Ma

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.
- 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

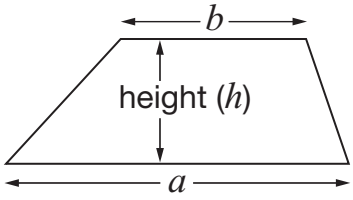
You **may** use a calculator to answer any question in this test.

Formulae

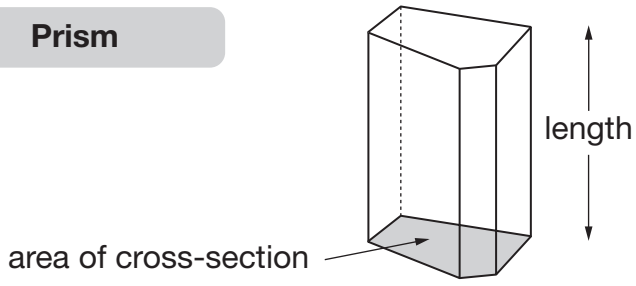
You might need to use these formulae

Trapezium

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

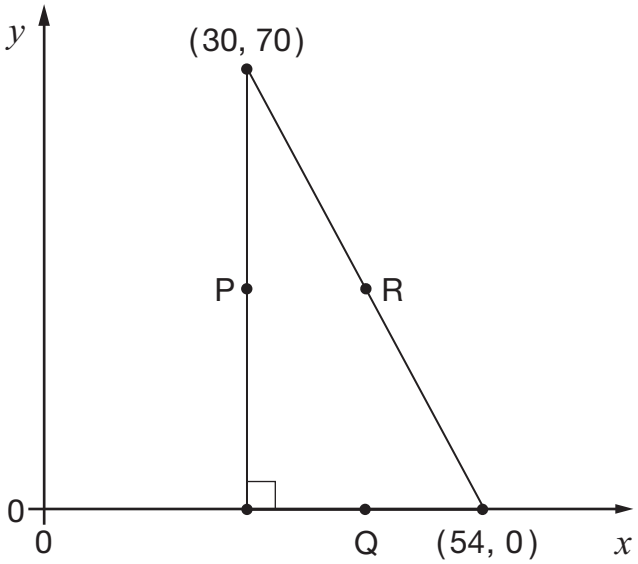


Prism



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.

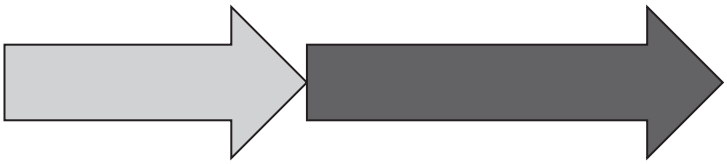
☐ A ☐ B

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

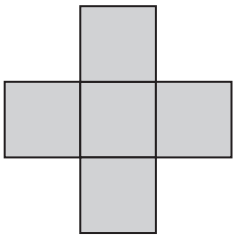
(b) A different car is travelling so that its **braking distance** is **125 feet**.

How fast is the car travelling?

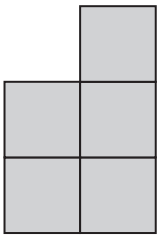
_____ miles per hour

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?

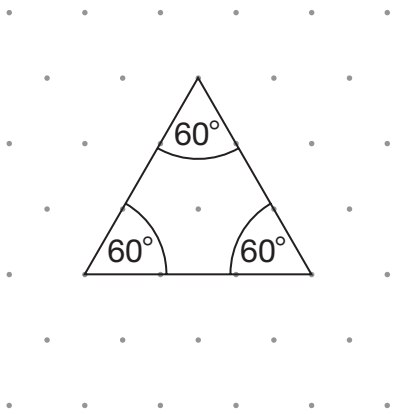
_____ tonnes

2 marks

6. (a) Look at the equilateral triangle.

Each angle in an equilateral triangle is 60°

Explain why.

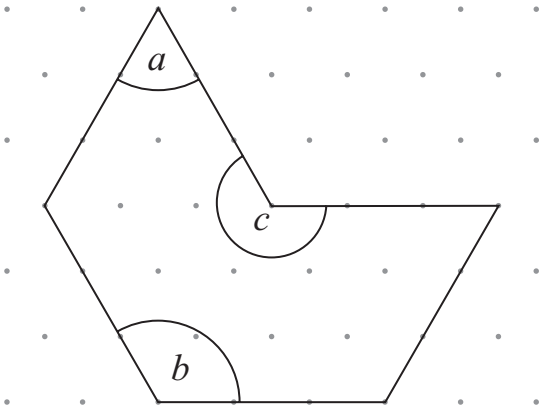


Isometric grid

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.

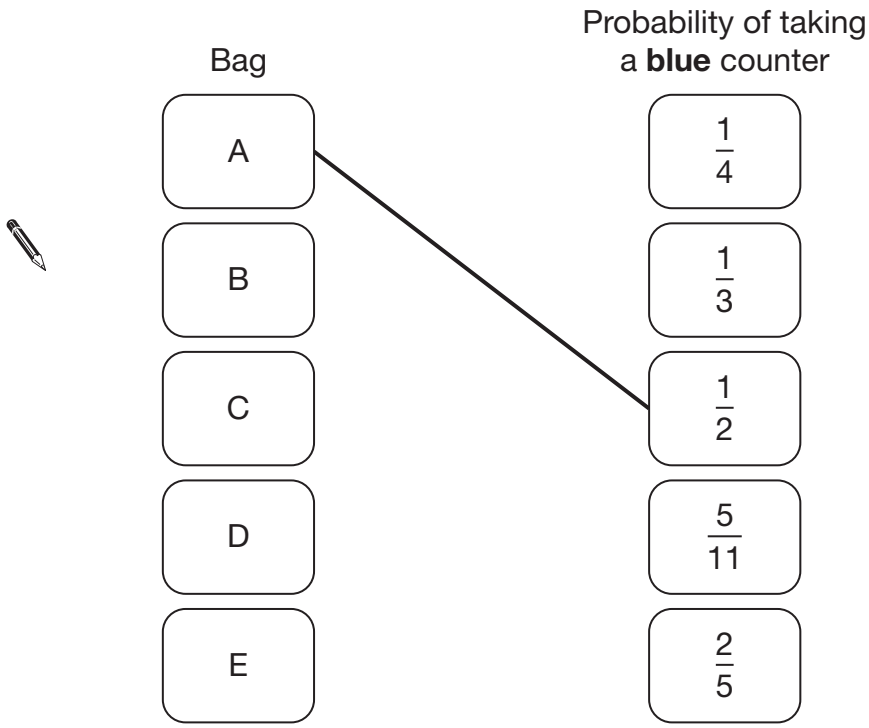
The table shows how many red and blue counters are in each bag.

	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'.

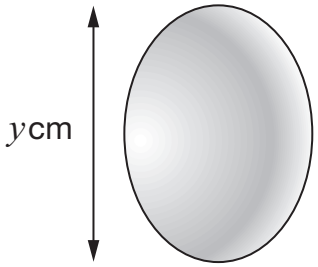
Altogether, how many pupils were in the survey?

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.

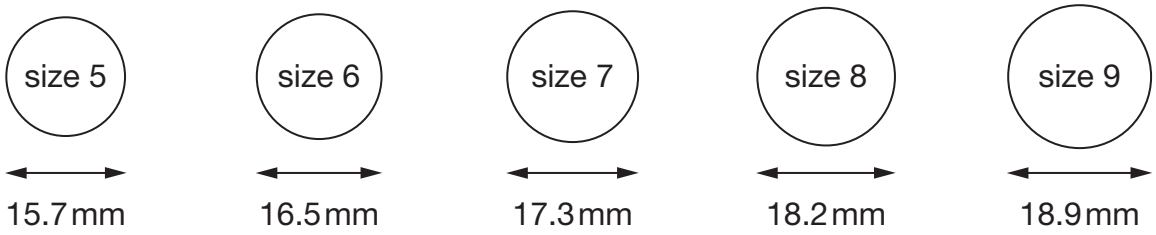
You **must** show your working.

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.

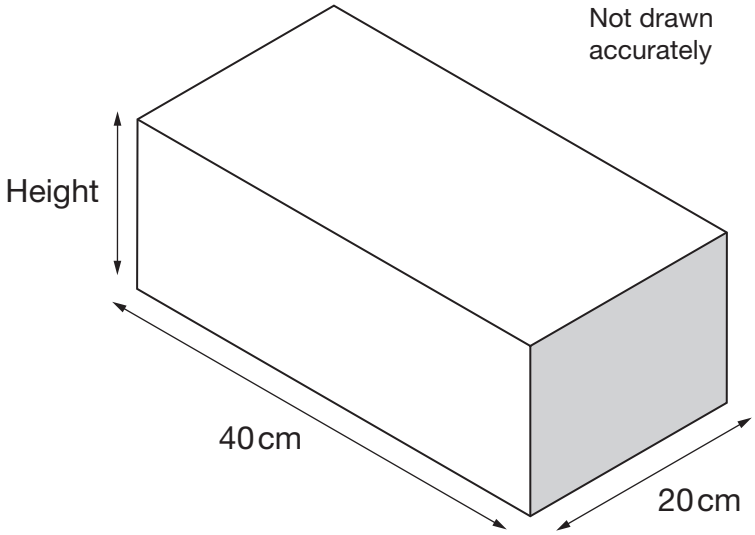
2 marks

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.

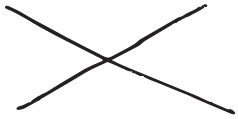
5, 16, 27, ...

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**

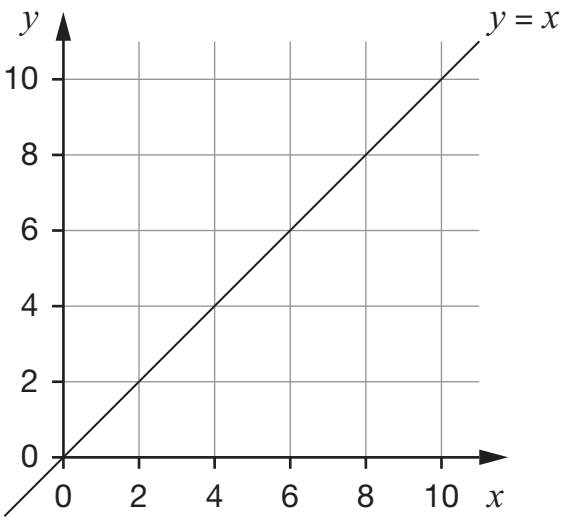
Tom has taken five units. His mean mark is **78**

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

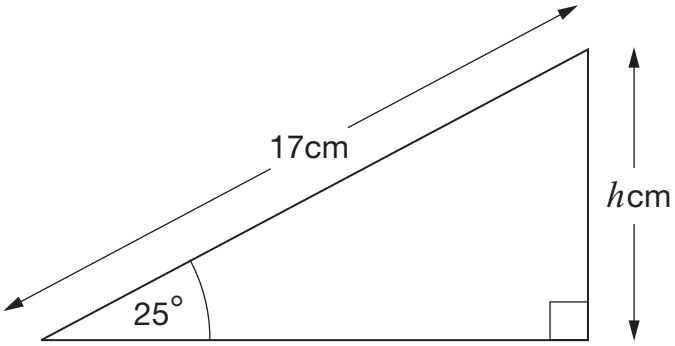
20. Look at this information from January 2005.

> **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.

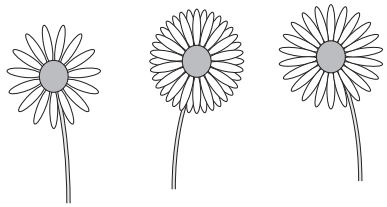
Men	Women
100	_____

_____

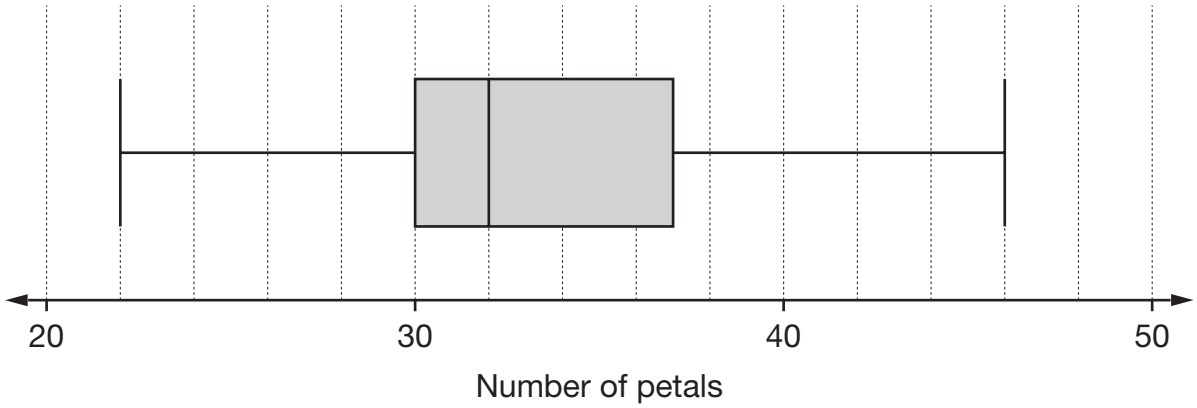
_____

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?

_____

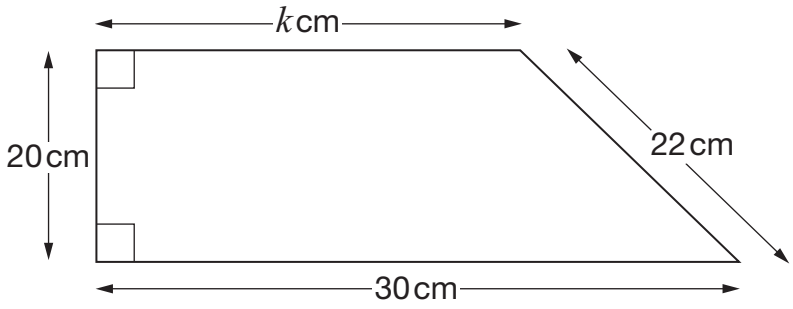
1 mark

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

_____ %

1 mark

24. Here is a trapezium.



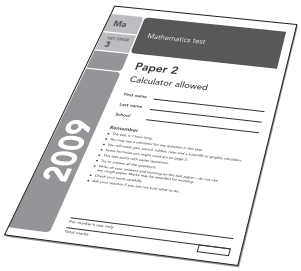
Not drawn accurately

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.

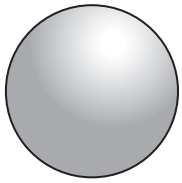
Give your answer correct to **2 significant figures**.

_____ g

3 marks

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

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

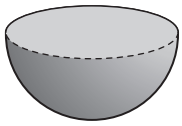


The solid sphere is cut in half to produce a solid hemisphere.

Complete the table below for the solid hemisphere.

Write your answers as simply as possible.

Radius	Volume	Surface area
r		



2 marks

END OF TEST

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