Year 9 mathematics test

Paper 2
Calculator allowed

First name

Last name

Class

Date

Please read this page, but do not open your booklet until your teacher tells you to start. Write your name, the name of your class and the date in the spaces above.

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 scientific or graphic calculator.
- 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 may 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. The chart shows the popularity of different television channels.

Complete the missing information.

In 1980, only three television channels were available. The most popular was ________________.

In 2005, the biggest percentage share is for ________________.

The percentage share for ________________ remained almost the same at about __________% each year.
2. A boat can be hired for children's parties.

The formula below shows the cost.

\[
\text{Cost} = 13.50 \times \text{the number of children} + 23
\]

(a) What is the cost of a party for 8 children?

\[
\pounds
\]

(b) A different children's party cost £225.50

How many children were at the party?

\[\text{Number of children} = \frac{225.50 - 23}{13.50} = 15\]
3. I make a sequence of shapes using grey and white tiles.

\[ \text{shape number 1} \hspace{1cm} \text{shape number 2} \hspace{1cm} \text{shape number 3} \]

The total number of tiles in shape number \( n \) is \( 4n + 4 \)

(a) I remove half the tiles to make the sequence of shapes below.

\[ \text{shape number 1} \hspace{1cm} \text{shape number 2} \hspace{1cm} \text{shape number 3} \]

Complete the sentence.

The total number of tiles in shape number \( n \) is _________

1 mark

(b) Then I remove half the tiles again.

\[ \text{shape number 1} \hspace{1cm} \text{shape number 2} \hspace{1cm} \text{shape number 3} \]

Complete the sentence.

The total number of tiles in shape number \( n \) is _________

1 mark
4. The table shows information about six types of bird that can be seen in Britain. The birds are listed in order of size from biggest to smallest.

<table>
<thead>
<tr>
<th>Name of bird</th>
<th>Size of bird</th>
<th>When it can be seen</th>
<th>Average egg length</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Summer</td>
<td>Winter</td>
</tr>
<tr>
<td>Mistle Thrush</td>
<td>Biggest</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Fieldfare</td>
<td></td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Blackbird</td>
<td></td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Ring Ouzel</td>
<td></td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Song Thrush</td>
<td></td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Redwing</td>
<td>Smallest</td>
<td></td>
<td>✓</td>
</tr>
</tbody>
</table>

Use the table to answer these questions.

(a) What is the name of the **smallest** bird that can be seen in summer?
(b) Fred says:

In this table, the **bigger birds always have bigger egg lengths** than the smaller birds.

Is he correct?

☐ Yes  ☐ No

Explain your answer.
5. People pay to visit a garden.

<table>
<thead>
<tr>
<th>Tickets:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Age 16 and over</td>
<td>£3.60</td>
</tr>
<tr>
<td>Under 16</td>
<td>£2.25</td>
</tr>
</tbody>
</table>

145 people pay.

39 of them are under 16

How much ticket money is paid altogether?
6. The diagram shows a prism.

The centimetre square grid below shows part of the net for the prism.

Complete the net accurately.
7. (a) Dave says:

30 is the only multiple of 3 that ends in a zero.

Is he correct?

☐ Yes  ☐ No

Explain your answer.

(b) Ali says:

30 is the only number that is divisible by both 5 and 2

Is she correct?

☐ Yes  ☐ No

Explain your answer.
8. Each shape on this square grid has angles that are $45^\circ$, $90^\circ$ or $135^\circ$

Complete the table.

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of $45^\circ$ angles</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of $90^\circ$ angles</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of $135^\circ$ angles</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2 marks

9. (a) Write a number that is bigger than $5\frac{2}{3}$ but smaller than 6

1 mark

(b) Now write a number that is bigger than 5.6 but smaller than $5\frac{2}{3}$

1 mark
10. The shaded rectangle is **twice as long** as it is wide.

The **perimeter** of the rectangle is **30cm**.

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

\[ \text{cm}^2 \]

\[ \text{cm}^2 \]

2 marks
11. The diagram shows a kite.
   The side lengths are in centimetres.

   \[\text{n} \quad \text{n} \quad \text{n} + 2 \quad \text{n} + 2\]
   \[\text{Not drawn accurately}\]

   (a) When \(n = 9\), what is the perimeter of the kite?

   \[\text{_______ cm}\]

   1 mark

   (b) When the perimeter of the kite is \(100\, \text{cm}\), what is the value of \(n\)?

   \[n = \text{___________}\]

   2 marks
I have a fair six-sided dice, numbered 4, 9, 12, 16, 20 and 24.

I am going to roll the dice.

(a) What is the probability of rolling a multiple of 4?

(b) What is the probability of rolling a square number?
13. The price of a coat is £65
In a sale the price is **reduced** by **15%**

What is the sale price of the coat?

[Diagram of a coat]

2 marks

14. A cuboid has length, \( l \), width, \( w \), and height, \( h \)

The distance between opposite corners is \( d \)

Look at the formula.

\[ d^2 = l^2 + w^2 + h^2 \]

Use the formula to find the value of \( d \) when \( l = 6 \), \( w = 2 \) and \( h = 3 \)

\[ d = \]  

2 marks
15. (a) Is it possible to draw a triangle with **angles** $150^\circ$, $10^\circ$ and $10^\circ$?

- [ ] Yes
- [ ] No

Explain your answer.

(b) Is it possible to draw a triangle with **sides** 150cm, 10cm and 10cm?

- [ ] Yes
- [ ] No

Explain your answer.
16. The pie chart shows how pupils in class 9A travelled to school one morning.

5 pupils in class 9A walked to school.

Work out how many pupils in class 9A travelled by bus.
17. (a) Every day a machine makes 500 000 drawing pins and puts them into boxes. The machine needs 150 drawing pins to fill a box. How many boxes can be filled with the 500 000 drawing pins?

__________ boxes  
1 mark

(b) Each drawing pin is made from 0.23g of metal. How many drawing pins can be made from 1kg of metal?

__________ drawing pins  
2 marks
18. Here are some exchange rates.

| £1 = 2.03 American dollars |
| £1 = 2.15 Canadian dollars |

Use the exchange rates to answer these questions.

(a) How many more Canadian dollars than American dollars would you get for £250?

(b) How many more pounds (£) would you get for 250 American dollars than for 250 Canadian dollars?
19. The first square number is 1, and the sum of the first 20 square numbers is 2870.
Work out the sum of the first 21 square numbers.

20. There are five people in the Smith family.

<table>
<thead>
<tr>
<th>Females</th>
<th>Males</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mrs Smith, 38 years old</td>
<td>Mr Smith, $x$ years old</td>
</tr>
<tr>
<td>Tina Smith, 9 years old</td>
<td>Ben Smith, $y$ years old</td>
</tr>
<tr>
<td>Helen Smith, 7 years old</td>
<td></td>
</tr>
</tbody>
</table>

The mean age of the males is 28.

What is the mean age of all five people in the family?
21. The **square** ABCD has side length 10cm.

E is the midpoint of BC.

Work out the length of DE.

Give your answer correct to **one decimal place**.
22. The scatter graph shows the lengths and diameters of 15 acorns.

(a) What is the modal class of the lengths of the acorns?
Tick (√) your answer.

- [ ] 18 mm ≤ length < 19 mm
- [ ] 19 mm ≤ length < 20 mm
- [ ] 20 mm ≤ length < 21 mm
- [ ] 21 mm ≤ length < 22 mm

(b) Which point on the graph shows the median length of the acorns?
Put a ring round it.
(c) Which scatter graph shows the line of best fit?

Tick (✓) the correct diagram.

Diagram A

Diagram B

Diagram C

1 mark
23. Look at the pie charts showing information about the world population in the years 1950 and 2000.

In the year 2000, more people lived in towns and cities than in 1950.

How many more?

_________ million

2 marks
This question is about number sequences and what their $n$th terms could be.

Write the missing information in each table.

<table>
<thead>
<tr>
<th>First four terms of the sequence</th>
<th>$n$th term</th>
</tr>
</thead>
<tbody>
<tr>
<td>3  6  9  12</td>
<td>$3n$</td>
</tr>
<tr>
<td>4  7  10  13</td>
<td></td>
</tr>
<tr>
<td>3(n + 1)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>First four terms of the sequence</th>
<th>$n$th term</th>
</tr>
</thead>
<tbody>
<tr>
<td>1  4  9  16</td>
<td>$n^2$</td>
</tr>
<tr>
<td>0  3  8  15</td>
<td></td>
</tr>
<tr>
<td>$(n + \underline{4})^2$</td>
<td></td>
</tr>
</tbody>
</table>

1 mark

1 mark
25. (a) Show that, at 40 km/h, it takes 1 minute 30 seconds to travel 1 km.

(b) At 80 km/h, how many seconds does it take to travel 1 km?
END OF TEST