Cambridge IGCSE

Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CANDIDATE NAME	
CENTRE NUMBER	
CANDIDATE NUMBER	

6607853333

CAMBRIDGE INTERNATIONAL MATHEMATICS **0607/31**

Paper 3 (Core) **October/November 2018**

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 **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)** **(i)** Write 88% as a decimal.

..... [1]

(ii) Write 0.3 as a fraction.

..... [1]

(iii) Shade 60% of this diagram.

[1]

(b) Find the value of

(i) 6^3,

..... [1]

(ii) $\sqrt{6.4}$, giving your answer correct to 1 decimal place,

..... [2]

(iii) $\dfrac{489}{21.2+8.8}$.

..... [1]

(c) Complete the list of factors of 12.

1 , ... , ... , ... , ... , 12 [1]

2 One day, Pat and Terry walk to school.

(a) It takes Pat 10 minutes 7 seconds to walk to school.
It takes Terry 14 minutes 49 seconds to walk to school.

(i) Who takes the least time and by how much?

..... takes the least time by ..... minutes ..... seconds [1]

(ii) When Pat left home, her watch showed this time.

Hours	Minutes	Seconds
7	58	45

What time did the watch show when Pat arrived at school?

Hours	Minutes	Seconds
.....	.....	.....

[2]

(b) Pat lives 0.78 km from school.

Terry lives $\frac{7}{8}$ km from school.

Work out who lives closer to school and by how much.
Give your answer in metres.

..... lives closer by ..... metres [2]

(c) One day Pat takes 1180 steps on her way to school.
The next day she takes 15% more steps.

Work out how many **more** steps she takes.

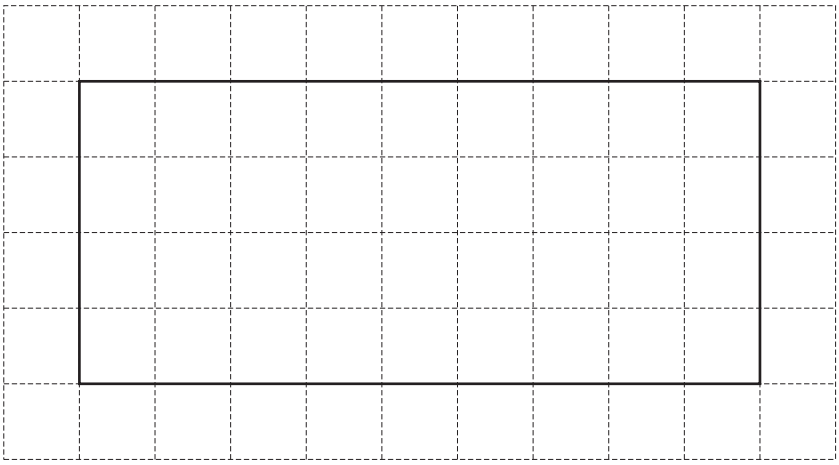
..... [1]

(d) On a different day Pat takes 1240 steps on her way to school and Terry takes 1400 steps.

Write the ratio 1240 : 1400 in its simplest form.

..... : ..... [2]

3 Here is a rectangle drawn on a 1 cm^2 grid.



(a) Work out the perimeter and the area of the rectangle.

Perimeter = ... cm

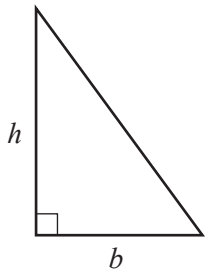
Area = ... cm^2 [2]

(b) A square has the same **area** as the rectangle.

Work out the length of one side of the square.

..... cm [2]

(c)



NOT TO SCALE

Work out a value for b and a value for h so that this triangle has the same area as the rectangle.

b = ... cm

h = ... cm [3]

4 **(a)** Here are the first four terms of a sequence.

1 4 7 10

(i) Write down the next two terms of this sequence.

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

(ii) Write down the rule to find the next term.

..... [1]

(b) Here are the first four terms of another sequence.

80 40 20 10

Write down the next **four** terms of this sequence.

..... , ... , ... , ... [2]

(c) Here are the first five terms of a different sequence.

1 3 5 7 9

(i) Find the nth term.

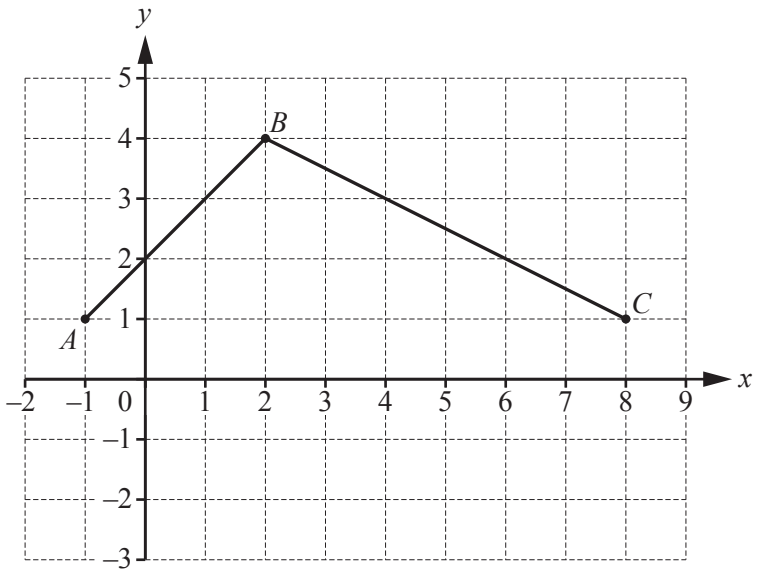
..... [2]

(ii) Explain why multiplying together any two terms in this sequence gives an answer that is also a term in the sequence.

.....

..... [1]

5



(a) Write down the co-ordinates of

(i) point B,

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

(ii) point A.

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

(b) $ABCD$ is a kite.

(i) On the grid, plot the point D and complete the kite. [1]

(ii) Write down the co-ordinates of point D.

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

(c) On the grid, draw the line of symmetry of the kite. [1]

(d) The equation of the line BC is $2y + x = 10$.

(i) Rearrange $2y + x = 10$ to make y the subject.

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

(ii) Write down the gradient of the line BC.

..... [1]

(e) The equation of the line AB is $y = x + 2$.

Write down the equation of the line parallel to AB, passing through the point $(0, -4)$.

..... [2]

6 **(a)** **(i)** Work out the value of $9y + 12$ when $y = 5$.

..... [1]

(ii) Factorise $9y + 12$.

..... [1]

(b) Solve these equations.

(i) $\frac{x}{2} = 8$

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

(ii) $3x - 5 = 7$

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

(c) Multiply out the brackets and simplify.

$(x + 3)(x + 2)$

..... [2]

(d) Write down the value of x^0.

..... [1]

(e) Simplify fully.

(i) $t^5 \times t^3$

..... [1]

(ii) $(p^4)^2$

..... [1]

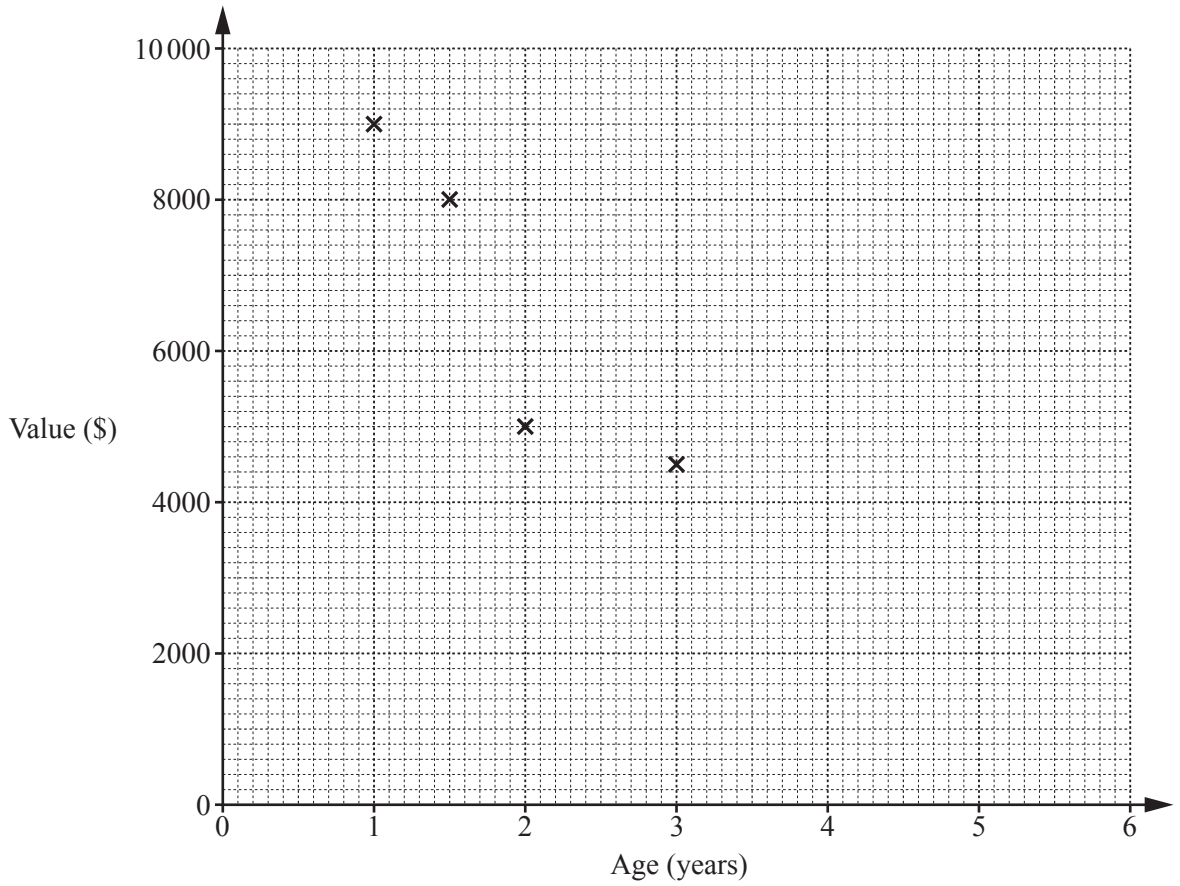
(iii) $\frac{18y^9}{6y^3}$

..... [2]

7 The table shows how the value of a car changes as it gets older.

Age (years)	1	1.5	2	3	4	4.5	5	6
Value ($)	9000	8000	5000	4500	3000	2500	2000	2000

(a) Complete the scatter diagram.
The first four points have been plotted for you.



[2]

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

..... [1]

(c) **(i)** Find the mean age and the mean value.

Mean age = ... years

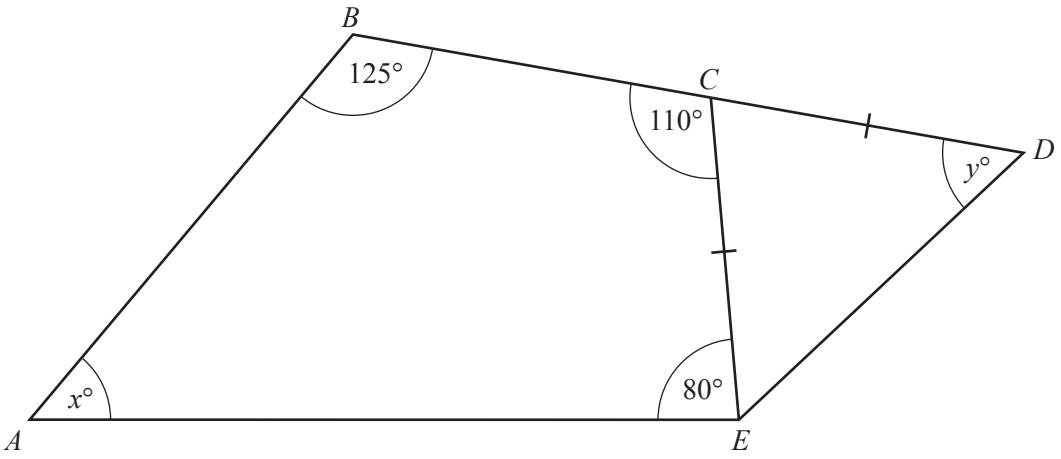
Mean value = $ ..... [2]

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

(d) Use your line of best fit to estimate the value of the car when it was 2.5 years old.

$ ..... [1]

8 **(a)** In the diagram, BCD is a straight line and $CE = CD$.



NOT TO SCALE

Work out the value of

(i) x,

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

(ii) y.

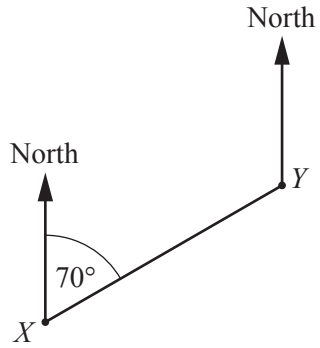
$y =$ ..... [2]

(b) On a map, two towns are 8.5 cm apart.
The scale of the map is 1 centimetre represents 5 kilometres.

Work out the actual distance between the two towns.

..... km [1]

(c)



NOT TO SCALE

The bearing of Y from X is 070°.

Work out the bearing of X from Y.

..... [2]

9 A bag contains black counters, white counters and red counters only.
Tam takes a counter, at random, from the bag.
He records the colour of the counter and then replaces the counter in the bag.
He does this 500 times.
The table below shows his results.

Colour of counter	Black	White	Red
Number of times	163	128	209

(a) Complete the relative frequency table below.
Give each of your answers as a decimal.

Colour of counter	Black	White	Red
Relative frequency			

[2]

(b) Tam chooses another counter from the bag at random.

Work out an estimate of the probability that it is either black or white.

..... [2]

(c) There is a total of 24 counters in the bag.

Work out an estimate of the number of red counters.

..... [2]

10 **(a)** Work out $(8.4 \times 10^3) \times (1.5 \times 10^{-8})$, giving your answer

(i) in standard form,

..... [1]

(ii) as an ordinary number.

..... [1]

(b) The Sun is a sphere of radius 696 000 km.

(i) Write 696 000 in standard form.

..... [1]

(ii) Work out the surface area of the Sun.
Write your answer in standard form correct to 2 significant figures.

.....km^2 [3]

[Turn over

11 Nur recorded the distance, d cm, that 100 people each sit from their computer screen. The table shows her results.

Distance from screen (d cm)	Frequency
$30 < d \leqslant 40$	4
$40 < d \leqslant 50$	50
$50 < d \leqslant 60$	27
$60 < d \leqslant 70$	16
$70 < d \leqslant 80$	3

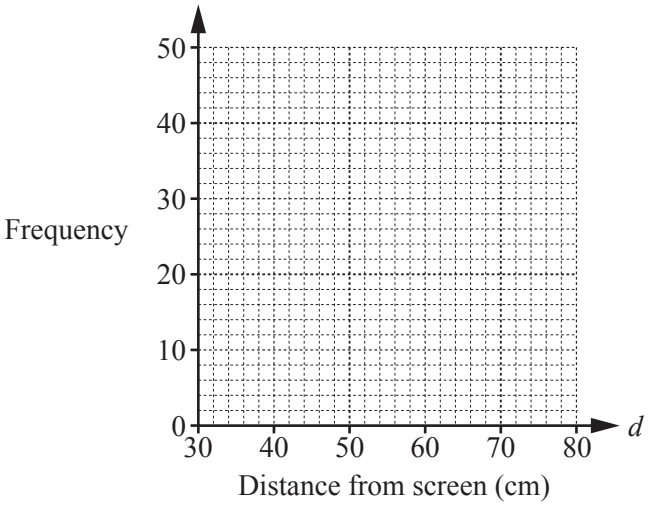
(a) Write down the modal class.

..... $< d \leqslant$ ..... [1]

(b) Work out an estimate of the mean distance.

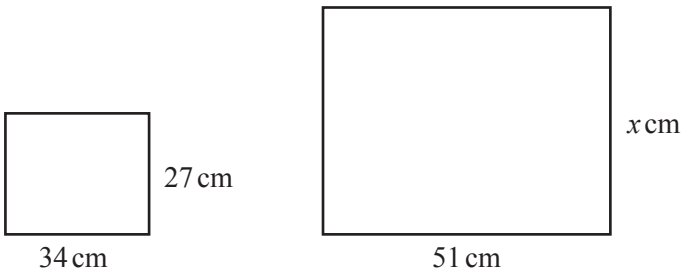
..... cm [2]

(c) Draw a bar chart to show this data.



[2]

12



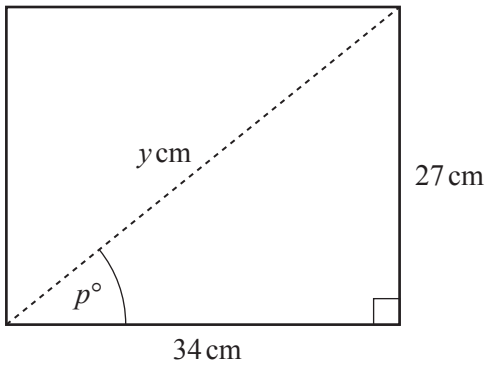
NOT TO SCALE

The diagram shows two rectangular computer screens.
The screens are mathematically similar.

(a) Find the value of x.

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

(b)



NOT TO SCALE

For the smaller computer screen, work out

(i) the value of y,

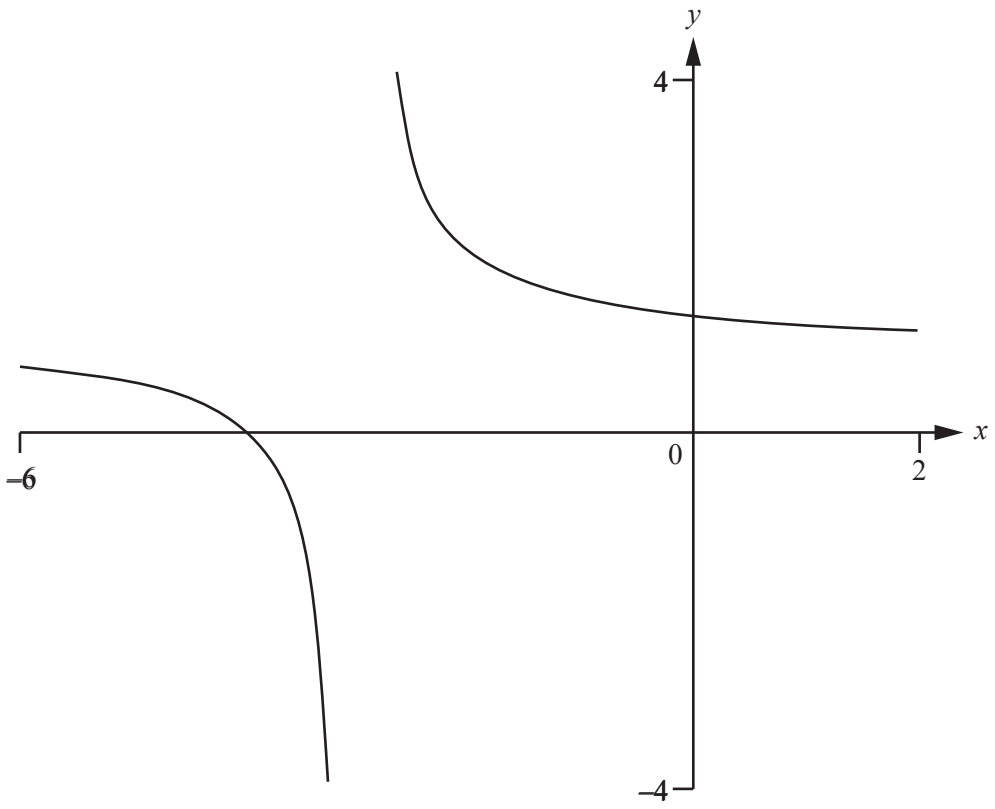
$y =$ ..... [2]

(ii) the value of p.

$p =$ ..... [2]

Question 13 is printed on the next page.

13 Here is a sketch of the graph $y = \frac{x+4}{x+3}$ for values of x between −6 and 2.



(a) (i) On the sketch, draw the asymptotes for this graph. [1]

(ii) Find the equation of each asymptote you have drawn.

.....

..... [2]

(b) Solve the equation $\frac{x+4}{x+3} = 3$.

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

(c) Describe fully the **single** transformation that maps the graph of

$y = \frac{x+4}{x+3}$ onto the graph of $y = \frac{x+4}{x+3} - 1$.

..... [2]