

**Ma**

KEY STAGE

**3**

TIER

**5–7**

# Mathematics test

## Paper 2

### Calculator allowed

First name \_\_\_\_\_

Last name \_\_\_\_\_

School \_\_\_\_\_

#### Remember

- The test is 1 hour long.
- You may use a calculator for any question in this test.
- You will need: pen, pencil, rubber, ruler, an angle measurer or protractor and a scientific or graphic calculator.
- 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	
Borderline check	

**2007**

## Instructions

### Answers



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

### Calculators



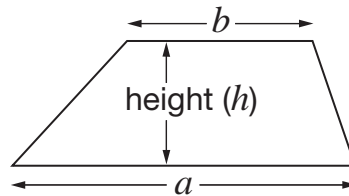
You **may** use a calculator to answer any question in this test.

## Formulae

You might need to use these formulae

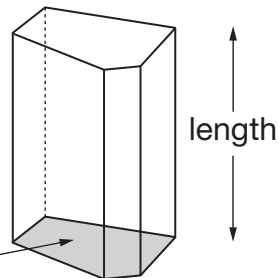
### Trapezium

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



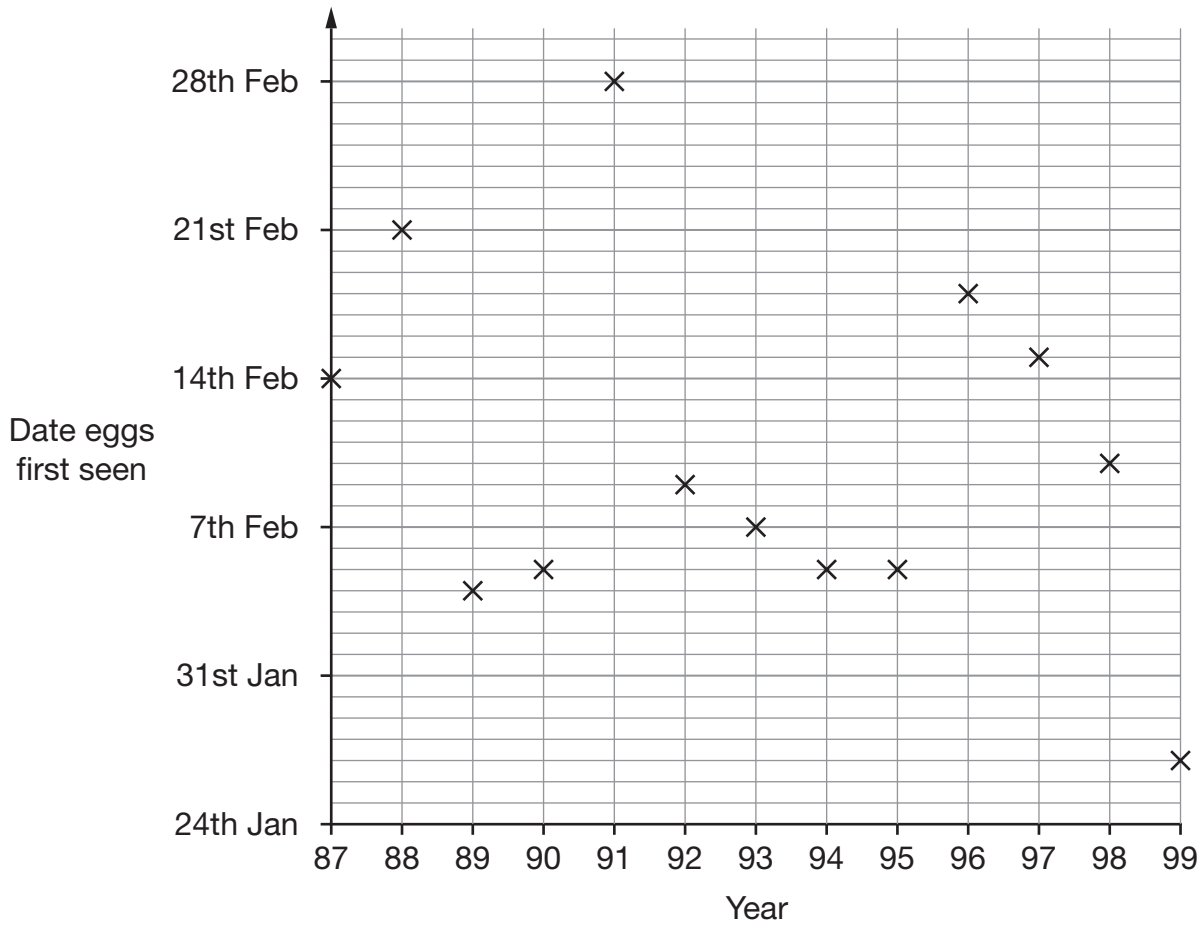
### Prism

area of cross-section



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

1. The graph shows the date each year that frogs' eggs were first seen.



(a) On what date in **1997** were frogs' eggs first seen?



\_\_\_\_\_

1 mark

(b) At the beginning of each year, the warmer the weather, the earlier frogs' eggs are first seen.

What can you say about the weather at the beginning of **1991**?



1 mark



2. (a) Here is an expression.

$$2a + 3 + 2a$$

Which expression below shows it written as simply as possible?

Put a ring round the correct one.



$7a$

$7 + a$

$2a + 5$

$4a + 3$

$4(a + 3)$

1 mark

- (b) Here is a different expression.

$$3b + 4 + 5b - 1$$

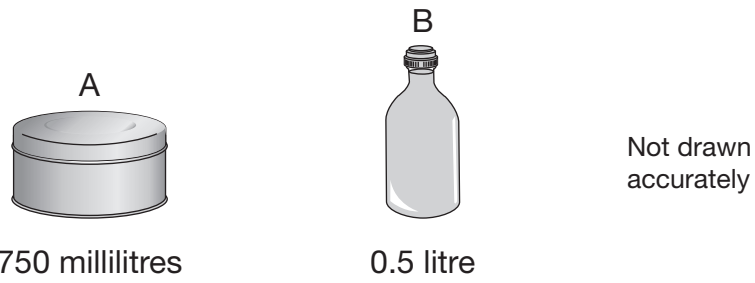
Write this expression as simply as possible.



\_\_\_\_\_

1 mark

3. Here are two containers and the amounts they hold.



Which container holds the greater amount?

A  B

How much **more** does it hold?

Give your answer in millilitres.

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

4. (a) A triangle has **three equal sides**.

Write the sizes of the **angles** in this triangle.

\_\_\_\_\_ ° , \_\_\_\_\_ ° , \_\_\_\_\_ ° 1 mark

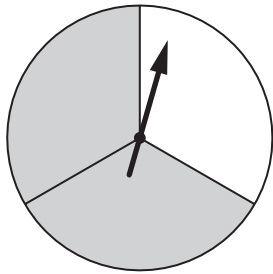
(b) A **right-angled triangle** has **two equal sides**.

Write the sizes of the **angles** in this triangle.

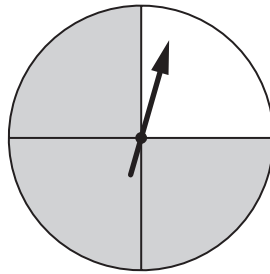
\_\_\_\_\_ ° , \_\_\_\_\_ ° , \_\_\_\_\_ ° 1 mark



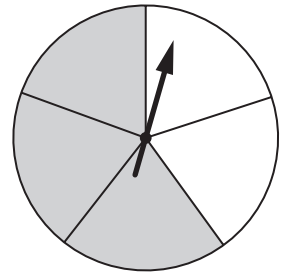
5. The diagram shows five fair spinners with grey and white sectors.  
Each spinner is divided into equal sectors.



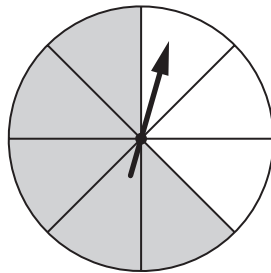
A



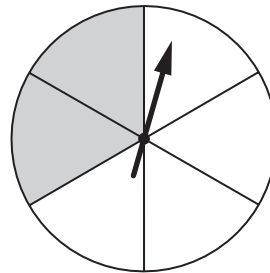
B



C



D



E

I am going to spin all the pointers.

- (a) For one of the spinners, the probability of spinning **grey** is  $\frac{3}{4}$   
Which spinner is this? Write its letter.



\_\_\_\_\_

1 mark

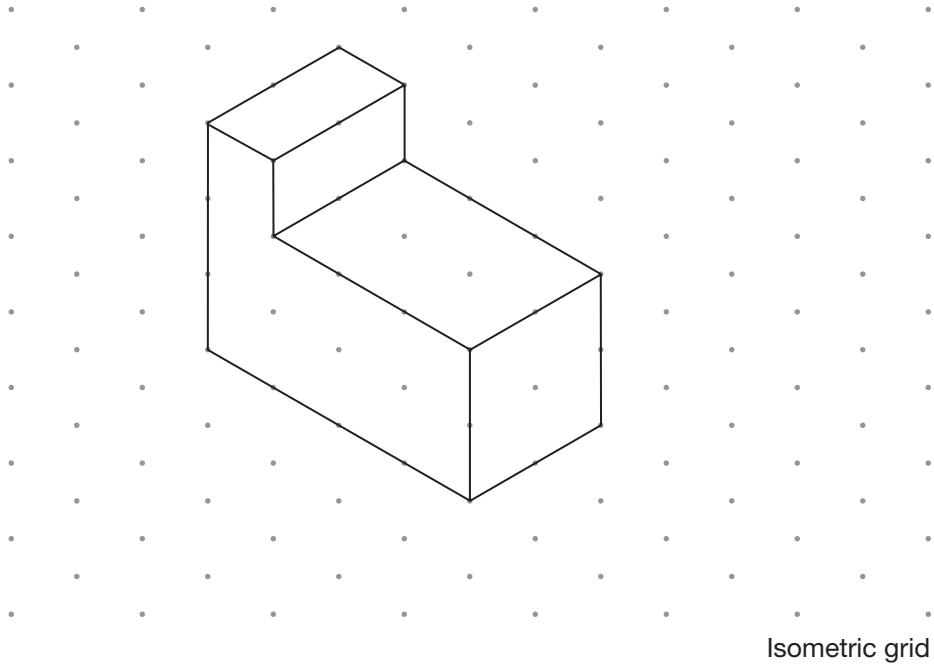
- (b) For two of the spinners, the probability of spinning **grey** is  
**more than 60%** but **less than 70%**  
Which two spinners are these? Write their letters.



\_\_\_\_\_ and \_\_\_\_\_

1 mark

6. (a) Look at the drawing of a prism on the grid.



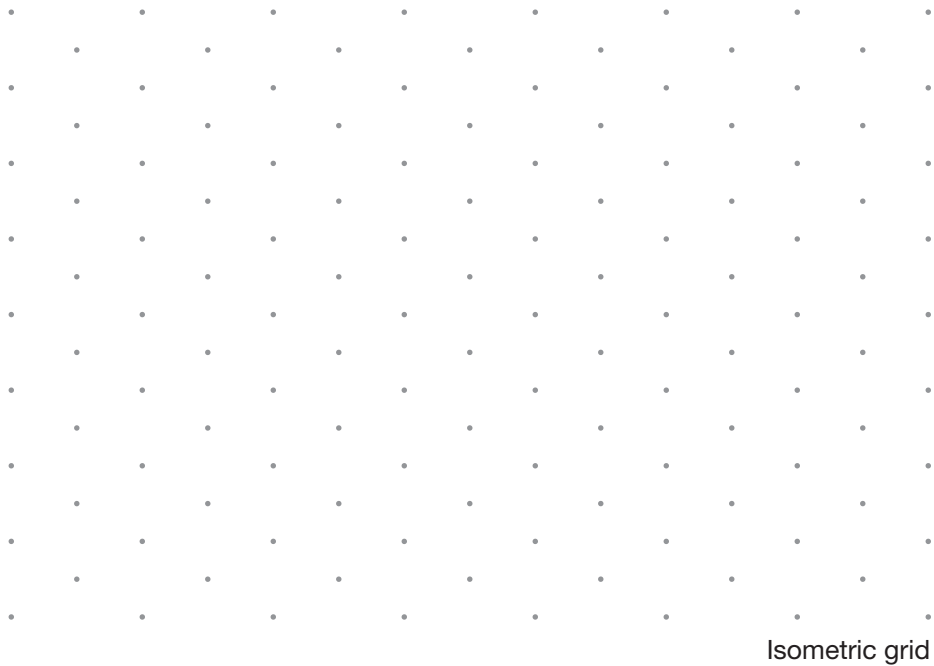
How many **faces** does the prism have?



\_\_\_\_\_

1 mark

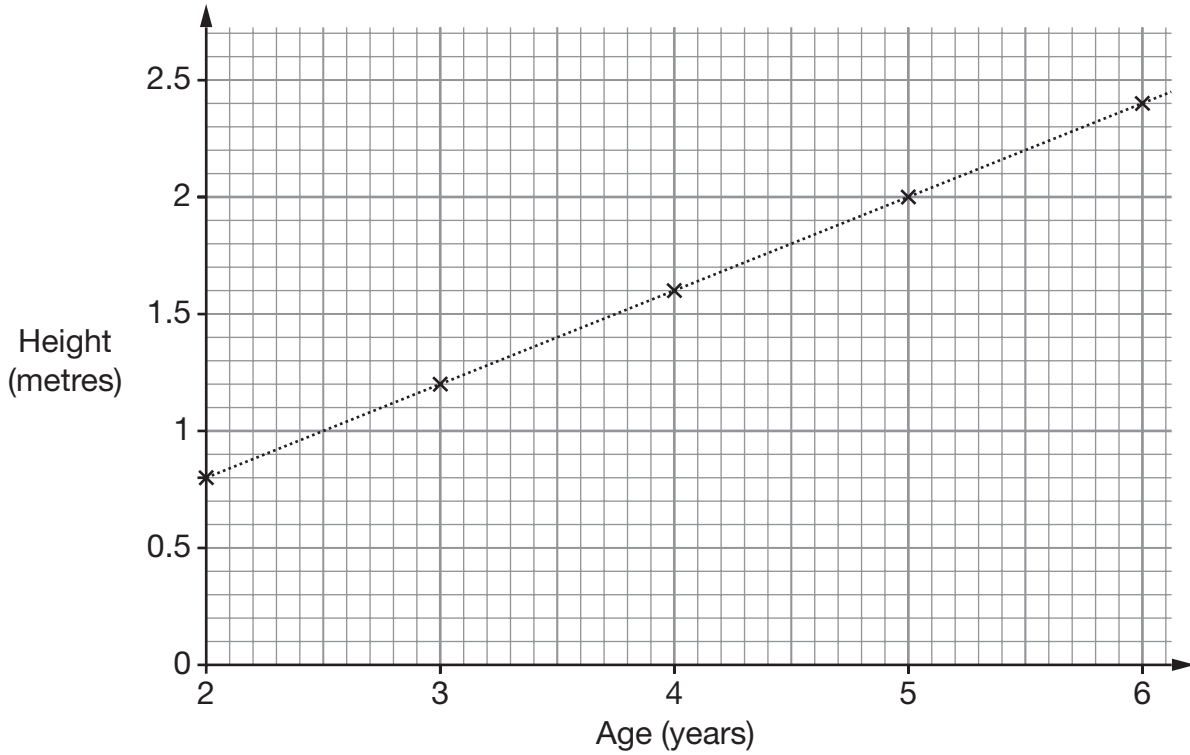
(b) Use the grid below to draw a solid with **6 faces**.



1 mark



7. The graph shows the average heights of fir trees of different ages.



The table shows the cost of fir trees of different heights.

	120cm to 159cm	160cm to 199cm	200cm to 239cm
Cost	£20.00	£25.00	£30.00

(a) One of these fir trees is  $5\frac{1}{2}$  years old.

**How much** is it likely to cost?



£

1 mark

(b) One of these fir trees costs **£25.00**

**How old** is the tree likely to be?

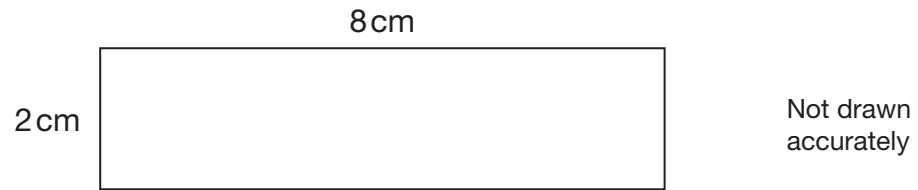


Between \_\_\_\_\_ and \_\_\_\_\_ years old

1 mark



8. Here is a rectangle.



- (a) A **square** has the **same area** as this rectangle.

What is the **side length** of this square?



\_\_\_\_\_ cm

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

- (b) A **different square** has the **same perimeter** as this rectangle.

What is the **side length** of this square?



\_\_\_\_\_ cm

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



9. Kate buys **24 cans** of lemonade.
- She buys the cans in **packs of 4**
- Each pack costs **£1.20**



Pack of 4  
Cost £1.20

- Steve buys **24 cans** of lemonade.
- He buys the cans in **packs of 6**
- Each pack costs **£1.60**



Pack of 6  
Cost £1.60

Kate pays more for her 24 cans than Steve pays for his 24 cans.

How much more?

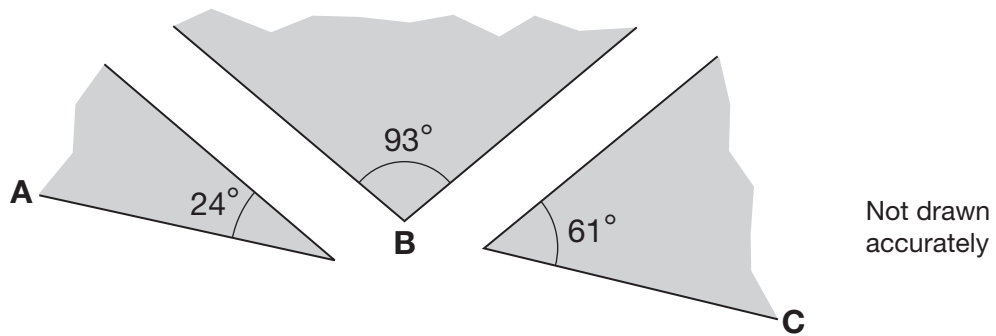


\_\_\_\_\_ p

\_\_\_\_\_

2 marks

10. Three shapes fit together at point B.



Will ABC make a straight line?




Yes

No

Explain your answer.



1 mark

11. Solve these equations.

$$32x + 53 = 501$$



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

1 mark

$$375 = 37 + 26y$$



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

1 mark



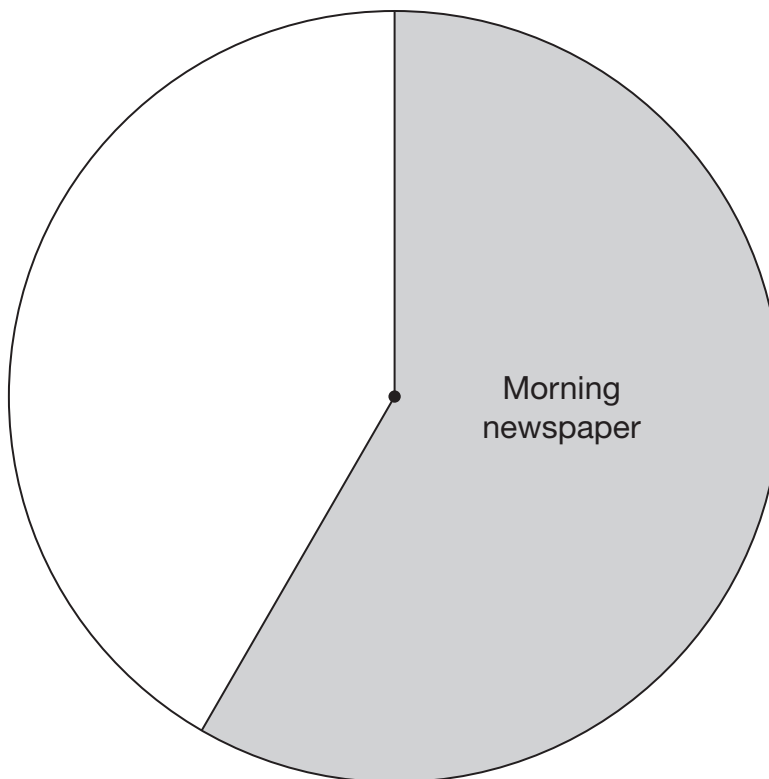
12. In a survey, 60 people were asked:

What kind of newspaper did you buy today?

Here are the results.

Type of newspaper	Number of people
Morning newspaper	35
Evening newspaper	10
No newspaper	15

Complete the pie chart to show this information.



2 marks

13. Look at the information.

$$x = 4 \quad y = 13$$

Complete the rules below to show **different** ways to get  $y$  using  $x$   
The first one is done for you.

To get  $y$ , **multiply**  $x$  by   2   and **add**   5  

This can be written as  $y =$     $2x + 5$   



To get  $y$ , **multiply**  $x$  by \_\_\_\_\_ and **add** \_\_\_\_\_

This can be written as  $y =$  \_\_\_\_\_

1 mark

To get  $y$ , **multiply**  $x$  by \_\_\_\_\_ and **subtract** \_\_\_\_\_

This can be written as  $y =$  \_\_\_\_\_

1 mark

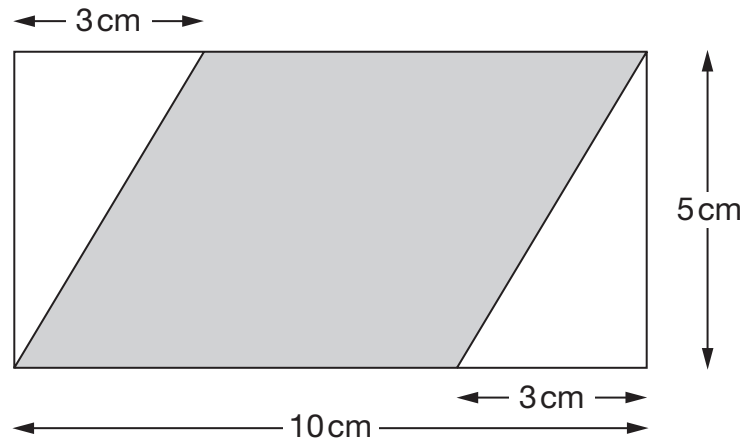
To get  $y$ , **divide**  $x$  by \_\_\_\_\_ and **add** \_\_\_\_\_

This can be written as  $y =$  \_\_\_\_\_

1 mark



14. The diagram shows a shaded parallelogram drawn inside a rectangle.



Not drawn accurately

What is the **area** of the shaded parallelogram?

You **must** give the correct unit with your answer.




\_\_\_\_\_

\_\_\_\_\_

2 marks


15. Write the missing numbers.

$$6x + 2 = 10$$

 so  $6x + 1 = \underline{\hspace{2cm}}$

1 mark

$$1 - 2y = 10$$

 so  $(1 - 2y)^2 = \underline{\hspace{2cm}}$

1 mark

16. The value of  $\pi$  correct to 7 decimal places is:

3.1415927

- (a) Write the value of  $\pi$  correct to **4 decimal places**.



1 mark

- (b) Which value below is closest to the value of  $\pi$ ?

Put a ring round the correct one.



$$\frac{179}{57}$$

$$3\frac{1}{7}$$

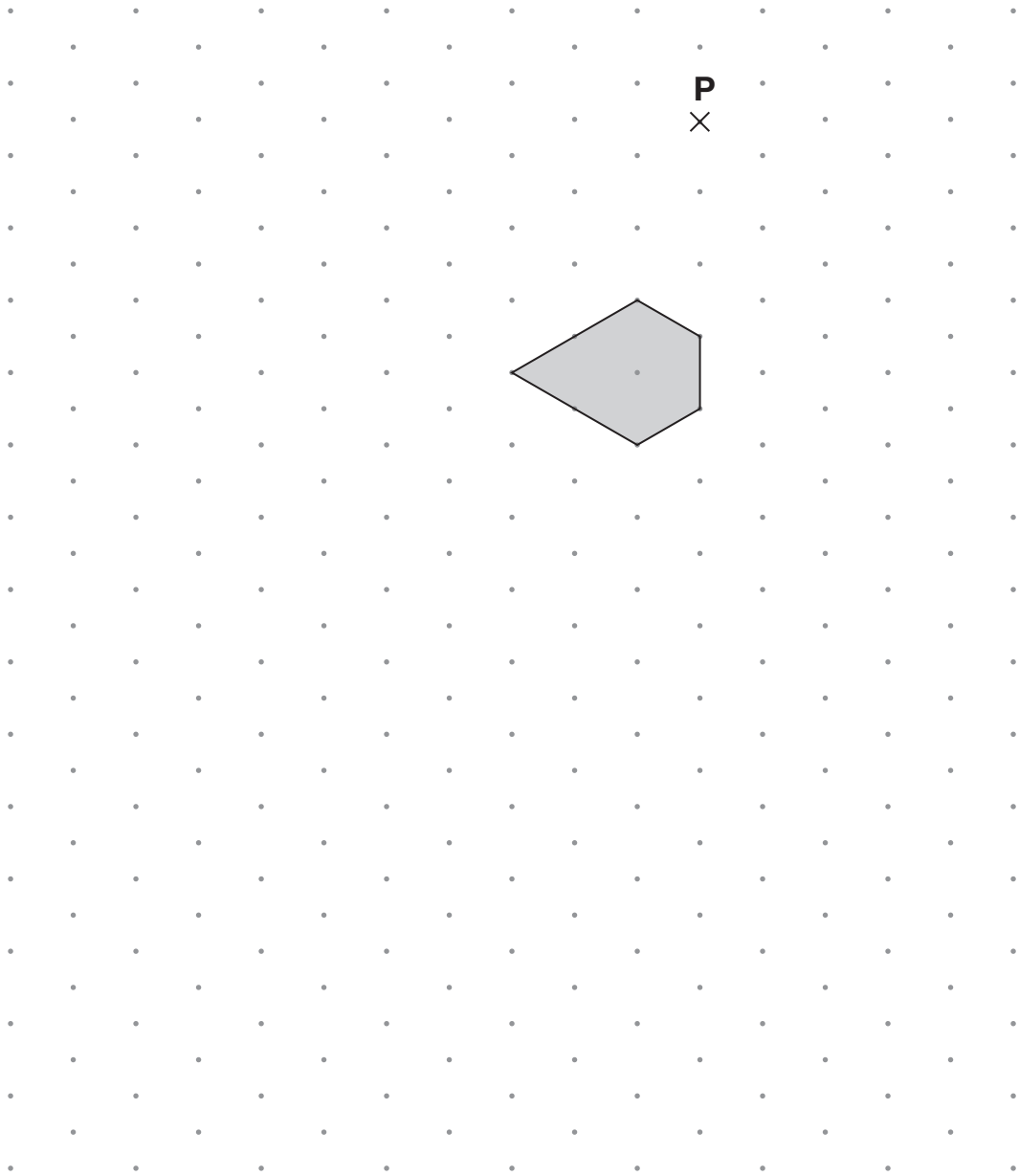
$$\left(\frac{16}{9}\right)^2$$

$$\frac{355}{113}$$

1 mark



17. Enlarge the shaded shape by a **scale factor of 2**, using **P** as the centre of enlargement.



\_\_\_\_\_

\_\_\_\_\_

2 marks

Isometric grid



18. (a) Here are two equations.

$$k = a + b$$

$$a + b + k = 30$$

What is the value of  $k$ ?



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

1 mark

(b) Look at this information.

$$10 = c + d$$

$c$  is one more than  $d$

What is the value of  $c$ ?



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

1 mark

(c) Now look at this information.

$$10 = e + f$$

$e$  is more than  $f$

What else can you say about the value of  $e$ ?



1 mark



19. A pupil investigated how the teachers at his school travel to work.  
The table shows the results.

Number of teachers who travel by car	Number of teachers who do <b>not</b> travel by car
18	7

- (a) What **percentage** of these teachers travel by car?



\_\_\_\_\_ %

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

- (b) **18 teachers** travel by car. Some of these teachers travel together.  
Write the missing frequency in the table below.

Number of teachers in one car	Number of cars
1	
2	4
3	2



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

- (c) What is the **mean** number of teachers in each car?



\_\_\_\_\_  
\_\_\_\_\_

\_\_\_\_\_ 2 marks

20. (a) Jenny wants to multiply out the brackets in the expression  $3(2a + 1)$

She writes:

$$3(2a + 1) = 6a + 1$$

Show why Jenny is **wrong**.



1 mark

- (b) Sandeep wants to multiply out the brackets in the expression  $(k + 4)(k + 7)$

He writes:

$$(k + 4)(k + 7) = k^2 + 28$$

Show why Sandeep is **wrong**.



1 mark



21. A computer is going to choose a letter at random from an English book.  
The table shows the probabilities of the computer choosing each vowel.

Vowel	A	E	I	O	U
Probability	0.08	0.13	0.07	0.08	0.03

What is the probability that it will **not** choose a vowel?



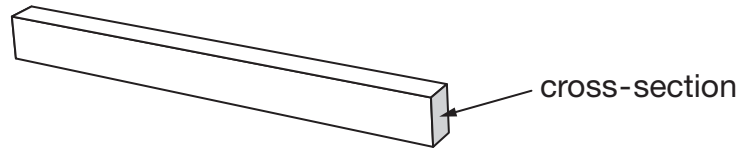
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2 marks

22. I am going to use a wooden beam to support a load.

The cross-section of the beam is a rectangle.

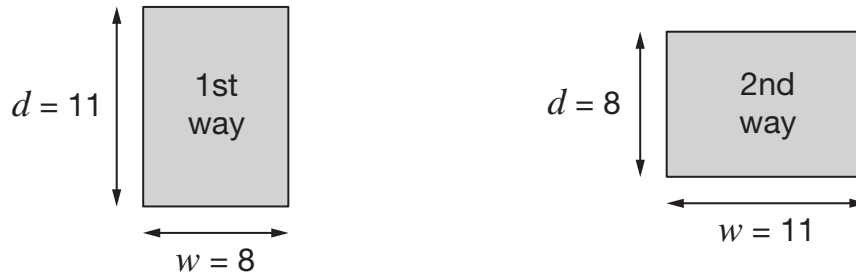


The formula below gives the greatest load, Mkg, that a beam of this length can support.

$$M = 5d^2w \quad \text{where} \quad d \text{ is the depth of the beam in cm,}$$

$$w \text{ is the width of the beam in cm.}$$

I can place the cross-section of the beam in two different ways.



In which way will the beam be able to support the greater load?

Calculate the difference.



The \_\_\_\_\_ way supports the greater load,

with a difference of \_\_\_\_\_ kg.

3 marks



23. One day, each driver entering a car park paid **exactly £1.50**

Car park
Pay exactly £1.50 to enter <b>Machine accepts only £1 coins and 50p coins</b>

Here is what was put into the machine that day.

Number of £1 coins            **136**

Number of 50p coins        **208**

On that day, what percentage of drivers paid with **three 50p coins**?



\_\_\_\_\_ %

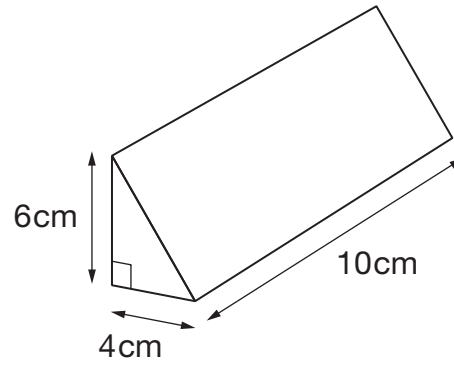
\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

3 marks

24. (a) Look at the triangular prism.



Not drawn accurately

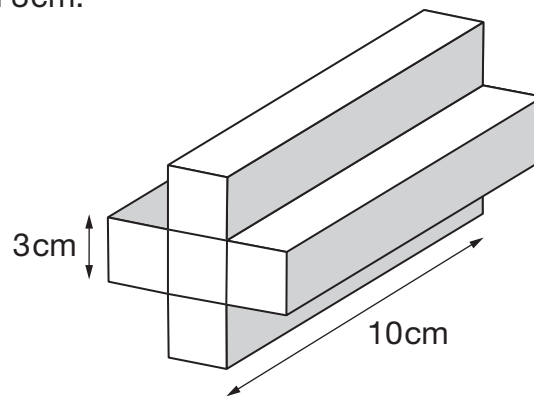
Work out the volume of the prism.

 \_\_\_\_\_  $\text{cm}^3$

1 mark

(b) One face of another prism is made from 5 squares.

Each square has side length 3 cm.



Not drawn accurately

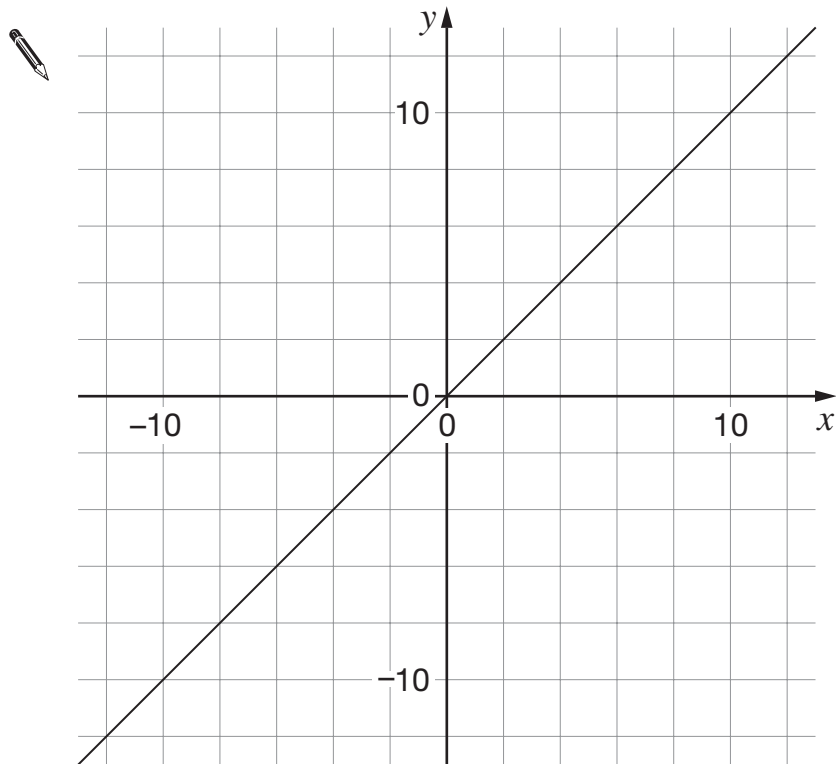
Work out the volume of the prism.

 \_\_\_\_\_  $\text{cm}^3$

1 mark



25. The graph shows a straight line with **gradient 1**



- (a) On the graph, draw a different straight line with gradient 1

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

- (b) The equation of another straight line is  $y = 5x + 20$

Write the missing number.



The straight line  $y = 5x + 20$  passes through  $(0, \text{_____})$

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

- (c) A straight line is **parallel** to the line with equation  $y = 5x + 20$

It passes through the point  $(0, 10)$

What is the equation of this straight line?



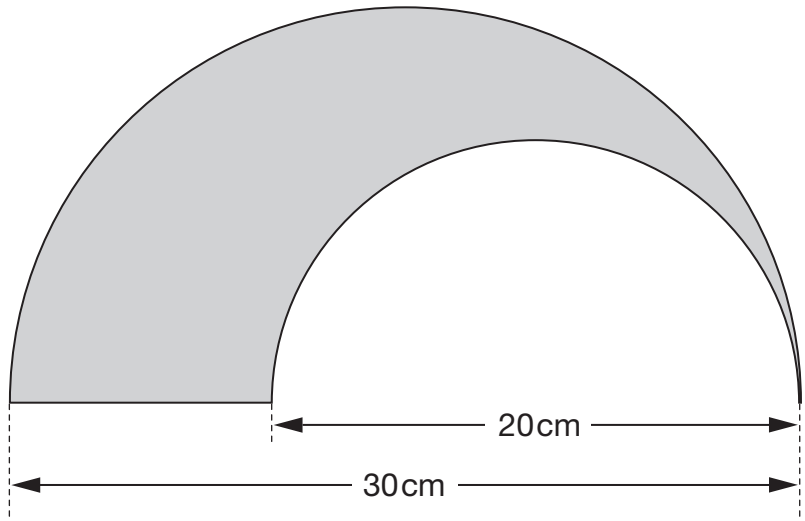
\_\_\_\_\_ 1 mark



26. This shaded shape is made using **two semicircles**.

One semicircle has a diameter of **20cm**.

The other has a diameter of **30cm**.



Not drawn accurately

Calculate the **perimeter** of the shaded shape.



\_\_\_\_\_ cm \_\_\_\_\_  
2 marks



27. The table shows the number of boys and girls in two different classes.

	Class 9A	Class 9B
Boys	13	12
Girls	15	14

A teacher is going to choose a pupil at random from each of these classes.

In which class is she **more likely** to choose a **boy**?

You **must** show your working.



Tick (✓) your answer.



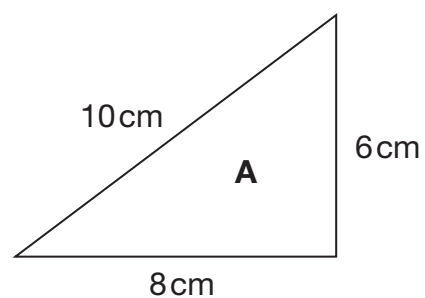
Class 9A

Class 9B

2 marks

28. The triangle in this question is not drawn accurately.

Use Pythagoras' theorem to explain why triangle A must be right-angled.



1 mark



**END OF TEST**