Ma

KEY STAGE 3

TIER 5–7

2005

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 and tracing paper (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/05/1433

Instructions

Answers

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

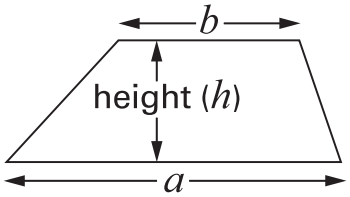
Calculators

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

Formulae

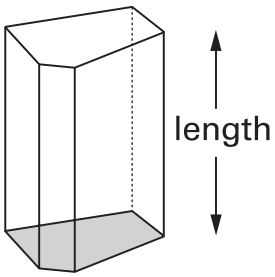
You might need to use these formulae

Trapezium



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

Prism



Volume = area of cross-section × length

1. (a) Complete the sentence.

..... **out of 10** is the same as **70%**

1 mark

(b) Complete the sentence.

..... **out of** ..... is the same as **5%**

1 mark

Now complete the sentence using **different** numbers.

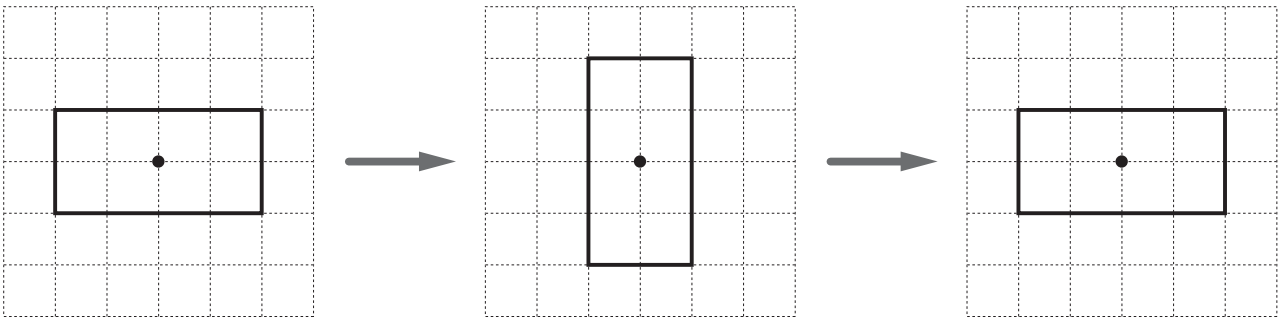
..... **out of** ..... is the same as **5%**

1 mark

2. The shapes below are drawn on square grids.

The diagrams show a rectangle that is rotated, then rotated again.

The centre of rotation is marked •

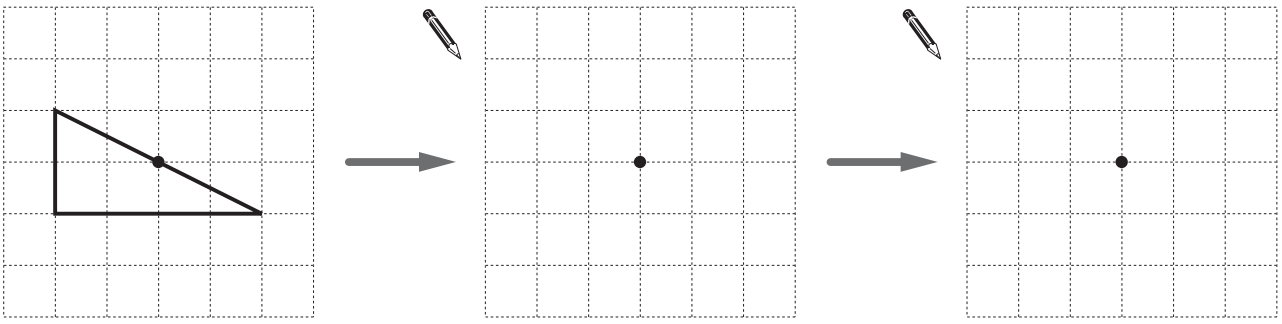


Rotate 90°clockwise

Rotate another 90°clockwise

Complete the diagrams below to show the triangle when it is rotated, then rotated again.

The centre of rotation is marked •



Rotate 90°clockwise

Rotate another 90°clockwise

. . . .

. . . .

2 marks

3. I am thinking of a number.

> My number **multiplied by 15** is **315**
>
> My number **multiplied by 17** is **357**

What is my number?

....

2 marks

4. Complete the statements below.

When x is ..... 8 ..... , ... $4x$ ..... is ....

1 mark

When x is .... , ... $4x$ ..... is ..... 48 .....

1 mark

When x is ..... 8 ..... , ... is ..... 48 .....

1 mark

5. (a) Look at these three numbers.

9	11	10

Show that the **mean** of the three numbers is **10**

. . . .
1 mark

Explain why the **median** of the three numbers is **10**

. . . .
1 mark

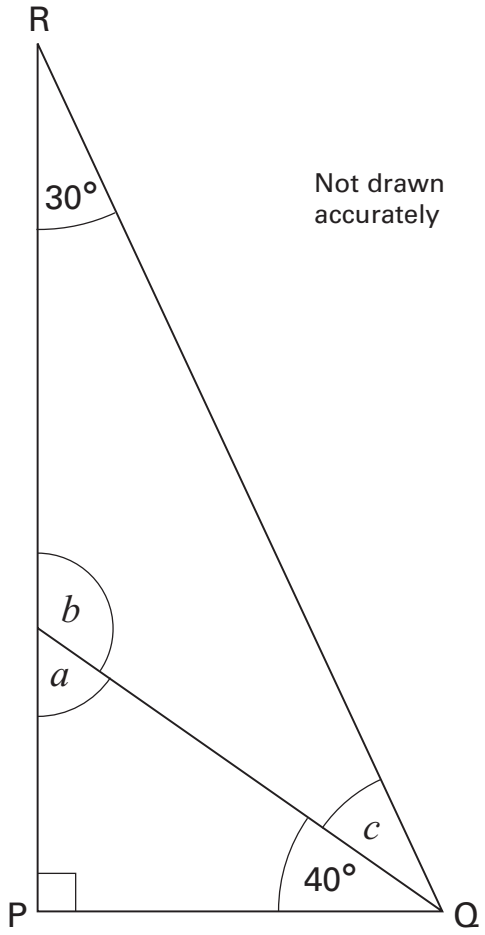
(b) Four numbers have a mean of 10 and a median of 10, but **none** of the numbers is 10

What could the four numbers be?

Give an example.

. . . .
1 mark

6. The diagram shows triangle PQR.



Work out the sizes of angles a, b and c

. . . . .
1 mark

. . . . .
1 mark

a = ... ° b = ... ° c = ... °

. . . . .
1 mark

7. Solve these equations.

$3y + 1 = 16$

$y =$ . . . .

. . . .
1 mark

$18 = 4k + 6$

$k =$ . . . .

. . . .
1 mark

8. Work out

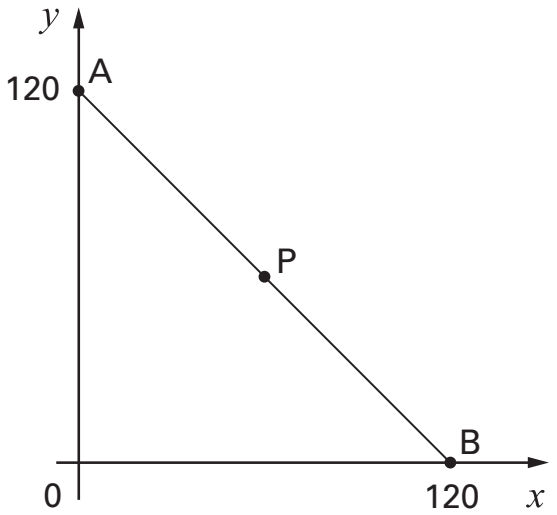
374×23

. . . .

. . . .

. . . .
2 marks

9. (a) P is the **midpoint** of line AB.



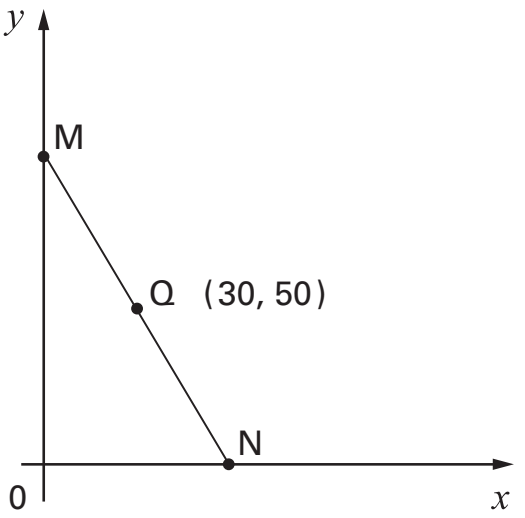
What are the coordinates of point **P**?

P is (..... , ...)

1 mark

(b) Q is the **midpoint** of line MN.

The coordinates of Q are (30, 50)



What are the coordinates of points **M** and **N**?

M is (..... , ...)

1 mark

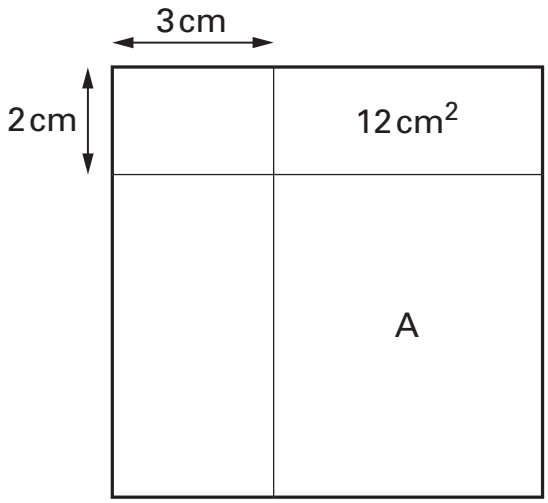
N is (..... , ...)

1 mark

10. The diagram shows a **square**.

Two straight lines cut the square into four rectangles.

The area of one of the rectangles is shown.



Not drawn accurately

Work out the area of the rectangle marked A.

..... cm^2

2 marks

11. (a) Look at this information.

Two numbers **multiply** to make zero.

One of the statements below is true.

Tick (✓) the true statement.

- ☐ Both numbers must be zero.
- ☐ At least one number must be zero.
- ☐ Exactly one number must be zero.
- ☐ Neither number can be zero.

1 mark

(b) Now look at this information.

Two numbers **add** to make zero.

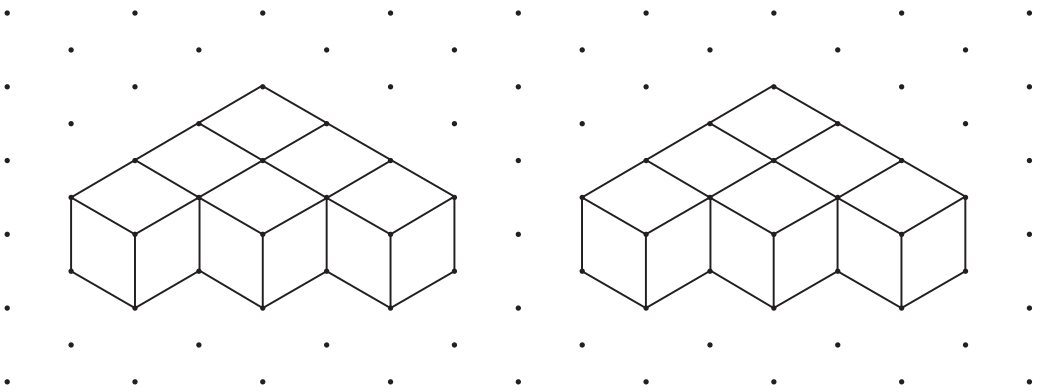
If **one** number is **zero**, what is the other number?

..... 1 mark

If **neither** number is **zero**, give an example of what the numbers could be.

..... and ..... 1 mark

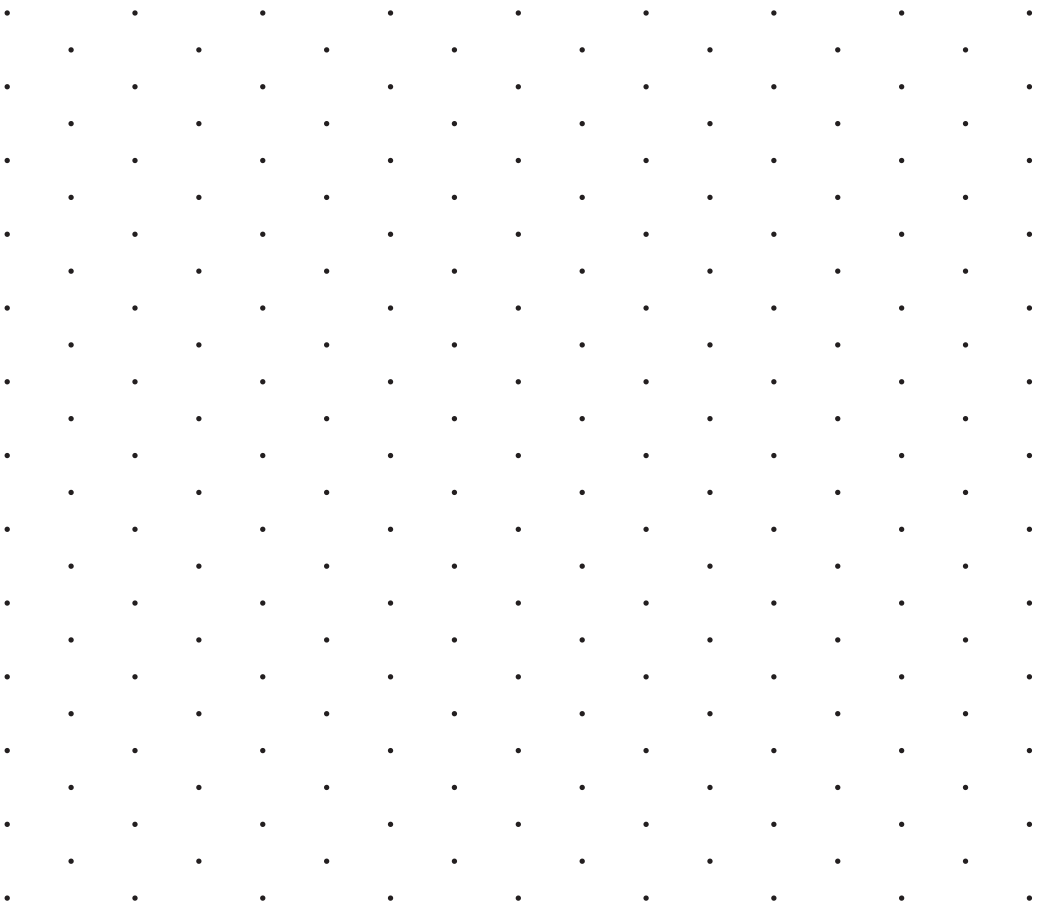
12. I join six cubes face to face to make each 3-D shape below.



Isometric grid

Then I join the 3-D shapes to make a **cuboid**.

Draw this cuboid on the grid below.



2 marks

Isometric grid

13. How many eighths are there in one quarter?

. . . . . .

Now work out $\frac{3}{4} \div \frac{1}{8}$

. . . . . .

. . . . . .

. . . . . .

. . . . .

3 marks

14. Solve this equation.

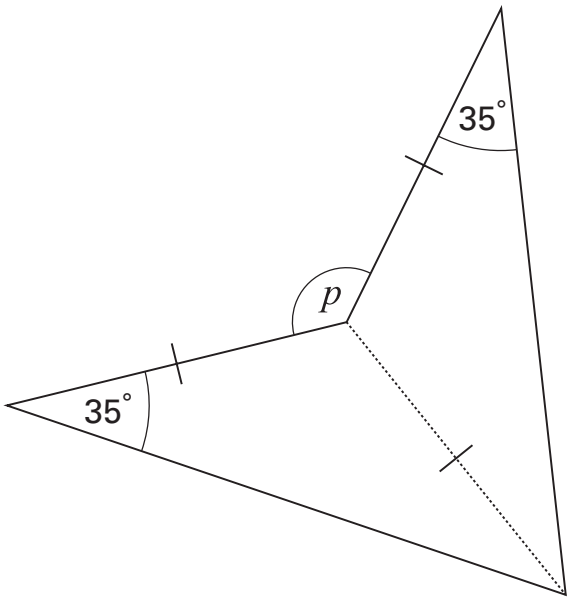
$75 + 2t = 100 - 2t$

$t =$ . . . . . .

. . . . .

2 marks

15. This shape has been made from two congruent **isosceles** triangles.



Not drawn accurately

What is the size of angle p?

$p =$ ..... °

. . . .
. . . .
2 marks

16. Bumps are built on a road to slow cars down.

The stem-and-leaf diagrams show the speed of **15 cars** before and after the bumps were built.

Key:

2 | 3 means 23 mph

Before

2	
2	7 8
3	0 2 4
3	5 6 8 9
4	1 3 4 4 4
4	6

After

2	3 4 4
2	6 6 7 8 8 9
3	0 0 0 1 2
3	5
4	
4	

(a) Use the diagrams to write the missing **numbers** in these sentences.

Before the bumps:

The maximum speed was ..... mph, and

..... cars went at more than 30 mph.

After the bumps:

The maximum speed was ..... mph, and

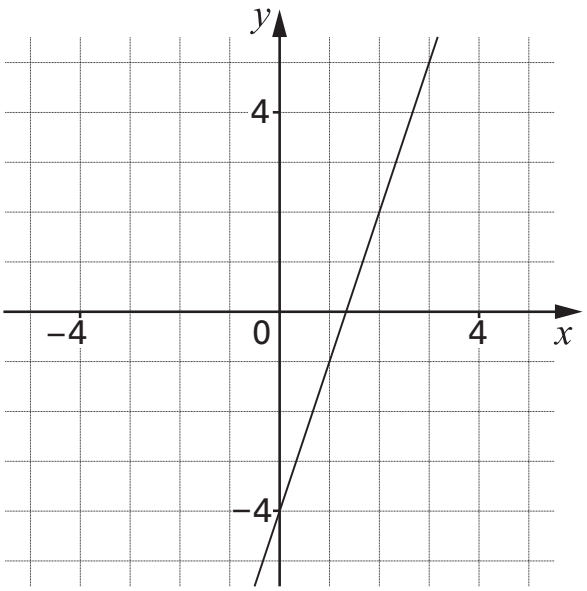
..... cars went at more than 30 mph.

2 marks

(b) Show that the **median** speed fell by 10 mph.

1 mark

17. The graph shows the straight line with equation $y = 3x - 4$



(a) A point on the line $y = 3x - 4$ has an ***x*-coordinate of 50**

What is the y-coordinate of this point?

. . . . . .

1 mark

(b) A point on the line $y = 3x - 4$ has a ***y*-coordinate of 50**

What is the x-coordinate of this point?

. . . . . .

1 mark

(c) Is the point $(-10, -34)$ on the line $y = 3x - 4$?

☐ Yes ☐ No

Show how you know.

. . . . . .

1 mark

18. Here is an equation.

$$x^y = 64$$

Give four **different** pairs of values that satisfy this equation.

First pair	$x =$	$y =$ .....
Second pair	$x =$	$y =$ .....
Third pair	$x =$	$y =$ .....
Fourth pair	$x =$	$y =$ .....

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

19. A teacher said to a pupil:

> To the nearest per cent, $\frac{1}{6}$ is **17%**

The pupil said:

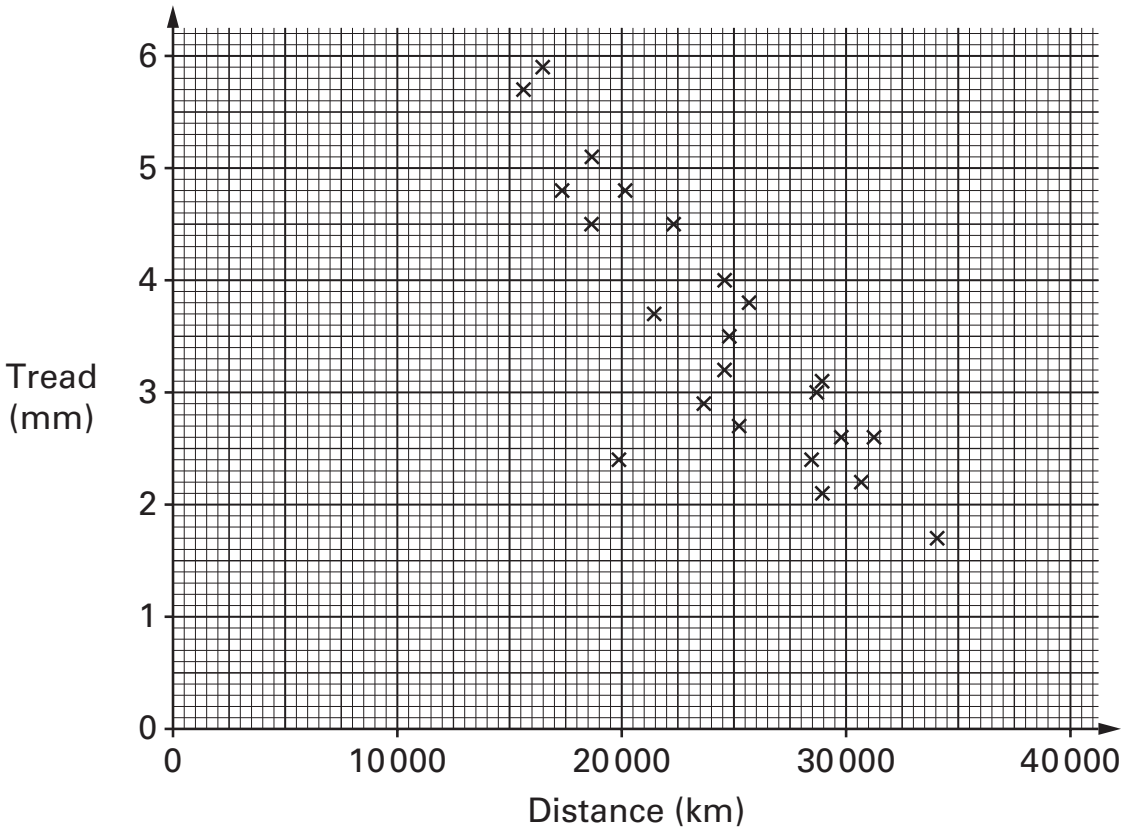
> So, to the nearest per cent, $\frac{2}{6}$ must be **34%**

Show that the pupil is **wrong**.

1 mark

20. Car tyres are checked for safety by measuring the tread.

The tread on a tyre and the distance travelled by that tyre were recorded for a sample of tyres. The scatter graph shows the results.



Tyres with a tread of **less than 1.6 mm** are illegal.

Suppose the government changes this rule to **less than 2.5 mm**.

(a) How many of these tyres would now be illegal?

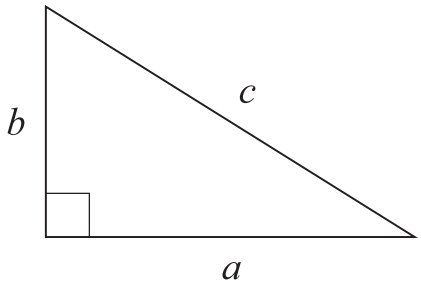
..... 1 mark

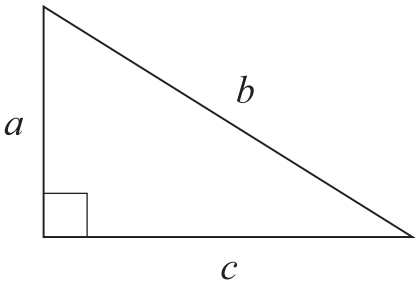
(b) About **how many fewer kilometres** would you expect a tyre to last before it was illegal?

..... 1 mark

21. (a) In which triangle below does $a^2 + b^2 = c^2$?

Tick (✓) the correct triangle.



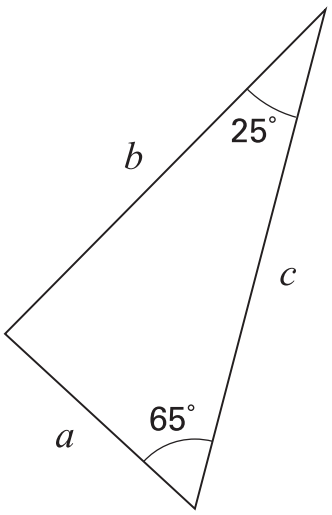


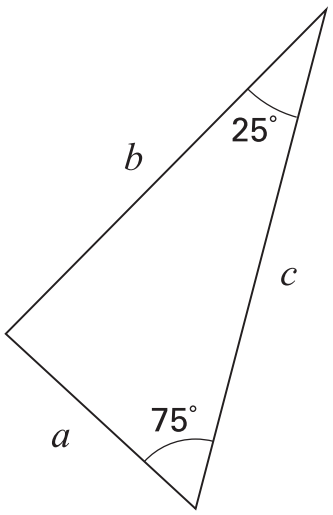
For the **other** triangle, write an equation linking a, b and c

. . . .
1 mark

(b) In which triangle below does $a^2 + b^2 = c^2$?

Tick (✓) the correct triangle.





Not drawn accurately

For the **other** triangle, explain why $a^2 + b^2$ does not equal c^2

. . . .
1 mark

22. Meg and Ravi buy sweet pea seeds and grow them in identical conditions.

Meg's results:

Number of packets	Number of seeds in each packet	Number of seeds that germinate from each packet
5	20	18, 17, 17, 18, 19

Ravi's results:

Number of packets	Number of seeds in each packet	**Total** number of seeds that germinate
10	20	170

(a) Using Meg's results and Ravi's results, calculate two different estimates of the **probability** that a sweet pea seed will germinate.

Using Meg's results: .....

1 mark

Using Ravi's results: .....

1 mark

(b) Whose results are likely to give the better estimate of the probability?

☐ Meg's ☐ Ravi's

Explain why.

1 mark

23. A three-digit number is **multiplied** by a two-digit number.

How many digits could the answer have?

Write the minimum number and the maximum number of digits that the answer could have.

You **must** show your working.

minimum number of digits .....

maximum number of digits .....

2 marks

24. Solve these simultaneous equations using an algebraic method.

$4x + 3y = 21$

$2x + y = 8$

You **must** show your working.

$x =$ ..... $y =$ .....

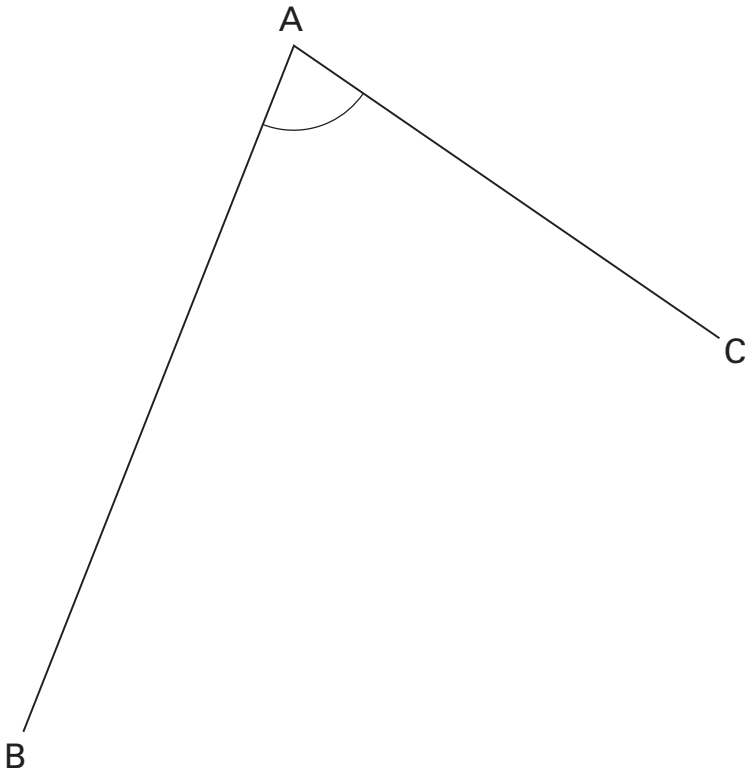
3 marks

PLEASE TURN OVER

25. In the diagram, lines AB and AC are straight lines.

Using compasses and a straight edge, construct the angle bisector of angle BAC.

You **must** leave in your construction lines.



. . . .

. . . .

2 marks

END OF TEST