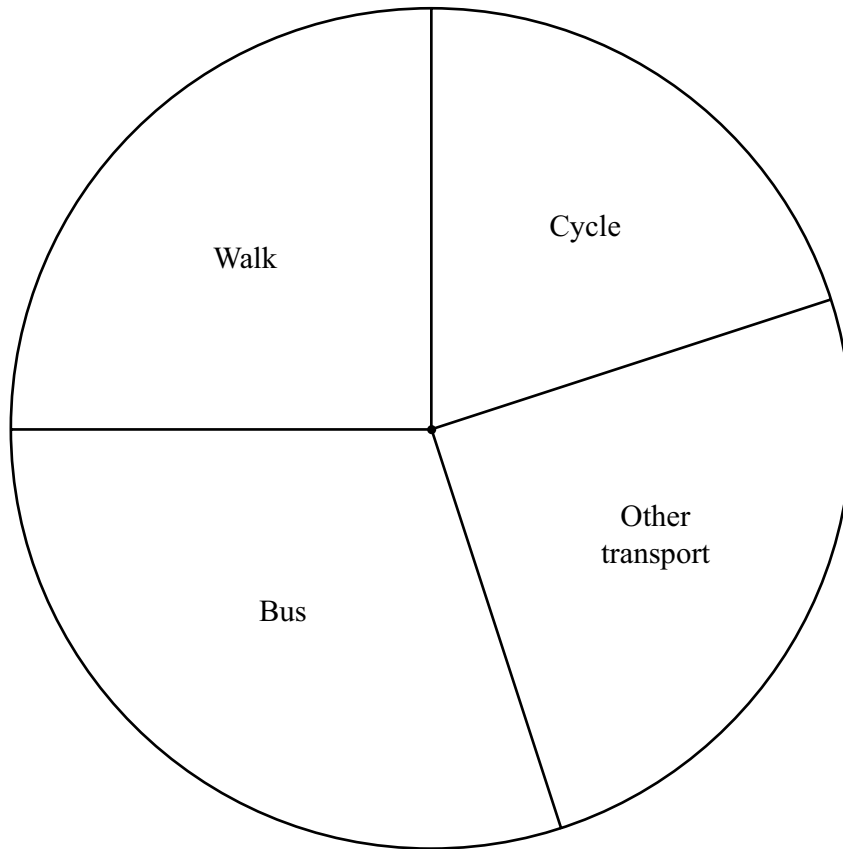
*Answer*  $\dots\dots\dots, \dots\dots\dots$  [1]

(b) Find an expression for the  $n$ th term of the sequence.

*Answer*  $\dots\dots\dots$  [1]

---

- 10 A group of students were asked how they travelled to school that day. The results are shown in the accurate pie chart below.



The number of students who walked is 7 more than the number of students who cycled. Find the total number of students in the group.

*Answer* ..... [3]

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- 11 Kim's monthly salary is \$2300.  
In one month, she spent:

\$630 on rent,  
10% of her salary on food and  
 $\frac{1}{4}$  of her salary on travel.

That month she saved the rest of her salary.

Find the percentage of her monthly salary she saved.

*Answer* .....% [3]

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12  $s = 3r^2 + 4t$

- (a) Find  $s$  when  $r = 2$  and  $t = -5$ .

*Answer*  $s =$  ..... [1]

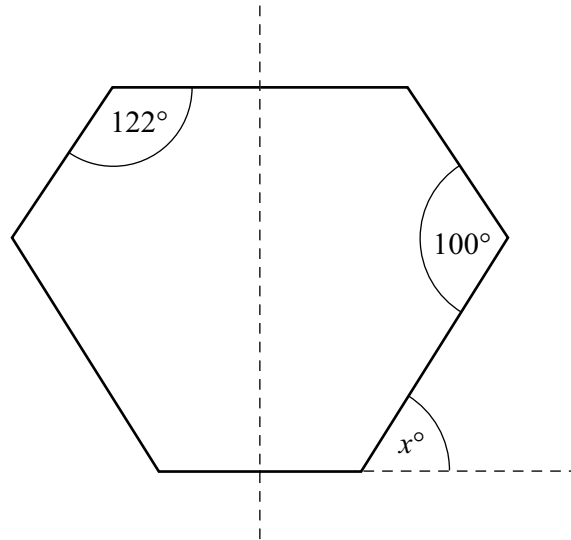
- (b) Rearrange the formula to make  $r$  the subject.

*Answer*  $r =$  ..... [2]

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13



This hexagon has one line of symmetry, marked on the diagram.

Calculate  $x$ .

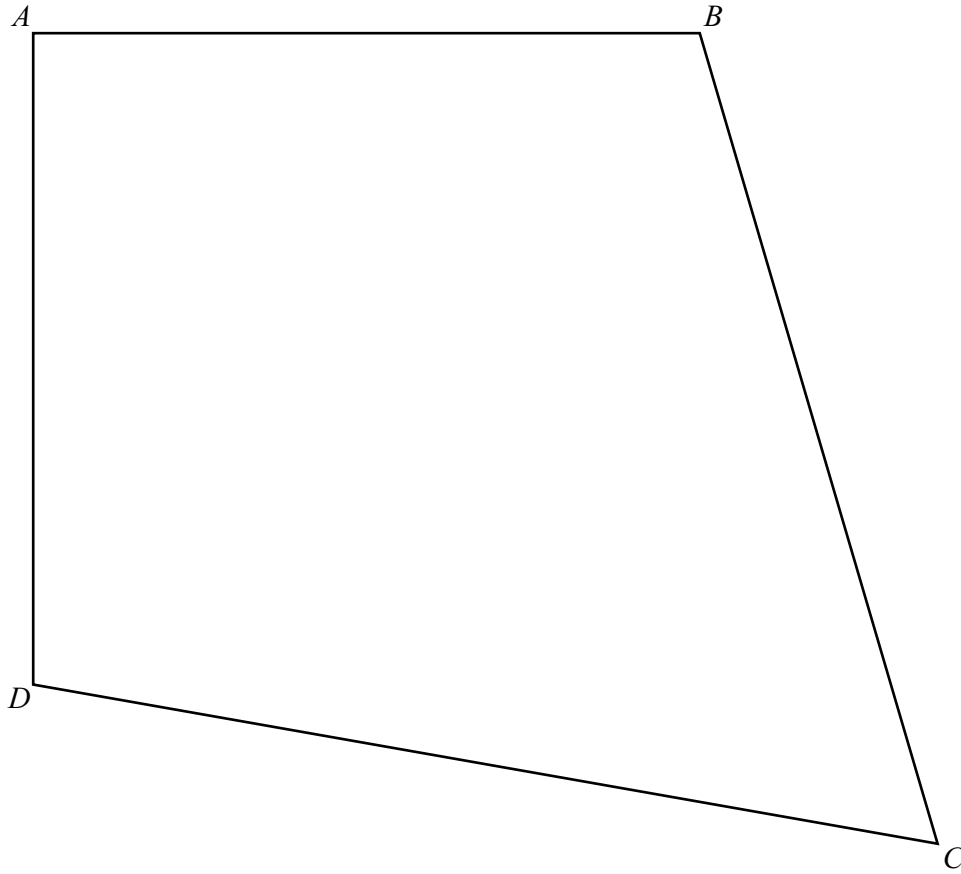
*Answer*  $x =$  ..... [3]

- 14 \$2500 is placed in an account earning compound interest of  $p\%$  per year. At the end of 3 years the total amount in the account is \$2606.48.

Calculate  $p$ .

*Answer*  $p =$  ..... [3]

15



$X$  is the intersection of the angle bisector of angle  $DAB$  and the perpendicular bisector of  $DC$ .

(a) By using constructions, find and label  $X$ . [2]

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

Answer ..... cm [1]

---

$$16 \quad \frac{a}{4x^2-9} + \frac{b}{2x+3} = \frac{10x-11}{4x^2-9}$$

Find  $a$  and  $b$ .

*Answer*  $a = \dots\dots\dots$

$b = \dots\dots\dots$  [3]

- 17 (a) Jiaxin exchanges 50 dollars (\$) for 1130 Thai Baht (THB).

Complete the exchange rate.

*Answer* \$1 =  $\dots\dots\dots$  THB [1]

- (b) £1 = \$1.79  
\$1 = €0.67

A tablet costs £180 in the United Kingdom.

An identical tablet costs €220 in France.

Joshua travels regularly between the United Kingdom and France.

Joshua says that it is cheaper to buy the tablet in France.

Do you agree? Explain your answer.

*Answer*

[3]

- 18 Two six-sided dice are rolled and the product of the two numbers is recorded. The table shows some of the possible products.

×	1	2	3	4	5	6
1	1	2	3	4	5	6
2	2	4	6	8	10	12
3	3	6	9	12	15	
4	4	8	12	16		
5	5	10	15			
6	6	12				

(a) Complete the table to show all the possible outcomes. [2]

(b) Find the probability that, when the two dice are rolled once, their product is

(i) a number less than 10,

*Answer* ..... [1]

(ii) a multiple of 8,

*Answer* ..... [1]

(iii) a factor of 12.

*Answer* ..... [1]

19 (a) Solve  $4(x + 3) = 7 - x$ .

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

(b)  $x^2 - 10x - 12 = (x + a)^2 + b$

(i) Find  $a$  and  $b$ .

*Answer*  $a = \dots\dots\dots$   $b = \dots\dots\dots$  [2]

(ii) Hence solve  $x^2 - 10x - 12 = 0$ , giving your answers correct to 2 decimal places.

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

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- 20  $A$  is the point  $(2, -6)$  and  $B$  is the point  $(k, 2k)$  with  $k > 0$ .  
The length of  $AB$  is 25 units.

(a) Form an equation in  $k$  and show that it simplifies to  $k^2 + 4k - 117 = 0$ .

*Answer*

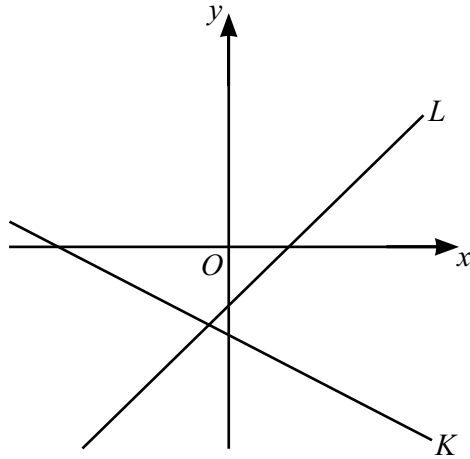
[3]

(b) Solve  $k^2 + 4k - 117 = 0$  and find the coordinates of  $B$ .

*Answer* (....., .....) [2]

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21 (a)



The equation of the line  $L$  is  $y = x - 3$ .

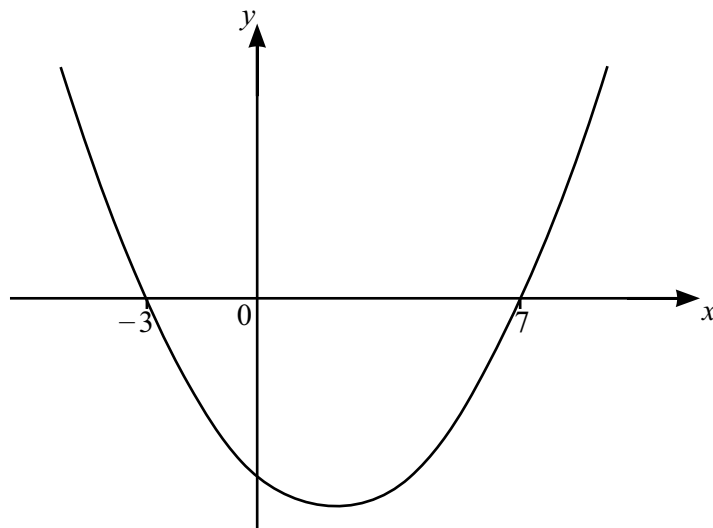
Huan says that a possible equation for the line  $K$  is  $x + 2y + 4 = 0$ .

Is she correct? Explain your answer.

Answer .....

..... [2]

(b) The sketch shows a quadratic curve.



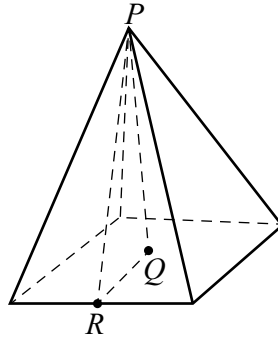
(i) Write down the equation of the curve in the form  $y = (x - a)(x - b)$ .

Answer ..... [1]

(ii) Find the coordinates of the minimum point.

Answer (....., .....) [2]

- 22 A square-based pyramid has perpendicular height 60 cm.  
 Each of the sides of the square has length 50 cm.  
 The centre of the base of the pyramid,  $Q$ , is directly below the top of the pyramid,  $P$ .  
 $R$  is the midpoint of one of the sides of the square.



- (a) Calculate the volume of the pyramid.

Answer ..... cm<sup>3</sup> [1]

- (b) (i) Calculate  $PR$ .

Answer  $PR =$  ..... cm [2]

- (ii) Calculate the **total** surface area of the pyramid.

Answer ..... cm<sup>2</sup> [3]

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