Cambridge IGCSE

Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CANDIDATE NAME	
CENTRE NUMBER	
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CAMBRIDGE INTERNATIONAL MATHEMATICS **0607/42**

Paper 4 (Extended) **October/November 2016**

2 hours 15 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.
Answer 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 120.

Formula List

For the equation $ax^2 + bx + c = 0$ $\quad x = \dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

Curved surface area, A, of cylinder of radius r, height h. $\quad A = 2\pi rh$

Curved surface area, A, of cone of radius r, sloping edge l. $\quad A = \pi rl$

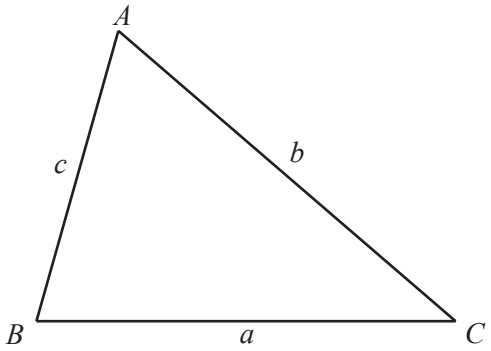
Curved surface area, A, of sphere of radius r. $\quad A = 4\pi r^2$

Volume, V, of pyramid, base area A, height h. $\quad V = \frac{1}{3}Ah$

Volume, V, of cylinder of radius r, height h. $\quad V = \pi r^2 h$

Volume, V, of cone of radius r, height h. $\quad V = \frac{1}{3}\pi r^2 h$

Volume, V, of sphere of radius r. $\quad V = \frac{4}{3}\pi r^3$



$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

$$a^2 = b^2 + c^2 - 2bc\cos A$$

$$\text{Area} = \frac{1}{2}bc\sin A$$

Answer **all** the questions.

1 The number of matches in each of 140 matchboxes are counted.
The table shows the results.

Number of matches	168	169	170	171	172	173	174	175	176	177	178
Number of matchboxes	7	13	16	23	22	21	14	11	8	3	2

(a) Write down the modal number of matches.

..... [1]

(b) Write down the range.

..... [1]

(c) Find the median.

..... [1]

(d) Find the inter-quartile range.

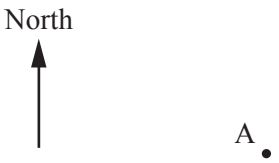
..... [2]

(e) Calculate the mean.
Give your answer correct to one decimal place.

..... [2]

[Turn over

2 Roberta starts from a point A and walks 1 km North to a point B.
She then walks 2 km East to a point C, then walks 3 km South to a point D and finally walks 4 km West to a point E.



(a) Find the distance *AE*.

.....km [3]

(b) Find the bearing of *E* from *A*.

..... [2]

(c) Find the area *ABCDE*.

.....km^2 [2]

3 Ten students at a school each recorded the number of hours they spent revising before an examination. The school compared the number of hours spent revising and the examination mark.

Number of hours spent revising (x)	3	4	8	9	10	12	13.5	17	21	24
Examination mark (y)	45	36	68	55	62	66	73	81	80	94

(a) What type of correlation is there between the number of hours spent revising and the examination mark?

.....[1]

(b) Find

(i) the mean number of hours spent revising,

.....[1]

(ii) the mean examination mark.

.....[1]

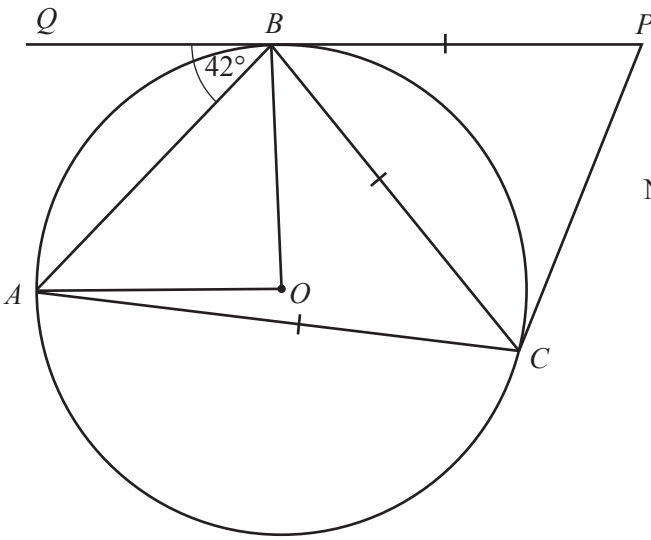
(c) **(i)** Find the equation of the regression line for y in terms of x.

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

(ii) Estimate the examination mark for a student who spent 19 hours revising.

.....[1]

4



A, B and *C* lie on a circle, centre *O*.
The line *QBP* is a tangent to the circle at *B*.
AC = *BC* = *BP* and angle *QBA* = 42°.

Find the value of

(a) angle *OAB*,

Angle *OAB* = ... [1]

(b) angle *AOB*,

Angle *AOB* = ... [2]

(c) angle *BCA*,

Angle *BCA* = ... [1]

(d) angle *CBP*,

Angle *CBP* = ... [2]

(e) angle *CPB*.

Angle *CPB* = ... [2]

5 The age, h, of each of 120 passengers travelling on a train are shown in the table.

Age (years)	Frequency
$0 < h \leqslant 15$	12
$15 < h \leqslant 20$	18
$20 < h \leqslant 25$	13
$25 < h \leqslant 35$	27
$35 < h \leqslant 50$	22
$50 < h \leqslant 90$	28

(a) Calculate an estimate of the mean age of a passenger.

.....years [2]

(b) Complete the frequency density column in this table.

Age (years)	Frequency	Frequency density
$0 < h \leqslant 15$	12	
$15 < h \leqslant 20$	18	
$20 < h \leqslant 25$	13	
$25 < h \leqslant 35$	27	
$35 < h \leqslant 50$	22	
$50 < h \leqslant 90$	28	

[3]

6 Describe fully the single transformation that is the **inverse** of

(a) a reflection in the line $y = x$,

.....

..... [2]

(b) a rotation of 90° clockwise, centre (2, 3),

.....

..... [2]

(c) a translation with vector $\begin{pmatrix} 4 \\ -3 \end{pmatrix}$,

.....

..... [2]

(d) an enlargement scale factor 3, centre (0, 0).

.....

..... [2]

7 Solve the simultaneous equations.
You must show all your working.

$$3x + 4y = -8$$
$$5x - 6y = -7$$

$x =$ .....

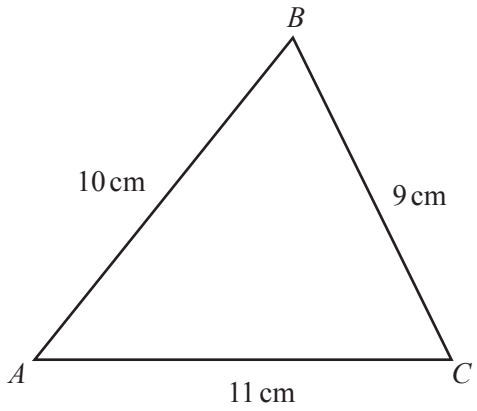
$y =$ ..... [4]

8 **(a)** $\cos x = \frac{1}{3}$ for $0° < x < 90°$.

Find the exact value of $\sin x$.
Give your answer as a surd.

$\sin x =$ ..... [3]

(b)



NOT TO SCALE

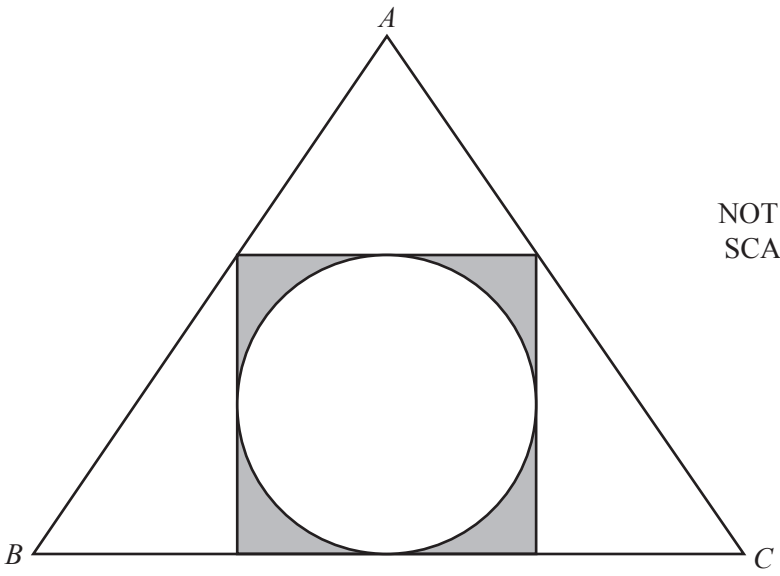
(i) Show that $\cos B = \frac{1}{3}$.

[2]

(ii) Using your answer to **part (a)**, show that the exact value of the area of triangle ABC is $30\sqrt{2}$ cm^2.

[3]

9 A circle of radius 5 cm is inscribed inside a square.
The square has one side on the base of an equilateral triangle, *ABC*.
The other two vertices of the square touch the triangle as shown.

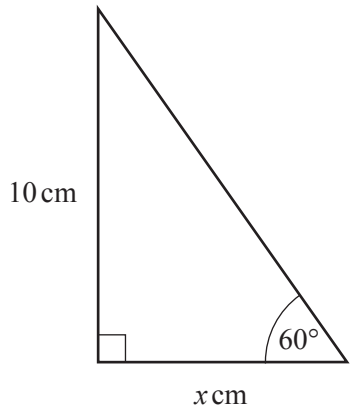


NOT TO SCALE

(a) Work out the shaded area.

.....cm^2 [2]

(b) (i)



NOT TO SCALE

Find the value of x.

x = ... [2]

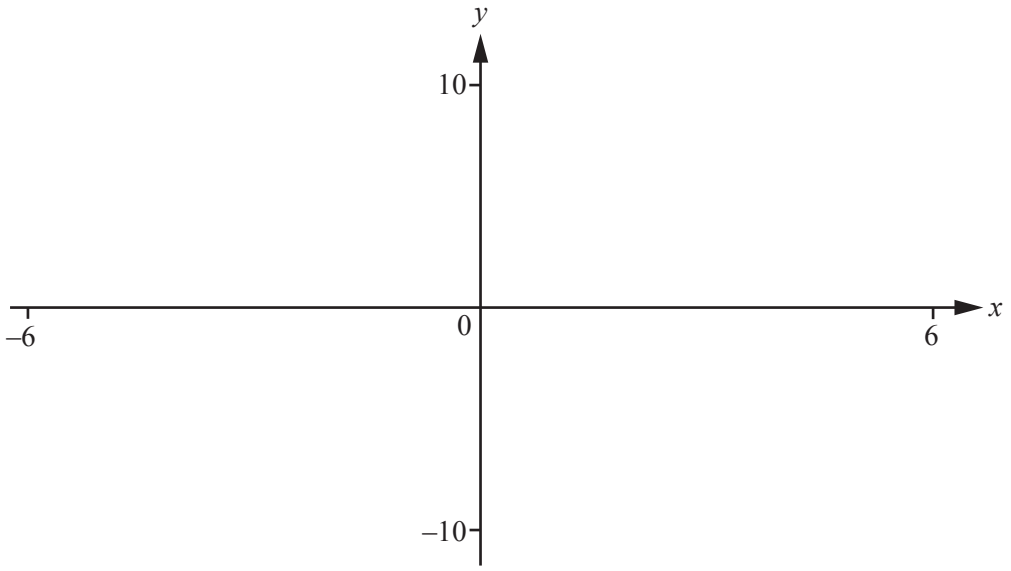
(ii) Work out the length of a side of the equilateral triangle *ABC*.

..... cm [2]

(iii) Calculate the area outside the square but inside triangle *ABC*.

.....cm^2 [4]

10



$$f(x) = 3 - \frac{6}{(x-2)}$$

(a) On the diagram, sketch the graph of $y = f(x)$ for values of x between -6 and 6. [3]

(b) Write down the equations of the asymptotes of the graph of $y = f(x)$.

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

(c) Solve the equation $f(x) = -x$.

..... [2]

(d) Solve the inequality $f(x) + x < 0$.

..... [3]

(e) Describe fully the **single** transformation that maps

(i) $y = 3 - \frac{6}{x}$ onto $y = 3 - \frac{6}{(x-2)}$,

.....

..... [2]

(ii) $y = -\frac{6}{(x-2)}$ onto $y = 3 - \frac{6}{(x-2)}$.

.....

..... [2]

11 Find the next term and the nth term in each of these sequences.

(a) 1, 8, 27, 64, 125, ...

Next term = ...

nth term = ... [2]

(b) 3, 7, 13, 21, 31, ...

Next term = ...

nth term = ... [4]

(c) –2, 1, 14, 43, 94, ...

Next term = ...

nth term = ... [4]

[Turn over

12 A solid hemisphere has radius 6 cm.

(a) Find, in terms of π,

(i) the volume of the hemisphere,

..... cm^3 [2]

(ii) the **total** surface area of the hemisphere.

..... cm^2 [2]

(b) Sixteen of these hemispheres, all with radius 6 cm, are made into one solid **sphere**.

(i) Find the radius of the sphere.

..... cm [3]

(ii) Find the ratio surface area of the sphere : total surface area of the 16 hemispheres.

Give your answer in its simplest form.

..... : .....[3]

13 **(a)** $3\log p + 2\log q - \log 6 = \log x$

Find x in terms of p and q.

x = ... [3]

(b) Solve the equations.

(i) $4^x = 6$

x = ... [3]

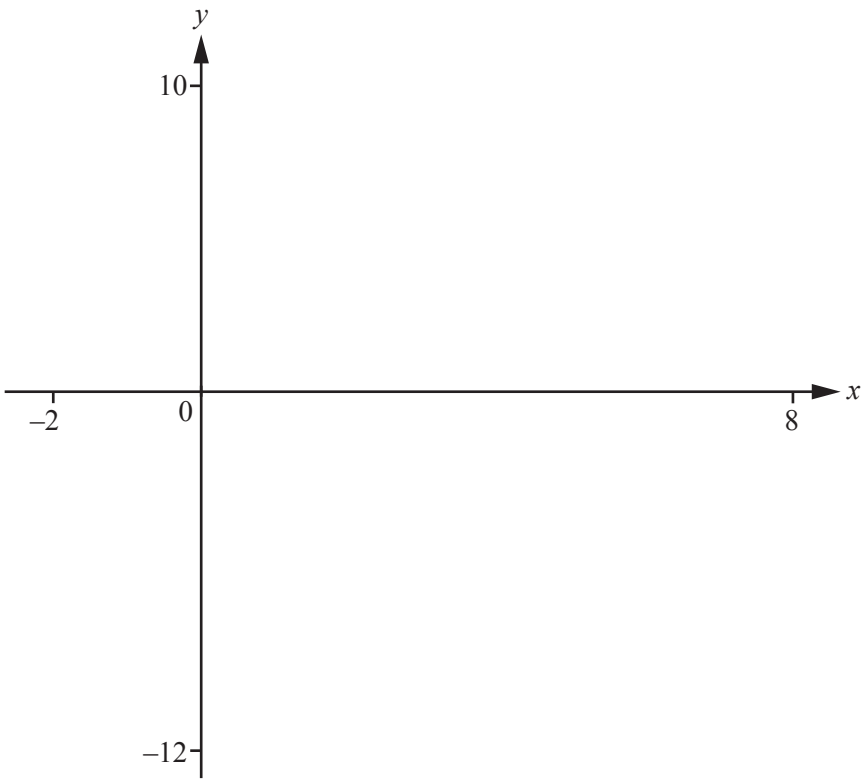
(ii) $(3x+2)(2x-3) = 1$

You must show all your working.

x = ... or x = ... [5]

Question 14 is printed on the next page.

14



$f(x) = 2^x - \frac{1}{3}x^3$

(a) On the diagram, sketch the graph of $y = f(x)$, for values of x between -2 and 8. [4]

(b) Write down the ***y* co-ordinates** of the local minimum points.

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

(c) Write down the co-ordinates of the local maximum point.

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

(d) Solve the equation $2^x - \frac{1}{3}x^3 = 2(1-x)$, for all real values of x.

$x =$ ..... or $x =$ ..... or $x =$ ..... or $x =$ ..... [4]