FORMULAE LIST

Circumference of a circle: \( C = \pi d \)
Area of a circle: \( A = \pi r^2 \)

Theorem of Pythagoras:
\[ a^2 + b^2 = c^2 \]

Trigonometric ratios in a right angled triangle:

\[ \tan \theta = \frac{\text{opposite}}{\text{adjacent}} \]
\[ \sin \theta = \frac{\text{opposite}}{\text{hypotenuse}} \]
\[ \cos \theta = \frac{\text{adjacent}}{\text{hypotenuse}} \]
ALL questions should be attempted.

1. (a) On the grid below plot the points A(–2,4), B(–4,–1) and C(1,–3).

(b) Plot the point D so that shape ABCD is a square.
2. The table below shows the basic annual premiums charged for car insurance by an insurance company. The basic premium depends on the area where the driver lives and the group their car belongs to.

<table>
<thead>
<tr>
<th>AREA</th>
<th>CAR GROUP</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>£428</td>
<td>£517</td>
<td>£613</td>
<td>£725</td>
<td>£838</td>
</tr>
<tr>
<td>A</td>
<td></td>
<td>£497</td>
<td>£555</td>
<td>£659</td>
<td>£779</td>
<td>£898</td>
</tr>
<tr>
<td>B</td>
<td></td>
<td>£525</td>
<td>£598</td>
<td>£712</td>
<td>£841</td>
<td>£975</td>
</tr>
<tr>
<td>C</td>
<td></td>
<td>£540</td>
<td>£651</td>
<td>£775</td>
<td>£915</td>
<td>£1055</td>
</tr>
<tr>
<td>D</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(a) Lynn’s car is in group 4 and she lives in area C. Write down her basic annual premium.

Drivers who do not make a claim on their insurance receive a discount on their basic annual premium as shown in the table below.

<table>
<thead>
<tr>
<th>Number of years without a claim</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4 or more</th>
</tr>
</thead>
<tbody>
<tr>
<td>Discount</td>
<td>30%</td>
<td>40%</td>
<td>55%</td>
<td>67%</td>
</tr>
</tbody>
</table>

(b) Lynn has not made a claim for 4 years. How much will it cost her to insure her car?
3. (a) Multiply out the brackets and simplify

$$4(5u - 2) + 15.$$ 

(b) Factorise $$9c + 24.$$
4. A grass lawn is treated with weedkiller.  
The lawn is split into twenty squares each of the same area.  
Ten of the squares are treated with Weedclear.  
Three weeks later the number of weeds in each of these squares is as follows:  

\[3, 4, 6, 2, 1, 7, 2, 1, 1, 3.\]

(a) Find the median.

(b) Find the range.

The other ten squares are treated with Noweed.  
For these squares the median is 2 and the range is 10.

(c) Make two comments comparing the number of weeds in squares treated with Weedclear and Noweed.
5. Ross drove 190 miles from Preston to Edinburgh in 3 hours 30 minutes. During the first part of his journey he drove for 2 hours at an average speed of 68 miles per hour. Find the average speed in miles per hour for the rest of his journey.
6. Some biology students were doing a project on “creepy crawlies”. The pie chart shows the different types of creepy crawlies that the students collected from a garden.

The students collected 220 creepy crawlies altogether. How many of them were beetles?
7. A farmer is building a wire fence around a field. The fence has heavy posts at the corners. Each corner post is supported by a stake as shown in the diagram.

- The corner post is 110 centimetres high.
- The stake meets the corner post halfway up.
- The stake meets the ground 80 centimetres from the foot of the corner post.
- 20 centimetres of the stake is below ground level.

Calculate the length of the stake.
Do not use a scale drawing.
8. Shown below are two pieces of cheese.
The weight of each piece is proportional to its volume.

Piece A has a volume of 400 cubic centimetres.
It weighs 480 grams.

Piece B is a cuboid.

Find the weight of piece B.
9. The table shows the ticket prices for a theme park in France. The prices are given in euros.

<table>
<thead>
<tr>
<th>Ticket</th>
<th>Adult price</th>
<th>Child price</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bronze</td>
<td>€50</td>
<td>€40</td>
</tr>
<tr>
<td>Silver</td>
<td>€90</td>
<td>€75</td>
</tr>
<tr>
<td>Gold</td>
<td>€110</td>
<td>€85</td>
</tr>
</tbody>
</table>

Gavin buys silver tickets for two adults and one child. Find the total cost, in pounds and pence, of buying these tickets if the exchange rate is £1 = 1.39 euros.
10. Solve algebraically the inequality

\[ \frac{1}{2} y + 3 > 13. \]

11. Calculate the area of the rectangle shown below.

*Do not use a scale drawing.*
12. Use the formula below to find the value of $T$ when $r = 2.6$ and $s = 1.4$.

$$T = \frac{rs}{r + s}$$
13. Sergei has been training to run a marathon. Since he started training his weight has dropped from 80 kilograms to 74 kilograms. Express his weight loss as a percentage of his original weight.
14. The diagram below shows part of a garden which is being watered from a sprinkler.

The area being watered is in the shape of a semi-circle and a right angled triangle.

Calculate the area being watered.