Mathematics test

Paper 1

Calculator not allowed

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 table shows the approximate populations of five different places.

<table>
<thead>
<tr>
<th>Place</th>
<th>Approximate population</th>
</tr>
</thead>
<tbody>
<tr>
<td>London</td>
<td>7 000 000</td>
</tr>
<tr>
<td>Sheffield</td>
<td>700 000</td>
</tr>
<tr>
<td>Harrogate</td>
<td>70 000</td>
</tr>
<tr>
<td>Ash Vale</td>
<td>7 000</td>
</tr>
<tr>
<td>Binbrook</td>
<td>700</td>
</tr>
</tbody>
</table>

(a) Which of the places has a population of about seventy thousand?

____________________________

(b) Use the table to complete these sentences.

The population of Harrogate is about 10 times as big as the population of ____________________

The population of ____________________ is about 100 times as big as the population of Harrogate.

The population of Sheffield is about ______ times as big as the population of Ash Vale.
2. Here are the rules for a number grid.

This number is the **sum** of the numbers in the middle row.

This number is the **product** of the numbers in the middle row.

Use the rules to write the missing numbers in these number grids.
3. The lengths of babies are measured at different ages. The graph shows the longest and shortest a baby boy is likely to be.

(a) Write the missing numbers below.

A baby boy is **8 weeks old**.

The **longest** he is likely to be is about ________ cm.

The **shortest** he is likely to be is about ________ cm.

(b) A **34 week** old baby boy is **72 cm** long.

Put a cross on the graph to show this information.
Cards for fractions

4. Here are six number cards.

\[2\quad 4\quad 6\quad 8\quad 10\quad 12\]

(a) Choose two of these six cards to make a fraction that is equivalent to \(\frac{1}{3}\)

(b) Choose two of these six cards to make a fraction that is greater than \(\frac{1}{2}\) but less than 1
5. The shape below is a regular pentagon.
All five sides are exactly the same length.

Measure accurately one of the sides, then work out the perimeter of the pentagon.

Perimeter = cm

1 mark

1 mark

1 mark
6. (a) A three-digit number is a multiple of 4

What could the number be?
Give an example.

Now give a different example.

(b) A two-digit number is a factor of 100

What could the number be?
Give an example.

Now give a different example.
7. (a) Write the answer to this calculation.

\[
\begin{array}{ccc}
2.5 & + & 2.5 \\
+ & + & =
\end{array}
\]

(b) Now write a number in each box to make this calculation correct.

The three numbers must be the same.

\[
\begin{array}{ccc}
\boxed{2.5} & + & \boxed{2.5} \\
+ & + & = \boxed{4.5}
\end{array}
\]

8. Sam says:

The only four-sided shape with four right angles is a square.

Is Sam correct?

\[\square \text{Yes} \quad \square \text{No}\]

Explain your answer.
9. (a) When \( x = 8 \), what is the value of \( 5x \)?

Tick (√) the correct box below.

\[
\begin{array}{cccc}
\square & 5 & \square & 13 \\
\square & 40 & \square & 58 \\
\square & \text{None of these} \\
\end{array}
\]

1 mark

(b) When \( x = 8 \), what is the value of \( 3x - x \)?

Tick (√) the correct box below.

\[
\begin{array}{cccc}
\square & 0 & \square & 3 \\
\square & 16 & \square & 30 \\
\square & \text{None of these} \\
\end{array}
\]

1 mark

(c) When \( x = 8 \), what is the value of \( x^2 \)?

Tick (√) the correct box below.

\[
\begin{array}{cccc}
\square & 8 & \square & 10 \\
\square & 16 & \square & 64 \\
\square & \text{None of these} \\
\end{array}
\]

1 mark
10. Lisa uses a grid to multiply 23 by 15

\[
\begin{array}{ccc}
\times & 20 & 3 \\
10 & 200 & 30 \\
5 & 100 & 15 \\
\end{array}
\]

\[
200 + 100 + 30 + 15 = 345
\]

Answer: \(345\)

Now Lisa multiplies two different numbers.
Complete the grid, then give the answer below.

\[
\begin{array}{ccc}
\times & \_ & 40 & 3 \\
30 & \_ & \_ & \_ \\
\_ & 600 & \_ & 18 \\
\end{array}
\]

Answer: \_

3 marks
11. **Fred has a bag of sweets.**

<table>
<thead>
<tr>
<th>Contents</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 yellow sweets</td>
</tr>
<tr>
<td>5 green sweets</td>
</tr>
<tr>
<td>7 red sweets</td>
</tr>
<tr>
<td>4 purple sweets</td>
</tr>
<tr>
<td>1 black sweet</td>
</tr>
</tbody>
</table>

He is going to take a sweet from the bag at random.

(a) What is the **probability** that Fred will get a **black** sweet?

(b) Write the missing **colour** in the sentence below.

The probability that Fred will get a _____________ sweet is \( \frac{1}{4} \)

1 mark
12. Write a number in each box to make the calculations correct.

\[ \square + \square = -8 \]  

\[ \square - \square = -8 \]  

1 mark

1 mark

13. A rectangle has an area of 24cm\(^2\)

How long could the sides of the rectangle be?

Give three different examples.

\( \square \) cm and \( \square \) cm

\( \square \) cm and \( \square \) cm

\( \square \) cm and \( \square \) cm

2 marks
14. (a) Write the missing numbers.

50% of 80 =

5% of 80 =

1% of 80 =

(b) Work out 56% of 80

You can use part (a) to help you.
15. Look at this equation.

\[ y = 2x + 10 \]

(a) When \( x = 4 \), what is the value of \( y \)?

(b) When \( x = -4 \), what is the value of \( y \)?

(c) Which equation below gives the same value of \( y \) for both \( x = 4 \) and \( x = -4 \)?

Put a ring round the correct equation.

\[ y = 2x \quad y = 2 + x \quad y = x^2 \quad y = \frac{x}{2} \]
16. The diagram shows four different sized barrels.

<table>
<thead>
<tr>
<th>Barrel A</th>
<th>Barrel B</th>
<th>Barrel C</th>
<th>Barrel D</th>
</tr>
</thead>
<tbody>
<tr>
<td>holds 54 gallons</td>
<td>holds 36 gallons</td>
<td>holds 18 gallons</td>
<td>holds 9 gallons</td>
</tr>
</tbody>
</table>

Write the missing fractions as simply as possible.

The first one is done for you.

Barrel C holds $\frac{1}{2}$ of the amount barrel B holds.

Barrel D holds _______ of the amount barrel B holds.

Barrel C holds _______ of the amount barrel A holds.

Barrel B holds _______ of the amount barrel A holds.

2 marks
17. The line on the graph below represents a speed of 60km/hour.

(a) Draw a line on the graph to represent a speed of 30km/hour. Label the line by writing 30km/hour.

(b) Now draw a line on the graph to represent a speed of 120km/hour. Label the line by writing 120km/hour.
18. (a) In this design, the ratio of **grey to black** is **3 : 1**

What **percentage** of the design is **black**?

(b) In this design, **60%** is **grey** and the rest is **black**.

What is the ratio of **grey to black**?

Write your ratio in its simplest form.
19. In a bag there are only red, blue and green counters.

(a) I am going to take a counter out of the bag at random.

Complete the table below.

<table>
<thead>
<tr>
<th>Colour of counters</th>
<th>Number of counters</th>
<th>Probability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Red</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Blue</td>
<td></td>
<td>$\frac{1}{5}$</td>
</tr>
<tr>
<td>Green</td>
<td>6</td>
<td></td>
</tr>
</tbody>
</table>

(b) Before I take a counter out of the bag, I put one extra blue counter into the bag.

What effect does this have on the probability that I will take a red counter?

Tick (✓) the correct box.

- The probability has increased.
- The probability has decreased.
- The probability has stayed the same.
- It is impossible to tell.
20. The diagram shows three straight lines.

Work out the sizes of angles $a$, $b$ and $c$

Give reasons for your answers.

$a = \underline{\hspace{2cm}} ^\circ$ because _____________________________

$b = \underline{\hspace{2cm}} ^\circ$ because _____________________________

$c = \underline{\hspace{2cm}} ^\circ$ because _____________________________
21. (a) Some of the fractions below are smaller than $\frac{1}{9}$

Tick (√) them.

\[
\begin{array}{cccccc}
\boxed{\frac{1}{10}} & \boxed{\frac{4}{9}} & \boxed{\frac{1}{2}} & \boxed{\frac{1}{100}} & \boxed{\frac{1}{8}}
\end{array}
\]

1 mark

(b) To the nearest per cent, what is $\frac{1}{9}$ as a percentage?

Tick (√) the correct percentage.

\[
\begin{array}{cccc}
\boxed{0.9\%} & \boxed{9\%} & \boxed{10\%} & \boxed{11\%} & \boxed{19\%}
\end{array}
\]

1 mark

(c) Complete the sentence below by writing a fraction.

\[
\frac{1}{9} \text{ is half of } \frac{1}{9}.
\]

1 mark
22. Solve this equation.

\[ 2(2n + 5) = 12 \]

\[ n = \ldots \]

2 marks

23. Kevin is working out the area of a circle with radius 4

He writes:

\[ \text{Area} = \pi \times 8 \]

Explain why Kevin's working is wrong.

1 mark
24. Write the missing numbers in these fraction sums.

\[
\begin{align*}
\frac{1}{4} + \frac{8}{8} &= 1 \\
\frac{1}{3} + \frac{8}{3} &= 1
\end{align*}
\]

1 mark

25. Look at the cube.

The area of a face of the cube is \(9x^2\).

Write an expression for the total surface area of the cube.

Write your answer as simply as possible.
END OF TEST