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	

Instructions

Answers

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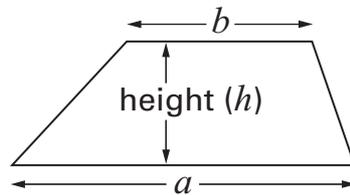
Calculators

You **must not** use a calculator to answer any question in this test.
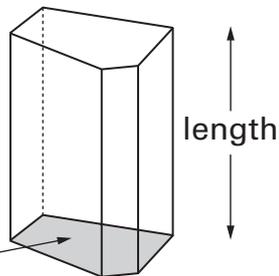
Formulae
You might need to use these formulae
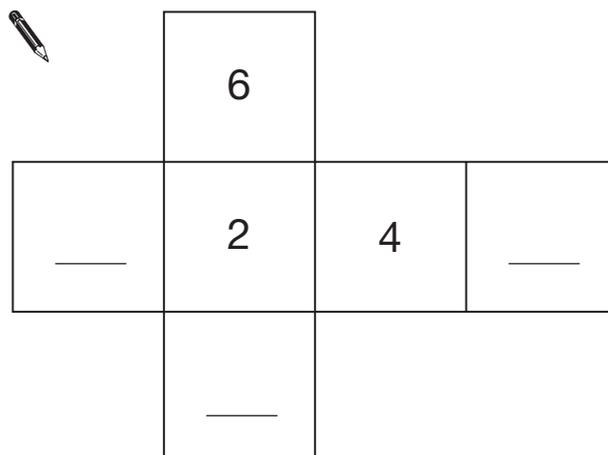
Trapezium

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

Prism
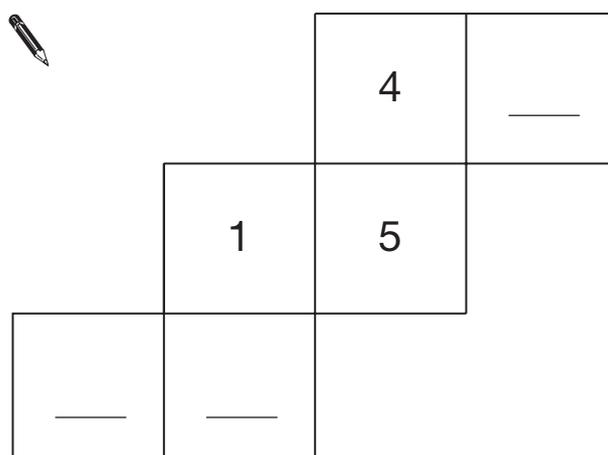
Volume = area of cross-section × length

1. The diagrams show nets for dice.

Each dice has six faces, numbered 1 to 6

Write the missing numbers so that the numbers on **opposite faces add to 7**

	6	
___	2	4	___
	___	

1 mark

	4	___
1	5	
___	___	

1 mark

2. (a) Put these values in order of size with the **smallest first**.

$$5^2 \qquad 3^2 \qquad 3^3 \qquad 2^4$$

_____   _____   _____   _____
smallest   largest

(b) Look at this information.

5^5 is 3125

What is **5^7**?

3.   Write the correct operations (+ or – or × or ÷) in these statements.

$$a \underline{\quad} a = 0$$

$$a \underline{\quad} a = 1$$

$$a \underline{\quad} a = 2a$$

$$a \underline{\quad} a = a^2$$

2 marks

4.   Solve this equation.

$$3y + 14 = 5y + 1$$

$$y = \underline{\qquad\qquad}$$

2 marks

5. Hanif asked ten people:

'What is your favourite sport?'

Here are his results.

football	*cricket*	*football*	*hockey*	*swimming*
hockey	*swimming*	*football*	*netball*	*football*

(a) Is it possible to work out the **mean** of these results?

☐ Yes   ☐ No

Explain how you know.

(b) Is it possible to work out the **mode** of these results?

☐ Yes   ☐ No

Explain how you know.

6. (a) Give an example to show the statement below is **not** correct.

> When you multiply a number by 2, the answer is always greater than 2

1 mark

(b) Now give an example to show the statement below is **not** correct.

> When you subtract a number from 2, the answer is always less than 2

1 mark

(c) Is the statement below correct for all numbers?

> The square of a number is greater than the number itself.
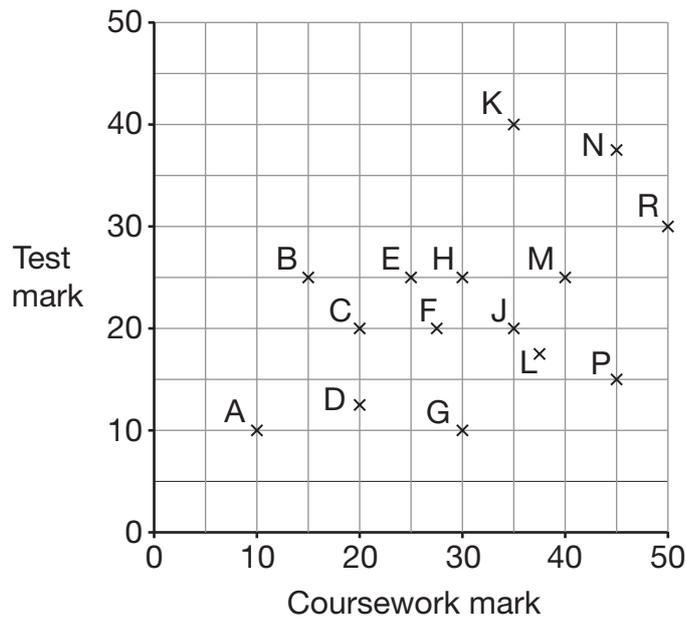
☐ Yes   ☐ No

Explain how you know.

1 mark

7.   The scatter graph shows 15 pupils' coursework and test marks.

To find a pupil's **total** mark, you add the coursework mark to the test mark.

(a)   Which pupil had the highest **total** mark?

_____

1 mark

(b)   Look at the statement below. Tick (✓) True or False.

The range of coursework marks was greater than the range of test marks.
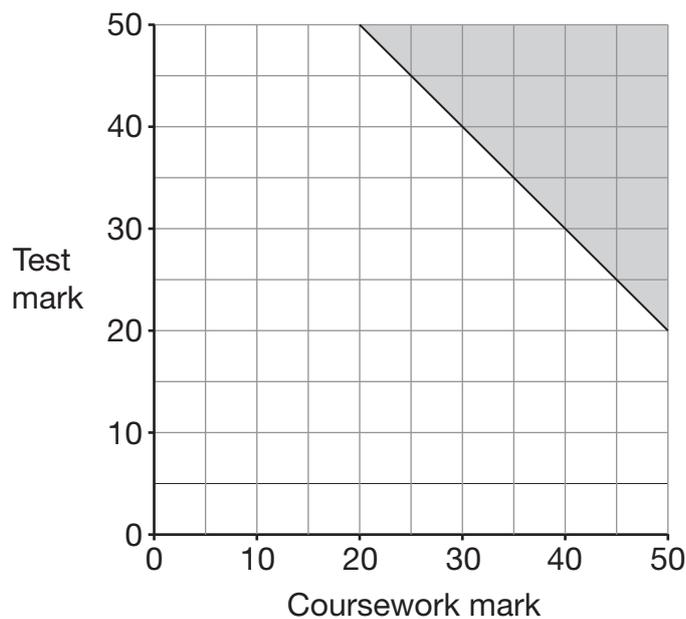
☐ True   ☐ False

Explain your answer.

1 mark

(c) Pupils with total marks in the shaded region on the graph win a prize.

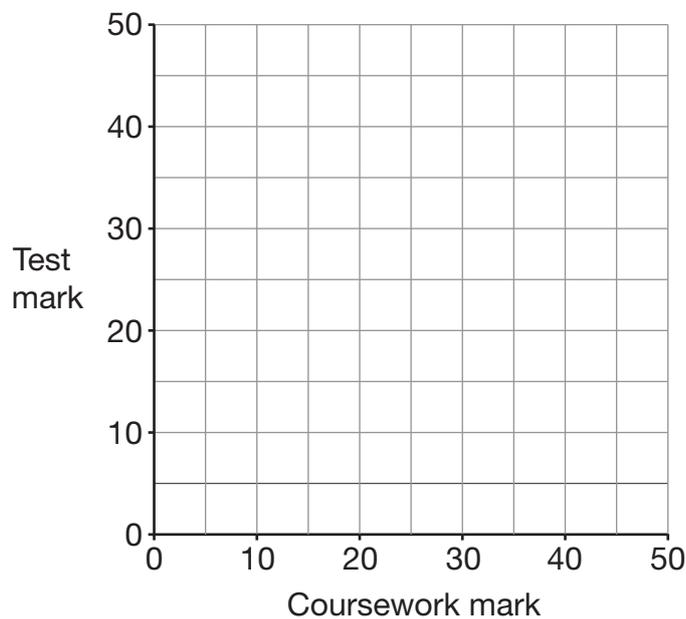What is the **smallest total mark**
needed to win a prize?

_____

(d) Another school has a different rule for pupils to win a prize.

Rule: The coursework mark must be 25 or more, and
the test mark must be 25 or more, and
the total mark must be 65 or more.

On the graph below, shade the region of total marks for which pupils would
win a prize.

8. Work out
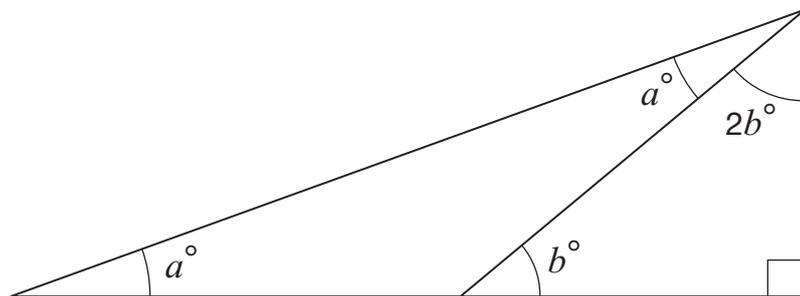
$$\frac{1}{4} \quad + \quad \frac{1}{3} \quad =$$

$$\frac{3}{5} \quad - \quad \frac{1}{15} \quad =$$

9.   Look at the triangle.

Not drawn
accurately

Work out the value of a

$a = $ _____

10.   Write the missing numbers in these multiplication grids.

×	8	
9	72	
−6		30

×	0.2	
3		1.2
		6

_____

_____

_____

3 marks

11. A teacher asked 21 pupils to estimate the height of a building in metres.

The stem-and-leaf diagram shows **all 21** results.

6	5	9				
7	0	2	6	8	8	
8	3	3	5	7	7	9
9	0	5	5	5		
10	4	8				
11	2	7				

6 | 5 represents 6.5 m

(a) Show that the **range** of estimated heights was **5.2 m**.

(b) What was the **median** estimated height?

m

(c) The height of the building was **9.2 m**.

What **percentage** of the pupils **over-estimated** the height?

_____ %

12. In a quiz game two people each answer **100 questions**.

They score one point for each correct answer.

The quiz game has not yet finished.

Each person has answered **90 questions**.

The table shows the results so far.

Person A	Person B
60% of the first 90 questions correct	50% of the first 90 questions correct

Can person B win the quiz game?

Explain your answer.

Tick (✓) your answer.

B can win. ☐

B cannot win but can draw. ☐

B cannot win or draw. ☐

2 marks

13. Solve these simultaneous equations using an algebraic method.

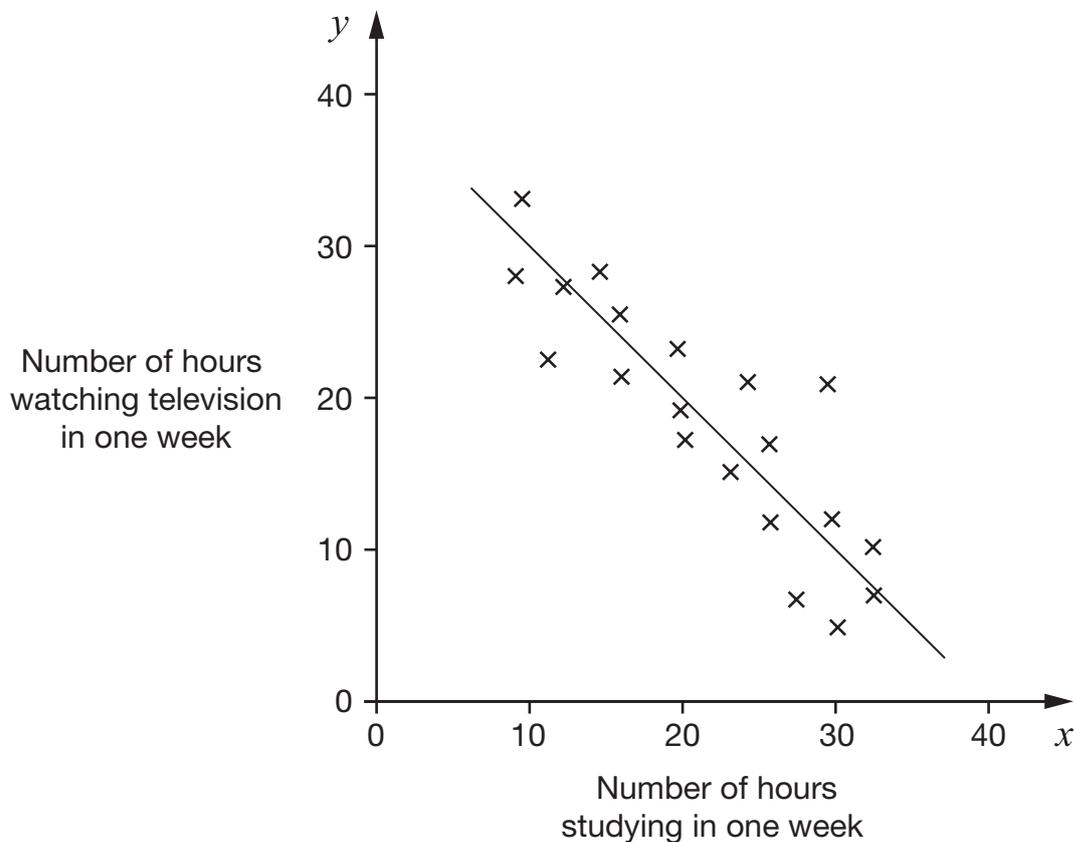$$3x + 7y = 18$$
$$x + 2y = 5$$

You **must** show your working.

$x =$ _____ $y =$ _____

14.   A pupil investigated whether students who study more watch less television.

The scatter graph shows his results. The line of best fit is also shown.
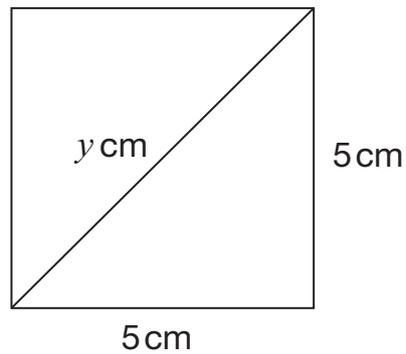

(a)   What type of correlation does the graph show?

_____

(b)   The pupil says the equation of the line of best fit is $y = x + 40$

Explain how you can tell that this equation is **wrong**.

15. The diagram shows a square with side length 5 cm.

y cm

5 cm

5 cm

Not drawn accurately

(a) The length of the diagonal is y cm.

Show that the value of y is $\sqrt{50}$

(b) The square is enlarged by a scale factor of 2

Which value below shows the length of the diagonal of the **enlarged** square?

☐ $\sqrt{100}$ ☐ $\sqrt{200}$

Explain your answer.

16. (a)   Look at the number.

$$8.679 \times 10^4$$

Round it to the nearest thousand.

Give your answer in **standard form**.

2 marks

(b)   Now look at this number.

$$8.679 \times 10^{-4}$$

Round it to the nearest **thousandth**.

Give your answer in **standard form**.

2 marks

17. (a) Complete these factorisations.

$$x^2 + 7x + 12 = (x + 3)(\underline{\quad} + \underline{\quad})$$

$$x^2 - 7x - 30 = (x + 3)(\underline{\quad} - \underline{\quad})$$

(b) Factorise these expressions.

$$x^2 + 7x - 18$$

$$x^2 - 49$$

18. The **mean** of a set of numbers is **zero**.

For each statement below, tick (✓) the correct box.

	Must be true	**Could** be true	**Cannot** be true
All the numbers in the set are zero.	☐	☐	☐
The sum of the numbers in the set is zero.	☐	☐	☐
There are as many positive numbers as negative numbers in the set.	☐	☐	☐

2 marks

19. Look at this equation.

$$y = \frac{60}{\pm\sqrt{x - 10}}$$

(a) Find y when $x = 19$

There are two answers. Write them both.

$y =$ _____ or $y =$ _____

(b) You cannot find a value for y when $x = 10$

Explain why not.

1 mark

(c) There are other values of x for which you cannot find a value for y

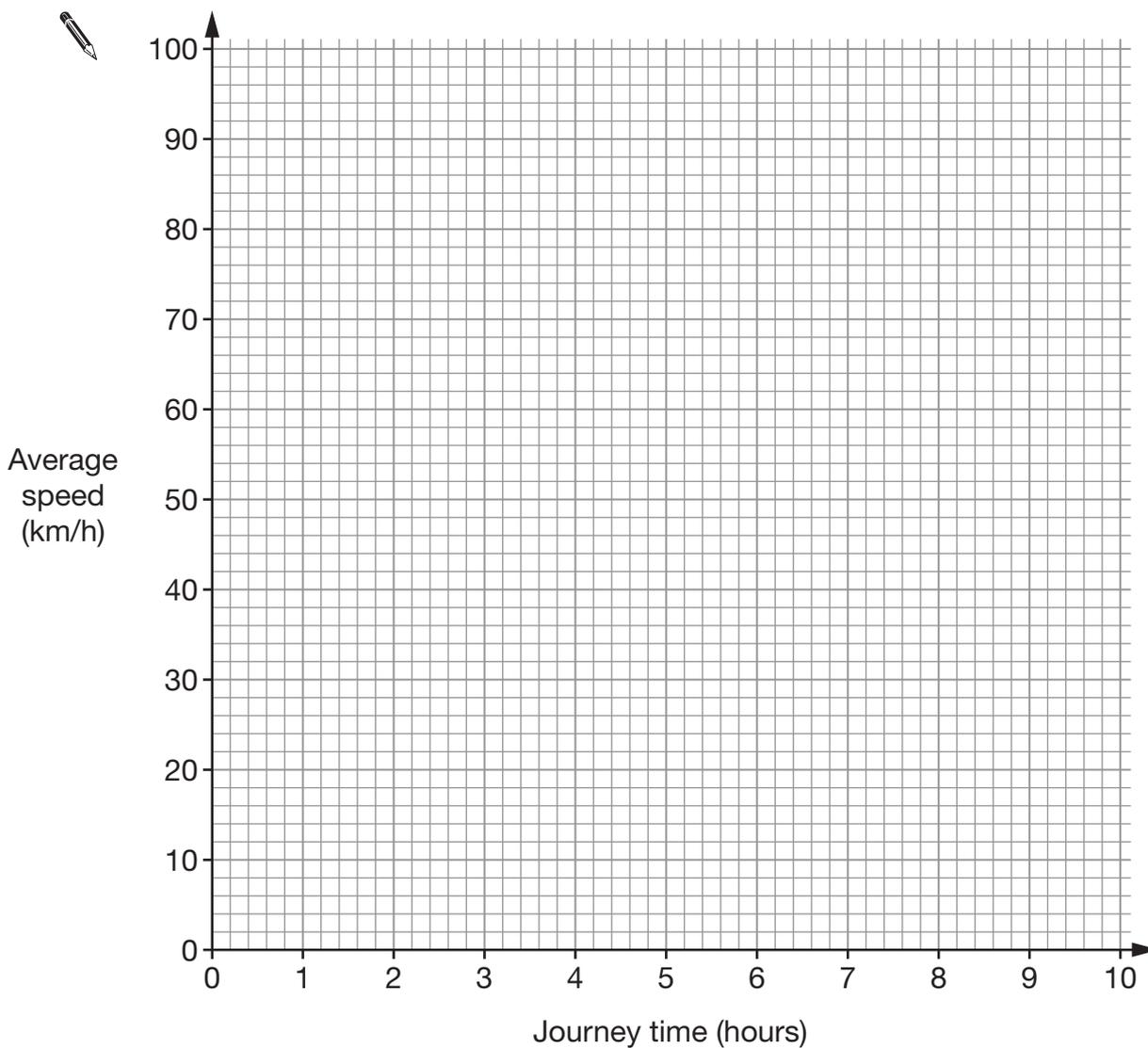Give one such value of x

$x =$ _____

1 mark

20.   This question is about a journey between two towns that are **100 km** apart.

When the journey time is 2 hours, the average speed is 50 km/h.

The journey time is different at different average speeds.

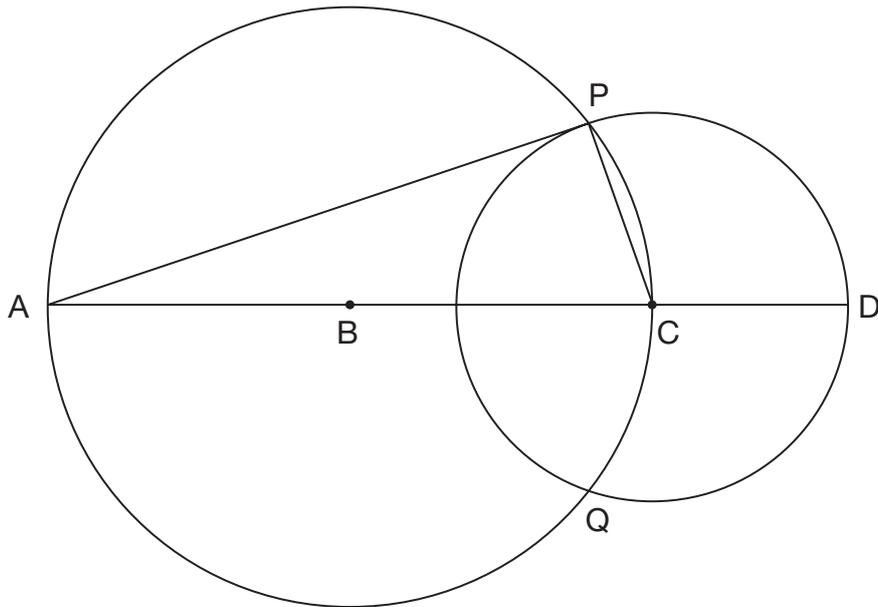Show the relationship between journey time and average speed by drawing a graph on the grid below.

Average
speed
(km/h)

Journey time (hours)

3 marks

21. The diagram shows two circles that intersect at P and Q.

B is the centre of the larger circle.

C is the centre of the smaller circle.

ABCD is a straight line.

Prove that the line through A and P is a **tangent** of the smaller circle.

END OF TEST