Ma

KEY STAGE 3

TIER 5–7

2003

Mathematics test

Paper 1

Calculator **not** allowed

Please read this page, but do not open your booklet until your teacher tells you to start. Write your name and the name of your school in the spaces below.

First name _____

Last name _____

School _____

Remember

- The test is 1 hour long.
- You **must not** use a calculator for any question in this test.
- You will need: pen, pencil, rubber, ruler, a pair of compasses, tracing paper and mirror (optional).
- Some formulae you might need are on page 2.
- This test starts with easier questions.
- Try to answer all the questions.
- Write all your answers and working on the test paper – do not use any rough paper. Marks may be awarded for working.
- Check your work carefully.
- Ask your teacher if you are not sure what to do.

For marker's use only

Total marks	

QCA/03/968

Instructions

Answers

This means write down your answer or show your working and write down your answer.

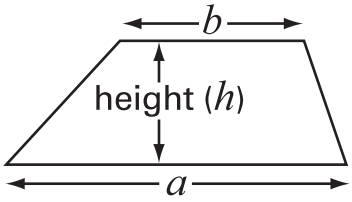
Calculators

You **must not** use a calculator to answer any question in this test.

Formulae

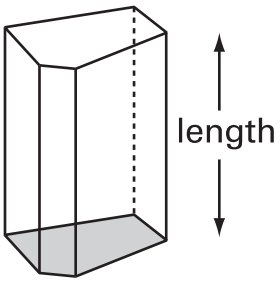
You might need to use these formulae

Trapezium



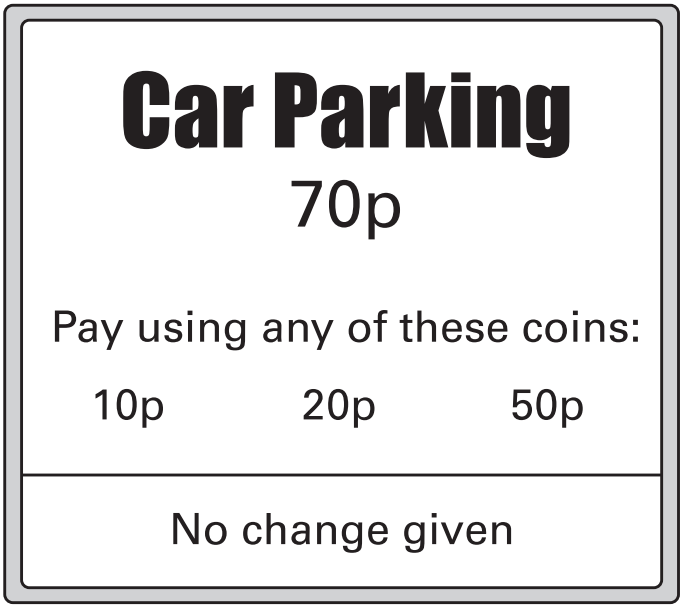
$$\text{Area} = \frac{1}{2}(a + b)h$$

Prism



Volume = area of cross-section × length

1. A car park shows this sign.



Complete the table to show all the **different ways** of paying **exactly 70p**.

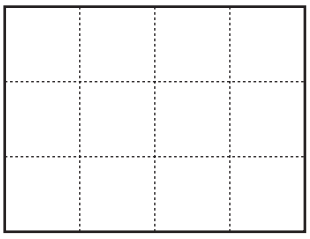
Number of **10p** coins	Number of **20p** coins	Number of **50p** coins
7	0	0

. . . .

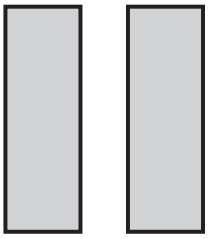
. . . .

2 marks

2. I have a square grid and two rectangles.

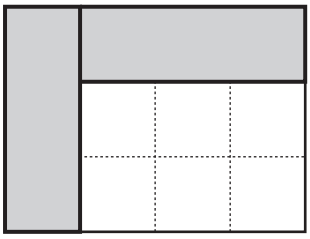


grid



two rectangles

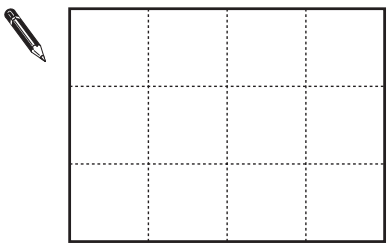
I make a pattern with the grid and the two rectangles:



The pattern has **no** lines of symmetry.

(a) Put both rectangles on the grid to make a pattern with **only one** line of symmetry.

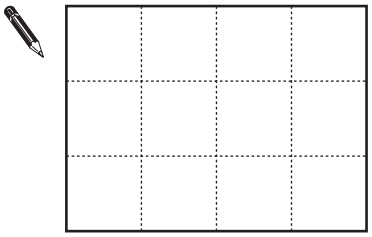
You must **shade** the rectangles.



. . . .
1 mark

(b) Put both rectangles on the grid to make a pattern with **rotation** symmetry of **order 2**

You must **shade** the rectangles.



. . . . .
1 mark

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3. Simplify these expressions.

$5k + 7 + 3k =$ .....

. . . . .
1 mark

$k + 1 + k + 4 =$ .....

. . . . .
1 mark

4. Fill in the missing numbers.

$\frac{1}{2}$ of 20 = $\frac{1}{4}$ of ....

1 mark

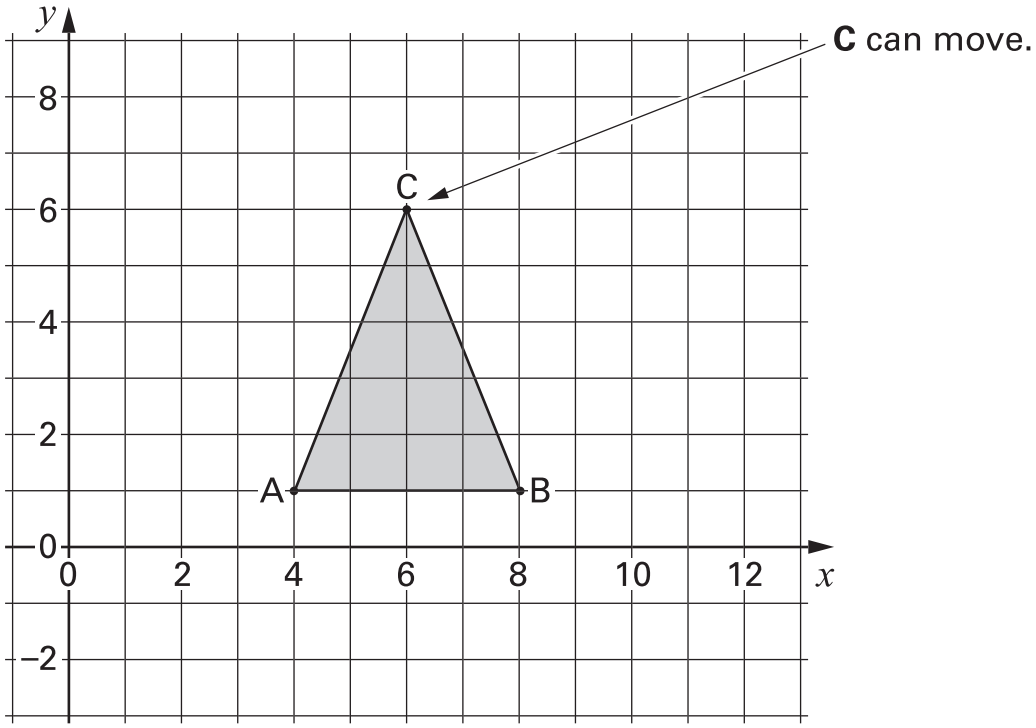
$\frac{3}{4}$ of 100 = $\frac{1}{2}$ of ....

1 mark

$\frac{1}{3}$ of 60 = $\frac{2}{3}$ of ....

1 mark

5. On this square grid, **A and B must not move**.



When C is at (6, 6), triangle ABC is **isosceles**.

(a) C moves so that triangle ABC is still **isosceles**.

Where could C have moved to?

Write the coordinates of its new position.

(. . . . . , ...) . . . .

1 mark

(b) Then C moves so that triangle ABC is **isosceles and right-angled**.

Where could C have moved to?

Write the coordinates of its new position.

(. . . . . , ...) . . . .

1 mark

6. (a) There are four people in Sita's family.

Their shoe sizes are 4, 5, 7 and 10

What is the **median** shoe size in Sita's family?

. . . .

1 mark

(b) There are **three** people in John's family.

The **range** of their shoe sizes is **4**

Two people in the family wear shoe size 6

John's shoe size is **not 6** and it is **not 10**

What is John's shoe size?

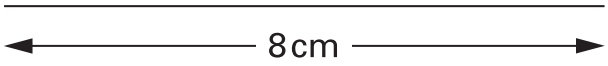
. . . .

1 mark

7. **Use compasses** to construct a triangle that has sides **8cm**, **6cm** and **7cm**.

Leave in your construction lines.

One side of the triangle is drawn for you.



. . . .

. . . .

2 marks

8. (a) I pay **£16.20** to travel to work each week.

I work for **45 weeks** each year.

How much do I pay to travel to work each year?

Show your working.

£ . . . .

. . . . .

2 marks

(b) I could buy one season ticket that would let me travel for **all 45 weeks**.

It would cost **£630**

How much is that per week?

£ . . . .

1 mark

9. Solve these equations.

Show your working.

$$8k - 1 = 15$$

$k =$ ....

. . . . 1 mark

$$2m + 5 = 10$$

$m =$ ....

. . . . 1 mark

$$3t + 4 = t + 13$$

$t =$ ....

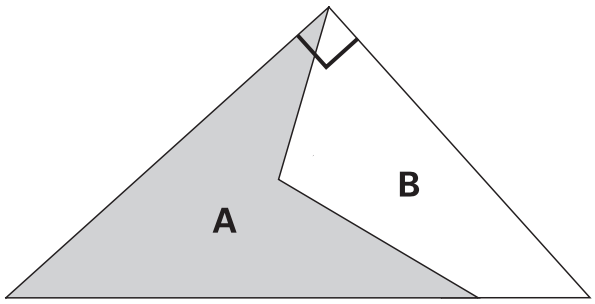
. . . .
. . . . 2 marks

$$2(3n + 7) = 8$$

$n =$ ....

. . . . 1 mark

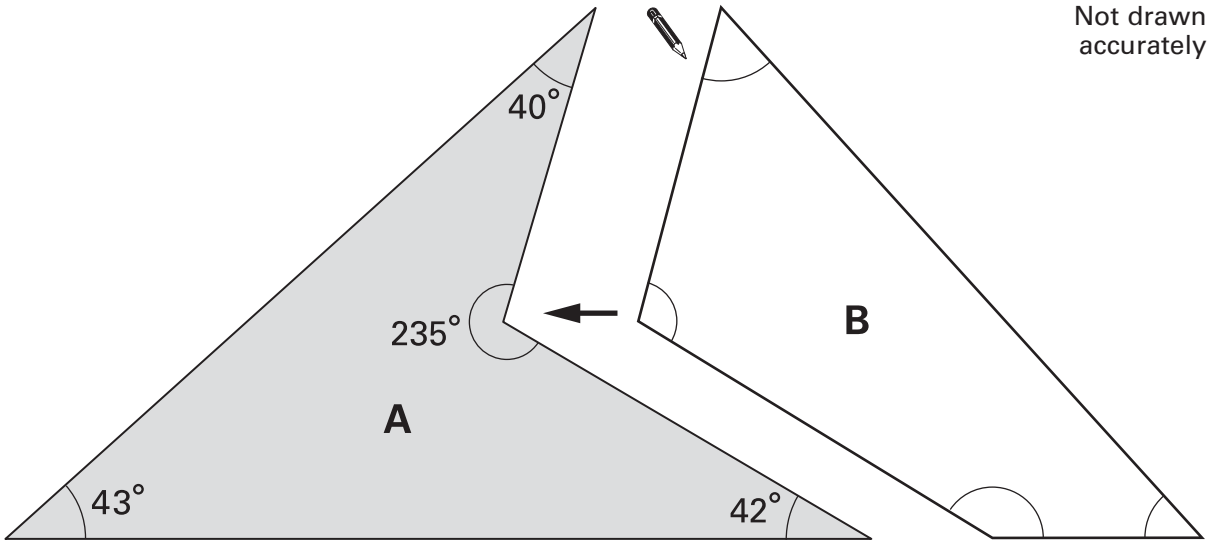
10. The drawing shows how shapes A and B fit together to make a **right-angled** triangle.



Work out the size of each of the angles in shape B.

Write them in the correct place in shape B below.

Not drawn accurately



. . . . .

. . . . .

. . . . .

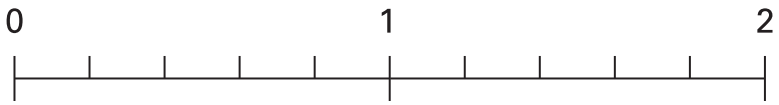
3 marks

11. (a) Add $\frac{6}{10}$ and $\frac{6}{5}$

. . . .

. . . .
1 mark

Now use an arrow (↓) to show the result on the number line.



. . . .
1 mark

(b) How many **sixths** are there in $3\frac{1}{3}$?

. . . .

. . . .
1 mark

(c) Work out $3\frac{1}{3} \div \frac{5}{6}$

Show your working.

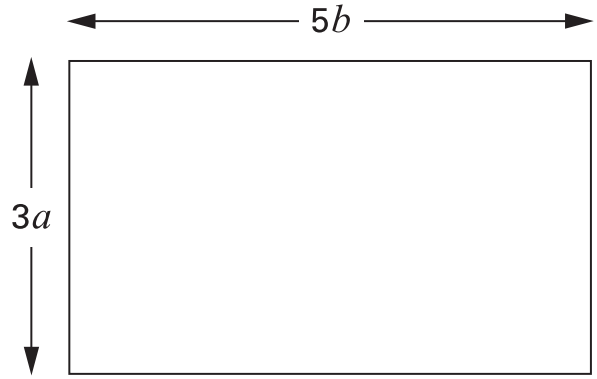
. . . .

. . . .

. . . .
2 marks

12. (a) The diagram shows a rectangle.

Its dimensions are $3a$ by $5b$



Write **simplified expressions** for the area and the perimeter of this rectangle.

Area: ....
1 mark

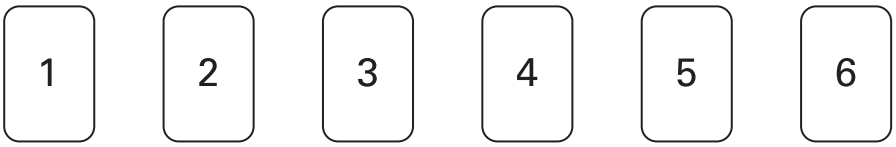
Perimeter: ....
1 mark

(b) A different rectangle has **area $12a^2$** and **perimeter $14a$**

What are the dimensions of this rectangle?

Dimensions: ..... by ....
1 mark

13. Here are six number cards.



(a) Arrange these six cards to make the calculations below.

The first one is done for you.

939 = 4 2 3 + 5 1 6

1164 = ☐ ☐ ☐ + ☐ ☐ ☐

. . . . .
1 mark

750 = ☐ ☐ ☐ + ☐ ☐ ☐

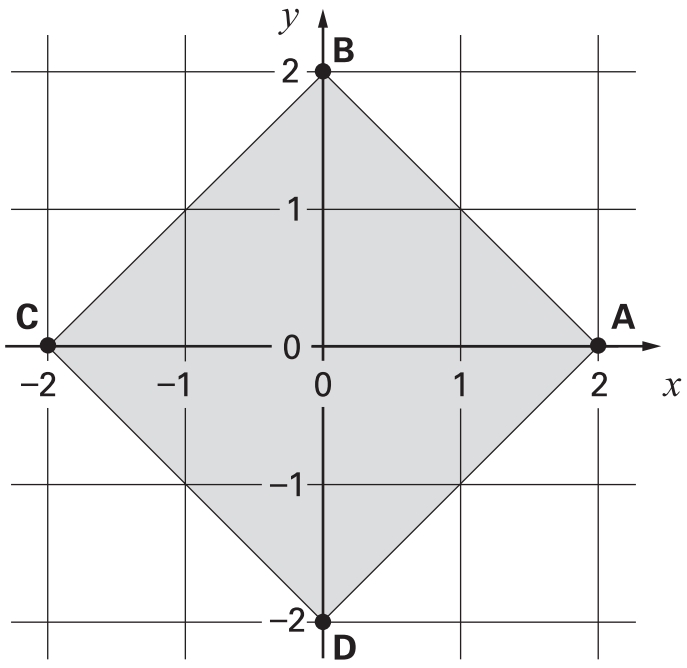
. . . . .
1 mark

(b) Now arrange the six cards to make a **difference** of 115

115 = ☐ ☐ ☐ − ☐ ☐ ☐

. . . . .
1 mark

14. The diagram shows a square drawn on a square grid.



(a) The points A, B, C and D are at the vertices of the square.

Match the correct line to each equation.

One is done for you.

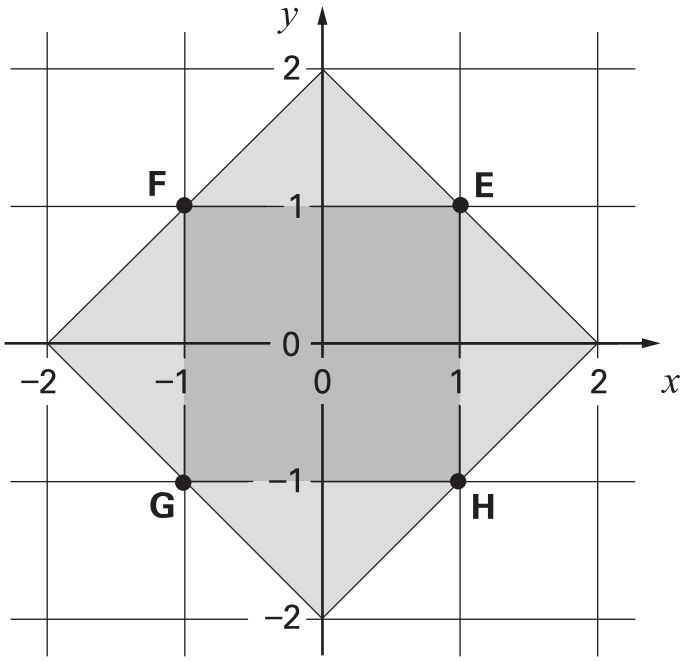
$y = 0$	Line through A and C
$x = 0$	Line through A and D
$x + y = 2$	Line through B and D
$x + y = -2$	Line through B and C
	Line through C and D
	Line through A and B

. . . . .

. . . . .

2 marks

The mid-points of each side, E, F, G and H, join to make a different square.



(b) Write the equation of the straight line through **E** and **H**.

. . . .
1 mark

(c) Is $y = -x$ the equation of the straight line through **E** and **G**?

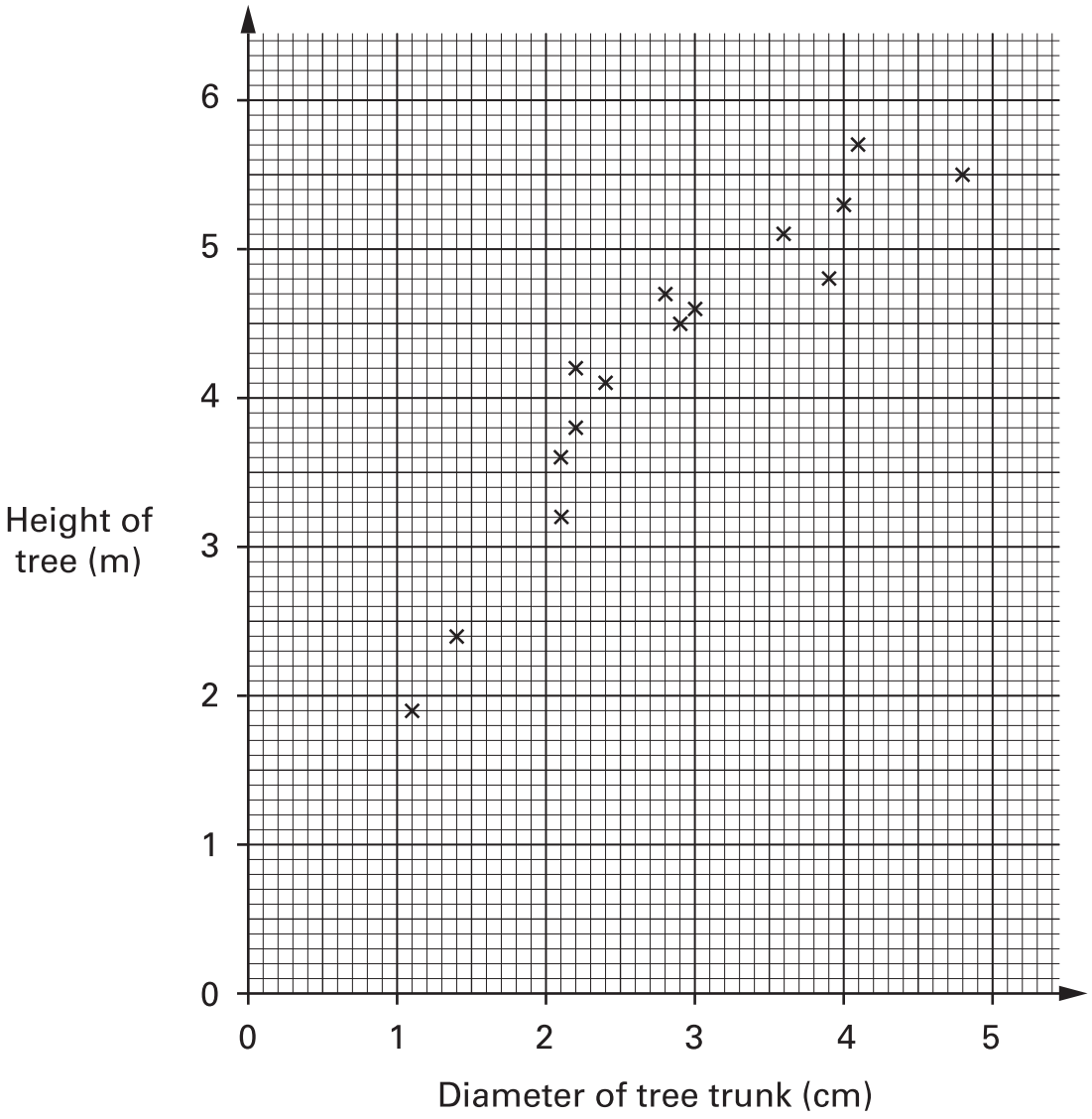
Tick (✓) Yes or No.

Yes ☐ No ☐

Explain how you know.

. . . .
1 mark

15. The scatter graph shows information about trees called poplars.



(a) What does the scatter graph show about the **relationship** between the diameter of the tree trunk and the height of the tree?

. . . . .

1 mark

(b) The height of a different tree is 3 m. The diameter of its trunk is 5 cm.

Use the graph to explain why this tree is **not** likely to be a poplar.

. . . . .

1 mark

(c) Another tree **is** a poplar. The diameter of its trunk is 3.2 cm.

Estimate the height of this tree.

..... m

. . . . .

1 mark

(d) Below are some statements about drawing lines of best fit on scatter graphs.

For each statement, tick (✓) to show whether the statement is True or False.

Lines of best fit must **always** ...

go through the origin.	☐ True	☐ False
have a positive gradient.	☐ True	☐ False
join the smallest and the largest values.	☐ True	☐ False
pass through every point on the graph.	☐ True	☐ False

. . . . .

. . . . .

2 marks

16. A headteacher wants to choose a pupil from year 7, 8 or 9 to appear on television.

The headteacher gives each pupil **one** ticket.

Then she will select the winning ticket at random.

The table shows information about the tickets used.

	Colour of the ticket	Numbers used
Year 7	red	1 to 80
Year 8	blue	1 to 75
Year 9	yellow	1 to 90

(a) What is the probability that the winning ticket will be **blue**?

. . . .
1 mark

(b) What is the probability that the winning ticket will show number **39**?

. . . .
1 mark

(c) The headteacher selects the winning ticket at random.

She says:

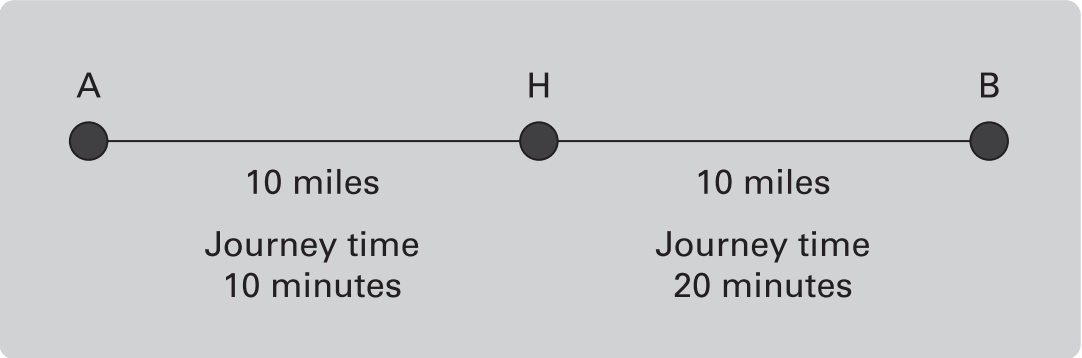
'The winning ticket number is 39'.

What is the probability that this winning ticket is blue?

. . . .
1 mark

17. The diagram shows the distance between my home, H, and two towns, A and B.

It also shows information about journey times.



(a) What is the average speed of the journey from my home to **town A**?

....
1 mark

(b) What is the average speed of the journey from my home to **town B**?

....
1 mark

(c) I drive from town A to my home and then to town B.

The journey time is 30 minutes.

What is my average speed?

Show your working.

....
2 marks

18. (a) Pupils started to solve the equation **$6x + 8 = 4x + 11$** in different ways.

For each statement below, tick (✓) True or False.

$6x + 8 = 4x + 11$ so $14x = 15x$ ☐ True ☐ False	$6x + 8 = 4x + 11$ so $6x + 4x = 11 + 8$ ☐ True ☐ False
$6x + 8 = 4x + 11$ so $6x = 4x + 3$ ☐ True ☐ False	$6x + 8 = 4x + 11$ so $2x + 8 = 11$ ☐ True ☐ False
$6x + 8 = 4x + 11$ so $2x = 3$ ☐ True ☐ False	$6x + 8 = 4x + 11$ so $-3 = -2x$ ☐ True ☐ False

. . . .
. . . .
. . . .
3 marks

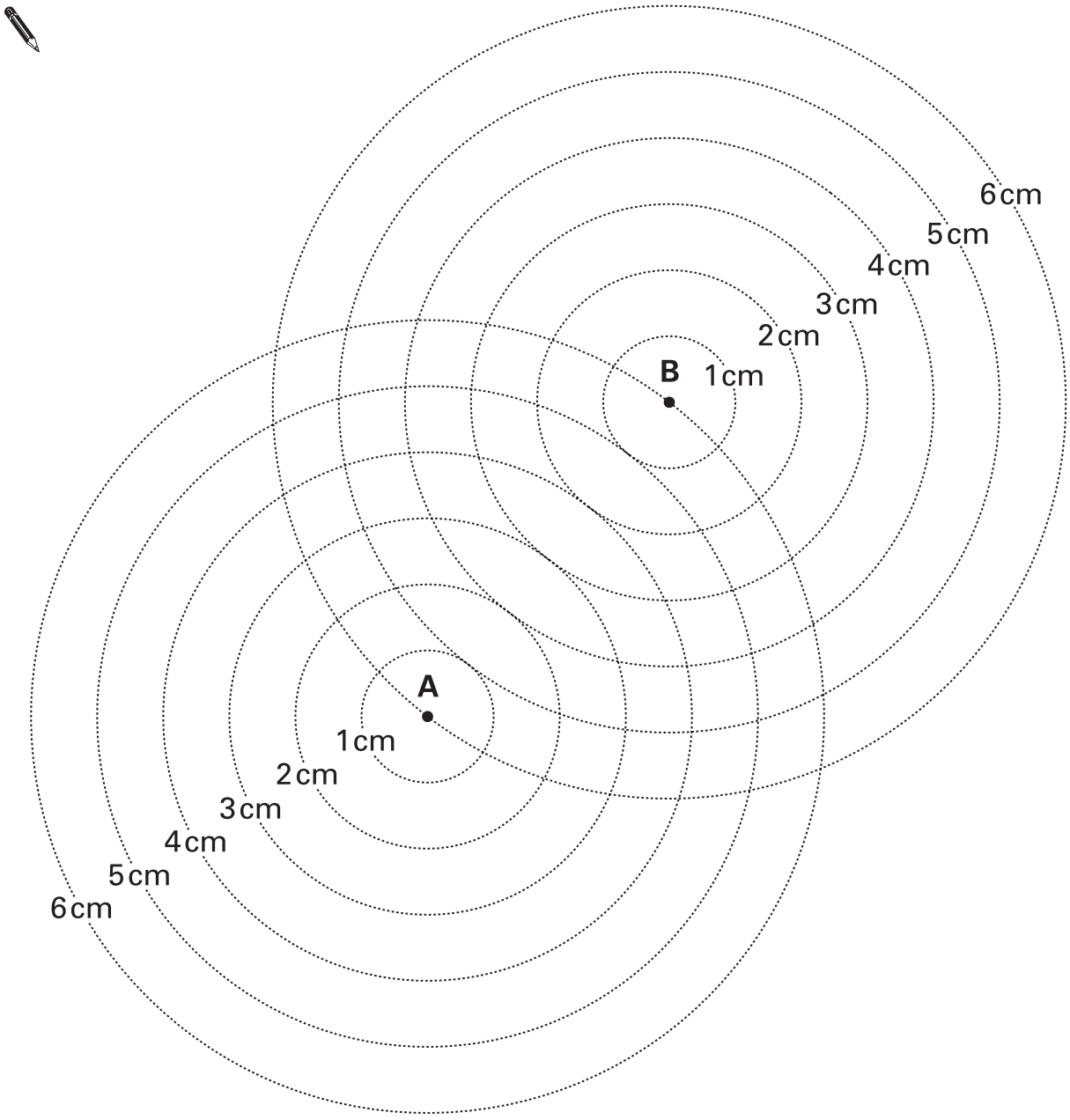
(b) A different pupil used trial and improvement to solve the equation $6x + 8 = 4x + 11$

Explain why trial and improvement is not a good method to use.

. . . .
1 mark

19. The diagram below shows two points A and B that are 6cm apart.

Around each point are six circles of radius 1cm, 2cm, 3cm, 4cm, 5cm and 6cm. Each circle has either A or B as its centre.



(a) On the diagram, mark with a cross any points that are 4cm away from A **and** 4cm away from B.

. . . .
1 mark

(b) Now draw the locus of **all** points that are the **same distance** from A as they are from B.

. . . .
1 mark

PLEASE TURN OVER

20. For each part of the question, tick (✓) the statement that is true.

(a)

When x is even, $(x-2)^2$ is even	When x is even, $(x-2)^2$ is odd
☐	☐

Show how you know it is true for **all** even values of x

1 mark

(b)

When x is even, $(x-1)(x+1)$ is even	When x is even, $(x-1)(x+1)$ is odd
☐	☐

Show how you know it is true for **all** even values of x

1 mark

END OF TEST