Mathematics test

Paper 2

Calculator 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 may use a calculator for any question in this test.
- You will need: pen, pencil, rubber, ruler, tracing paper and mirror (optional) and a 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.

For marker’s use only

<table>
<thead>
<tr>
<th>Total marks</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Borderline check</td>
<td></td>
</tr>
</tbody>
</table>
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 \( \times \) length
1. The square grid shows a rectangle reflected in **two mirror lines**.

On the square grid below, show the **triangle** reflected in the two mirror lines.
2. (a) These rules show how to get from one number to the next in these sequences.

Use the rules to write the next two numbers in each sequence.

| Rule: Add 8 | 4 | 12 |   |   |
| Rule: Multiply by 3 | 4 | 12 |   |   |
| Rule: Divide by 4 then add 11 | 4 | 12 |   |   |

(b) A sequence of numbers starts like this:

30 22 18

Could the rule be Subtract 8?

Yes [ ] No [ ]

Explain your answer.
3. A bottle contains **250ml** of cough mixture.

**One adult** and **one child** need to take cough mixture 4 **times a day** every day for **5 days**.

Will there be enough cough mixture in the bottle?

Explain your answer.
4. The grids in this question are centimetre square grids.

For each shape on the left, draw a rectangle that has the same area.
The first one is done for you.
5. The table shows the average length of pregnancy for different mammals.

<table>
<thead>
<tr>
<th>Mammal</th>
<th>Average length of pregnancy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dolphin</td>
<td>276 days</td>
</tr>
<tr>
<td>Horse</td>
<td>337 days</td>
</tr>
<tr>
<td>Seal</td>
<td>350 days</td>
</tr>
<tr>
<td>Whale</td>
<td>365 days</td>
</tr>
<tr>
<td>Camel</td>
<td>406 days</td>
</tr>
<tr>
<td>Elephant</td>
<td>640 days</td>
</tr>
</tbody>
</table>

Use the information in the table to answer these questions.

(a) Which mammal has an average length of pregnancy of 1 year?

(b) Which mammal has an average length of pregnancy of 50 weeks?

(c) A human has an average length of pregnancy of about 9 months. Which other mammal also has an average length of pregnancy of about 9 months?
6. Write the missing numbers in the boxes.

\[ 4 \times \underline{} + 20 = 180 \]

1 mark

\[ 4 \times 20 + \underline{} = 180 \]

1 mark

\[ 4 \times \underline{} - 20 = 180 \]

1 mark
7. I use two congruent trapeziums to make the shapes below. Tick (✓) all the shapes that are **hexagons**.

- Hexagon
- Trapezium
- Trapezium
- Trapezium
8. The pupils in a class had a sponsored swim. They collected £429.24

(a) How much is £429.24 to the nearest hundred pounds?

£

1 mark

(b) How much is £429.24 to the nearest ten pounds?

£

1 mark
9. I buy **12 packets** of cat food in a box.

The table shows the different varieties in the box.

<table>
<thead>
<tr>
<th>Variety</th>
<th>Number of packets</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cod</td>
<td>3</td>
</tr>
<tr>
<td>Salmon</td>
<td>3</td>
</tr>
<tr>
<td>Trout</td>
<td>3</td>
</tr>
<tr>
<td>Tuna</td>
<td>3</td>
</tr>
</tbody>
</table>

(a) I am going to take out a packet at random from the box.

What is the **probability** that it will be **cod**?

(b) My cat eats **all** the packets of **cod**.

I am going to take out a packet at random from the ones left in the box.

What is the **probability** that it will be **salmon**?

(c) A different type of cat food has **10 packets** in a box.

The probability that the variety is **chicken** is **0.7**

What is the probability that the variety is **not** chicken?
10. Wine gums are sweets that are made in different colours.

Pupils tested whether people can taste the difference between black wine gums and other wine gums.

The percentage bar charts show three pupils’ results.

**Key:**
- Cannot taste the difference
- Can taste the difference

<table>
<thead>
<tr>
<th></th>
<th>Ravi's results</th>
<th>Sita's results</th>
<th>Tina's results</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td></td>
<td>80%</td>
<td>80%</td>
<td>80%</td>
</tr>
<tr>
<td></td>
<td>60%</td>
<td>60%</td>
<td>60%</td>
</tr>
<tr>
<td></td>
<td>40%</td>
<td>40%</td>
<td>40%</td>
</tr>
<tr>
<td></td>
<td>20%</td>
<td>20%</td>
<td>20%</td>
</tr>
<tr>
<td></td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
</tr>
</tbody>
</table>

Ravi asked 50 people
Sita asked 100 people
Tina asked 200 people
Values

(a) Complete the table.

<table>
<thead>
<tr>
<th></th>
<th>Number of people who were tested</th>
<th>Number of people who can taste the difference</th>
<th>Number of people who cannot taste the difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ravi</td>
<td>50</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sita</td>
<td>100</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tina</td>
<td>200</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(b) Explain why Tina’s results are likely to be more reliable than Ravi’s or Sita’s.

11. Look at the three expressions below.

\[ 8 + k \quad 3k \quad k^2 \]

When \( k = 10 \), what is the value of each expression?

\[ 8 + k = \quad 3k = \quad k^2 = \]

2 marks
Some statements in the table are true. Some are false.

Beside each statement, write **true** or **false**.

For **true** statements you must **draw an example**.

The first one is done for you.

<table>
<thead>
<tr>
<th>Statement</th>
<th>Write true or false.</th>
<th>If true, draw an example.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Some triangles have one right angle and two acute angles.</td>
<td>true</td>
<td></td>
</tr>
<tr>
<td>Some triangles have three right angles.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Some triangles have three acute angles.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Some triangles have one obtuse angle and two acute angles.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Some triangles have two obtuse angles and one acute angle.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

3 marks
13. A shop sells toilet rolls.
   You can buy them in packs of 9 or packs of 6

Pack of 9 toilet rolls
£3.90

Pack of 6 toilet rolls
£2.50

Which pack gives you better value for money?

You must show your working.
14. Three different types of woodpecker live in Britain.  
The pictogram shows information about the numbers of each type.

<table>
<thead>
<tr>
<th>Type</th>
</tr>
</thead>
</table>
| A    | great spotted woodpecker  
| B    | lesser spotted woodpecker  
| C    | green woodpecker  

Key: 🦚 represents 10,000 woodpeckers

(a) Complete the table below to show the percentages of each type of woodpecker.

<table>
<thead>
<tr>
<th>Type</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1 mark
(b) The ratio of type A : type B woodpeckers is 6 : 1

What is the ratio of type B : type C woodpeckers?

_____ : _____

1 mark

15. Write the missing numbers in the boxes.

120mm is the same as _____ cm

1 mark

120cm is the same as _____ m

1 mark

120m is the same as _____ km

1 mark
16. Look at the diagram, made from four straight lines. The lines marked with arrows are parallel.

![Diagram of four angles with angles marked as a, b, c, and d.]

Work out the sizes of the angles marked with letters.

\[a = \underline{\quad}^\circ\quad b = \underline{\quad}^\circ\quad c = \underline{\quad}^\circ\quad d = \underline{\quad}^\circ\]

3 marks
17. Look at this equation.

\[ 3a + 20 = 4a + k \]

(a) If \( a = 15 \), find the value of \( k \)

\[ k = \quad \text{(1 mark)} \]

(b) If \( a = -15 \), find the value of \( k \)

\[ k = \quad \text{(1 mark)} \]
18. Each shape below is made from **five cubes** that are joined together.

Complete the missing diagrams below.

<table>
<thead>
<tr>
<th>Shape drawn on an isometric grid</th>
<th>View from above of the shape drawn on a square grid</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1.png" alt="Shape 1" /></td>
<td><img src="image2.png" alt="View 1" /></td>
</tr>
<tr>
<td><img src="image3.png" alt="Shape 2" /></td>
<td><img src="image4.png" alt="View 2" /></td>
</tr>
<tr>
<td><img src="image5.png" alt="Shape 3" /></td>
<td><img src="image6.png" alt="View 3" /></td>
</tr>
<tr>
<td><img src="image7.png" alt="Shape 4" /></td>
<td><img src="image8.png" alt="View 4" /></td>
</tr>
</tbody>
</table>

**2 marks**

**1 mark**

**2 marks**
19. Look at these pairs of number sequences.

The second sequence is formed from the first sequence by adding a number or multiplying by a number.

Work out the missing \( n \)th terms.

(a) 5, 9, 13, 17, … \( n \)th term is \( 4n + 1 \)

(b) 12, 18, 24, 30, … \( n \)th term is \( 6n + 6 \)

(c) 2, 7, 12, 17, … \( n \)th term is \( 5n - 3 \)
20. Look at the square grids.
Each diagram shows an enlargement of scale factor 2

The centre of this enlargement is marked with a cross.

Where is the centre of enlargement in these diagrams?
Mark each one with a cross.
21. Kate asked people if they read a daily newspaper.

Then she wrote this table to show her results.

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>No</strong></td>
<td><strong>80 people</strong></td>
<td><strong>40%</strong></td>
</tr>
<tr>
<td><strong>Yes</strong></td>
<td><strong>126 people</strong></td>
<td><strong>60%</strong></td>
</tr>
</tbody>
</table>

The values in the table *cannot* all be correct.

The error could be in the number of people.

Complete each table to show what the correct numbers could be.

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>No</strong></td>
<td><strong>80 people</strong></td>
<td><strong>40%</strong></td>
</tr>
<tr>
<td><strong>Yes</strong></td>
<td>_____ people</td>
<td>60%</td>
</tr>
</tbody>
</table>

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
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<tbody>
<tr>
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</tr>
<tr>
<td><strong>Yes</strong></td>
<td><strong>126 people</strong></td>
<td><strong>60%</strong></td>
</tr>
</tbody>
</table>
22. The graph shows information about the diameters and heights of a sample of three types of tomato.

The dotted lines on the graph can be used to decide which type of tomato each point is likely to represent.

(a) The diameter of a tomato of type C is 11 cm.

What would you expect its height to be?

 cm

1 mark
Expressions

(b) The diameter of a different tomato is 3.2 cm. Its height is 5.8 cm.
Which of the three types of tomato is it most likely to be?

☐ A   ☐ B   ☐ C

Explain your answer.

1 mark

(c) Which type of tomato is most nearly **spherical** in shape?

☐ A   ☐ B   ☐ C

Explain your answer.

1 mark

23. Multiply out this expression.
Write your answer as simply as possible.

\[ 5(x + 2) + 3(7 + x) \]
END OF TEST
END OF TEST