

90928



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Level 1 Biology, 2017

90928 Demonstrate understanding of biological ideas relating to the life cycle of flowering plants

9.30 a.m. Thursday 16 November 2017
Credits: Four

| Achievement | Achievement with Merit | Achievement with Excellence |
|---|--|---|
| Demonstrate understanding of biological ideas relating to the life cycle of flowering plants. | Demonstrate in-depth understanding of biological ideas relating to the life cycle of flowering plants. | Demonstrate comprehensive understanding of biological ideas relating to the life cycle of flowering plants. |

Check that the National Student Number (NSN) on your admission slip is the same as the number at the top of this page.

You should attempt ALL the questions in this booklet.

If you need more space for any answer, use the page(s) provided at the back of this booklet and clearly number the question.

Check that this booklet has pages 2–8 in the correct order and that none of these pages is blank.

YOU MUST HAND THIS BOOKLET TO THE SUPERVISOR AT THE END OF THE EXAMINATION.

Excellence

TOTAL

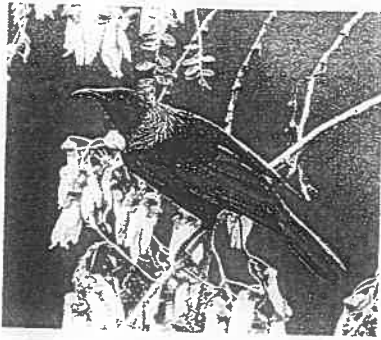
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QUESTION ONE: POLLINATION

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Pollination is an important part of a plant's life cycle. Pollination can occur in a number of different ways. Use the following pictures and diagrams to help you answer the question below.



Tūi in a kōwhai tree.

www.tonywhitehead.com/wildlight/2012/10/tuis-in-the-kowhai/

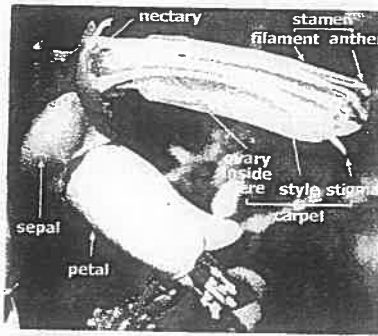
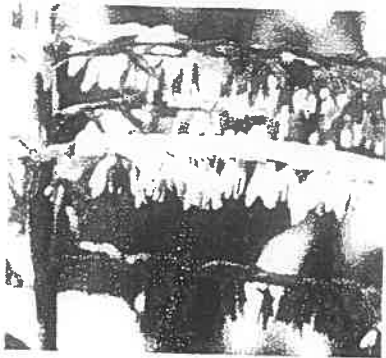


Diagram of kōwhai flower.

<http://sciencelearn.org.nz/Contexts/Pollination/Sci-Media/Images/Cutaway-kowhai>



Maize flowers releasing pollen.

<http://sciencelearn.org.nz/Contexts/Pollination/Sci-Media/Images/Maize-flowers-releasing-pollen>

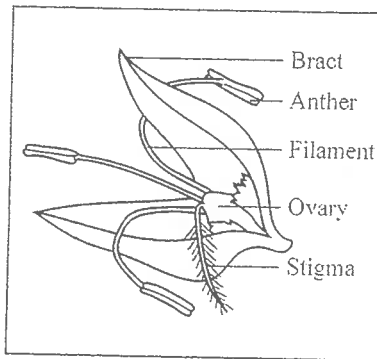


Diagram of a wind-pollinated flower.

<http://slideplayer.com/slide/4027685/>

Compare and contrast pollination carried out by the wind and pollination carried out by an animal such as an insect or bird, and discuss why pollination is important in the life cycle of a flowering plant.

In your answer:

- describe the process of pollination
 - explain the similarities and differences between wind pollination and pollination carried out by an animal such as a bird or an insect
- ① discuss the importance of pollination to the life cycle of all flowering plants.

Pollination is the ~~the~~ transfer of the male gamete, pollen from the anther ~~or~~ of one plant to the stigma of another through wind, water, ~~plant or~~ animal ~~or~~ explosion ~~or~~ animal.

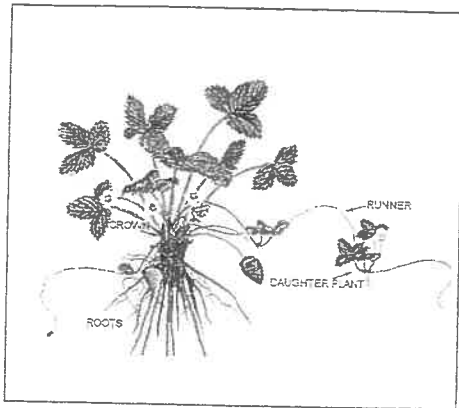
Wind pollinated plants tend to have the following characteristics. Long anthers, ~~the~~ large feathery stigma, their pollen is small round and light, produces no nectar and their flowers are small and ~~are~~ often ~~are~~ not brightly coloured.

Wind pollinated plants have long anthers. This is ~~due to~~ done in order for the wind to carry the pollen easily. The pollen itself is light round and small so it can be carried over long distances easily. Animal pollinated plants have shorter anthers that tend to be firmer in order to brush the pollen onto the animal. The ~~ex~~ pollen itself is larger and spiky so it can be attached to the animal easier. Furthermore they produce less ~~as~~ pollen as ~~they~~ the chances of a successful pollination is higher with animals than wind. Wind has to create a lot more, due to this. The stigmas are ^{long and} feathery on wind pollinated plants allowing it to have a larger surface area to increase chances of ~~it~~ ~~or~~ catching pollen. ~~Wind~~ ^{Animal} pollinated plants have shorter ones that can be brushed against when the animal goes for nectar. These flowers have a nectary along with bright flowers to ~~attract~~ ~~birds or~~ ~~insects~~ attract birds or insects. Wind pollinated have no nectary ~~or~~ brightly ~~are~~ coloured flowers as they do not need to attract animals. Pollination is ~~a~~ extremely important in the life cycle of all flowering plants. It is essential for the reproduction of the plant in order for the ~~species~~ species to survive. Pollination is the first step for sexual reproduction ~~where~~ where the conjunction of the male gamete pollen and the female ~~gamete~~ gamete ovule conjoin to form a zygote.

QUESTION TWO: SEXUAL AND ASEXYAL REPRODUCTION

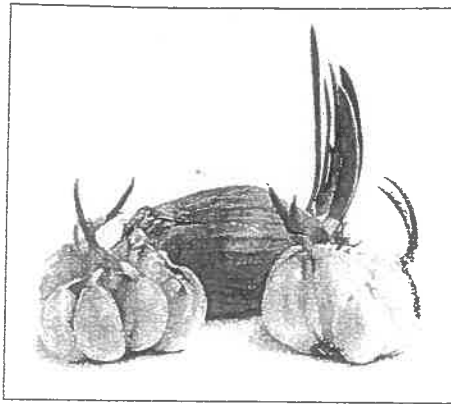
Some flowering plants are able to reproduce both sexually with flowers, and asexually through tubers, rhizomes, runners or bulbs. Below are pictures of some ways flowering plants reproduce.

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Strawberry plant showing runners and flowers.

<https://bonnieplants.com/wp-content/uploads/strawberry-plant-illustration-web.jpg>



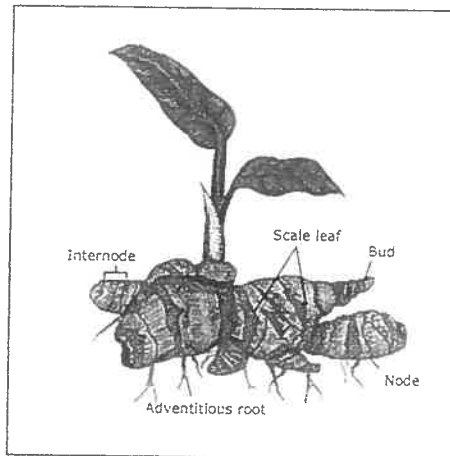
Bulbs of onion and garlic.

www.dreamstime.com/stock-images-bulbs-garlic-onion-image4947184



Potato plant showing tubers and flowers.

www.shutterstock.com/image-photo/potato-plant-tubers-soil-dirt-isolated-101102626



Ginger plant rhizome.

www.tutorvista.com/content/biology/biology-iii/angiosperm-morphology/underground-stem-modifications.php

Compare and contrast the advantages and disadvantages to a plant of being able to reproduce both sexually and asexually.

Your answer should:

- describe the purpose of reproduction in plants
- explain how at least TWO of the following: tubers, bulbs, rhizomes, and runners, allow a plant to reproduce asexually.
- discuss the overall advantages and disadvantages to a plant of reproducing sexually, asexually, or both.

Reproduction in plants is a natural part of the life cycle. It is to produce offspring.

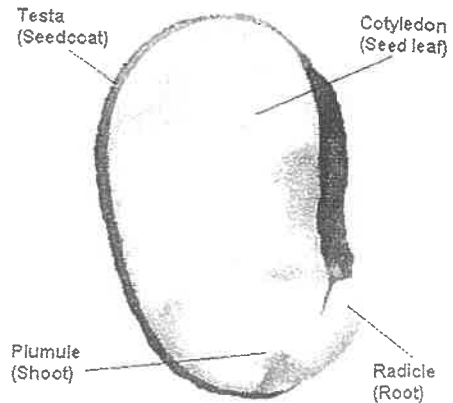
and increase the number of plants of the species to increase survival. Firstly runners produce asexually by sending out a stem or "runner" across the surface of the ground. ~~Thus~~ Along these runner ~~and~~ daughter plants are formed. Doing so is efficient and the ~~parent~~ ~~also~~ daughter plant uses the food provided by the parent plant until it grows roots and leaves to carry out its life processes of photosynthesis and absorption of nutrients and water by itself. ~~Is this on the other hand~~ Rhizomes ~~are~~ are also similar to runners. Daughter plants are produced from the an under ground stem that grows horizontally. ~~Then~~ Along this ~~at~~ under ground stem new plants grow, therefore creating offspring. It is essentially like a rhizome but the process occurs underground instead of above. ~~Asexual~~ Asexual reproduction is overall a lot more efficient and effective than sexual reproduction as firstly, they do not have to wait to be fertilised by another gamete through pollination. They ~~can~~ also do not waste energy on producing gametes in the first place. They can grow whenever they have the resources to. However there is one major disadvantage they have. They ~~are~~ are all genetically identical. Asexual reproduction creates plants that are genetically identical to their parent plants. This is bad as if there is a sudden change in environment, the ~~plant~~ ~~and~~ species would not be able to cope as none of them ~~or~~ would be resistant. Sexual reproduction on the other hand creates offspring that are all genetically different.

QUESTION THREE: GERMINATION AND GROWTH

Successful germination of seeds is an important part of the life cycle of a flowering plant.

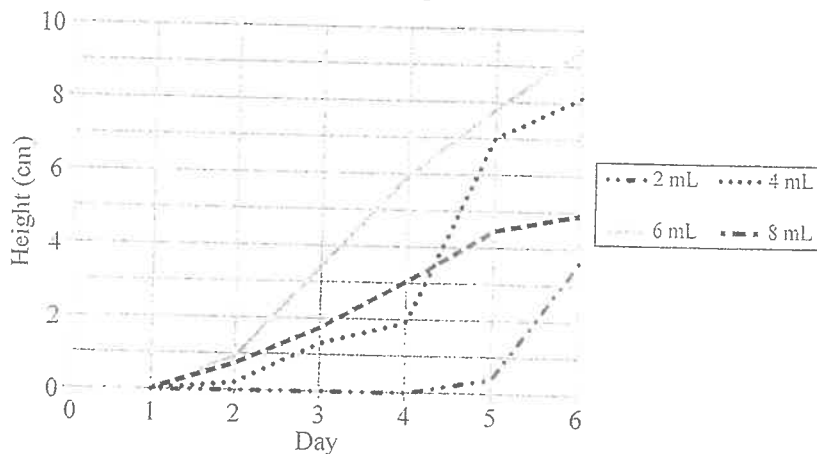
A student dissected a seed and set up some experiments to find out about the environmental factors that are important for seed germination and seedling growth.

After some of the seeds germinated, the student wanted to find out more about how different volumes of water affected the growth of the seedlings, and graphed the results.



<http://www.mysmartgarden.org.au/en/Resources/Food/Seed-Saving-Workshop>

The effects of different amounts of water on seedling growth



adapted from: <http://aaryamscience.blogspot.co.nz/2015/10/mung-bean-plant-research.html>

Discuss how environmental factors can affect successful seed germination and growth of a seedling.

In your answer:

- describe the environmental factors required for seed germination to occur
- explain the purpose of different parts of a seed in germination
- describe how different volumes of water can affect the growth of a seedling
- discuss how environmental factors and the parts of a seed and seedling, work together to allow the seed to germinate and grow.

For seed germination to occur 3 environmental factors are essential. Warmth, for the activity of enzymes to digest and use food storages. Enzymes have a specific temperature that they work best at. If it is too cold, it cannot work and catalyse processes and its activity is low. Hence the food is in the form of complex molecules such e.g starch

and proteins within the cotyledons in the seed. Enzymes help it break down into usable glucose and amino acids for growth. Secondly, ~~warmth is needed~~ ^(water) oxygen is needed for the ~~softer~~ ~~softer~~ softening of the hard testa. On a seed a micropyle is present, this is an opening that allows water and oxygen into the seed. Therefore when water is introduced into the seed, the testa can soften and release the radicle to grow downwards to form a root and the plumule to grow upwards to form the shoot. The cotyledons are then used to act as the first few leaves, which start the ~~photosynthesis~~ photosynthesis process and the plant seedling can now start producing its own food. Finally oxygen is needed for the process of respiration. Aerobic respiration requires oxygen and glucose to form CO_2 , water and ATP. ~~is~~ The energy of life. Without it seeds cannot live for longer periods of time as they would die without oxygen due to lack of respiration. ~~oxy~~ Oxygen is therefore essential for the germination ~~of plant~~ ~~as it~~ and survival of ~~plant~~ plants as respiration is essential for life. Oxygen is taken through the micropyle on the seed. This is an opening that allows ~~the~~ oxygen and water to pass through. Without it the testa would cause the seed to suffocate and essentially die. Different volumes of water can affect the growth of a seedling primarily due to ~~the~~ firstly its use in softening the testa, then further more the use of it in photosynthesis. In the ~~at~~ 2 and 4 mL tests we saw that the growth was slower, signifying that the heat breaking of the testa took longer, for ~~fourth~~ ^{fourth} Biology 90928, 2017 it happened on day 43 and for 2 it happened on day 1

| Subject: | Biology | Standard: | 90928 | Total score: | 21 |
|-----------------|--------------------|---|--------------|---------------------|-----------|
| Q | Grade score | Annotation | | | |
| 1 | E7 | This response provides evidence towards E7 because it has discussed the differences of wind and animal/insect structures for pollination and reasons for differences. It links the difference structures to importance of pollination in maximising fertilisation of gametes and continuation of species. | | | |
| 2 | E7 | This response provides evidence towards E7 because it discusses how runners are asexually reproduced developing into a daughter plant. It links disadvantage of asexual reproduction to being genetically identical and consequences of a sudden change in the environment to the species. | | | |
| 3 | E7 | This response provides evidence towards E7 because it links the environmental factor (water) to parts of the seed (microphyle, enzymes, plumule) for the process of germination. | | | |