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 and a pair of compasses.
- 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

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 \( \times \) length
1. Match each expression on the left with the equivalent expression on the right. The first one is done for you.
2. Look at the two triangular prisms.

They are joined to make the new shape below.
3. I am thinking of a number.

My number is a **multiple of 6**

What **three other numbers** must my number be a multiple of?

_________, _________ and ___________
4. There are 25 pupils in a class.

The table shows information about their test results in maths and English.

<table>
<thead>
<tr>
<th></th>
<th>English</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Level 5</td>
</tr>
<tr>
<td>maths</td>
<td></td>
</tr>
<tr>
<td>Level 5</td>
<td>0</td>
</tr>
<tr>
<td>Level 6</td>
<td>2</td>
</tr>
<tr>
<td>Level 7</td>
<td>2</td>
</tr>
<tr>
<td>Level 8</td>
<td>0</td>
</tr>
</tbody>
</table>

(a) How many pupils had the same level in both maths and English?

(b) How many pupils had a higher level in maths than in English?
5. The diagram shows a square with a **perimeter** of **12 cm**.

![Square tiles](image)

Six of these squares fit together to make a rectangle.

![Rectangular tiles](image)

What is the **area** of the **rectangle**?

You **must** give the correct unit with your answer.
6. The table shows whether pupils in a class walk to school.

<table>
<thead>
<tr>
<th></th>
<th>Walk to school</th>
<th>Do not walk to school</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boys</td>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td>Girls</td>
<td>5</td>
<td>10</td>
</tr>
</tbody>
</table>

(a) What percentage of the **boys** walk to school?

\[ \frac{2}{2+8} \times 100 \% \]

\[ \text{\_\_\_\_\_\_\%} \]

1 mark

(b) What percentage of the **pupils** in this class walk to school?

\[ \frac{2+5}{2+8+5+10} \times 100 \% \]

\[ \text{\_\_\_\_\_\%} \]

2 marks
7. A pupil recorded the times of 23 people running the 100 metres. The stem-and-leaf diagram shows the results.

<table>
<thead>
<tr>
<th>13</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>14</td>
<td>1 3 4</td>
</tr>
<tr>
<td>14</td>
<td>7 7 8 9</td>
</tr>
<tr>
<td>15</td>
<td>0 1 1 3 4 4</td>
</tr>
<tr>
<td>15</td>
<td>5 7 8 8 9</td>
</tr>
<tr>
<td>16</td>
<td>2 2 4 4</td>
</tr>
</tbody>
</table>

Key: 13 6 represents 13.6 seconds

(a) Two of the people ran the 100 metres in 14.7 seconds. How many of them ran the 100 metres faster than this?

\[ \text{__________ people} \]

(b) What was the range of times?

\[ \text{__________ seconds} \]

(c) What was the median time?

\[ \text{__________ seconds} \]
8. (a) For each sequence below, tick (✓) the correct box to show if it is increasing, decreasing or neither.

<table>
<thead>
<tr>
<th></th>
<th>increasing</th>
<th>decreasing</th>
<th>neither</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1/3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1/4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1/5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6/13</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7/12</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8/11</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9/10</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1/2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2/4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3/6</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4/8</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3/2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4/3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5/4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6/5</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2 marks

(b) A different sequence has this expression for the \( n \)th term:

\[
\frac{1}{(n + 1)^2}
\]

Work out the first four terms in the sequence.
9. Find the value of $x$

$6 + 2x = x - 6$

$x = \underline{\phantom{0}}$

2 marks

10. Work out

$\frac{1 \times 2 \times 3 \times 4 \times 5}{1 \times 2 \times 3} = \underline{\phantom{0}}$

1 mark

$\frac{(1 \times 2 \times 3 \times 4 \times 5)^2}{(1 \times 2 \times 3)^2} = \underline{\phantom{0}}$

1 mark
11. This map of part of America shows Chicago and New York.

The scale is **1cm to 100 miles**.

Atlanta is further south than both Chicago and New York.

It is **710 miles** from Chicago and **850 miles** from New York.

Use accurate construction to show Atlanta on the map.

You **must** leave in your construction lines.

2 marks
12. Point A has coordinates \((4, 3)\) and point B has coordinates \((10, 3)\).
They lie on a horizontal line.

Another point, \(P\), lies on the same horizontal line.

\(P\) is **twice as far from A** as it is from B.

What could the coordinates of point \(P\) be?
There are two possible answers. Give them both.

\[(______, ______)\] or \[(______, ______)\]
13. In this question, consider only positive values of $x$.

Look at this function.

$$p = 3x$$

As $x$ increases, $p$ increases.

For each function below, tick (√) the correct box.

$\begin{align*}
q &= x - 2 \\
r &= \frac{1}{2}x \\
s &= 2 - x \\
t &= \frac{1}{x}
\end{align*}$

- As $x$ increases, $q$ increases
- As $x$ increases, $r$ increases
- As $x$ increases, $s$ decreases
- As $x$ increases, $t$ decreases

2 marks
14. In a bag, there are red and blue cubes in the ratio 4 : 7

I add 10 more red cubes to the bag.

Now there are red and blue cubes in the ratio 6 : 7

How many blue cubes are in the bag?

2 marks
15. (a) A straight line goes through the points (0, 1), (2, 5) and (4, 9)

The equation of the straight line is \( y = 2x + 1 \)

Is the point (7, 12) on this straight line?

☐ Yes  ☐ No

Explain your answer.

(b) A different straight line goes through the points (0, 1), (2, 7) and (4, 13)

Write the equation of this straight line.
16. (a) Explain why $\sqrt{89}$ must be between 9 and 10

(b) $\sqrt{389}$ is also between two consecutive whole numbers.
What are the two numbers?

17. Here are the rules of a game.

Each person chooses heads or tails at random, then a coin is thrown.
People who choose the side shown by the coin are left in the game.
The rest are out of the game.

If a group of 1000 people are going to play this game, how many people might you expect to be left in the game after 5 throws?
18. The diagram shows the net of a cube made of 6 squares.

\[ K (20, 10) \]

What are the coordinates of the points \( L \) and \( M \)?

- L is ( _____ , _____ )  
  1 mark

- M is ( _____ , _____ )  
  1 mark
19. (a) Ed writes:
\[
\frac{1}{2} \text{ of } 10^3 = 5^3
\]
Show why Ed is wrong.

(b) Sasha writes:
\[
\frac{1}{2} \text{ of } 6 \times 10^8 = 3 \times 10^4
\]
Show why Sasha is wrong.

(c) Work out \(\frac{1}{2}\) of \(1.65 \times 10^6\)
Give your answer in standard form.
20. Jane and Delia work together.

Delia's pay is exactly **twice** as much as Jane's.

They are each going to get a pay increase.

(a) If they each get a **pay increase of £2000**, tick (✓) the true statement below.

- Delia's pay will be more than twice as much as Jane's.
- Delia's pay will be exactly twice as much as Jane's.
- Delia's pay will be less than twice as much as Jane's.
- There is not enough information to tell.

1 mark

(b) If instead they each get a **5% pay increase**, tick (✓) the true statement below.

- Delia's pay will be more than twice as much as Jane's.
- Delia's pay will be exactly twice as much as Jane's.
- Delia's pay will be less than twice as much as Jane's.
- There is not enough information to tell.

1 mark
21. Look at this factorisation.

\[ x^2 + 5x + 6 = (x + 2)(x + 3) \]

Write numbers to make a correct factorisation below.

\[ x^2 + 7x + _____ = (x + _____)(x + _____) \]

Now write different numbers to make a correct factorisation.

\[ x^2 + 7x + _____ = (x + _____)(x + _____) \]
Dario has five cards showing different shapes.

He is going to mix them up, then take out one card at random. Then he is going to take out a second card without replacing the first card.

(a) What is the probability that he will take out the square first and then the circle?

(b) What is the probability that he will take out the square and the circle, in either order?
23. The graph shows the straight line with equation $y = \frac{1}{2}x + 1$

(a) For each point in the table, tick (✓) the correct box to show if it is above the line, on the line or below the line.

The first one is done for you.

<table>
<thead>
<tr>
<th>Point</th>
<th>Above the line</th>
<th>On the line</th>
<th>Below the line</th>
</tr>
</thead>
<tbody>
<tr>
<td>(6, 3)</td>
<td></td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>(8, 5)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(100, 60)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(−4, −3)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(b) Write the equation of a different straight line that is always below the line with equation $y = \frac{1}{2}x + 1$
24. Each expression below represents either a length, an area or a volume.

\( a, b \) and \( c \) all represent lengths.

For each expression, tick (✓) the correct one.

The first one is done for you.

\[
2a + c
\]

- ✓ length
- ✗ area
- ✗ volume

\[
3ab
\]

- ✗ length
- ✓ area
- ✗ volume

\[
4a(b + c)
\]

- ✗ length
- ✗ area
- ✓ volume

\[
a^2b
\]

- ✗ length
- ✗ area
- ✓ volume

2 marks
25. The cumulative frequency diagram shows the speeds of cars on a motorway on a Monday and a Thursday.

(a) The speed limit is **70mph**.

On **Monday**, about what proportion of these cars were going faster than the speed limit?

(b) On one of the days, it rained all day.

Which day is this more likely to be?

- [ ] Monday
- [x] Thursday

Explain your answer.
26. Look at this information about a pair of numbers, \( k \) and \( n \)

\[
\begin{align*}
  k &< n \\
  \text{and} & \quad k^2 > n^2
\end{align*}
\]

Give an example of what the numbers could be.

\[
k = \underline{\hspace{2cm}} \quad n = \underline{\hspace{2cm}}
\]

1 mark

27. I think of two numbers, \( x \) and \( y \)

\( x - y \) is half of \( x + y \)

Write \( x \) in terms of \( y \)

\[
x = \underline{\hspace{2cm}}
\]

2 marks
END OF TEST
END OF TEST