Fudges Bakery is proud of the high quality of its biscuits.
To keep them in the best condition they need good packaging.
If biscuits are left open they absorb moisture and go soft. You will investigate how well different types of packaging prevent this.

**Procedure**

Comparing packaging materials for biscuits

1. Weigh biscuit 1. In both tables, record the mass in the column **original mass of biscuit 1**.
2. Place the biscuit in the base of a Petri dish. Weigh the dish and biscuit. In both tables, record the mass in the column **mass of dish and biscuit 1**.
3. Weigh biscuit 2. In both tables, record the mass in the column **original mass of biscuit 2**.

Use the tables, on page 3, to record your results.
4 Place biscuit 2 in the base of a second Petri dish. Carefully cover the dish with one of the packaging materials. Wrap the material around the dish and seal it to the underside with sticky tape.

5 In both tables, record the name of the packaging material used.

6 Weigh the dish and biscuit 2. In both tables, record the mass in the column mass of dish and biscuit 2.

7 Place both dishes in a plastic box, together with a beaker half full of water. Put the lid on the plastic box.

8 Label the box with your name. Store it where your teacher tells you. Be careful not to spill the water.

9 In the next lesson, weigh both dishes again. Record their masses in the first table.

10 Work out the increase in the mass of each biscuit. Do this by subtracting mass of dish and biscuit from mass of dish and biscuit next lesson. This tells you how much moisture the biscuit has absorbed from the damp air.

11 Calculate the percentage increase in mass for each biscuit:
   \[
   \text{percentage increase} = \frac{\text{increase in mass (grams)}}{\text{original mass of biscuit (grams)}} \times 100\%
   \]

12 After about a week, repeat steps 9 and 10. Write your results in the second table.

13 Collect the results for different packaging materials. Draw a bar chart to compare them.

Warning: Do not eat the biscuits. They will be contaminated.
### Results from Lessons 1 and 2

<table>
<thead>
<tr>
<th></th>
<th>Unwrapped</th>
<th></th>
<th>Wrapped</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>original mass of biscuit 1</strong></td>
<td></td>
<td><strong>mass of dish and biscuit 1</strong></td>
<td></td>
</tr>
<tr>
<td><strong>mass of dish and biscuit 1</strong></td>
<td></td>
<td><strong>next lesson</strong></td>
<td></td>
</tr>
<tr>
<td>Increase in Mass</td>
<td>grams</td>
<td>grams</td>
<td>grams</td>
</tr>
</tbody>
</table>

### Results from Lessons 1 and 3

<table>
<thead>
<tr>
<th></th>
<th>Unwrapped</th>
<th></th>
<th>Wrapped</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>original mass of biscuit 1</strong></td>
<td></td>
<td><strong>mass of dish and biscuit 1</strong></td>
<td></td>
</tr>
<tr>
<td><strong>mass of dish and biscuit 1</strong></td>
<td></td>
<td><strong>after 1 week</strong></td>
<td></td>
</tr>
<tr>
<td>Increase in Mass</td>
<td>grams</td>
<td>grams</td>
<td>grams</td>
</tr>
</tbody>
</table>

**Increase = %**
Comparing results

- Which packaging keeps moisture out the best?
- Apart from the material, what else do you think affects how well the packaging keeps out moisture?
- Fudges Bakery has changed from using polyvinylchloride (pvc) film to polypropylene (pp), because pp is less damaging to the environment. According to your results, which is better for packaging biscuits: pp or pvc? Explain why.
- Why did you need to calculate the percentage increase in mass, instead of just using the increase in grams?