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

CANDIDATE NAME

CENTRE NUMBER | S | | | | |

INDEX NUMBER | | | | |

MATHEMATICS

Paper 1

4048/01

October/November 2017

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 π, use either your calculator value or 3.142, unless the question requires the answer in terms of π.

At the end of the examination, fasten all your work securely together.
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.

For Examiner's Use

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

CAMBRIDGE International Examinations

DC (ST/JG) 130019/3

[Turn over

Answer **all** the questions.

1 Given that $\frac{1}{81} = 3^k$, find k.

Answer $k =$ ..... [1]

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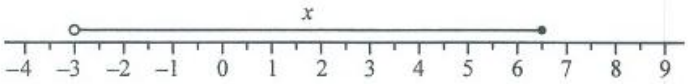
2 A range of values for x is represented on the number line below.



Write down inequalities that represent this range of values for x.

Answer ..... [1]

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3 The stem-and-leaf diagram shows the masses, in grams, of some apples.

19	1	4	5	5			
20	0	3	4	7	8	8	
21	0	1	4	7	7	8	9
22	4	6	8				

Key: 19 | 4 represents 194 grams

For these masses, find

(a) the range,

Answer ..... grams [1]

(b) the median.

Answer ..... grams [1]

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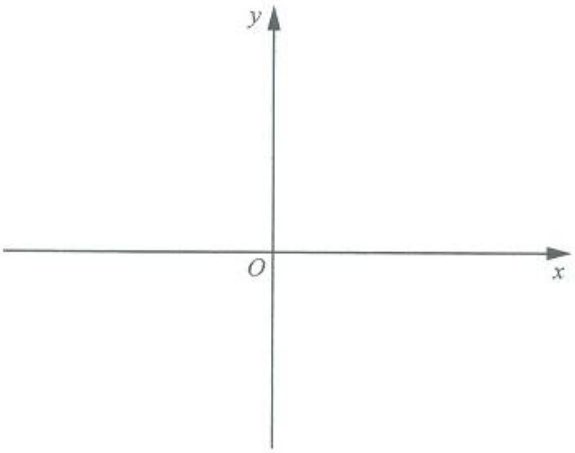
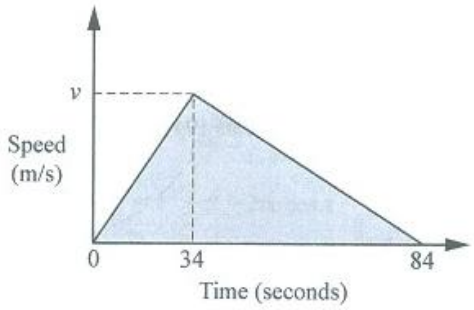
4 **Sketch** the graph of $y = -(x-8)(x+3)$ on the axes below.
Indicate clearly the values where the graph crosses the x- and y- axes.



[2]

5 The diagram shows the speed–time graph for a car's journey between two sets of traffic lights.
The shaded area represents the distance travelled.
The distance travelled is 693 m.



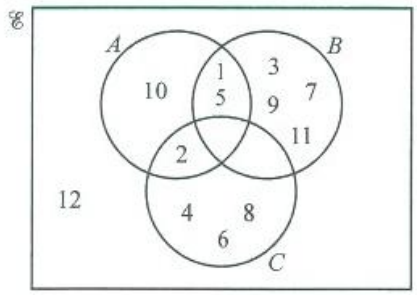
(a) Calculate the greatest speed, v m/s, of the car.

Answer $v =$ ..... m/s [1]

(b) Calculate the acceleration for the first 34 seconds of the journey.

Answer .....m/s^2 [1]

6 $\mathscr{E} = \{\text{integers } x : 1 \leqslant x \leqslant 12\}$
The Venn diagram shows the elements of $\mathscr{E}$ and three sets A, B and C.



Use one of the symbols below to complete each statement.

$\varnothing \quad \subset \quad \not\subset \quad \notin \quad \in \quad \mathscr{E}$

(a) $\{2, 10\}$ ..... A [1]

(b) 3 ..... B [1]

(c) $B \cap C =$ ..... [1]

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7 Parveen runs a squash club.
58 of the members are adults and 37 are children.
Her aim is that at least 70% of the members should be adults.

Work out the smallest number of adults that would need to join the club in order to achieve her aim.

Answer ..... [3]

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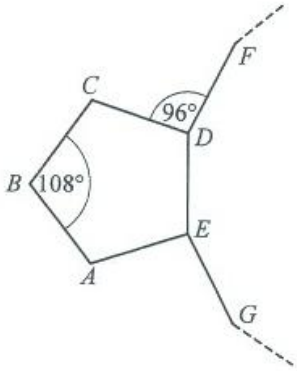
8 The diagram shows a regular pentagon, $ABCDE$, and three of the sides, GE, ED and DF, of a second regular polygon.
Angle $ABC = 108°$ and angle $CDF = 96°$.



Find the number of sides in the second regular polygon.

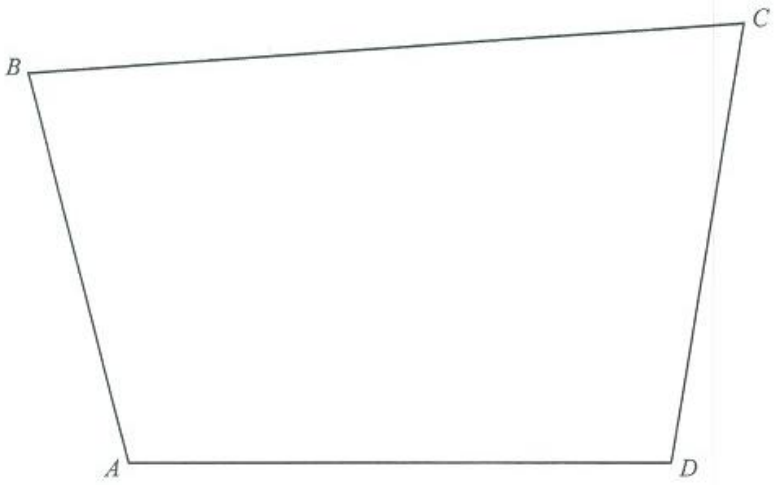
Answer ..... [3]

9 A solid cylinder has radius r cm and height h cm.
A solid hemisphere has radius r cm.
The volumes of the cylinder and hemisphere are equal.

Work out, in terms of r, the total surface area of the cylinder.

Answer ..... cm^2 [3]

10 The diagram represents a plot of land, $ABCD$, which is to be used for a park.



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

(b) Construct the bisector of angle ADC. [1]

(c) A café is to be built in the park, nearer to C than to B and nearer to AD than to CD.

Shade the region where the café is to be built. [1]

11 Solve $\frac{3x-4}{2} - \frac{2x}{3} = 1$.

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

12 ABC is a triangle.

$\overrightarrow{AB} = \begin{pmatrix} 5 \\ -1 \end{pmatrix}, \overrightarrow{AC} = \begin{pmatrix} -1 \\ 8 \end{pmatrix}$.

Calculate the length of BC.

Answer ..... units [3]

13 Nur invested a sum of money in an account paying compound interest at 2.5% per year.
After 4 years, the money had earned **total interest** of $674.79.

Calculate the sum of money Nur invested in the account.

Answer $ ..... [3]

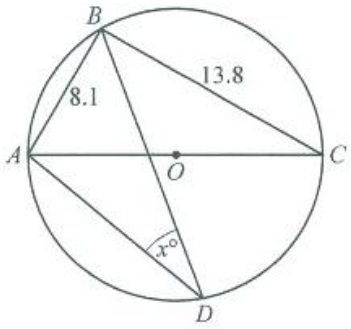
14 **(a)** Factorise completely $2x^2 - 5x - 12$.

Answer ..... [2]

(b) Hence factorise completely $2(2y-3)^2 - 5(2y-3) - 12$.
Write your answer as simply as possible.

Answer ..... [2]

15



In the diagram, A, B, C and D are points on a circle, centre O.
$AB = 8.1$ cm, $BC = 13.8$ cm and angle $BDA = x°$.

Find x.
Show your working and give reasons.

Answer $x =$ ..... [4]

---

16 A group of 200 adults took part in a challenge.
The table below shows the distribution of the times taken to complete the challenge.

Time (t minutes)	$20 < t \leqslant 30$	$30 < t \leqslant 40$	$40 < t \leqslant 50$	$50 < t \leqslant 60$	$60 < t \leqslant 70$
Number of adults	28	84	62	21	5

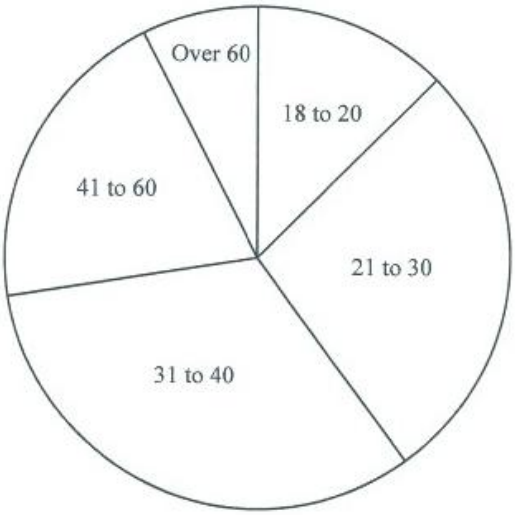
(a) Calculate an estimate of the mean time.

Answer ..... minutes [1]

(b) Calculate an estimate of the standard deviation of these times.

Answer ..... minutes [1]

(c) This **accurate** pie chart shows the age groups of a second group of adults taking part in the challenge.

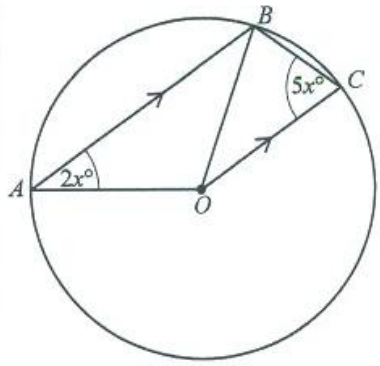


44 of the adults were aged 21 to 30 years old.

Find the number of adults that were aged 41 to 60 years old.

Answer ..... [2]

17



In the diagram, A, B and C are points on a circle, centre O.
OC is parallel to AB.
Angle $OAB = 2x°$ and angle $OCB = 5x°$.

Find x.

Answer $x =$ ..... [4]

---

18 **(a)** Use prime factors to explain why 28×63 is a perfect square.

Answer .....

..... [3]

(b) The number $28k$ is a perfect cube.

Find the smallest positive integer value of k.

Answer ..... [2]

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19 A tennis club charges by the hour for the hire of its courts.
In one week, courts are hired for 28 hours by children (C), for 170 hours by adults (A) and for 95 hours by senior citizens (S).
The next week the courts are hired for x hours by children, for 176 hours by adults and for 89 hours by senior citizens.

(a) Represent this information in a 2×3 matrix, **P**.

Answer $\mathbf{P} =$ C A S
$\begin{pmatrix} & & \\ & & \end{pmatrix}$ Week 1 / Week 2 [1]

(b) The charge for one hour's hire is \$3 for children, \$5 for adults and \$4 for senior citizens.

Find, in terms of x, the matrix $\mathbf{R} = \mathbf{P}\begin{pmatrix} 3 \\ 5 \\ 4 \end{pmatrix}$.

Answer $\mathbf{R} =$ [2]

(c) Explain what each element in matrix **R** represents.

Answer .....

..... [1]

(d) The total amount of money collected for the hire of the courts was the same for both weeks.

Calculate x.

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

20 In a sequence, the same number is subtracted each time to obtain the next term.
The first five terms of the sequence are

$$39 \quad p \quad q \quad r \quad 11 .$$

(a) Find the values of p, q and r.

Answer $p =$ .....

$q =$ .....

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

(b) Write down an expression for the nth term of this sequence.

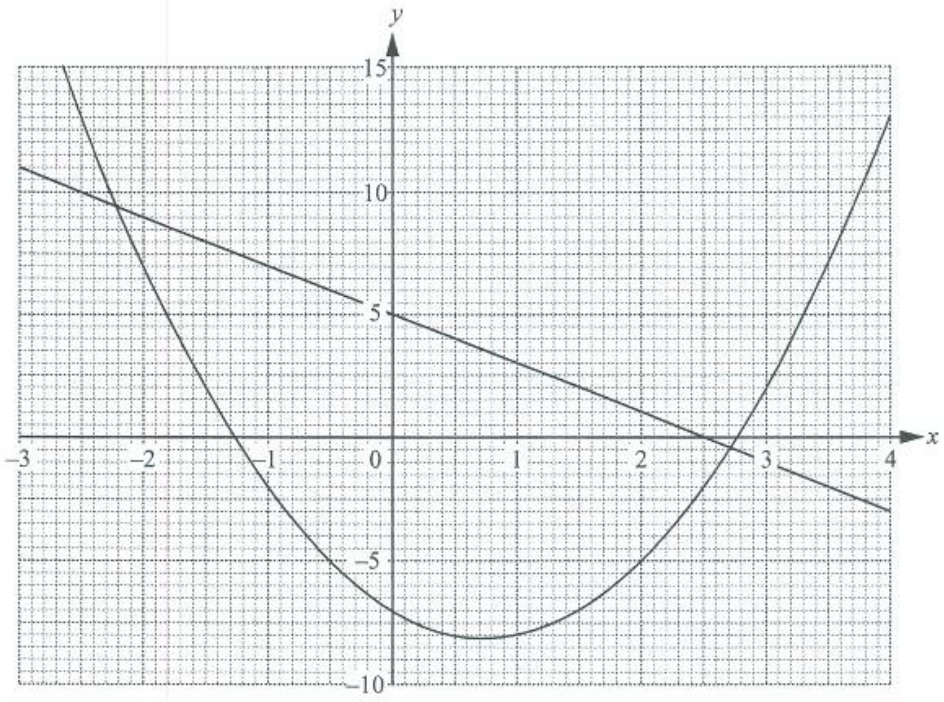
Answer ..... [2]

(c) Explain why -246 is not a term of this sequence.

Answer .....

..... [1]

21 The graphs of $y = 2x^2 - 3x - 7$ and $y = 5 - 2x$ are drawn on the grid.



(a) Explain why the equation $2x^2 - 3x - 7 = k$ does not have solutions for some values of k.

Answer .....

..... [1]

(b) The points of intersection of the curve and the straight line give the solutions of a quadratic equation.

Find the quadratic equation, giving your answer in the form $ax^2 + bx + c = 0$.

Answer ..... [1]

(c) The equation $2x^2 - 6x - 3 = 0$ can be solved by drawing a suitable straight line on the grid.

(i) Find the equation of the straight line.

Answer ..... [1]

(ii) By drawing this straight line, solve the equation $2x^2 - 6x - 3 = 0$.

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

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22 $A = \dfrac{b(c+2)}{5-c}$

(a) Calculate the value of A when $b = 12.17$ and $c = 1.615$.
Write your answer correct to two decimal places.

Answer ..... [2]

(b) Rearrange the formula to make c the subject.

Answer $c =$ ..... [4]

[Question 23 is printed on the next page]

23

A company manufactures three sizes of the same brand of shampoo.

(a) Show that the cost of the shampoo is **not** directly proportional to the quantity of shampoo.

Answer

[2]

(b) The bottles are all geometrically similar.
The height of the 250 ml bottle is 18.4 cm.

Calculate the height of the 75 ml bottle.

Answer ..... cm [3]