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, ruler, a pair of compasses, tracing paper and mirror (optional).
- 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
\[
\text{Area} = \frac{1}{2} (a + b)h
\]

Prism
Volume = area of cross-section \times \text{length}
1. (a) The number chain below is part of a **doubling** number chain.
   Fill in the two missing numbers.
   
   ![Doubling Number Chain Diagram]

   1 mark

(b) The number chain below is part of a **halving** number chain.
   Fill in the two missing numbers.
   
   ![Halving Number Chain Diagram]

   1 mark
2. A teacher has five number cards.

She says:

‘I am going to take a card at random.

Each card shows a different positive whole number.

It is certain that the card will show a number less than 10
It is impossible that the card will show an even number.’

What numbers are on the cards?

[5 blank boxes]

3. Work out

\[ 1048 + 208 = \ldots \ldots \ldots \ldots \]

1 mark

\[ 4828 - 480 = \ldots \ldots \ldots \ldots \]

1 mark
4. When the wind blows it feels colder.
The stronger the wind, the colder it feels.

Fill in the gaps in the table.
The first row is done for you.

<table>
<thead>
<tr>
<th>Wind strength</th>
<th>Temperature out of the wind (°C)</th>
<th>How much colder it feels in the wind (°C)</th>
<th>Temperature it feels in the wind (°C)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moderate breeze</td>
<td>5</td>
<td>7 degrees colder</td>
<td>−2</td>
</tr>
<tr>
<td>Fresh breeze</td>
<td>−8</td>
<td>11 degrees colder</td>
<td>.....</td>
</tr>
<tr>
<td>Strong breeze</td>
<td>−4</td>
<td>..... degrees colder</td>
<td>−20</td>
</tr>
<tr>
<td>Gale</td>
<td>.....</td>
<td>23 degrees colder</td>
<td>−45</td>
</tr>
</tbody>
</table>

---
5. Some pupils throw two fair six-sided dice. Each dice is numbered 1 to 6. One dice is blue. The other dice is red.

Anna’s dice show **blue 5, red 3**

Her total score is **8**

The cross on the grid shows her throw.

(a) Carl’s total score is **6**

What numbers could Carl’s dice show?

Put crosses on the grid to show all the different pairs of numbers Carl’s dice could show.
(b) The pupils play a game.

**Winning rule:** Win a point if the number on the **blue** dice is the **same as** the number on the **red** dice.

Put crosses on the grid to show all the different winning throws.

(c) The pupils play a different game.

The grid shows all the different winning throws.

Complete the sentence below to show the winning rule.

**Winning rule:** Win a point if the number on the **blue** dice is
6. Look at the hexagon and the triangle.

(a) Do the hexagon and triangle have the **same area**?
   Tick (✓) Yes or No.

   Yes [ ]  No [x]

   Explain your answer.

(b) Do the hexagon and triangle have the **same perimeter**?
   Tick (✓) Yes or No.

   Yes [ ]  No [x]

   Explain your answer.
7. There are two small tins and one big tin on these scales. The two small tins each have the same mass. The mass of the big tin is 2.6kg. What is the mass of one small tin? Show your working.

The two small tins each have the same mass. The mass of the big tin is **2.6kg**.

What is the mass of one small tin? Show your working.

2 marks
8. I have a square grid and two rectangles.

I make a pattern with the grid and the two rectangles:

The pattern has no lines of symmetry.

(a) Put both rectangles on the grid to make a pattern with two lines of symmetry.
You must shade the rectangles.
(b) Put both rectangles on the grid to make a pattern with **only one** line of symmetry.

You must **shade** the rectangles.

(c) Put both rectangles on the grid to make a pattern with **rotation** symmetry of **order 2**

You must **shade** the rectangles.

9. Simplify these expressions.

\[5k + 7 + 3k = \quad .................\]  

\[k + 1 + k + 4 = \quad .................\]
10. A car park shows this sign.

![Car Parking Sign]

Complete the table to show all the different ways of paying exactly 70p.

<table>
<thead>
<tr>
<th>Number of 10p coins</th>
<th>Number of 20p coins</th>
<th>Number of 50p coins</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

2 marks
11. Fill in the missing numbers.

\[
\frac{1}{2} \text{ of } 20 = \frac{1}{4} \text{ of } \ldots \ldots \ldots \text{ 1 mark}
\]

\[
\frac{3}{4} \text{ of } 100 = \frac{1}{2} \text{ of } \ldots \ldots \ldots \text{ 1 mark}
\]

\[
\frac{1}{3} \text{ of } 60 = \frac{2}{3} \text{ of } \ldots \ldots \ldots \text{ 1 mark}
\]
12. On this square grid, A and B must not move.

When C is at (6, 6), triangle ABC is isosceles.

(a) C moves so that triangle ABC is still isosceles.

Where could C have moved to?
Write the coordinates of its new position.

( , )

(b) Then C moves so that triangle ABC is isosceles and right-angled.

Where could C have moved to?
Write the coordinates of its new position.

( , )
13. (a) There are four people in Sita’s family. 
Their shoe sizes are 4, 5, 7 and 10 

What is the **median** shoe size in Sita’s family?

(b) There are **three** people in John’s family. 
The **range** of their shoe sizes is 4 
Two people in the family wear shoe size 6 
John’s shoe size is **not 6** and it is **not 10** 

What is John’s shoe size?
14. **Use compasses** to construct a triangle that has sides **8cm**, **6cm** and **7cm**.

Leave in your construction lines.

One side of the triangle is drawn for you.
15. (a) I pay £16.20 to travel to work each week.
   I work for 45 weeks each year.
   How much do I pay to travel to work each year?
   Show your working.

   £

   2 marks

(b) I could buy one season ticket that would let me travel for all 45 weeks.
   It would cost £630
   How much is that per week?

   £

   1 mark
16. Solve these equations.

Show your working.

\[ 8k - 1 = 15 \]

\[ k = \ldots \] 1 mark

\[ 2m + 5 = 10 \]

\[ m = \ldots \] 1 mark

\[ 3t + 4 = t + 13 \]

\[ t = \ldots \] 2 marks
17. The drawing shows how shapes A and B fit together to make a right-angled triangle.

Work out the size of each of the angles in shape B. Write them in the correct place in shape B below.
18. (a) Add \( \frac{6}{10} \) and \( \frac{6}{5} \)

Now use an arrow (↑) to show the result on the number line.

(b) How many \textbf{sixths} are there in \( 3\frac{1}{3} \)?

(c) Work out \( 3\frac{1}{3} \div \frac{5}{6} \)

Show your working.
19. (a) The diagram shows a rectangle.
   Its dimensions are $3a$ by $5b$

   Write **simplified expressions** for the area and the perimeter of this rectangle.

   Area: ........................................
   Perimeter: .................................
   1 mark
   1 mark

(b) A different rectangle has **area** $12a^2$ and **perimeter** $14a$
    What are the dimensions of this rectangle?

   Dimensions: ........... by ...........
   1 mark
20. Here are six number cards.

\[ \begin{array}{cccccc}
1 & 2 & 3 & 4 & 5 & 6 \\
\end{array} \]

(a) Arrange these six cards to make the calculations below.

The first one is done for you.

\[ \begin{align*}
939 &= \begin{array}{ccc}
4 & 2 & 3 \\
\end{array} + \begin{array}{ccc}
5 & 1 & 6 \\
\end{array} \\
1164 &= \begin{array}{ccc}
\text{缺} & \text{缺} & \text{缺} \\
\end{array} + \begin{array}{ccc}
\text{缺} & \text{缺} & \text{缺} \\
\end{array} \quad \text{1 mark}
\end{align*} \]

\[ \begin{align*}
750 &= \begin{array}{ccc}
\text{缺} & \text{缺} & \text{缺} \\
\end{array} + \begin{array}{ccc}
\text{缺} & \text{缺} & \text{缺} \\
\end{array} \quad \text{1 mark}
\end{align*} \]

(b) Now arrange the six cards to make a difference of 115

\[ \begin{align*}
115 &= \begin{array}{ccc}
\text{缺} & \text{缺} & \text{缺} \\
\end{array} - \begin{array}{ccc}
\text{缺} & \text{缺} & \text{缺} \\
\end{array} \quad \text{1 mark}
\end{align*} \]
21. The diagram shows a square drawn on a square grid.

The points A, B, C and D are at the vertices of the square.

Match the correct line to each equation.

One is done for you.

- $y = 0$ (Line through C and D)
- $x = 0$ (Line through A and C)
- $x + y = 2$ (Line through B and D)
- $x + y = -2$ (Line through A and B)
22. The scatter graph shows information about trees called poplars.

(a) What does the scatter graph show about the relationship between the diameter of the tree trunk and the height of the tree?
(b) The height of a different tree is 3 m. The diameter of its trunk is 5 cm.

Use the graph to explain why this tree is not likely to be a poplar.

(c) Another tree is a poplar. The diameter of its trunk is 3.2 cm.

Estimate the height of this tree.

............. m
END OF TEST