We hope that the teaching session at Kew assisted in developing the skills and knowledge of your pupil’s and provided them with an insight into the amazing plants and world-leading plant science at Kew.

Following your visit, you can use the post-visit activity to further support your pupils’ learning.

Pupils could have a go at the exam-style question on the following page, and then use the mark scheme to check their answers.
The diagram below shows a food chain from a pond ecosystem, including the amount of energy available at each trophic level.

Waterweed (34000 kJ m\(^{-2}\) year\(^{-1}\))

Freshwater Shrimp (7800 kJ m\(^{-2}\) year\(^{-1}\))

Trout (1080 kJ m\(^{-2}\) year\(^{-1}\))

Kingfisher (135 kJ m\(^{-2}\) year\(^{-1}\))

1. **Tick two terms that could be used to describe the freshwater shrimp.**

   - [ ] Producer
   - [ ] At the first trophic level
   - [ ] Primary consumer
   - [ ] Secondary consumer
   - [ ] At the second trophic level

   [1 mark]
2. The percentage efficiency of energy transfer between the waterweed and the freshwater shrimp is 22.9%. Showing your working, use the food chain to calculate the percentage energy efficiency of energy transfer between the secondary and tertiary consumers. [2 marks]

3. Explain why food chains don’t usually have more than 4 trophic levels. [2 marks]

4. Tropical coral reefs usually have longer food chains than polar ecosystems. Suggest why. [3 marks]
## KS5 Energy and Recycling in Ecosystems

<table>
<thead>
<tr>
<th>Question</th>
<th>Marking Guidance</th>
<th>Mark</th>
<th>AO</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Primary Consumer</td>
<td>1</td>
<td>AO1</td>
<td>Must have both correct for 1 mark. Reject if more than two boxes with tick. Ignore crossed-out ticks. Accept tick to right or left of correct box</td>
</tr>
<tr>
<td></td>
<td>At the second trophic level</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>12.5% Correct answer, award 2 marks. 1 mark for the correct equation: 135/1080 x 100</td>
<td>2</td>
<td>AO2</td>
<td>Accept 13%</td>
</tr>
<tr>
<td>1.</td>
<td>Percentage energy efficiency decreases with each trophic level. There wouldn’t be enough energy to sustain another trophic level.</td>
<td>2</td>
<td>AO1</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>Tropical coral reefs receive more light than polar regions, As they are closer to the equator. This means there is a greater input of energy into food chains.</td>
<td>3</td>
<td>AO3</td>
<td></td>
</tr>
</tbody>
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