

OXFORD CAMBRIDGE AND RSA EXAMINATIONS
GCSE
J567/04
MATHEMATICS B
Paper 4 (Higher Tier)
FRIDAY 7 NOVEMBER 2014:
Morning
DURATION: 1 hour 45 minutes
plus your additional time allowance
MODIFIED ENLARGED 24pt

Candidate forename		Candidate surname	
Centre number	<div style="border: 1px solid black; width: 20px; height: 20px; margin: 2px; display: inline-block;"></div> <div style="border: 1px solid black; width: 20px; height: 20px; margin: 2px; display: inline-block;"></div> <div style="border: 1px solid black; width: 20px; height: 20px; margin: 2px; display: inline-block;"></div> <div style="border: 1px solid black; width: 20px; height: 20px; margin: 2px; display: inline-block;"></div> <div style="border: 1px solid black; width: 20px; height: 20px; margin: 2px; display: inline-block;"></div>	Candidate number	<div style="border: 1px solid black; width: 20px; height: 20px; margin: 2px; display: inline-block;"></div> <div style="border: 1px solid black; width: 20px; height: 20px; margin: 2px; display: inline-block;"></div> <div style="border: 1px solid black; width: 20px; height: 20px; margin: 2px; display: inline-block;"></div> <div style="border: 1px solid black; width: 20px; height: 20px; margin: 2px; display: inline-block;"></div>

Candidates answer on the Question Paper.

OCR SUPPLIED MATERIALS:

Insert for Question 14

OTHER MATERIALS REQUIRED:

Geometrical instruments

Tracing paper (optional)

Scientific or graphical calculator

**YOU ARE PERMITTED TO USE A
CALCULATOR FOR THIS PAPER**

READ INSTRUCTIONS OVERLEAF

INSTRUCTIONS TO CANDIDATES

Write your name, centre number and candidate number in the boxes on the first page. Please write clearly and in capital letters.

Use black ink. HB pencil may be used for graphs and diagrams only.

Answer ALL the questions.

Read each question carefully. Make sure you know what you have to do before starting your answer.

Your answers should be supported with appropriate working. Marks may be given for a correct method even if the answer is incorrect.

Write your answer to each question in the space provided. Additional paper may be used if necessary but you must clearly show your candidate number, centre number and question number(s).

INFORMATION FOR CANDIDATES

The number of marks is given in brackets [] at the end of each question or part question.

Use the π button on your calculator or take π to be 3.142 unless the question says otherwise.

Your quality of written communication is assessed in questions marked with an asterisk (*).

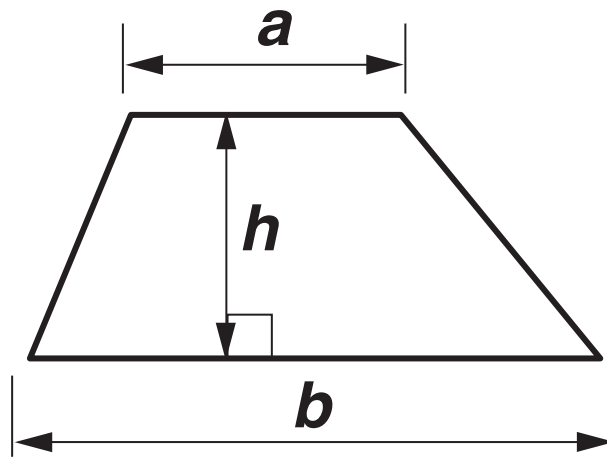
The total number of marks for this paper is 100.

Any blank pages are indicated.

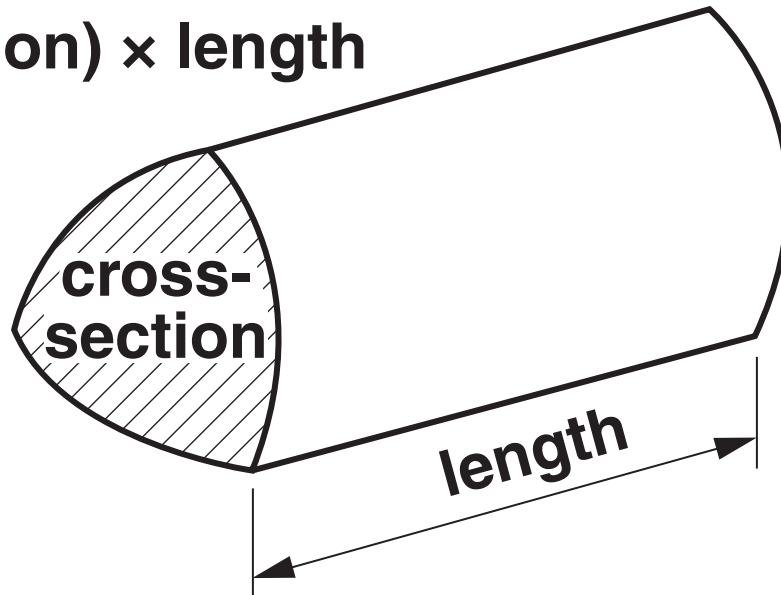
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FORMULAE SHEET: HIGHER TIER

Area of trapezium
 $= \frac{1}{2}(a + b)h$



Volume of prism
 $= (\text{area of cross-section}) \times \text{length}$

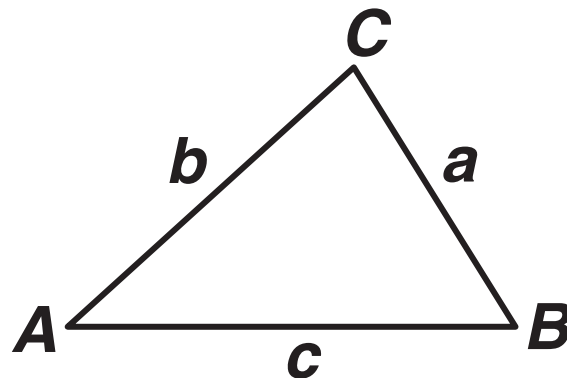


In any triangle ABC

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

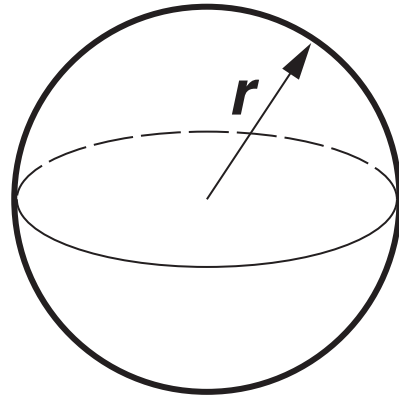
Cosine rule $a^2 = b^2 + c^2 - 2bc \cos A$

Area of triangle $= \frac{1}{2} ab \sin C$



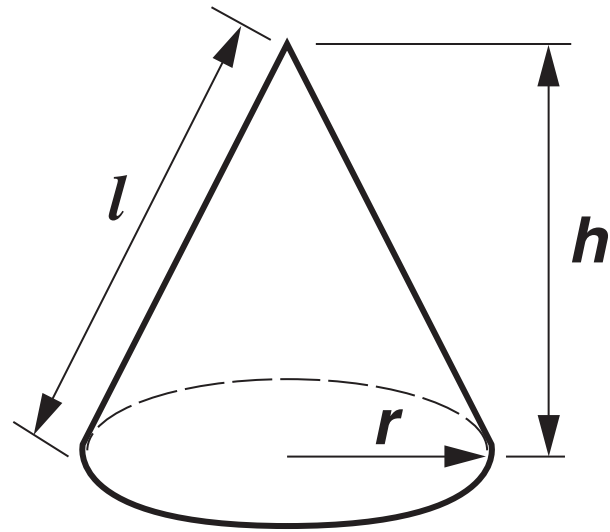
Volume of sphere = $\frac{4}{3} \pi r^3$

Surface area of sphere = $4\pi r^2$



Volume of cone = $\frac{1}{3} \pi r^2 h$

Curved surface area of cone = $\pi r l$



The Quadratic Equation

**The solutions of $ax^2 + bx + c = 0$,
where $a \neq 0$, are given by**

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Answer ALL the questions.

1 (a) Work out.

$$\frac{4.8 + 7.1}{1.9 \times 0.3}$$

Give your answer correct to 1 decimal place.

(a) _____ [2]

(b) Find the cube root of 729 000.

(b) _____ [1]

2 (a) Solve this inequality.

$$6x + 5 > 23$$

(a) _____ [2]

(b) Rearrange this formula to make r the subject.

$$p = 3r - 7$$

(b) _____ [2]

3 Eastfield School held a sponsored swim and a fun run to raise money for the school fund and the local hospice.

(a) Twenty students entered the sponsored swim. The number of lengths completed by each student is listed below.

**34 32 40 38 52 25 45 62 21 42
41 53 48 28 60 45 36 43 57 34**

(i) Complete this stem and leaf diagram to represent the data.

2	
3	
4	
5	
6	

Key: 3 | 4 represents 34 lengths

[3]

(ii) Find the median number of lengths completed.

(a)(ii) _____ lengths [2]

**(iii) What fraction of the group completed fewer than 40 lengths?
Give your answer in its simplest form.**

(iii) _____ [2]

(b) The times taken by the students who entered the fun run are summarised below.

Time (t minutes)	Frequency		
$15 \leq t < 20$	18		
$20 \leq t < 25$	34		
$25 \leq t < 30$	32		
$30 \leq t < 35$	26		
$35 \leq t < 40$	10		

Calculate an estimate of the mean of these times.

(b) _____minutes [4]

(c) The amounts raised from the two events are shown below.

Eastfield School Fundraising	
Sponsored swim	£650
Fun run	£1250

- (i) Write the ratio of the amount raised from the swim to the amount raised from the run in its simplest form.**

(c)(i) _____ [2]

- (ii) The TOTAL amount raised is divided between the school fund and the local hospice in the ratio 2 : 3.**

Work out the amount of money given to the local hospice.

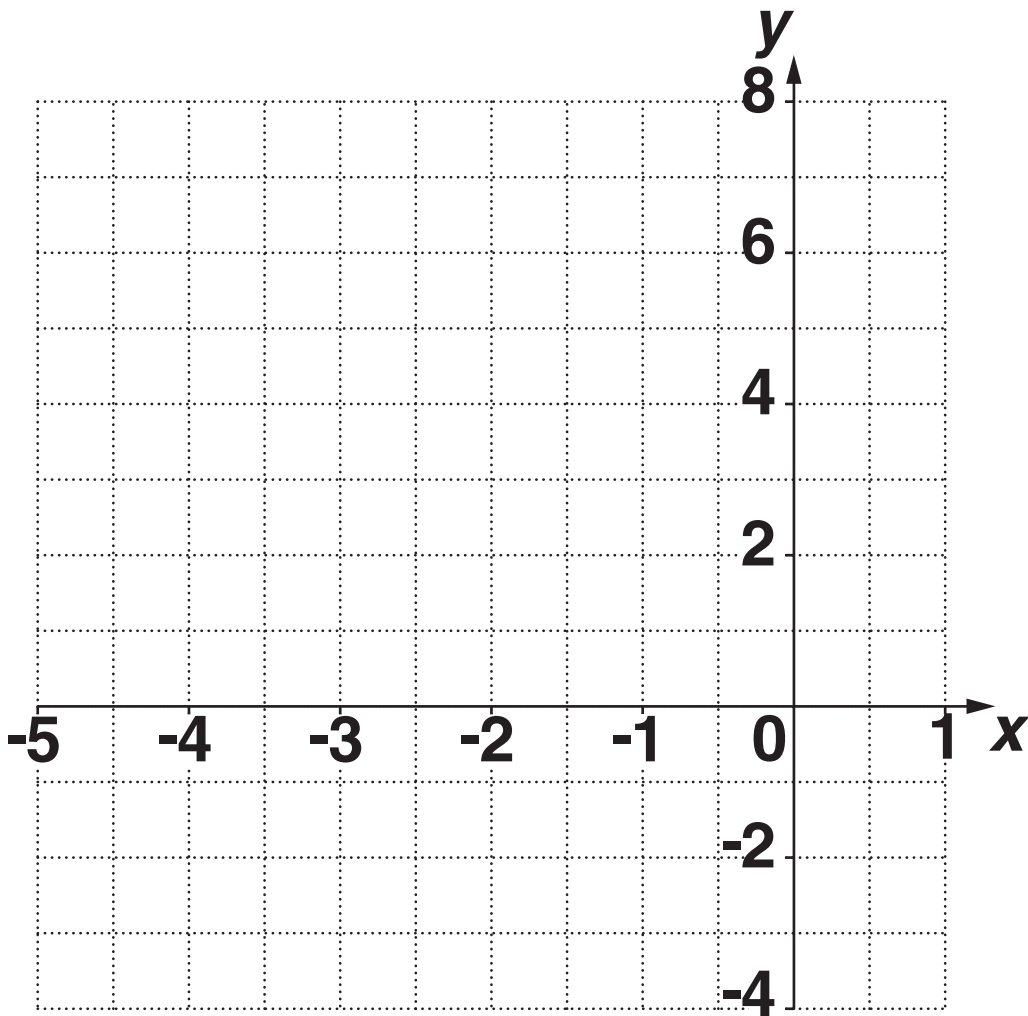
(ii) £ _____ [2]

4 (a) (i) Complete the table for $y = x^2 + 4x + 2$.

x	-5	-4	-3	-2	-1	0	1
y	7	2	-1		-1	2	7

[1]

(ii) Draw the graph of $y = x^2 + 4x + 2$ for values of x from -5 to 1.



[2]

(iii) Use your graph to solve $x^2 + 4x + 2 = 0$.

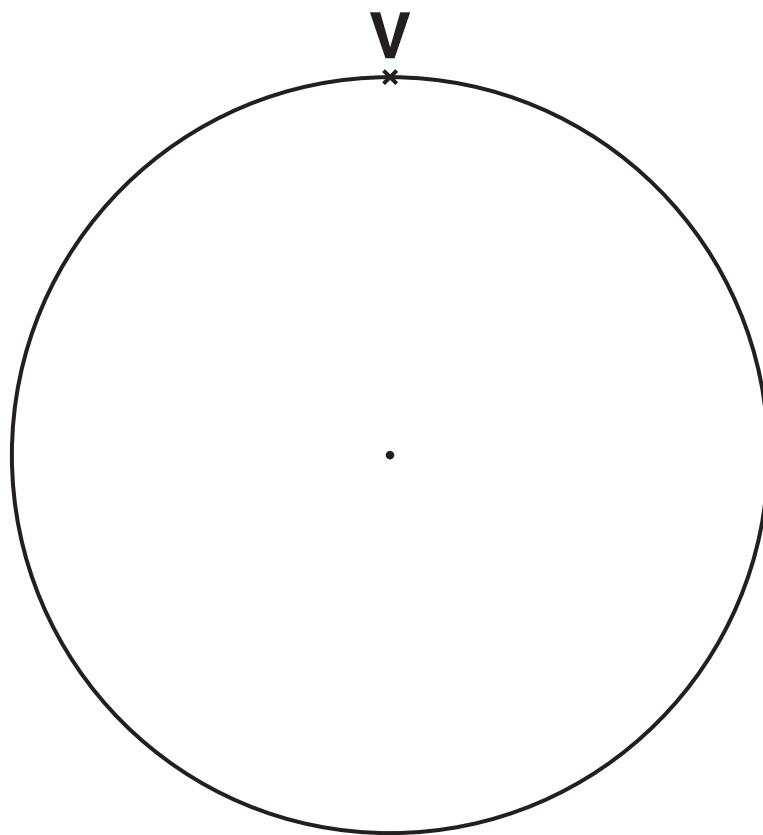
(a)(iii) $x =$ _____ or $x =$ _____ [2]

(b) The equation $x^3 + 5x = 24$ has a solution between 2 and 3.

**Find this solution correct to 1 decimal place.
Show all your trials and their outcomes.**

(b) $x =$ _____ [3]

- 5 (a) Construct a regular octagon with its vertices on the circumference of the circle below. One vertex, V, is marked for you.

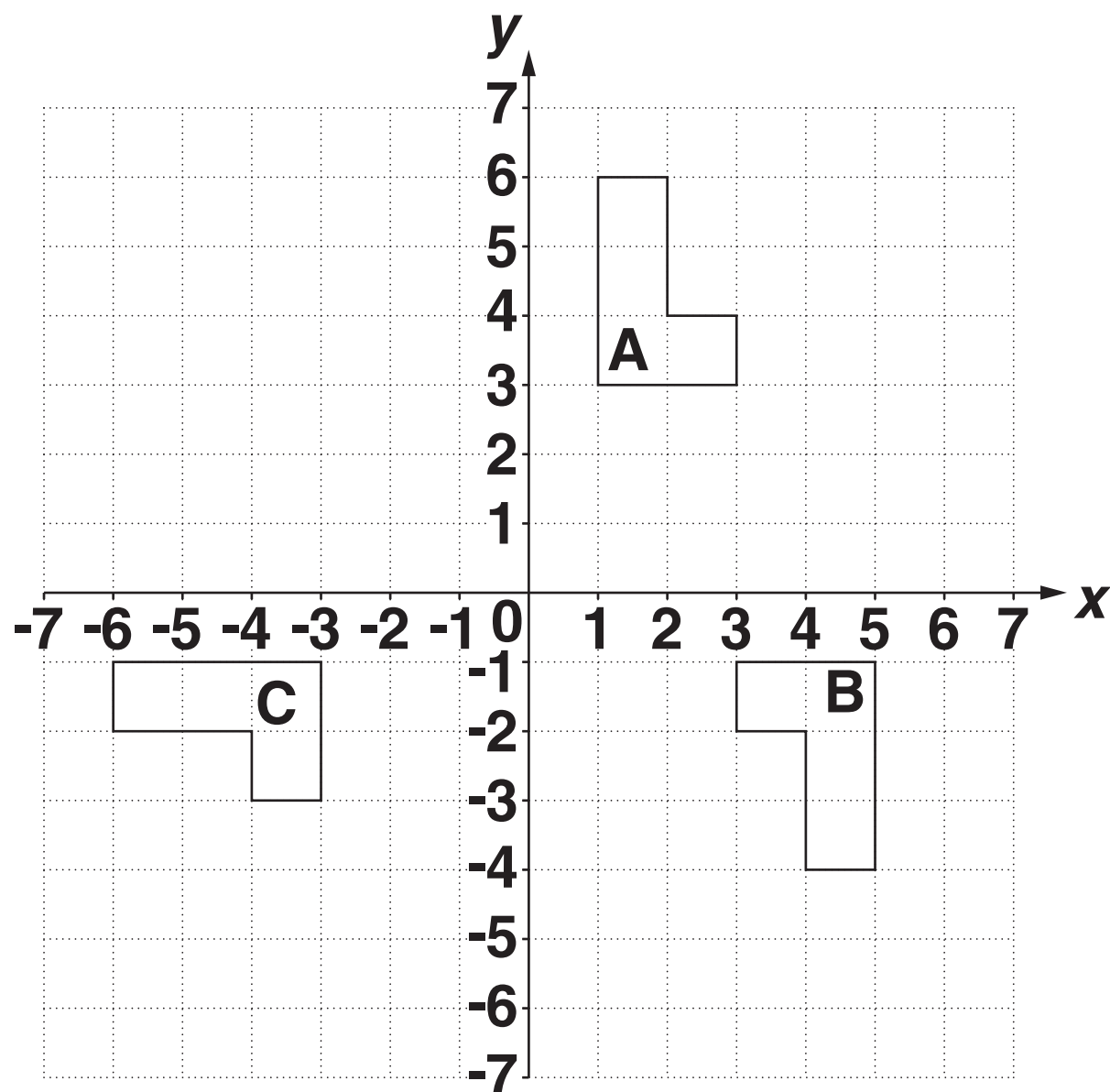


[2]

- (b) Work out the size of an interior angle of a regular 12-sided polygon.

(b) _____° [2]

6 Shapes A, B and C are drawn on the grid below.



(a) Describe fully the SINGLE transformation that maps shape A onto shape B.

[3]

(b) Shape A can be transformed onto shape C using a combination of two transformations:

a rotation of 90° anticlockwise about $(0, 0)$, followed by transformation T.

Describe fully transformation T.

[3]

- 7 (a) Irina puts £5340 into a savings account.
The interest rate is 3.3% per year.**

Calculate how much is in her account after one year.

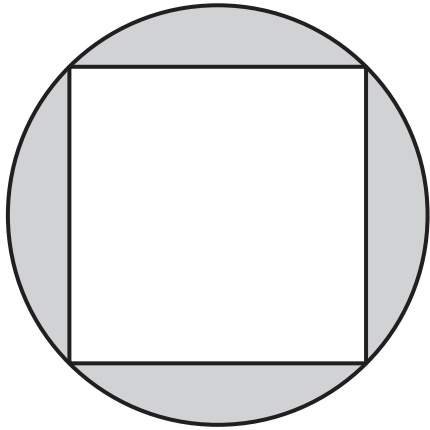
(a) £ _____ [3]

- (b) Jason is awarded a 6% pay rise.
After his pay rise, he earns £2597 per month.**

Work out how much he earned per month before the pay rise.

(b) £ _____ [3]

- 8 The diagram shows a company logo.
It is a square inside a circle of diameter 6 cm.
The vertices of the square lie on the circumference of the circle.



- (a) Show that the square has sides of length 4.24 cm, correct to 2 decimal places.

[3]

(b) Work out the percentage of the logo that is shaded.

(b) _____ % [5]

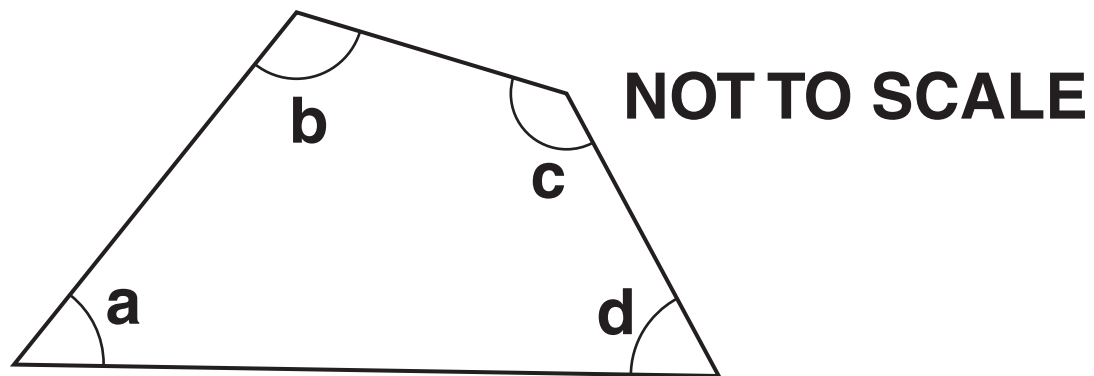
9 In the quadrilateral below:

angle b is twice the size of angle a

angle c is 40° more than angle b

angle d is half the size of angle c.

Work out the size of the largest angle in the quadrilateral.



_____ $^\circ$ [5]

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10 The box plot opposite shows the distribution of heights of a group of 16-year-old girls.

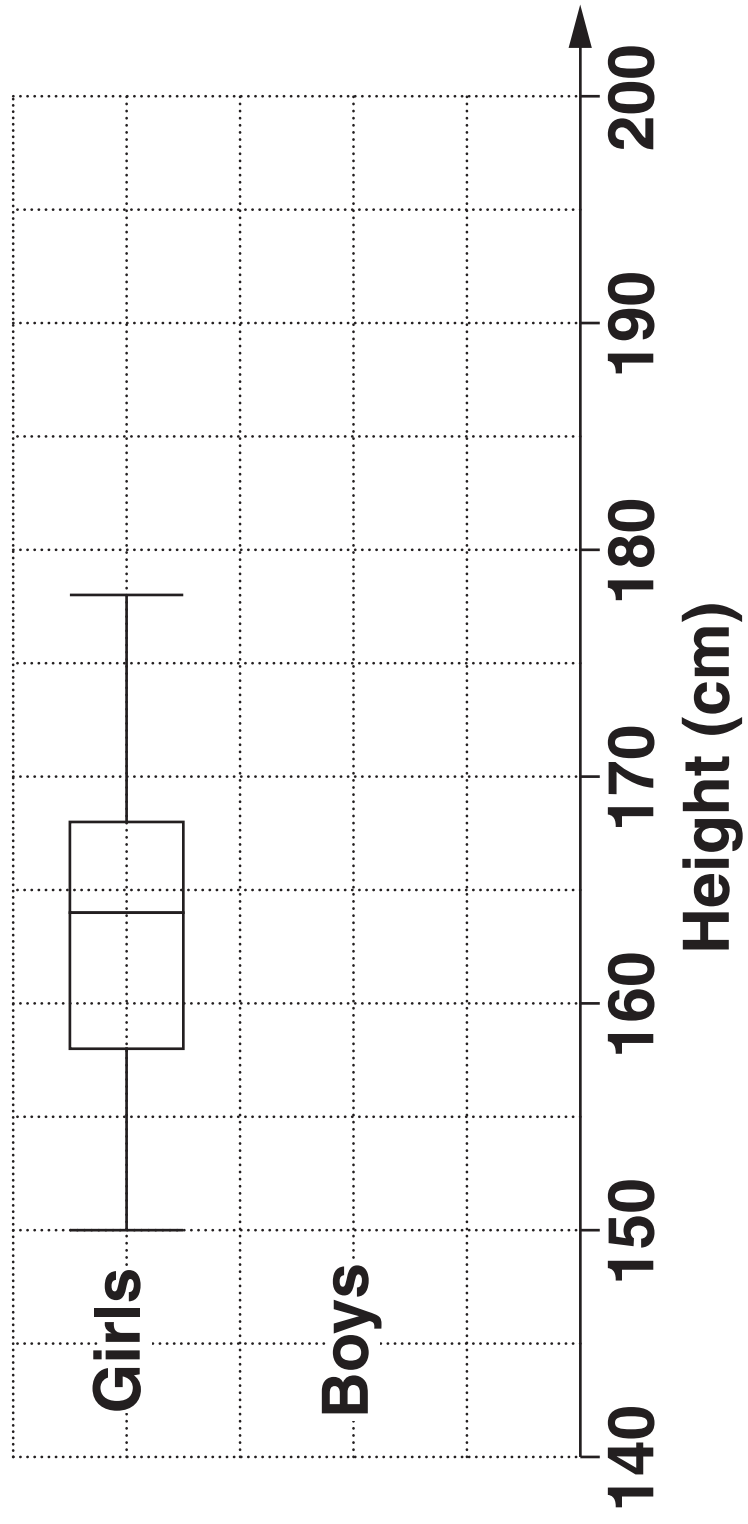
(a) Here is some information about the heights of a group of 16-year-old boys.

Minimum height	158 cm
Maximum height	186 cm
Median height	174 cm
Upper quartile	180 cm
Interquartile range	14 cm

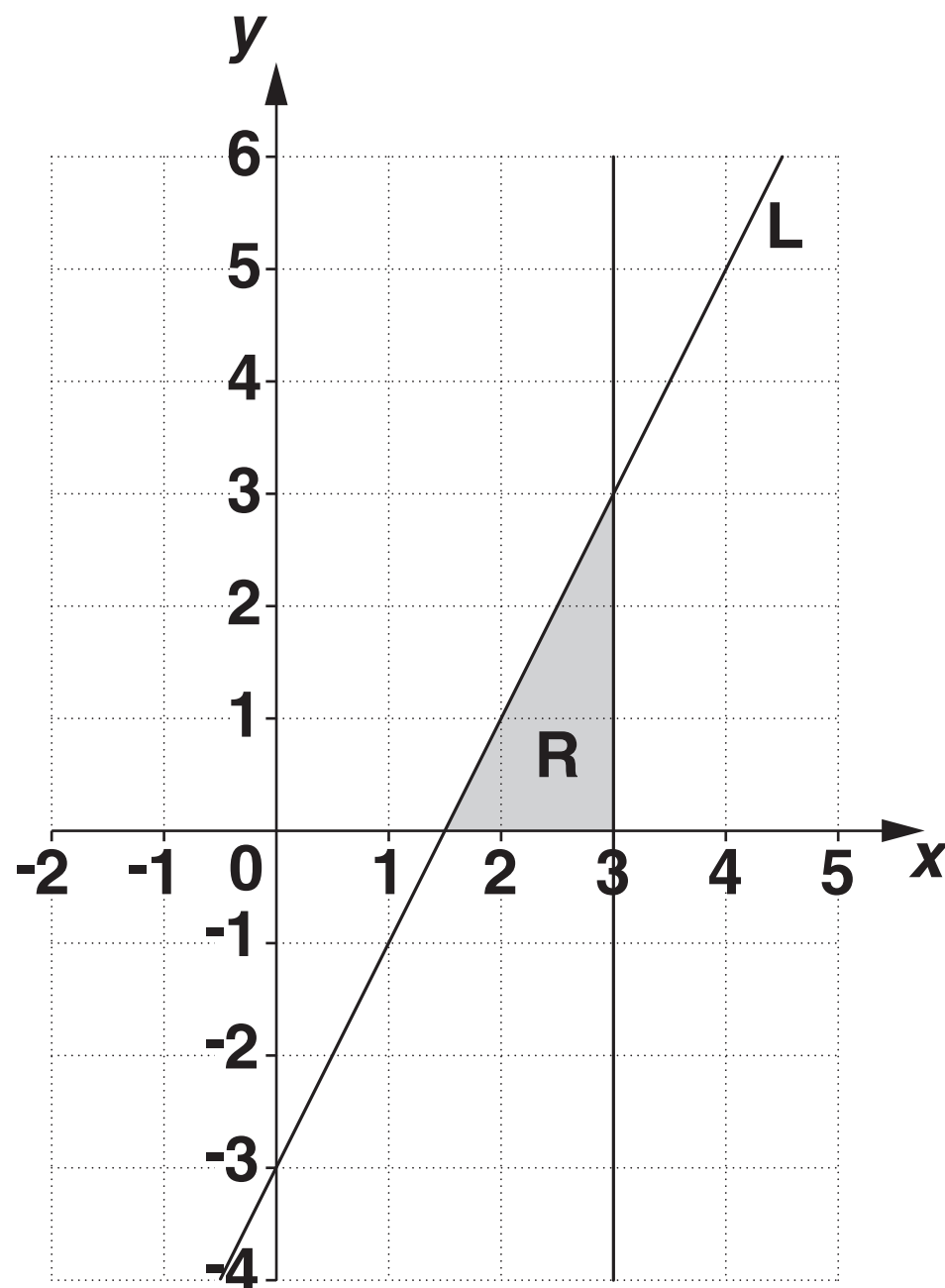
On the grid above, draw the box plot for the boys. [3]

(b) Make two comments comparing the distributions of the heights of the boys and the girls. Use these statistics to justify your comments.

2



11 The line L and the region R are shown on the grid below.



(a) Write down the equation of the line L.

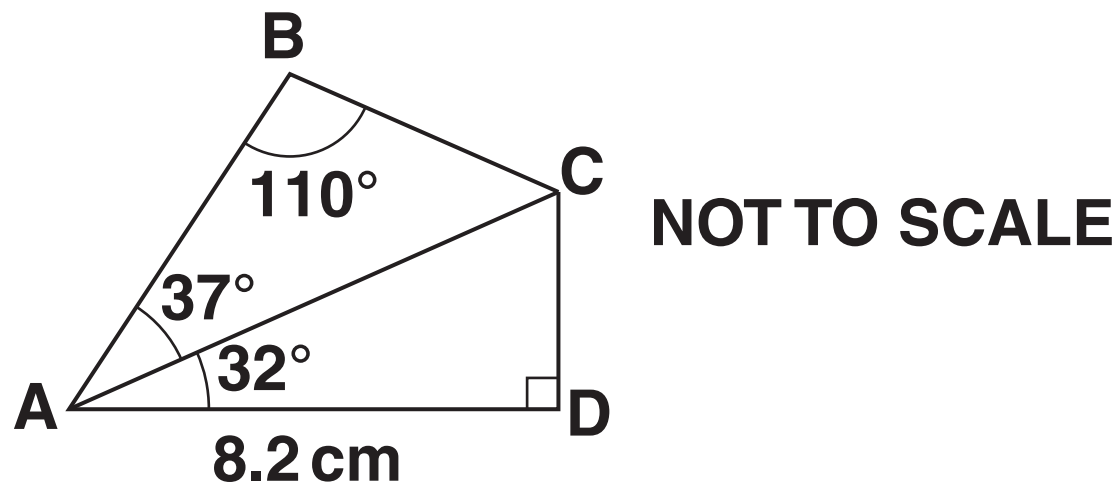
(a) _____ [2]

(b) The region R is defined by three inequalities.
One of these is $y \geq 0$.

Write down the other two inequalities.

(b) _____
_____ [2]

- 12 ABCD is a quadrilateral with a right angle at D.
Angle ABC = 110° , angle BAC = 37° , angle DAC = 32° and
AD = 8.2 cm.



- (a) Show that AC = 9.7 cm correct to 1 decimal place.

[2]

- (b) Calculate BC.

(b) _____ cm [3]

13 (a) Solve.

$$\frac{6x-1}{2} - \frac{2x+1}{3} = 5$$

(a) $x =$ _____ [4]

(b) Solve this equation.

$$5x^2 - 3x - 6 = 0$$

Give your solutions correct to 2 decimal places.

(b) $x =$ _____ or $x =$ _____ [3]

14 The histogram on the insert summarises the ages of the patients at a surgery one morning.

(a) Use the information in the histogram to complete the frequency table.

Age (a years)	Frequency
$0 < a \leq 15$	
$15 < a \leq 30$	
$30 < a \leq 60$	
$60 < a \leq 80$	
$80 < a \leq 100$	

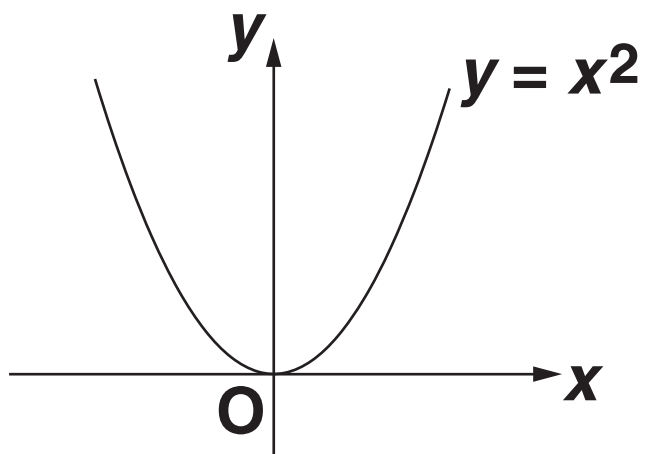
[3]

(b) Angus says that the oldest patient at the surgery that morning was 100 years old.

Is he definitely correct? Explain your answer.

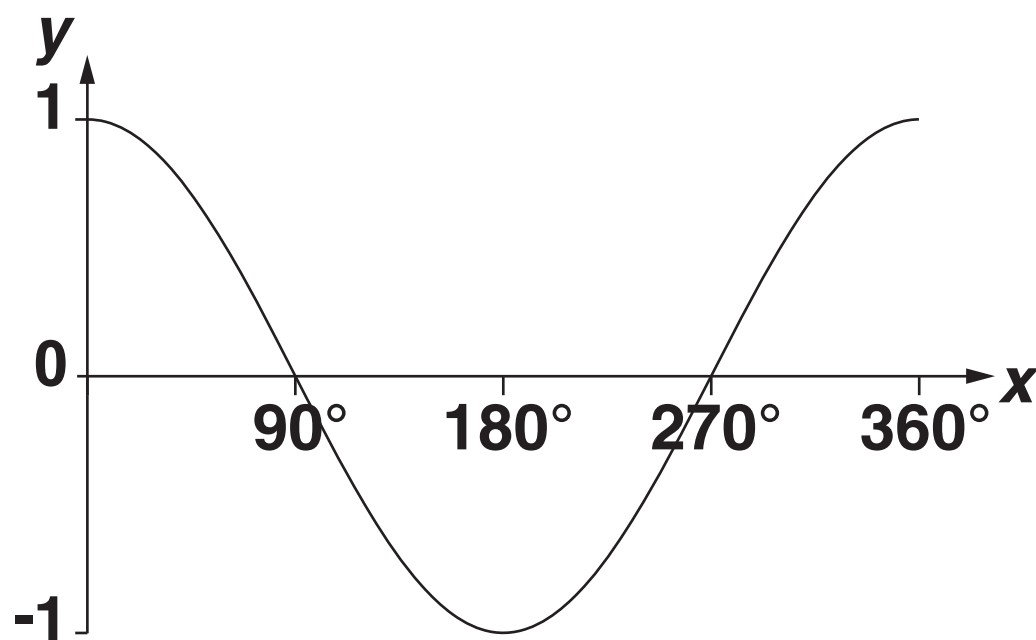
[1]

15 (a) This is a sketch of the graph of $y = x^2$.



On the same axes, sketch the graph of $y = (x + 2)^2$. [1]

(b) The diagram shows the graph of $y = \cos x$ for $0^\circ \leq x \leq 360^\circ$.



Find the values of x which satisfy $\cos x = -0.39$ in the range $0^\circ \leq x \leq 360^\circ$.

Use your calculator and the graph to help you.

(b) $x =$ _____ $^\circ$ or $x =$ _____ $^\circ$ [2]

16* The total capacity of an oil tank is 8600 litres, correct to the nearest 100 litres.

The tank should only be filled to 95% of its total capacity.

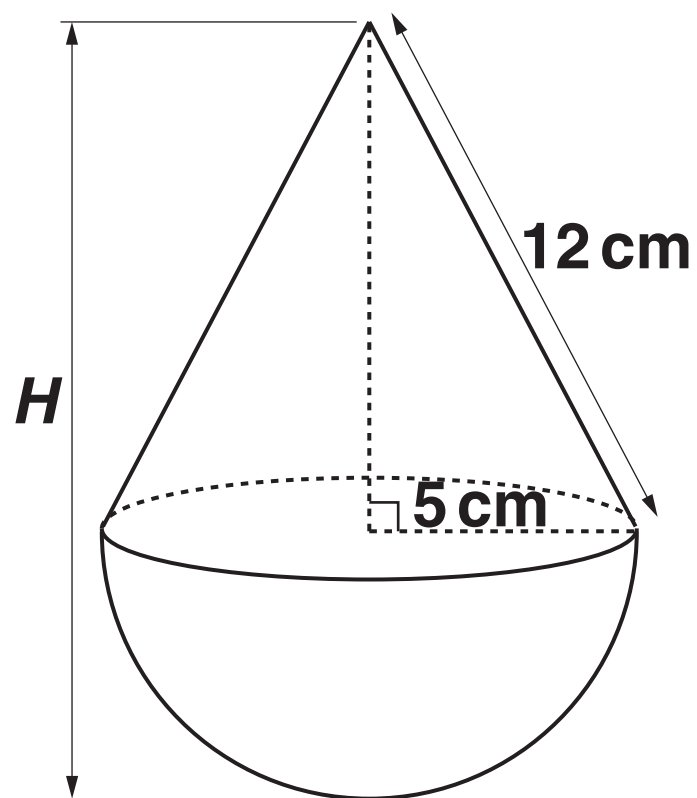
A pump can deliver oil to the tank at a rate of 740 litres per minute, correct to the nearest 10 litres per minute.

Calculate the maximum possible time it would take to fill the empty tank.

Give your answer in minutes and seconds.

_____ minutes _____ seconds [5]

- 17 A child's toy is made by joining a cone to a hemisphere. The hemisphere and cone each have radius 5 cm. The slant height of the cone is 12 cm.



- (a) Show that the total height, H , of the toy is 15.9 cm.

[3]

(b) Calculate the total volume of the toy.

(b) _____ cm³ [4]

END OF QUESTION PAPER

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