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.
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. (a) Join all the pairs of numbers that **add** together to equal 1

   The first one is done for you.

   

<table>
<thead>
<tr>
<th>0.1</th>
<th>0.99</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.11</td>
<td>0.9</td>
</tr>
<tr>
<td>0.01</td>
<td>0.999</td>
</tr>
<tr>
<td>0.91</td>
<td>0.89</td>
</tr>
<tr>
<td>0.001</td>
<td>0.09</td>
</tr>
</tbody>
</table>

   2 marks

(b) Now join all the pairs of numbers that **multiply** to equal 1

   The first one is done for you.

   

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.5</td>
<td>4</td>
</tr>
<tr>
<td>0.25</td>
<td>1</td>
</tr>
<tr>
<td>0.1</td>
<td>20</td>
</tr>
<tr>
<td>0.05</td>
<td>10</td>
</tr>
</tbody>
</table>

   2 marks
2. Paul has 15 T-shirts.

The information shows the colours of his T-shirts.

- 5 black
- 3 white
- 3 red
- 2 dark blue
- 1 light blue
- 1 yellow

Paul is going to take one of his T-shirts at random.

(a) What is the probability that the T-shirt will be red?

(b) What is the probability that the T-shirt will not be black?

(c) He takes one of his blue T-shirts at random.

What is the probability that the T-shirt is light blue?
3. Zak has some water in a jug.

He pours this water into the jug below.

Draw the correct level of the water on the jug.
4. Lisa has some boxes that are all cubes of the same size. She uses four of the boxes to make a pile with a height of 72 cm. She puts one more box on top of the pile.

Work out the height of the pile of five boxes.

\[ \hline \text{cm} \\hline \]
5. (a) Work out 5% of 360

\[
\text{\underline{1 mark}}
\]

(b) Work out 15% of 360

You can use part (a) to help you.

\[
\text{\underline{1 mark}}
\]
6. In these number grids, two numbers are added to give the number below.

Example:

\[
\begin{array}{c|c}
13 & 12 \\
\hline
& 25 \\
\end{array}
\]

\[13 + 12 = 25\]

Write numbers in the number grids below to make them correct.

\[
\begin{array}{c|c|c}
\text{22} & & \\
\hline
35 & 17 & \\
\hline
& & \\
\end{array}
\]

1 mark

\[
\begin{array}{c|c|c|c}
7 & & & \\
\hline
& & & 12 \\
\end{array}
\]

1 mark
7. Look at the right-angled triangle ABC.

The square fits exactly inside the triangle.

Work out the sizes of angles $x$, $y$ and $z$

$x = \underline{\phantom{1000}}^\circ$

$y = \underline{\phantom{1000}}^\circ$

$z = \underline{\phantom{1000}}^\circ$

3 marks
8. Look at these equations.

\[ 11 = 6 + a \]
\[ a + 7 = 10 + b \]

Use both equations to work out the value of \( b \)

\[ b = \]  

2 marks

9. Match each instruction on the left with an instruction on the right that has the same effect.

The first one is done for you.

- Add 0
- Add 2
- Subtract 2
- Subtract 0
- Add \( \frac{1}{2} \)
- Subtract \( \frac{1}{2} \)
- Add –2
- Subtract –2

1 mark
10. Pupils are investigating oak leaves. They want to collect a sample of oak leaves. Here is their plan for how to collect the sample.

<table>
<thead>
<tr>
<th>Plan</th>
</tr>
</thead>
<tbody>
<tr>
<td>Choose one oak tree.</td>
</tr>
<tr>
<td>Take 10 leaves from the lowest branches of the tree.</td>
</tr>
</tbody>
</table>

Give two reasons why this sample of leaves may not be representative of all oak leaves.

First reason:

Second reason:
11. Look at the rectangle.

```
x
```

The total area of the rectangle is $40 \text{cm}^2$

Work out lengths $x$ and $y$

$x = \underline{\text{cm}} \quad y = \underline{\text{cm}}$

2 marks
12. (a) Bags A and B contain some counters.

Bag A: \(6y + 1\) counters

Bag B: \(4y + 7\) counters

The number of counters in each bag is the same.

Work out the value of \(y\)

(b) Bag C contains more counters than bag D.

Bag C: \(4k\) counters

Bag D: \(k + 12\) counters

What is the smallest possible value of \(k\)?
13. Gary took part in a quiz show and won a **million pounds**.

He spent **£20 000** on a holiday.

Then he spent **half** of the **money left** on a house.

How much did Gary’s house cost?
14. Look at these two scatter graphs. They are both drawn using the same scale.

Graph A

Graph B

(a) Which scatter graph shows **positive** correlation?

- [ ] A
- [ ] B

Explain your answer.

(b) Which scatter graph shows **stronger** correlation?

- [ ] A
- [ ] B

Explain your answer.
15. Look at the sequence of shapes on a square grid.

The table shows information about these shapes.

<table>
<thead>
<tr>
<th>Shape number</th>
<th>Base $B$</th>
<th>Height $H$</th>
<th>Area $A$</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>4</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>2</td>
<td>4</td>
<td>3</td>
<td>6</td>
</tr>
<tr>
<td>3</td>
<td>4</td>
<td>4</td>
<td>8</td>
</tr>
<tr>
<td>4</td>
<td>4</td>
<td>5</td>
<td>10</td>
</tr>
</tbody>
</table>

Rules connect $N$, $B$, $H$ and $A$.

Write one missing letter in each space below to complete the rule.

\[
H = \underline{} + 1
\]

\[
A = \underline{} \times 2
\]

\[
\underline{} = 2N + 2
\]
16. Look at this information.

\[
\frac{27}{40} = 0.675
\]

\[
\frac{29}{40} = 0.725
\]

Use this information to write the missing **decimals** below.

\[
\frac{31}{40} = \underline{\text{_____}}
\]

1 mark

\[
\frac{23}{40} = \underline{\text{_____}}
\]

1 mark
17. In this question, \( n \) stands for any \textbf{whole number}.

(a) For the expression \( 2n \), tick (\( \checkmark \)) the correct statement below.

- \( 2n \) must be odd.
- \( 2n \) must be even.
- \( 2n \) could be odd or even.

Explain your answer.

(b) For the expression \( 3n \), tick (\( \checkmark \)) the correct statement below.

- \( 3n \) must be odd.
- \( 3n \) must be even.
- \( 3n \) could be odd or even.

Explain your answer.
18. (a) On this necklace the ratio of black beads to white beads is \(1 : 3\)

How many more black beads do you need to add to make the ratio of black to white \(3 : 1\)?

\[
\underline{\text{black beads}} \quad \underline{1 \text{ mark}}
\]

(b) Here is the necklace again.

How many more black beads and white beads do you need to add to make the ratio of black to white \(3 : 2\)?

\[
\underline{\text{black beads}} \quad \underline{\text{white beads}} \quad \underline{1 \text{ mark}}
\]
19. Show that the difference between $3^2$ and $3^3$ is 18

20. Sophie says:

If $n$ represents a prime number, then $2n + 1$ will also represent a prime number.

Use an example to explain why she is wrong.
21. A game has six rounds.

In each round of the game, the player gains points which are added to their total score.

(a) The graph shows Sue’s total score after each round of her game.

![Graph showing Sue's total score after each round](image)

How many points did Sue gain in round 4?

(b) Derek plays the game.

The graph of his total score after each round is a straight line.

What can you say about the number of points Derek gained in each round?
22. Inside the rectangle below is a shaded rhombus.

The vertices of the rhombus are the midpoints of the sides of the rectangle.

What is the area of the shaded rhombus?
23. (a) Sandra is thinking of two numbers.  
Her two numbers have a **negative sum**, but a **positive product**.

Give an example of what her numbers could be.

\[ \text{_________ and _________} \]

1 mark

(b) Mark is also thinking of two numbers.
His two numbers have a **positive sum**, but a **negative product**.

Give an example of what his numbers could be.

\[ \text{_________ and _________} \]

1 mark

24. The mean of five numbers is **10**

I add one more number and the mean is now **11**

What number did I add?
25. Solve these simultaneous equations using an algebraic method.

\[ 3x + 6y = 30 \]
\[ x + 6y = 20 \]

You **must** show your working.

\[ x = \quad y = \quad \]

3 marks
26. This shape is made of four congruent rectangles.

Each rectangle has side lengths $2a$ and $a$

The **perimeter** of the shape is $80 \text{ cm}$.

Work out the **area** of the shape.

\[
\text{cm}^2
\]
27. The diagram shows three congruent circles drawn on an isometric grid.

The area of this equilateral triangle is \( y \)

The area of this segment is \( w \)

Write an expression, using \( y \) and \( w \), for the area \( A \).

\[
\text{Area } A = \quad \text{__________________________}
\]
28. A pupil wrote:

For all numbers $j$ and $k$, 
$(j + k)^2 = j^2 + k^2$

Show that the pupil is **wrong**.
END OF TEST