Year 9 into 10 Bridging Project Higher

Please complete the Mathematics Papers attached. You do not need to print this and can answer the questions in your book. Make sure you label the questions clearly and write your workings out. You do not need to write out the full question.

You may use your books and notes to help you.

Spend a maximum of 1 Hour on each paper.

The Mark Scheme is on a separate document if you finish early and are able to mark it. Following this you will find it beneficial to make a list on the front page of:

- 3 topics/questions you understand and were successful at – full marks.
- 3 topics/questions you nearly understand – some marks or processes were correct.
- 3 topics/questions you do not understand including after you have looked at the mark scheme – no marks.

Ma

KEY STAGE 3

TIER 6–8

2009

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 and a ruler.
- 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.

TOTAL MARKS	

Instructions

Answers

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

Calculators

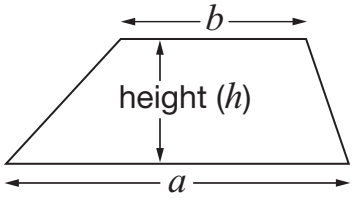
You **must not** use a calculator to answer any question in this test.

Formulae

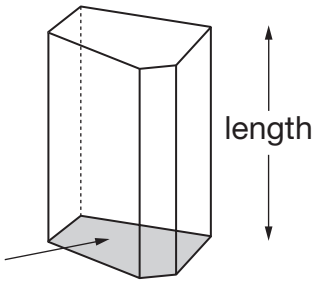
You might need to use these formulae

Trapezium

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



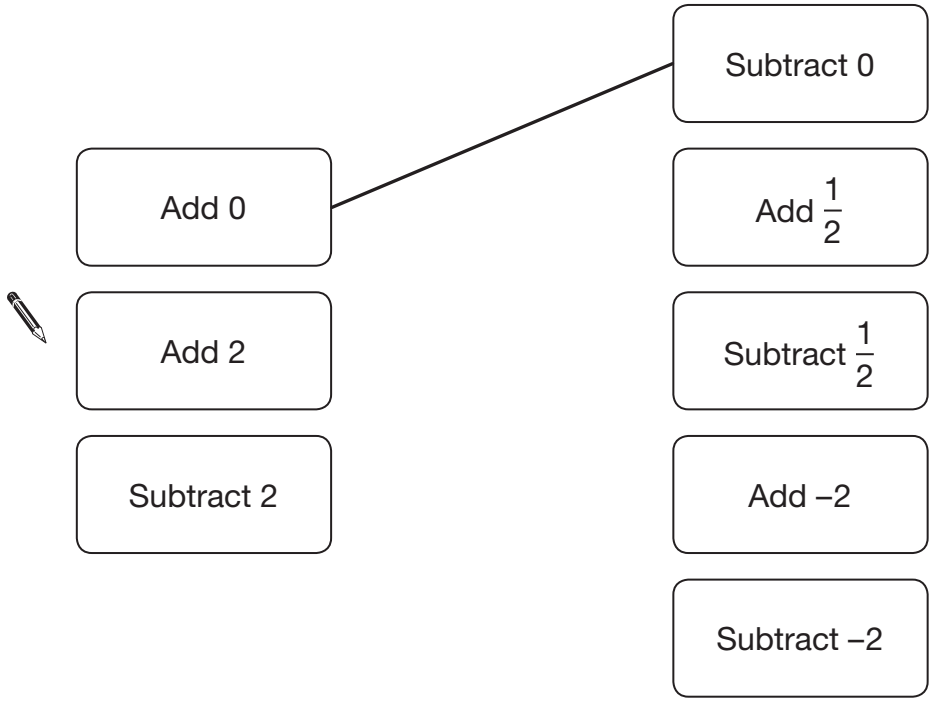
Prism



Volume = area of cross-section × length

1. Match each instruction on the left with an instruction on the right that has **the same effect**.

The first one is done for you.



1 mark

2. Pupils are investigating oak leaves.

They want to collect a sample of oak leaves.

Here is their plan for how to collect the sample.

Plan
Choose one oak tree. Take 10 leaves from the lowest branches of the tree.

Give **two** reasons why this sample of leaves may **not be representative** of all oak leaves.

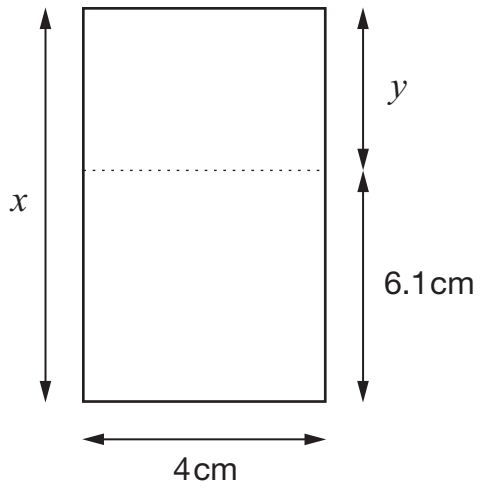
First reason:

1 mark

Second reason:

1 mark

3. Look at the rectangle.



Not drawn accurately

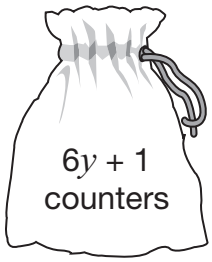
The **total area** of the rectangle is **40 cm^2**

Work out lengths x and y

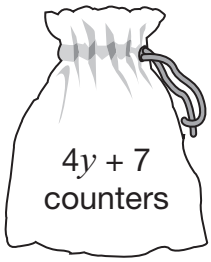
x = _____ cm y = _____ cm

2 marks

4. (a) Bags A and B contain some counters.



Bag A



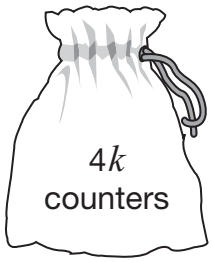
Bag B

The number of counters in each bag **is the same**.

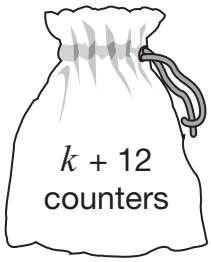
Work out the value of y

2 marks

(b) Bag **C** contains **more** counters than bag **D**.



Bag C



Bag D

What is the **smallest** possible value of k?

2 marks

5. Gary took part in a quiz show and won a **million pounds**.

He spent **£20 000** on a holiday.

Then he spent **half** of the **money left** on a house.

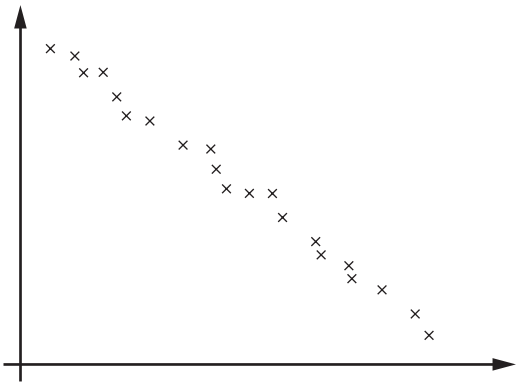
How much did Gary's house cost?

£

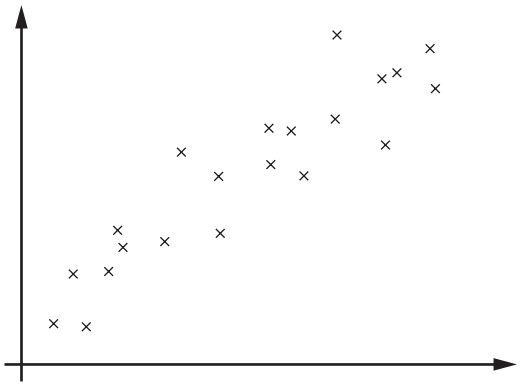
2 marks

6. Look at these two scatter graphs. They are both drawn using the same scale.

Graph A



Graph B



(a) Which scatter graph shows **positive** correlation?

☐ A ☐ B

Explain your answer.

1 mark

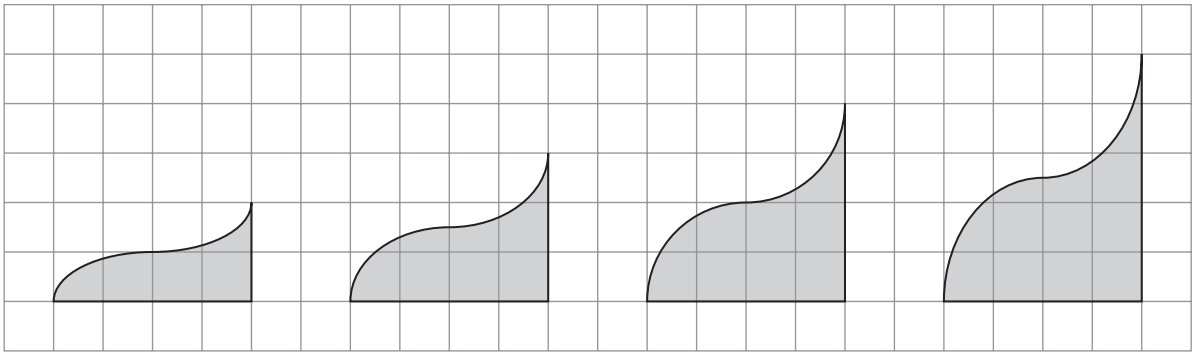
(b) Which scatter graph shows **stronger** correlation?

☐ A ☐ B

Explain your answer.

1 mark

7. Look at the sequence of shapes on a square grid.



Shape number 1 | Shape number 2 | Shape number 3 | Shape number 4

The table shows information about these shapes.

Shape number N	Base B	Height H	Area A
1	4	2	4
2	4	3	6
3	4	4	8
4	4	5	10

Rules connect N, B, H and A.

Write one missing letter in each space below to complete the rule.

H = _____ + 1

A = _____ × 2

_____ = $2N$ + 2

2 marks

8. Look at this information.

$$\frac{27}{40} = 0.675$$

$$\frac{29}{40} = 0.725$$

Use this information to write the missing **decimals** below.

$$\frac{31}{40} = \_\_\_\_\_$$

1 mark

$$\frac{23}{40} = \_\_\_\_\_$$

1 mark

9. In this question, n stands for any **whole number**.

(a) For the expression $\mathbf{2}\boldsymbol{n}$, tick (✓) the correct statement below.

- ☐ $\mathbf{2}\boldsymbol{n}$ must be odd.
- ☐ $\mathbf{2}\boldsymbol{n}$ must be even.
- ☐ $\mathbf{2}\boldsymbol{n}$ could be odd or even.

Explain your answer.

1 mark

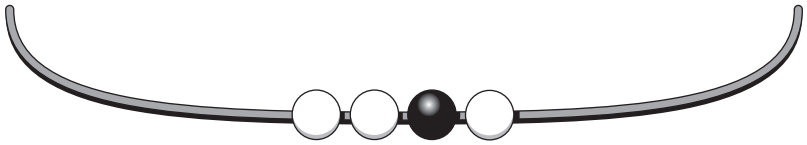
(b) For the expression $\mathbf{3}\boldsymbol{n}$, tick (✓) the correct statement below.

- ☐ $\mathbf{3}\boldsymbol{n}$ must be odd.
- ☐ $\mathbf{3}\boldsymbol{n}$ must be even.
- ☐ $\mathbf{3}\boldsymbol{n}$ could be odd or even.

Explain your answer.

1 mark

10. (a) On this necklace the ratio of black beads to white beads is **1 : 3**

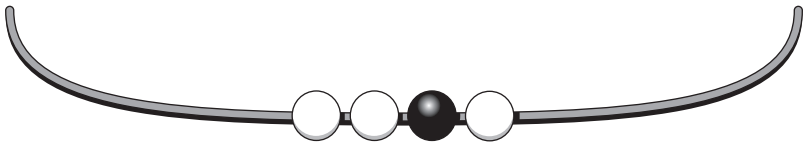


How many **more** black beads do you need to add to make the ratio of black to white **3 : 1**?

_____ black beads

1 mark

(b) Here is the necklace again.



How many **more** black beads and white beads do you need to add to make the ratio of black to white **3 : 2**?

_____ black beads, _____ white beads

1 mark

11. Show that the **difference** between 3^2 and 3^3 is **18**

1 mark

12. Sophie says:

> If n represents a prime number, then
> $2n + 1$ will also represent a prime number.

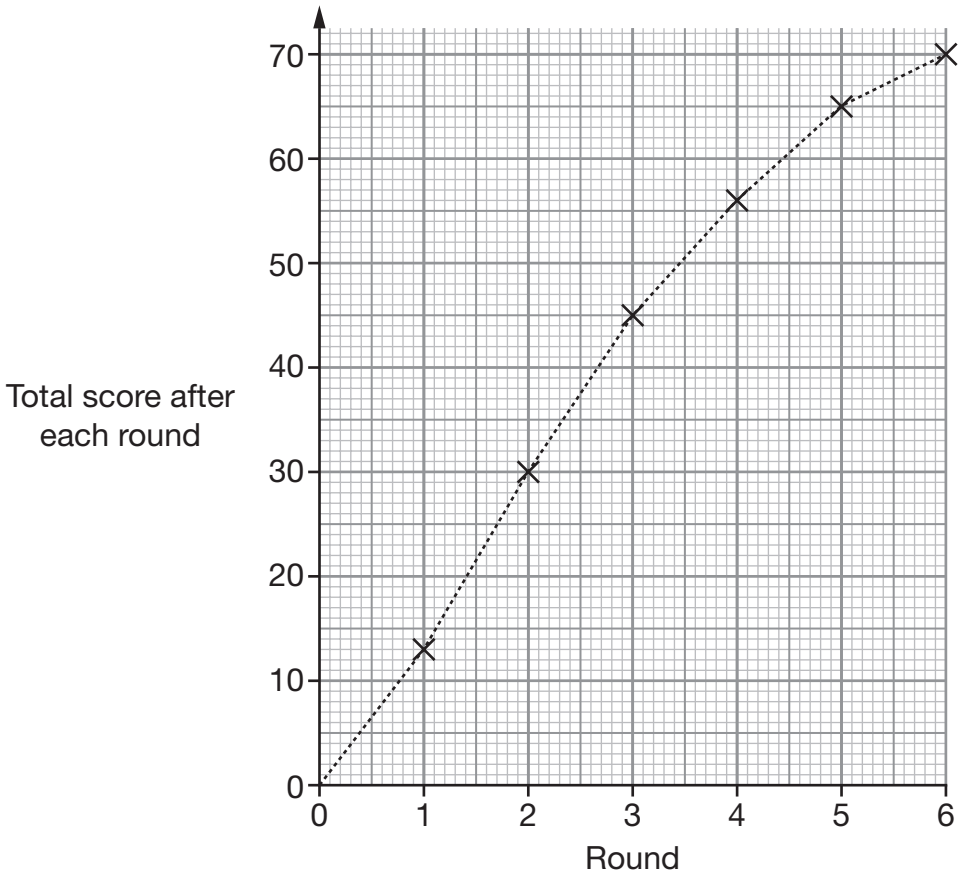
Use an example to explain why she is **wrong**.

1 mark

13. A game has six rounds.

In each round of the game, the player gains points which are added to their total score.

(a) The graph shows Sue's total score after each round of her game.



How many points did Sue gain in **round 4**?

2 marks

(b) Derek plays the game.

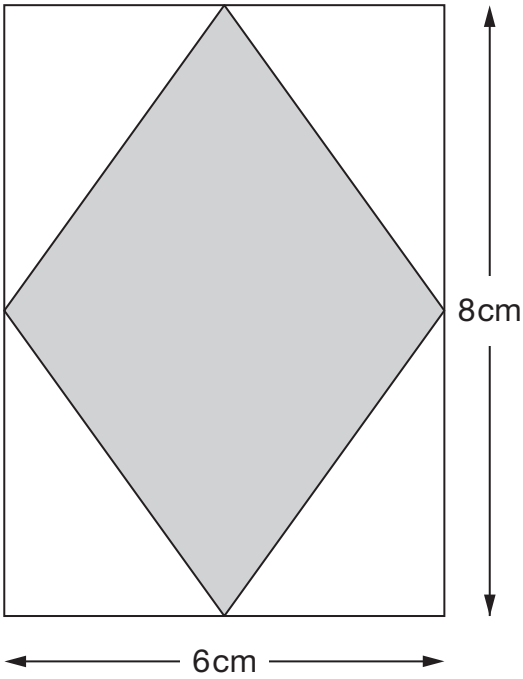
The graph of his total score after each round is a **straight line**.

What can you say about the number of points Derek gained in each round?

1 mark

14. Inside the rectangle below is a shaded rhombus.

The vertices of the rhombus are the midpoints of the sides of the rectangle.



Not drawn accurately

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

2 marks

1 mark

15. (a) Sandra is thinking of two numbers.

Her two numbers have a **negative sum**, but a **positive product**.

Give an example of what her numbers could be.

_____ and _____

1 mark

(b) Mark is also thinking of two numbers.

His two numbers have a **positive sum**, but a **negative product**.

Give an example of what his numbers could be.

_____ and _____

1 mark

16. The mean of five numbers is **10**

I add one more number and the mean is now **11**

What number did I add?

_____

2 marks

17. Solve these simultaneous equations using an algebraic method.

$$3x + 6y = 30$$

$$x + 6y = 20$$

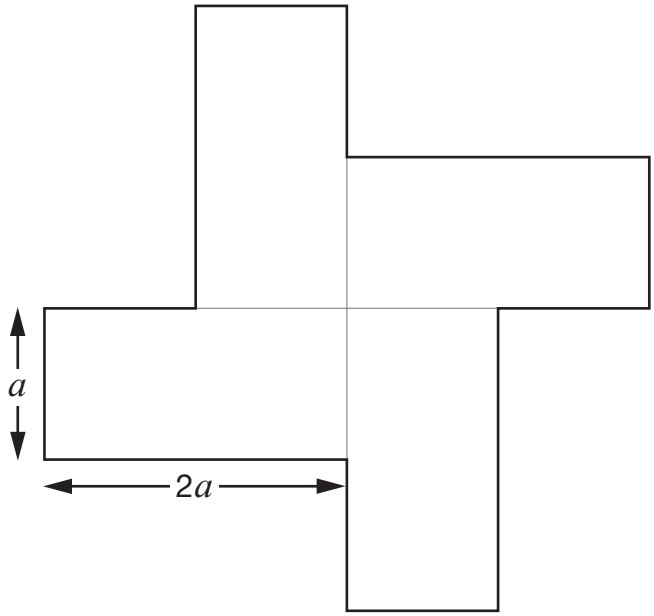
You **must** show your working.

$x =$ _____ $y =$ _____

3 marks

18. This shape is made of four congruent rectangles.

Each rectangle has side lengths $2a$ and a



Not drawn accurately

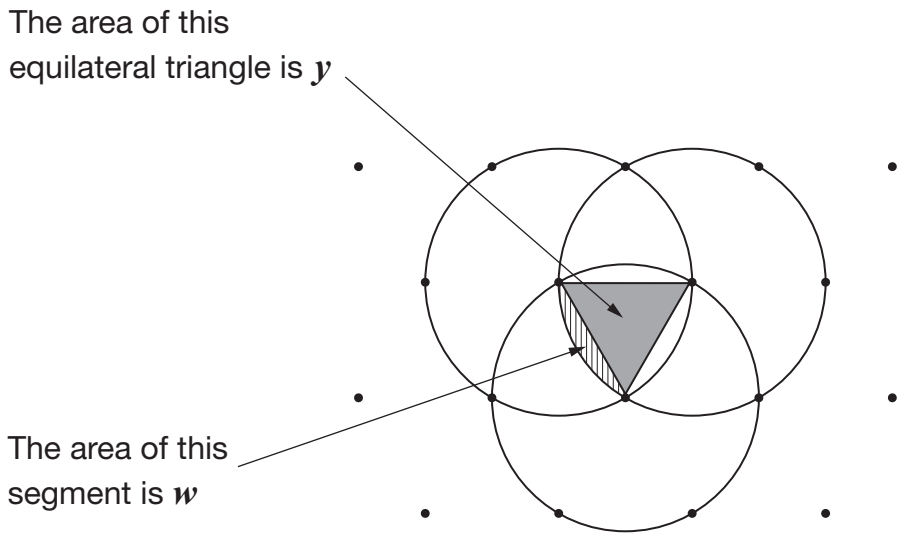
The **perimeter** of the shape is **80 cm**.

Work out the **area** of the shape.

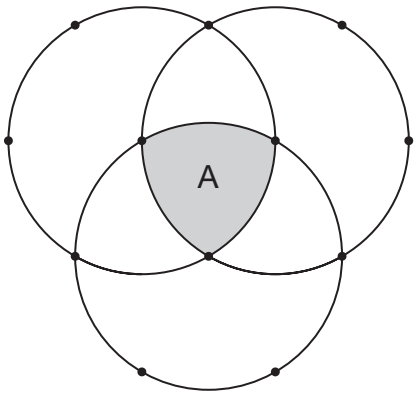
_____ cm^2

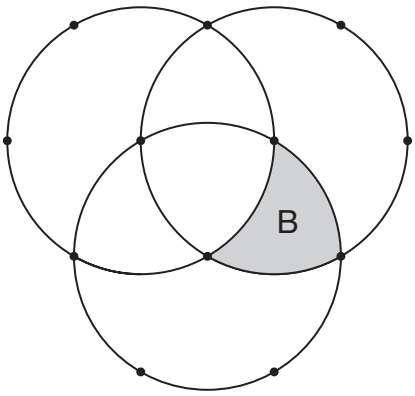
2 marks

19. The diagram shows three congruent circles drawn on an isometric grid.



Write expressions, using y and w, for area A and area B.





Area A = _____ Area B = _____

1 mark

1 mark

False

20. (a) A pupil wrote:

> For all numbers j and k,
> $(j + k)^2 = j^2 + k^2$

Show that the pupil is **wrong**.

2 marks

(b) A different pupil wrote:

> For all numbers j and k,
> $(j + k)^2$ can **never** be equal to $j^2 + k^2$

Show that this pupil is also **wrong**.

1 mark

21. I have two fair four-sided dice.

The dice are both numbered **3**, **4**, **5** and **6**

I am going to roll both dice and **multiply** the scores.

What is the probability that the product is a **multiple of 3**?

2 marks

22. Solve these equations using an algebraic method.

You **must** show your working.

$$\frac{5(3y - 4)}{2y} = 7$$

y = _____

2 marks

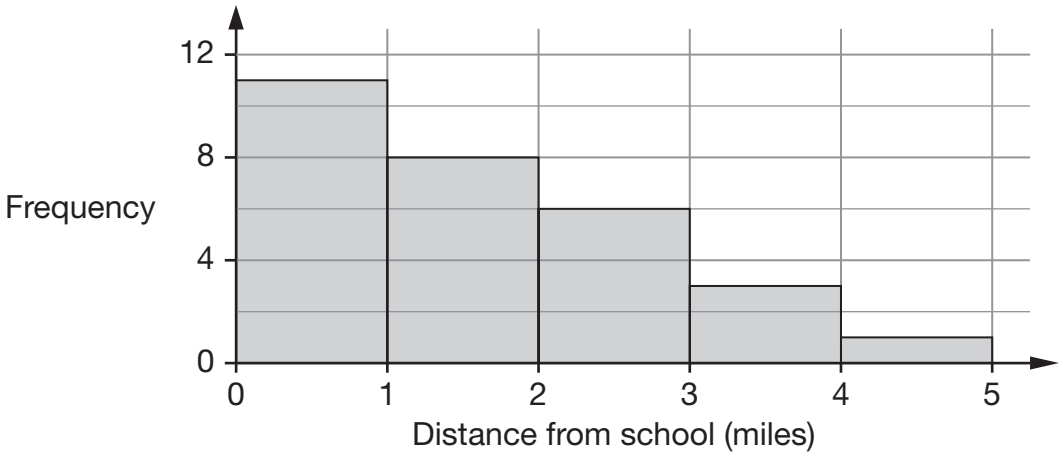
$$(x + 4)(x - 4) = 9$$

x = _____ or x = _____

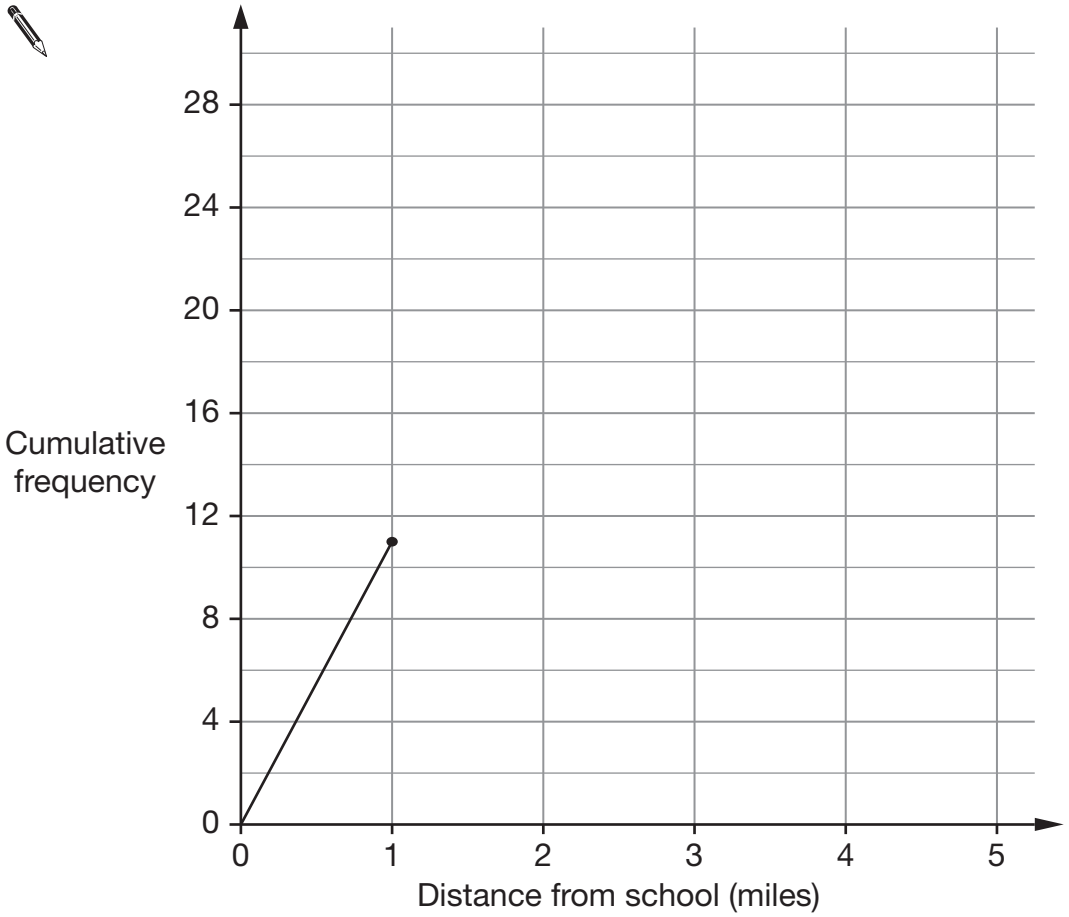
2 marks

23. Pupils in a class investigated how far they live from school.

The frequency diagram shows the results.



(a) Complete the **cumulative frequency** graph below to show these results.



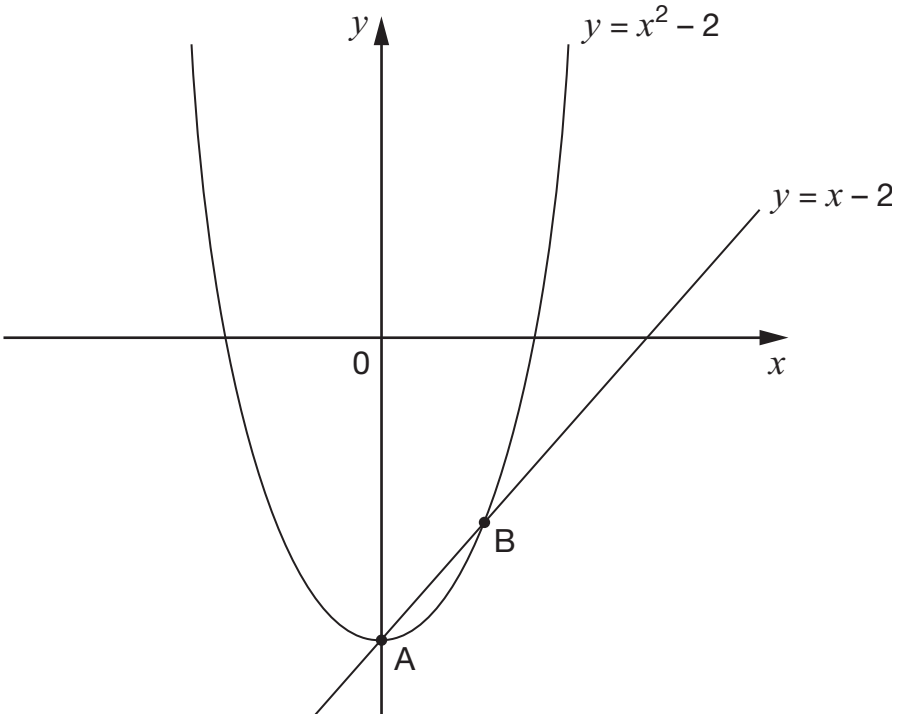
2 marks

(b) Estimate the median distance from school for this class.

miles

1 mark

24. Look at the graph.



Not drawn accurately

At points A and B, $y = x - 2$ **and** $y = x^2 - 2$

What are the coordinates of A and B?

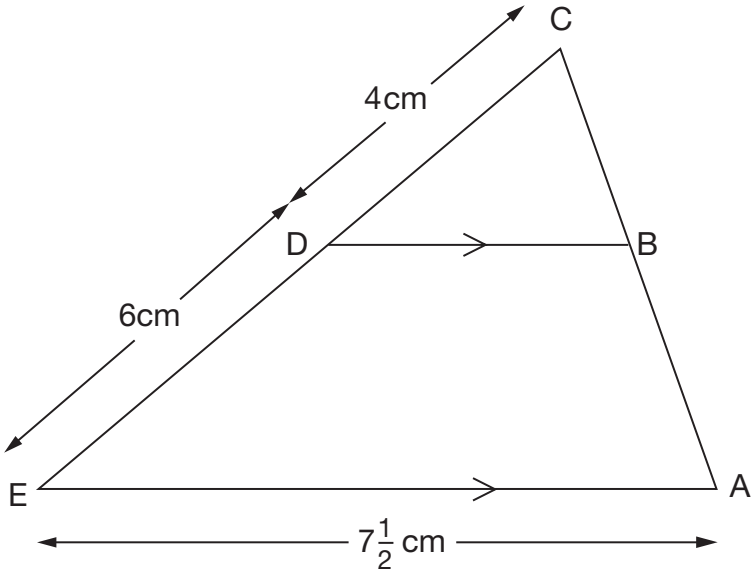
A is (_____ , _____)

1 mark

B is (_____ , _____)

1 mark

25. In the diagram triangle BCD is mathematically similar to triangle ACE.



Not drawn accurately

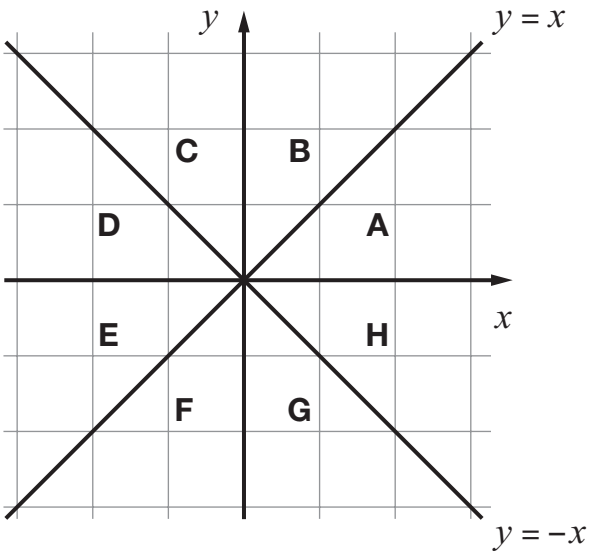
Work out the length of BD.

_____ cm

2 marks

26. Look at the graph.

The x-axis, the y-axis and the lines $y = x$ and $y = -x$ divide the graph into eight regions, A to H.



(a) Write down the letters of the four regions where $x \geq 0$

_____, _____, _____ and _____

1 mark

(b) Write down the letters of the four regions where $y \geq x$

_____, _____, _____ and _____

1 mark

(c) Write down the letters of the four regions where $xy \geq 0$

_____, _____, _____ and _____

1 mark

27. A cyclist went 1 km up a hill at 15 km per hour.

Then she went 1 km down the hill at 30 km per hour.

Show that her **average** speed for the 2 km was **20 km per hour**.

2 marks

END OF TEST

ISBN No: 978-1-84721-706-6
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QCA/09/3783 (Mark scheme pack)
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KEY STAGE 3

TIER 6–8

2009

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 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.
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TOTAL MARKS	

Instructions

Answers

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

Calculators

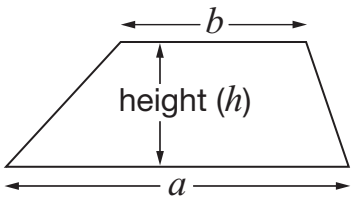
You **may** use a calculator to answer any question in this test.

Formulae

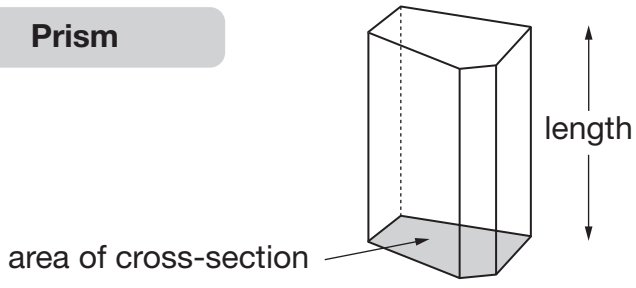
You might need to use these formulae

Trapezium

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

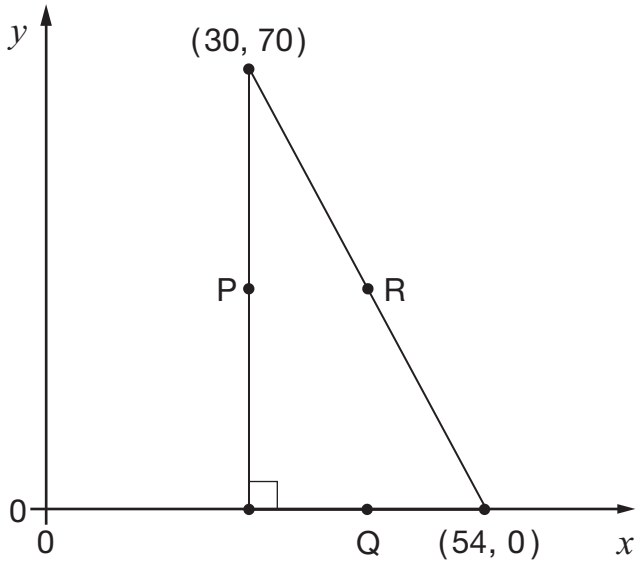


Prism



Volume = area of cross-section × length

1. The diagram shows a right-angled triangle.



Not drawn accurately

P, Q and R are the **midpoints** of the sides of the triangle.

Work out the coordinates of P, Q and R.

P is (_____ , _____) _____ 1 mark

Q is (_____ , _____) _____ 1 mark

R is (_____ , _____) _____ 1 mark

2. The table shows information about the rainfall in two places in South America.

Place	Season	Mean rainfall	Number of months	Months
A	Dry	10 cm per month	8	Jan to Aug
	Wet	20 cm per month	4	Sept to Dec
B	Dry	5 cm per month	10	July to Apr
	Wet	50 cm per month	2	May to June

Which of the places has **more rainfall** on average over the whole year?

Show working to explain your answer.

Tick (✓) your answer.

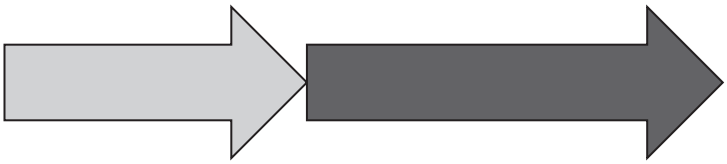
☐ A ☐ B

2 marks

3. The distance needed for a car to stop depends on how fast the car is travelling.

This distance can be calculated by adding the thinking distance and the braking distance.

For example: at **30 miles per hour**



30 feet	+	45 feet	=	75 feet
thinking distance		**braking distance**		**total stopping distance**

Here are the formulae to work out the thinking distance and the braking distance for a car travelling at V miles per hour.

Thinking distance = V feet Braking distance = $\frac{V^2}{20}$ feet

(a) A car is travelling at **70 miles per hour**.

What is the **total stopping distance** for this car?

_____ feet

2 marks

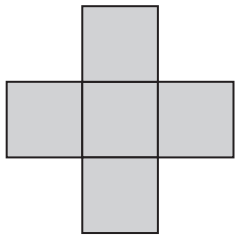
(b) A different car is travelling so that its **braking distance** is **125 feet**.

How fast is the car travelling?

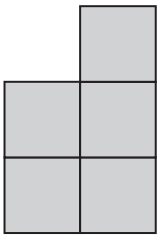
_____ miles per hour

1 mark

4. Shape A and shape B are each made from five identical squares.



A



B

Not drawn accurately

The **perimeter** of shape A is **72cm**.

Work out the **perimeter** of shape B.

_____ cm

2 marks

5. In one year, **2 million tonnes** of glass bottles and jars were thrown away in the UK.

38% of these bottles and jars were recycled.

How many tonnes of the bottles and jars were recycled?

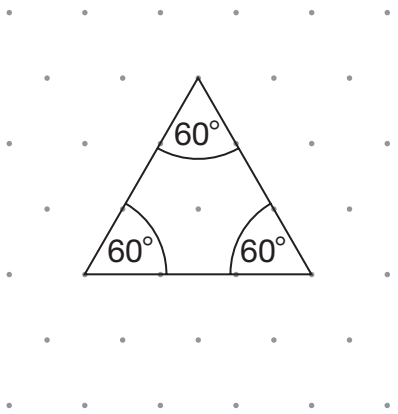
_____ tonnes

2 marks

6. (a) Look at the equilateral triangle.

Each angle in an equilateral triangle is 60°

Explain why.

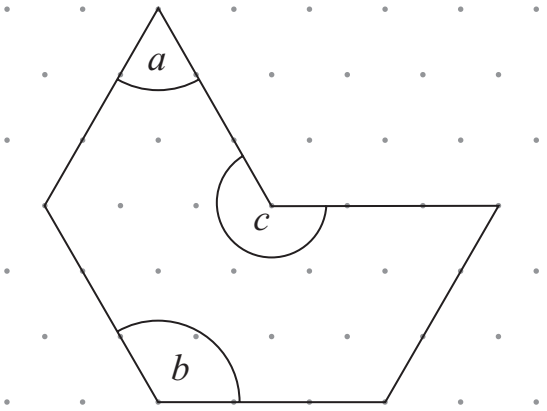


Isometric grid

1 mark

(b) Now look at this shape.

Work out the sizes of angles a, b and c



Isometric grid

a = _____ ° b = _____ ° c = _____ °

2 marks

7. A teacher has five bags containing only red and blue counters.

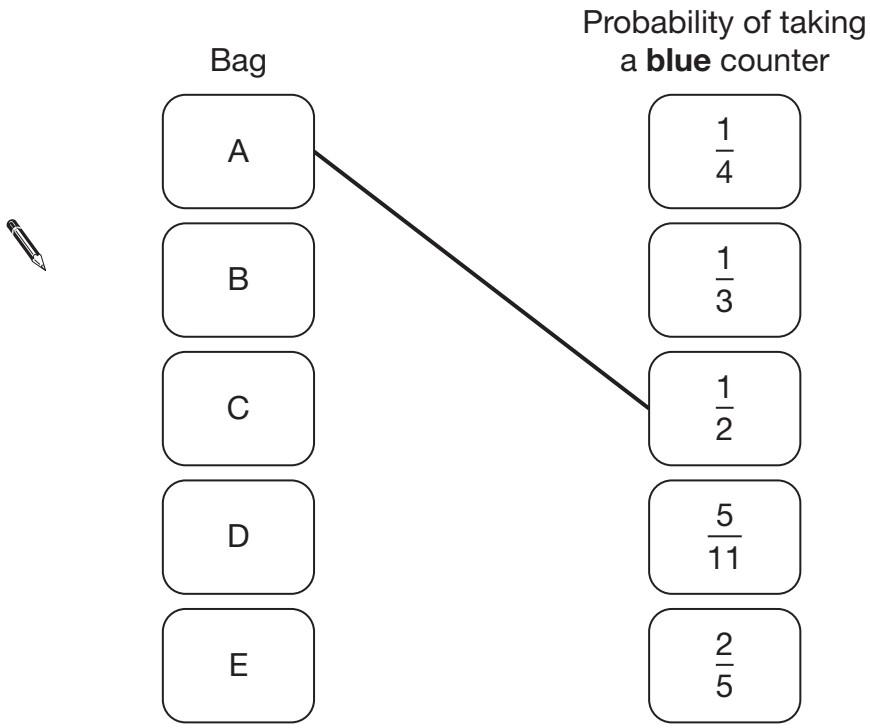
The table shows how many red and blue counters are in each bag.

	Bag				
	A	B	C	D	E
Red counters	6	6	6	6	6
Blue counters	6	5	4	3	2

The teacher is going to take a counter at random from each bag.

Match each bag with the correct probability of taking a **blue** counter below.

The first one is done for you.



2 marks

8. In a survey, pupils were asked if they owned a bicycle.

Results:

$\frac{3}{8}$ of the pupils said '**Yes**'.

$\frac{5}{8}$ of the pupils said '**No**'.

46 more pupils said 'No' than said 'Yes'.

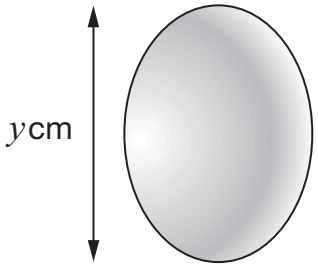
Altogether, how many pupils were in the survey?

2 marks

9. In this question you will need the following information about hens' eggs.

Approximate **mass**, in grams, is given by:

$$\text{Mass} = \frac{\pi y^3}{10} \times 1.15$$



Mass of egg	Grade of egg
Up to 53g	Small
53g up to 63g	Medium
63g up to 73g	Large
73g or more	Extra large

The length, y, of an egg is **5.5cm**.

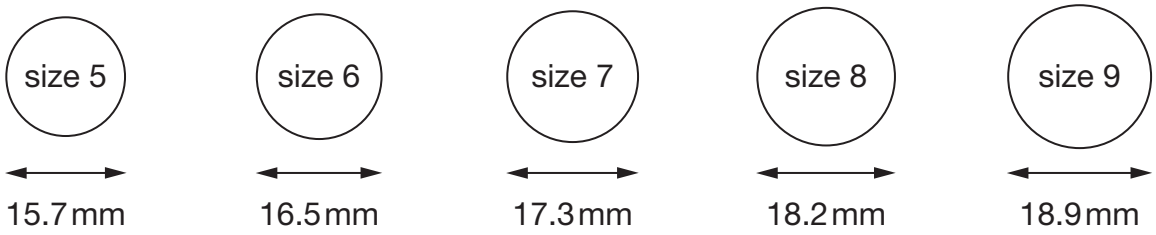
Use the formula to find the **grade** of the egg.

You **must** show your working.

Grade _____ 2 marks

10. A shop sells rings of different sizes.

The diagram shows the diameters of the different sizes.



(a) What is the circumference of a **size 8** ring?

mm

1 mark

(b) Rachel wants to buy a ring for her middle finger.

That finger has a circumference of **51 mm**.

What size ring should she buy?

Show working to explain your answer.

Tick (✓) your answer.

☐ size 5 ☐ size 6 ☐ size 7 ☐ size 8 ☐ size 9

2 marks

11. Look at this calculation.

$$3^5 + 10^2 = 7^x$$

Find the value of x.

You **must** show your working.

x = _____

2 marks

12. The table below shows the number of schools and the number of pupils in England.

	Number of schools	Total number of pupils
Primary	17 642	4 069 385
Secondary	3 385	3 315 805

Show that, on average, a secondary school has about **four times** as many pupils as a primary school.

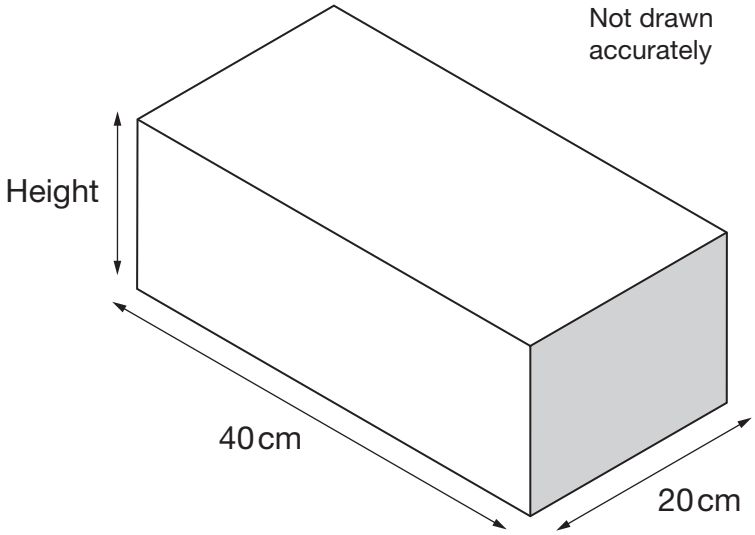
2 marks

13. The cuboid container below holds **12 litres** of water when full.

One litre is 1000cm^3

The inside length and width of the cuboid are **40cm** and **20cm**.

What is the inside **height** of the cuboid?



Height = _____ cm

2 marks

14. The first three terms of a sequence are shown in the box.

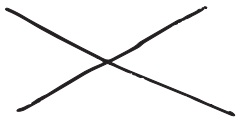
5, 16, 27, ...

Look at each expression below.

Write 'No' if it could **not** be the nth term expression for this sequence.

Write 'Yes' if it could be the nth term expression for this sequence and then work out the **4th** term.

The first one is done for you.

Expression	Could it be the nth term expression?	If 'Yes', work out the 4th term
$5n$	No	
$n + 11$		
$11n - 6$		
$n^2(6 - n)$		

3 marks

15. There are 6 units in an exam course.

Each unit is marked out of 100

To get grade A, the **mean** mark of all six units must be at least **80**

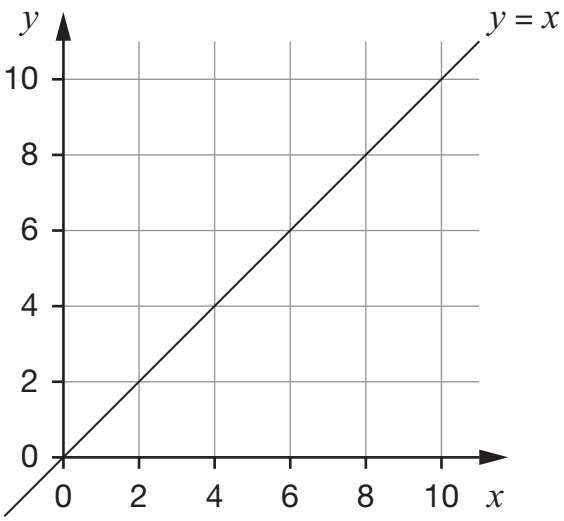
Tom has taken five units. His mean mark is **78**

To get grade A, how many marks must he get on the last unit?

2 marks

16. (a) The grid shows a straight line.

The equation of the line is $y = x$



Two of the equations below also describe the straight line $y = x$

Put rings round the correct equations.

$x = y$ $\quad$ $y = -x$ $\quad$ $yx = 0$

$x - y = 0$ $\quad$ $x + y = 0$

1 mark

(b) Write the coordinates of two points that have an x coordinate that is one less than the y coordinate.

(_____ , _____) $\quad$ (_____ , _____)

What would be the equation of the straight line through these two points?

_____

1 mark

17. In 2004 a newspaper published this **incorrect** report:

> Houses cost £60 000 one year ago.
>
> They now cost £80 000
>
> This is a 25% increase.

Write the missing numbers below to make each statement correct.

(a)

> Houses cost £60 000 one year ago.
>
> They now cost £ _____
>
> This is a 25% increase.

1 mark

(b)

> Houses cost £60 000 one year ago.
>
> They now cost £80 000
>
> This is a _____ % increase.

1 mark

(c)

> Houses cost £ _____ one year ago.
>
> They now cost £80 000
>
> This is a 25% increase.

1 mark

18. Here are some number cards with the values written in standard form.

2×10^4	2×10^6	2×10^8
2.5×10^4	2.5×10^6	2.5×10^8

Two of the number cards **multiply** to give **5×10^{16}**

Write them in the calculation below.

[ ] × [ ] = 5×10^{16}

1 mark

19. (a) Look at this equation:

$$c + 3 = d - 4$$

Which of c and d is greater, and by how much?

_____, by _____ _____
1 mark

(b) Look at this equation:

$$3 - e = 4 - f$$

Which of e and f is greater, and by how much?

_____, by _____ _____
1 mark

20. Look at this information from January 2005.

> **546 400**, or **98%** of all 3-year-old children in England go to play school or nursery, or have some other type of education.

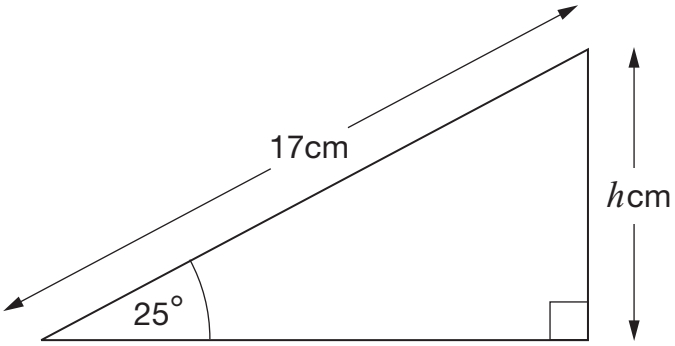
To the **nearest thousand**, how many 3-year-old children were there in England?

_____

_____

2 marks

21. The diagram shows a right-angled triangle.



Not drawn accurately

What is the value of h?

h = _____

2 marks

22. A town in the south of England has the lowest ratio of men to women in England.

There were only 87 men for every 100 women.

Men	Women
87	100

For every 100 men, how many women were there?

Give your answer to the nearest integer.

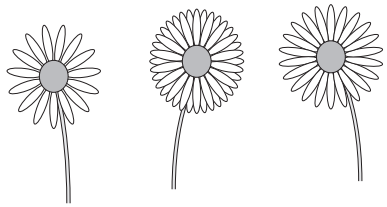
Men	Women
100	_____

_____

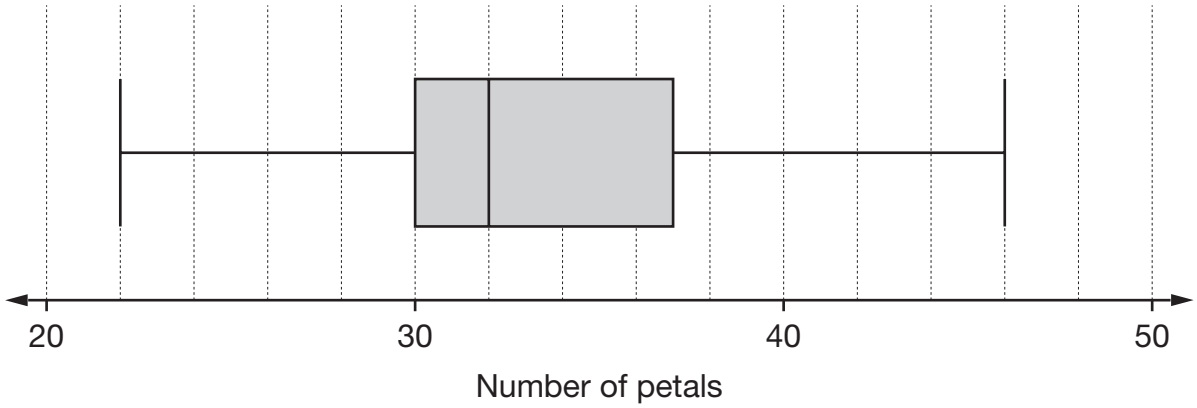
_____

2 marks

23. The numbers of petals that daisies have can vary.



The box plot shows information about the petals for a sample of daisies.



(a) For the sample of daisies, what is the median number of petals?

_____

1 mark

(b) For the sample of daisies, what is the **inter-quartile range** of the number of petals?

_____

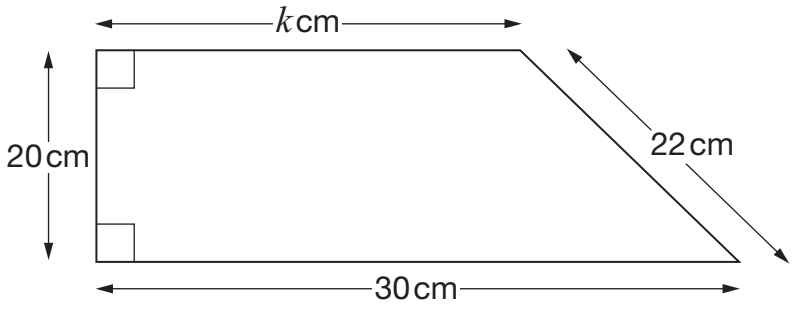
1 mark

(c) What percentage of the daisies in the sample has **fewer than 30** petals?

_____ %

1 mark

24. Here is a trapezium.



Not drawn accurately

Use Pythagoras' theorem to find the value of k

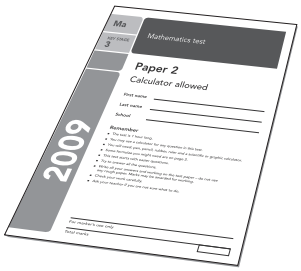
$k =$ _____

2 marks

25. A booklet is made from **6** rectangular pieces of paper.

Each piece of paper measures **297 mm** by **420 mm**.

The mass of the paper is **80 g per m^2**



Calculate the mass of the booklet.

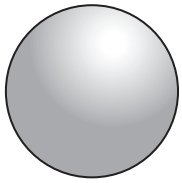
Give your answer correct to **2 significant figures**.

_____ g

3 marks

26. This table gives some information about a solid sphere.

Radius	Volume	Surface area
r	$\frac{4}{3}\pi r^3$	$4\pi r^2$

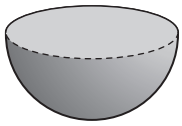


The solid sphere is cut in half to produce a solid hemisphere.

Complete the table below for the solid hemisphere.

Write your answers as simply as possible.

Radius	Volume	Surface area
r		



2 marks

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ISBN No: 978-1-84721-707-3

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