Ma

KEY STAGE
3

TIER
5–7

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

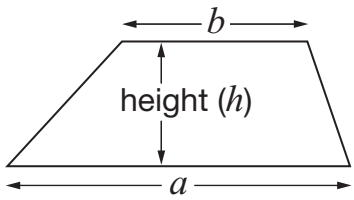
You **must not** use a calculator to answer any question in this test.

Formulae

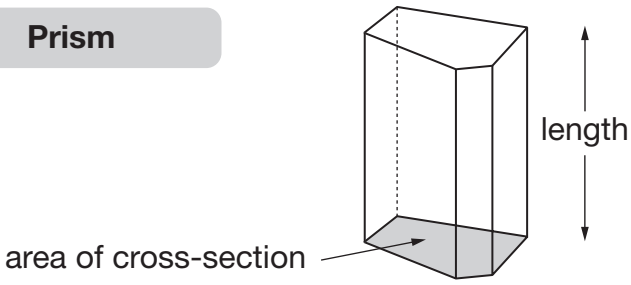
You might need to use these formulae

Trapezium

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



Prism



Volume = area of cross-section × length

1. (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**

×	**20**	**3**
10	200	30
5	100	15

200 + 100 + 30 + 15 = 345

Answer: **345**

Now Lisa multiplies two different numbers.

Complete the grid, then give the answer below.

×	_____	**40**	**3**
30	_____	_____	_____
_____	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?

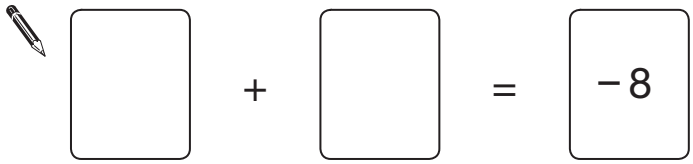
1 mark

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

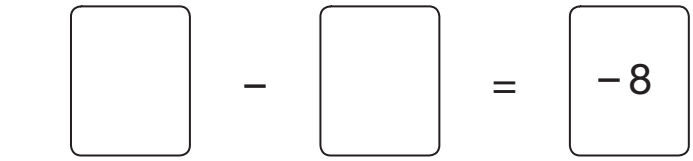
The probability that Fred will get a _____ sweet is $\frac{1}{4}$

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 cm²**

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% of 80 = _____

5% of 80 = _____

1% of 80 = _____

2 marks

(b) Work out 56% of 80

You can use part (a) to help you.

_____

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

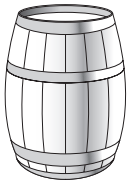
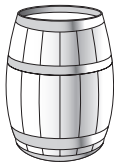
(c) Which equation below gives the **same** value of y for both $x = 4$ and $x = -4$?

Put a ring round the correct equation.

$y = 2x$ $\quad$ $y = 2 + x$ $\quad$ $y = x^2$ $\quad$ $y = \frac{x}{2}$

1 mark

8. The diagram shows four different sized barrels.

			
Barrel **A** holds **54 gallons**	Barrel **B** holds **36 gallons**	Barrel **C** holds **18 gallons**	Barrel **D** holds **9 gallons**

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.

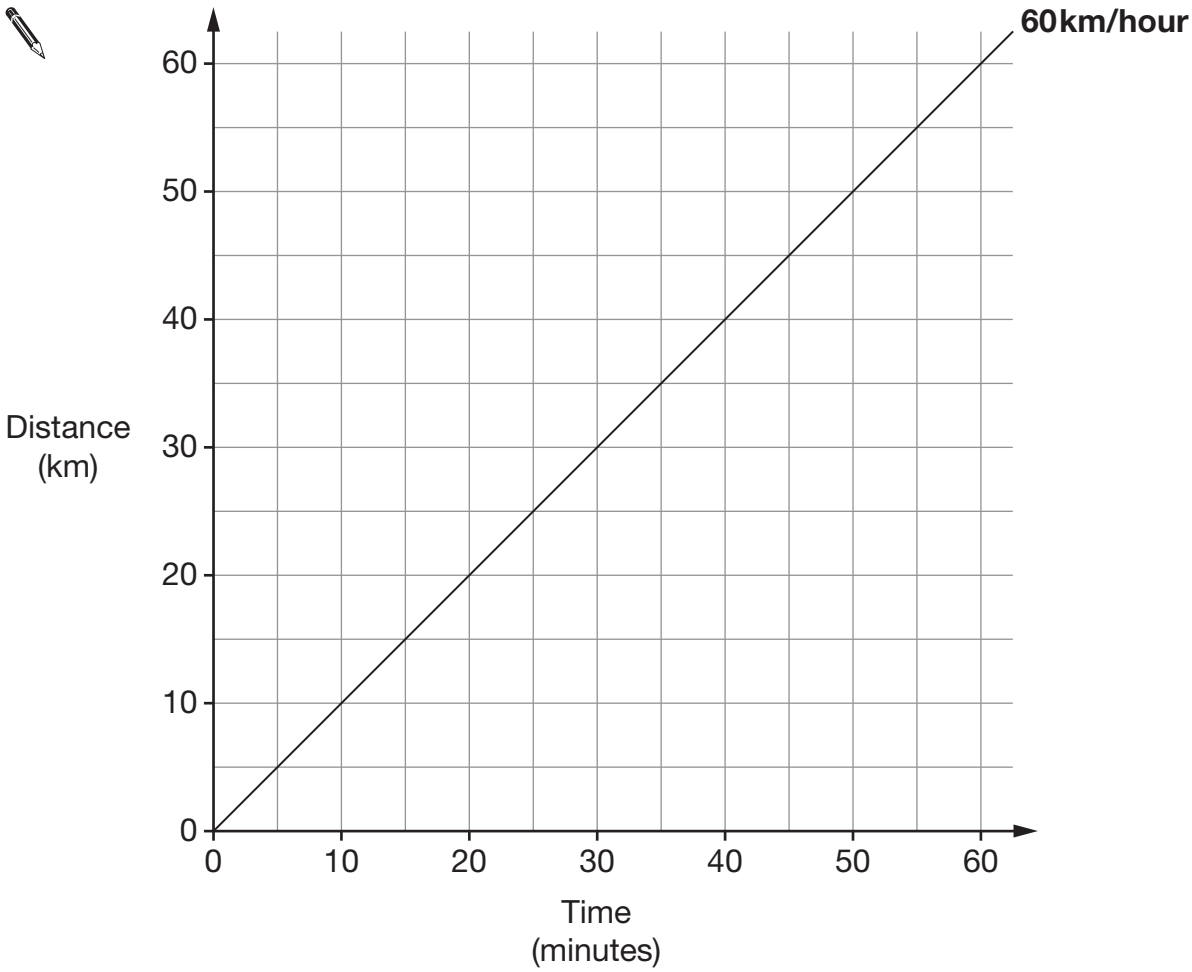
Barrel **D** holds _____ of the amount barrel **B** holds.

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 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

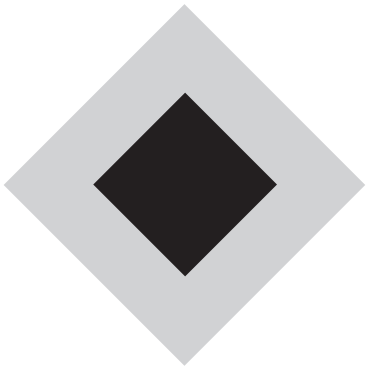
(b) Now draw a line on the graph to represent a speed of **120 km/hour**.

Label the line by writing 120 km/hour.

1 mark

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

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



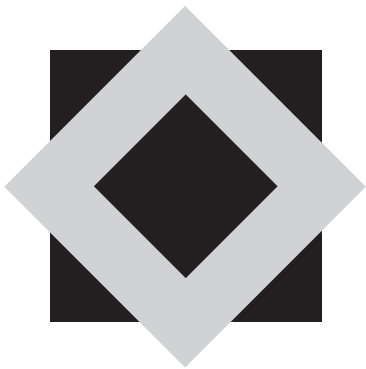
_____ %

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.

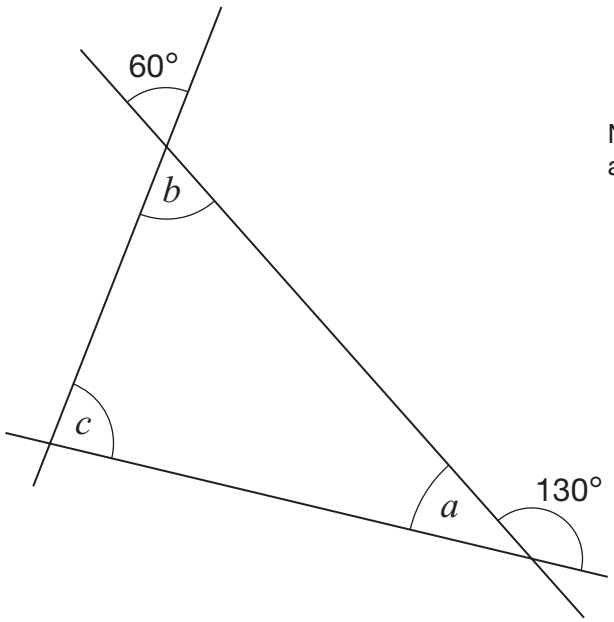
What effect does this have on the probability that I will take a **red** counter?

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 = _____ ° because _____

_____

_____ 1 mark

b = _____ ° because _____

_____

_____ 1 mark

c = _____ ° 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

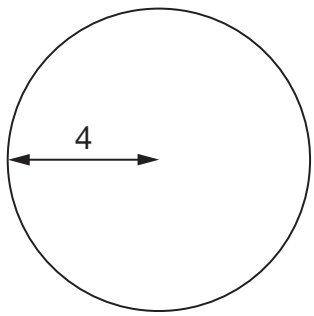
14. Solve this equation.

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

n = _____

2 marks

15. 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

16. Write the missing numbers in these fraction sums.

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

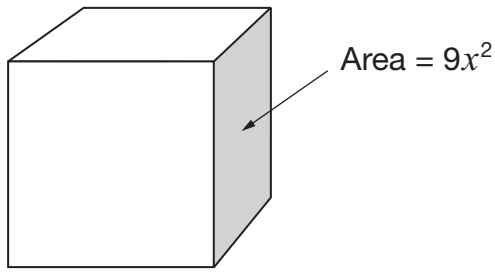
1 mark

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

1 mark

17. Look at the cube.

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



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.

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

19. 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

20. (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

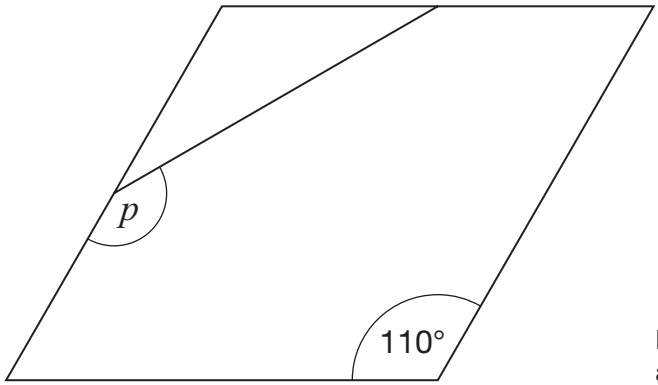
(b) Write the **first four** terms of the number sequence using the nth term rule below.

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

2 marks

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?

$p =$ _____ °

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?

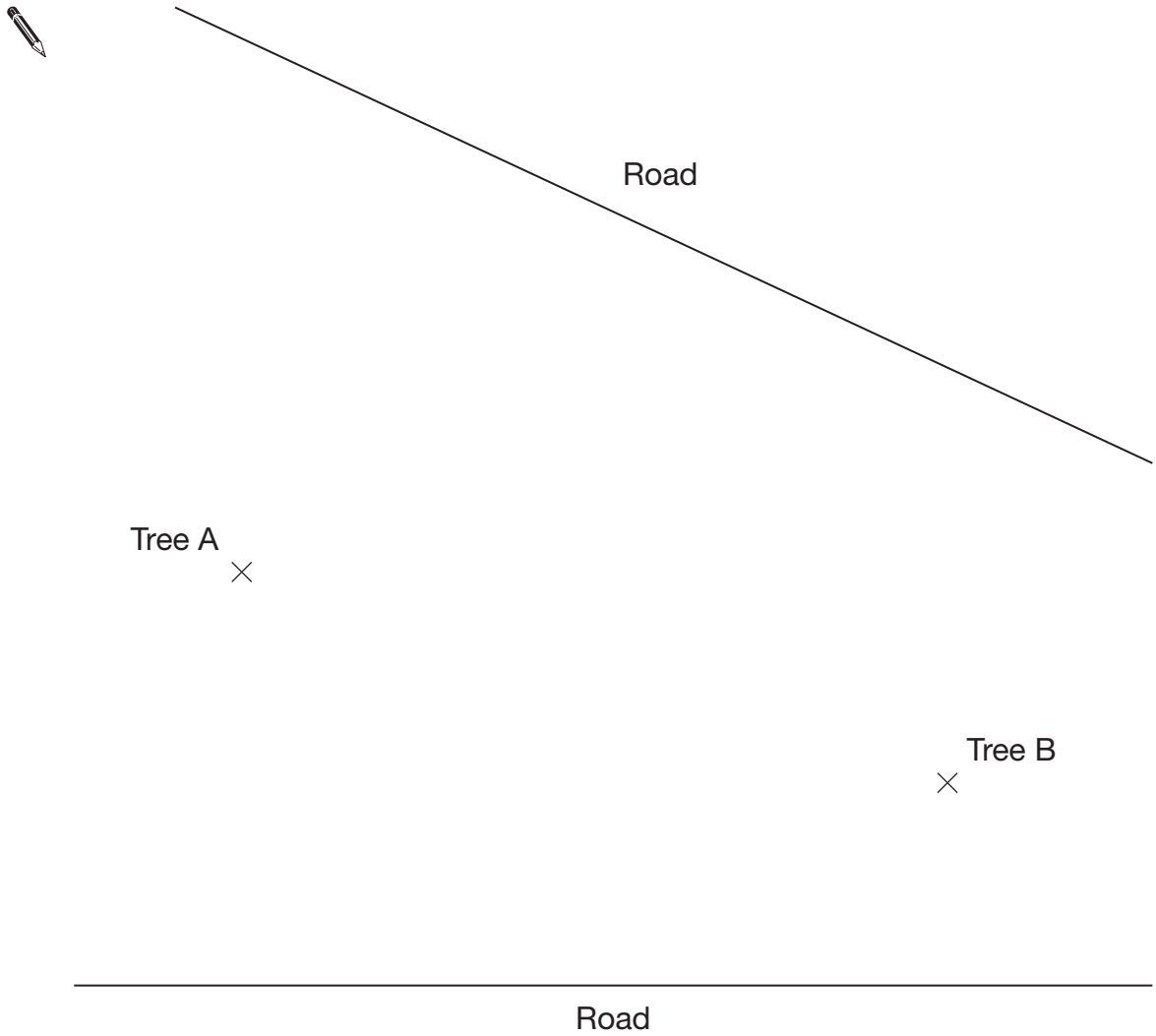
2 marks

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

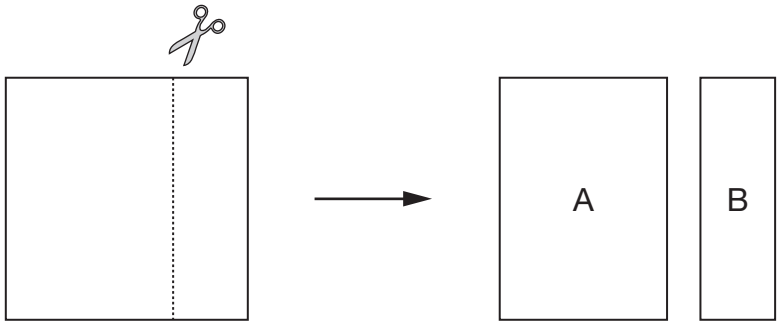
$$5^8 \times 5^4 = 5^m$$

m = _____ 1 mark

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

n = _____ 1 mark

25. A **square** of area **64 cm^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

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

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QCA/06/2778 (Mark scheme pack)
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