EXEMPLAR

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NZQA
NEW ZEALAND QUALIFICATIONS AUTHORITY
MANA TOHU MĀTAURANGA O AOTEAROA

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For Supervisor's use only

Level 1 Biology, 2007

90167 Describe plant processes

Credits: Four
9.30 am Tuesday 27 November 2007

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 answer 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 2–10 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.

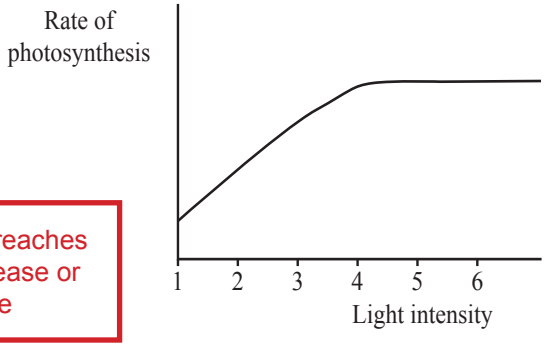
For Assessor's use only	**Achievement Criteria**		
Achievement	**Achievement with Merit**	**Achievement with Excellence**	
Describe biological ideas relating to the functioning of plant processes. ✓	Explain biological ideas relating to the functioning of a plant process. ✓	Discuss biological ideas relating to the functioning of a plant process. –	
Overall Level of Performance M			

You are advised to spend 50 minutes answering the questions in this booklet.

Assessor's use only

QUESTION ONE

(a) **Describe** the relationship between light intensity and the rate of photosynthesis as shown in the graph below.



what happens after it reaches optimum: doesn't increase or decrease – stays same

The rate in photosynthesis climbs with the increase in light intensity. Though it reaches an optimum level of photosynthesis around mid way and from there further increase in light intensity does not effect the rate of photosynthesis.

N

(b) The leaves of plants normally have a green colour due to the presence of chlorophyll.

Describe the function of chlorophyll in the leaf.

Chlorophyll is contained in the chloroplast organelles and is needed along with light in order for the leaves to carry out the process of photosynthesis.

N

no mention of absorption of light; mentions only that chlorophyll is needed along with light

In an investigation of photosynthesis, leaves of a destarched plant were treated as shown below, and the plant left in a sunny place for 2 days.

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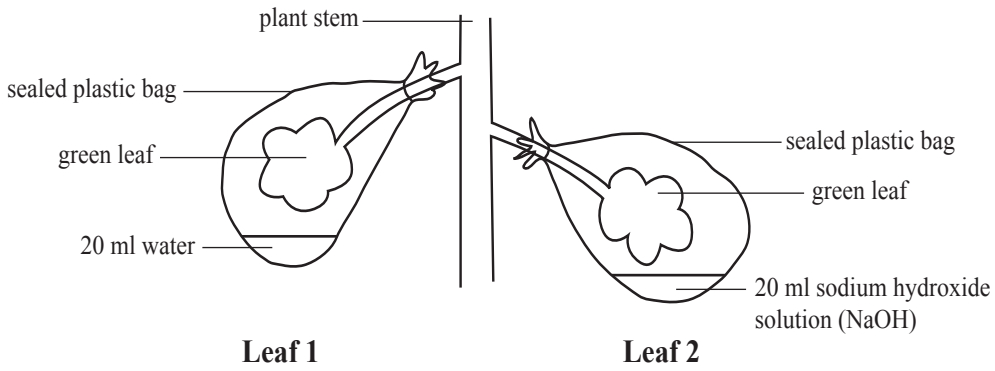

Leaf 1 **Leaf 2**

After two days an iodine test on both leaves gave the following results:

Leaf 1 **Leaf 2**

(c) **Explain** these results in terms of photosynthesis.

Plants require water and carbon dioxide to carry out photosynthesis. Sodium hydroxide deprives the leaf two of carbon dioxide which means the leaf is unable to carry out photosynthesis and produce starch. Leaf one on the other hand has no Sodium hydroxide and is therefore able to carry out photosynthesis as it has both carbondioxide and water.

- Leaf 1: able to carry out photosynthesis
- Leaf 2: no CO_2, no photosynthesis, no starch

M

QUESTION TWO

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The diagram below shows the internal structure of a leaf.

Adapted from V. Slaughter, *Living Things* (London: Hodder & Stoughton, 1980), p 30.

Explain how TWO features of a leaf allow it to carry out photosynthesis.

The underside of the leaf has stomata which are pores through which carbon dioxide diffuses into the leaf. Carbon dioxide is an ingredient necessary for photosynthesis to happen. The palisade cells contain many chloroplasts and are the main site of photosynthesis. The palisade cells are located directly underneath the upper epidermis to allow for maximum light absorbtion. Photosynthesis can only happen when light is present and higher intensity light often leads to a higher rate of photosynthesis.

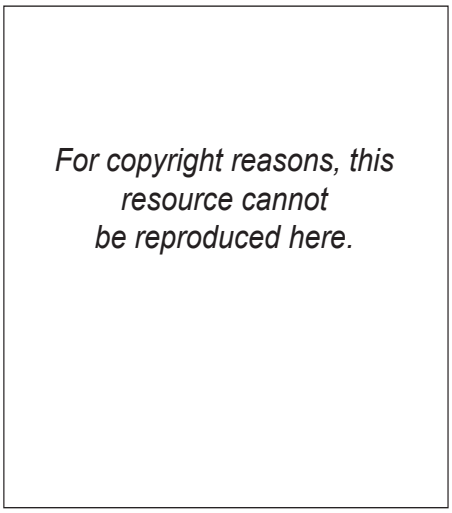
M

Two features:
- palisade cells explained
- what they do

QUESTION THREE

Assessor's use only

Plants need enough nitrogen for healthy growth. The diagram shows a plant that has grown in soil that did not have enough nitrogen in it.



Rogers and Poletti, *Year 11 Biology Workbook* (Hamilton: ABA Books, 2004), p 20.

Explain how plants use nitrogen for healthy growth.

Plants use nitrogen to help make chlorophyll which is the chemical needed for photosynthesis. Photosynthesis is the process by which plants make their own food (glucose) and without it they have no energy for growth. Chlorophyll also gives plants their green colour by reflecting green light waves.

A

has included nitrogen to make chlorophyll but hasn't explained the role of chlorophyll and how this makes a plant healthy

QUESTION FOUR

Assessor's use only

Different plant structures are built from specialised groups of plant cells called tissues. Each plant structure is made up of tissues designed to carry out specialised functions or processes.

The diagram shows the arrangement of plant tissues in a dicotyledon stem.

Don Bramley, *Yates Guide to Horticulture* (Auckland: Heinemann, 1987), p 22.

(a) Each year the stem will grow thicker by secondary thickening.

Explain how the stem grows thicker.

The cambium is a layer of rapidly dividing cells that is responcible for producing the secondary xylem and secondary phloem. The production of secondary xylem and phloem each year will create secondary growth (thickening) as the xylem from each year remains creating a growth ring the new xylem builds on this thickening the stem.

M

- cambium dividing cells
- produce xylem and phloem each year

(b) Plant growth at the shoot tips and the root tips shows some similarities and some differences.

Discuss reasons for the similarities and the differences in the way plants grow at the shoot tips compared with the root tips.

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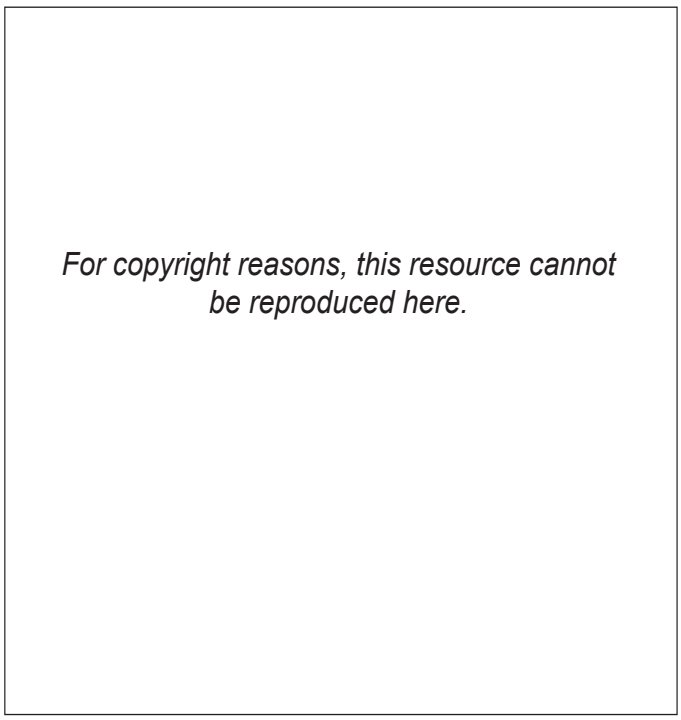

Rogers and Poletti, *Year 11 Biology Workbook* (Hamilton: ABA Books, 2004), p 14.

Growth in the root tips is directed by positive gravitropism and positive hydrotropism. This means that the roots are inclined to grow downwards with gravity and also towards water. The shoot tips are directed by negative gravitropism and positive phototropism. This means they grow upwards against gravity and also towards light. Though they grow in opposite directions they have in common the fact that they both grow towards substances/things needed for photosynthesis. Theses things are light (positive phototropism) for shoots and water (positive hydrotropism) for roots

A

direction of growth and why but no cell division for **M**, so **A**

QUESTION FIVE

Assessor's use only

Some plants can reproduce both sexually and asexually.

(a) **Describe** an advantage **to a plant** of sexual reproduction.

variation is produced which means that the plants are able to adapt and evolve. The result of this is that a change in environment or a pathogen (disease) will not likely wipe out the entire species. ✓

A

(b) **Describe** THREE ways that seeds are dispersed.

no mechanism

mechanism

wind dispersal (dandelion). They can have hooks that attach on animals coats to be carried away. They can be eaten as a fruit and dispersed in the animals droppings. ✓

mechanism

A

(c) **Explain** how the dispersal of seeds can increase plant survival.

Having seeds dispersed away from the parent plant means that there won't be competition for light, water, nutrients and space all of which the plant needs to survive. ✓

A

doesn't explain why competition helps plants' survival

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In sexual reproduction in flowering plants, some flowers are pollinated by insects and some are pollinated by the wind. Below are diagrams of an insect-pollinated flower and a wind-pollinated flower.

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insect-pollinated flower	wind-pollinated flower

V. Slaughter, *Living Things* (London: Hodder & Stoughton, 1980), p 150.

Annotation Key
(I) = feature **Insect**
(W) = feature **Wind**
see assessment schedule

(d) **Discuss** how the features of the flower allow pollination to occur in wind-pollinated flowers compared to insect-pollinated flowers.

Insect pollinated flowers have large brightly coloured Petals ~~flowers~~ and nectar to attract insects. Wind pollinated flowers have small or no petals and no nectar. Insect pollinated flowers also have a scent to attract insects which wind pollinated flowers don't have. Insect pollinated flowers have short filaments and anthers that are down inside the flower where the insect will brush up against them collecting pollen as it goes to get nectar. Wind pollinated flowers have long filaments that allow the anthers to hang out where the wind can blow the pollen off of them. Pollen grains for insect pollenated plants are large and fluffy so as to easily become stuck to the insect where as wind pollenated pollen grains are small and smooth so they can be easily carried on the wind. The stigma of the insect pollenated flower is down between the

Answer continues on following page.

Extra paper for continuation of answers if required.
Clearly number the question.

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Question number

5d Petals where the insect will bash up against it when it goes to get nectar. The wind pollenated flowers Stigma is long and fluffy hanging outside of the plant where it can catch wind born pollen grains

E