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| **%** | **I can …** | **Prove it!** |
| **80%+** | **Describe quantitatively the proportion of energy transferred between trophic levels and use this to calculate efficiency (triple only)**  **Apply inverse square laws and light intensity to the context of photosynthesis. (triple only)**  **Explain the economic importance of limiting factors in greenhouses (triple only)**  **Explain how biogas generators can be used to produce a fuel (triple only)**  **Evaluate the impact of environmental factors on the distribution of a species (temperature, availability of water, atmospheric gas composition) (triple only)**  **Explain how to improve the efficiency of food production (triple only)**  **Explain how microorganisms can be cultured for food (e.g. fungus fusarium -> mycoprotein) (triple only)** | 1. Calculate the % of energy lost between each level (triple only).  Energy flow from producers to primary consumers is 500 kj, primary to secondary is 75 kj, secondary to tertiary is 7.5 kj.  Producers lose 4500 kf, primary lose 425 kj and secondary lose 67.5 kj  A-B =    B-C =  C-D =  2. Explain why energy is lost between each trophic level (triple only).    3. Light intensity obeys and inverse square law - this means that if you double the distance you quarter the intensity.  Use the inverse square law to sketch the shape of the graph that you would see:  4a. Draw a mind map to show how each of the following affect the rate of decay (make sure you explain how they affect it).(triple only)   * temperature * moisture * oxygen   4b. Can you then use this information to write a set of instructions for how to make home-made compost?  5. Draw a labelled and annotated diagram to explain how biogas generators can be used to produce fuel. (triple only)  6. Complete the table to show how each of these factors affects the distribution of species:   |  |  |  |  |  | | --- | --- | --- | --- | --- | | Factor | Description | Effect if too high | Effect of too low | Example | | temperature |  |  |  |  | | water |  |  |  |  | | oxygen |  |  |  |  | | carbon dioxide |  |  |  |  | | nitrogen |  |  |  |  |   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)  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) |
| **70%** | **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 tropic levels and the importance of each level (triple only)**  **Construct accurate pyramids of biomass (triple only)**  **Explain how biomass is lost between the different tropic 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 |   Image result for limiting factors temperature  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 30⁰C.  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

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| **%** | **I can …** | **Prove it!** |
| **60%** | **Interpret data from graphs and tables relating to predator and prey relationships predicting numbers of species based on changes in this data**  **Use a range of experimental methods to calculate the abundance and distribution of species in a given ecosystem**  **Calculate the rate of water uptake by a plant**  **Calculate the percentage change in mass following osmosis**  **Describe the process of active transport and explain why it is necessary**  **Compare diffusion, osmosis and active transport**  **Describe the process of transpiration and translocation (including the structure and function of stomata).**  **Explain the effect of changing temperature, humidity, air movement and light intensity on the rate of transpiration**  **Define ‘sustainability’ (triple only)**  **Explain in detail human impact on biodiversity (waste management, pollution, land use, deforestation, global warming)**  **Describe 6 biological factors threatening food security (triple only)** | Image result for predator prey graph1. Use the graph to describe and explain the following:  a. What happens to the number of prey when the predator numbers increase?  b. What happens to the number of predators when the prey numbers decrease?  c. What happens to the number of predators when the prey numbers increase?  2. Write a step by step method of how to use quadrats to estimate the number of dandelions in Kennington park  3. Complete the summary table to show the differences between osmosis, diffusion and active transport in plants:   |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | Type pf transport | Description | Substances transported | Direction of movement | Membrane channels involved | Examples in a plant | | osmosis |  |  |  |  |  | | active transport |  |  |  |  |  | | Diffusion |  |  |  |  |  |   4. Write labels for 1, 2, 3 explaining how transpiration occurs:  5. Explain how each of the following affects the rate of transpiration:  a. high temperature =  b. low temperature =  c. high humidity =  d. low humidity =  e. high wind speed =  f. low wind speed =  6. Calculate the rate of water uptake for these plants:   |  |  |  |  |  | | --- | --- | --- | --- | --- | | 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 |  |   7. Create a mindmap to summarise how each of the following impacts on biodiversity:  waste management, pollution, land use, deforestation, global warming  8. Write a definition for the term ‘sustainability’. |

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| **%** | **I can …** | **Prove it!** |
| **50%** | **Define extremophiles linking to the conditions that they inhabit (bacteria in deep sea vents)**  **List biotic and abiotic factors and explain how changes in them would affect a given community**  **Explain the role of producers in food chains**  **Describe in detail the location, function and adaptations of xylem tissue, phloem tissue, stomata and guard cells**  **Describe how glucose is used after photosynthesis** | 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.   |  |  |  |  | | --- | --- | --- | --- | | Name | Habitat | Conditions | Adaptations | |  |  |  |  |   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?  Image result for stomata4a. Annotate this diagram of a stomata to show how it helps plants. Use these key words: oxygen, carbon dioxide, guard cells, in, out, water.  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.  4. Draw and label a diagram of a root hair cell. Write a sentence explaining how root hair cells are adapted to absorb water.  5. Complete the table to show the function of each of the following:   |  |  |  |  | | --- | --- | --- | --- | | Structure | Diagram | Job | Adaptations | | xylem tissue |  |  |  | | phloem tissue |  |  |  | | stomata |  |  |  | | guard cells |  |  |  |   6. List all the ways that plants use glucose once it has been produced by photosynthesis |
|  | **Define “ecosystem”**  **Draw and label an unspecialised plant cell and a palisade, root hair, xylem and phloem specialised cell**  **Label a transverse section of a leaf**  **Describe the process of osmosis**  **Recall the word and symbol equation for photosynthesis**  **Use tests to identify starch, glucose and proteins**  **Describe the carbon cycle and its importance**  **Describe the water cycle and its importance**  **Define biodiversity and explain its importance**  40%  **Describe structural, behavioural and functional adaptations of organisms**  **Name the 5 tissues and name the key organs in the plant** | 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 \_\_\_\_\_\_\_\_\_\_.’  Image result for transverse section of leaf unlabelled2. 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  3. Label the diagram of a leaf cross section:  4. Complete the description of osmosis using the key words:  **high, permeable, photosynthesis, water, low, roots**  ‘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 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_’  5a. Write down the word and symbol equations for photosynthesis:  5b. Complete the table to show the tests for starch, glucose and proteins:   |  |  |  |  |  | | --- | --- | --- | --- | --- | | Substance | Test | Colour before | Colour after | Part of plant substance is found | |  |  |  |  |  | |  |  |  |  |  | |  |  |  |  |  |   Image result for carbon cycle  6. Use three sentences to describe what is happening in the carbon cycle at each point:  1:  2:  3:  7. Use one sentence to describe what is happening in the water cycle at each point:  Image result for water cycle  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 |  |  |  | |
| **30%** | **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 thigs that animals and plants compete for to survive.   |  |  | | --- | --- | | Animals | Plants | |  |  | |