Mathematics test

Paper 2

Calculator 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 may use a calculator in this test.
▪ You will need: pen, pencil, rubber, ruler, a pair of compasses, an angle measurer or protractor and a scientific or graphic calculator.
▪ Some formulae you might need are on page 3.
▪ 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
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.

Formulae
You might need to use these formulae.

**Trapezium**

Area = \( \frac{(a + b)}{2} \times h \)

**Prism**

Volume = area of cross-section × length
1. (a) Tick (✓) any rectangles below that have an area of 12 cm²

(b) A square has an area of 100 cm²

What is its perimeter?
Show your working.
2. Here is a plan of a ferry crossing.

(a) Complete the accurate scale drawing of the ferry crossing below.

(b) What is the length of the ferry crossing on your diagram?

(c) The scale is 1 cm to 20 m. Work out the length of the real ferry crossing. Show your working, and write the units with your answer.
3. (a) You pay £2.40 each time you go swimming.

Complete the table.

<table>
<thead>
<tr>
<th>Number of swims</th>
<th>0</th>
<th>10</th>
<th>20</th>
<th>30</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total cost (£)</td>
<td>0</td>
<td>24</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(b) Now show this information on the graph on the page opposite. Join the points with a straight line.

(c) A different way of paying is to pay a yearly fee of £22.

Then you pay £1.40 each time you go swimming.

Complete the table.

<table>
<thead>
<tr>
<th>Number of swims</th>
<th>0</th>
<th>10</th>
<th>20</th>
<th>30</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total cost (£)</td>
<td>22</td>
<td>36</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(d) Now show this information on the same graph. Join these points with a straight line.

(e) For how many swims does the graph show that the cost is the same for both ways of paying?
4. A teacher has **5 full packets** of mints and **6 single** mints. The number of mints inside each packet is the same.

The teacher tells the class:

‘**Write an expression** to show how many mints there are altogether. Call the number of mints inside each packet \( y \)’

Here are some of the expressions that the pupils write:

- \( 5 + 6 + y \)
- \( 5y + 6 \)
- \( 6 + 5y \)
- \( 5 + 6y \)
- \( (5 + 6) \times y \)

(a) Write down **two** expressions that are correct.

\[ \text{......} \quad \text{and} \quad \text{......} \]

2 marks

(b) A pupil says: ‘I think the teacher has a total of **56 mints**’. Could the pupil be correct? Tick (\( \checkmark \)) Yes or No.

Yes [ ] No [ ]

Explain how you know.
5. A drink from a machine costs 55p

The table shows the coins that were put into the machine one day.

<table>
<thead>
<tr>
<th>Coins</th>
<th>Number of coins</th>
</tr>
</thead>
<tbody>
<tr>
<td>50p</td>
<td>31</td>
</tr>
<tr>
<td>20p</td>
<td>22</td>
</tr>
<tr>
<td>10p</td>
<td>41</td>
</tr>
<tr>
<td>5p</td>
<td>59</td>
</tr>
</tbody>
</table>

How many cans of drink were sold that day?

Show your working.

...... cans

3 marks
6. You can work out the cost of an advert in a newspaper by using this formula:

\[ C = 15n + 75 \]

- **C** is the cost in pounds
- **n** is the number of words in the advert

(a) An advert has **18 words**.

Work out the cost of the advert.

Show your working.

(b) The cost of an advert is **£615**

How many words are in the advert?

Show your working.
7. (a) A coach travels **300 miles** at an average speed of **40 mph**.
   
   For how many hours does the coach travel?
   
   . . . . . . . hours . . . . 
   1 mark

(b) An aeroplane flies **1860 miles** in **4 hours**.
   
   What is its average speed?
   
   . . . . . . . mph . . . . 
   1 mark

(c) A bus travels for **2 \( \frac{1}{2} \) hours** at an average speed of **24 mph**.
   
   How far does the bus travel?
   
   . . . . . . . miles . . . . 
   1 mark
8. A trundle wheel is used to measure distances.

Imran makes a trundle wheel, of diameter 50 cm.

(a) Calculate the circumference of Imran’s trundle wheel.
Show your working.

\[ \text{Circumference} = \pi d \]

\[ = \pi \times 50 \text{ cm} \]

\[ = 157.08 \text{ cm} \]

(b) Imran uses his trundle wheel to measure the length of the school car park.

His trundle wheel rotates 87 times.

What is the length of the car park, to the nearest metre?

\[ \text{Length} = 87 \times 157.08 \text{ cm} \]

\[ = 13652.66 \text{ cm} \]

\[ = 136.53 \text{ m} \]
9. (a) Join pairs of algebraic expressions that have the **same value** when \(a = 3\), \(b = 2\) and \(c = 6\).

One pair is joined for you.

(b) Draw lines to join any pairs that will always have the **same value** when \(a = b = c\).
10. A teacher asked two different classes:

‘What type of book is your favourite?’

(a) Results from class A (total 20 pupils):

<table>
<thead>
<tr>
<th>Type of book</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crime</td>
<td>3</td>
</tr>
<tr>
<td>Non-fiction</td>
<td>13</td>
</tr>
<tr>
<td>Fantasy</td>
<td>4</td>
</tr>
</tbody>
</table>

Complete the pie chart to show this information.
Show your working and draw your angles accurately.
(b) The pie chart below shows the results from all of class B.
Each pupil had only one vote.

The sector for **Non-fiction** represents **11 pupils**.

How many pupils are in class B?

Show your working.

\[
\text{\ldots\ldots\ldots pupils}
\]

2 marks
11. (a) The label on yoghurt A shows this information.

How many grams of **protein** does **100 g** of yoghurt provide?
Show your working.

<table>
<thead>
<tr>
<th>Yoghurt A <strong>125 g</strong></th>
<th>Each 125 g provides</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy</td>
<td>430 kJ</td>
</tr>
<tr>
<td>Protein</td>
<td>4.5 g</td>
</tr>
<tr>
<td>Carbohydrate</td>
<td>11.1 g</td>
</tr>
<tr>
<td>Fat</td>
<td>4.5 g</td>
</tr>
</tbody>
</table>

(b) The label on yoghurt B shows different information.

A boy eats the same amount of yoghurt A and yoghurt B.

Which yoghurt provides him with more **carbohydrate**?
Show your working.

<table>
<thead>
<tr>
<th>Yoghurt B <strong>150 g</strong></th>
<th>Each 150 g provides</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy</td>
<td>339 kJ</td>
</tr>
<tr>
<td>Protein</td>
<td>6.6 g</td>
</tr>
<tr>
<td>Carbohydrate</td>
<td>13.1 g</td>
</tr>
<tr>
<td>Fat</td>
<td>0.2 g</td>
</tr>
</tbody>
</table>

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KS3/01/Ma/Tier 5–7/P2

16
12. (a) Calculate the length of the unknown side of this right-angled triangle. Show your working.

![Diagram of a right-angled triangle with sides 12 cm and 17 cm.]

(b) Calculate the length of the unknown side of the right-angled triangle below. Show your working.

![Diagram of a right-angled triangle with sides 5 cm and 11 cm.]

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KS3/01/Ma/Tier 5–7/P2

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The goldcrest is Britain’s smallest species of bird. On winter days, a goldcrest must eat enough food to keep it warm at night. During the day, the mass of the bird increases.

The scatter diagram shows the mass of goldcrests at different times during winter days. It also shows the line of best fit.

(a) Estimate the mass of a goldcrest at 11:30 am.
(b) Estimate how many grams, on average, the mass of a goldcrest increases during **one hour**.

\[ \ldots \ldots \ g \]

1 mark

(c) Which goldcrest represented on the scatter diagram is **least likely** to survive the night if it is cold?

Show your answer by circling the correct point on the scatter diagram, then explain why you chose that point.
14. (a) On the cm$^2$ grid below, draw a **right-angled triangle** with an area of **12 cm$^2$**
Use line AB as one side of the triangle.

(b) Now draw an **isosceles triangle** with an area of **12 cm$^2$**
Use line AB as one side of the triangle.
15. A gardener wants to plant a tree.

She wants it to be **more than 8 m** away from the **vegetable plot**.
She wants it to be **more than 18 m** away from the **greenhouse**.

The plan below shows part of the garden.
The scale is **1 cm to 4 m**.

Show **accurately** on the plan the region of the garden where she can plant the tree.

Label this region **R**.

<table>
<thead>
<tr>
<th></th>
<th>1956</th>
<th>1998</th>
</tr>
</thead>
<tbody>
<tr>
<td>Men</td>
<td>£11.89</td>
<td>£420.30</td>
</tr>
<tr>
<td>Women</td>
<td>£6.16</td>
<td>£303.70</td>
</tr>
</tbody>
</table>

(a) For **1956**, calculate the average weekly earnings for women as a percentage of the average weekly earnings for men.

Show your working and give your answer to 1 decimal place.

(b) For **1998**, show that the average weekly earnings for women were a greater proportion of the average weekly earnings for men than they were in 1956.
END OF TEST