Ma

KEY STAGE
3

TIER
6–8

2007

Mathematics test

Paper 1

Calculator **not** allowed

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 and a pair of compasses.
- 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	

Instructions

Answers

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

Calculators

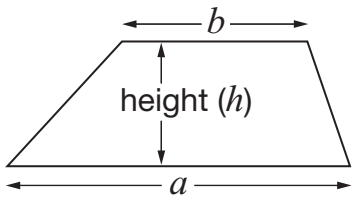
You **must not** use a calculator to answer any question in this test.

Formulae

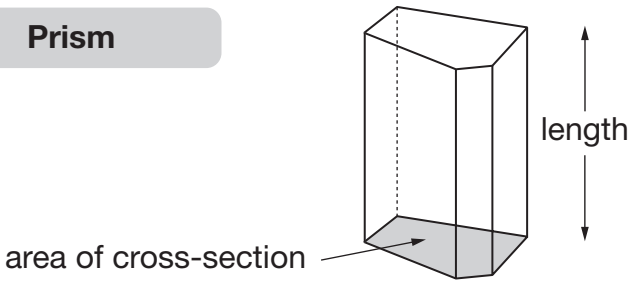
You might need to use these formulae

Trapezium

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

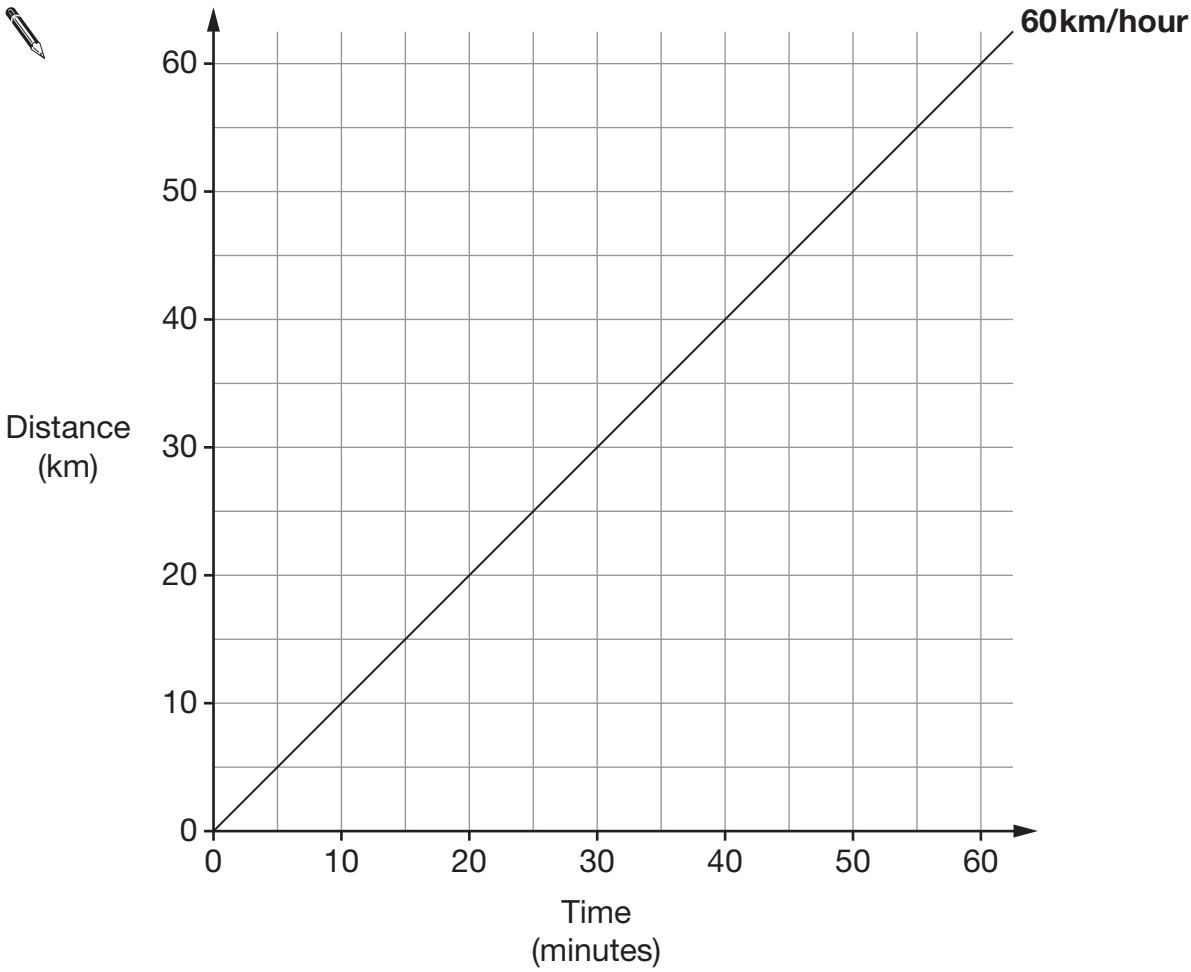


Prism



Volume = area of cross-section × length

1. The line on the graph below represents a speed of 60 km/hour.



(a) Draw a line on the graph to represent a speed of **30 km/hour**.

Label the line by writing 30 km/hour.

1 mark

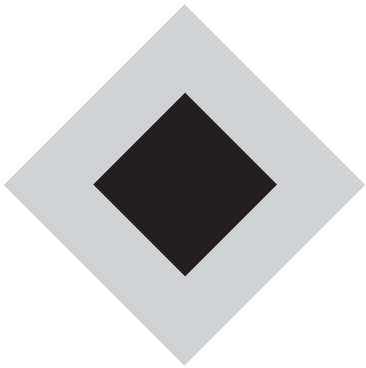
(b) Now draw a line on the graph to represent a speed of **120 km/hour**.

Label the line by writing 120 km/hour.

1 mark

2. (a) In this design, the ratio of **grey to black** is **3 : 1**

What **percentage** of the design is **black**?



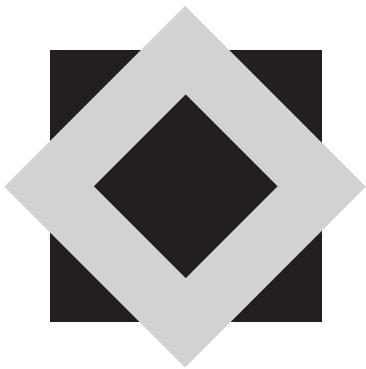
_____ %

1 mark

(b) In this design, **60%** is **grey** and the rest is black.

What is the ratio of **grey to black**?

Write your ratio in its simplest form.



_____ : _____

2 marks

3. In a bag there are only red, blue and green counters.

(a) I am going to take a counter out of the bag at random.

Complete the table below.

Colour of counters	Number of counters	Probability
Red	6	
Blue		$\frac{1}{5}$
Green	6	

2 marks

(b) Before I take a counter out of the bag, I put **one extra blue** counter into the bag.

What effect does this have on the probability that I will take a **red** counter?

Tick (✓) the correct box.

☐ The probability has increased.

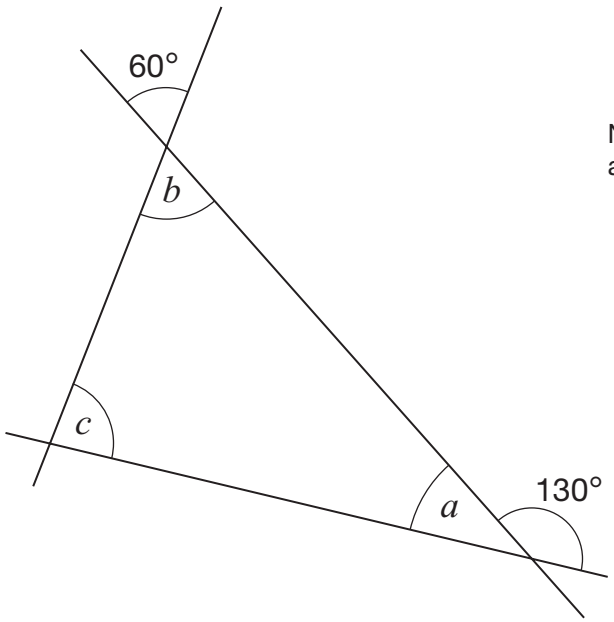
☐ The probability has decreased.

☐ The probability has stayed the same.

☐ It is impossible to tell.

1 mark

4. The diagram shows three straight lines.



Not drawn accurately

Work out the sizes of angles a, b and c

Give reasons for your answers.

a = _____ ° because _____

_____

_____ 1 mark

b = _____ ° because _____

_____

_____ 1 mark

c = _____ ° because _____

_____

_____ 1 mark

5. (a) Some of the fractions below are **smaller than $\frac{1}{9}$**

Tick (✓) them.

☐ $\frac{1}{10}$ ☐ $\frac{4}{9}$ ☐ $\frac{1}{2}$ ☐ $\frac{1}{100}$ ☐ $\frac{1}{8}$

1 mark

(b) To the nearest per cent, what is **$\frac{1}{9}$ as a percentage**?

Tick (✓) the correct percentage.

☐ 0.9% ☐ 9% ☐ 10% ☐ 11% ☐ 19%

1 mark

(c) Complete the sentence below by writing a **fraction**.

$\frac{1}{9}$ is half of _____

1 mark

6. Solve this equation.

$$2(2n + 5) = 12$$

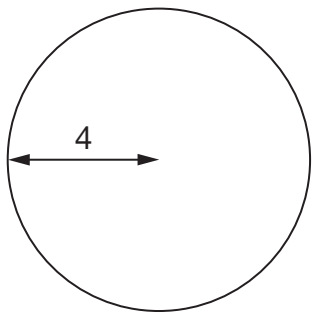
n = _____

2 marks

7. Kevin is working out the **area** of a circle with **radius 4**

He writes:

Area = $\pi \times 8$



Explain why Kevin's working is **wrong**.

1 mark

8. Write the missing numbers in these fraction sums.

$$\frac{1}{4} + \frac{\square}{8} = 1$$

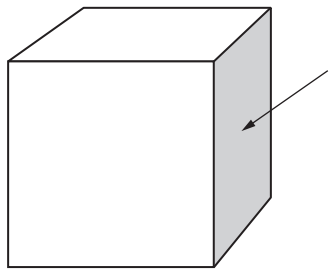
1 mark

$$\frac{1}{3} + \frac{8}{\square} = 1$$

1 mark

9. Look at the cube.

The area of a **face** of the cube is $\mathbf{9}\boldsymbol{x}^{\mathbf{2}}$



(a) Write an expression for the **total surface area** of the cube.

Write your answer as simply as possible.

_____

1 mark

(b) Write an expression for the **volume** of the cube.

Write your answer as simply as possible.

_____

2 marks

10. Chris read the first 55 numbers from a book of random numbers.

As he read each number he recorded it in the diagram below.

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

Key

1 | 3 represents 13

(a) What was the **largest** number he recorded?

1 mark

(b) Explain how Chris could change the diagram to make it easier for him to find the **median** of his data set.

1 mark

11. Here is the rule to find the **geometric mean** of two numbers.

> **Multiply** the two numbers together, then
>
> find the **square root** of the result.

Example: geometric mean of 4 and 9 $= \sqrt{4 \times 9}$

$= \sqrt{36}$

$= 6$

(a) For the two numbers **10** and x, the geometric mean is **30**

What is the value of x?

$x =$ _____

1 mark

(b) Reena says:

'For the two numbers **–2** and **8**, it is **impossible** to find the geometric mean.'

Is Reena correct?

☐ Yes ☐ No

Explain your answer.

1 mark

12. (a) **Draw lines** to match each nth term rule to its number sequence.

nth term	Number sequence
$4n$	4, 7, 12, 19, …
$(n + 1)^2$	4, 8, 12, 16, …
$n^2 + 3$	4, 9, 16, 25, …
$n(n + 3)$	4, 10, 18, 28, …

2 marks

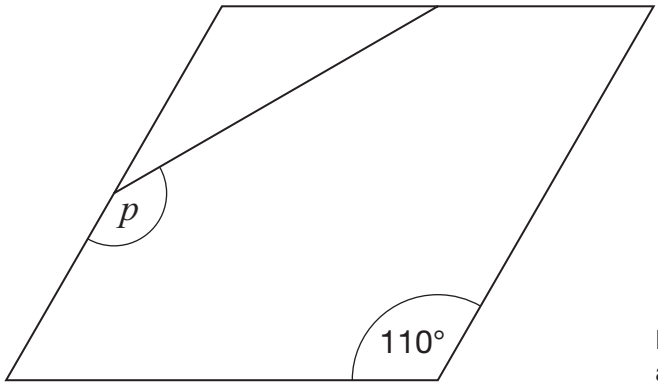
(b) Write the **first four** terms of the number sequence using the nth term rule below.

$n^3 + 3$ ——— _____, _____, _____, _____

2 marks

13. The diagram shows a **rhombus**.

The **midpoints** of two of its sides are joined with a straight line.



Not drawn accurately

What is the size of angle p?

$p =$ _____ °

2 marks

14. A bag contains counters that are **red**, **black**, or **green**.

$\frac{1}{3}$ of the counters are **red**

$\frac{1}{6}$ of the counters are **black**

There are **15 green** counters in the bag.

How many **black** counters are in the bag?

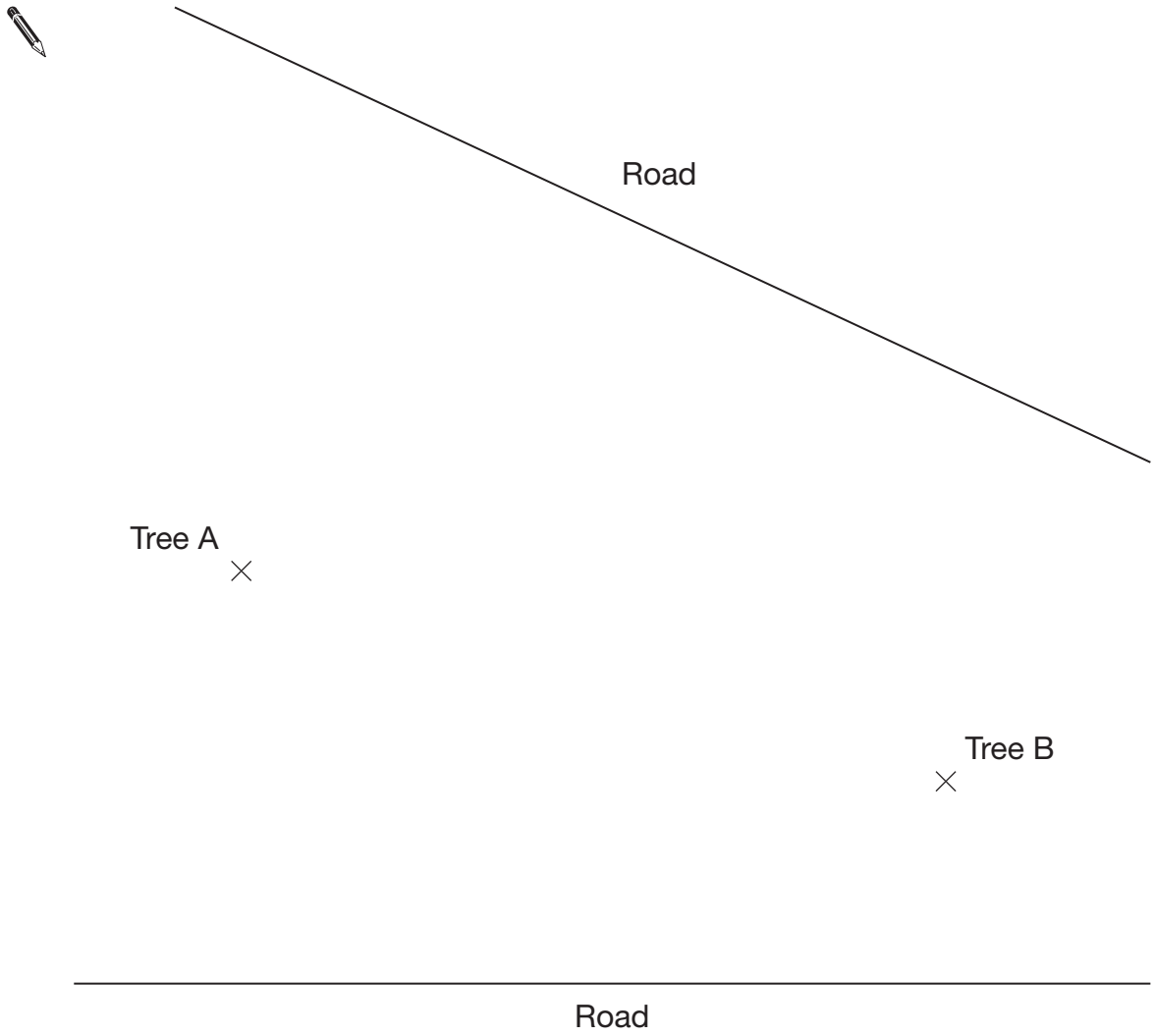
2 marks

15. Here is a plan of some land.

There will be a fence that is always the **same distance** from tree A as from tree B, going all the way from one road to the other road.

Use compasses and a straight edge to show accurately on the plan where the fence will go.

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



2 marks

16. Work out the values of m and n

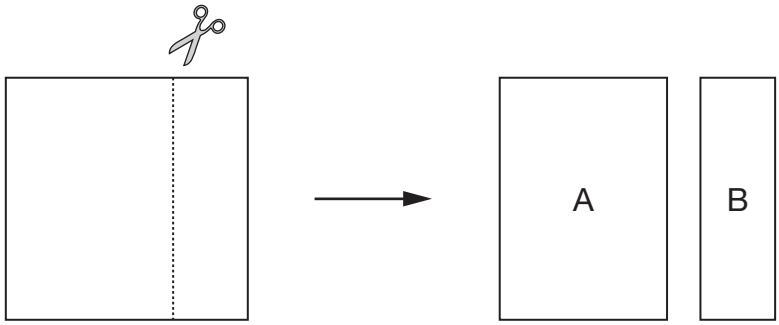
$$5^8 \times 5^4 = 5^m$$

m = _____ 1 mark

$$\frac{5^8}{5^4} = 5^n$$

n = _____ 1 mark

17. A **square** of area **64cm^2** is cut to make two rectangles, A and B.



Not drawn accurately

Area = 64 cm^2

The ratio of **area A** to **area B** is **3 : 1**

Work out the dimensions of rectangles A and B.

Rectangle A: _____ cm by _____ cm

Rectangle B: _____ cm by _____ cm

2 marks

18. A teacher has some coins in his pocket.

He is going to take one of the coins at random.

He says:

> There are **more than four** coins in my pocket.
>
> The total value of the coins is **25p**.
>
> The probability that I will take a **1p** coin is $\frac{1}{4}$

List **all the coins** that must be in his pocket.

2 marks

19. For each equation below, when x **increases by 3**, what happens to y?

Complete the sentences.

$y = x$

When x increases by 3, y increases by _____

$y = 2x$

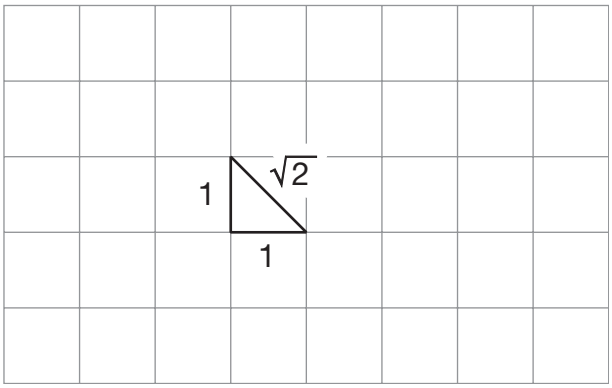
When x increases by 3, y increases by _____

$y = 3x + 1$

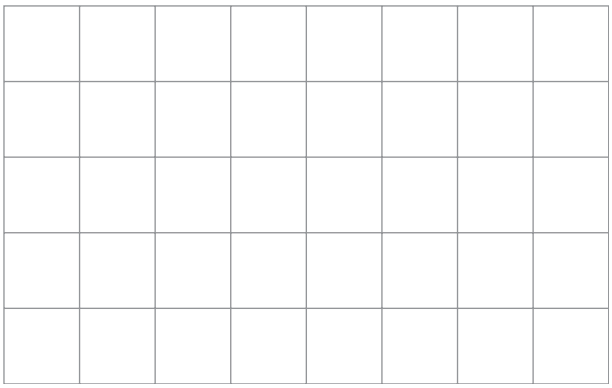
When x increases by 3, y increases by _____

2 marks

20. The perimeter of the triangle drawn on the square grid is $(2 + \sqrt{2})$ cm.

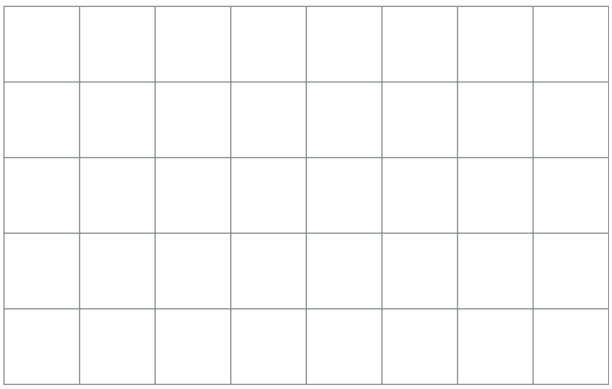


(a) On the square grid below, draw a **triangle** with a perimeter of $3(2 + \sqrt{2})$ cm.



1 mark

(b) On the square grid below, draw a **shape** with a perimeter of $(2 + 3\sqrt{2})$ cm.



1 mark

21. Look at this information.

$$y^2 = 10$$

Use the information to write numbers in the boxes below.

$y^4 = \square$

1 mark

$y^{\square} = 1000$

1 mark

22. (a) Is 3^{100} even or odd?

☐ Even ☐ Odd

Explain your answer.

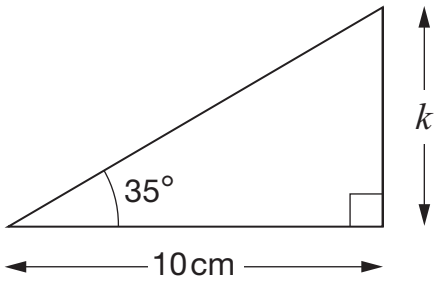
1 mark

(b) Tick (✓) the number below that is the same as $3^{100} \times 3^{100}$

☐ 3^{200} ☐ 6^{100} ☐ 9^{200} ☐ 3^{10000} ☐ 9^{10000}

1 mark

23. (a) Use **tan35°** as **0.7** to work out length k

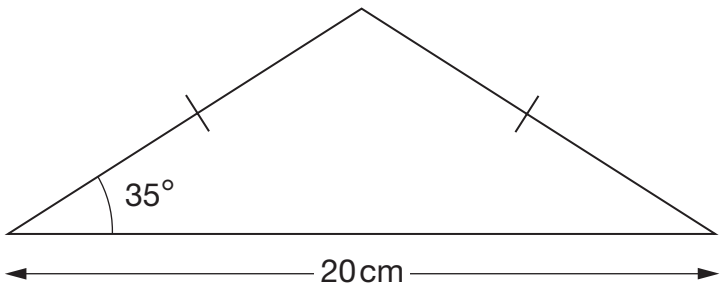


Not drawn accurately

k = _____ cm

1 mark

(b) Now use tan35° as 0.7 to work out the **area** of this isosceles triangle.



Not drawn accurately

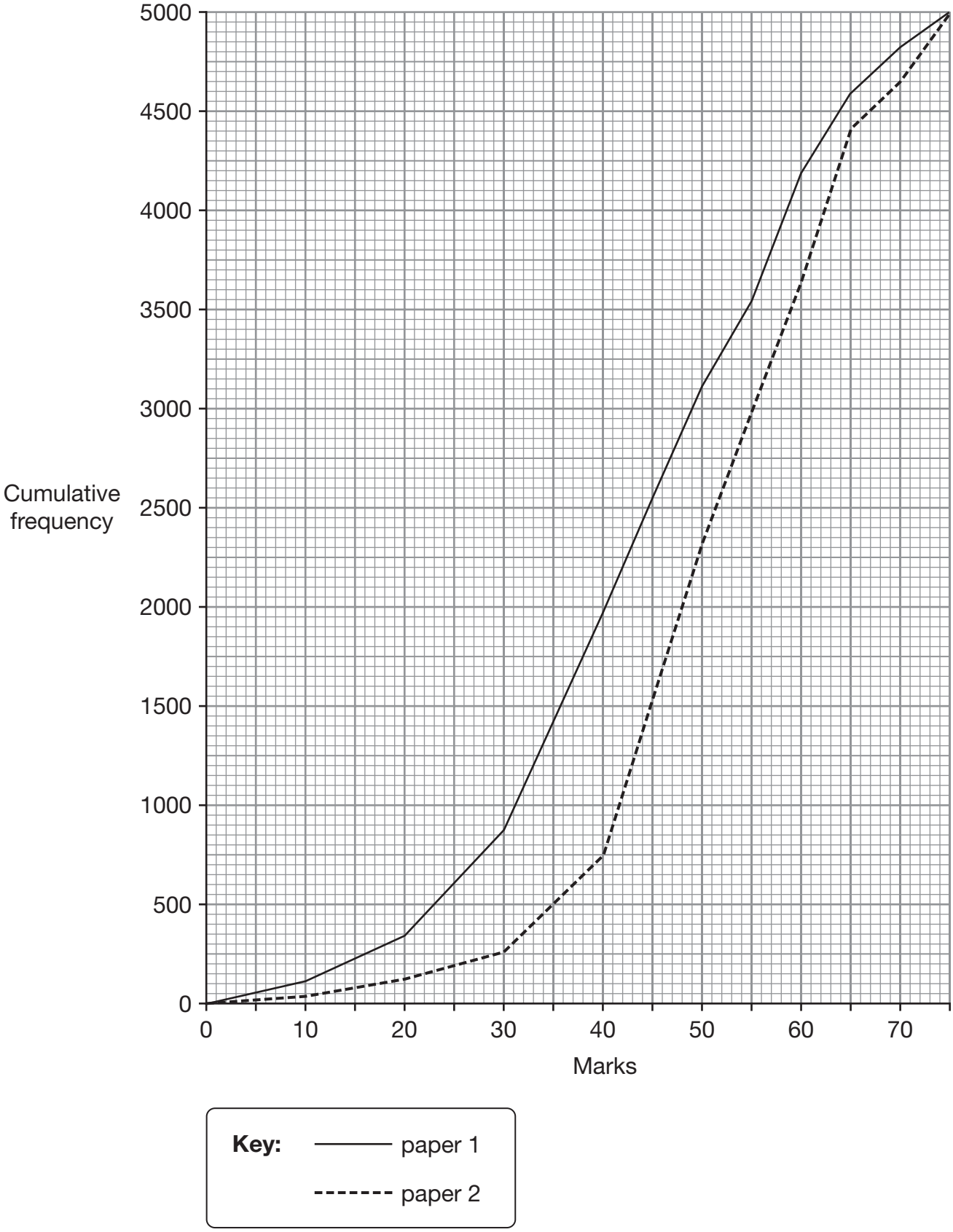
You **must** show your working.

Area = _____ cm^2

1 mark

24. 5000 pupils took part in a test. Pupils took two papers, paper 1 and paper 2.

The graph shows the cumulative frequencies of their marks for each paper.



Use the graph to answer these questions.

For each question tick (✓) True, or False, or Not enough information.

(a) The median mark for **paper 1** was about 38

☐ True ☐ False ☐ Not enough information

Explain your answer.

1 mark

(b) The inter-quartile range of the marks for **paper 1** was about 23

☐ True ☐ False ☐ Not enough information

Explain your answer.

1 mark

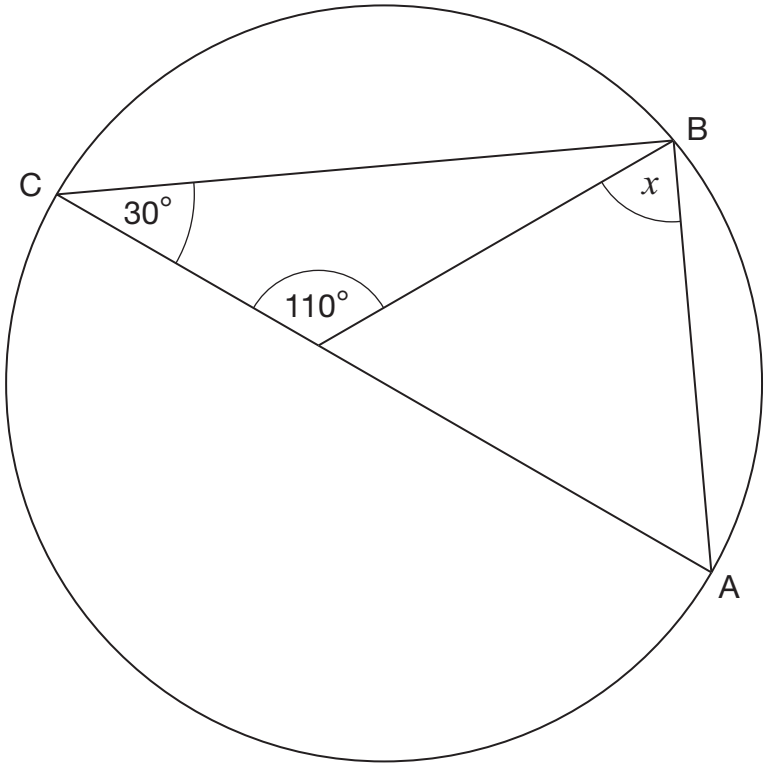
(c) Paper 1 was easier than paper 2.

☐ True ☐ False ☐ Not enough information

Explain your answer.

1 mark

25. AC is the diameter of a circle and B is a point on the circumference of the circle.



Not drawn accurately

What is the size of angle x?

x = _____ °

2 marks

26. Write a number in each box to make the inequalities true.

$\square \div \square < -1$

1 mark

$-1 < \square \div \square < 0$

1 mark

27. Two pupils each drew a triangle with
one side of 5cm, one angle of 20° and one angle of 60°

Must their triangles be congruent?

☐ Yes ☐ No

Explain your answer.

1 mark

END OF TEST

QCA/06/2785 (Pupil pack)
QCA/06/2778 (Mark scheme pack)