Ma

KEY STAGE 3

TIER 6–8

2004

Mathematics test

Paper 1

Calculator **not** allowed

Please read this page, but do not open your booklet until your teacher tells you to start. Write your name and the name of your school in the spaces below.

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.

For marker's use only

Total marks	

QCA/04/1201

Instructions

Answers

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

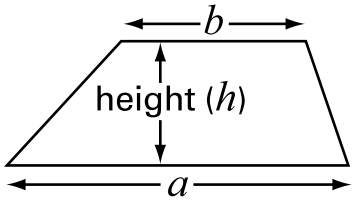
Calculators

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

Formulae

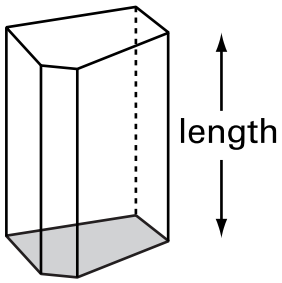
You might need to use these formulae

Trapezium



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

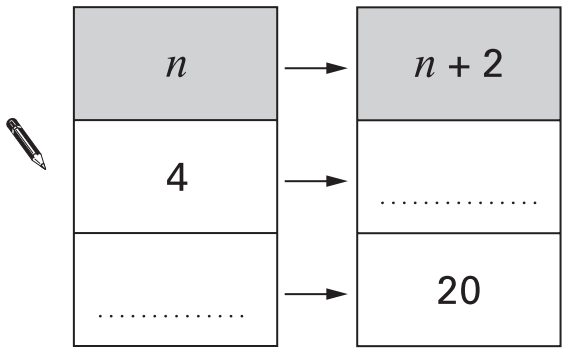
Prism



Volume = area of cross-section × length

1. (a) A function maps the number n to the number $n + 2$

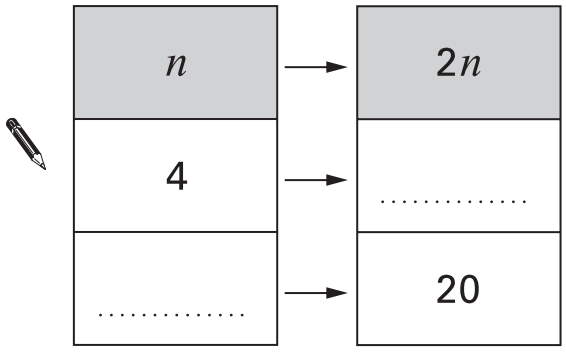
Complete the missing values.



. . . .
1 mark

(b) A different function maps the number n to the number $2n$

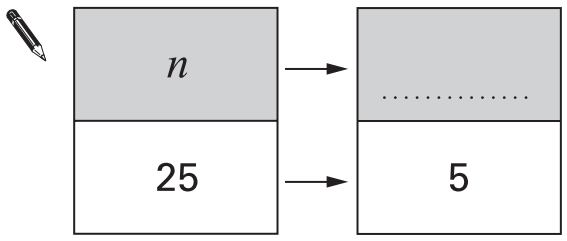
Complete the missing values.

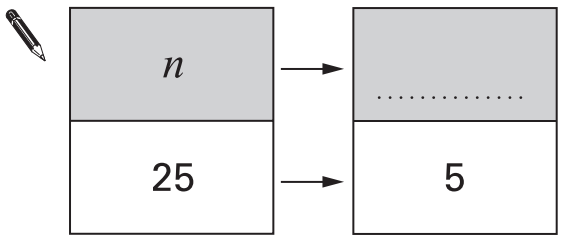


. . . .
1 mark

(c) Many different functions can map the number 25 to the number 5

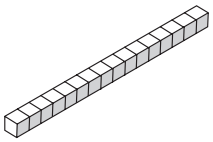
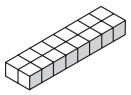
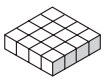
Complete the tables by writing two **different** functions.





. . . .
. . . .
2 marks

2. You can make only four different cuboids with **16 cubes**.

	Dimensions		
Cuboid **A** 	1	1	16
Cuboid **B** 	1	2	8
Cuboid **C** 	1	4	4
Cuboid **D** 	2	2	4

(a) Which of the cuboids **A** and **D** has the **larger surface area**?

Tick (✓) the correct answer below.

Cuboid A ☐

Cuboid D ☐

Both the same ☐

Explain how you know.

. . . . .

1 mark

(b) Which cuboid has the **largest volume**?

Tick (✓) the correct answer below.

- Cuboid A ☐
- Cuboid B ☐
- Cuboid C ☐
- Cuboid D ☐
- All the same ☐

. . . . .
1 mark

(c) How many of **cuboid D** make a cube of dimensions **4 × 4 × 4**?

. . . . . .

. . . . .
1 mark

(d) You can make only six **different** cuboids with **24 cubes**.

Complete the table to show the dimensions.

Two have been done for you.

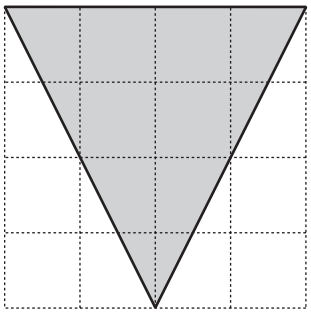
	Dimensions		
Cuboid **E**	1	1	24
Cuboid **F**	1	2	12
Cuboid **G**			
Cuboid **H**			
Cuboid **I**			
Cuboid **J**			

. . . . .

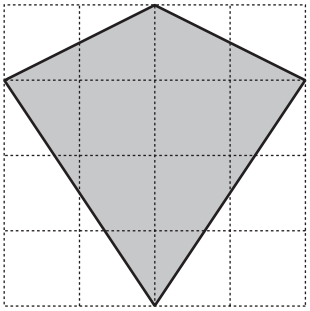
. . . . .

. . . . .
3 marks

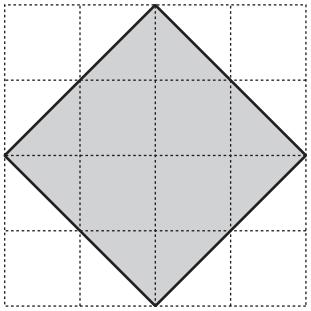
3. The shapes below are drawn on square grids.



shape **A**



shape **B**



shape **C**

(a) Is shape **A** an **equilateral triangle**? Tick (✓) Yes or No.

☐ Yes ☐ No

Explain your answer.

. . . . .
1 mark

(b) Is shape **B** a **kite**?

☐ Yes ☐ No

Explain your answer.

. . . . .
1 mark

(c) Is shape **C** a **square**?

☐ Yes ☐ No

Explain your answer.

. . . . .
1 mark

4. Write the missing numbers in the table.

The first row is done for you.

First number	Second number	**Sum** of first and second numbers	**Product** of first and second numbers
3	6	9	18
5	−3		
−8		−5	

. . . . .
1 mark

. . . . .
1 mark

5. (a) Calculate $\frac{5}{6} \times \frac{3}{5}$

Show your working.

Write your answer as a fraction in its **simplest form**.

. . . .

. . . .

2 marks

(b) Four-fifths of the members of a club are female.

Three-quarters of these females are over 20 years old.

What fraction of the members of the club are females over 20 years old?

Show your working.

. . . .

. . . .

2 marks

6. (a) Rearrange the equations.

$b + 4 = a$ $\quad b =$ ....
1 mark

$4d = c$ $\quad d =$ ....
1 mark

$m - 3 = 4k$ $\quad m =$ ....
1 mark

(b) Rearrange the equation to make t the subject.

Show your working.

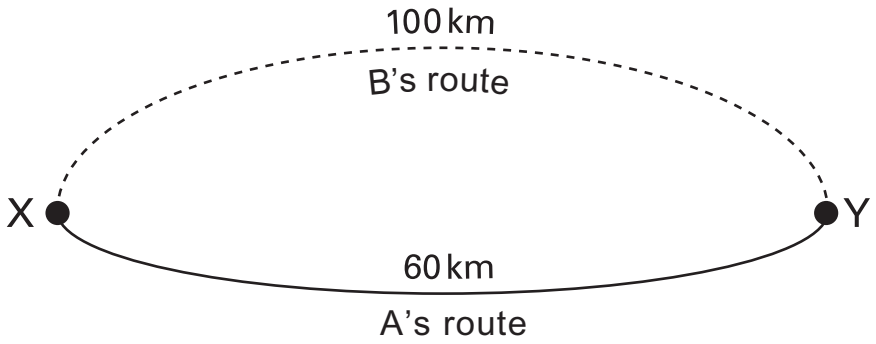
$5(2 + t) = w$

. . . .

$t =$ ....
2 marks

7. Two people, A and B, travel from X to Y along different routes.

Their journeys take the same amount of time.



B travels at an average speed of **40 km/h**.

What is A's average speed?

Show your working.

..... km/h

2 marks

8. (a) Ring the expression below that is the same as $y^2 + 8y + 12$

$(y + 3)(y + 4)$ $(y + 7)(y + 1)$

$(y + 2)(y + 6)$

$(y + 1)(y + 12)$ $(y + 3)(y + 5)$

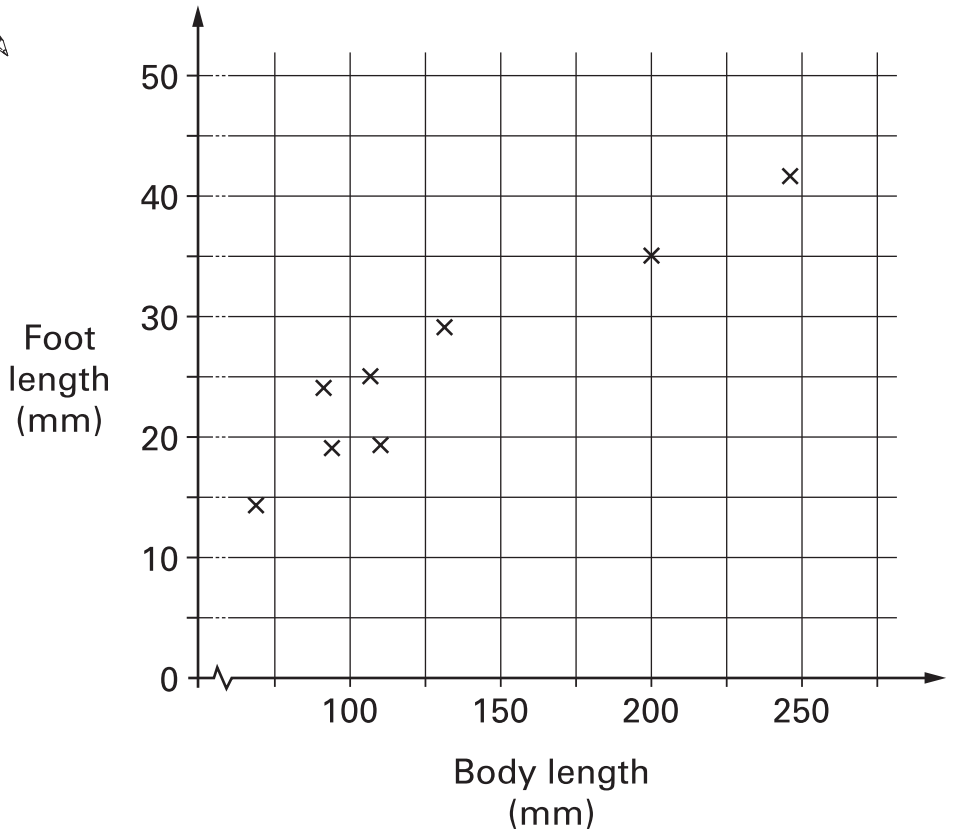
1 mark

(b) Multiply out the expression $(y + 9)(y + 2)$

Write your answer as simply as possible.

2 marks

9. The scatter graph shows the average body length and average foot length of different species of rodents.



(a) What does the scatter graph tell you about the **type of correlation** between the body length and foot length for these rodents?

. . . . .

1 mark

(b) Draw a **line of best fit** on the scatter graph.

. . . . .

1 mark

(c) If body length increased by **50mm**, by approximately how many millimetres would you expect foot length to increase?

Ring the correct value below.

2 7 15 50 275

. . . . .

1 mark

(d) An animal has a body length of **228 mm**, and foot length of **22 mm**.

Is this animal likely to be one of these species of rodents?

Tick (✓) Yes or No.

☐ Yes ☐ No

Explain your answer.

. . . . .

1 mark

10. I have two fair 4-sided dice.

One dice is numbered **2**, **4**, **6** and **8**

The other is numbered **2**, **3**, **4** and **5**

I throw both dice and **add** the scores.

What is the probability that the total is **even**?

You **must** show working to explain your answer.

. . . . .

. . . . .

2 marks

11. The table shows a recipe for a fruit drink.

Type of juice	Amount
Orange	$\frac{1}{2}$ litre
Cranberry	$\frac{1}{3}$ litre
Grape	$\frac{1}{6}$ litre
	Total 1 litre

I want to make **$1\frac{1}{2}$ litres** of the same drink.

Complete the table below to show how much of each type of juice to use.

Show your working.

Type of juice	Amount
Orange	litre
Cranberry	litre
Grape	litre
	Total $1\frac{1}{2}$ litres

. . . .

. . . .

2 marks

12. Think about triangles that have

> a perimeter of 15cm,
>
> two or more equal sides,
>
> and each side a whole number of centimetres.

Prove that there are only **four** of these triangles.

You do not need to construct the triangles.

. . . .

. . . .

. . . .

3 marks

13. The table shows data about births in the UK.

Year	Number of births
1910	1.05×10^6
1920	1.13×10^6
1930	7.69×10^5
1940	7.02×10^5
1950	8.18×10^5
1960	9.18×10^5
1970	9.04×10^5
1980	7.54×10^5
1990	7.99×10^5

(a) In which year was the number of births the highest?

. . . .

1 mark

(b) How many more births were there in 1990 than in 1980?

Show your working and write your answer in **standard form**.

. . . .

2 marks

14. (a) Look at these equations.

$48 = 3 \times 2^a$ $56 = 7 \times 2^b$

What are the values of a and b?

$a =$ ..... $b =$ ....
1 mark

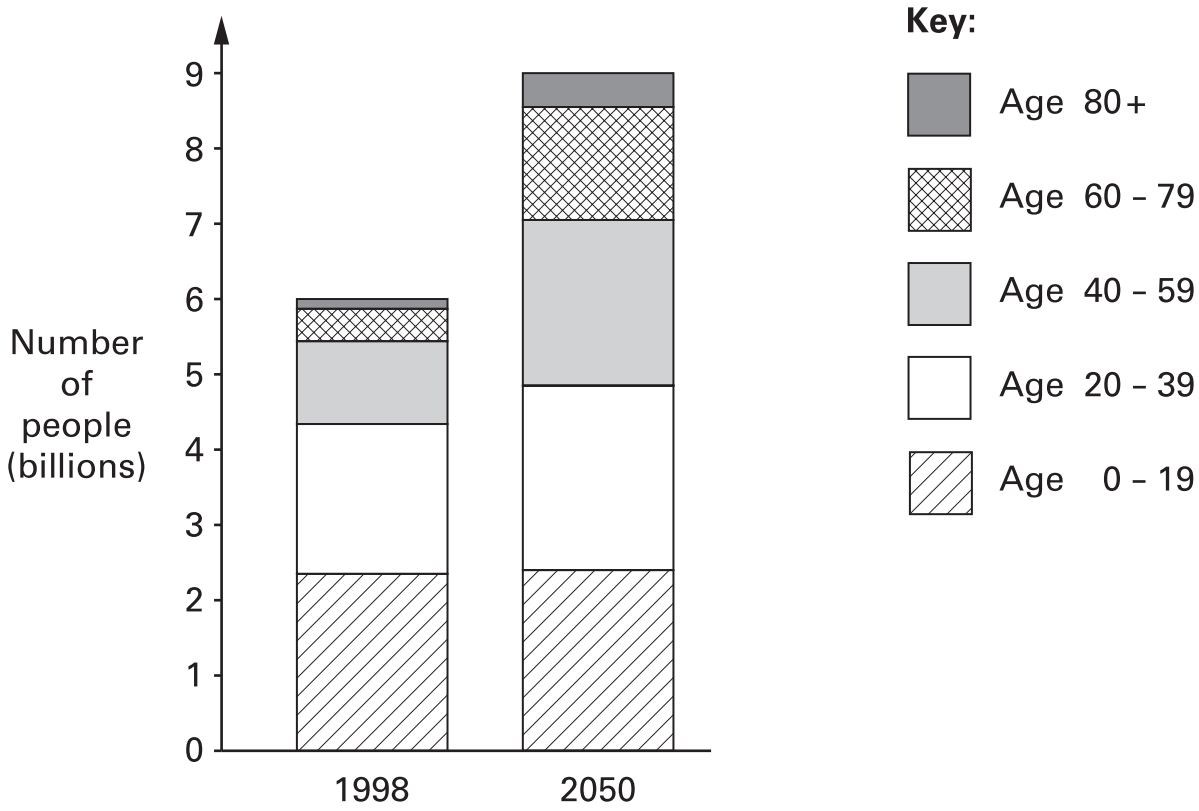
(b) $48 \times 56 = 3 \times 7 \times 2^c$

What is the value of c?

$c =$ ....
1 mark

15. The chart shows the ages of the world's population in 1998.

It also shows a prediction of the ages of the world's population in 2050.



(a) Use the information in the chart to decide if the statement below is true or false or if there is not enough information to tell.

> The **percentage** of the population that is aged **under 20** is expected to be about the **same** in 2050 as it was in 1998.

☐ True ☐ False ☐ Not enough information

Explain your answer.

. . . . .

1 mark

(b) **Approximately**, what is the expected percentage increase from 1998 to 2050 in the **total** world population?

..... %

1 mark

(c) **Approximately**, what is the expected percentage increase from 1998 to 2050 in the number of people who are aged **60 or over**?

..... %

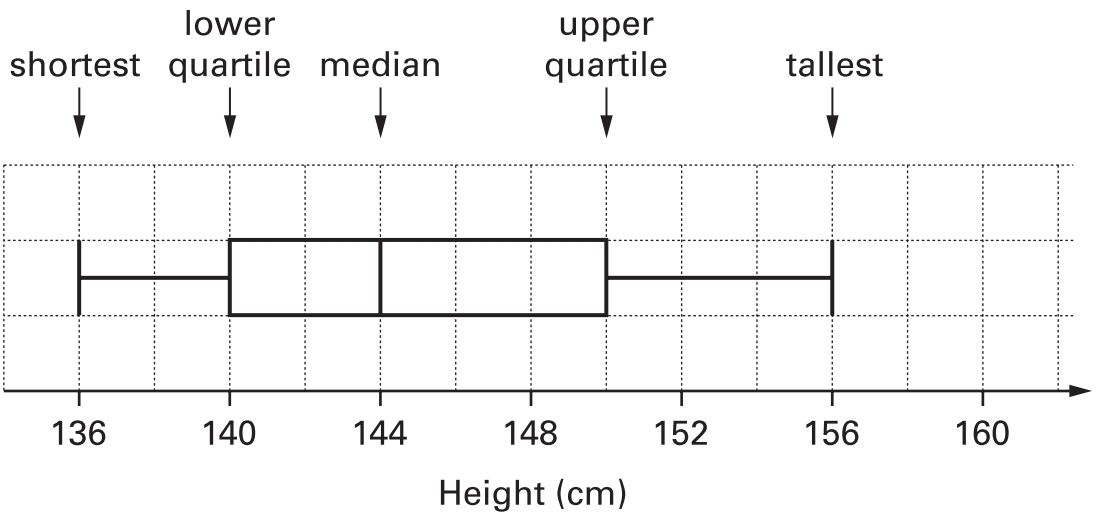
1 mark

(d) Using your answers to part (b) and part (c), write a sentence about the **expected change** in the **ages** of the world's population from 1998 to 2050.

1 mark

16. A pupil recorded the heights of all the **girls** in **year 7**
She summarised her results, then drew this box plot.

Year 7 girls

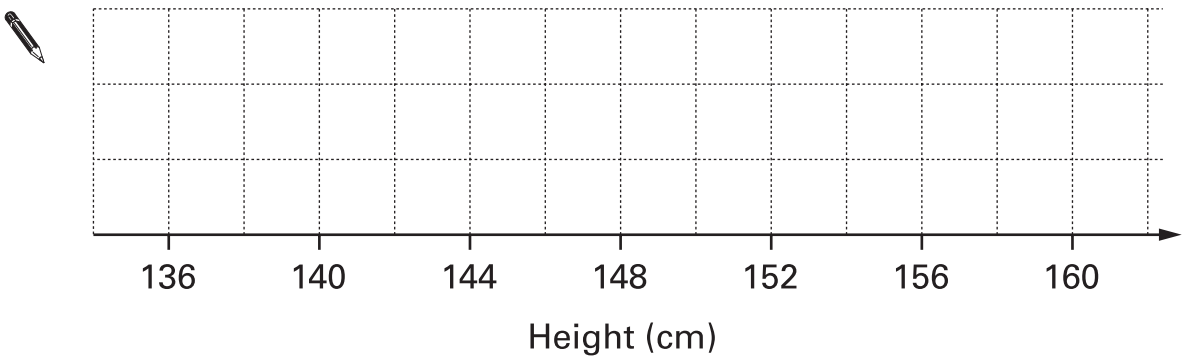


The pupil compared the heights of year 7 boys with year 7 girls.

- the shortest boy was the **same height** as the shortest girl;
- the **range** of boys' heights was **greater** than the range of girls' heights;
- the **inter-quartile range** of boys' heights was **smaller** than the inter-quartile range of girls' heights.

(a) Draw what the box plot for boys could look like.

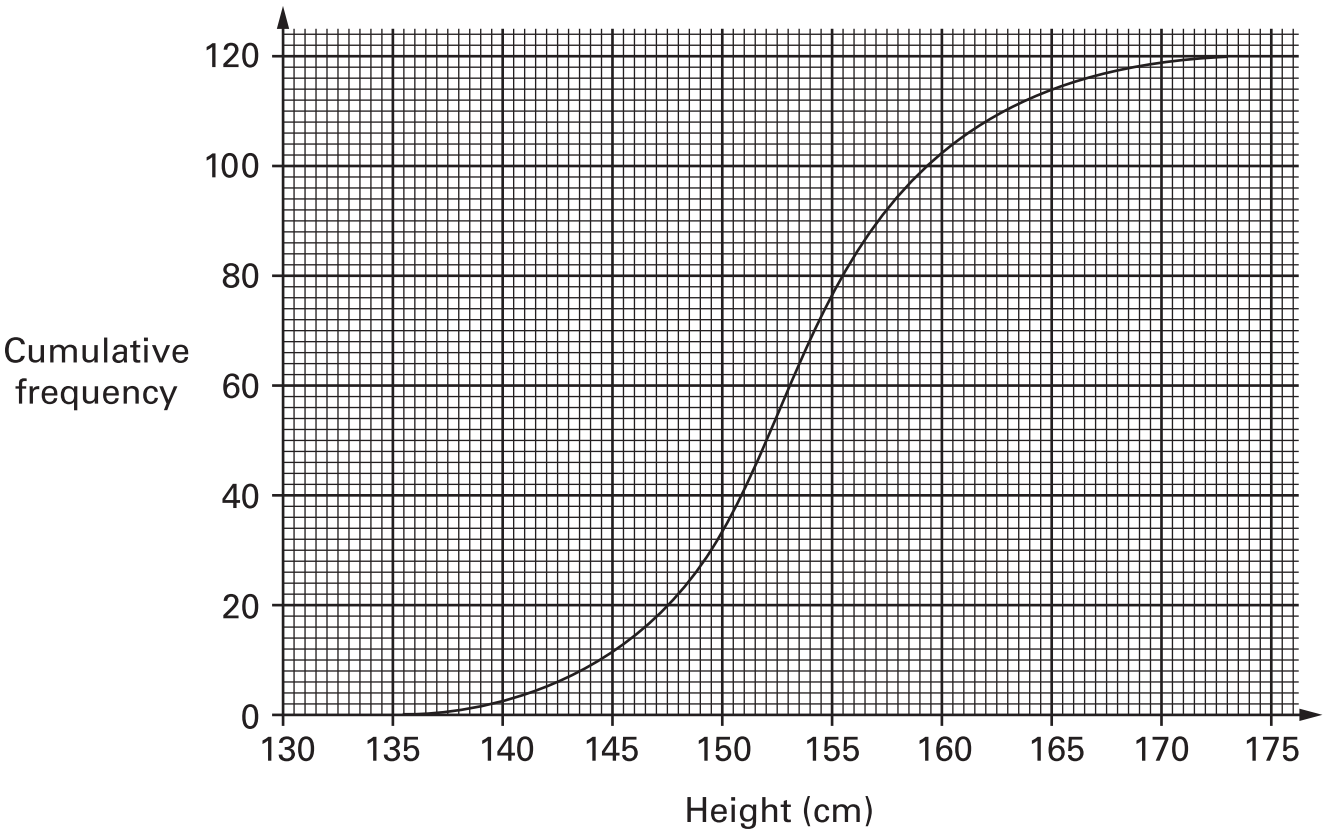
Year 7 boys



. . . . .
. . . . .
2 marks

There are 120 girls in **year 9**

The cumulative frequency diagram shows information about their heights.



(b) Compare the heights of year 9 girls with year 7 girls.

. . . .

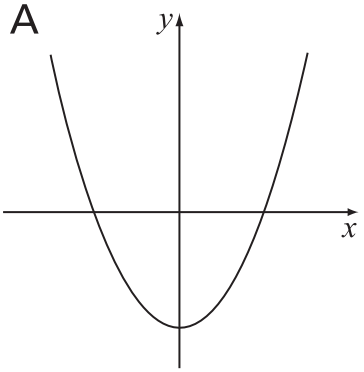
. . . .

. . . .

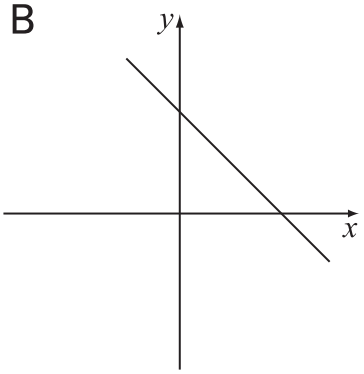
3 marks

17. Match each graph to the correct equation.

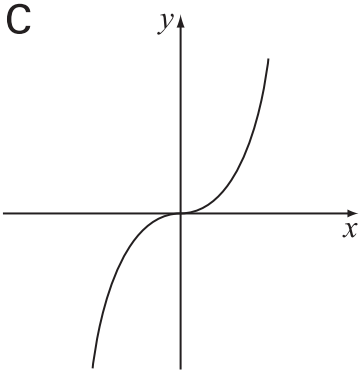
A



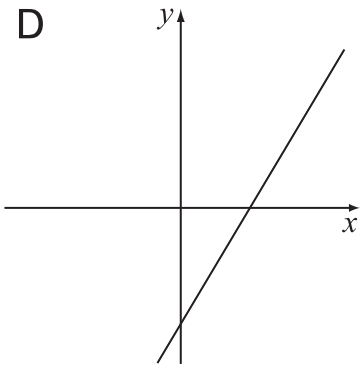
B



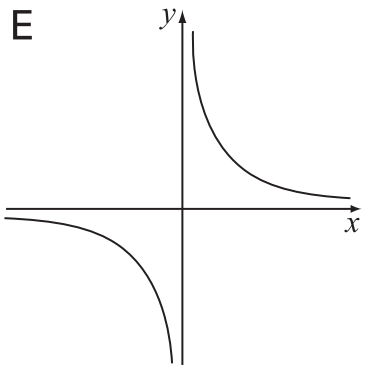
C



D



E



Graph ..... shows the equation $y = 2x - 6$

Graph ..... shows the equation $y = 6x^3$

Graph ..... shows the equation $y = 6 - x$

Graph ..... shows the equation $y = x^2 - 6$

Graph ..... shows the equation $y = \frac{1}{6x}$

. . . .

. . . .

2 marks

18. I start with any two **consecutive integers**.

I square each of them, then

I add the two squares together.

Prove that the total **must** be an **odd** number.

. . . .

. . . .

. . . .

3 marks

END OF TEST

QCA, Key Stage 3 Team, 83 Piccadilly, London W1J 8QA