Cambridge IGCSE

Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CANDIDATE NAME	
CENTRE NUMBER	
CANDIDATE NUMBER	

6941565017

CAMBRIDGE INTERNATIONAL MATHEMATICS **0607/42**

Paper 4 (Extended) **May/June 2014**

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 **19** printed pages and **1** blank page.

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[Turn over

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. $\quad A = \pi rl$

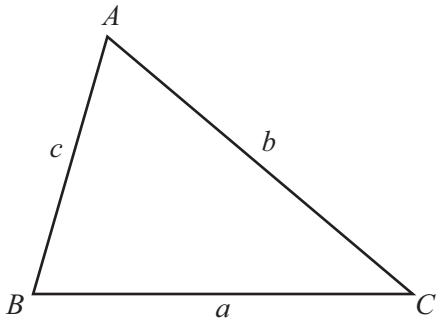
Curved surface area, A, of sphere of radius r. $\quad A = 4\pi r^2$

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

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

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

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



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

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

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

Answer **all** the questions.

1 In one country the population of starlings reduced by 5% per year from 1980 to 2010.
On 1st January 2000 the population was 8.5 million.

(a) Write 8.5 million in standard form.

Answer(a) ..... [1]

(b) Calculate the population on 1st January 2010.
Give your answer correct to 2 significant figures.

Answer(b) ..... [2]

(c) Calculate the population on 1st January 1980.
Give your answer correct to 3 significant figures.

Answer(c) ..... [3]

(d) Calculate the percentage **reduction** in the population from 1st January 1980 to 1st January 2010.

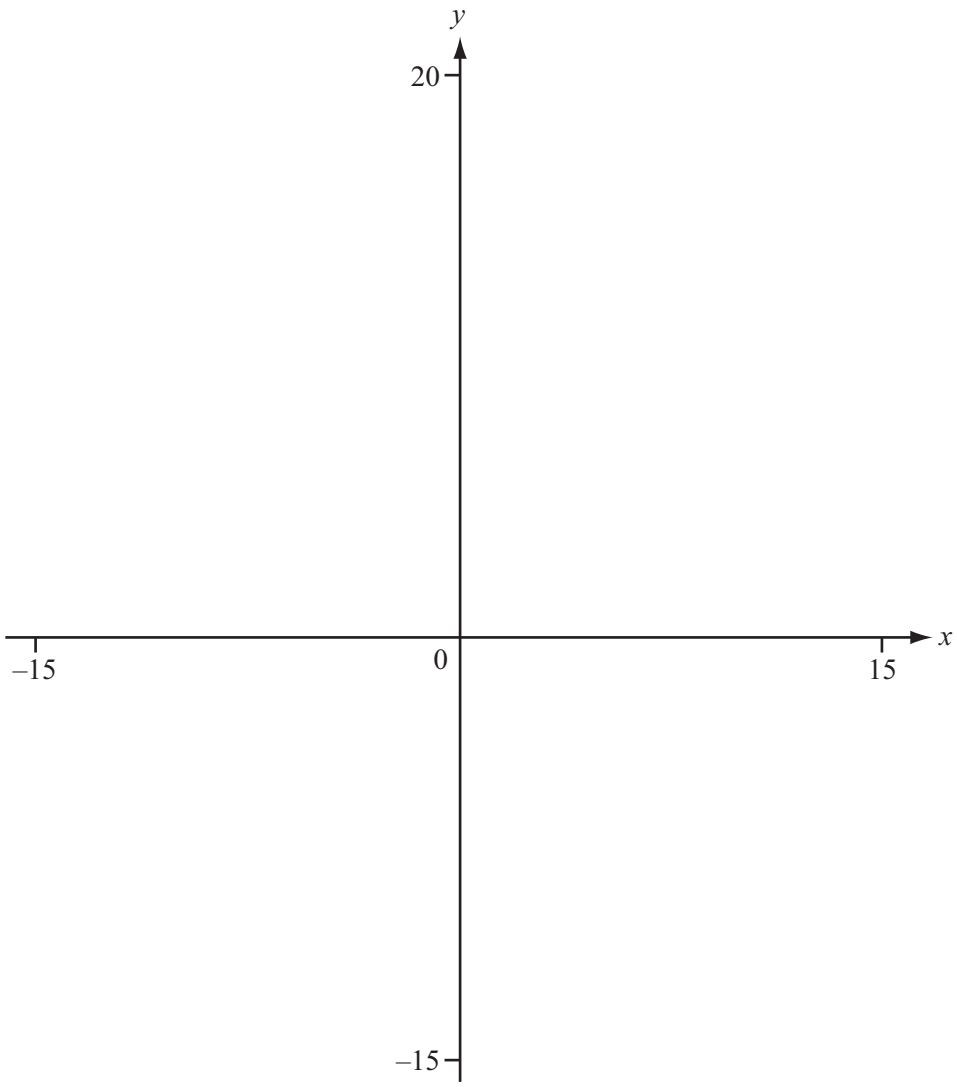
Answer(d) ..... % [3]

(e) If the population of starlings continues to reduce at the same rate, find the year in which the population will first be below 3 500 000.

Answer(e) ..... [3]

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2



$f(x) = 10\cos 20x°$ for $-15 \leqslant x \leqslant 15$

(a) On the diagram, sketch the graph of $y = f(x)$. [3]

(b) Find the co-ordinates of the local maximum and the local minimum points.

Answer(b) (..... , ...)

(..... , ...)

(..... , ...) [3]

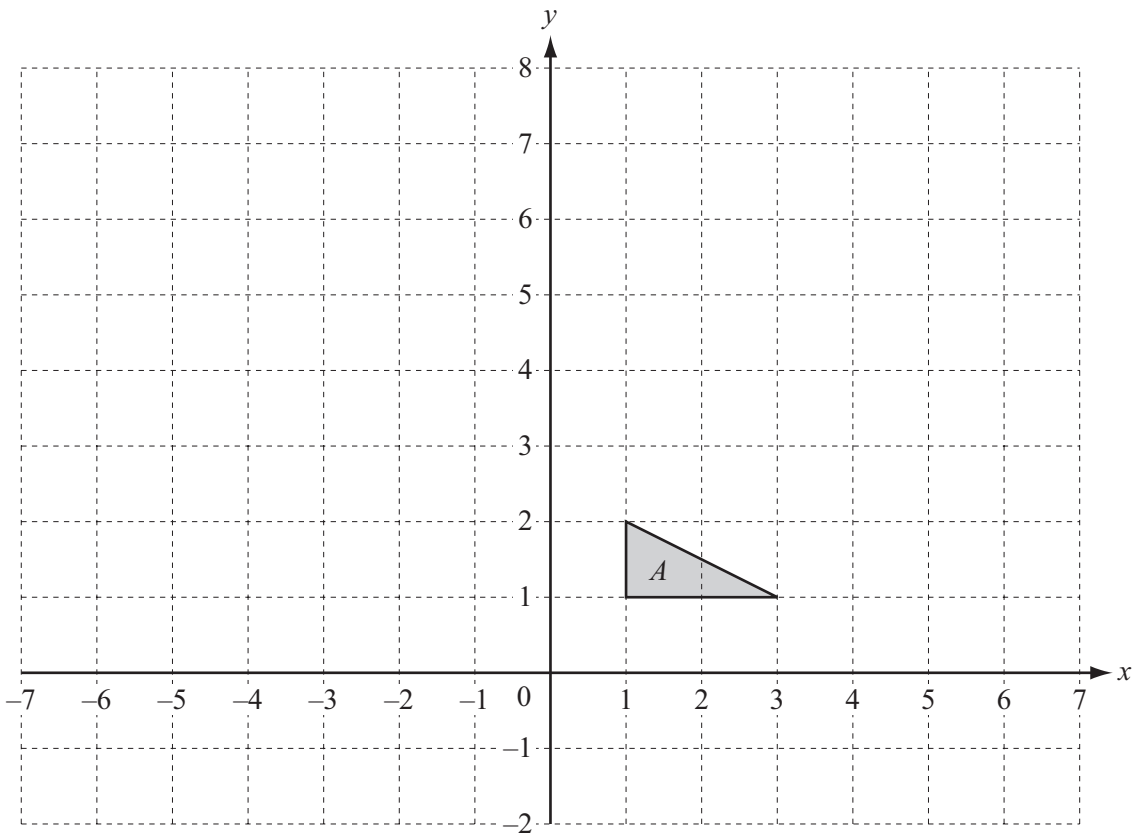
(c) On the same diagram, sketch the graph of $y = g(x)$ where $g(x) = |x + 2|$ for $-15 \leqslant x \leqslant 15$. [1]

(d) Solve $f(x) = g(x)$.

Answer(d) ..... [2]

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3



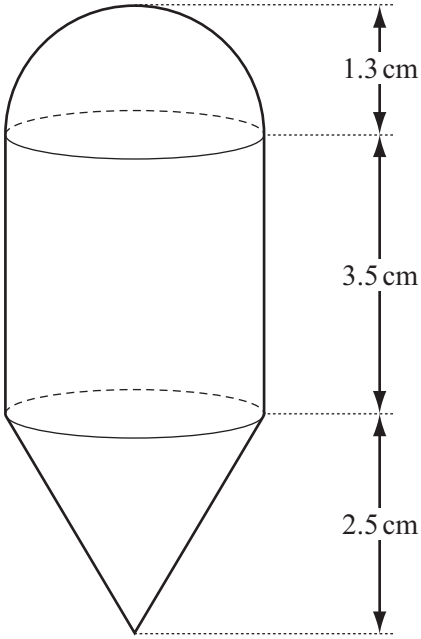
(a) Translate triangle A by the vector $\begin{pmatrix} -4 \\ 2 \end{pmatrix}$. [2]

(b) Describe fully the **single** transformation that is equivalent to a translation by the vector $\begin{pmatrix} -4 \\ 2 \end{pmatrix}$ followed by a rotation of 90° clockwise about (–2, 6).

Answer(b) .....

..... [5]

4



NOT TO SCALE

The diagram shows a brass object, used by builders, known as a plumb bob.
The plumb bob is made up of a hemisphere, a cylinder and a cone, each of radius 1.3 cm.
The height of the cylinder is 3.5 cm and the height of the cone is 2.5 cm.

(a) Find the total volume of the plumb bob.

Answer(a) ..... cm^3 [4]

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(b) Each cubic centimetre of brass weighs 8.4 grams.

Calculate the total mass of the plumb bob.

Answer(b) ..... g [1]

(c) A mathematically similar plumb bob is also made of brass.
Its mass is twice the mass of the plumb bob shown in the diagram opposite.

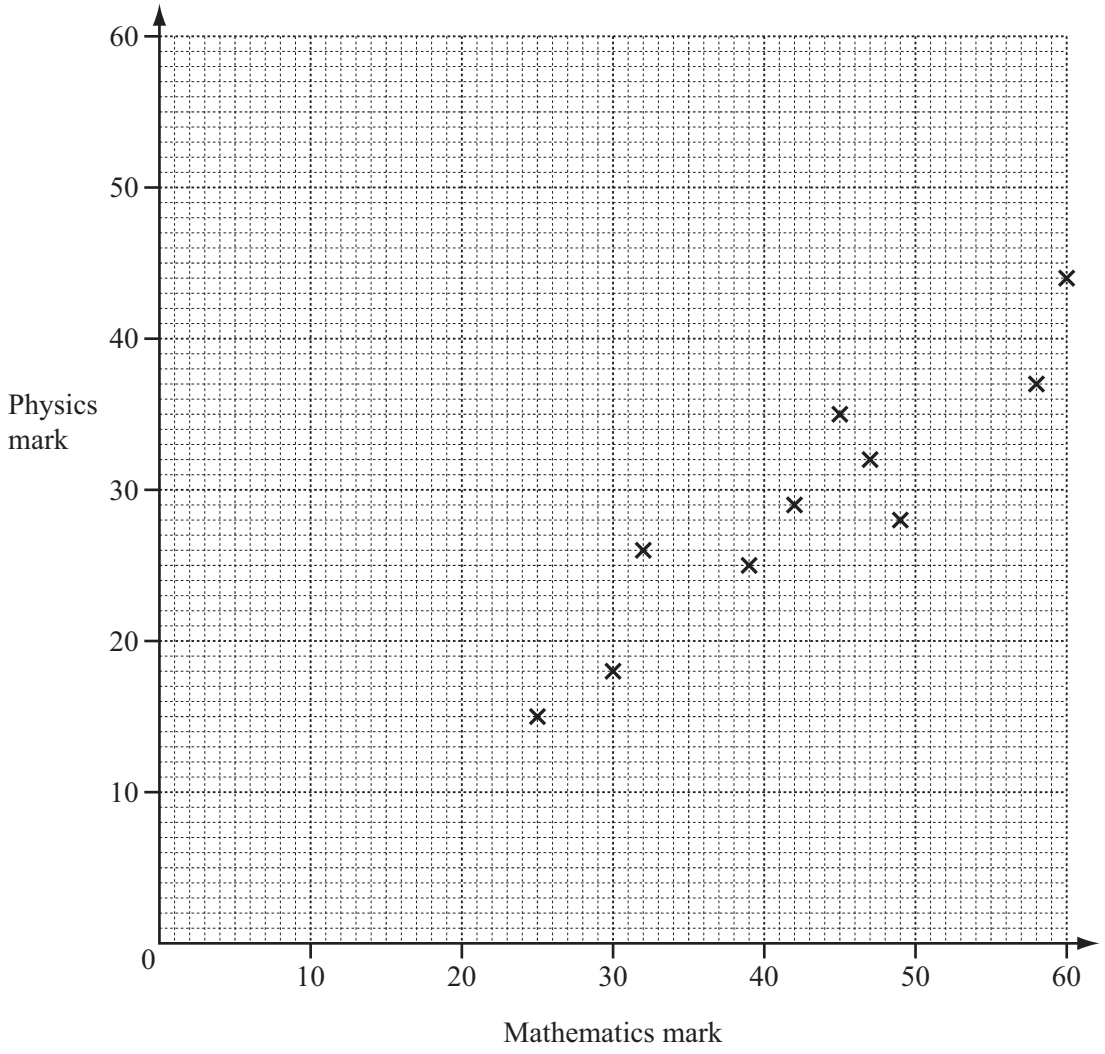
Calculate the total height of the larger plumb bob.

Answer(c) ..... cm [3]

5 15 students each took a mathematics test and a physics test.
Each test was marked out of 60.
These are their marks.

Mathematics mark	25	30	39	47	45	58	42	60	49	32	52	35	55	27	35
Physics mark	15	18	25	32	35	37	29	44	28	26	38	23	40	22	32

(a) Complete the scatter diagram.
The first 10 points have been plotted for you.



[2]

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

Answer(b) ..... [1]

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(c) **(i)** Calculate the mean of the mathematics marks.

Answer(c)(i) ..... [1]

(ii) Calculate the mean of the physics marks.

Answer(c)(ii) ..... [1]

(d) Find the equation of the regression line for the physics marks (y) and the mathematics marks (x). Write your answer in the form $y = mx + c$.

Answer(d) $y =$ ..... [2]

(e) Find the value of y when $x = 26$.

Answer(e) ..... [1]

(f) Draw accurately the line of regression on the scatter diagram. [2]

(g) It was later decided that the physics test was too difficult.
The physics teacher added 12 marks to each of the physics marks.

Write down the equation of the regression line for the new physics marks (y) in terms of the mathematics marks (x).

Answer(g) $y =$ ..... [1]

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6 The equation of the straight line L is $5y + 2x + 20 = 0$.

(a) Find the gradient of the line L.

Answer(a) ..... [1]

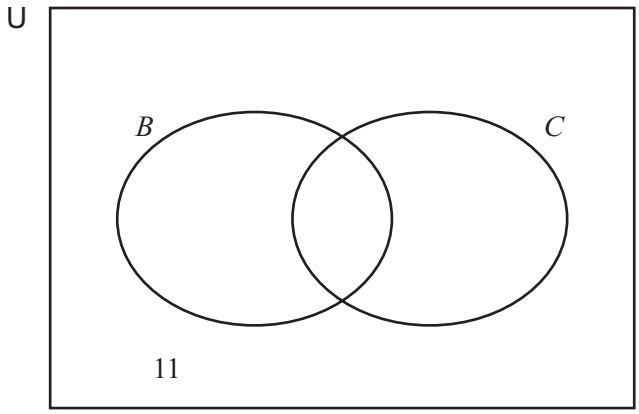
(b) Find the co-ordinates of the point where the line L crosses the y-axis.

Answer(b) (..... , ...) [1]

(c) Find the equation of the line, perpendicular to L, which passes through the point (2, 3).
Give your answer in the form $y = mx + c$.

Answer(c) $y =$ ..... [3]

7



In a school, biology (B) and chemistry (C) are two of the optional subjects.
The Venn diagram represents the choices of 40 students.

n(B) = 25 and n(C) = 17.
11 students study neither biology nor chemistry.

(a) Complete the Venn diagram. [2]

(b) Use set notation to show the number of students who study neither biology nor chemistry.

Answer(b) ..... [1]

(c) One of the 40 students is chosen at random.
What is the probability that this student studies both biology and chemistry?

Answer(c) ..... [1]

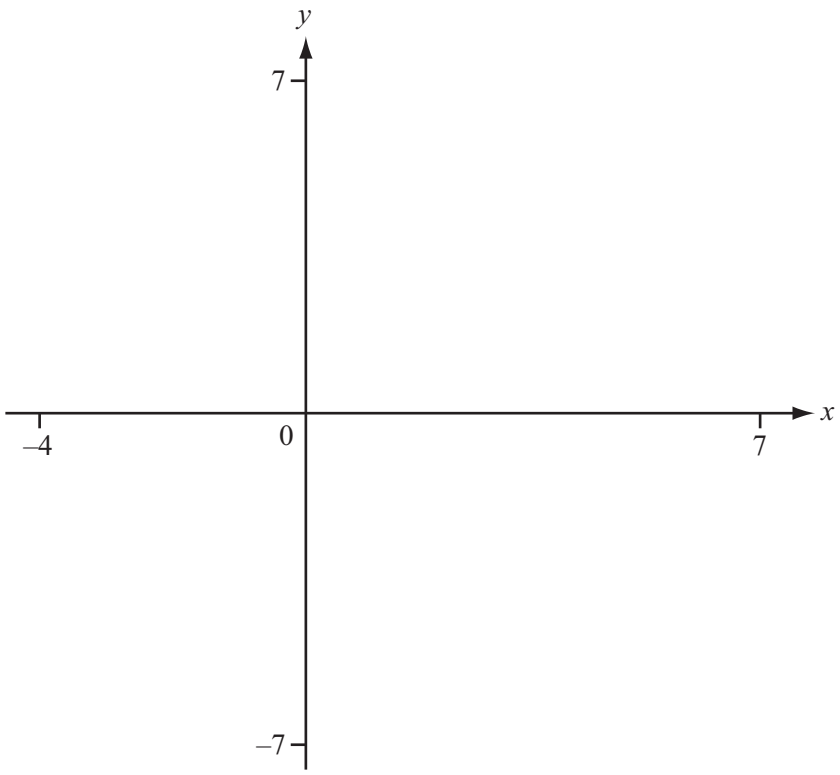
(d) Two of the 40 students are chosen at random.
Find the probability that both students study biology but not chemistry.

Answer(d) ..... [3]

(e) Two of the students who study biology are chosen at random.
Find the probability that both students also study chemistry.

Answer(e) ..... [3]

8



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

(a) On the diagram, sketch the graph of $y = f(x)$ for x between –4 and 7. [3]

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

Answer(b) .....

.....

..... [3]

(c) Find the range of values of x for which $f(x) < 4$.

Answer(c) ..... [3]

(d) The graph of $y = g(x)$ is the graph of $y = f(x)$ translated by the vector $\begin{pmatrix} 1 \\ 0 \end{pmatrix}$.

Find $g(x)$.

Answer(d) $g(x) =$ ..... [2]

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9 The table shows a frequency distribution for 79 pieces of data.

x	1	2	3	4	5	6
Frequency	9	26	18	11	9	6

(a) When x is the number of children in a family, find

(i) the mode,

Answer(a)(i) ..... [1]

(ii) the range,

Answer(a)(ii) ..... [1]

(iii) the median,

Answer(a)(iii) ..... [1]

(iv) the mean,

Answer(a)(iv) ..... [2]

(v) the upper quartile.

Answer(a)(v) ..... [1]

(b) When x is the distance, to the nearest kilometre, that the children travel to school,

(i) explain why the range of the distances may not be the same as your answer to **part (a)(ii)**,

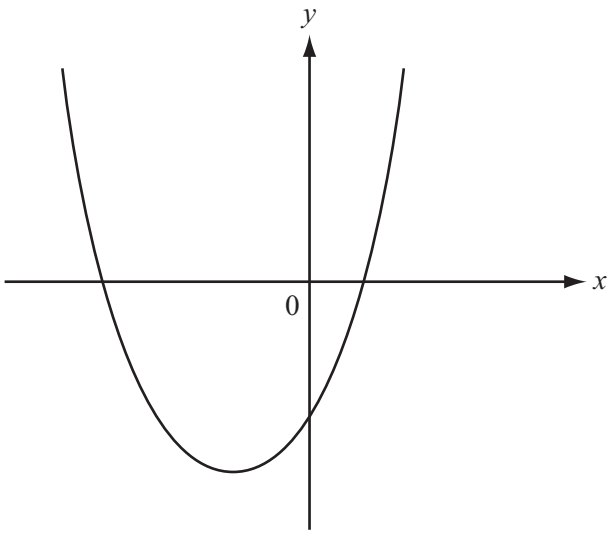
Answer(b)(i) .....

..... [1]

(ii) write down the modal interval.

Answer(b)(ii) ..... $< x \leqslant$ ..... [1]

10



NOT TO SCALE

The diagram shows a sketch of the graph of $y = x^2 + bx + c$.
The graph passes through the points (1, 2) and (–3, –6).

(a) Use this information to write down two equations in b and c.

Answer(a) .....

..... [2]

(b) Use these equations to show that $y = x^2 + 4x - 3$.

[3]

(c) **(i)** Solve the equation $x^2 + 4x - 3 = 0$.
Give your answers correct to 2 decimal places.

Answer(c)(i) $x =$ ..... or $x =$ ..... [2]

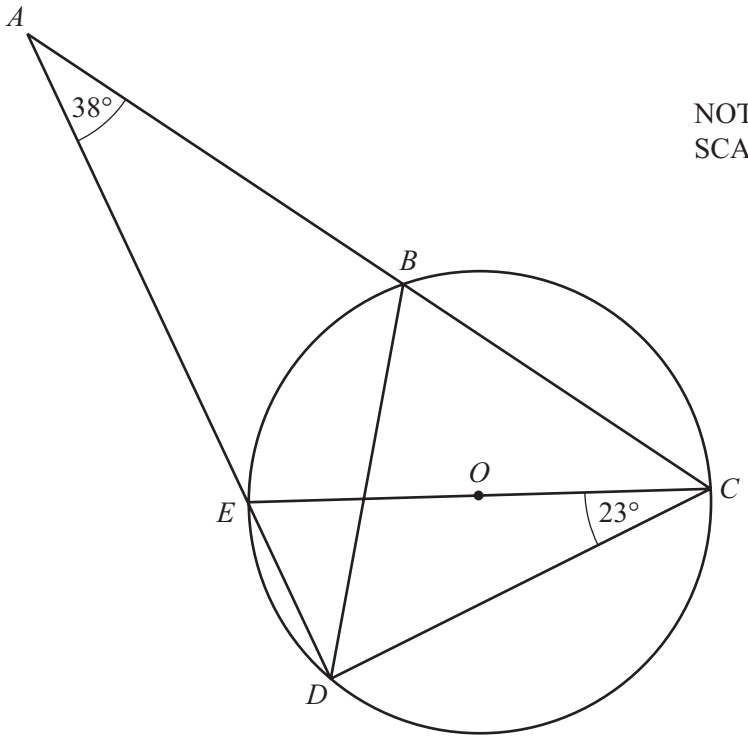
(ii) Write down the equation of the line of symmetry of the graph of $y = x^2 + 4x - 3$.

Answer(c)(ii) ..... [1]

(iii) Find the minimum value of y.

Answer(c)(iii) ..... [1]

11 (a)



In the diagram, *EC* is a diameter of the circle centre *O*.
ABC and *AED* are straight lines.
Angle *ECD* = 23° and angle *BAE* = 38°.

Find

(i) angle *DBC*,

Answer(a)(i) ..... [2]

(ii) angle *ECB*,

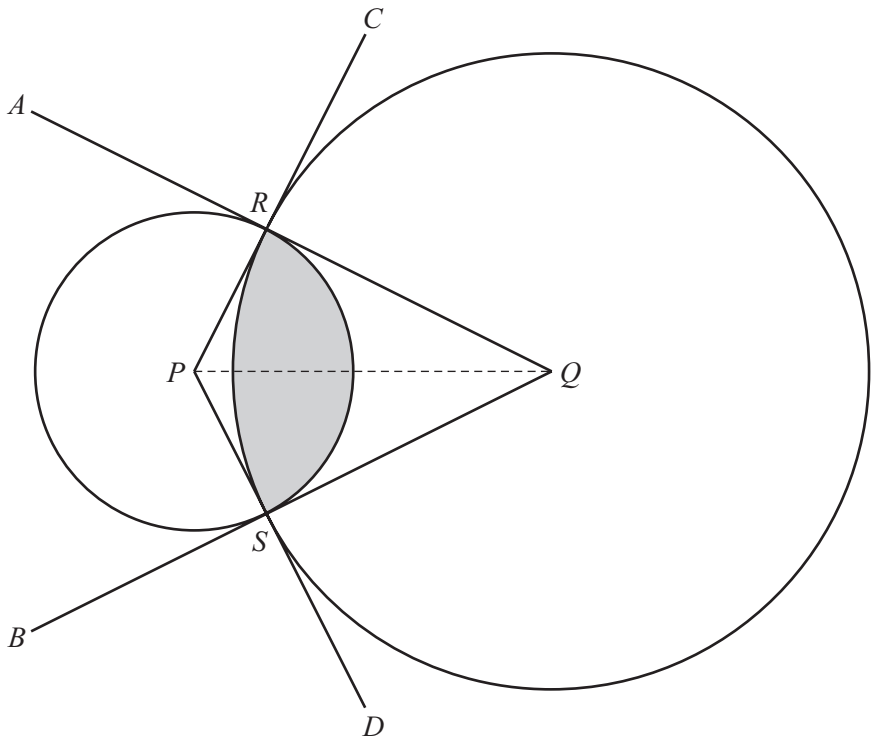
Answer(a)(ii) ..... [2]

(iii) angle *DOE*.

Answer(a)(iii) ..... [1]

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(b)



In the diagram, QA and QB are tangents, at R and S, to the circle centre P.
PC and PD are tangents, at R and S, to the circle centre Q.
$QR = 8$ cm and angle $RQS = 56°$.

(i) Calculate PR.

Answer(b)(i) ..... cm [2]

(ii) Find angle RPS.

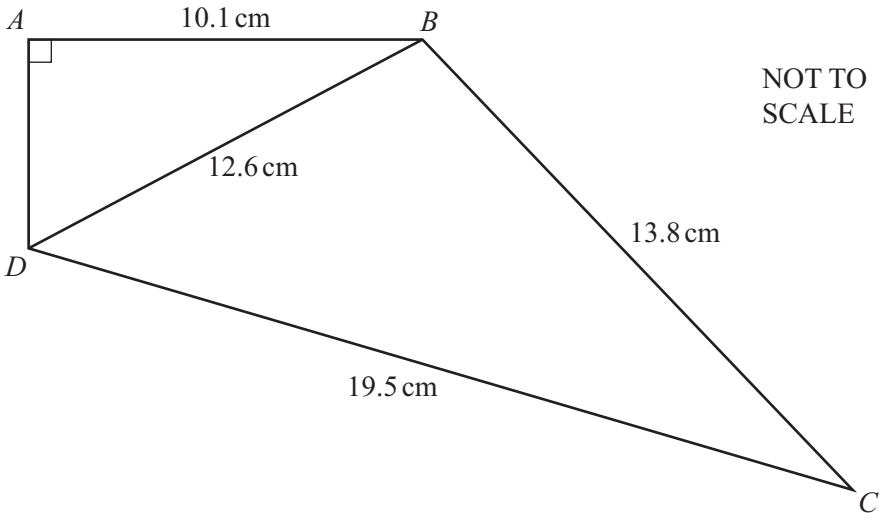
Answer(b)(ii) ..... [1]

(iii) Calculate the **perimeter** of the shaded region.

Answer(b)(iii) ..... cm [4]

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12



In the diagram angle $DAB = 90°$.
$AB = 10.1$ cm, $DB = 12.6$ cm, $BC = 13.8$ cm and $DC = 19.5$ cm.

(a) Calculate the length AD.

Answer(a) ..... cm [3]

(b) Calculate angle DBC.

Answer(b) ..... [3]

(c) Calculate the total area of the quadrilateral $ABCD$.

Answer(c) ..... cm^2 [4]

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13 Gita travels from her home to work in the city.
She drives her car to a car park and cycles the remaining distance.
The car journey takes x minutes.
The cycle journey takes 4 minutes less than the car journey.

(a) Write down an expression, in terms of x, for the time **in hours** of the cycle journey.

Answer(a) ..... hours [1]

(b) Gita's average speed in her car is 70 km/h and her average speed on her cycle is 15 km/h.
The total distance she travels is 33 km.

(i) Write down an equation in x and show that it simplifies to $17x - 12 = 396$.

[3]

(ii) Solve the equation to find the time taken for the car journey.

Answer(b)(ii) ..... min [2]

(c) Find the average speed, in kilometres per hour, for the whole journey.

Answer(c) ..... km/h [2]

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