Cambridge IGCSE

Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CANDIDATE NAME	
CENTRE NUMBER	
CANDIDATE NUMBER	

9891348022

CAMBRIDGE INTERNATIONAL MATHEMATICS **0607/31**

Paper 3 (Core) **May/June 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, 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 **16** printed pages.

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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.	$V = \frac{4}{3}\pi r^3$

Answer **all** the questions.

1 **(a)** What type of number is 7?
Give **two** possible mathematical words to describe it.

..... and ..... [2]

(b) **(i)** Write down a multiple of 7.

..... [1]

(ii) Write 7% as a fraction.

..... [1]

(iii) Work out.

$7 + 7^2 + 7^3$

..... [1]

(c) Write

(i) $\frac{1}{7}$ as a decimal, correct to 2 decimal places,

..... [2]

(ii) $\sqrt{7}$ as a decimal, correct to 3 significant figures,

..... [2]

(iii) 7^7 in standard form.

..... [2]

2 Rin asked some people how many pets they each have.
The results are shown in the table.

Number of pets	0	1	2	3	4	5
Number of people	14	45	18	11	7	5

(a) Find the number of people that Rin asked.

..... [1]

(b) Find how many more people have 1 pet than have 2 pets.

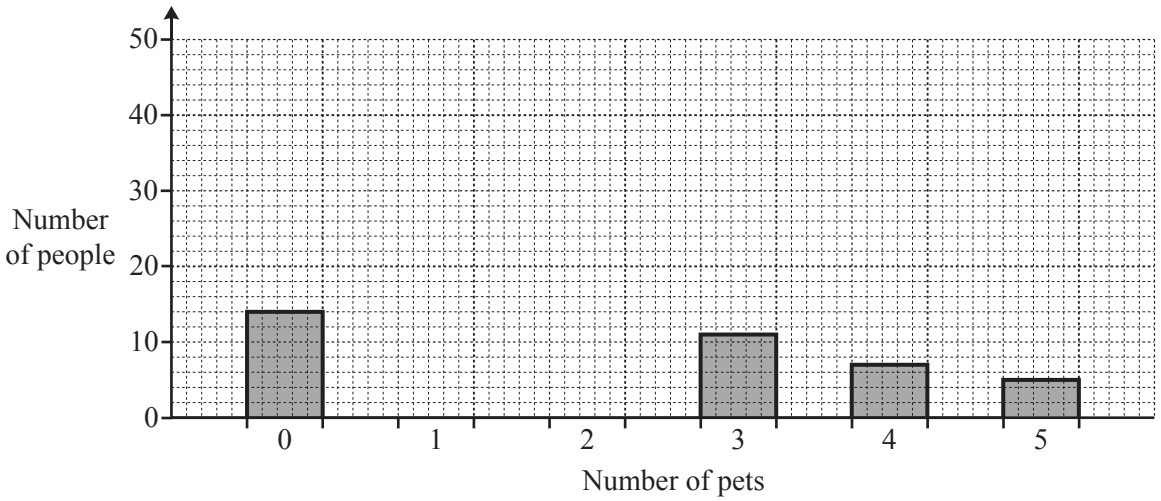
..... [1]

(c) One of the people is chosen at random.

Work out the probability that this person has 1 pet.
Give your answer as a fraction in its simplest form.

..... [2]

(d) Complete the bar chart.



[2]

3 The price of a game of golf at each of two golf clubs is shown below.

The Forest golf club	**The Valley golf club**
Each game $13.50	One game for $15 Buy 6 games and get the 7th game free

(a) (i) Find how much it costs to play 7 games at The Forest golf club.

$..... [1]

(ii) Find how much it costs to play 7 games at The Valley golf club.

$..... [1]

(iii) Find which golf club is cheaper for 7 games, and by how much.

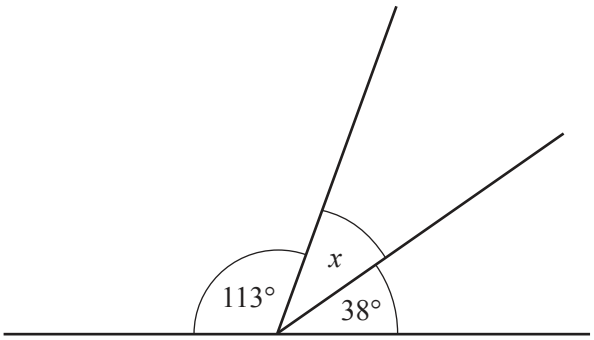
..... is cheaper by $..... [1]

(b) Jason is given $200 to spend playing golf at The Forest golf club.

Find the greatest number of games he can play.
Show all your working.

..... [3]

4 **(a)** Here are three angles on a straight line.

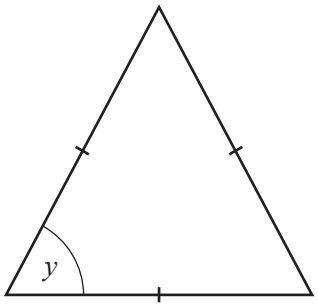


NOT TO SCALE

Work out the size of angle x.

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

(b)



NOT TO SCALE

(i) Write down the mathematical name for this triangle.

..... [1]

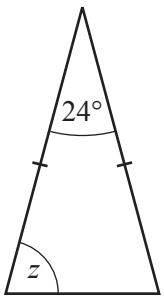
(ii) Find the size of angle y.

$y =$ ..... [2]

(iii) Write down the number of lines of symmetry this triangle has.

..... [1]

(c)



NOT TO SCALE

Work out the size of angle z.

$z =$ ..... [2]

5 Write each of these as a single power of x.

(a) $x^7 \times x^4$

..... [1]

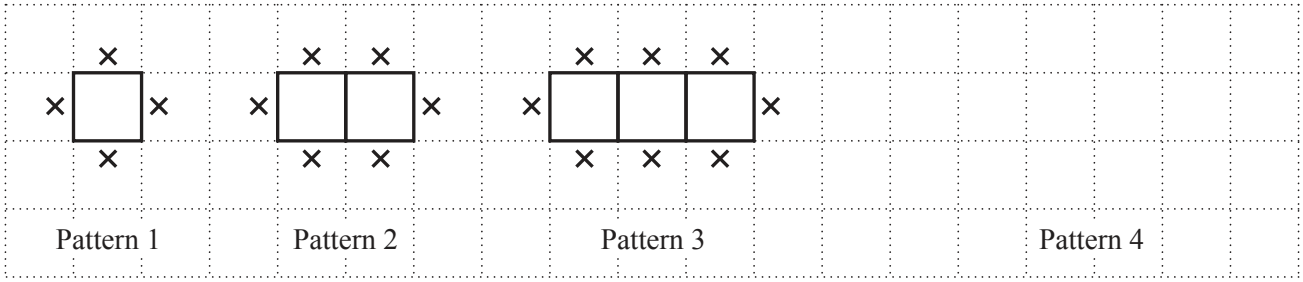
(b) $\frac{x^{10}}{x^2}$

..... [1]

(c) $(x^6)^3$

..... [1]

6 **(a)** Here is a sequence of patterns using squares and crosses.



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

(ii) Find the number of crosses in Pattern 5.

..... [1]

(b) These are the first three terms of another sequence.

1 2 4

Find two **different** sequences that could have 1, 2 and 4 as their first three terms.
In each case, write down the next three terms and the rule for continuing the sequence.

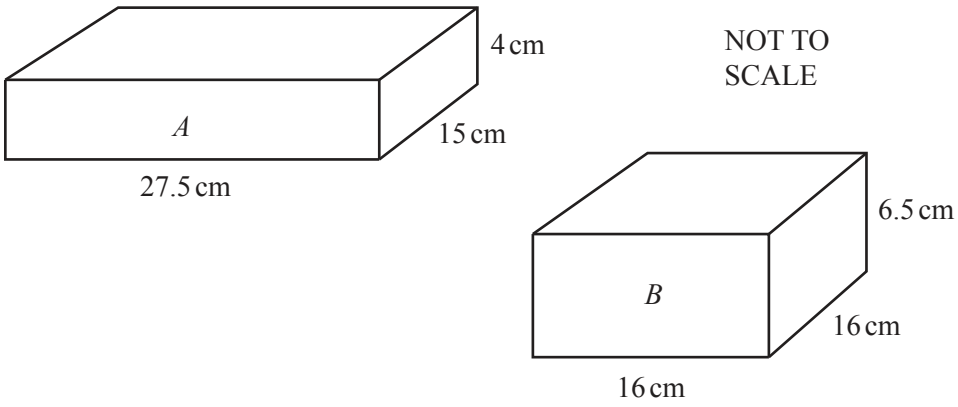
1 , 2 , 4 , ... , ... , ...

Rule .....

1 , 2 , 4 , ... , ... , ...

Rule ..... [6]

7



A company sells tissues in two different boxes, *A* and *B*.
Each box is a cuboid.

(a) Find the difference between the volumes of the two boxes.

..... cm^3 [4]

(b) The total surface area of box *A* is 1165 cm^2.

Show that the total surface area of box *B* is approximately 80% of the total surface area of box *A*.

[5]

8 **(a)** Work out the value of $5a - 4b$ when $a = 3$ and $b = 2$.

..... [2]

(b) Factorise completely.

$$3x^2 - 9x$$

..... [2]

(c) Solve.

(i) $4x + 5 = 13$

..... [2]

(ii) $3(x - 4) = 15$

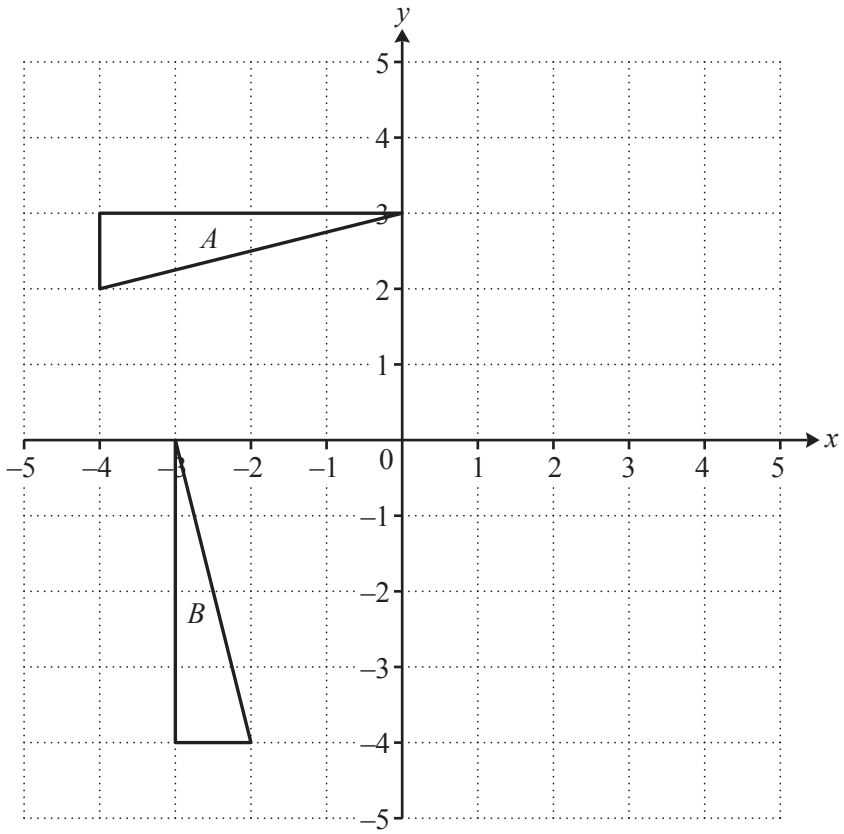
..... [2]

(d) Rearrange this formula to make A the subject.

$$F = 2A + B$$

$A =$ ..... [2]

9



(a) Describe fully the **single** transformation that maps triangle *A* onto triangle *B*.

.....

..... [3]

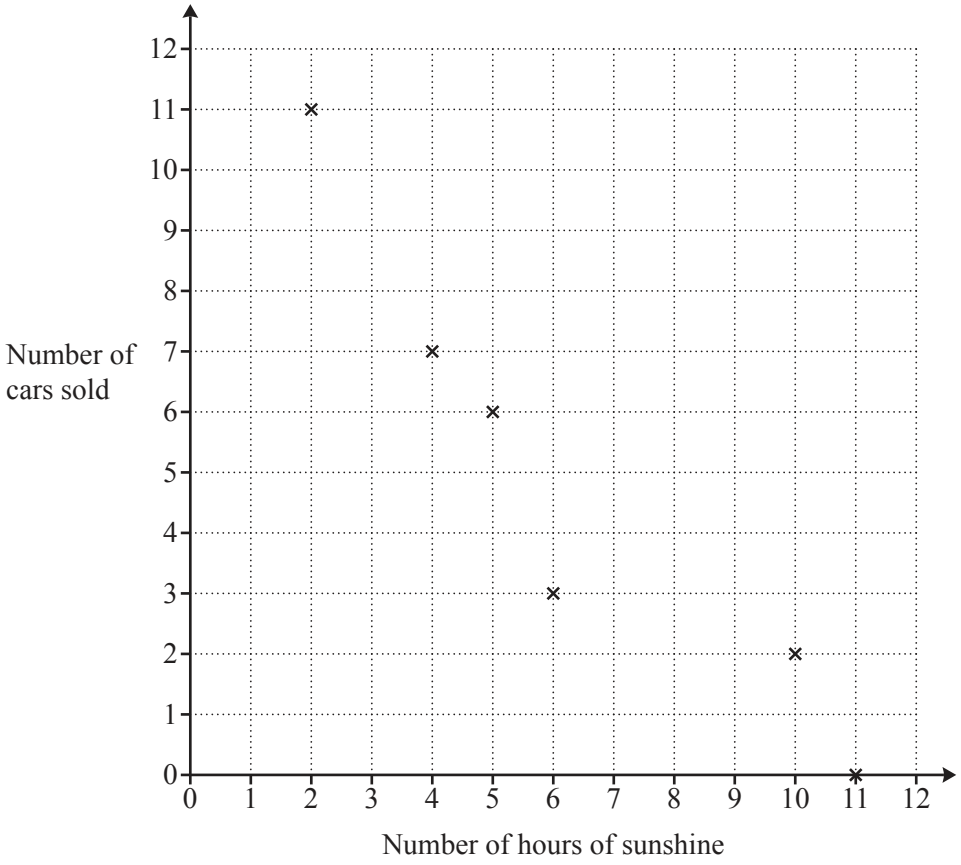
(b) On the grid, translate triangle *A* by the vector $\begin{pmatrix} 4 \\ 1 \end{pmatrix}$.
Label the image *C*. [2]

(c) On the grid, reflect triangle *B* in the line $x = 1$.
Label the image *D*. [2]

10 Tariq sells cars.
For each of ten days he records the number of cars sold and the number of hours of sunshine.
His results are shown in the table.

Number of hours of sunshine	6	5	2	10	11	4	8	2	5	7
Number of cars sold	3	6	11	2	0	7	2	12	7	5

(a) Complete the scatter diagram to show this information.
The first 6 points have been plotted for you.



[2]

(b) What type of correlation is shown in your diagram?

..... [1]

(c) Calculate

(i) the mean number of hours of sunshine,

..... hours [1]

(ii) the mean number of cars sold.

..... [1]

(d) On the diagram, draw a line of best fit. [2]

(e) Use your line of best fit to estimate the number of cars sold on a day when there are 3 hours of sunshine.

..... [1]

(f) This table shows the number of cars Tariq sold each week for one year.

Number of cars sold	Number of weeks
0 to 20	12
21 to 40	17
41 to 60	15
61 to 80	7
81 to 100	1

(i) Write down the modal class of the number of cars sold.

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

(ii) Find the largest possible range and the smallest possible range of the number of cars sold.

Largest range .....

Smallest range ..... [2]

11 **(a)** Tammi travels 7 km at an average speed of 30 km / h.

Find the number of minutes this journey takes.

..... minutes [2]

(b) When the speed limit is 50 km / h, Tammi travels at a speed 8% below this limit.

Find the speed at which Tammi travels.

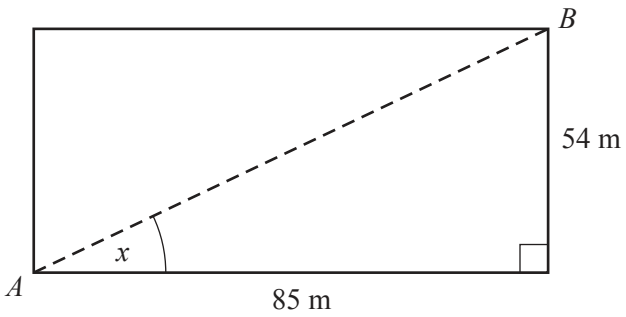
..... km / h [2]

(c) In a town, there are 208 roads.
The speed limit on the roads is either 30 km / h or 50 km / h.
The ratio number of 30 km / h roads : number of 50 km / h roads = 11 : 2.

Calculate the number of 30 km / h roads.

..... [2]

12 The diagram shows a rectangular field.



NOT TO SCALE

(a) Find how much further it is from A to B when walking along two sides of the field rather than straight across the field.

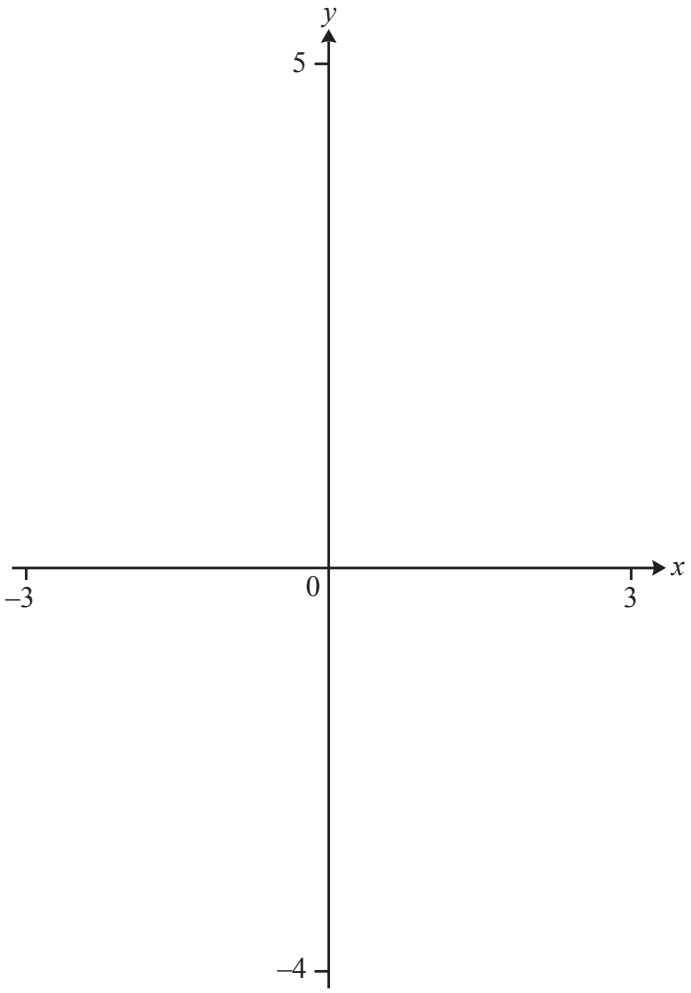
..... m [4]

(b) Use trigonometry to calculate angle x.

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

Question 13 is printed on the next page.

13



(a) On the diagram, sketch the graph of $y = 2^x - 3$ for values of x from $x = -3$ to $x = 3$. [2]

(b) On the diagram, sketch the graph of $y = \frac{1}{x}$ for values of x from $x = -3$ to $x = 3$. [2]

(c) Find the x co-ordinates of the points of intersection of

$$y = 2^x - 3 \quad \text{and} \quad y = \frac{1}{x}.$$

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