

Ma

KEY STAGE

3

TIER

6–8

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	
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Instructions

Answers



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

Calculators



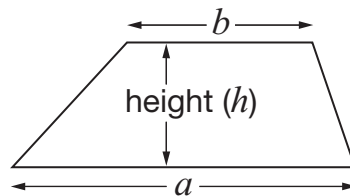
You **must not** use a calculator to answer any question in this test.

Formulae

You might need to use these formulae

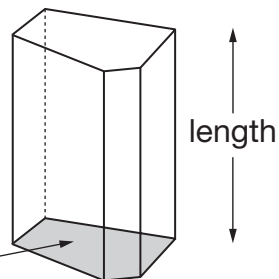
Trapezium

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



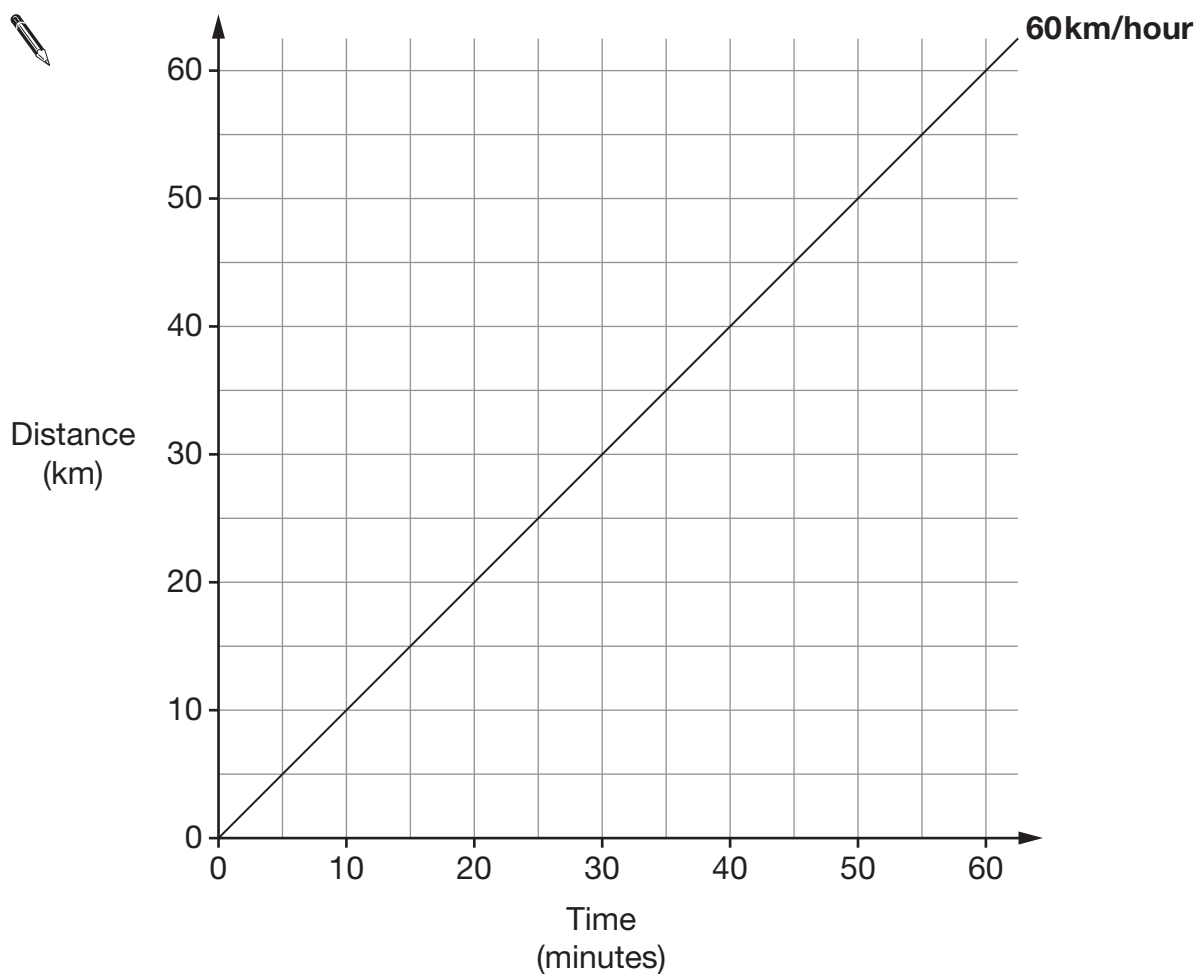
Prism

area of cross-section



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

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



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

Label the line by writing 30km/hour.

1 mark

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

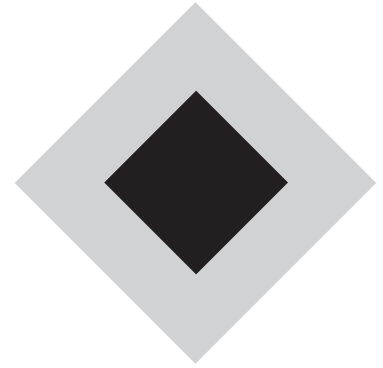
Label the line by writing 120km/hour.

1 mark



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

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



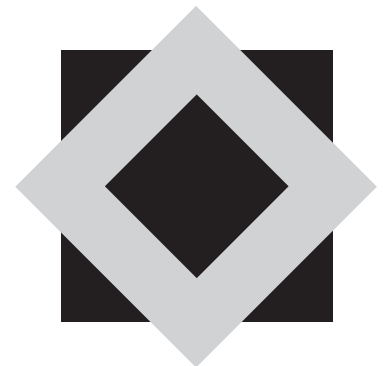
_____ %

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.

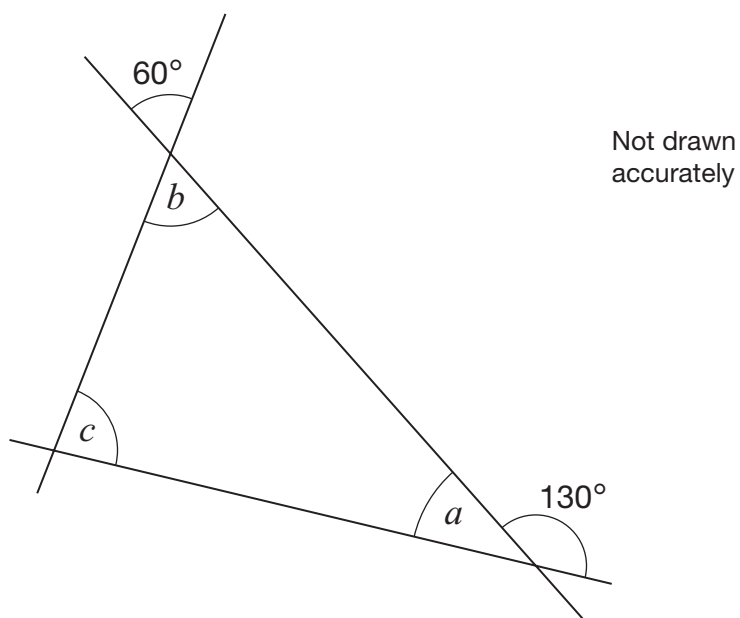


- ☐ The probability has increased.
- ☐ The probability has decreased.
- ☐ The probability has stayed the same.
- ☐ It is impossible to tell.

1 mark



4. The diagram shows three straight lines.



Work out the sizes of angles a , b and c

Give reasons for your answers.



$a =$ _____ $^{\circ}$ because _____

1 mark

$b =$ _____ $^{\circ}$ because _____

1 mark

$c =$ _____ $^{\circ}$ 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.

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



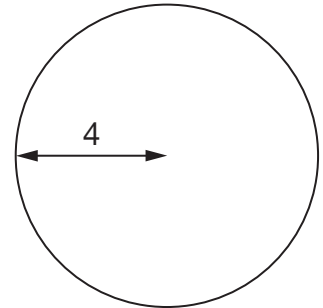
$$n = \underline{\hspace{2cm}}$$

2 marks

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

He writes:

$$\text{Area} = \pi \times 8$$



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



1 mark

8. Write the missing numbers in these fraction sums.



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

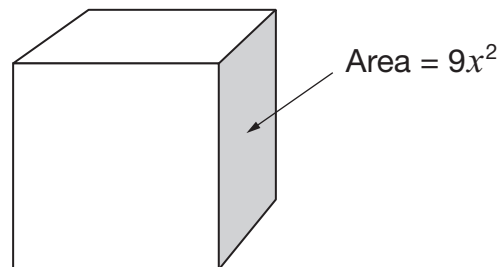
1 mark

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

1 mark

9. Look at the cube.

The area of a **face** of the cube is $9x^2$



- (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
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



Example:

$$\begin{aligned}\text{geometric mean of } 4 \text{ and } 9 &= \sqrt{4 \times 9} \\&= \sqrt{36} \\&= 6\end{aligned}$$

- What is the value of x ?

$$x = \underline{\hspace{2cm}}$$


12

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



n th 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 n th term rule below.



$$n^3 + 3$$

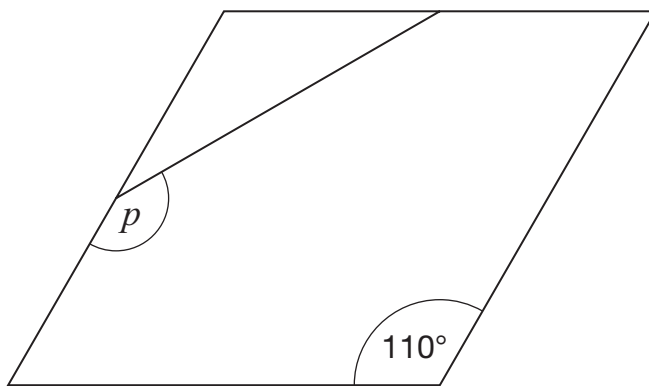
_____, _____, _____, _____

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 ?



$p =$ _____^o

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

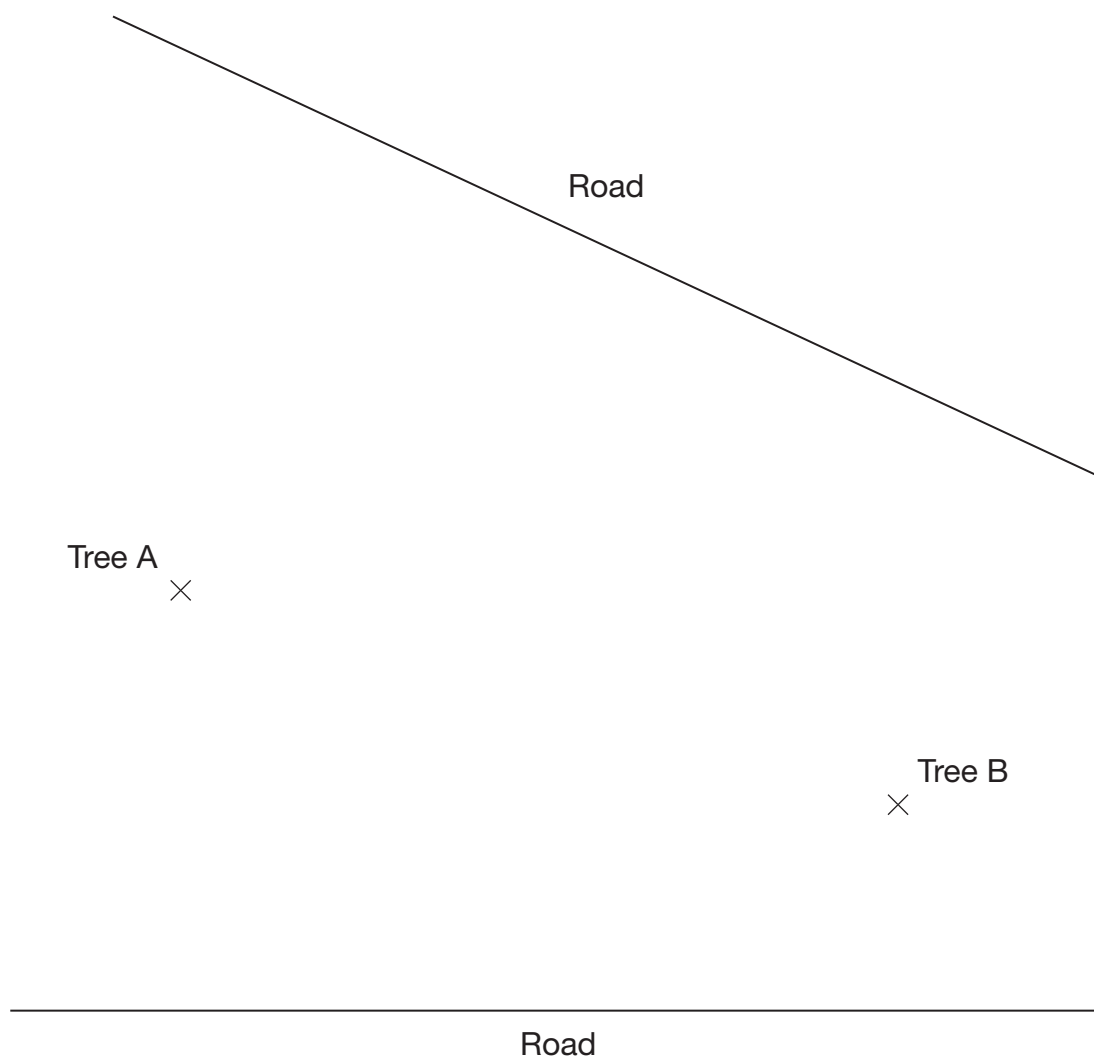


15. Here is a plan of some land.

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

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

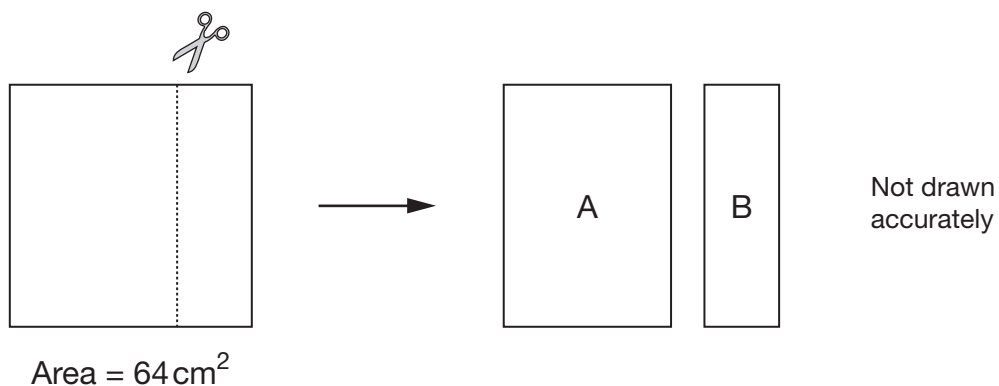


$n =$ _____

1 mark



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



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 _____

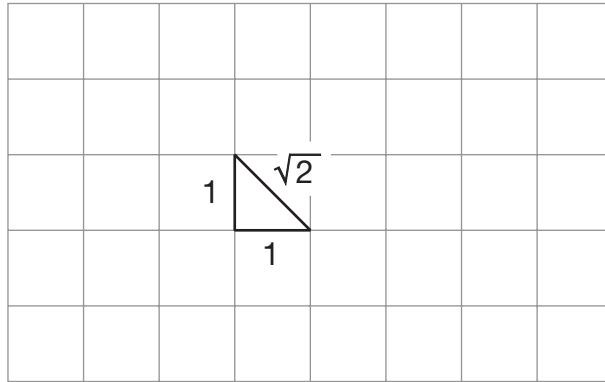
$$y = 3x + 1$$



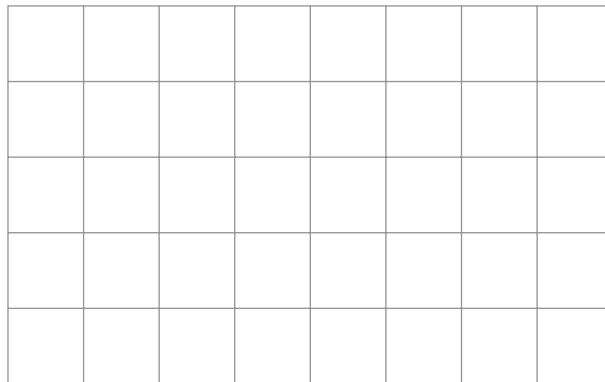
When x increases by 3, y increases by _____

2 marks

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

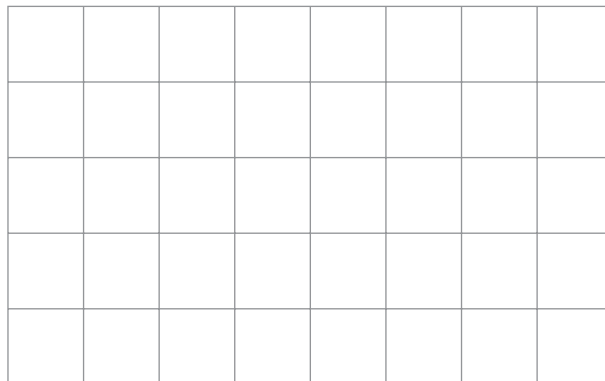


- (a) On the square grid below, draw a **triangle** with a perimeter of $3(2 + \sqrt{2})$ cm.



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.



$$y^4 = \boxed{}$$

1 mark

$$y^{\boxed{}} = 1000$$

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}

☐

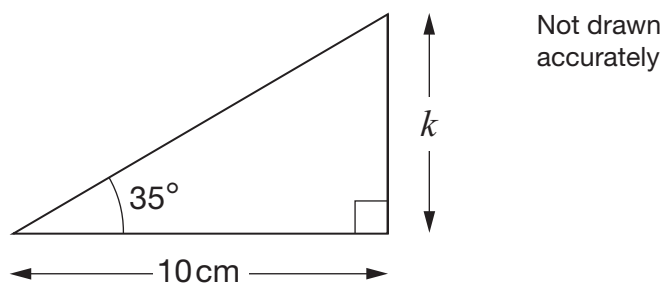
3^{10000}

☐

9^{10000}

1 mark

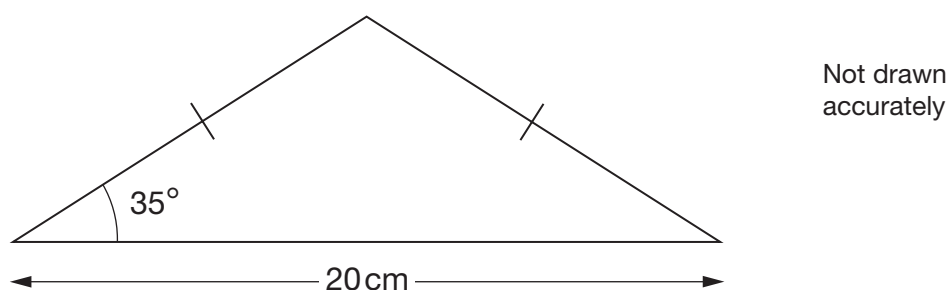
23. (a) Use $\tan 35^\circ$ as **0.7** to work out length k



$k =$ _____ cm

1 mark

- (b) Now use $\tan 35^\circ$ as 0.7 to work out the **area** of this isosceles triangle.



You **must** show your working.

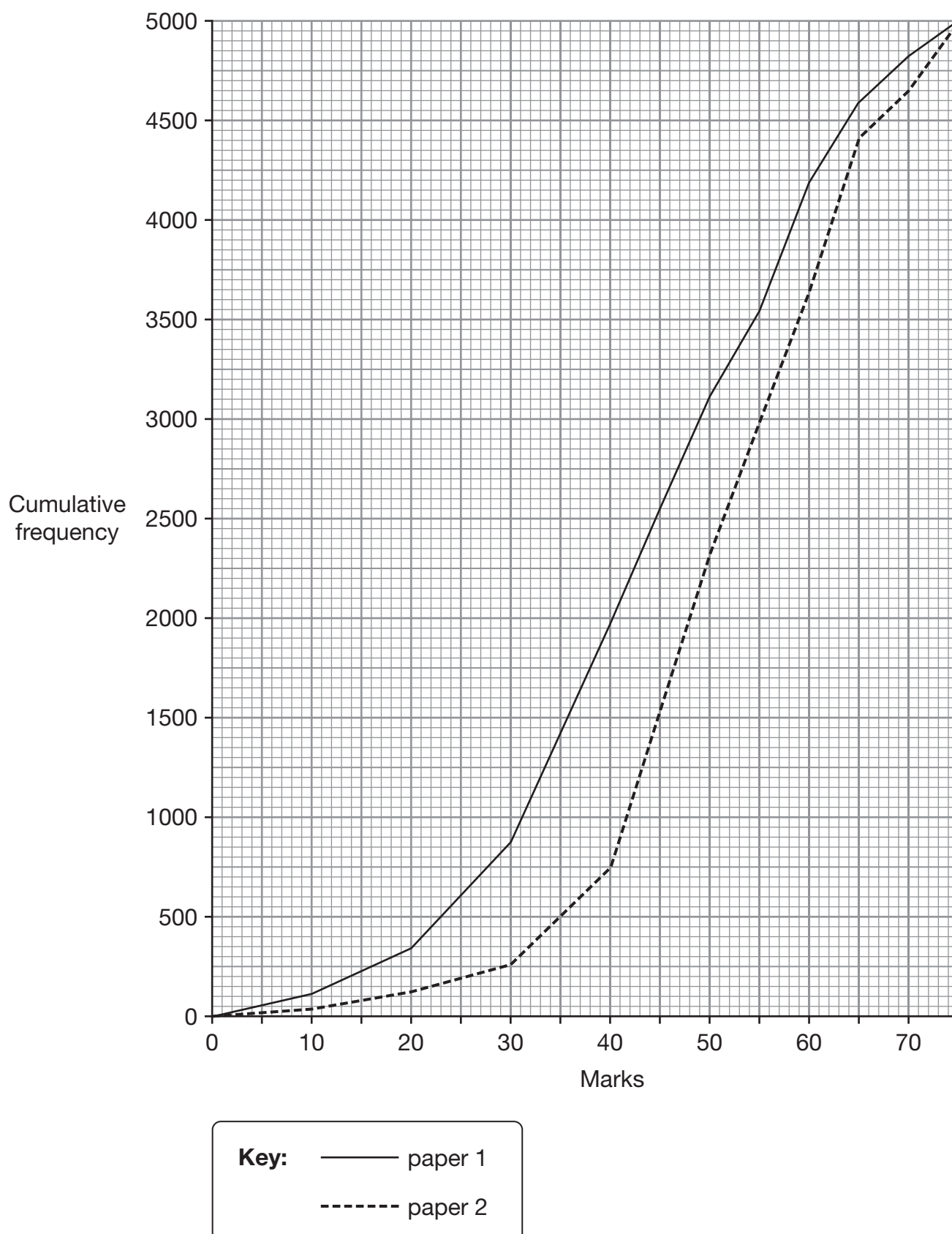


Area = _____ cm^2

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

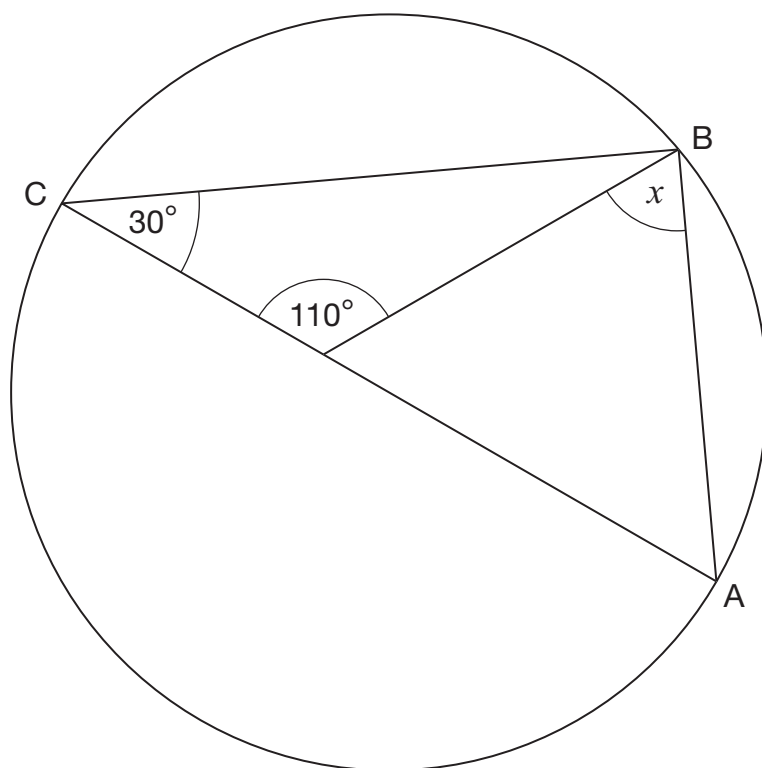
Explain your answer.



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 ?



$$x = \underline{\hspace{2cm}}^\circ$$

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