



MINISTRY OF EDUCATION, SINGAPORE  
in collaboration with  
UNIVERSITY OF CAMBRIDGE LOCAL EXAMINATIONS SYNDICATE  
General Certificate of Education Ordinary Level

CANDIDATE  
NAME

CENTRE  
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**MATHEMATICS**

**4048/01**

Paper 1

**October/November 2019**

**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 IN ANY BARCODES.

Answer **all** questions.  
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 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, unless the question requires the answer in terms of  $\pi$ .

The number of marks is given in brackets [ ] at the end of each question or part question.  
The total of the marks for this paper is 80.

This document consists of **18** printed pages and **2** blank pages.



Singapore Examinations and Assessment Board

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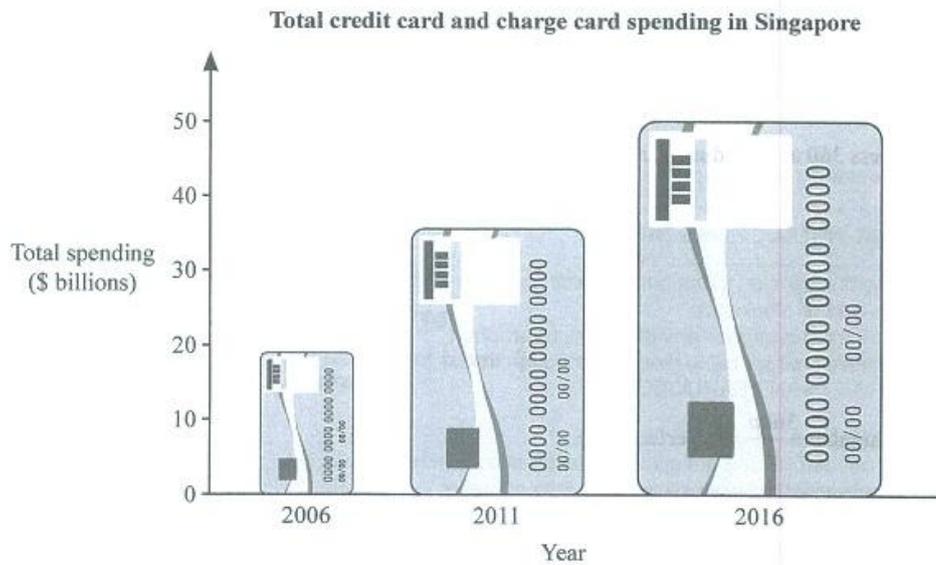
**Oct/Nov 2019 Paper 1 (I)**

Answer **all** the questions.

- 1 The number of people in a cinema is given as 400, correct to the nearest hundred.  
Write down the minimum number of people that could be in the cinema at this time.

Answer ..... [1]

2



Explain how the chart above may be misleading.

.....  
..... [1]

3 (a) Simplify  $(x^6)^{\frac{2}{3}}$ .

Answer ..... [1]

(b)  $3^a = 3^7 + 3^7 + 3^7$

Find the value of  $a$ .

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

4 (a) Express 360 as a product of its prime factors.

Answer ..... [1]

(b) The number  $\frac{360p}{q}$  is a perfect cube.

$p$  and  $q$  are prime numbers.

Find the value of  $p$  and the value of  $q$ .

Answer  $p =$  .....

$q =$  ..... [1]

5 The estimated number of Bengal tigers increased from 3200 in 2010 to 3890 in 2016.  
The number increased by  $r\%$  every year.

Find the value of  $r$ .

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

6 Write as a single fraction in its simplest form  $\frac{1}{2x-3} - \frac{3}{3x-1}$ .

Answer ..... [2]

7 A bag contains 8 red counters, 9 green counters and 3 yellow counters.

(a) A counter is chosen at random and then replaced.

What is the probability that it is **not** a yellow counter?

Answer ..... [1]

(b)  $x$  green counters are removed from the bag.

The probability of choosing a red counter is now  $\frac{2}{3}$ .

Find the value of  $x$ .

Answer  $x =$  ..... [1]

8 Use factorisation to solve the equation.

$$3p^2 + p - 10 = 0$$

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

9 (a) < = >

Choose a symbol from the list above to make a correct statement.

Answer 33% .....  $\frac{1}{3}$  [1]

(b) Solve the inequalities  $6 \leq 2x + 11 < 19$ .

Answer ..... [2]

10  $P$  is directly proportional to  $Q^3$ .

(a) When  $Q = \frac{1}{3}$ ,  $P = 2$ .

Find  $P$  when  $Q = \frac{1}{6}$ .

Answer ..... [2]

(b) A change in  $Q$  produces a change in  $P$ .

When the value of  $Q$  is multiplied by  $\frac{1}{2}$ , the value of  $P$  changes by a factor of  $m$ .

Find  $m$ .

Answer  $m =$  ..... [1]

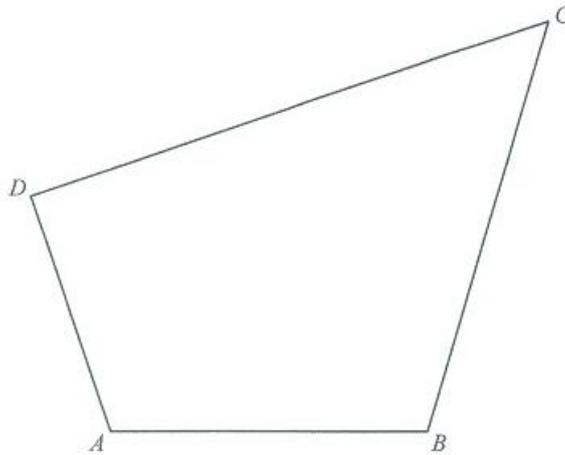
11 (a) Factorise  $x^2 - y^4$ .

Answer ..... [1]

(b) Factorise completely  $6ab + 1 - 3a - 2b$ .

Answer ..... [2]

12 The diagram shows a quadrilateral  $ABCD$ .



On the diagram,

- (a) construct the bisector of angle  $ADC$ , [1]
- (b) construct the perpendicular bisector of  $AB$ , [1]
- (c) shade the region inside  $ABCD$  that is closer to  $DC$  than to  $DA$  and closer to  $A$  than to  $B$ . [1]

13 The point  $A$  is translated to  $B(5, -2)$  by the vector  $\begin{pmatrix} -3 \\ 7 \end{pmatrix}$ .

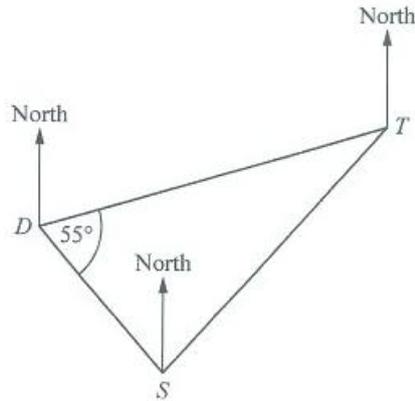
- (a) Find the coordinates of point  $A$ .

Answer (....., .....) [1]

- (b) Find the magnitude of  $\begin{pmatrix} -3 \\ 7 \end{pmatrix}$ .

Answer ..... [2]

14



The diagram shows the positions of three cities, Singapore ( $S$ ), Delhi ( $D$ ) and Tokyo ( $T$ ).  
Angle  $SDT = 55^\circ$ .

The bearing of Delhi from Singapore is  $317^\circ$  and the bearing of Tokyo from Singapore is  $044^\circ$ .

(a) Find the bearing of Singapore from Delhi.

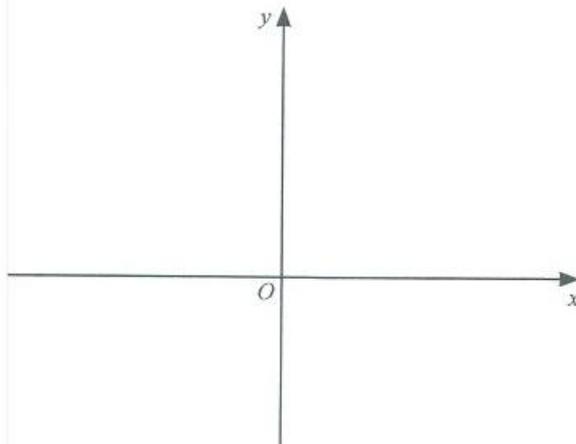
Answer ..... [1]

(b) Find the bearing of Delhi from Tokyo.

Answer ..... [2]

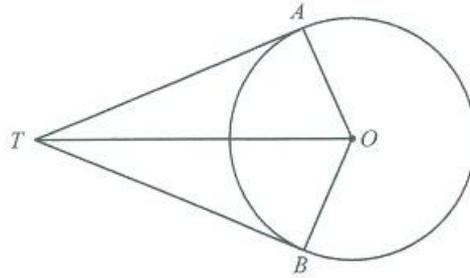
15 Sketch the graph of  $y = -(x-2)^2 + 9$  on the axes below.

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



[3]

16



- (a)  $TA$  and  $TB$  are tangents to a circle, centre  $O$ .

Show that triangle  $OAT$  and triangle  $OBT$  are congruent.  
Give a reason for each statement you make.

*Answer*

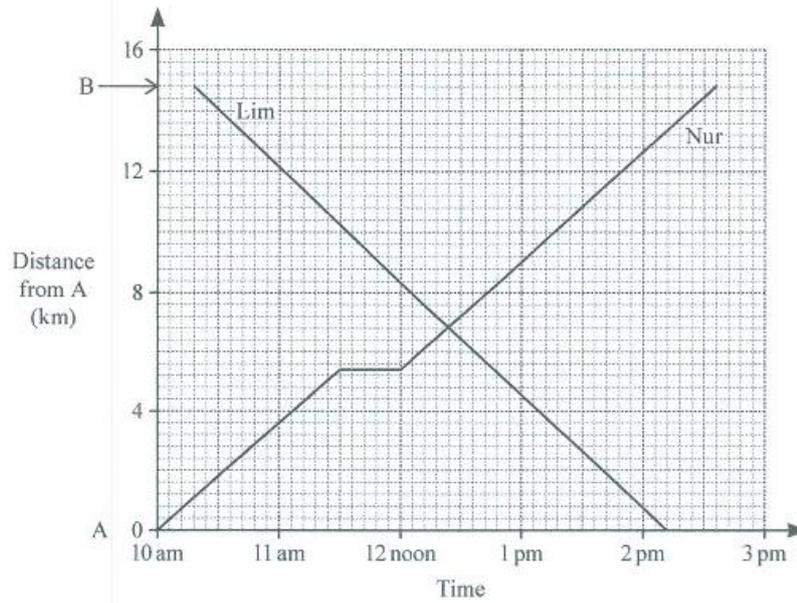
[3]

- (b) Point  $P$  lies on the circumference of the circle so that triangle  $APT$  is congruent to triangle  $BPT$ .

On the diagram, mark the two possible positions for the point  $P$ .

[1]

17



The distance–time graph shows the journeys for two people, Nur and Lim, between two villages, A and B.

- (a) Find Nur’s speed for the first hour of her journey.

Answer ..... km/h [1]

- (b) (i) Find the time when Nur and Lim pass each other.

Answer ..... [1]

- (ii) How far are they from village B when they pass each other?

Answer ..... km [1]

- (c) Lim jogs back to village B at 8 km/h.

Change 8 km/h into metres per second.

Answer ..... m/s [1]

- 18  $\mathbb{Z} = \{\text{integers } x: 4 < x < 16\}$   
 $P = \{\text{prime numbers}\}$   
 $Q = \{\text{multiples of } 4\}$   
 $R = \{\text{factors of } 30\}$

(a) List the elements in

(i)  $R$ ,

Answer ..... [1]

(ii)  $P \cap R$ .

Answer ..... [1]

(b) Underline the correct statements from the list below.

$R \cap Q = \emptyset$      $Q \cup R = \{5, 6, 8, 10, 12\}$      $P \cap Q = \{0\}$      $Q \subset R$      $16 \notin P$     [2]

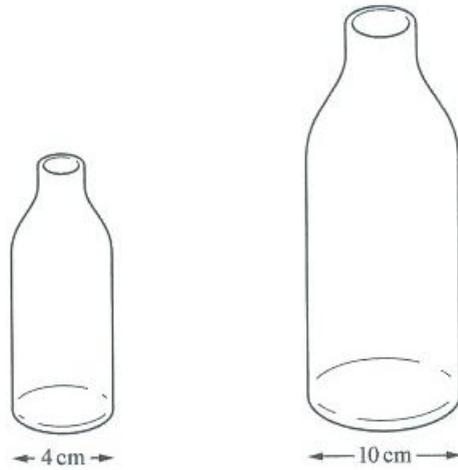
- 19 Ann and Ben each have a savings account.  
The ratio Ann's savings : Ben's savings = 7 : 5.

They each spend \$60 from their savings.  
The new ratio Ann's savings : Ben's savings = 3 : 2.

Find how much money Ann now has in her account.

Answer \$..... [4]

20



The diagram shows two geometrically similar bottles. The diameter of the base of the smaller bottle is 4 cm. The diameter of the base of the larger bottle is 10 cm.

- (a) The height of the larger bottle is 30 cm.

Calculate the height of the smaller bottle.

Answer ..... cm [2]

- (b) The smaller bottle has a capacity of 125 ml. The manufacturer makes another geometrically similar bottle that holds 500 ml.

Calculate the diameter of the base of this bottle.

Answer ..... cm [2]

- 21 The cost, in cents, of printing black and white copies and colour copies on two printers, A and B, is represented by the matrix P.

$$P = \begin{matrix} & \begin{matrix} A & B \end{matrix} \\ \begin{pmatrix} 10 & 8 \\ 40 & 45 \end{pmatrix} & \begin{matrix} \text{B/W} \\ \text{C} \end{matrix} \end{matrix}$$

- (a) Koh, Min and Suman each have access to the printers A and B.  
Koh needs to print 24 black and white copies and 14 colour copies.  
Min needs to print 29 black and white copies and  $x$  colour copies.  
Suman needs to print 20 black and white copies and 15 colour copies.

Represent this information in a  $3 \times 2$  matrix Q.

Answer Q =  $\begin{pmatrix} & \\ & \\ & \end{pmatrix}$  [1]

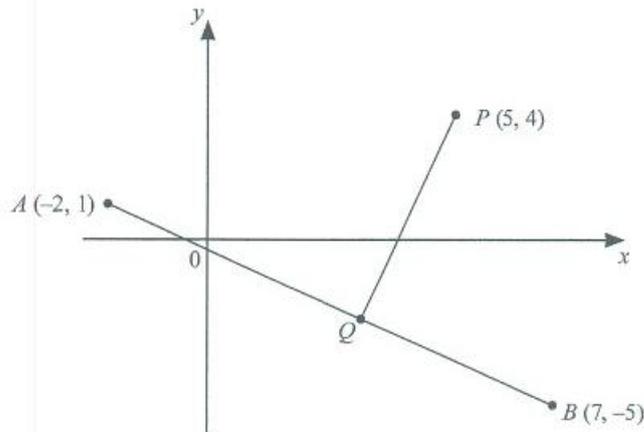
- (b) Find, in terms of  $x$ , the matrix  $T = QP$ .

Answer T = [2]

- (c) If Koh and Min both use printer A, Min would pay 70 cents less than Koh.  
Find the value of  $x$ .

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

22



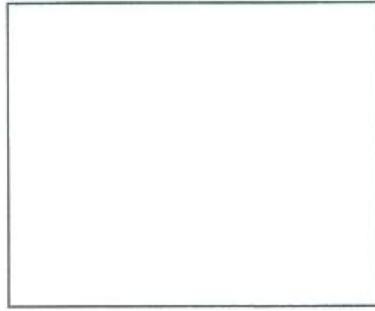
The diagram shows the points  $A(-2, 1)$ ,  $B(7, -5)$  and  $P(5, 4)$ .  
 $Q$  is a point on  $AB$  so that  $PQ$  is perpendicular to  $AB$ .

The product (gradient of  $PQ$ )  $\times$  (gradient of  $AB$ ) =  $-1$ .

Use this information to find the equation of the line  $PQ$ .

Answer ..... [4]

23



Scale: 1 cm represents  $n$  metres

The diagram shows the floor plan of Cheryl's rectangular bedroom. It is drawn to a scale of 1 cm represents  $n$  metres.

The actual area of the floor is  $19.2\text{m}^2$ .

(a) Using the plan, find the value of  $n$ .

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

(b) Cheryl decides to varnish the floor in her bedroom. The varnish she needs is sold in tins of three sizes.

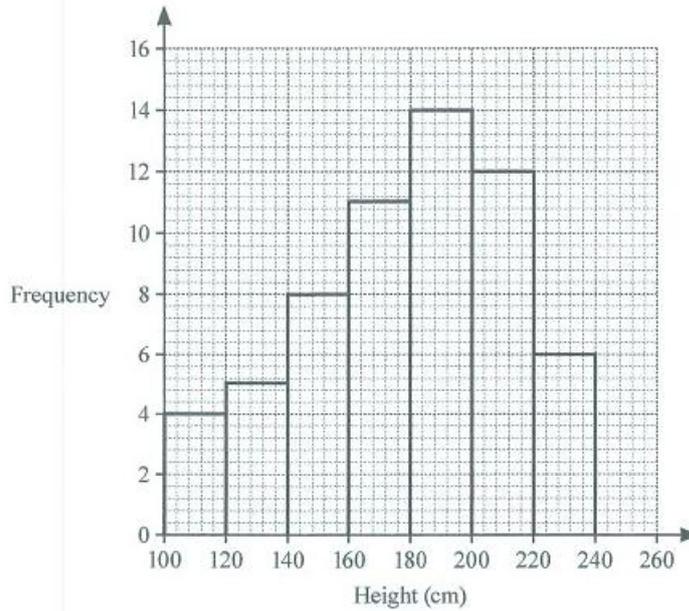
250 ml \$24.00	500 ml \$42.50	1 litre \$85.95
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1 litre of varnish covers  $16\text{m}^2$ .

Calculate the least amount of money that Cheryl needs to pay for the varnish.

Answer \$..... [3]

24 (a)



The histogram shows the distribution of the heights of 60 young trees.

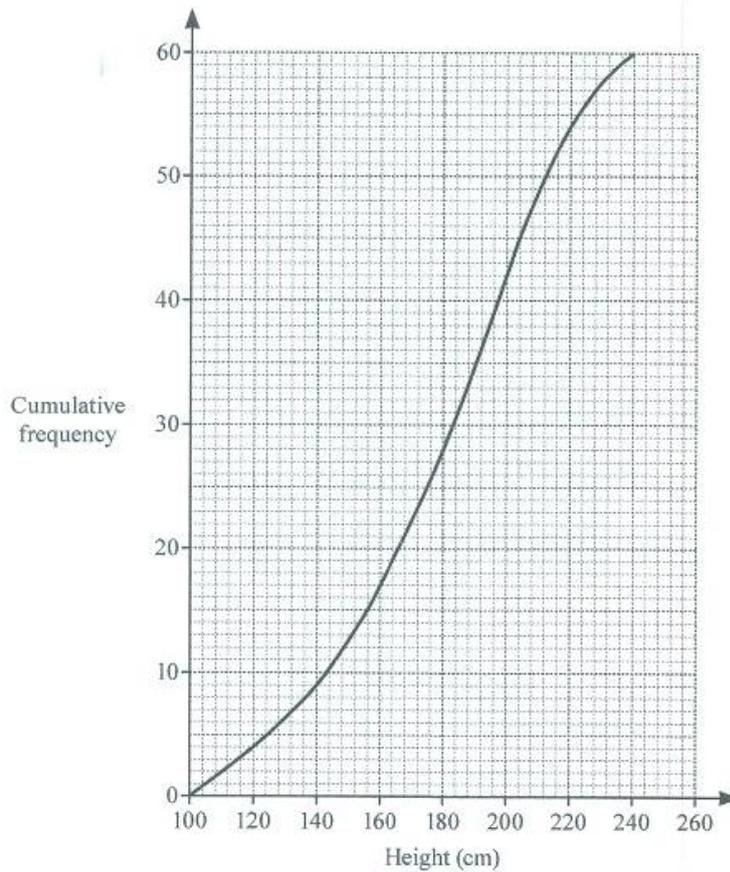
(i) Which interval contains the median height?

Answer ..... [1]

(ii) Calculate an estimate of the mean height of the trees.

Answer ..... cm [1]

(b)



The cumulative frequency graph also represents the heights of the 60 trees.

Use the graph to find

- (i) the number of trees with a height of at least 1.92 m,

Answer ..... [1]

- (ii) the interquartile range of the heights.

Answer ..... cm [1]

- (c) Another set of trees has heights with an interquartile range of 36 cm.

Explain what this tells us about the second set of trees compared with the first.

.....  
 ..... [1]

25 (a) The first four terms of a sequence are 8, 11, 14 and 17.

The sum of the first  $n$  terms of this sequence is given by  $pn^2 + qn$ .

(i) When  $n = 1$ ,  $p + q = 8$ .

Show that  $4p + 2q = 19$ .

*Answer*

[1]

(ii) Solve  $p + q = 8$   
 $4p + 2q = 19$ .

*Answer*  $p = \dots\dots\dots$

$q = \dots\dots\dots$  [3]

(b) The sum of the first  $n$  terms of a different sequence is given by  $3n^2 + 7n$ .

Find the 10th term of this sequence.

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