

Ma

KEY STAGE

3

TIER

5–7

# 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



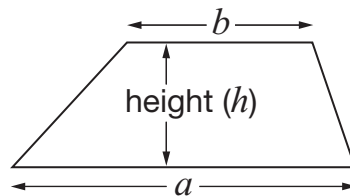
You **must not** use a calculator to answer any question in this test.

## Formulae

You might need to use these formulae

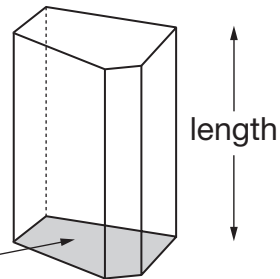
### Trapezium

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



### Prism

area of cross-section



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

1. (a) When  $x = 8$ , what is the value of  $5x$ ?

Tick (✓) the correct box below.

 5 13 40 58 None of these

\_\_\_\_\_   
 1 mark

(b) When  $x = 8$ , what is the value of  $3x - x$ ?

Tick (✓) the correct box below.

 0 3 16 30 None of these

\_\_\_\_\_   
 1 mark

(c) When  $x = 8$ , what is the value of  $x^2$ ?

Tick (✓) the correct box below.

 8 10 16 64 None of these

\_\_\_\_\_   
 1 mark



2. Lisa uses a grid to multiply **23** by **15**


×	<b>20</b>	<b>3</b>
<b>10</b>	200	30
<b>5</b>	100	15

$$200 + 100 + 30 + 15 = 345$$

Answer: **345**

Now Lisa multiplies two different numbers.

Complete the grid, then give the answer below.



×	_____	<b>40</b>	<b>3</b>
<b>30</b>	_____	_____	_____
_____	600	_____	18



Answer: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

3 marks

3. Fred has a bag of sweets.

Contents
3 yellow sweets
5 green sweets
7 red sweets
4 purple sweets
1 black sweet

He is going to take a sweet from the bag at random.

- (a) What is the **probability** that Fred will get a **black** sweet?



1 mark

- (b) Write the missing **colour** in the sentence below.




The probability that Fred will get a \_\_\_\_\_ sweet is  $\frac{1}{4}$

1 mark



4. Write a number in each box to make the calculations correct.

  +  =

1 mark


-  =

1 mark

5. A rectangle has an **area** of **24 cm<sup>2</sup>**

How long could the sides of the rectangle be?

Give three **different** examples.

 \_\_\_\_\_ cm and \_\_\_\_\_ cm

\_\_\_\_\_ cm and \_\_\_\_\_ cm

\_\_\_\_\_ cm and \_\_\_\_\_ cm

2 marks

6. (a) Write the missing numbers.



$50\% \text{ of } 80 = \underline{\hspace{2cm}}$

$5\% \text{ of } 80 = \underline{\hspace{2cm}}$

$1\% \text{ of } 80 = \underline{\hspace{2cm}}$

          
2 marks

(b) Work out 56% of 80

You can use part (a) to help you.



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

          
1 mark



7. Look at this equation.

$$y = 2x + 10$$

- (a) When  $x = 4$ , what is the value of  $y$ ?



\_\_\_\_\_

1 mark

- (b) When  $x = -4$ , what is the value of  $y$ ?



\_\_\_\_\_

1 mark

- (c) Which equation below gives the **same** value of  $y$  for both  $x = 4$  and  $x = -4$ ?

Put a ring round the correct equation.



$y = 2x$

$y = 2 + x$

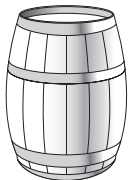
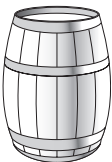


$y = x^2$

$y = \frac{x}{2}$

1 mark



8. The diagram shows four different sized barrels.

			
Barrel <b>A</b> holds <b>54 gallons</b>	Barrel <b>B</b> holds <b>36 gallons</b>	Barrel <b>C</b> holds <b>18 gallons</b>	Barrel <b>D</b> holds <b>9 gallons</b>

Write the missing fractions **as simply as possible**.

The first one is done for you.

Barrel **C** holds  $\frac{1}{2}$  of the amount barrel **B** holds.



Barrel **D** holds \_\_\_\_\_ of the amount barrel **B** holds.

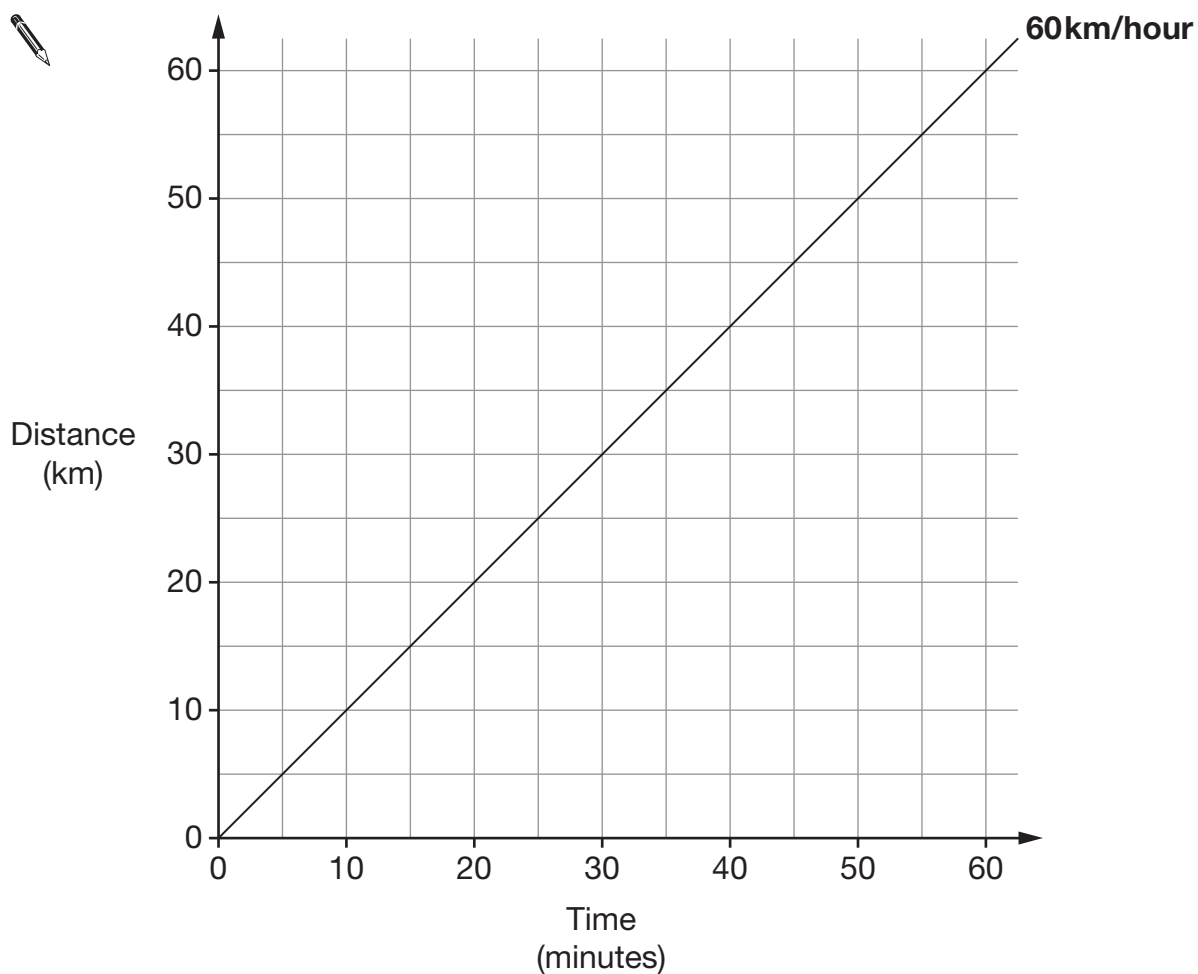
Barrel **C** holds \_\_\_\_\_ of the amount barrel **A** holds.

Barrel **B** holds \_\_\_\_\_ of the amount barrel **A** holds.

2 marks



9. 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

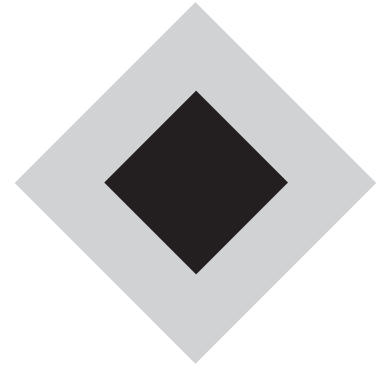
- (b) Now draw a line on the graph to represent a speed of **120km/hour**.

**Label the line** by writing 120km/hour.

1 mark

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

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



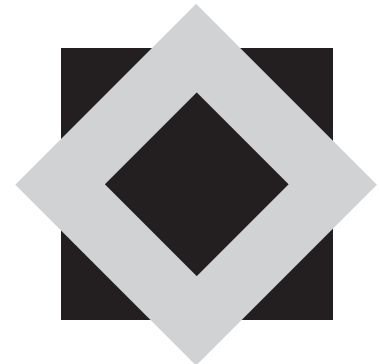
\_\_\_\_\_ %

\_\_\_\_\_   
 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



11. 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.

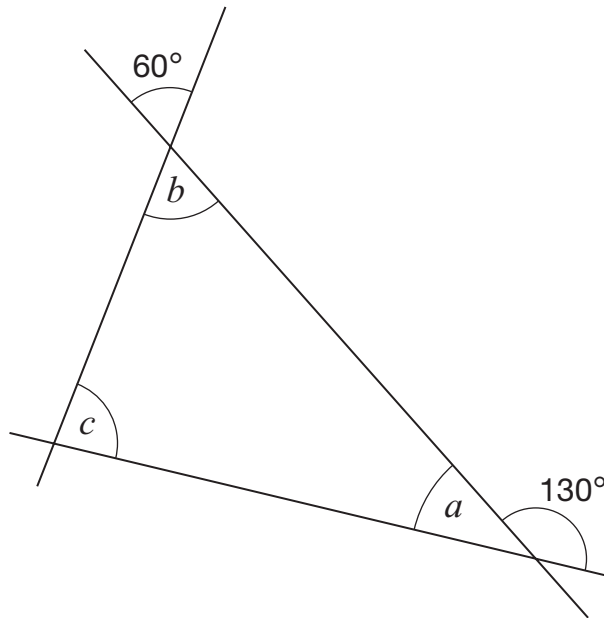


- The probability has increased.
- The probability has decreased.
- The probability has stayed the same.
- It is impossible to tell.

\_\_\_\_\_

1 mark

12. The diagram shows three straight lines.



Not drawn  
accurately

Work out the sizes of angles  $a$ ,  $b$  and  $c$

Give reasons for your answers.



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

\_\_\_\_\_

\_\_\_\_\_

1 mark

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

\_\_\_\_\_

\_\_\_\_\_

1 mark

$c =$  \_\_\_\_\_  $^{\circ}$  because \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

1 mark



13. (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

14. Solve this equation.

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



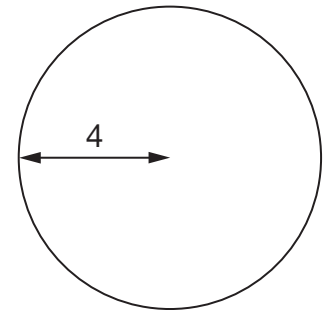
$$n = \underline{\hspace{2cm}}$$

2 marks

15. 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



16. Write the missing numbers in these fraction sums.



$$\frac{\boxed{1}}{\boxed{4}} + \frac{\boxed{\phantom{000}}}{\boxed{8}} = 1$$

---

 1 mark

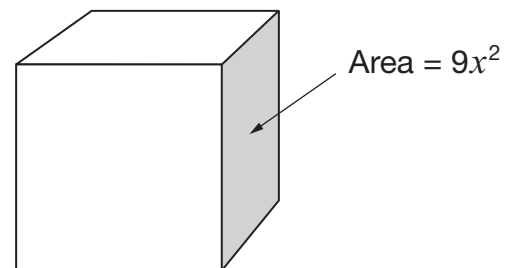
$$\frac{\boxed{1}}{\boxed{3}} + \frac{\boxed{8}}{\boxed{\phantom{000}}} = 1$$

---

 1 mark

17. Look at the cube.

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



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

Write your answer as simply as possible.




---



---

 1 mark



18. Chris read the first 55 numbers from a book of random numbers.  
As he read each number he recorded it in the diagram below.

<b>0</b>	5	9	9	8	3	4	1	
<b>1</b>	6	3	1	0	3			
<b>2</b>	8	2						
<b>3</b>	1	1	6	9	3			
<b>4</b>	6	9	9	4	7	0		
<b>5</b>	5	7	7	6				
<b>6</b>	0	2	8	4	8	0	3	5
<b>7</b>	6	8	0	1	5	4		
<b>8</b>	6	6	9	2	8	5	7	
<b>9</b>	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





20. (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.



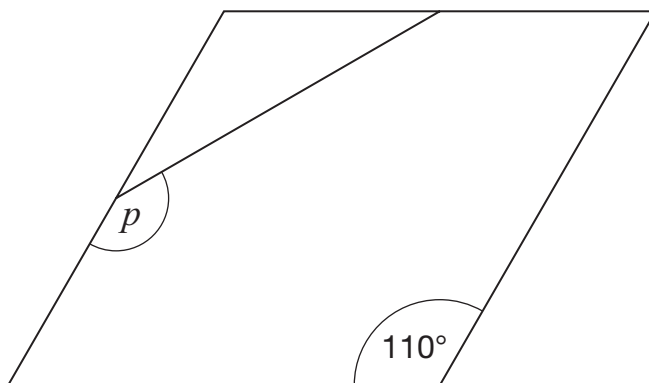
$$n^3 + 3$$

\_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_

2 marks



21. 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  $p$ ?



$$p = \text{_____}^\circ$$

\_\_\_\_\_

2 marks

22. 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

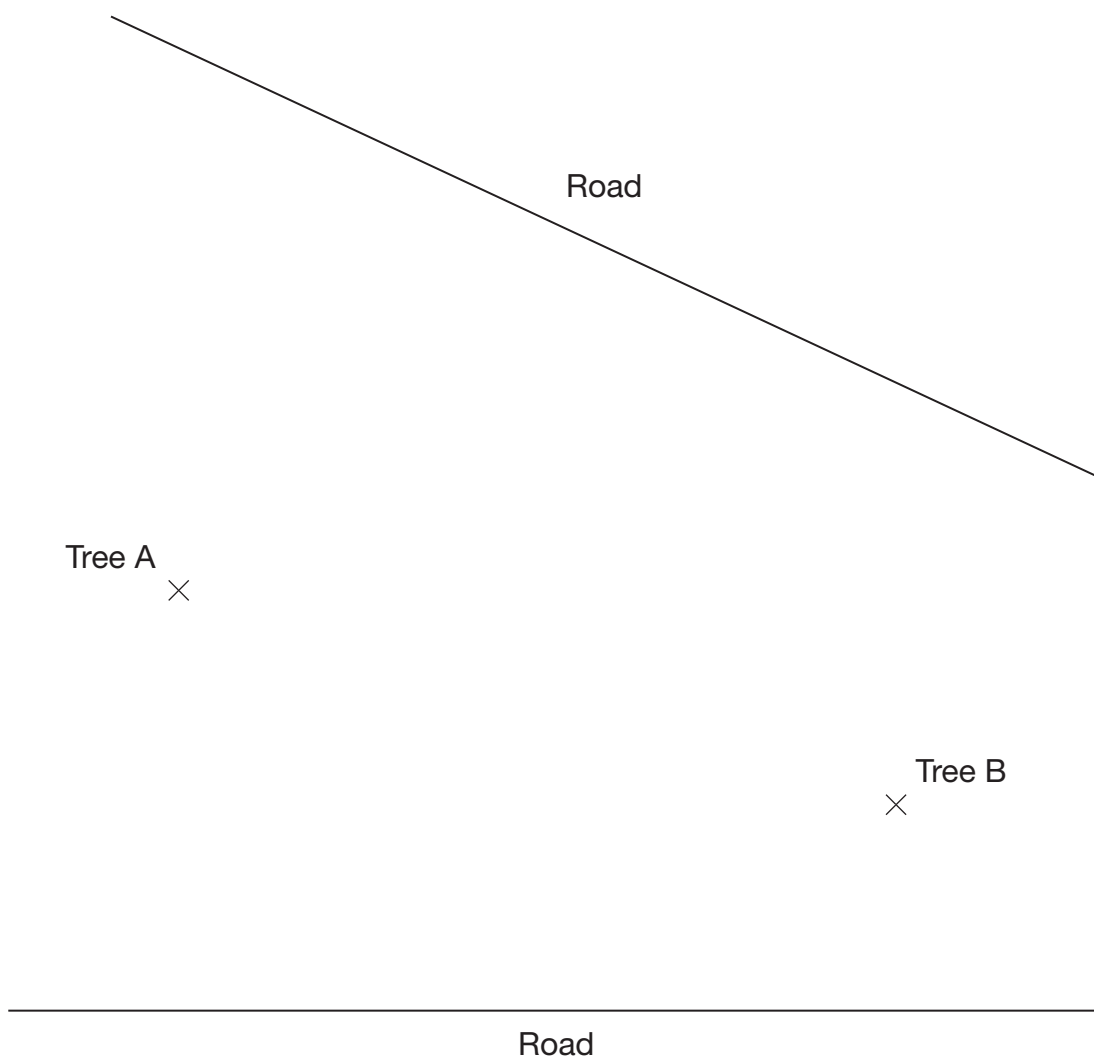


23. Here is a plan of some land.

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

24. Work out the values of  $m$  and  $n$

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



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

          
1 mark

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

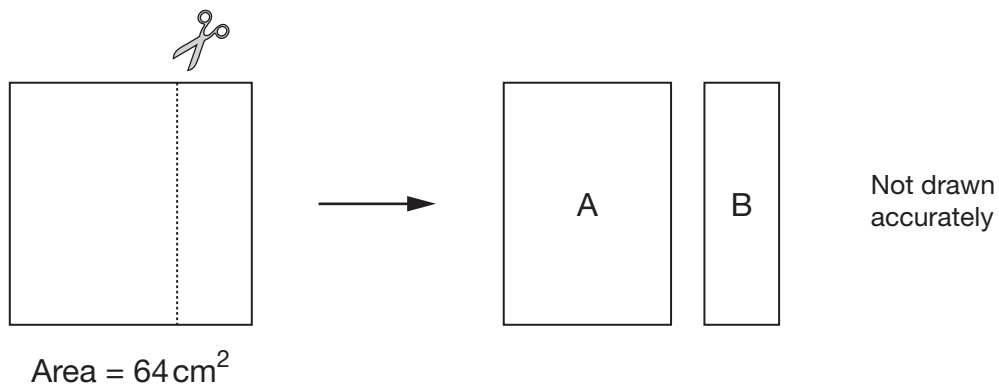


$n = \underline{\hspace{2cm}}$

          
1 mark



25. A square of area  $64\text{cm}^2$  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



26. 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



**END OF TEST**

**END OF TEST**

