

**Ma**

KEY STAGE

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TIER

**5–7****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 3.
- 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.

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For marker's  
use only

Total marks	
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## Instructions

### Answers



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

### Calculators

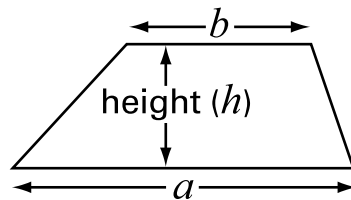


You **must not** use a calculator to answer any question in this test.

## Formulae

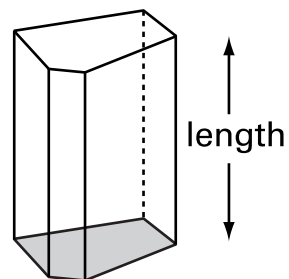
You might need to use these formulae

### Trapezium



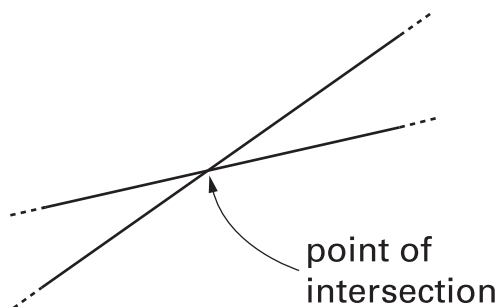
$$\text{Area} = \frac{1}{2}(a + b)h$$

### Prism



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

1. The diagram shows two straight lines.  
Where the lines **cross** is called  
a **point of intersection**.



- (a) Draw **three** straight lines that have only **one** point of intersection.



.....  
1 mark

- (b) **Three** straight lines have exactly **two** points of intersection.

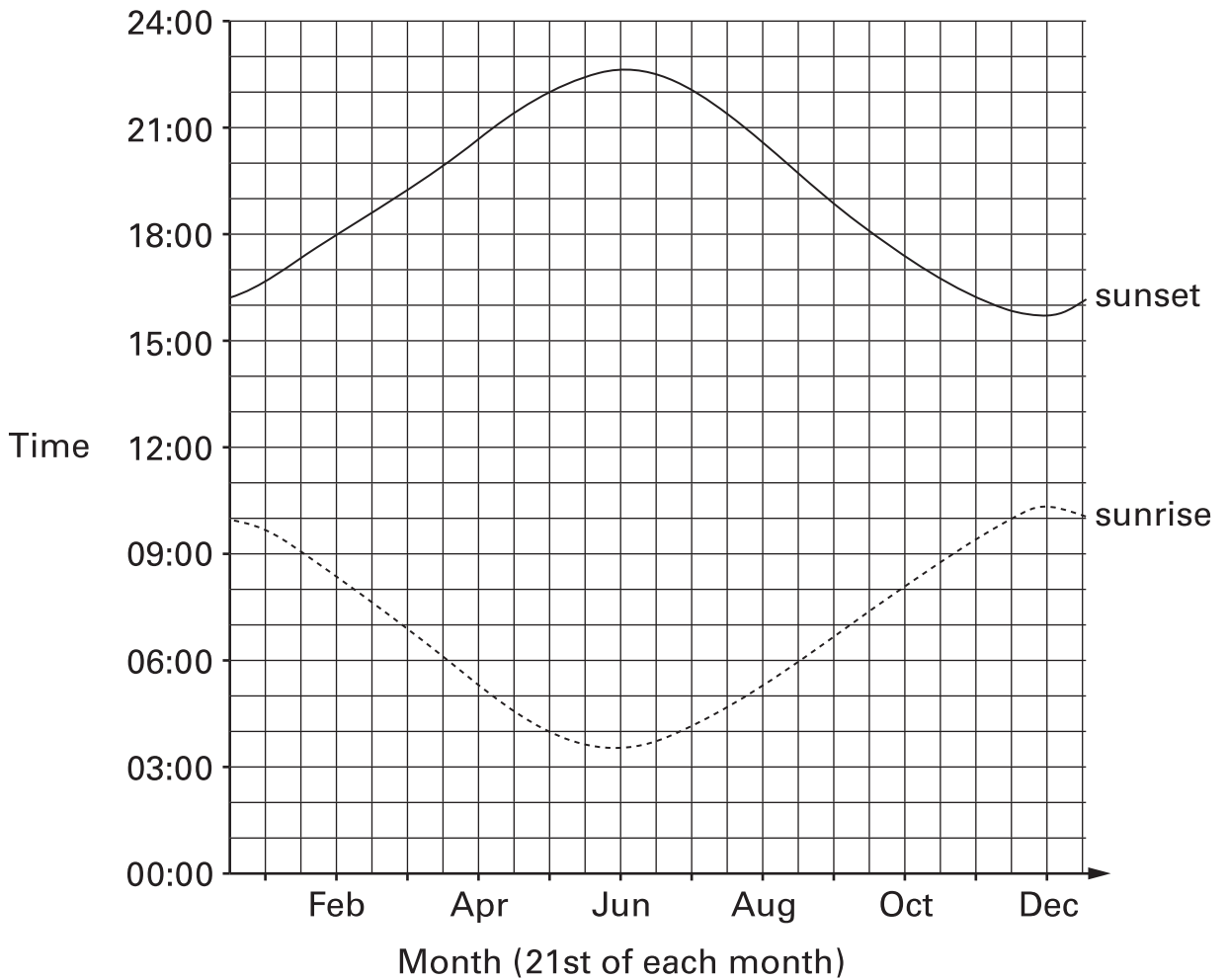
Complete the sentence below.



Two of the lines must be .....

.....  
1 mark

2. The graph shows at what **time** the sun rises and sets in the American town of Anchorage.



The day with the **most** hours of daylight is called the longest day.

Fill in the gaps below, using the information from the graph.



The **longest day** is in the month of .....

On this day, there are about ..... hours of daylight.

The **shortest day** is in the month of .....

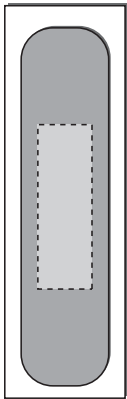
On this day, there are about ..... hours of daylight.

.....  
 .....  
 .....  
 3 marks

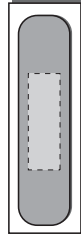


3. I buy a box of different size plasters.

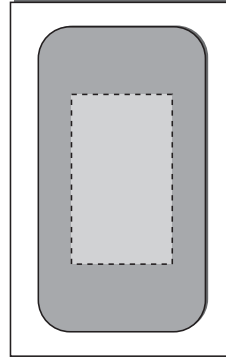
Assume each plaster is equally likely to be the top plaster inside the box.



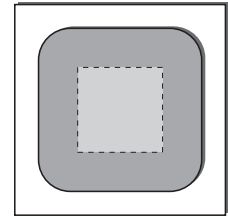
**16 plasters  
of size A**



**16 plasters  
of size B**



**2 plasters  
of size C**



**1 plaster  
of size D**

Altogether there are **35** plasters.

I take the top plaster from inside the box.

(a) What is the probability that the plaster is of **size D**?



.....  
1 mark

(b) What is the probability that the plaster is of **size A**?



.....  
1 mark

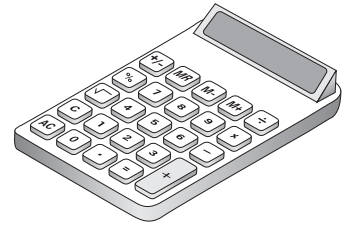
(c) What is the probability that the plaster is **not** of **size A**?



.....  
1 mark

4. You can buy a new calculator for **£1.25**

In 1979 the same type of calculator  
cost **22 times** as much as it costs now.



How much did the same type of calculator cost in 1979?

Show your working.

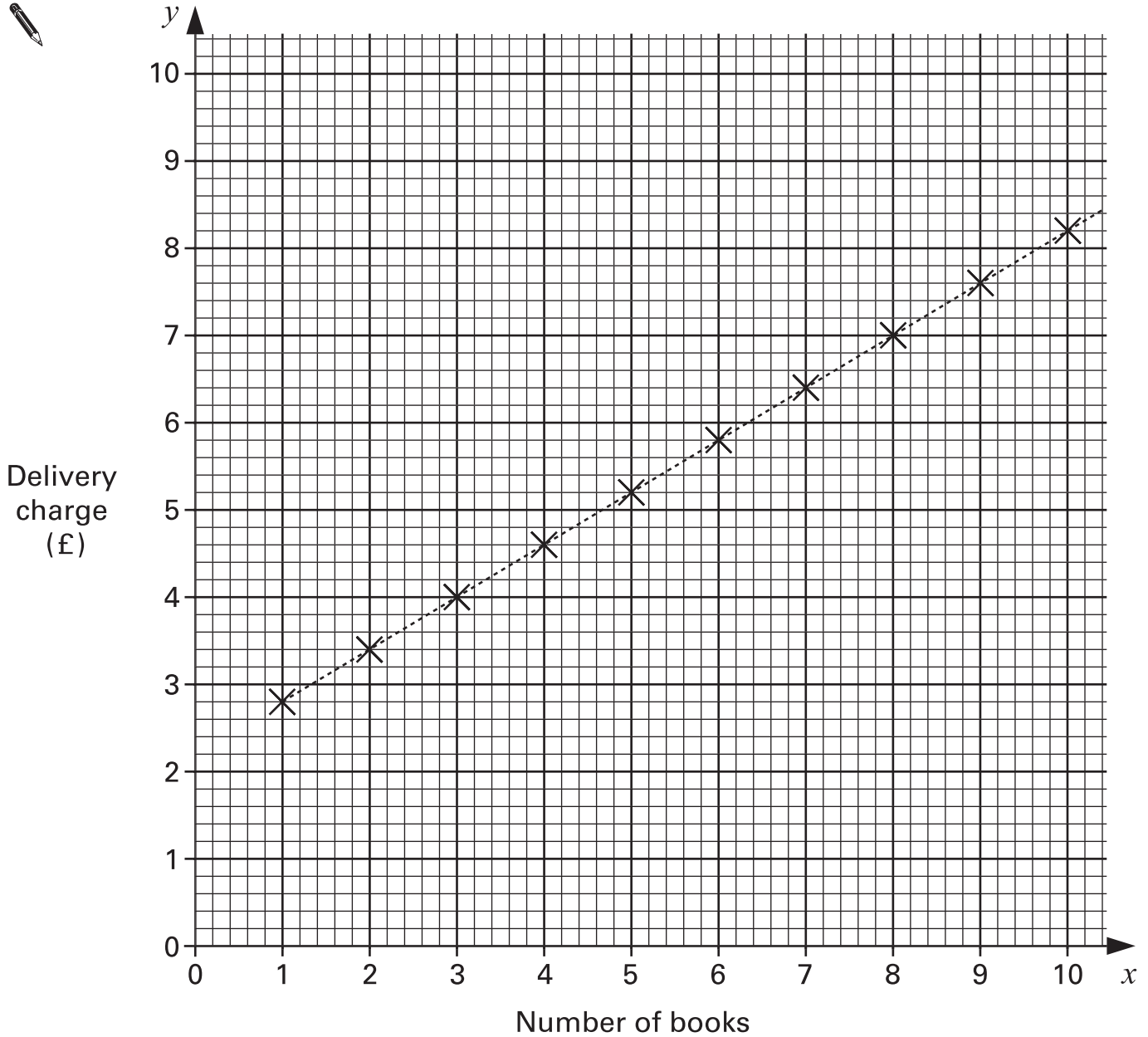


£

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



5. A company sells books using the internet.  
The graph shows their delivery charges.





(a) Use the graph to fill in the values in this table.

Number of books	Delivery charge (£)
8	
9	



.....  
1 mark

(b) For every extra book you buy, how much more must you pay for delivery?



..... p

.....  
1 mark

(c) A second company sells books using the internet.

Its delivery charge is **£1.00 per book**.

On the graph opposite, draw a line to show this information.

.....  
1 mark

(d) Complete the sentence.



Delivery is cheaper with the **first** company

if you buy at least ..... books.

.....  
1 mark



6. One way to make a magic square is to substitute numbers into this algebra grid.

$a + b$	$a - b + c$	$a - c$
$a - b - c$	$a$	$a + b + c$
$a + c$	$a + b - c$	$a - b$

- (a) Complete the magic square below using the values

$$a = 10$$

$$b = 3$$

$$c = 5$$



		5
	10	
15		

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

(b) Here is the algebra grid again.

$a + b$	$a - b + c$	$a - c$
$a - b - c$	$a$	$a + b + c$
$a + c$	$a + b - c$	$a - b$

I use **different values** for  $a$ ,  $b$  and  $c$  to complete the magic square.

20	21	7
3	16	29
25	11	12

What values for  $a$ ,  $b$  and  $c$  did I use?

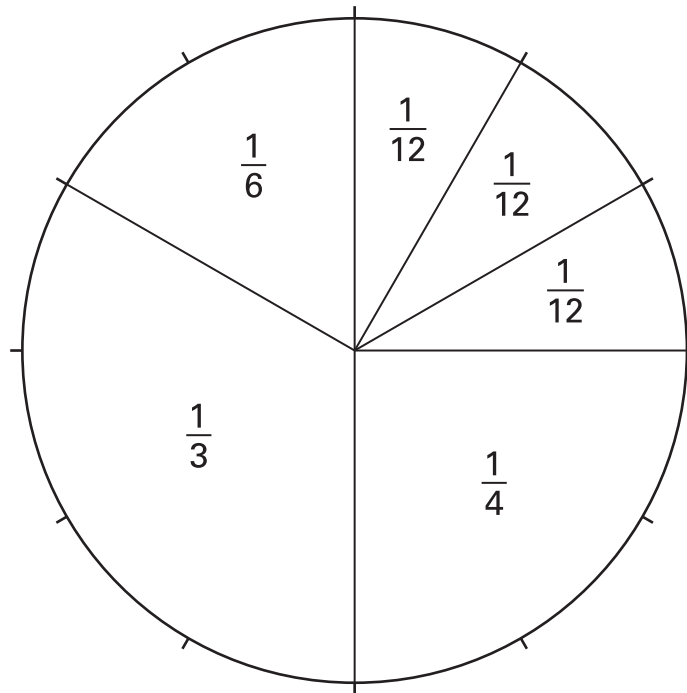


$a = \dots\dots\dots$        $b = \dots\dots\dots$        $c = \dots\dots\dots$

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



7. Look at this diagram.



The diagram can help you work out some fraction calculations.

Calculate



$$\frac{1}{12} + \frac{1}{4} =$$

.....  
1 mark

$$\frac{1}{3} + \frac{1}{4} =$$

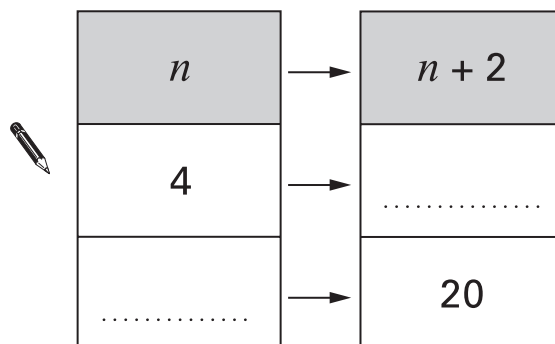
.....  
1 mark

$$\frac{1}{3} - \frac{1}{6} =$$

.....  
1 mark

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

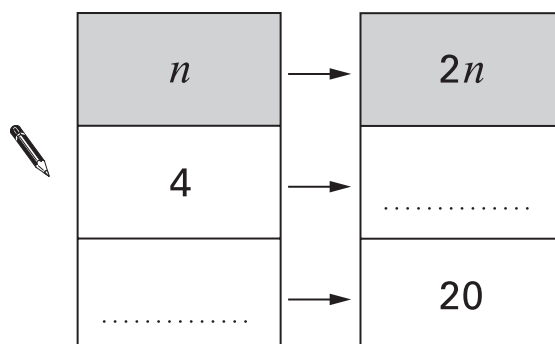
Complete the missing values.



.....  
1 mark

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

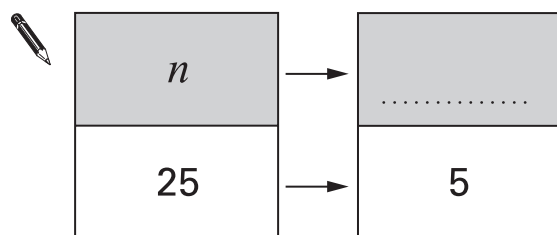
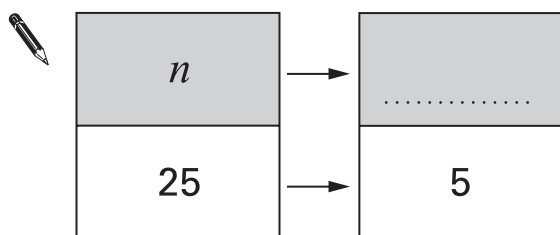
Complete the missing values.



.....  
1 mark

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

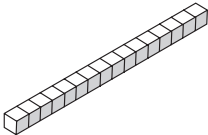
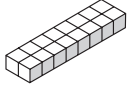


Complete the tables by writing two **different** functions.



.....  
2 marks



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

		Dimensions		
Cuboid <b>A</b>		1	1	16
Cuboid <b>B</b>		1	2	8
Cuboid <b>C</b>		1	4	4
Cuboid <b>D</b>		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.



(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.

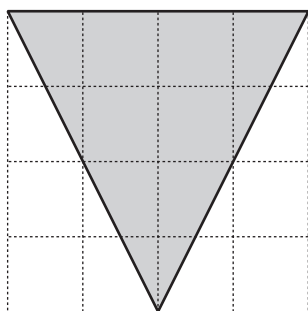
Two have been done for you.



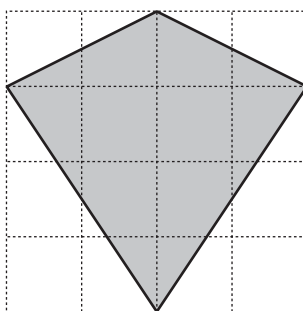
	Dimensions		
Cuboid <b>E</b>	1	1	24
Cuboid <b>F</b>	1	2	12
Cuboid <b>G</b>			
Cuboid <b>H</b>			
Cuboid <b>I</b>			
Cuboid <b>J</b>			

.....  
.....  
.....  
3 marks

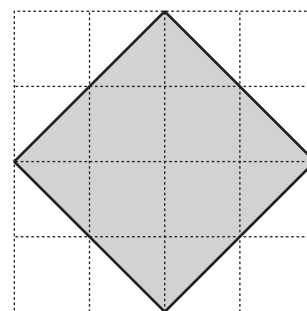
10. The shapes below are drawn on square grids.



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



11. 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



12. (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

13. (a) Rearrange the equations.



$$b + 4 = a$$

$$b = \dots\dots\dots$$

.....  
1 mark

$$4d = c$$

$$d = \dots\dots\dots$$

.....  
1 mark

$$m - 3 = 4k$$

$$m = \dots\dots\dots$$

.....  
1 mark

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

Show your working.



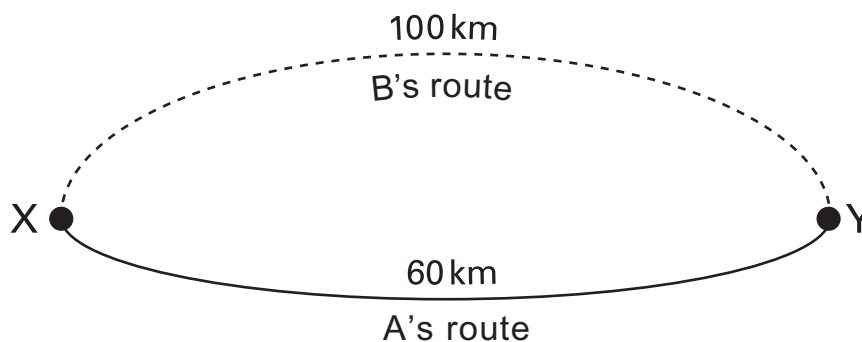
$$5(2 + t) = w$$

$$t = \dots\dots\dots$$

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



14. 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

15. (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.

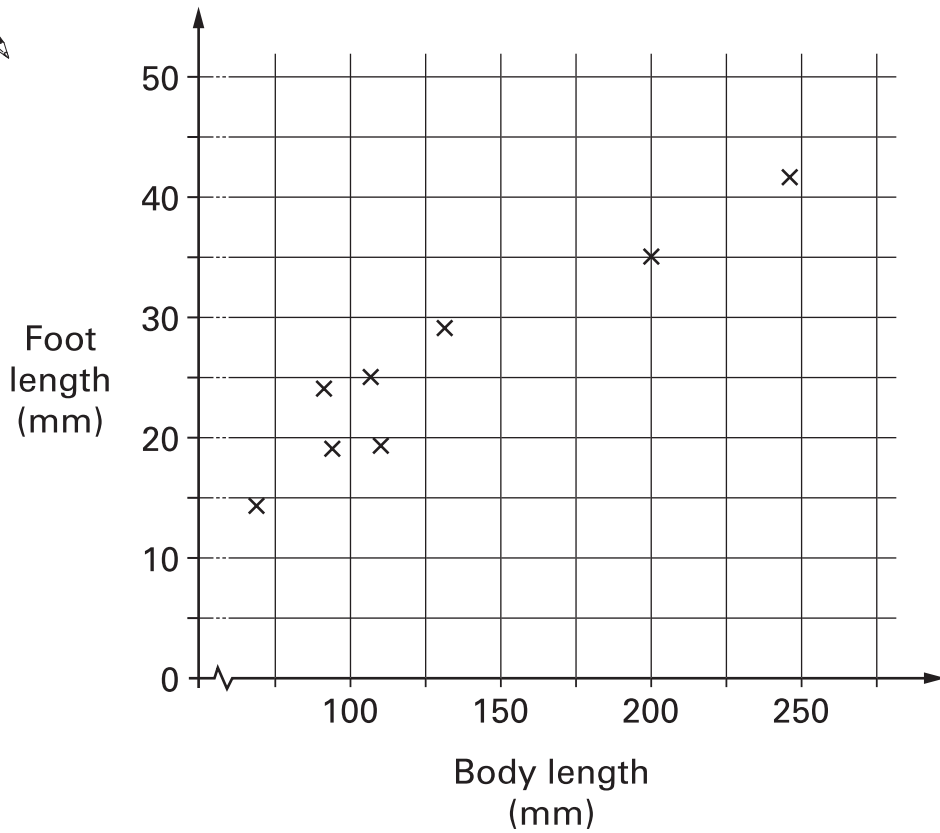


.....

.....  
2 marks



16. 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 **228mm**, and foot length of **22mm**.

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

Tick (✓) Yes or No.



Yes

No

Explain your answer.



.....  
1 mark

17. 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



18. 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



19. 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



**END OF TEST**

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