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, 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

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
\[
\text{Volume} = \text{area of cross-section} \times \text{length}
\]
1. Write two numbers that add to 10

One of the numbers must be positive.
The other number must be negative.

\[ \square + \square = 10 \]

1 mark

2. Work out the following.

\[ 1.2 \times 6 \]

1 mark

\[ 1.2 \div 6 \]

1 mark
3. Duckweed is a plant that grows in water.

Pupils added **different amounts of salt** to three identical containers of water.

In each container they put some duckweed plants.

Then they recorded the number of leaves on the plants every day.

**Results:**

![Graph showing number of leaves over days for three containers A, B, and C with different amounts of salt.]

<table>
<thead>
<tr>
<th>Day</th>
<th>Container A</th>
<th>Container B</th>
<th>Container C</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0</td>
<td>60</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>10</td>
<td>50</td>
<td>10</td>
</tr>
<tr>
<td>3</td>
<td>20</td>
<td>40</td>
<td>20</td>
</tr>
<tr>
<td>4</td>
<td>30</td>
<td>30</td>
<td>30</td>
</tr>
<tr>
<td>5</td>
<td>40</td>
<td>20</td>
<td>40</td>
</tr>
<tr>
<td>6</td>
<td>50</td>
<td>10</td>
<td>50</td>
</tr>
<tr>
<td>7</td>
<td>60</td>
<td>0</td>
<td>60</td>
</tr>
</tbody>
</table>

**Key:**

- **A:** No salt
- **B:** Small amount of salt
- **C:** Large amount of salt
(a) How many leaves were in each container on day 1?

(b) In container A, how many more leaves were there on day 19 than on day 1?

(c) Duckweed plants with no leaves are dead. On which day did the pupils record that the plants in container B were dead?

(d) How did the amount of salt affect the change in the number of leaves?
4. Each shape in this question is made from **six cubes**.

Look at this shape.

Which **two** of the diagrams below show the **same** shape?

Tick (✓) them both.
5. Write **numbers** in the boxes to make the statements true.

When \( x = \) then \( x + 3 = \)

When \( x = \) then \( 3x = \)

When \( x = \) then \( \frac{x}{3} = \)

2 marks

6. Boxes of tins are delivered to a shop.

There are **37 boxes**.

Each box contains **25 tins**.

How many tins are there?
7. (a) Write the correct numbers in the gaps below.

\[
\begin{align*}
\text{1} \times \frac{3}{2} &= \frac{3}{2} \\
\text{2} \times \frac{3}{2} &= 7 \\
\text{3} \times \frac{3}{2} &= 10 \frac{1}{2} \\
\text{4} \times \frac{3}{2} &= \text{_____} \\
\text{5} \times \frac{3}{2} &= \text{_____} \\
\text{6} \times \frac{3}{2} &= 21
\end{align*}
\]

Use the table to help you work out this calculation.

\[
60 \times \frac{3}{2} = \text{_____}
\]
(b) Is the answer to $11 \times 3\frac{1}{2}$ a whole number?

☐ Yes  ☐ No

Explain your answer.

1 mark

8. Find the values of $x$

$5x - 3 = 12$

$x = \underline{\hspace{2cm}}$

1 mark

$13 + 2x = 3$

$x = \underline{\hspace{2cm}}$

1 mark

KS3/08/Ma/Tier 5–7/P1
9. Look at the square drawn on the graph.

Point A is the centre of the square.

What are the coordinates of point A?

A is \( (\ ,\ ) \)
10. Match each expression on the left with the equivalent expression on the right. The first one is done for you.

- $3d + d$ corresponds to $3$
- $3d - d$ corresponds to $3d$
- $3d \times d$ corresponds to $2d^2$
- $3d \div d$ corresponds to $2d^3$
11. Look at the two triangular prisms.

They are joined to make the new shape below.
Complete the views of the new shape on the grid.
The first one is done for you.

View from the TOP

View from the FRONT

View from the SIDE

Square grid

12. 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 ________
13. There are **25 pupils** in a class.

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

<table>
<thead>
<tr>
<th>maths</th>
<th>English</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Level 5</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?
14. The diagram shows a square with a perimeter of 12 cm.

Six of these squares fit together to make a rectangle.

What is the area of the rectangle?

You must give the correct unit with your answer.
15. 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?

\[
\text{Percentage} = \frac{\text{Number of boys who walk}}{\text{Total number of boys}} \times 100
\]

\[
\frac{2}{8} \times 100 = \frac{1}{4} \times 100 = 25 \%
\]

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

\[
\text{Percentage} = \frac{\text{Number of pupils who walk}}{\text{Total number of pupils}} \times 100
\]

\[
\frac{2 + 5}{8 + 10} \times 100 = \frac{7}{18} \times 100 \approx 38.89 \%
\]
16. A pupil recorded the times of 23 people running the 100 metres. The stem-and-leaf diagram shows the results.

| 13 | 6 |
| 14 | 1 3 4 |
| 14 | 7 7 8 9 |
| 15 | 0 1 1 3 4 4 |
| 15 | 5 7 8 8 9 |
| 16 | 2 2 4 4 |

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?

\[ \underline{\text{__________ people}} \]

(b) What was the range of times?

\[ \underline{\text{__________ seconds}} \]

(c) What was the median time?

\[ \underline{\text{__________ seconds}} \]
17. (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>$\frac{1}{2}$</td>
<td>$\frac{1}{3}$</td>
<td>$\frac{1}{4}$</td>
<td>$\frac{1}{5}$</td>
</tr>
<tr>
<td>$\frac{6}{13}$</td>
<td>$\frac{7}{12}$</td>
<td>$\frac{8}{11}$</td>
<td>$\frac{9}{10}$</td>
</tr>
<tr>
<td>$\frac{1}{2}$</td>
<td>$\frac{2}{4}$</td>
<td>$\frac{3}{6}$</td>
<td>$\frac{4}{8}$</td>
</tr>
<tr>
<td>$\frac{3}{2}$</td>
<td>$\frac{4}{3}$</td>
<td>$\frac{5}{4}$</td>
<td>$\frac{6}{5}$</td>
</tr>
</tbody>
</table>

(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.
18. Find the value of $x$

$$6 + 2x = x - 6$$

$x = \underline{\hspace{2cm}}$

2 marks

19. Work out

$$\frac{1 \times 2 \times 3 \times 4 \times 5}{1 \times 2 \times 3} = \underline{\hspace{2cm}}$$

1 mark

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

1 mark
20. 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.
21. 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 (______, ______)
22. 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.

\[ q = x - 2 \]  
As $x$ increases, $\square$ $q$ increases $\square$ $q$ decreases

\[ r = \frac{1}{2}x \]  
As $x$ increases, $\square$ $r$ increases $\square$ $r$ decreases

\[ s = 2 - x \]  
As $x$ increases, $\square$ $s$ increases $\square$ $s$ decreases

\[ t = \frac{1}{x} \]  
As $x$ increases, $\square$ $t$ increases $\square$ $t$ decreases

2 marks
23. 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?
24. (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?

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

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.
25. (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?

\[ \underline{\hspace{2cm}} \quad \text{and} \quad \underline{\hspace{2cm}} \]

26. 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?

\[ \underline{\hspace{2cm}} \quad \text{people} \]

2 marks
27. The diagram shows the net of a cube made of 6 squares.

\[ \text{K is the point} \ (20, 10) \]

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

\[ \text{L is} \ (\_\_\_, \_\_\_) \]

\[ \text{M is} \ (\_\_\_, \_\_\_) \]
28. Ed writes:

\[ \frac{1}{2} \text{ of } 10^3 = 5^3 \]

Show why Ed is wrong.