Mathematics test

Paper 1

Calculator not allowed

Please read this page, but do not open the booklet until your teacher tells you to start. Write your name and the name of your school in the spaces below. If you have been given a pupil number, write that also.

First name

Last name

School

Pupil number

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.
- 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{(a + b)}{2} \times h

Prism
Volume = \text{area of cross-section} \times \text{length}
1. The diagram shows a box.

Complete the net for the box.
2. Mark and Kate each buy a family pack of crisps. Each family pack contains ten bags of crisps.

The table shows how many bags of each flavour are in each family pack.

<table>
<thead>
<tr>
<th>flavour</th>
<th>number of bags</th>
</tr>
</thead>
<tbody>
<tr>
<td>plain</td>
<td>5</td>
</tr>
<tr>
<td>vinegar</td>
<td>2</td>
</tr>
<tr>
<td>chicken</td>
<td>2</td>
</tr>
<tr>
<td>cheese</td>
<td>1</td>
</tr>
</tbody>
</table>

(a) Mark is going to take a bag of crisps at random from his family pack. Complete these sentences.

The probability that the flavour will be plain is $\frac{1}{2}$

The probability that the flavour will be cheese is $\ldots \ldots \ldots \ldots \ldots$ 

(b) Kate ate two bags of plain crisps from her family pack of 10 bags. Now she is going to take a bag at random from the bags that are left. What is the probability that the flavour will be cheese?
(c) A shop sells **12 bags** of crisps in a large pack.

I am going to take a bag at random from the large pack.

The table below shows the probability of getting each flavour.

Use the probabilities to work out how many **bags** of each flavour are in this large pack.

<table>
<thead>
<tr>
<th>flavour</th>
<th>probability</th>
<th>number of bags</th>
</tr>
</thead>
<tbody>
<tr>
<td>plain</td>
<td>$\frac{7}{12}$</td>
<td></td>
</tr>
<tr>
<td>vinegar</td>
<td>$\frac{1}{4}$</td>
<td></td>
</tr>
<tr>
<td>chicken</td>
<td>$\frac{1}{6}$</td>
<td></td>
</tr>
<tr>
<td>cheese</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>
3. The diagrams show the number of hours of sunshine in two different months.

### Number of hours of sunshine in month A

- **Hours of sunshine**
  - less than 4
  - 4 to 8
  - more than 8

- **Number of days**
  - number of days with less than 4
  - number of days with 4 to 8
  - number of days with more than 8

### Number of hours of sunshine in month B

Key:
- number of days with less than 4 hours
- number of days with 4 to 8 hours
- number of days with more than 8 hours
(a) How many days are there in month A?
Tick (✓) the correct box.

28 [ ] 29 [ ] 30 [ ] 31 [ ] not possible to tell [ ]

(b) How many days are there in month B?
Tick (✓) the correct box.

28 [ ] 29 [ ] 30 [ ] 31 [ ] not possible to tell [ ]

(c) Which month had more hours of sunshine?
Tick (✓) the correct box.

month A [ ] month B [ ]

Explain how you know.
4. (a) Look at these fractions.

\[ \frac{1}{2} \quad \frac{1}{3} \quad \frac{5}{6} \]

Mark each fraction on the number line.

The first one is done for you.

(b) Fill in the missing numbers in the boxes.

\[ \frac{2}{12} = \quad \frac{12}{6} \]

\[ \frac{1}{2} = \quad \boxed{1} \]

\[ \boxed{\frac{6}{24}} \]
5. (a) What **fraction** of this shape is shaded? Write your fraction as simply as possible.

(b) What **percentage** of this shape is shaded?

(c) Which shape has the **greater percentage** shaded? Tick (√) the correct box.

- Shape A
- Shape B
- Both the same

Explain how you know.
6. (a) A football club is planning a trip.
    The club hires 234 coaches. Each coach holds 52 passengers.
    How many passengers is that altogether?
    Show your working.

(b) The club wants to put one first aid kit into each of the 234 coaches.
    These first aid kits are sold in boxes of 18
    How many boxes does the club need?
7. There are **60 pupils** in a school. **6** of these pupils wear glasses.

(a) The pie chart is not drawn accurately. What should the angles be? Show your working.

(b) Exactly **half** of the 60 pupils in the school are boys.

From this information, what **percentage of boys** in this school **wear glasses**? Tick (✓) the correct box below.

- 5%
- 6%
- 10%
- 20%
- 50%
- not possible to tell
8. Ali, Barry and Cindy each have a bag of counters. They do not know how many counters are in each bag. They know that

Barry has **two more** counters than Ali.
Cindy has **four times as many** counters as Ali.

(a) Ali calls the number of counters in her bag \(a\)

Write **expressions using \(a\)** to show the number of counters in Barry’s bag and in Cindy’s bag.

(b) Barry calls the number of counters in his bag \(b\)

Write **expressions using \(b\)** to show the number of counters in Ali’s bag and in Cindy’s bag.
(c) Cindy calls the number of counters in her bag \( c \)

Which of the expressions below shows the number of counters in Barry’s bag?
Circle the correct one.

\[
\begin{align*}
4c + 2 & \quad 4c - 2 & \quad \frac{c}{4} + 2 \\
\frac{c}{4} - 2 & \quad \frac{c + 2}{4} & \quad \frac{c - 2}{4}
\end{align*}
\]
9. The diagram shows two isosceles triangles inside a parallelogram.

(a) On the diagram, mark another angle that is 75°.
Label it 75°.

(b) Calculate the size of the angle marked $k$.
Show your working.
Now look at the triangle drawn on the straight line PQ

(c) Write $x$ in terms of $y$

(d) Now write $x$ in terms of $t$ and $w$

(e) Use your answers to parts (c) and (d) to show that $y = t + w$
10. Here are three number cards. The numbers are hidden.

The mode of the three numbers is 5
The mean of the three numbers is 8

What are the three numbers?
Show your working.

11. On a farm 80 sheep gave birth.

30% of the sheep gave birth to two lambs.
The rest of the sheep gave birth to just one lamb.

In total, how many lambs were born?
Show your working.
12. Two parts of this square design are shaded black.
Two parts are shaded grey.

Show that the ratio of black to grey is $5 : 3$
13. (a) Solve this equation.

\[ 7 + 5k = 8k + 1 \]

\[ k = \ldots \ldots \ldots \] 1 mark

(b) Solve this equation. Show your working.

\[ 10y + 23 = 4y + 26 \]

\[ y = \ldots \ldots \ldots \] 2 marks
14. (a) Look at these numbers.

\[ 1^6 \quad 2^5 \quad 3^4 \quad 4^3 \quad 5^2 \quad 6^1 \]

Which is the **largest**?

Which is equal to \(9^2\)?

(b) Which **two** of the numbers below are **not** square numbers?

\[ 2^4 \quad 2^5 \quad 2^6 \quad 2^7 \quad 2^8 \]
15. (a) \( m \) is an odd number.

Which of the numbers below must be even, and which must be odd?

Write ‘odd’ or ‘even’ under each one.

<table>
<thead>
<tr>
<th>( 2m )</th>
<th>( m^2 )</th>
<th>( 3m - 1 )</th>
<th>( (m - 1)(m + 1) )</th>
</tr>
</thead>
</table>

(b) \( m \) is an odd number.

Is the number \( \frac{m + 1}{2} \) odd, or even, or is it not possible to tell?

Tick (✓) the correct box.

odd | even | not possible to tell

Explain your answer.
16. (a) Alan has a guessing game on his computer. He estimates that the probability of winning each game is \(0.35\). Alan decides to play 20 of these games. How many of these games should he expect to win?

(b) Sue played the same computer game. She won 12 of the games she played, and so she estimated the probability of winning each game to be \(0.4\). How many games did Sue play? Show your working.

(c) The manufacturers of another guessing game claim that the probability of winning each game is \(0.65\). Karen plays this game 200 times and wins 124 times. She says: ‘The manufacturers must be wrong’. Do you agree with her? Tick (✓) Yes or No. Yes [ ] No [ ] Explain your answer.
17. Here are six different equations, labelled A to F

<table>
<thead>
<tr>
<th></th>
<th>Equation</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>$y = 3x - 4$</td>
</tr>
<tr>
<td>B</td>
<td>$y = 4$</td>
</tr>
<tr>
<td>C</td>
<td>$x = -5$</td>
</tr>
<tr>
<td>D</td>
<td>$x + y = 10$</td>
</tr>
<tr>
<td>E</td>
<td>$y = 2x + 1$</td>
</tr>
<tr>
<td>F</td>
<td>$y = x^2$</td>
</tr>
</tbody>
</table>

Think about the graphs of these equations.

(a) Which graph goes through the point $(0, 0)$?

(b) Which graph is parallel to the $y$-axis?

(c) Which graph is not a straight line?

(d) Which two graphs pass through the point $(3, 7)$?
(e) The diagram shows the graph of the equation $y = 4 - x^2$

What are the coordinates of the points where the graph of this equation meets the graph of equation E?

\[( , ) \text{ and } ( , )\]

3 marks