Assessment Schedule – 2021

Biology: Demonstrate understanding of biological ideas relating to the life cycle of flowering plants (90928)

Evidence Statement

Q	Achievement	Merit	Excellence
ONE	**Describes** (single, simple ideas). **Examples** of possible ideas include: • **Pollination** is the transfer of pollen from the anther of one flower to another flower / stigma (or within the same flower). • Pollination can occur via wind / insect / bird: - The animals / insects / birds pick up pollen from the male anthers and carry it to the female stigma. Flowers have different shapes, colours, and smells, and often sugary nectar, to encourage animals to visit and pollinate them. - Wind-pollinated flowers are shaped to make it easy for the wind to pick up pollen and transport it in the air. • **Fertilisation** is the joining of male nuclei / sperm / male gamete / male sex cell with female sex cell / ovule / egg. • Before fertilisation can occur, a pollen tube grows down inside the style with the male sex cells / pollen nuclei / sperm inside. • The ovary wall becomes the fruit. • Receptacle becomes the fruit. • The fruit helps with dispersal of the seed. • The fruit can provide nutrients for the germinating seed. etc.	**Explains** (gives reasons how or why something occurs / provides examples) flower structures, pollination, and fertilisation, with correct definition of both pollination and fertilisation **Examples** of possible responses: • Links structure of flower to pollination, using external factors (wind / insects / animals) as an example. For example: - The anthers of wind-pollinated flowers hang outside the petals, so the pollen can be moved by wind gusts onto other flowers. - The flower produces a large quantity of pollen that is light / feathery and small, which allows it to be easily carried by the wind / animals. • Pollen must land on the stigma of a suitable flower of the same species for pollination. This allows the male gamete to reach the female gamete, allowing formation of a **seed**. • After fertilisation has occurred, the ovule forms the seed and develops into a fruit, ready to be **dispersed**. • Many plants have ways to make sure they are only pollinated by pollen from a flower on a different plant, which is called **cross-pollination**. For example, some have the male and female parts in separate flowers on the same plant, while others have male and female flowers on different plants. Some have the stigmas and anthers ripening at different times to prevent self-pollination.	**Discusses** links between flowers' structures and functions and the life cycle of the plant. Pollination and fertilisation are both important for: • The development of a **seed** and this process is important because it allows for the **dispersal** of the seed which allows for the seed to be dispersed away from the parent plant and this **reduces competition**. • The **increase** in genetic diversity, and thus increased **reproductive success**. This will overall allow the species to have an increased chance of **survival** in a changing environment.

NØ	N1	N2	A3	A4	M5	M6	E7	E8
No response / no relevant evidence.	ONE relevant idea given.	TWO relevant ideas given.	THREE relevant ideas given.	FOUR relevant ideas given.	Explains TWO ideas.	Explains THREE ideas.	Links the structures and their functions involved in BOTH process to an importance in the life cycle of the plant.	Links the structures and their functions involved in BOTH process to TWO importance's in the life cycle of the plant.

Q	Achievement	Merit	Excellence
TWO	**Describes** (single, simple ideas). Seeds can be dispersed by wind, water, animal transportation, explosion / bursting (1 × Achievement point for each method, up to two). **Describes examples of seed dispersal methods:** e.g. • Karaka trees have nutrient-rich, fleshy berries that surround the seeds. Birds such as kererū eat these berries and disperse the seeds in their droppings. • Animals can disperse seeds that stick to their sides when they walk past, for example seeds with hooks and barbs. The seeds eventually fall off the animal in a different location to the parent plant.	**Explains** (gives reasons how or why something occurs / provides examples) aspects of seed dispersal. **Explains how seeds are dispersed linked to importance**: • Birds can fly far away from the parent plant and therefore **reduce intraspecific competition** between the parent plant and their offspring. • Seeds from dandelion plants are light and have feathery bristles, which means that they can be carried long distances by the wind. • Some plants, such as kauri trees, have winged seeds. This means that they flutter to the ground when they leave the parent plant, and will stay in the air long enough to move a distance away from the parent plant. **Explains why seeds need to be dispersed** e.g. • Seeds contain the embryo of a new plant. Plants are sessile, which means that their offspring will grow next to them if the seeds are not dispersed. If their offspring grow next to them, they will be **competing** against each other for resources. Seeds being dispersed away from the parent plant mean that the offspring has access to resources that are not in direct competition with the parent, or their "siblings". • By dispersing many seeds at once, to many different places, plants increase the chance that their **genes will be passed on**. For example, a dandelion has many seeds that are blown randomly by the wind. This means that the chances of at least one of these seeds landing in an area with the right resources and conditions to survive are increased.	**Discusses** comprehensively the links between seed **structure** and successful seed **dispersal**. Examples **(**linking structure of seed, to the importance of dispersal method, such as colonisation of new area, decrease in competition, distance from parent place, and / or genetic variation). • Seeds such as those found in the karaka berry are dispersed successfully (by birds) because of the structure in which they are encased. It is a bright orange, fleshy berry. The colour is visible and attractive to native birds. Birds that can open their beak wide enough to eat the berry may also have digestive chemicals in their digestive systems that break down the flesh (releasing nutrients for the bird to use) and expose the seed, which will be deposited via the bird's droppings, and germinate with the right environmental conditions. • The colour of the berry / fruit that surrounds the seed, the properties of the seed coat AND the nutrients in this berry are all critical for the successful dispersal of the karaka seeds. Without the bird eating them, the seed would not be exposed (via the bird's digestive systems) and the seeds would not be distributed away from the parent.

NØ	N1	N2	A3	A4	M5	M6	E7	E8
No response / no relevant evidence.	ONE relevant idea given.	TWO relevant ideas given.	THREE relevant ideas given.	FOUR relevant ideas given.	Explains TWO ideas (Must have at least one reason why seeds are dispersed) .	Explains THREE ideas.	Links the structures of ONE seed to the successful dispersal of these seeds.	Links the structures of TWO seeds to the successful dispersal of these seeds.

Q	Achievement	Merit	Excellence
THREE	**Describes** (single, simple ideas). **Describes the chemical process of photosynthesis in words or symbols (does not need to be a balanced chemical equation).** E.g. $6CO_2 + 6H_2O \rightarrow C_6H_{12}O_6 + 6O_2$. Carbon dioxide + water → glucose + oxygen The reactants, six carbon dioxide molecules and six water molecules, are converted by light energy into a sugar molecule and six oxygen molecules (the products). Accept sugar or glucose. **Describes the location of organelles or structures in the leaf (one Achievement point for each description).** Chloroplasts are the organelles involved in photosynthesis; they trap light to be converted to chemical energy. • The leaf is wide (broad) and flat. • The leaf has a spongy mesophyll cell layer with large intra-cellular spaces. • Waxy cuticle. • Dark green from lots of chloroplasts. • Xylem transports water. • Pholem transports food / nutrients.	Explains (gives reasons how or why something occurs / provides examples) structures / adaptations of the leaf that assist photosynthesis. The stomata are located mainly on the underside of the leaf, so that gases can enter and exit, but they are not in direct sunlight – this prevents **excess water loss.** Water can still leave via the stomata (through the process of transpiration), but at a lower rate than if they were on the top side of the leaf. The **guard cells** for the stomata are where the carbon dioxide gas diffuses through to get to the chloroplasts found in the palisade cells and in the mesophyll layer. Chloroplasts contain chlorophyll, which is a pigment that attracts light energy and captures the energy. This energy drives the reaction of photosynthesis – without it, photosynthesis could not occur. The leaf is broad and flat / thin, which increases surface area to volume ratio and increases the surface through which light can be absorbed. The leaf is **thin** to allow the **quick diffusion of gases** to the site of photosynthesis (short diffusion distance). The **waxy cuticle** is a clear waterproof layer that prevents the loss of water, which is required for photosynthesis. This layer prevents the loss of water by evaporation, while allowing light to pass through. The epidermal layer provides a thin layer of cells, which are transparent to allow the red and blue wavelengths of light through and provide protection to the cells below. etc.	Discusses specialised features and structures (three), linked to the overall efficiency of photosynthesis. **Example** The more effectively a plant can carry out photosynthesis, the greater its chances of survival. Thus, all the adaptations a leaf has are to **increase the efficiency** of photosynthesis and **maximise light absorption and hence starch production**. For example, the more chloroplasts a leaf has in its palisade cells, the darker green it appears, and the way that the palisade cells are organised (lengthways with regular shapes closely packed together) ensures it can trap more sunlight, to then be converted to chemical energy by photosynthesis.

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No response / no relevant evidence.	ONE relevant idea given.	TWO relevant ideas given.	THREE relevant ideas given.	FOUR relevant ideas given.	Explains TWO ideas.	Explains THREE ideas.	Discusses how TWO parts of the leaf work together to enable photosynthesis to occur efficiently.	Discusses how THREE parts of the leaf work together to enable photosynthesis to occur efficiently.

Cut Scores

Not Achieved	Achievement	Achievement with Merit	Achievement with Excellence
0 – 7	8 – 14	15 – 19	20 – 24