Assessment Schedule – 2005

Level One Biology: Describe plant processes (90167)

Evidence Statement

Q	Achievement	Achievement with Merit	Achievement with Excellence
1	**A** = water **B** = carbon dioxide **C** = sugars / glucose **D** = oxygen Three of these must be correct. Can use formula.		
2(a)	Two out of the three points must be made At low light intensity the photosynthesis rate is low. As light intensity increases, the photosynthesis rate increases. At high light intensity the rate of photosynthesis does not increase any more, but stays roughly constant. **OR** a description of low and high. Must talk about photosynthesis not numbers of bubbles.		
2(b)	States that there is a limiting factor but the factor isn't identified.	Gives reasons for reaching a maximum. The photosynthesis rate increases to a maximum then levels off because **EITHER** There is some other factor limiting the rate of photosynthesis such as: chlorophyll concentration: all chlorophyll are absorbing light energy at maximum rate and can't absorb any more **OR** CO_2 availability: the availability of CO_2 is now not enough to keep up with the amount of light being absorbed so it limits the rate of photosynthesis **OR** All the chloroplasts are functioning at their maximum metabolic rate. They cannot operate any faster.	

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3	Must have the TWO factors mentioned: • need for chlorophyll • need for light.	Must have BOTH factors identified **plus** reason for ONE of the following physiological reasons • **Chlorophyll** is necessary to trap the light energy required for the photosynthesis process. • **Light** is necessary for providing the energy for starch production during the photosynthesis process. **OR** Discussion of both light and chlorophyll from the experiment. • The white parts of the leaf have no chlorophyll, so they act as a control for comparison with the green parts of the leaf. Because the starch is only produced in the original green portions of the leaf, chlorophyll must be necessary for starch production. • The shaded portions of the leaf receive no light, and the results show that these portions do not contain starch, whereas the areas that receive light **and** are green, do contain starch.	Must have BOTH factors identified **plus** reason for ONE of the following physiological reasons • **Chlorophyll** is necessary to trap the light energy required for the photosynthesis process. • **Light** is necessary for providing the energy for starch production during the photosynthesis process. **AND** Discussion of both light and chlorophyll from the experiment. • The white parts of the leaf have no chlorophyll, so they act as a control for comparison with the green parts of the leaf. Because the starch is only produced in the original green portions of the leaf, chlorophyll must be necessary for starch production. • The shaded portions of the leaf receive no light, and the results show that these portions do not contain starch, whereas the areas that receive light **and** are green, do contain starch. The analysis of the results and logical reasoning are needed for Excellence. Knowledge of the investigation is not necessary, just knowledge of the factors required for photosynthesis, and logical reasoning.
4(a)	Any THREE characteristics described: • attractive scent • brightly coloured petals / 'UV patterns' on petals • nectar present • mimic.		
4(b)	Any ONE of the following (or similar) • because it is wind-pollinated • to make it easier for pollination.	Pollination is more successful if the flowers are on the ends of the branches so the wind can more easily disperse the pollen **AND** it is an advantage to release the pollen before the leaves appear, to increase the chances of the wind blowing pollen onto the exposed female flower parts.	

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5(a)	ONE of the following required to be correct: • the **ovary** swells and develops into the pod • the **ovule** is fertilised and develops into the pea seeds.		
5(b)	For dispersal of seeds.	Needs TWO parts **to be linked** for Merit: Gives a reason for why dispersal helps survival • fruit is the method by which a flowering plant disperses its seeds **AND** • seed dispersal is necessary to avoid competition with the parent plant for moisture or food, or space **OR** locate new habitats where there is less competition for moisture or food, or space, colonisation of new areas where there is less competition for moisture or food, or space.	
6(a)	Any TWO asexual reproduction methods **described**: Production of: • stem tubers (storage stems that can develop into separate plants, eg potatoes) • root tubers (storage roots that can develop into separate plants, eg dahlia) • bulbs (actually special stems that can become new plants, eg garlic, lily, daffodil) • corms (several stems each stacked on top of each other. They can split off and become independent plants, eg gladiolus) • rhizomes (underground stems, eg ginger, iris) • stolons or runners (eg strawberry) • layering, where the stem bends down and touches the soil, and produces roots. This can become an independent plant (eg lilac) • budding, where the leaves actually produce miniature plants on the leaf surface. These can fall off and exist independently (eg bryophyllum, spider plant).		

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6(b)	Any ONE of the following differences described: • Asexual reproduction produces offspring that are genetically the same, but the offspring of sexually reproducing plants are all different. • Only one parent is needed in asexual reproduction, but two flowers are generally needed in sexual reproduction (assuming cross pollination). • There are no gametes (or pollen) produced in asexual reproduction. • There is no fertilisation required in asexual reproduction.	Any ONE of the following essential differences is explained: **EITHER:** Asexual reproduction produces identical offspring because (**one** required): • there are no gametes produced • there is no fertilisation • there is only one parent plant • no sexual reproductive organs are required • no meiosis occurs (only mitosis occurs) • mitosis produces identical cells. **OR** Sexual reproduction produces unique offspring because: (ONE required) • gametes are produced • fertilisation occurs • generally involves two different flowers or parent plants (not in self-pollination though) • flowers are required (with sex organs) • meiosis produces gametes that are all different. But must compare one reason for difference	**For Excellence the discussion must directly compare two of the following in both sexually reproducing AND asexually reproducing plants:** • Sexual reproduction involves the production of **gametes** which fuse together in fertilisation, whereas asexual reproduction requires no gametes or fertilisation. • Sexual reproduction requires meiosis to produce the genetically unique gametes, whereas asexual reproduction requires only mitosis to produce identical cells. • Sexual reproduction produces genetically unique offspring because of the combination of genes from two sources, whereas all offspring from asexual reproduction are genetically identical because only one parent is involved. Must compare on two levels.
7	BOTH of the following are required: • The marks carved on the tree should be at the same height as when they were carved. • The marks will have expanded **OR** be obscured by bark growth.		

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8(a)	Requires ONE answer relating to the effect of gravity **AND** ONE answer relating to the effect of light. Gravity effects: (one required) • radicle / young root grows downwards • plumule / young shoot grows upwards • lateral roots and root hairs grow out laterally. Light effects: (one required) • young shoot unbends • young shoot grows toward the light when it is above the soil • leaves and / or cotyledons open • leaves and / or cotyledons turn green.		
8(b)	The carbohydrate provides the source of energy so that the seed can germinate / grow. **OR** The carbohydrate provides a source of food so that the seed can germinate / grow. Provide food is not enough.	Explains that it provides a food source for growth when the plant is unable to create its own energy from photosynthesis because: It has no leaves so no photosynthesis. **OR** The leaves are under the ground so there is no way that they can absorb light and carry out photosynthesis. **OR** The leaves are under the ground so the chlorophyll hasn't developed so the seed is unable to carry out photosynthesis. Must clearly explain why the seed needs this energy source and link it to not being able to carry out photosynthesis.	

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8(c)	**(**Not an Achievement opportunity**)**	For Merit, a student must give the reason **why** something occurs. Gravity – to get water / nutrients / anchorage. Light – produce own food / photosynthesis. Eg the young radicle, plumule and cotyledons are sensitive to gravity and light, and the cells respond by causing growth downwards towards gravity or towards light. Eg the young seedling responds to gravity and light because it is important for the young roots to grow downwards, and the young shoot to grow towards the light.	For Excellence the student must outline at least TWO things that are important to the establishment of the young seedling that are directly attributed to the response to **gravity AND light.** Orientation / competition / food store running out. **Gravity effects:** • The young radicle will grow downwards even if the seed is planted upside down. This enables the radicle to locate more water and minerals. • The young radicle will grow downwards even if the seed is planted upside down. This enables the radicle to anchor the seedling firmly in the soil. • The young shoot grows directly up through the soil, even if planted upside down. This is a response to gravity not light. **Light effects:** • The hypocotyl (part of the seedling stem just below the cotyledons) responds to light by uncurling to lift the cotyledons out of the soil. • Seed leaves (cotyledons) and first true leaves of a young seedling need to be positioned horizontally to pick up maximum light. • The young stem above the soil grows strongly towards light. This enables it to grow away from competitors or shady regions for maximum photosynthesis. • The cotyledons and / or leaves respond to light by turning a green colour, so that they can photosynthesise.

Judgement Statement

Achievement	Achievement with Merit	Achievement with Excellence
Total of SEVEN opportunities answered at Achievement level or higher. 7 × A	Total of TEN opportunities answered with FOUR at Merit level or higher. 4 × M + 6 × A	Total of TEN opportunities answered with ONE at Excellence level *and* FOUR at Merit level. 1 × E + 4 × M + 5 × A