Cambridge IGCSE

Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CANDIDATE NAME	
CENTRE NUMBER	
CANDIDATE NUMBER	

4095866357

CAMBRIDGE INTERNATIONAL MATHEMATICS **0607/43**

Paper 4 (Extended) **May/June 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.
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 120.

This document consists of **20** printed pages.

© UCLES 2016

CAMBRIDGE International Examinations

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. $\quad A = \pi rl$

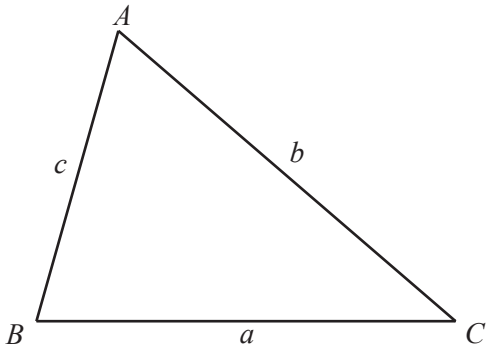
Curved surface area, A, of sphere of radius r. $\quad A = 4\pi r^2$

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 **(a)** Write the number 13205.17268

(i) correct to 1 decimal place,

..... [1]

(ii) correct to 3 significant figures,

..... [1]

(iii) correct to the nearest 10,

..... [1]

(iv) correct to the nearest 0.001.

..... [1]

(b) Write the number 120 correct to the nearest 10.

..... [1]

2 **(a)** Factorise.

$$3x^2 - 10x - 8$$

..... [2]

(b) Solve the inequality.

$$3x^2 - 10x - 8 < 0$$

..... [2]

(c) Solve the equation.

$$3\sin^2 x - 10\sin x - 8 = 0 \quad \text{for} \quad 0° < x < 360°$$

..... [3]

3 y is directly proportional to $(x+1)^3$.
$y = 32$ when $x = 3$.

(a) Find the value of y when $x = 4$.

$y =$ ..... [3]

(b) Find the value of x when $y = 13.5$.

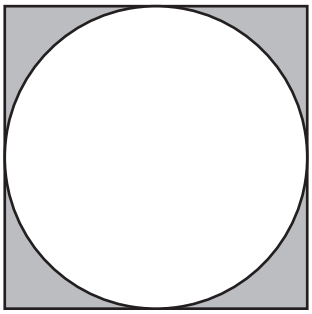
$x =$ ..... [2]

(c) Find x in terms of y.

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

© UCLES 2016

4



A circle of radius r cm is inside a square, so that the circle touches the sides of the square.

(a) (i) Find an expression for the area of the shaded region in terms of π and r.

..... [2]

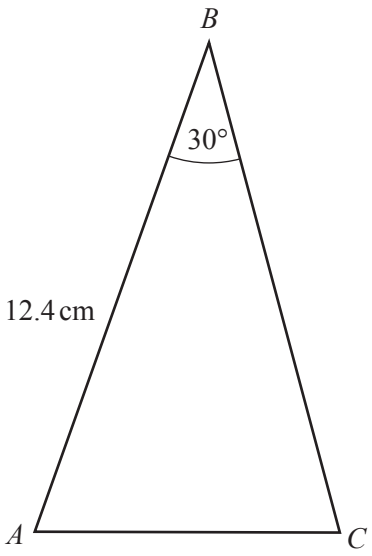
(ii) Calculate the area of the shaded region when $r = 6$.

..... cm^2 [1]

(b) Find an expression for the perimeter of the shaded region in terms of π and r.

..... [3]

5



NOT TO SCALE

The area of triangle ABC is $34.1\,cm^2$.
$AB = 12.4\,cm$ and angle $ABC = 30°$.

(a) Show that $BC = 11\,cm$.

[1]

(b) Find AC.

$AC =$ ..... cm [3]

(c) Find angle CAB.

Angle CAB = ... [3]

(d) Find the length of the perpendicular line from A to the line BC.

..... cm [2]

6 The heights of 400 students are given in the table.

Height (h cm)	Frequency
$145 < h \leqslant 155$	26
$155 < h \leqslant 160$	66
$160 < h \leqslant 165$	82
$165 < h \leqslant 170$	118
$170 < h \leqslant 175$	82
$175 < h \leqslant 190$	26

(a) Calculate an estimate of the mean height of a student.

..... cm [2]

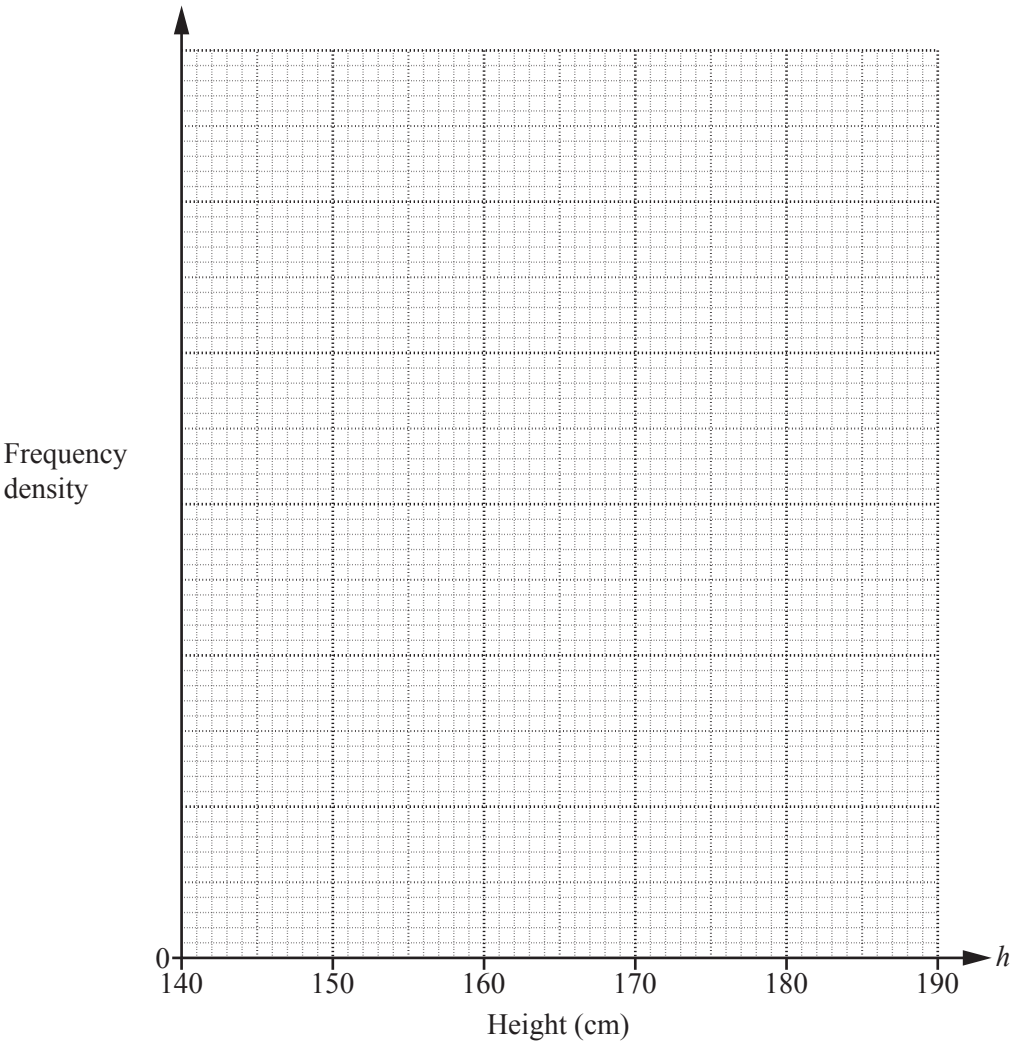
(b) **(i)** Complete the frequency density column in this table.

Height (h cm)	Frequency	Frequency density
$145 < h \leqslant 155$	26	
$155 < h \leqslant 160$	66	
$160 < h \leqslant 165$	82	
$165 < h \leqslant 170$	118	
$170 < h \leqslant 175$	82	
$175 < h \leqslant 190$	26	

[2]

© UCLES 2016

(ii) On the grid below, draw an accurate histogram to show this information.
Complete the scale on the frequency density axis.



[4]

7 Sasha bought a house on 1st January 2013.
By 1st January 2014 the value of the house had increased by 10%.
By 1st January 2015 the value of the house had increased by a further 5% of its value on 1st January 2014.
The value of the house on 1st January 2015 was $103 950.

(a) Find how much Sasha paid for the house in 2013.

$ ..... [4]

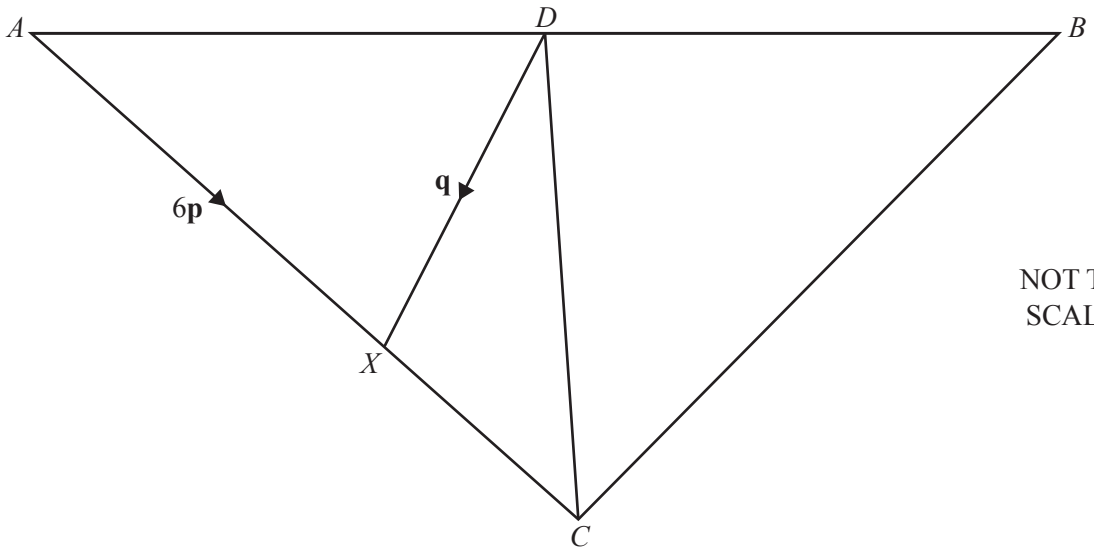
(b) By 1st January each year, from 2015, the value of the house increases by 5% of its value on 1st January the previous year.
The value of the house on 1st January 2015 was $103 950.

Find the year in which the value of the house will first be greater than $200 000.

..... [3]

© UCLES 2016

8



NOT TO SCALE

ABC is a triangle.

$AX = \frac{2}{3}AC$ and $AD = \frac{1}{2}AB$.

$\overrightarrow{AX} = 6\mathbf{p}$ and $\overrightarrow{DX} = \mathbf{q}$.

Find an expression, in terms of **p** and **q**, for

(a) $\overrightarrow{AD}$,

..... [2]

(b) $\overrightarrow{DC}$,

..... [2]

(c) $\overrightarrow{CB}$.

..... [3]

9 The transformation **AB** means transformation **B** followed by transformation **A**.

(a) The transformation **P** is a rotation through 90° clockwise about the origin.
The transformation **Q** is a rotation through 180° about the origin.
The transformation **R** is a rotation through 270° clockwise about the origin.
The transformation **S** is a reflection in the y-axis.
The transformation **T** is a reflection in the x-axis.

Write down the letter of the **single** transformation, **P**, **Q**, **R**, **S** or **T**, that is equivalent to each of the transformations **QR**, **PQR**, **ST**, **SQ**, **PTP** and **TPP**.

QR = ...

PQR = ...

ST = ...

SQ = ...

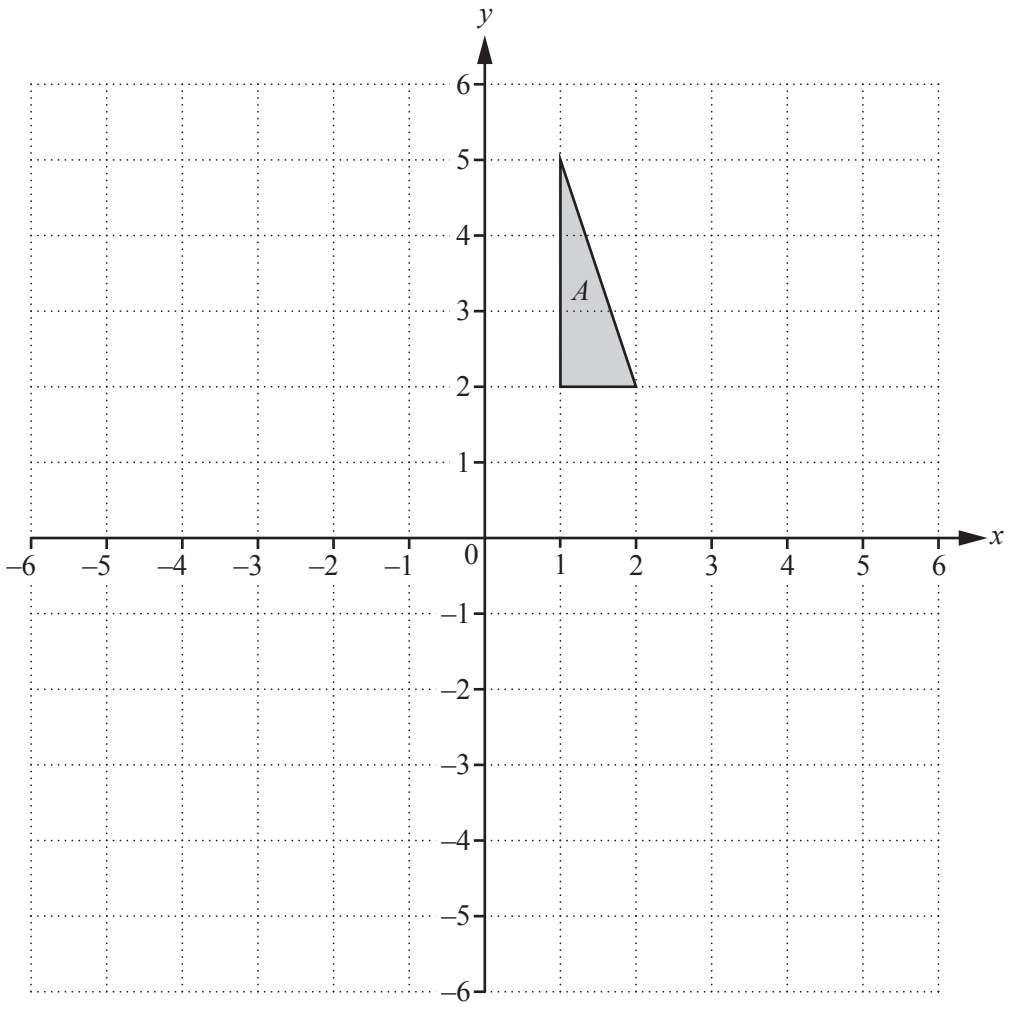
PTP = ...

TPP = ...

[6]

© UCLES 2016

(b)



(i) Draw the image of triangle A after a reflection in the line $y = x$.
Label this image B.

[2]

(ii) Draw the image of **triangle *B*** after a reflection in the x-axis.
Label this image C.

[1]

(iii) Describe fully the **single** transformation that maps **triangle *C*** onto **triangle *A***.

.....

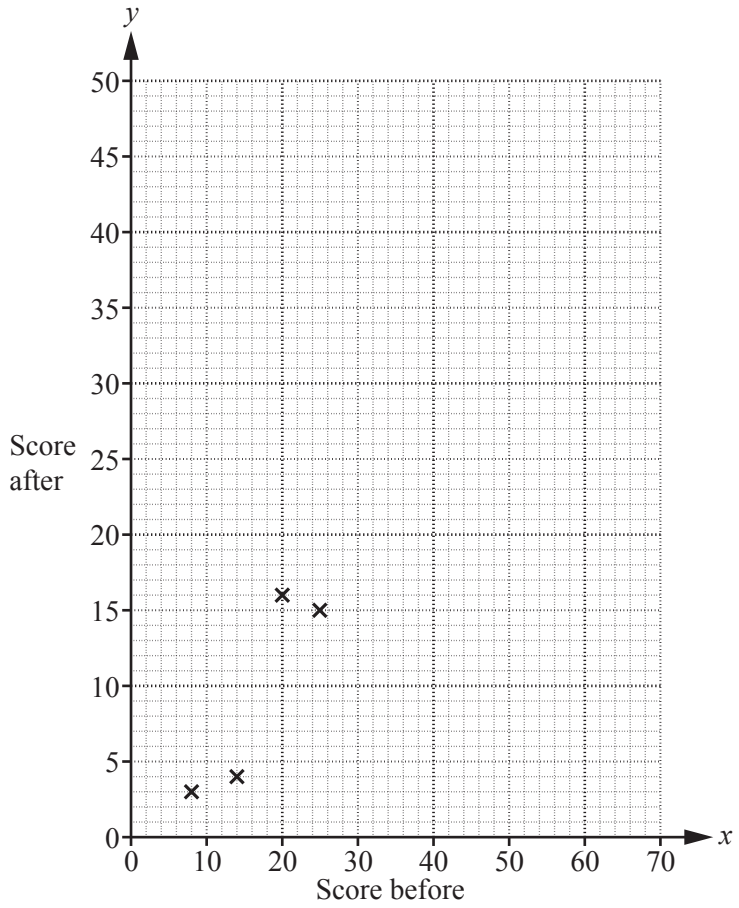
..... [3]

10 A company is testing a new drug.
Ten patients were examined and given a score before and after taking the drug.
A decrease in score represents an improvement.

The results are shown in the table.

Patient	A	B	C	D	E	F	G	H	I	J
Score before (x)	8	14	20	25	32	34	41	42	50	61
Score after (y)	3	4	16	15	20	27	34	28	40	49

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



[3]

(ii) What type of correlation is shown by the scatter diagram?

..... [1]

© UCLES 2016

(b) Find

(i) the mean score before taking the drug,

..... [1]

(ii) the mean score after taking the drug.

..... [1]

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

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

(ii) Estimate the score after taking the drug when the score before taking the drug was 30.

..... [1]

(iii) A patient has a score before taking the drug of 80.

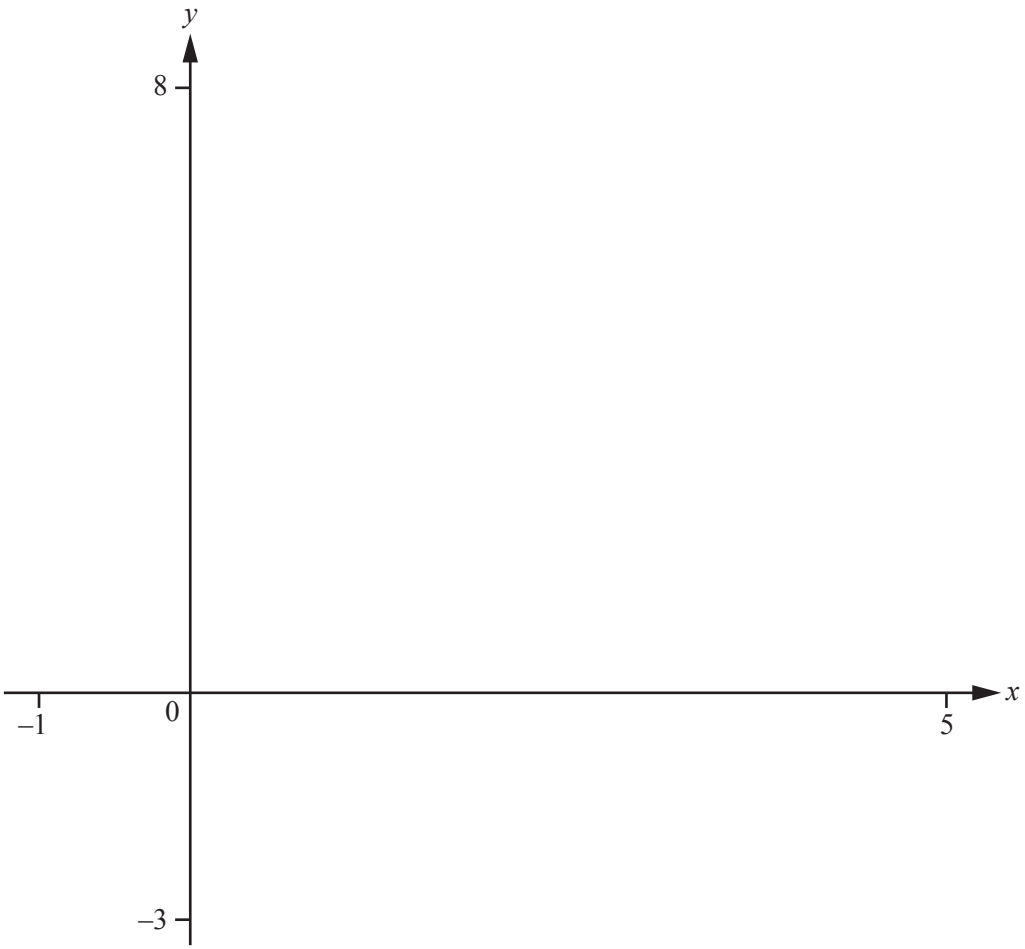
Explain why using the line of regression is unlikely to be reliable in predicting the score of the patient after taking the drug.

.....

..... [1]

© UCLES 2016

11



$$f(x) = 3 + \frac{1}{(x^2 - 4x + 3)}$$

(a) On the diagram, sketch the graph of $y = f(x)$ between $x = -1$ and $x = 5$. [4]

(b) Write down the equations of the three asymptotes.

..... , ... , ... [3]

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

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

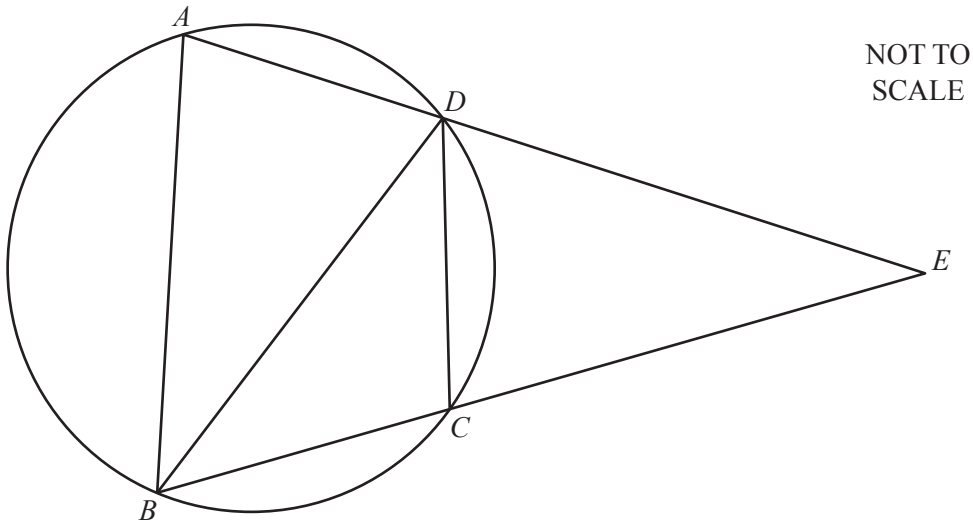
(d) The line $y = x$ intersects the curve $y = 3 + \frac{1}{(x^2 - 4x + 3)}$ three times.

Find the values of the x co-ordinates of these three points of intersection.

$x =$ ..... , $x =$ ..... , $x =$ ..... [3]

© UCLES 2016

12



NOT TO SCALE

A, B, C and D lie on a circle.
ADE and BCE are straight lines that intersect at E.
$BD = DE$, angle $BAD = 4x$, angle $BCD = 6x$ and angle $BDC = 3x$.

Find

(a) x,

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

(b) angle CBD ,

Angle $CBD =$ ..... [2]

(c) angle CDE .

Angle $CDE =$ ..... [3]

© UCLES 2016

13

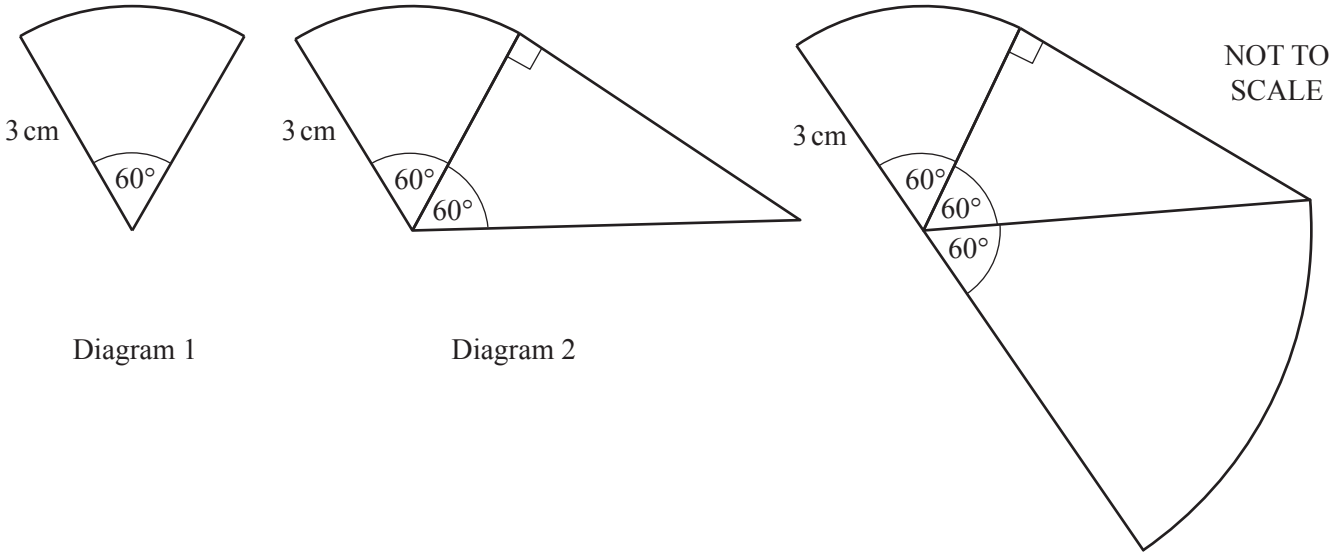


Diagram 1

Diagram 2

Diagram 3

Diagram 1 is a sector of a circle, radius 3 cm and sector angle 60°.
Diagram 2 has a right-angled triangle, with an angle of 60°, drawn on a radius of this sector.
Diagram 3 has a sector of a circle, with a sector angle 60°, drawn on the hypotenuse of the right-angled triangle.

(a) Calculate the area of

(i) Diagram 1,

..... cm^2 [2]

(ii) Diagram 2,

..... cm^2 [3]

(iii) Diagram 3.

..... cm^2 [3]

(b) Diagram 1, Diagram 2 and Diagram 3 are the first three diagrams in a pattern.
There are 6 diagrams in the pattern.
Diagram 4 has a right-angled triangle added to Diagram 3 in the same way as Diagram 2.
Diagram 5 has a sector added to Diagram 4 in the same way as Diagram 3.
Diagram 6 has a right-angled triangle added to Diagram 5 in the same way as Diagram 2.

Find the area of Diagram 6.

..... cm^2 [4]

Question 14 is printed on the next page.

14 In this question, give all your answers as single fractions in terms of x and y.

A bag contains x red balls and y blue balls.

(a) Rosario chooses a ball at random from the bag, notes its colour and replaces it in the bag. He then chooses a ball from the bag a second time, notes its colour and replaces it in the bag.

Find the probability, in terms of x and y, that the two balls chosen are

(i) both red,

..... [2]

(ii) one red and one blue.

..... [3]

(b) Magda chooses a ball at random from the bag and does not replace it. She then chooses a ball from the bag a second time.

Find the probability, in terms of x and y, that the two balls chosen are

(i) both red,

..... [3]

(ii) one red and one blue.

..... [3]

Permission to reproduce items where third-party owned material protected by copyright is included has been sought and cleared where possible. Every reasonable effort has been made by the publisher (UCLES) to trace copyright holders, but if any items requiring clearance have unwittingly been included, the publisher will be pleased to make amends at the earliest possible opportunity.

To avoid the issue of disclosure of answer-related information to candidates, all copyright acknowledgements are reproduced online in the Cambridge International Examinations Copyright Acknowledgements Booklet. This is produced for each series of examinations and is freely available to download at www.cie.org.uk after the live examination series.

Cambridge International Examinations is part of the Cambridge Assessment Group. Cambridge Assessment is the brand name of University of Cambridge Local Examinations Syndicate (UCLES), which is itself a department of the University of Cambridge.