International Morse code:
- each ● takes 1 unit of time
- each — takes 3 units of time
- each 'in-between' takes 1 unit of time.

The code for J is ● — — —

How many units of time does it take?

(Remember the in-between units!)

Three letters have different codes.

Each of these codes takes 5 units of time.

What are the three codes?
Every letter in the English alphabet has a different code.

Explain why each of these codes **must** have an **odd** number of units of time.
2. This ‘Christmas tree’ is made from cubes that are all the same size.

They are arranged in **seven layers**

to form a solid square-based pyramid.

In each layer, the cubes around the perimeter are green and the others are white, e.g.

**Altogether**, how many **white cubes** are there?

Show how you know.
In a hurdle race, each runner jumps over hurdles.

<table>
<thead>
<tr>
<th>400 metre race: ten hurdles altogether</th>
</tr>
</thead>
<tbody>
<tr>
<td>Start to the first hurdle</td>
</tr>
<tr>
<td>45m</td>
</tr>
</tbody>
</table>

Nia wants to have ten hurdles in a 625 metre race.

<table>
<thead>
<tr>
<th>625 metre race: ten hurdles altogether</th>
</tr>
</thead>
<tbody>
<tr>
<td>Start to the first hurdle</td>
</tr>
<tr>
<td>45m</td>
</tr>
</tbody>
</table>

What should the distance between each pair of hurdles be?
My 13th birthday was on a Friday.
My 14th birthday was on a Saturday.

There are **365** days in a year (or 366 in a leap year).

How does that explain why your birthday is usually **1 day later** each year?

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In a survey in a restaurant:

- **two-thirds** of the people said the food was good, and
- **one-quarter** of people said it was average.

Five people said the food was poor.

How many people took part in the survey?
Here are two cogs.

The bigger cog has 30 teeth.
The smaller cog has 20 teeth.

The bigger cog turns 180 degrees clockwise.

Give reasons why the line on the smaller cog must now be in this position.