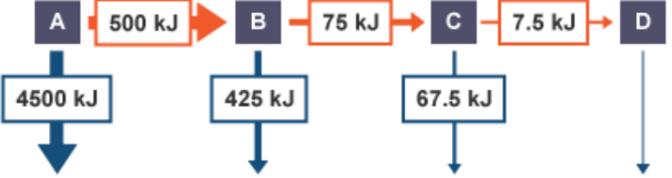


%	I can ...	Prove it!																														
<p style="text-align: center;">80%+</p>	<p>Describe quantitatively the proportion of energy transferred between trophic levels and use this to calculate efficiency (triple only)</p> <p>Apply inverse square laws and light intensity to the context of photosynthesis. (triple only)</p> <p>Explain the economic importance of limiting factors in greenhouses (triple only)</p> <p>Explain how biogas generators can be used to produce a fuel (triple only)</p> <p>Evaluate the impact of environmental factors on the distribution of a species (temperature, availability of water, atmospheric gas composition) (triple only)</p> <p>Explain how to improve the efficiency of food production (triple only)</p> <p>Explain how microorganisms can be cultured for food (e.g. fungus fusarium -> mycoprotein) (triple only)</p>	<p>1. Calculate the % of energy lost between each level (triple only).</p> <div style="display: flex; align-items: center; justify-content: center;">  <div style="margin-left: 20px;"> <p>A-B =</p> <p>B-C =</p> <p>C-D =</p> </div> </div> <p>2. Explain why energy is lost between each trophic level (triple only).</p> <p>3. Light intensity obeys an inverse square law - this means that if you double the distance you quarter the intensity.</p> <p>Use the inverse square law to sketch the shape of the graph that you would see:</p> <div style="display: flex; align-items: center;"> <div style="margin-right: 20px;"> <p>Sketch a quick graph :</p> <p>Light Intensity (LUX)</p> <p>Distance (cm)</p> </div>  </div> <p>4a. Draw a mind map to show how each of the following affects the rate of decay (make sure you explain how they affect it). (triple only)</p> <ul style="list-style-type: none"> • temperature • moisture • oxygen <p>4b. Can you then use this information to write a set of instructions for how to make home-made compost?</p> <p>5. Draw a labelled and annotated diagram to explain how biogas generators can be used to produce fuel. (triple only)</p> <p>6. Complete the table to show how each of these factors affects the distribution of species:</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Factor</th> <th>Description</th> <th>Effect if too high</th> <th>Effect if too low</th> <th>Example</th> </tr> </thead> <tbody> <tr> <td>temperature</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>water</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>oxygen</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>carbon dioxide</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>nitrogen</td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table> <p>7. Ms. Clark wants to build a greenhouse in her garden. Write a paragraph explaining how she can maximise her production of tomatoes but at the same time stay within her budget. Use the following words: limiting factors, sunlight, carbon dioxide, oxygen, temperature, cost. (triple only)</p> <p>8. Les wants to come up with a new way of generating food for the canteen. Write a letter to Les to convince him that using microorganisms would be a good idea. (triple only)</p>	Factor	Description	Effect if too high	Effect if too low	Example	temperature					water					oxygen					carbon dioxide					nitrogen				
Factor	Description	Effect if too high	Effect if too low	Example																												
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carbon dioxide																																
nitrogen																																



Plant Biology



Describe the role of decomposers within an ecosystem (triple only)

Explain factors that affect the rate of decay, calculating rate changes using this to explain how to speed up the production of compost (triple only)

Describe the differences in the trophic levels of organisms within an ecosystem (triple only)

Describe the numbering system of trophic levels and the importance of each level (triple only)

Construct accurate pyramids of biomass (triple only)

Explain how biomass is lost between the different trophic levels (triple only)

Analyse and draw graphs relating to osmosis

Calculate surface area, volume and mean in transpiration investigation

Explain the effects of temperature, light intensity, carbon dioxide intensity and the amount of chlorophyll on the rate of photosynthesis

Analyse data and calculate rates of photosynthesis and limiting factors from graphs and tables

Translate information between tabulated and graphical form (from tables to graphs) selecting the appropriate scale for axes

Explain limiting factors of photosynthesis (Triple only)

Describe and evaluate some of the programs used to reduce the negative effects of humans on ecosystems and biodiversity

Analyse data from graphs and tables relating to transpiration experiments

Explain the use of nitrate ions within plants

Describe and evaluate modern farming techniques (including: intensive farming, sustainable fisheries and sustainable farming) (triple only)

1. Draw a flow chart to show how decomposers recycle nutrients in an ecosystem (triple only)

2a. Construct a pyramid of biomass using the following data.

b. Label the pyramid of biomass with the following labels: producer, primary consumer, secondary consumer, tertiary consumer.

c. List the reasons that biomass (energy) is lost at each trophic level.

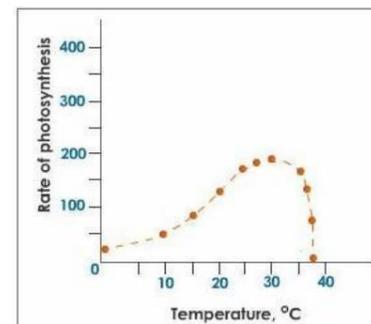
Organism	Number	Biomass
Oak tree	1	500,000
Aphids	10,000	1000
Ladybirds	200	50
Blackbirds	5	10

3a. Define the term 'limiting factor'

b. For each limiting factor sketch a graph against rate of photosynthesis: light intensity, carbon dioxide, amount of chlorophyll, temperature.

c. Explain the shape of each graph.

d. Use the graph below to calculate the rate of photosynthesis at 30°C.



4. Complete the table below to evaluate the different programs in place to reduce the negative impact of humans on ecosystems:

Program	Description	Example	Advantages	Disadvantages
Breeding programs				
Reintroduction of hedgerows and field margins				
Reduction of deforestation				
Reduction of carbon emissions				
Increased recycling				
Protection of rare habitats				

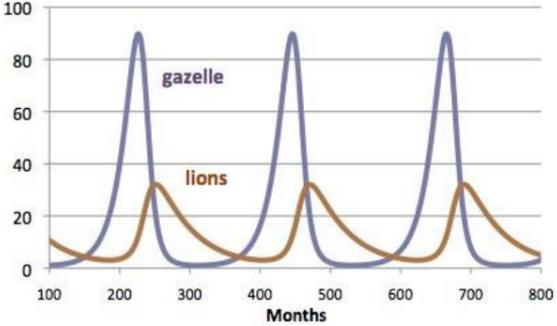
5. Complete the following table to summarise the use of modern farming techniques:

Type of farming	Description	Example	Advantages	Disadvantages
intensive farming				
sustainable fisheries				
sustainable farming				

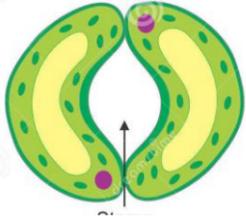
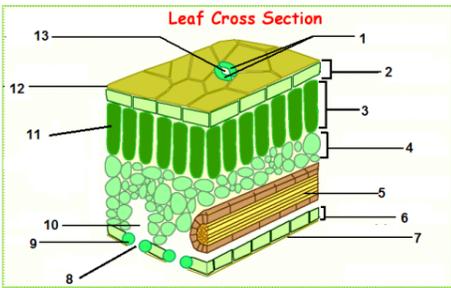
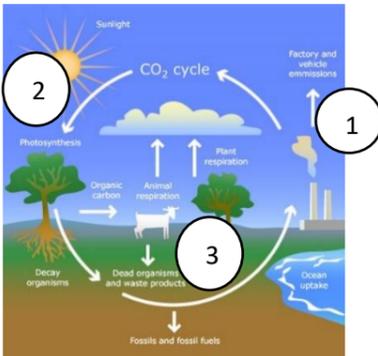
Key Words:

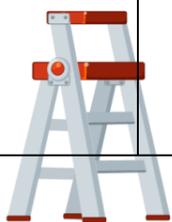
Ecosystem Biotic factor Abiotic factor Quadrat Producers Trophic levels Decomposers Fossilisation
 Combustion Nitrogen cycle Ammonia Water cycle Precipitation Agriculture Yield Permeable
 Selectively permeable Partially permeable Diffusion Concentration gradient Active transport Osmosis
 Limiting factor Epidermal tissue Palisade mesophyll Spongy mesophyll Xylem cells Phloem cells Root hair cell Transpiration
 Translocation Stomata Guard cells Vascular bundles Endothermic Cellulose Chlorophyll Positive phototropism
 Positive gravitropism/geotropism Auxin Hydrotropism Gibberellins Ethene Biogas Biodiversity Sustainability



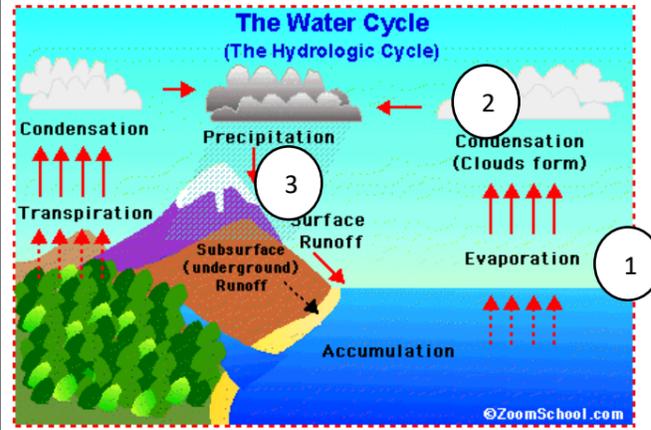
%	I can ...	Prove it!																																												
<p>60%</p>	<p>Interpret data from graphs and tables relating to predator and prey relationships predicting numbers of species based on changes in this data</p> <p>Use a range of experimental methods to calculate the abundance and distribution of species in a given ecosystem</p> <p>Calculate the rate of water uptake by a plant</p> <p>Calculate the percentage change in mass following osmosis</p> <p>Describe the process of active transport and explain why it is necessary</p> <p>Compare diffusion, osmosis and active transport</p> <p>Describe the process of transpiration and translocation (including the structure and function of stomata).</p> <p>Explain the effect of changing temperature, humidity, air movement and light intensity on the rate of transpiration</p> <p>Define 'sustainability' (triple only)</p> <p>Explain in detail human impact on biodiversity (waste management, pollution, land use, deforestation, global warming)</p> <p>Describe 6 biological factors threatening food security (triple only)</p>	<p>1. Use the graph to describe and explain the following:</p> <p>a. What happens to the number of prey when the predator numbers increase?</p> <p>b. What happens to the number of predators when the prey numbers decrease?</p> <p>c. What happens to the number of predators when the prey numbers increase?</p>  <p>2. Write a step by step method of how to use quadrats to estimate the number of dandelions in Kennington park</p> <p>3. Complete the summary table to show the differences between osmosis, diffusion and active transport in plants:</p> <table border="1" data-bbox="844 994 1936 1311"> <thead> <tr> <th>Type of transport</th> <th>Description</th> <th>Substances transported</th> <th>Direction of movement</th> <th>Membrane channels involved</th> <th>Examples in a plant</th> </tr> </thead> <tbody> <tr> <td>osmosis</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>active transport</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Diffusion</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table> <p>4. Write labels for 1, 2, 3 explaining how transpiration occurs:</p> <p>5. Explain how each of the following affects the rate of transpiration:</p> <p>a. high temperature =</p> <p>b. low temperature =</p> <p>c. high humidity =</p> <p>d. low humidity =</p> <p>e. high wind speed =</p> <p>f. low wind speed =</p>  <p>6. Calculate the rate of water uptake for these plants:</p> <table border="1" data-bbox="844 1834 1873 2136"> <thead> <tr> <th>Mass of plant at start (g)</th> <th>Mass of plant at the end (g)</th> <th>Change in mass (g)</th> <th>Time (s)</th> <th>Rate of water uptake (g/m) = change in mass (g) ÷ time (m)</th> </tr> </thead> <tbody> <tr> <td>100.04</td> <td>100.10</td> <td></td> <td>30</td> <td></td> </tr> <tr> <td>98.20</td> <td>98.70</td> <td></td> <td>90</td> <td></td> </tr> <tr> <td>102.10</td> <td>102.20</td> <td></td> <td>160</td> <td></td> </tr> </tbody> </table> <p>7. Create a mindmap to summarise how each of the following impacts on biodiversity: waste management, pollution, land use, deforestation, global warming</p> <p>8. Write a definition for the term 'sustainability'.</p>	Type of transport	Description	Substances transported	Direction of movement	Membrane channels involved	Examples in a plant	osmosis						active transport						Diffusion						Mass of plant at start (g)	Mass of plant at the end (g)	Change in mass (g)	Time (s)	Rate of water uptake (g/m) = change in mass (g) ÷ time (m)	100.04	100.10		30		98.20	98.70		90		102.10	102.20		160	
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%	I can ...	Prove it!																												
	<p>Define extremophiles linking to the conditions that they inhabit (bacteria in deep sea vents)</p> <p>List biotic and abiotic factors and explain how changes in them would affect a given community</p> <p>Explain the role of producers in food chains</p> <p>Describe in detail the location, function and adaptations of xylem tissue, phloem tissue, stomata and guard cells</p> <p>Describe how glucose is used after photosynthesis</p>	<p>1a. Write a definition for the term 'extremophile'. b. Choose one extremophile and complete the table to show how it is adapted to these conditions.</p> <table border="1" data-bbox="636 418 2003 560"> <thead> <tr> <th>Name</th> <th>Habitat</th> <th>Conditions</th> <th>Adaptations</th> </tr> </thead> <tbody> <tr> <td> </td> <td> </td> <td> </td> <td> </td> </tr> </tbody> </table> <p>3a. Define the terms 'biotic' and 'abiotic' b. Make a list of all the abiotic factors in a rainforest ecosystem. c. What would happen to the number of plants if the level of sunlight decreased? Why? d. What would happen to the number of plants if the level of moisture decreased? Why? e. What would happen to the number of plants if the temperature decreased? Why?</p> <p>4a. Annotate this diagram of a stomata to show how it helps plants. Use these key words: oxygen, carbon dioxide, guard cells, in, out, water.</p>  <p>b. Write a paragraph explaining why producers are important in an ecosystem using these key words: food, energy, primary consumers, secondary consumers, tertiary consumers, food chain, trophic levels.</p> <p>4. Draw and label a diagram of a root hair cell. Write a sentence explaining how root hair cells are adapted to absorb water.</p> <p>5. Complete the table to show the function of each of the following:</p> <table border="1" data-bbox="636 1184 2003 1368"> <thead> <tr> <th>Structure</th> <th>Diagram</th> <th>Job</th> <th>Adaptations</th> </tr> </thead> <tbody> <tr> <td>xylem tissue</td> <td> </td> <td> </td> <td> </td> </tr> <tr> <td>phloem tissue</td> <td> </td> <td> </td> <td> </td> </tr> <tr> <td>stomata</td> <td> </td> <td> </td> <td> </td> </tr> <tr> <td>guard cells</td> <td> </td> <td> </td> <td> </td> </tr> </tbody> </table> <p>6. List all the ways that plants use glucose once it has been produced by photosynthesis</p>	Name	Habitat	Conditions	Adaptations					Structure	Diagram	Job	Adaptations	xylem tissue				phloem tissue				stomata				guard cells			
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	<p>Define "ecosystem"</p> <p>Draw and label an unspecialised plant cell and a palisade, root hair, xylem and phloem specialised cell</p> <p>Label a transverse section of a leaf</p> <p>Describe the process of osmosis</p> <p>Recall the word and symbol equation for photosynthesis</p> <p>Use tests to identify starch, glucose and proteins</p>	<p>1. Complete this definition of an ecosystem using these words: environment, living, interactions 'An ecosystem is the _____ and non-living factors and the _____ between them in an _____.'</p> <p>2. Draw and label each of the following cells: a. unspecialised plant cell b. palisade leaf cell c. root hair cell d. xylem cell e. phloem cell</p> <p>3. Label the diagram of a leaf cross section:</p>  <p>4. Complete the description of osmosis using the key words: high, permeable, photosynthesis, water, low, roots</p> <p>'Osmosis is the movement of _____ molecules from an area of _____ water concentration to an area of _____ water concentration across a partially _____ membrane. It happens in the _____ of plants and is the way that plants get water to cells for _____'</p> <p>5a. Write down the word and symbol equations for photosynthesis: 5b. Complete the table to show the tests for starch, glucose and proteins:</p> <table border="1" data-bbox="636 2199 1948 2383"> <thead> <tr> <th>Substance</th> <th>Test</th> <th>Colour before</th> <th>Colour after</th> <th>Part of plant substance is found</th> </tr> </thead> <tbody> <tr> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> </tr> </tbody> </table> <p>6. Use three sentences to describe what is happening in the carbon cycle at each point:</p>  <p>1: 2: 3:</p>	Substance	Test	Colour before	Colour after	Part of plant substance is found																							
Substance	Test	Colour before	Colour after	Part of plant substance is found																										



7. Use one sentence to describe what is happening in the water cycle at each point:



Describe the carbon cycle and its importance

Describe the water cycle and its importance

Define biodiversity and explain its importance

Describe structural, behavioural and functional adaptations of organisms

Name the 5 tissues and name the key organs in the plant



1:

2:

3:

8. Decide if these adaptations are structural, behavioural or physiological by ticking the correct box:

Adaptation	Structural	Behavioural	Physiological
Large ears to increase heat loss			
Reduced urine production			
Sleeps in the day time			
Lives in the tallest branches in the rainforest			
Has large petals to attract insects			
Contains haemoglobin in red blood cells to carry oxygen			

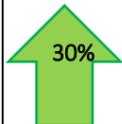
Define "ecosystem"

Define 'interdependence' and explain what species depend on

Define primary, secondary and tertiary consumers

Describe the process of photosynthesis

Describe what plants and animals 'compete' with each other for



1. Complete this definition of an ecosystem using these words: environment, living, interactions
'An ecosystem is the _____ and non-living factors and the _____ between them in an _____.'

2. Which of these is the correct definition for the term 'interdependence'?

- a. Interdependence is the way that all of the non-living things in a community affect the living things.
- b. Interdependence is the way that all of the living and non-living things in a community affect each other.
- c. Interdependence is the way that all of the living things in a community depend on each other.

3. Match the key term to its correct definition:

producer	An organism that eats a secondary consumer.
primary consumer	An organism that produces its own food using sunlight energy in photosynthesis.
secondary consumer	An organism that eats a producer.
tertiary consumer	An organism that eats a primary consumer.

4. Use these key words to write a summary of photosynthesis: sunlight energy, convert, glucose, food, producer, chlorophyll, chloroplasts, absorb, waste, oxygen.

5. List the different things that animals and plants compete for to survive.

Animals	Plants

