

**OXFORD CAMBRIDGE AND RSA EXAMINATIONS
GCSE**

J567/03

MATHEMATICS B

Paper 3 (Higher Tier)

MONDAY 9 JUNE 2014: Morning

**DURATION: 1 hour 45 minutes
plus your additional time allowance**

MODIFIED ENLARGED

Candidate forename		Candidate surname	
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Centre number						Candidate number				
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Candidates answer on the Question Paper.

OCR SUPPLIED MATERIALS:

None

OTHER MATERIALS REQUIRED:

**Geometrical instruments
Tracing paper (optional)**

<p>WARNING NO CALCULATOR CAN BE USED FOR THIS PAPER</p>
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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.

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

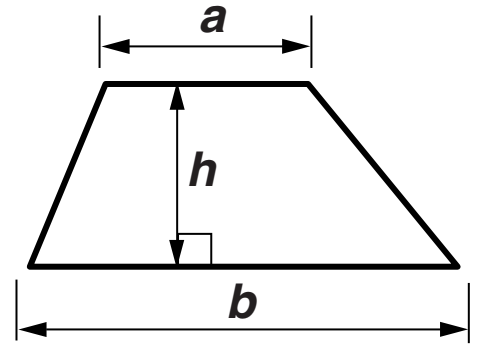
The total number of marks for this paper is 100.

Any blank pages are indicated.

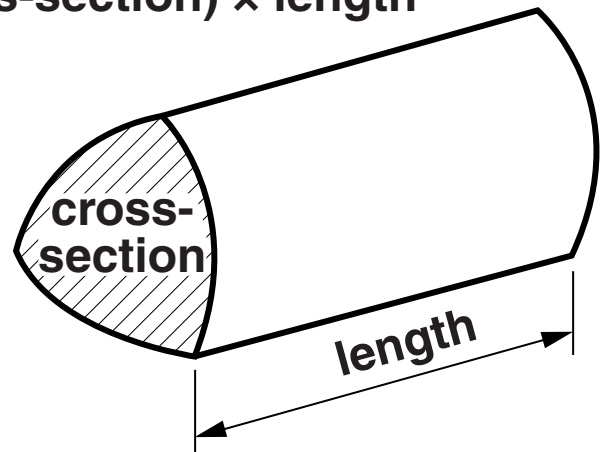
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FORMULAE SHEET: HIGHER TIER

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



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

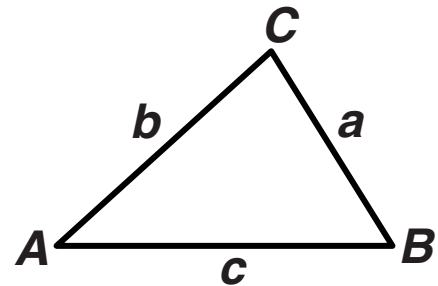


In any triangle ABC

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

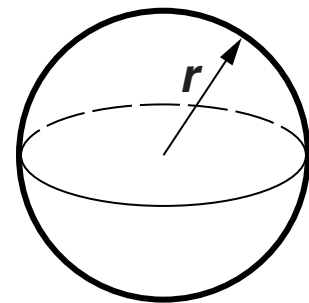
$$\text{Cosine rule} \quad a^2 = b^2 + c^2 - 2bc \cos A$$

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



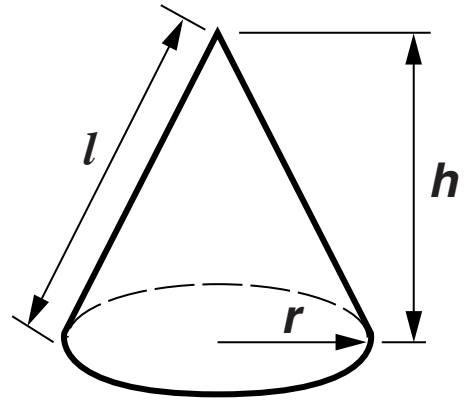
$$\text{Volume of sphere} = \frac{4}{3} \pi r^3$$

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



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 Students at a sports college choose activities for games.

(a) In Year 7 they chose between rounders and athletics in the ratio 1 : 4.

There are 60 students in Year 7.

Work out how many chose athletics.

(a) _____ [2]

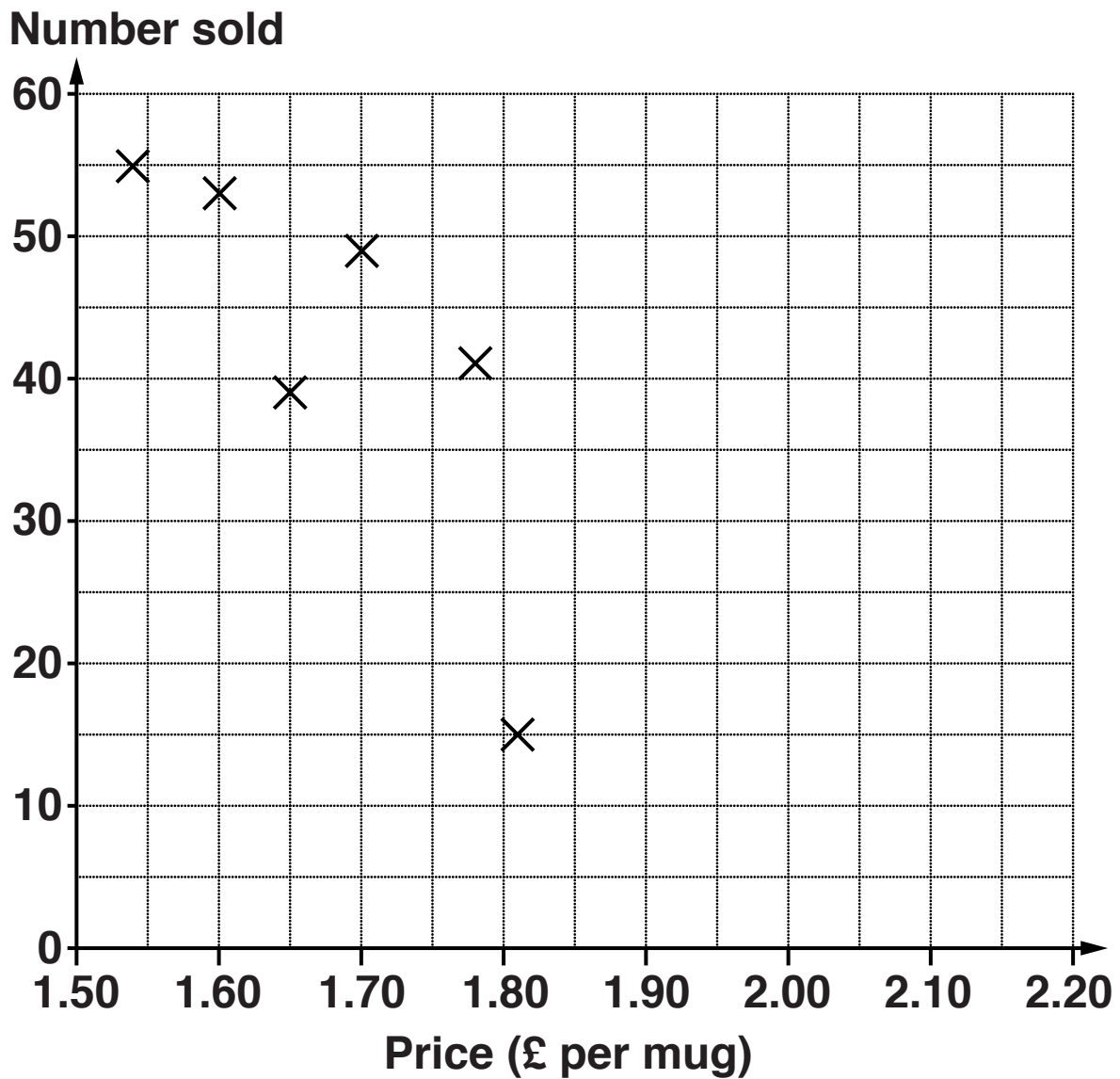
(b) In Year 8 they chose between badminton and swimming in the ratio 3 : 5.

If 42 students chose badminton, work out how many chose swimming.

(b) _____ [2]

- 2 Chico sells coffee in his café.
He changes the price of a mug of coffee every day.
The table below shows the number of mugs of coffee
he sells and the price on each of ten days.**

	Price (£ per mug)	Number sold
Day 1	1.54	55
Day 2	1.60	53
Day 3	1.65	39
Day 4	1.70	49
Day 5	1.78	41
Day 6	1.81	15
Day 7	1.88	40
Day 8	2.05	25
Day 9	2.14	28
Day 10	2.20	21



(a) The first six points have been plotted on the scatter diagram above.

Complete the scatter diagram by plotting the last four points. [2]

(b) Describe the correlation shown.

(b) _____ [1]

(c) Draw a line of best fit on the diagram. [1]

(d) The café closed early one day.

Put a ring around the cross that shows this day. [1]

(e) One day Chico charges £2.00 per mug of coffee.

**Use the diagram to estimate how much money
IN TOTAL Chico takes this day on coffee.**

(e) £ _____ [2]

3 (a) Work out the value of $5x^2 + 2x$ when $x = 3$.

(a) _____ [2]

(b) Work out the value of $3a - 5b$ when $a = 6$ and $b = -2$.

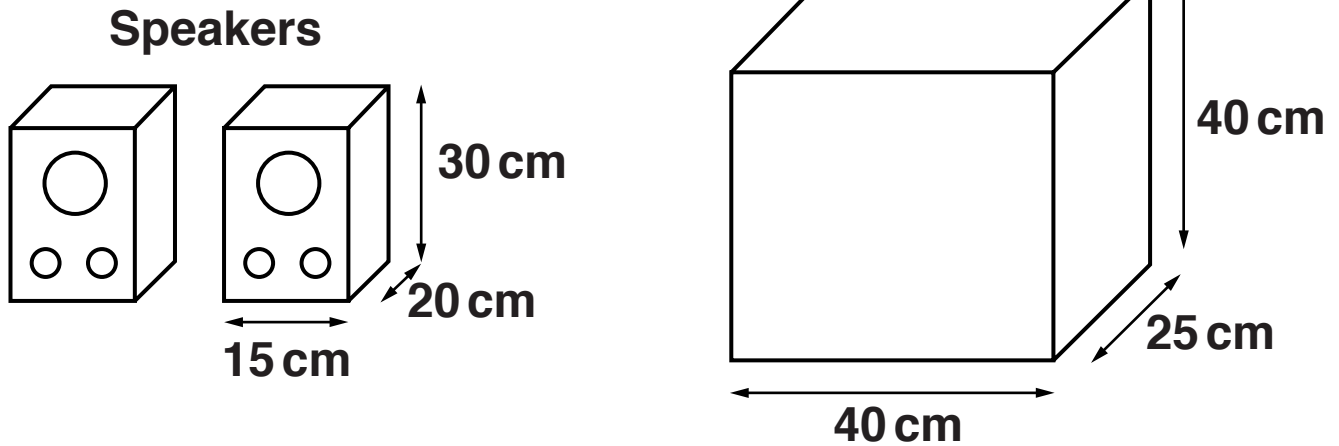
(b) _____ [2]

4 Work out.

$$5\frac{3}{5} - 2\frac{1}{6}$$

_____ **[3]**

- 5 (a) A hi-fi speaker is a cuboid measuring 15 cm by 20 cm by 30 cm.
TWO of these speakers are packed into a box with internal measurements 40 cm by 25 cm by 40 cm.



The rest of the space inside the box is filled with polystyrene.

Calculate the volume of polystyrene.

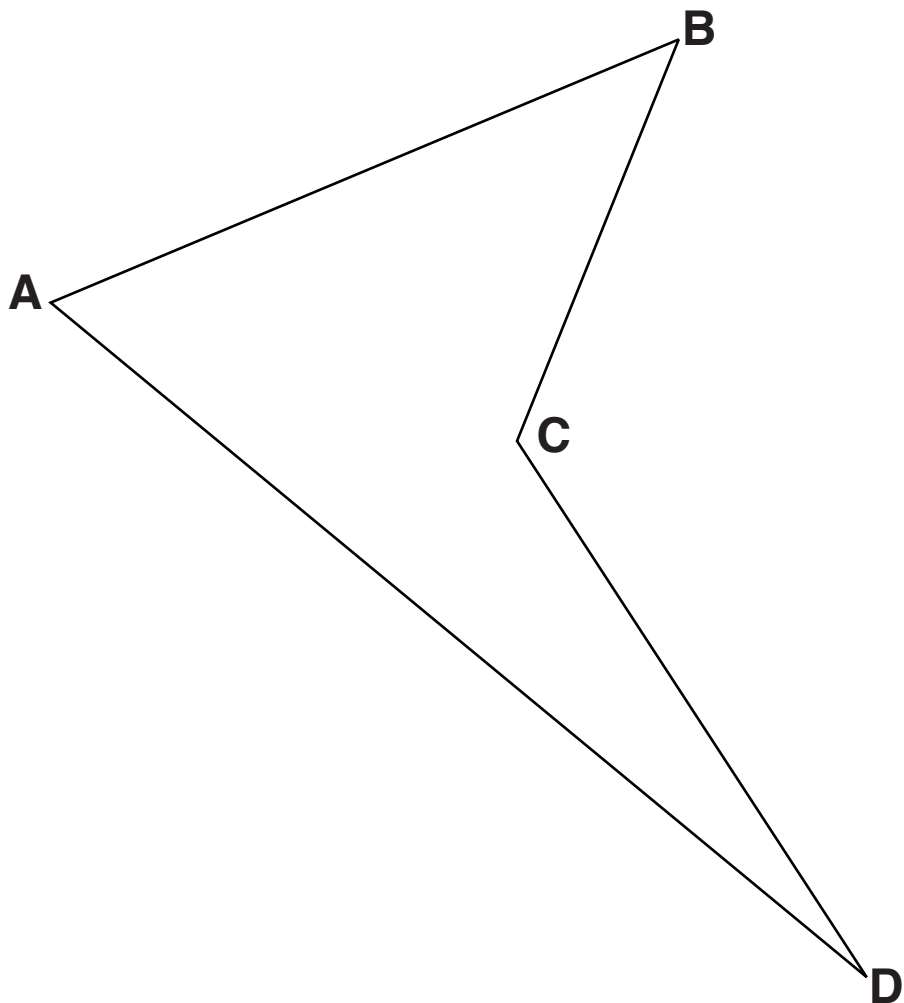
(a) _____ cm^3 [4]

(b) An amplifier is packed into a box measuring 20 cm by 15 cm by 10 cm.

Calculate the surface area of the box.

(b) _____ cm² [3]

6 The scale diagram below shows a park ABCD.



Scale: 1 cm represents 100 m

The council want to put a shed inside the park and it must be

nearer to AB than AD

less than 400 m from C.

**Shade the region where they can put the shed.
You must show all your construction arcs.**

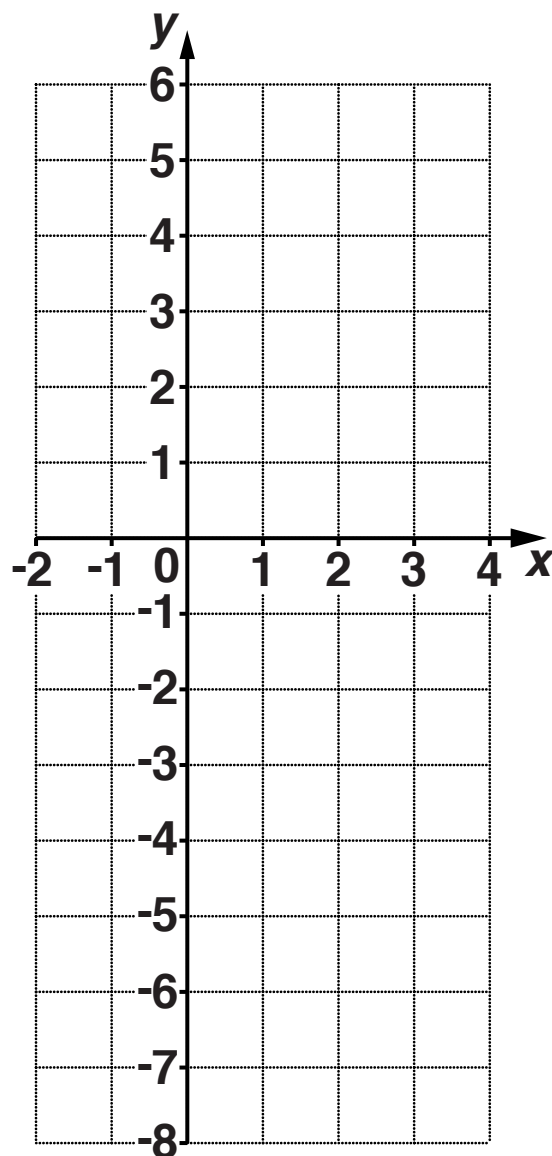
[4]

- 7 (a) Complete the table below for $y = 2x - 3$ by filling in the three missing numbers.

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

[1]

- (b) On the grid below draw the graph of $y = 2x - 3$ for values of x from -2 to 4.

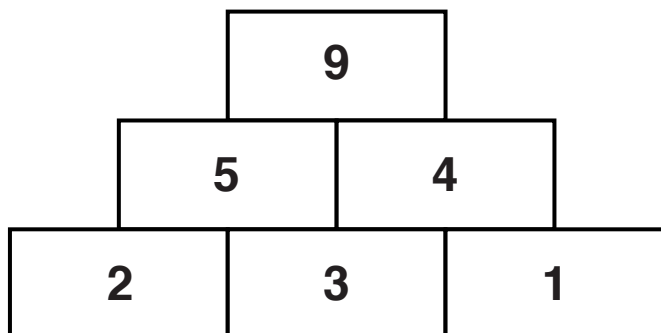


[2]

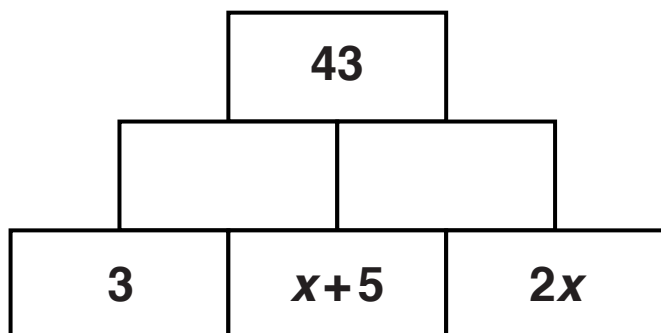
(c) Write down the gradient of the line $y = 2x - 3$.

(c) _____ [1]

- 8 Here is a number pyramid.
The value in each cell is found by adding the values in the two cells beneath it.



In the number pyramid below, find the value of x .
Show all your working.



$x =$ _____ [4]

**9 Winnie drives 184 miles.
She drives 60 miles on ordinary roads and the rest on
a motorway.**

She completes the journey in $3\frac{1}{2}$ hours.

**She drives at an average speed of 40 mph on ordinary
roads.**

Work out her average speed on the motorway.

_____ mph [4]

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TURN OVER FOR QUESTION 10

10 (a) Multiply out.

$$5(3x - y)$$

(a) _____ **[1]**

(b) Solve.

$$5x + 17 = x + 3$$

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

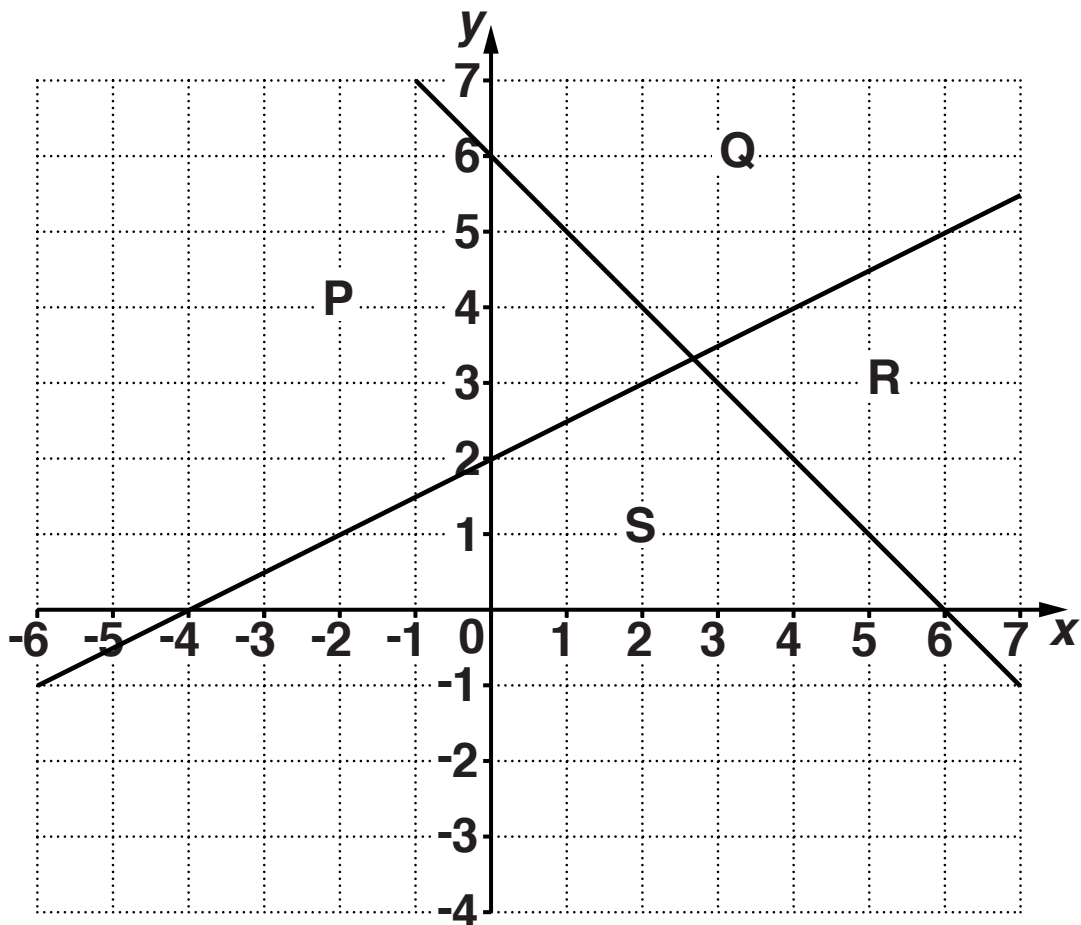
(c) Rearrange $y = 2x - 3$ to make x the subject.

(c) $x =$ _____ **[2]**

(d) Rearrange $u = 5t^2$ to make t the subject.

(d) $t =$ _____ [2]

- 11 The coordinate grid below is divided into four regions, P, Q, R and S.



Choose the correct regions to complete these sentences.

Regions _____ and _____ satisfy the inequality $x + y \geq 6$.

Region _____ satisfies the inequalities $x + y \leq 6$ and $y \geq \frac{1}{2}x + 2$.

[2]

12 (a) (i) Write 5 400 000 in standard form.

(a)(i) _____ [1]

(ii) Write 4.63×10^{-4} as an ordinary number.

(ii) _____ [1]

(b) The UK's Gross Domestic Product (GDP) in 1987 was $\$7 \times 10^{11}$ and in 2007 it was $\$2.8 \times 10^{12}$.

Work out the increase in GDP between 1987 and 2007.

Write your answer in standard form.

(b) \$ _____ [2]

**13 Pet insurance costs £180 each year.
There is a discount of 5% if it is bought online.**

**Calculate the cost of one year's pet insurance after
the discount.**

£ _____ [3]

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TURN OVER FOR QUESTION 14

- 14 Imogen went fishing and recorded the weight of each fish she caught.
The table below shows her results.

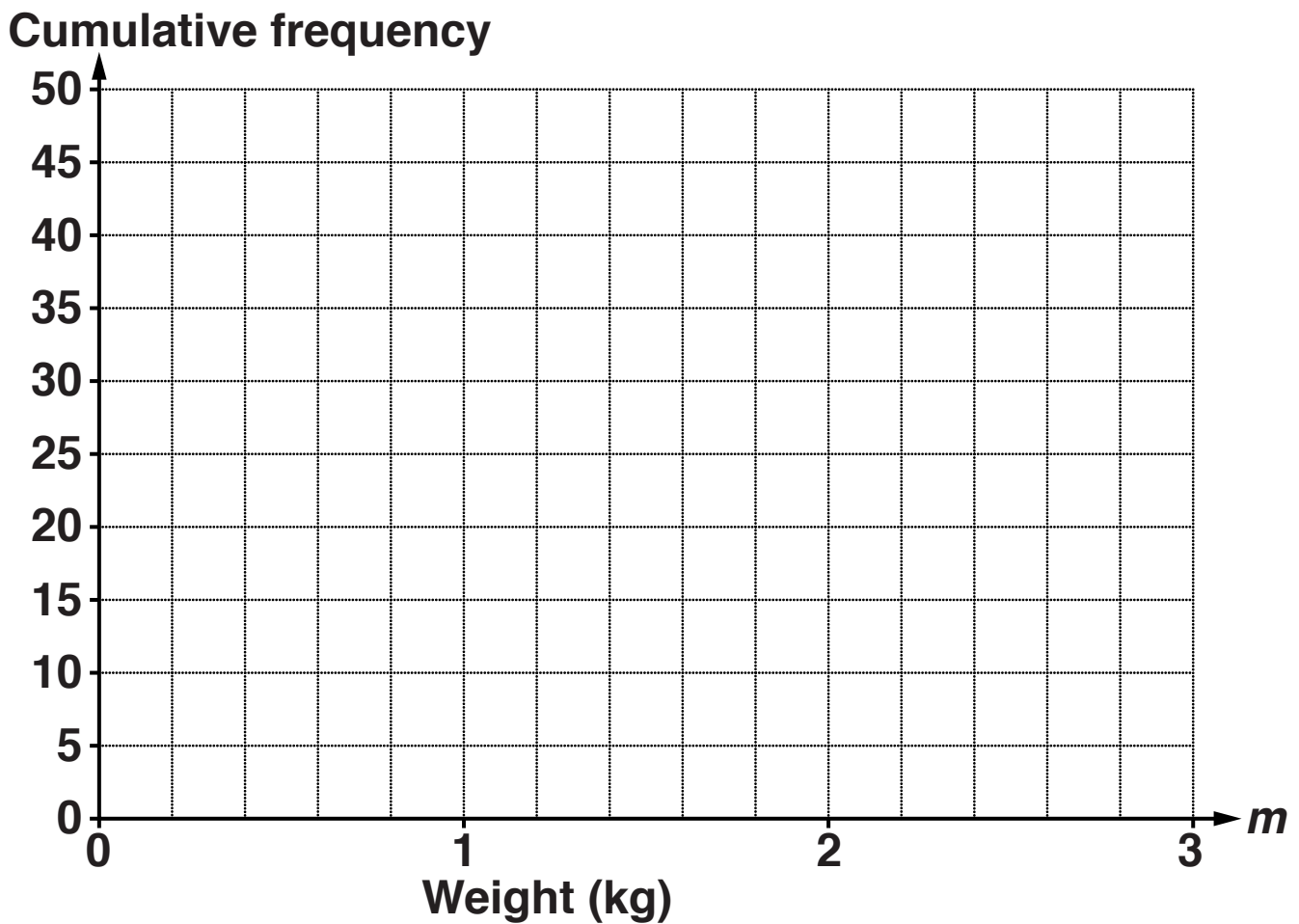
Weight (<i>m</i> kg)	Number of fish
$0 < m \leq 0.5$	10
$0.5 < m \leq 1$	5
$1 < m \leq 1.5$	15
$1.5 < m \leq 2$	16
$2 < m \leq 3$	4

- (a) Complete the following cumulative frequency table for Imogen's results.

Weight (<i>m</i> kg)	Cumulative frequency
$m \leq 0.5$	
$m \leq 1$	
$m \leq 1.5$	
$m \leq 2$	
$m \leq 3$	

[2]

(b) On the grid below draw the cumulative frequency graph for her results.



[2]

(c) The median weight of fish Ruth caught is 1.2 kg.

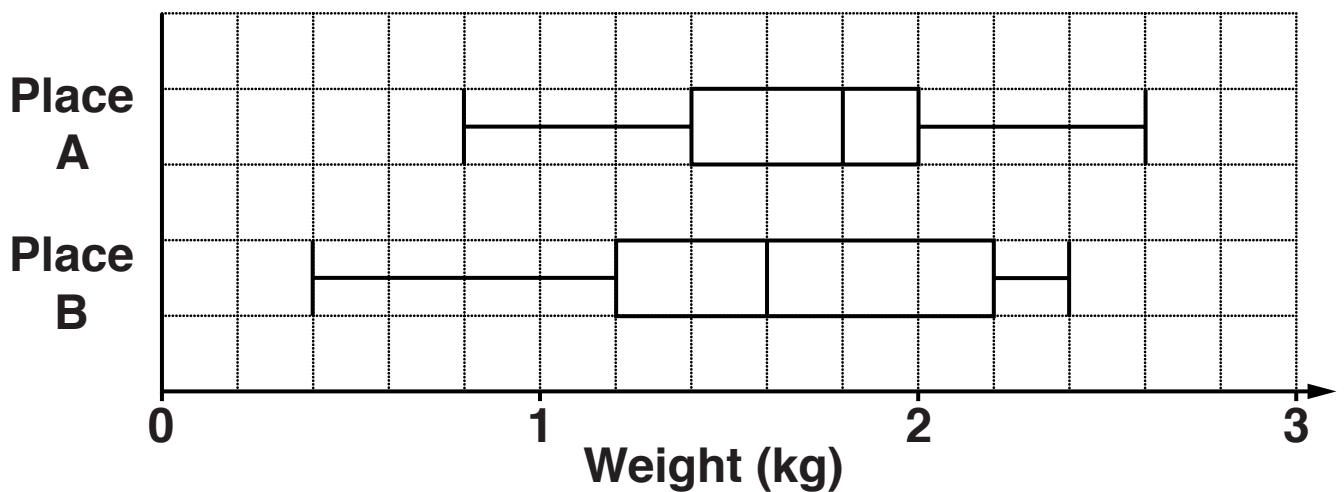
**Is Imogen's median higher or lower than Ruth's?
Show how you decide.**

[1]

(d) Use your graph to work out the percentage of fish Imogen caught that were over 1.8 kg.

(d) _____ % [3]

(e) The box plots below summarise the weights of fish that Calvin caught at place A and place B.



Write TWO different comments comparing the weights of fish caught at the two places.

1 _____

2 _____

[2]

15 (a) Write $y = x^2 + 12x + 24$ in the form $y = (x + p)^2 + q$.

(a) _____ [3]

(b) Hence state

(i) the minimum value of $y = x^2 + 12x + 24$,

(b)(i) _____ [1]

(ii) the value of x at which this minimum occurs.

(ii) _____ [1]

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TURN OVER FOR QUESTION 16

16 (a) Expand and simplify.

$$(1 + \sqrt{3})(4 + 2\sqrt{3})$$

(a) _____ [2]

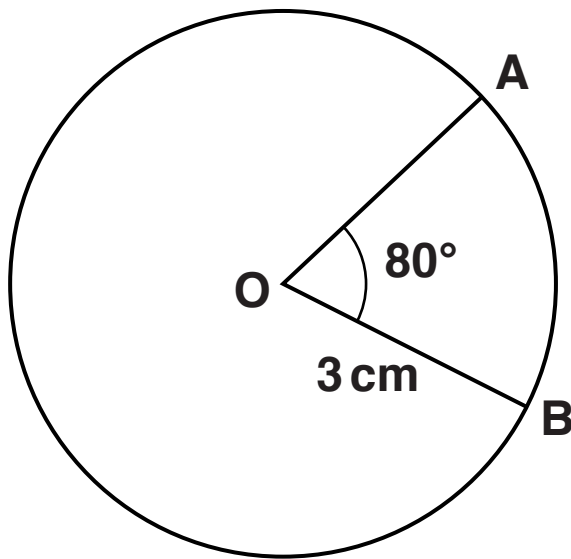
(b) Rationalise the denominator in this expression.

$$\frac{3 + \sqrt{2}}{\sqrt{2}}$$

(b) _____ [2]

(c) The diagram below shows a circle, centre O.

Find the area of the sector OAB in terms of π .
Write your answer in its simplest form.



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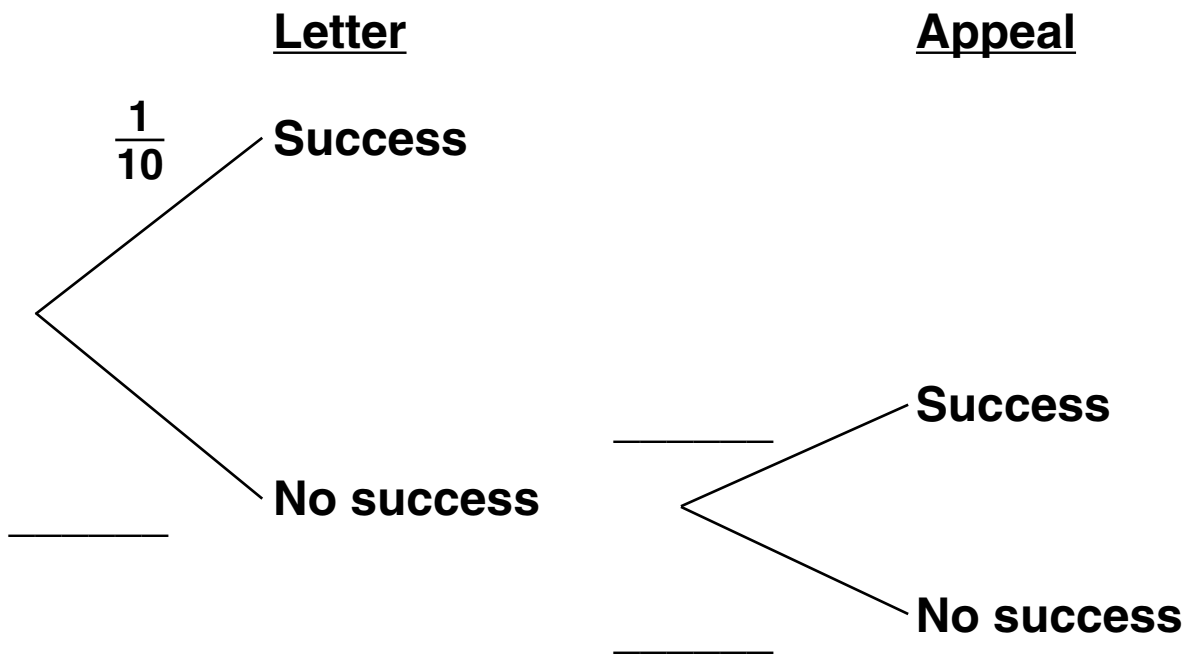
(c) _____ cm^2 [3]

17 Terry applies for funding to set up a community skatepark.
He writes a letter of application.

The probability of this being successful is $\frac{1}{10}$.

If his letter is unsuccessful, he can appeal. The probability of success at the appeal is $\frac{1}{3}$.

(a) Complete the following tree diagram by filling in the three missing items.



[2]

(b) Work out the probability that he is successful in getting funding.

(b) _____ [3]

18 $\vec{PQ} = \begin{pmatrix} 3 \\ -2 \end{pmatrix}$

(a) Work out $3\vec{PQ}$.

(a) _____ [1]

(b) If $Q = (7, -5)$, write down the coordinates of P.

(b) (_____ , _____) [1]

19 Write $0.\dot{7}\dot{2}$ as a fraction in its simplest terms.

_____ **[3]**

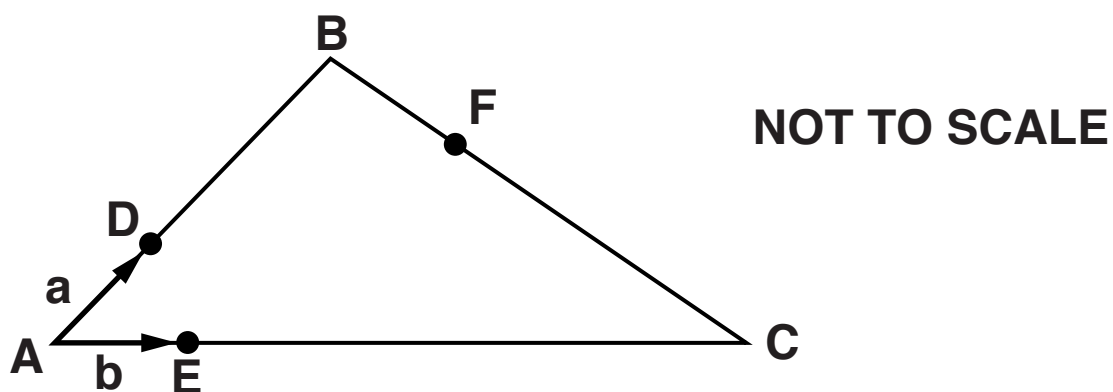
20 (a) In the diagram below, ABC is a triangle.

$$\vec{AD} = a \text{ and } \vec{AE} = b$$

D is a point on AB such that $AB = 4AD$

E is a point on AC such that $AC = 4AE$

F is a point on BC such that $BC = 4BF$



Write these vectors in terms of a and b in their simplest form.

(i) \vec{AB}

(a)(i) _____ [1]

(ii) \vec{BC}

(ii) _____ [1]

(iii) \vec{EF}

(iii) _____ [2]

(b) What do your answers from (a)(i) and (a)(iii) tell you about AB and EF?

_____ [1]

21* At The Oval Theatre there are three different ticket prices, adult, child and student.
Henri finds three receipts for tickets for the same performance.
Information from the three receipts is show below.

Ticket A:
5 adults and 3 children
Total: £85

Ticket B:
2 adults, 1 child and 3 students
Total: £58

Ticket C:
4 adults and 2 children
Total: £65

Work out the price for an adult and the price for a child.

Adult price £ _____

Child price £ _____ [5]

END OF QUESTION PAPER

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