

Surname						Other Names					
Centre Number						Candidate Number					
Candidate Signature											

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General Certificate of Secondary Education
November 2003

MATHEMATICS (SPECIFICATION A) 3301/2I
Intermediate Tier
Paper 2 Calculator



Friday 14 November 2003 9.00 am to 11.00 am

<p>In addition to this paper you will require:</p> <ul style="list-style-type: none"> a calculator mathematical instruments. 	
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For Examiner's Use	
Pages	Mark
3	
4 – 5	
6 – 7	
8 – 9	
10 – 11	
12 – 13	
14 – 15	
16 – 17	
18 – 19	
20 – 21	
22	
TOTAL	
Examiner's Initials	

Time allowed: 2 hours

Instructions

- Use blue or black ink or ball-point pen. Draw diagrams in pencil.
- Fill in the boxes at the top of this page.
- Answer **all** questions in the spaces provided.
- Do all rough work in this booklet.
- If your calculator does not have a π button, take the value of π to be 3.14 unless otherwise instructed in the question.

Information

- The maximum mark for this paper is 100.
- Mark allocations are shown in brackets.
- Additional answer paper, graph paper and tracing paper will be issued on request and must be tagged securely to this answer booklet.
- You are expected to use a calculator where appropriate.

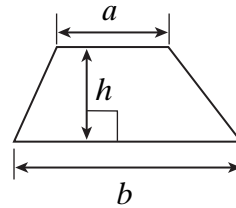
Advice

- In all calculations, show clearly how you work out your answer.

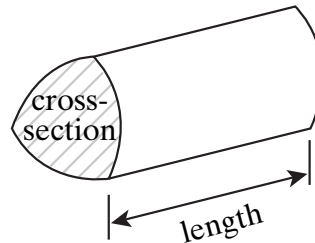
Formulae Sheet: Intermediate Tier

You may need to use the following formulae:

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



Volume of prism = area of cross-section \times length



Answer **all** questions in the spaces provided.

- 1 (a) Three cards are numbered 1, 3 and 4.
Three discs are numbered 2, 4 and 5.



A game consists of picking one card at random and one disc at random.
The numbers on the card and disc are added together.

- (i) Complete the table to show all the possible totals.

		Disc		
		2	4	5
Card	1	3		
	3			
	4			

(2 marks)

- (ii) What is the probability of getting a total which is an even number?

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Answer (2 marks)

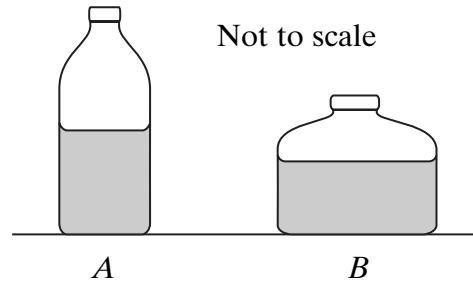
- (b) In a different game the probability of getting a total which is an even number is $\frac{3}{5}$.
What is the probability of getting a total which is an odd number?

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Answer (1 mark)

Turn over ►

- 2 Two bottles are on a shelf.
The 3 litre bottle, *A*, is 55% full of water.
The 2.5 litre bottle, *B*, is three-quarters full of water.
Which bottle contains more water?
You **must** show all your working.



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Answer (4 marks)

- 3 (a) Caroline buys 1.4 kilograms of bananas at 95 pence per kilogram.
She also buys 0.8 kilograms of apples.
Her total bill is £1.93
How much per kilogram was she charged for the apples?

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Answer pence (4 marks)

- (b) Jane spends £4.50 on fruit.
Her total bill is £22.50
What percentage of her total bill is for fruit?

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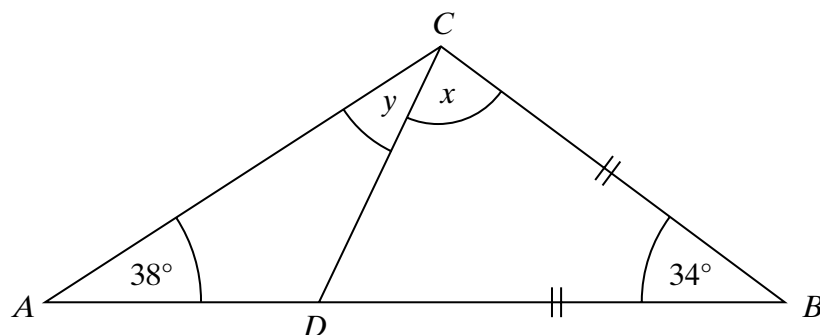
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Answer % (2 marks)

4 ABC is a triangle.

D is a point on AB such that $BC = BD$.



Not drawn accurately

(a) Work out the value of x .

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Answer degrees (2 marks)

(b) Work out the value of y .

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Answer degrees (2 marks)

(c) Does $AD = DC$?

Give a reason for your answer.

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(1 mark)

Turn over ►

- 5 You are given that $m = \frac{3}{4}$, $p = \frac{1}{2}$ and $t = 2$

Find the value of

(a) $mp + t$

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Answer (2 marks)

(b) $\frac{m + p}{t}$

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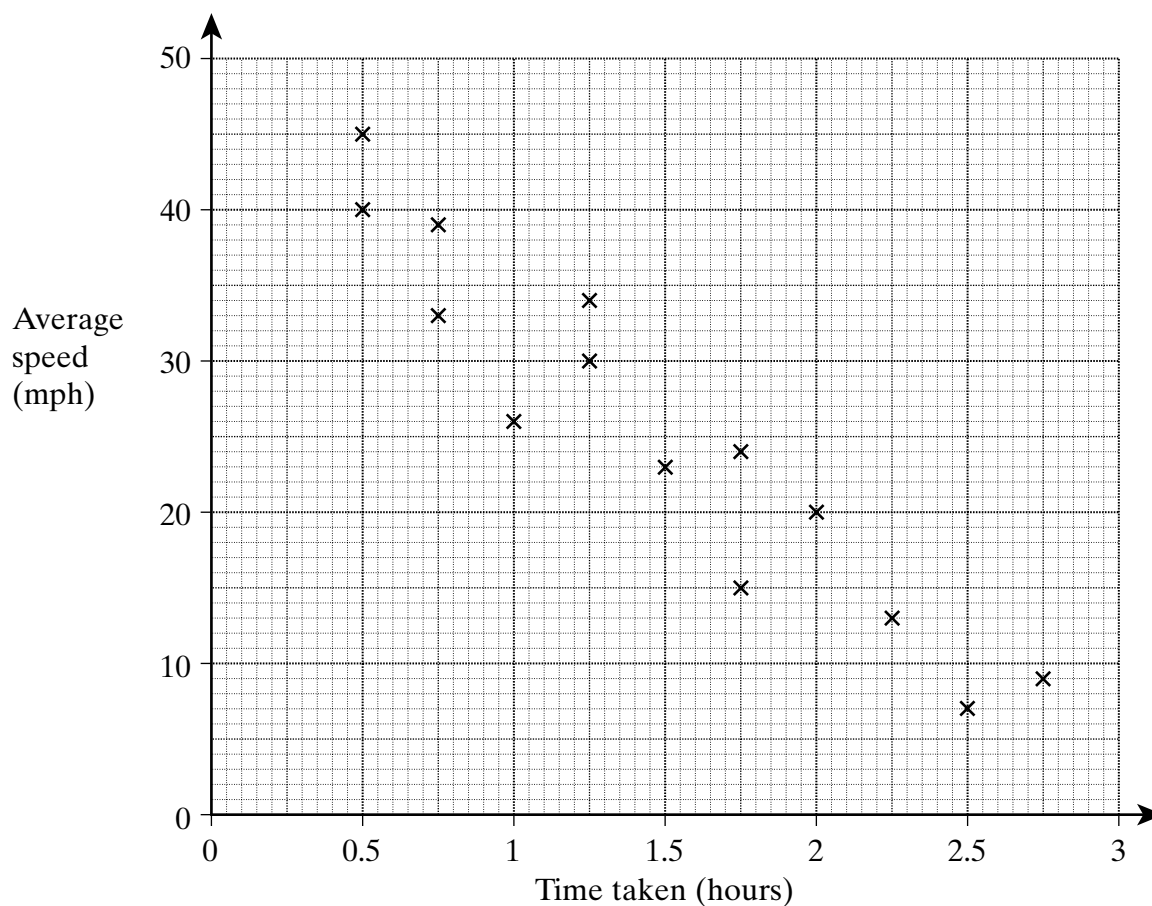
Answer (2 marks)

- 6 A bathroom wall measures 2.55 metres by 2.85 metres.
It is to be covered with square tiles of side 15 centimetres.
Tiles are sold in boxes of 24.
How many boxes are needed?

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Answer boxes (4 marks)

- 7 Steve records the time taken and the average speed for several different journeys. This information is shown on the scatter graph.



- (a) Draw a line of best fit on the scatter graph. (1 mark)
- (b) Describe the relationship between the time taken and the average speed.

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(1 mark)

Turn over ►

- 8 For many years, people have tried to find an estimate for the value for π . Here are some of the estimates used.

Greek $\frac{22}{7}$

Hindu $\sqrt{10}$

Egyptian $\frac{256}{81}$

Roman $3\frac{1}{8}$

- (a) Put these estimates in order of size, starting with the smallest.
You **must** show all your working.

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Answer (2 marks)

- (b) The value of π on a calculator is 3.141592654
Which of the above estimates is closest to this value?

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Answer (1 mark)

- 9 (a) Simplify $2x + 3y + 5x - 2y - 4x$

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Answer (2 marks)

- (b) Factorise $4c + 12$

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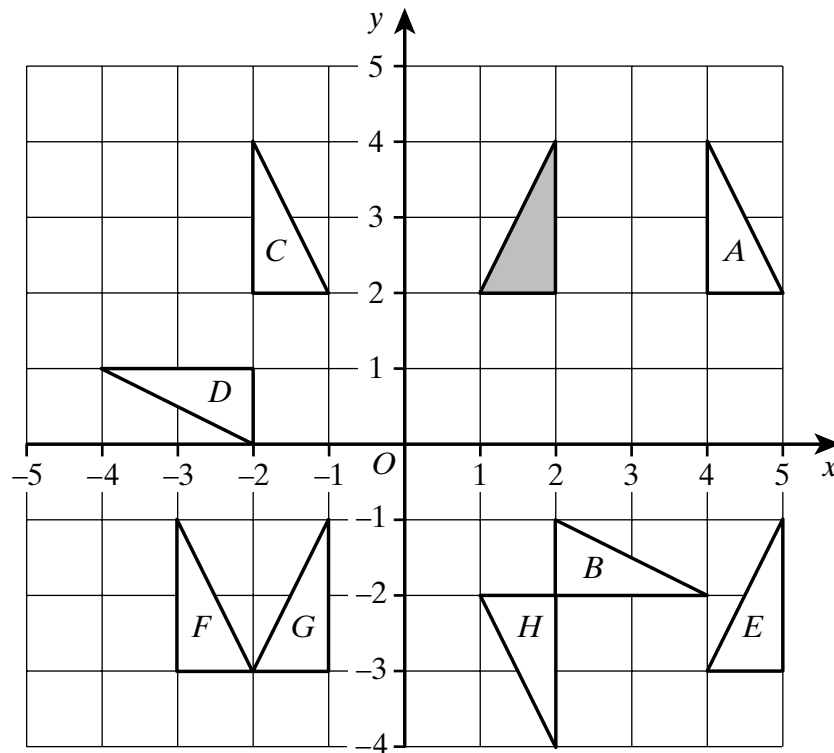
Answer (1 mark)

- (c) Factorise $x^2 + 5x$

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Answer (2 marks)

- 10 The grid shows several transformations of the shaded triangle.



- (a) Write down the letter of the triangle

- (i) after the shaded triangle is reflected in the line $x = 3$,

Answer (1 mark)

- (ii) after the shaded triangle is translated by 3 squares to the right and 5 squares down,

Answer (1 mark)

- (iii) after the shaded triangle is rotated 90° clockwise about O .

Answer (1 mark)

- (b) Describe fully the **single** transformation which takes triangle F onto triangle G .

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(2 marks)

Turn over ►

11 Solve these equations

(a) $6r + 2 = 8$

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Answer $r =$ (2 marks)

(b) $7s + 2 = 5s + 3$

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Answer $s =$ (3 marks)

(c) $\frac{12-y}{3} = 5$

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Answer $y =$ (3 marks)

- 12** The sizes of the interior angles of a quadrilateral are in the ratio

$$3 : 4 : 6 : 7$$

Calculate the size of the largest angle.

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Answer degrees (3 marks)

- 13** (a) Calculate the area of a circle of radius 8 cm.

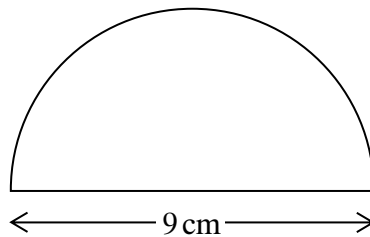
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Answer (3 marks)

- (b) A semi-circular protractor has a diameter of 9 cm.



Not drawn accurately

Calculate the perimeter.

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Answer cm (3 marks)

Turn over ►

- 14** The probabilities of whether a student, picked at random from a school, is vegetarian or not are shown in this table.

	Boys	Girls
Vegetarian	0.08	0.2
Non-vegetarian	0.4	0.32

- (a) What is the probability that a student chosen at random from the school is vegetarian?

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Answer (1 mark)

- (b) There are 320 girls in the school who are vegetarian.
How many students are there in the school altogether?

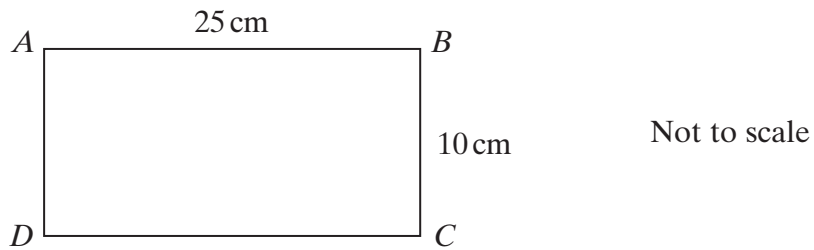
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Answer students (2 marks)

- 15** $ABCD$ is a rectangle with length 25 cm and width 10 cm.



The length of the rectangle is increased by 10%.

The width of the rectangle is increased by 20%.

Find the percentage increase in the area of the rectangle.

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Answer % (3 marks)

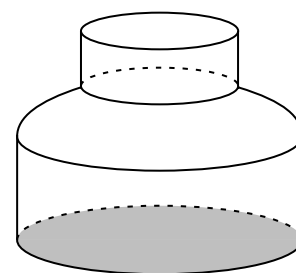
TURN OVER FOR THE NEXT QUESTION

- 16** (a) Liquid is poured at a steady rate into the bottle shown in the diagram.

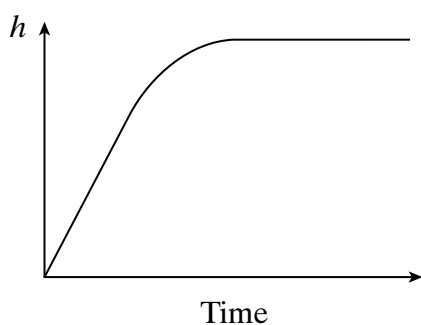
As the bottle is filled, the height, h , of the liquid in the bottle changes.

Which of the five graphs below shows this change?

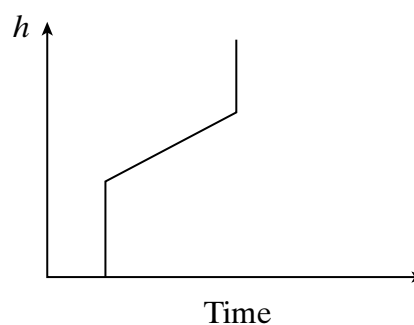
Give a reason for your choice.



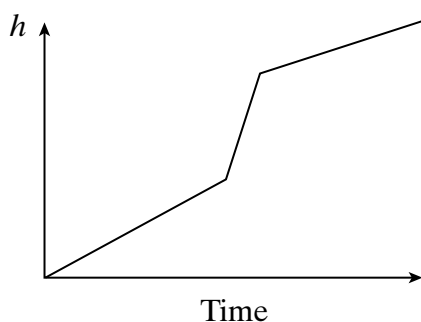
Graph A



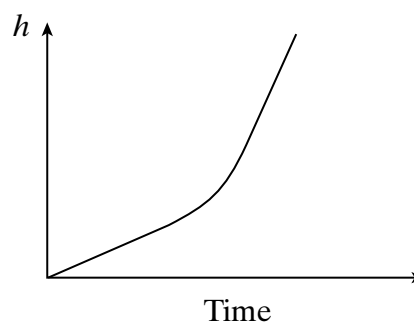
Graph B



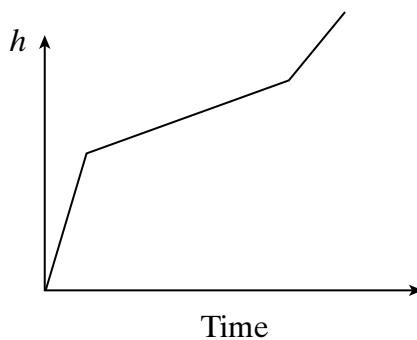
Graph C



Graph D



Graph E



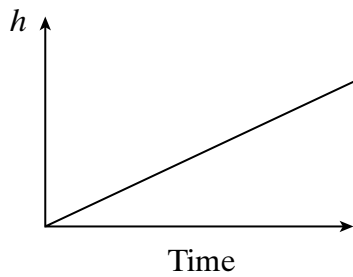
Graph

Reason

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(2 marks)

- (b) Liquid is poured at a steady rate into another container.
The graph below shows how the height, h , of the liquid in this container changes.



Sketch a picture of this container.

(1 mark)

TURN OVER FOR THE NEXT QUESTION

- 17 (a) Expand and simplify

$$5(2a - c) + 4(3a + 2c)$$

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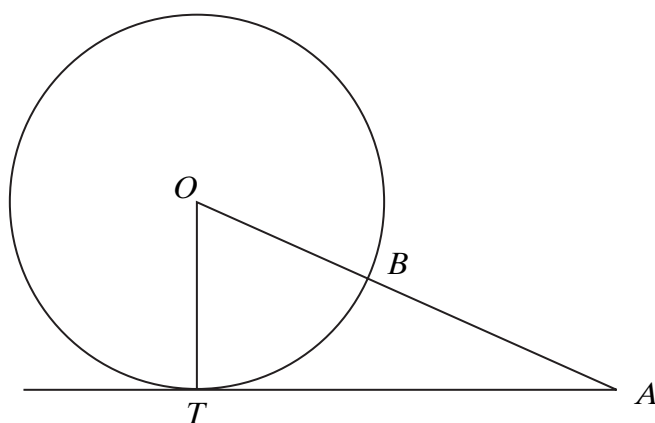
Answer (2 marks)

- (b) Solve $3x + 7 < 1$

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Answer (2 marks)

- 18 The diagram shows a circle with centre O and radius 2.5 cm.
 TA is a tangent to the circle, of length 6 cm.
 The line from A to the centre O of the circle cuts the circumference at B .



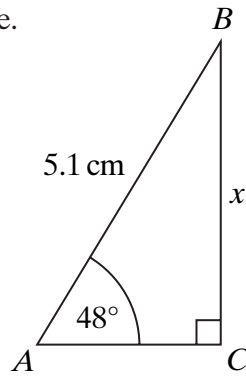
Not drawn accurately

Calculate the length of AB .

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Answer cm (4 marks)

- 19 (a) ABC is a right-angled triangle.
 $AB = 5.1$ cm
 $\angle CAB = 48^\circ$



Not drawn accurately

Find the length of BC (marked x in the diagram).
 Give your answer to a suitable degree of accuracy.

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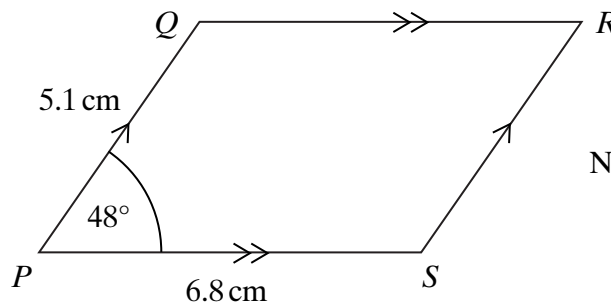
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Answer cm (4 marks)

- (b) $PQRS$ is a parallelogram.
 $PQ = 5.1$ cm
 $PS = 6.8$ cm
 $\angle QPS = 48^\circ$



Not drawn accurately

Calculate the area of $PQRS$.

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Answer cm² (2 marks)

Turn over ►

- 20** Show that the sum of **any** three consecutive integers is always a multiple of 3.

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(3 marks)

- 21** Make t the subject of the formula $u = \frac{t}{3} + 5$

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Answer $t = \dots\dots\dots$ (2 marks)

- 22** (a) Write 7 billion as a number in standard form.

1 billion = 1000 million

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Answer (1 mark)

- (b) Write the number 4.5×10^{-3} as an ordinary number.

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Answer (1 mark)

- (c) Find the value of $(2.7 \times 10^3) \div (3.375 \times 10^5)$
Give your answer in standard form.

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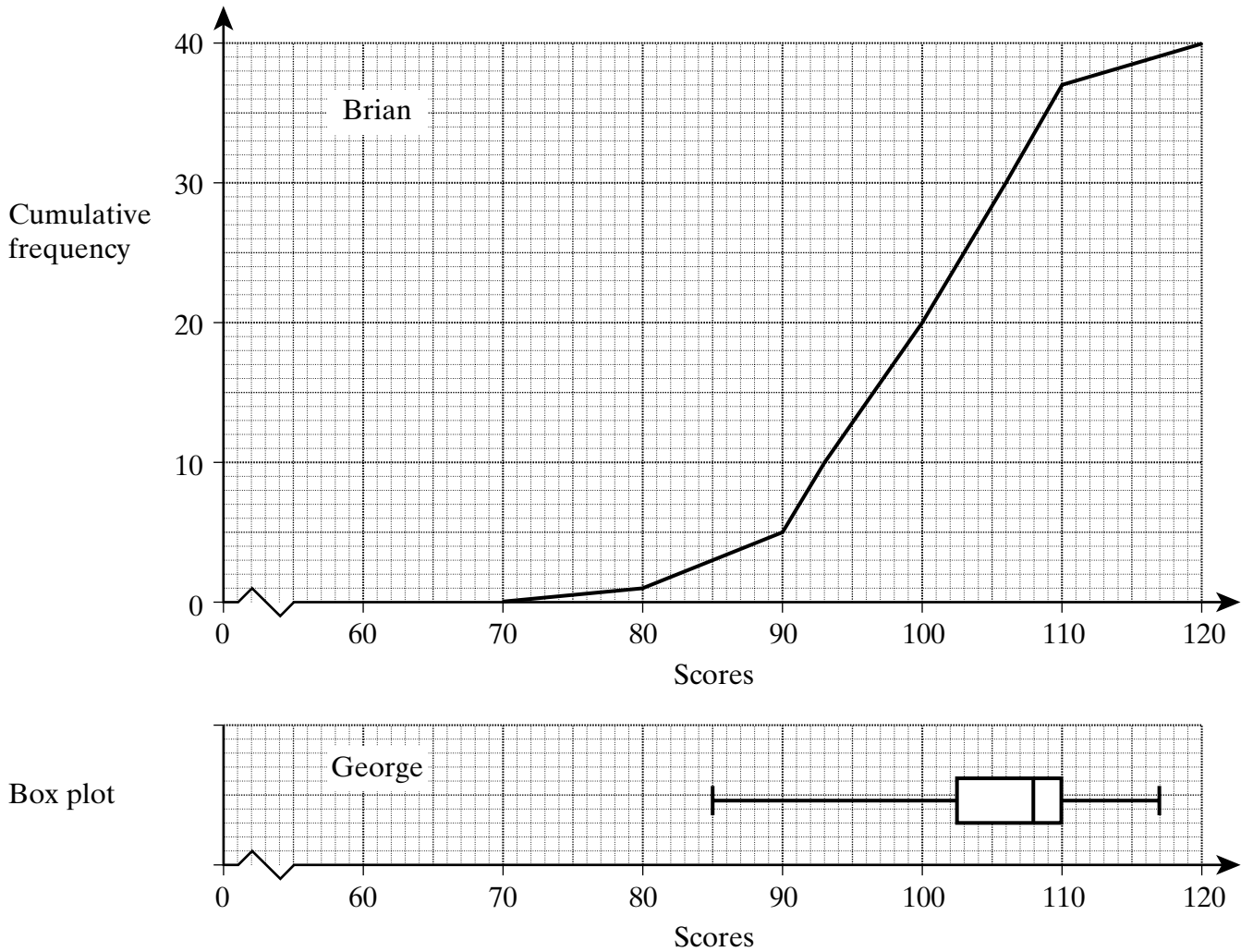
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Answer (2 marks)

TURN OVER FOR THE NEXT QUESTION

Turn over ►

- 23** Brian and George played 40 games of golf.
The cumulative frequency diagram shows information about Brian's scores.
The box plot shows information about George's scores.



(a) Showing your method clearly, find

(i) Brian's median score

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Answer (1 mark)

(ii) Brian's inter-quartile range.

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Answer (2 marks)

(b) Use the cumulative frequency diagram and the box plot to answer the following.

- (i) Which player is the more consistent in his scoring?
Give a reason for your choice.

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(1 mark)

- (ii) The winner of a game of golf is the player who has the lowest score.
Who do you think is the better player?
Give a reason for your choice.

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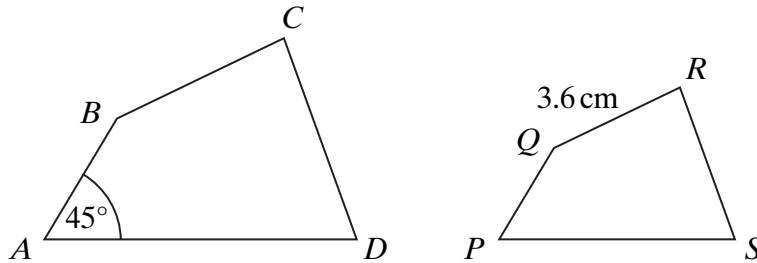
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(1 mark)

TURN OVER FOR THE NEXT QUESTION

Turn over ►

- 24** $PQRS$ is an enlargement of $ABCD$ with scale factor $\frac{2}{3}$
 $QR = 3.6$ cm
 Angle $BAD = 45^\circ$



Not to scale

- (a) Calculate the length of BC .

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Answer cm (2 marks)

- (b) Find the size of angle QPS .

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Answer degrees (1 mark)

END OF QUESTIONS