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 and a calculator.
▪ 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

Borderline check
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.
1. (a) Look at these shapes.

Explain why the shapes are **hexagons**.

(b) Draw a **regular hexagon** on the grid below.
2. Look at this diagram.

It shows distances in miles between some cities.

(a) How far is it from Bristol to Manchester?

\[ \ldots \ldots \text{ miles} \]

(b) Which two cities are 212 miles apart?

\[ \text{......................... and .........................} \]
(c) Kim lives in Birmingham.

She wants to visit either York or London.

Which of these cities is nearer to Birmingham?
Tick (√) your answer.

☐ York ☐ London

How many miles nearer to Birmingham is it?

................ miles

1 mark

(d) Sanjay drives from London to Bristol,
then he drives to Birmingham,
and then he drives directly back to London.

How many miles does he drive altogether?
Show your working.

................ miles

2 marks
3. (a) Look at these three number cards.

You can put them together to show different numbers.
For example:

```
0 9 4
```

*ninety-four*

Put the three cards together in a different way.
Write **in words** what number the cards show.

```
0 4
```

1 mark

Now put the three cards together in another different way.
Write **in words** what number the cards show.

```
0 4
```

1 mark
(b) Here are three different number cards.

What is the **biggest** number you can show with these cards?

What is the **biggest even** number you can show with these cards?
4. A school records how many pupils are late each day. The bar charts show the results for one week.
(a) **Altogether**, how many pupils were late on **Monday**?

   ---------------
   1 mark

(b) **Altogether**, how many lates were recorded for **Y9** pupils?

   ---------------
   1 mark

(c) The school bus broke down on one of the days.

   Which day do you think that was?

   ---------------------
   1 mark

   Explain why you chose that day.
5. (a) I slice a cube in half like this:

How many faces does each piece have?

(b) Then I slice another cube in half like this:

How many faces does each piece have?

(c) I slice a different cube in half through its corners like this:

How many faces does each piece have?
6. Alice and Ben each buy a bicycle but they pay in different ways.

Ben pays more than Alice.

How much more?

Show your working.
7. Mark did a survey.

He asked pupils in his school:

‘Do you like the colour of the school uniform?’

The table shows his results.

<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>No</th>
<th>Don’t know</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year 7</td>
<td>35</td>
<td>17</td>
<td>2</td>
</tr>
<tr>
<td>Year 8</td>
<td>20</td>
<td>24</td>
<td>5</td>
</tr>
<tr>
<td>Year 9</td>
<td>19</td>
<td>17</td>
<td>6</td>
</tr>
</tbody>
</table>

(a) How many pupils from **year 7** took part in the survey?

(b) Altogether, more pupils said ‘Yes’ than said ‘No’.

How many more?
(c) Mark asked the same question to **40 pupils** in **year 11**

25% said ‘Yes’. 50% said ‘No’. The rest said ‘Don’t know’.

Complete the table to show how many pupils from year 11 gave each answer.

<table>
<thead>
<tr>
<th>Yes</th>
<th>No</th>
<th>Don’t know</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Year 11

2 marks

(d) Anna does a different survey with pupils in year 9

She wants to know if more boys than girls have pets.

She asks:

‘Do you have a pet?’

What labels should Anna use on her results table?

Fill in the missing labels.

| ............ | ............ |
|.............|.............|
|.............|.............|

1 mark
8. The chart shows information about seven kings and queens. It shows their ages when they died and how many years they ruled.

Use the chart to answer these questions.

(a) For how many years did Edward III rule?

\[ \text{\underline{------------- years}} \]

1 mark

(b) Which king or queen died at the age of 69 and ruled for 44 years?

\[ \text{\underline{------------------------}} \]

1 mark

(c) Queen Victoria died at the age of 81 and ruled for 63 years.

Put a cross on the chart to show this information.

1 mark
9. The table shows how much it costs to go to a cinema.

<table>
<thead>
<tr>
<th></th>
<th>Before 6pm</th>
<th>After 6pm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adult</td>
<td>£3.20</td>
<td>£4.90</td>
</tr>
<tr>
<td>Child (14 or under)</td>
<td>£2.50</td>
<td>£3.50</td>
</tr>
<tr>
<td>Senior Citizen (60 or over)</td>
<td>£2.95</td>
<td>£4.90</td>
</tr>
</tbody>
</table>

Mrs Jones (aged 35), her daughter (aged 12), her son (aged 10) and a friend (aged 65) want to go to the cinema.

They are not sure whether to go before 6pm or after 6pm.

How much will they save if they go before 6pm?

Show your working.

£
10. (a) The thermometer shows Alan’s temperature.

Alan’s normal temperature is 37.0°C

How many degrees higher than normal is Alan’s temperature?

\[ \text{°C} \]

(b) On Monday morning, Bina’s temperature was 39.2°C

By Tuesday morning, Bina’s temperature had fallen by 1.3°C

What was Bina’s temperature on Tuesday morning?

\[ \text{°C} \]
(c) You can measure temperature in °C or in °F

The diagram shows how to change °F to °C

\[\text{°F} \rightarrow \text{Subtract 32, then multiply the answer by 5, then divide by 9} \rightarrow \text{°C}\]

The highest temperature ever recorded in a human was 115.7 °F

What is this temperature in °C?
Show your working.
11. In this question, all the grids are centimetre square grids.

(a) Draw a rectangle that has an area of \(12\text{cm}^2\)

(b) Draw another rectangle that has an area of \(12\text{cm}^2\)
This rectangle must have a different perimeter from the rectangle in part (a).
(c) Draw a **triangle** that has an **area** of **6cm^2**
12. I have two bags of cubes.
Each bag contains more than 20 but fewer than 30 cubes.

(a) I can share the cubes in bag A equally between 9 people.
How many cubes are in bag A?

(b) I can share the cubes in bag B equally between 4 people.
How many cubes could be in bag B?
There are two answers. Write them both.
13. Each diagram below was drawn on a square grid.

(a) Write what **percentage** of each diagram is shaded. The first one is done for you.

\[
\begin{array}{ccc}
\color{gray}{\square} & \color{white}{\square} & \color{gray}{\square} \\
\end{array}
\quad 75 \quad \% \\
\]

\[
\begin{array}{ccccccc}
\color{gray}{\square} & \color{gray}{\square} & \color{gray}{\square} & \color{gray}{\square} & \color{white}{\square} & \color{white}{\square} & \color{white}{\square} \\
\end{array}
\quad \ldots \ldots \% \\
\quad \quad \text{1 mark}
\]

\[
\begin{array}{cccc}
\color{gray}{\square} & \color{gray}{\square} & \color{gray}{\square} & \color{gray}{\square} \\
\end{array}
\quad \ldots \ldots \% \\
\quad \quad \text{1 mark}
\]

(b) Explain how you know that \(12\frac{1}{2}\) % of the diagram below is shaded.

\[
\begin{array}{cccc}
\color{gray}{\square} & \color{gray}{\square} & \color{gray}{\square} & \color{white}{\square} \\
\end{array}
\]

\[
\quad \ldots \ldots \% \\
\quad \quad \text{1 mark}
\]

(c) Shade \(37\frac{1}{2}\) % of the diagram below.

\[
\begin{array}{ccccccc}
\color{gray}{\square} & \color{gray}{\square} & \color{gray}{\square} & \color{gray}{\square} & \color{white}{\square} & \color{white}{\square} & \color{white}{\square} \\
\end{array}
\]

\[
\quad \ldots \ldots \% \\
\quad \quad \text{1 mark}
\]
14. (a) It is Tina’s birthday. We do not know how old Tina is.

Call Tina’s age, in years, \( n \)

The expressions below compare Tina’s age to some other people’s ages. Use words to compare their ages. The first one is done for you.

<table>
<thead>
<tr>
<th>Tina’s age</th>
<th>( n )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ann’s age</td>
<td>( n + 3 )</td>
</tr>
</tbody>
</table>

Ann is \( 3 \) years older than Tina

<table>
<thead>
<tr>
<th>Tina’s age</th>
<th>( n )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Barry’s age</td>
<td>( n - 1 )</td>
</tr>
</tbody>
</table>

Barry is

<table>
<thead>
<tr>
<th>Tina’s age</th>
<th>( n )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carol’s age</td>
<td>( 2n )</td>
</tr>
</tbody>
</table>

Carol is

(b) In one year’s time Tina’s age will be \( n + 1 \)

Write simplified expressions to show the ages of the other people in one year’s time.

<table>
<thead>
<tr>
<th></th>
<th>Tina</th>
<th>Ann</th>
<th>Barry</th>
<th>Carol</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age now</td>
<td>( n )</td>
<td>( n + 3 )</td>
<td>( n - 1 )</td>
<td>( 2n )</td>
</tr>
<tr>
<td>Age in one year’s time</td>
<td>( n + 1 )</td>
<td>( \ldots )</td>
<td>( \ldots )</td>
<td>( \ldots )</td>
</tr>
</tbody>
</table>
(c) When \( n = 30 \), find the value of \( 2n + 1 \)

When \( n = 30 \), find the value of \( 2(n + 1) \)
15. Some pupils plan a survey to find the most common types of tree in a wood.

**Design 1**

**Instructions:**
Write down the type of each tree that you see.

**For example:**
Elm, oak, oak, oak, sycamore, ash, ...

**Design 2**

**Instructions:**
Use these codes to record the type of each tree that you see.

<table>
<thead>
<tr>
<th>Tree</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ash</td>
<td>A</td>
</tr>
<tr>
<td>Birch</td>
<td>B</td>
</tr>
<tr>
<td>Elm</td>
<td>E</td>
</tr>
<tr>
<td>Oak</td>
<td>O</td>
</tr>
<tr>
<td>Sycamore</td>
<td>S</td>
</tr>
</tbody>
</table>

**For example:**
E, O, O, O, S, A, ...

**Design 3**

**Instructions:**
Use a tally chart to record the type of each tree that you see.

**For example:**

<table>
<thead>
<tr>
<th>Type of tree</th>
<th>Tally</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ash</td>
<td>I</td>
</tr>
<tr>
<td>Birch</td>
<td>I</td>
</tr>
<tr>
<td>Elm</td>
<td>III</td>
</tr>
<tr>
<td>Oak</td>
<td>I</td>
</tr>
<tr>
<td>Sycamore</td>
<td>I</td>
</tr>
<tr>
<td>Other</td>
<td>I</td>
</tr>
</tbody>
</table>

The pupils will only use one design.

(a) Choose a design they should **not** use.

Design ..........  

Explain why it is not a good design to use.

(b) Choose the design that is the best.

Design ..........  

Explain why it is the best.
16. (a) Jo has these 4 coins.

Jo is going to take one of these coins at random.
Each coin is equally likely to be the one she takes.

Show that the probability that it will be a 10p coin is \( \frac{1}{2} \)

(b) Colin has 4 coins that total 33p.

He is going to take one of his coins at random.

What is the probability that it will be a 10p coin?
You must show your working.
17. Look at the diagram.

Triangle ABD is the reflection of triangle ABC in the line AB.

Fill in the gaps below to explain how to find angle $x$

The length of AC is $\ldots \ldots \ldots$ cm.

The length of AD is $\ldots \ldots \ldots$ cm.

The length of CD is $\ldots \ldots \ldots$ cm.

ACD is an equilateral triangle because $\ldots \ldots \ldots$ $\ldots \ldots \ldots$ $\ldots \ldots \ldots$ $\ldots \ldots \ldots$

so angle $y$ is $\ldots \ldots \ldots$ because $\ldots \ldots \ldots$ $\ldots \ldots \ldots$ $\ldots \ldots \ldots$ $\ldots \ldots \ldots$

so angle $x$ is $\ldots \ldots \ldots$ because $\ldots \ldots \ldots$ $\ldots \ldots \ldots$ $\ldots \ldots \ldots$ $\ldots \ldots \ldots$
18. (a) A glass holds \(225\text{ml}\).

An adult needs about \(1.8\text{ litres}\) of water each day to stay healthy.

How many glasses is that?
Show your working.

(b) An adult weighs \(80\text{kg}\).

\(60\%\) of his total mass is water.

What is the mass of this water?
END OF TEST