Cambridge IGCSE

Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CANDIDATE NAME	
CENTRE NUMBER	
CANDIDATE NUMBER	

4610588250

CAMBRIDGE INTERNATIONAL MATHEMATICS **0607/31**

Paper 3 (Core) **October/November 2017**

1 hour 45 minutes

Candidates answer on the Question Paper.

Additional Materials: Geometrical Instruments
Graphics Calculator

READ THESE INSTRUCTIONS FIRST

Write your Centre number, candidate number and name on all the work you hand in.
Write in dark blue or black pen.
Do not use staples, paper clips, highlighters, glue or correction fluid.
You may use an HB pencil for any diagrams or graphs.
DO **NOT** WRITE IN ANY BARCODES.

Answer **all** the questions.
Unless instructed otherwise, give your answers exactly or correct to three significant figures as appropriate.
Answers in degrees should be given to one decimal place.
For π, use your calculator value.
You must show all the relevant working to gain full marks and you will be given marks for correct methods, including sketches, even if your answer is incorrect.
The number of marks is given in brackets [ ] at the end of each question or part question.
The total number of marks for this paper is 96.

This document consists of **15** printed pages and **1** blank page.

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Formula List

Area, A, of triangle, base b, height h.	$A = \frac{1}{2}bh$
Area, A, of circle, radius r.	$A = \pi r^2$
Circumference, C, of circle, radius r.	$C = 2\pi r$
Curved surface area, A, of cylinder of radius r, height h.	$A = 2\pi rh$
Curved surface area, A, of cone of radius r, sloping edge l.	$A = \pi rl$
Curved surface area, A, of sphere of radius r.	$A = 4\pi r^2$
Volume, V, of prism, cross-sectional area A, length l.	$V = Al$
Volume, V, of pyramid, base area A, height h.	$V = \frac{1}{3}Ah$
Volume, V, of cylinder of radius r, height h.	$V = \pi r^2 h$
Volume, V, of cone of radius r, height h.	$V = \frac{1}{3}\pi r^2 h$
Volume, V, of sphere of radius r.	$V = \frac{4}{3}\pi r^3$

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Answer **all** the questions.

1 **(a)** Bijul and Samar work in a restaurant on Saturdays.

(i) One Saturday Bijul sells 280 hamburgers at \$1.50 each and 330 bags of fries at \$1.10 each.

Calculate the total amount of money Bijul receives.

\$ ..... [2]

(ii) Samar is paid \$12 per hour.

Work out how much she is paid for working 8 hours.

\$ ..... [1]

(iii) Bijul is paid \$15 per hour.

Work out Samar's pay per hour as a percentage of Bijul's pay per hour.

..... % [1]

(b) Bijul has \$15 to spend on cards.
Cards cost \$1.20 per packet.

Find the greatest number of packets Bijul can buy and how much change she receives.

..... packets of cards and \$ ..... change [3]

(c) Samar invests \$600 at a rate of 4% simple interest per year.

Calculate how much interest she will receive at the end of 5 years.

\$ ..... [2]

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2 **(a)** **(i)** The mean number of sweets in 9 bags is 35.

Show that the total number of sweets in all 9 bags is 315.

[1]

(ii) Another bag has 45 sweets.

Find the mean number of sweets in all 10 bags.

..... [2]

(b) Ad, Ben and Gal share 72 sweets.
They share the sweets in the ratio Ad : Ben : Gal = 5 : 4 : 3.

Work out the number of sweets that Ben receives.

..... [2]

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3 **(a)** Write 3562.845

(i) correct to 2 decimal places,

..... [1]

(ii) correct to 3 significant figures,

..... [1]

(iii) correct to the nearest hundred.

..... [1]

(b) Work out $\frac{284-632}{14}$.

Write your answer correct to the nearest whole number.

..... [2]

(c) Find the value of $\sqrt{156.25}$.

..... [1]

(d) Write 38% as a fraction in its simplest form.

..... [2]

(e) Complete the list of factors of 63.

1, ... , ... , ... , ... , 63 [2]

(f) Write the following in order of size, starting with the smallest.

$\frac{3}{5}$ 55% 0.59 0.5^2

..... < ..... < ..... < ..... [2]
smallest

4 Lucy plays a game with the cards below.

-2.7	1	$\frac{1}{3}$	27	$\frac{8}{9}$
5.8	-5	$-\frac{5}{6}$	7	9

(a) From these numbers, write down

(i) a positive integer,

..... [1]

(ii) a square number,

..... [1]

(iii) a prime number.

..... [1]

(b) The 10 cards are turned over to hide the numbers and one card is chosen at random.

Find the probability that the number is

(i) negative,

..... [1]

(ii) even,

..... [1]

(iii) less than 1.

..... [1]

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5 24 students each recorded the number of hours of voluntary service they completed during one year. The results are shown in the table.

Number of hours	30	40	50	60	70	80
Number of students	9	5	4	1	2	3

(a) For the number of hours completed, find

(i) the range,

..... hours [1]

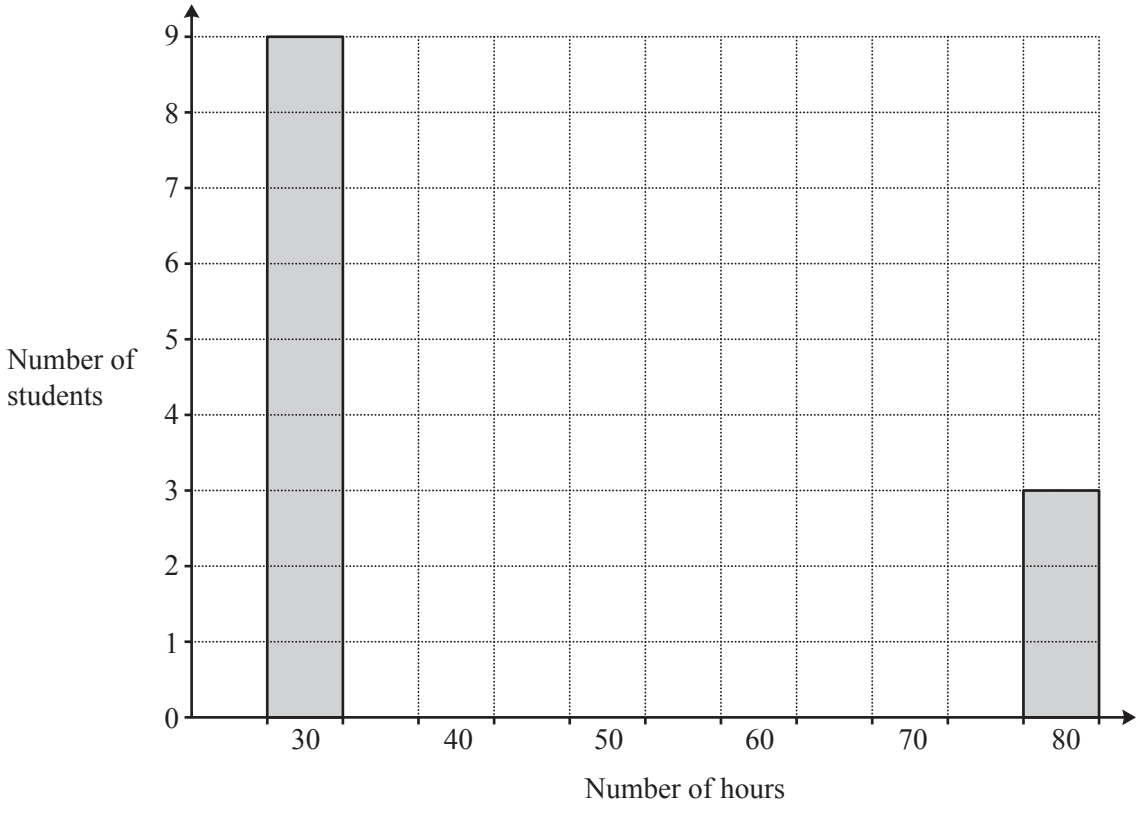
(ii) the mode.

..... hours [1]

(b) Find the mean number of hours completed by a student.

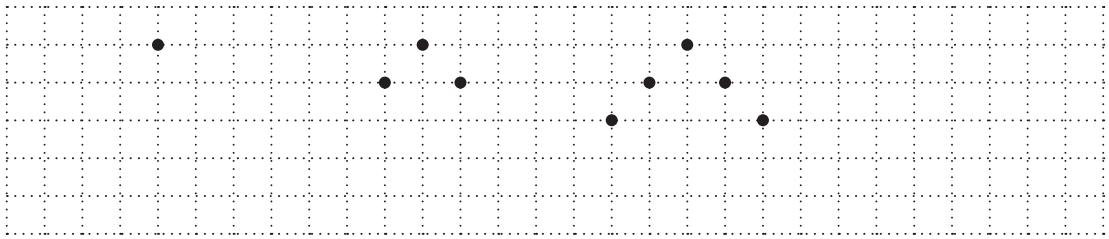
..... hours [2]

(c) Complete the bar chart.



[2]

6 Here is a pattern of shapes.



Pattern 1 Pattern 2 Pattern 3 Pattern 4

(a) In the space above, draw Pattern 4. [1]

(b) Complete the table.

Pattern number	1	2	3	4	5
Number of dots	1	3			

[2]

(c) Find an expression for the number of dots in Pattern n.

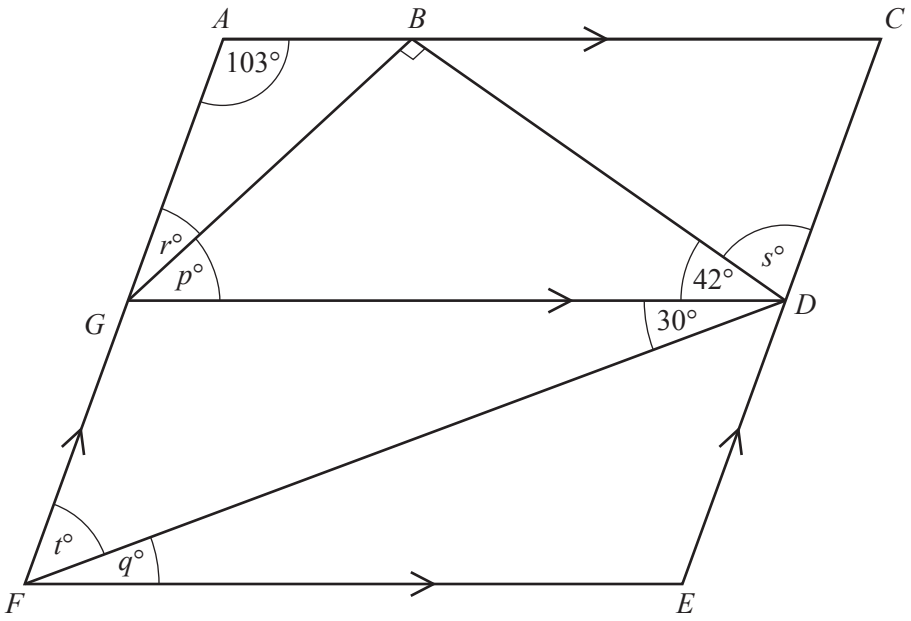
..... [2]

(d) Use your expression in **part (c)** to find the number of dots in Pattern 18.

..... [2]

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NOT TO SCALE

ABC, *GD* and *FE* are parallel lines.
AGF and *CDE* are also parallel lines.

Find the values of p, q, r, s and t.

$p =$ .....

$q =$ .....

$r =$ .....

$s =$ .....

$t =$ ..... [5]

8 400 students each took a mathematics test.
The results are shown in the table below.

Mark (x)	Frequency
$10 < x \leqslant 20$	10
$20 < x \leqslant 30$	30
$30 < x \leqslant 40$	40
$40 < x \leqslant 50$	60
$50 < x \leqslant 60$	120
$60 < x \leqslant 70$	60
$70 < x \leqslant 80$	30
$80 < x \leqslant 90$	30
$90 < x \leqslant 100$	20

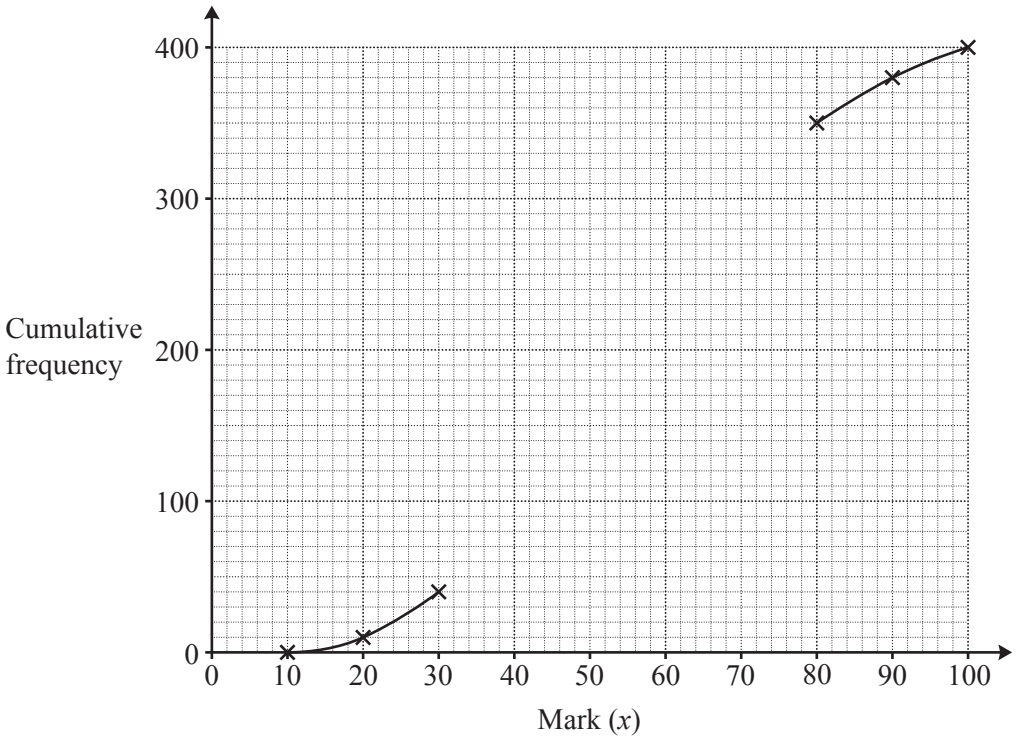
(a) Complete the cumulative frequency table for this data.

Mark (x)	Cumulative frequency
$x \leqslant 20$	10
$x \leqslant 30$	40
$x \leqslant 40$	
$x \leqslant 50$	
$x \leqslant 60$	
$x \leqslant 70$	
$x \leqslant 80$	350
$x \leqslant 90$	380
$x \leqslant 100$	400

[2]

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(b) Complete the cumulative frequency curve.



[2]

(c) Use your curve to find

(i) the median mark,

..... [1]

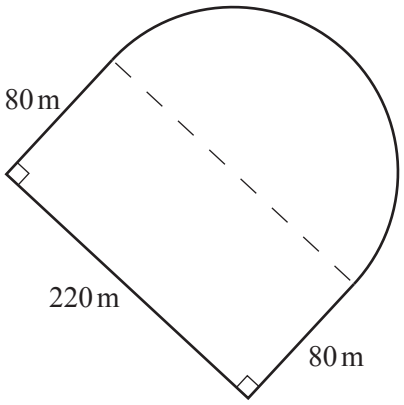
(ii) the inter-quartile range,

..... [2]

(iii) the number of students with a mark greater than 75.

..... [2]

9



NOT TO SCALE

A path is made up of three straight lines and the arc of a semicircle.

(a) Write down the length of the diameter of the semicircle.

..... m [1]

(b) Find the length of the arc of the semicircle.

..... m [2]

(c) Find the total length of the path.

..... m [1]

(d) Kumi walks at an average speed of 4.5 km/h.

Work out the time it takes him to walk the whole length of the path.

..... minutes [2]

(e) Calculate the total area enclosed by the path.

..... m^2 [3]

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10 Daisuke is given the following directions.

- Start at *A*.
- Face North and then turn clockwise through 150°.
- Walk 225 metres in a straight line to point *B*.
- Face North and then turn 60° clockwise.
- Walk 270 metres in a straight line to point *C*.

(a) Draw a sketch to show this information.
On the sketch, label *B* and *C* and mark the angles and distances.



[4]

(b) Angle *ABC* is a right angle.
Use Pythagoras' Theorem to calculate the distance *AC*.

AC ..... m [2]

(c) Use trigonometry to help you work out the bearing of *C* from *A*.

..... [3]

11 **(a)** Solve.

$$3x + 5 = x - 3$$

$x =$ ..... [2]

(b) Expand the brackets and simplify.

$$(x - 1)(x + 3)$$

..... [2]

(c) Factorise completely.

$$x^2y^3 - 3xy$$

..... [2]

(d) **(i)** $a^4 \times a^p = a^{12}$

Find the value of p.

$p =$ ..... [1]

(ii) $\dfrac{b^q}{b^4} = b^{12}$

Find the value of q.

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

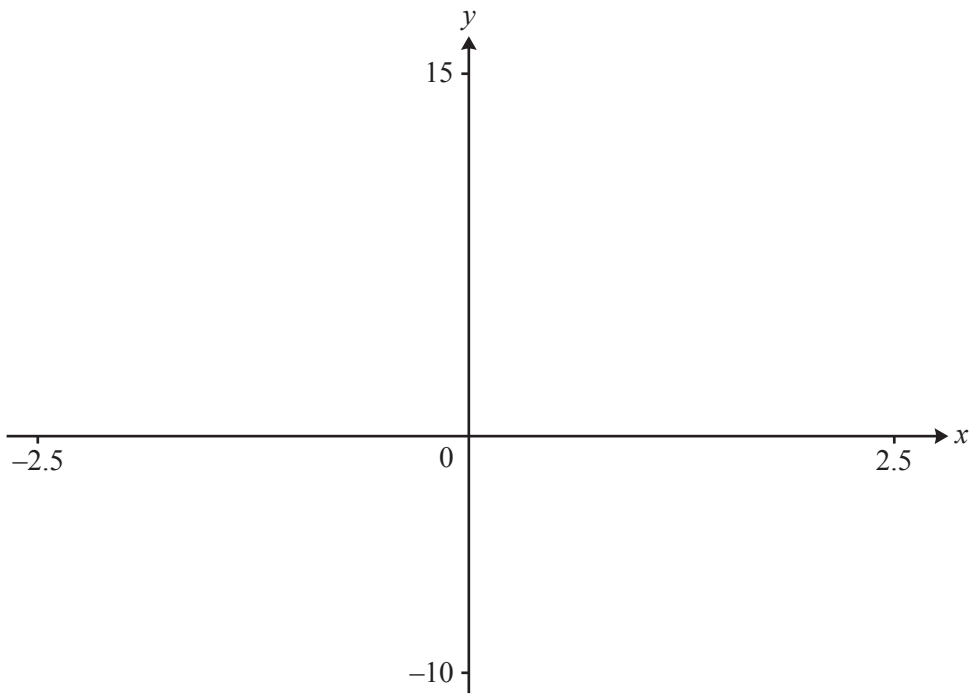
(e) Simplify.

$$\frac{2y}{3} - \frac{3y}{5}$$

..... [2]

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$f(x) = 3x^2 - 1.5x - 9$

(a) On the diagram, sketch the graph of $y = f(x)$ for $-2.5 \leqslant x \leqslant 2.5$. [2]

(b) Find the co-ordinates of the points where the graph cuts

(i) the x-axis,

(..... , ...) and (..... , ...) [2]

(ii) the y-axis.

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

(c) Find the co-ordinates of the local minimum point.

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

(d) Find the x co-ordinates of the two points of intersection of the graph of $y = f(x)$ and the line $y = 5$.

$x =$ ..... and $x =$ ..... [2]

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