



For Supervisor's use only

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90716



NEW ZEALAND QUALIFICATIONS AUTHORITY
MANA TOHU MĀTAURANGA O AOTEAROA



National Certificate of Educational Achievement
TAUMATA MĀTAURANGA Ā-MOTU KUA TAEA

Level 3 Biology, 2006

90716 Describe animal behaviour and plant responses in relation to environmental factors

Credits: Four

9.30 am Thursday 30 November 2006

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 2–14 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.

| <i>For Assessor's use only</i> | | Achievement Criteria | |
|---|--------------------------|---|------------------------------------|
| Achievement | | Achievement with Merit | Achievement with Excellence |
| Describe animal behaviour and plant responses in relation to environmental factors. | <input type="checkbox"/> | Describe animal behaviour and plant responses in relation to environmental factors. | <input type="checkbox"/> |
| | | Explain animal behaviour or plant responses in relation to environmental factors. | <input type="checkbox"/> |
| | | Describe animal behaviour and plant responses in relation to environmental factors. | <input type="checkbox"/> |
| | | Discuss animal behaviour or plant responses in relation to environmental factors. | <input type="checkbox"/> |
| Overall Level of Performance (all criteria within a column are met) | | | <input type="checkbox"/> |

You are advised to spend 40 minutes answering the questions in this booklet.

QUESTION ONE: PLANT RESPONSES TO LIGHT

Figure 1 shows the response of recently germinated wheat shoots (coleoptiles) to a directional light source. The coleoptiles have been treated in several different ways.

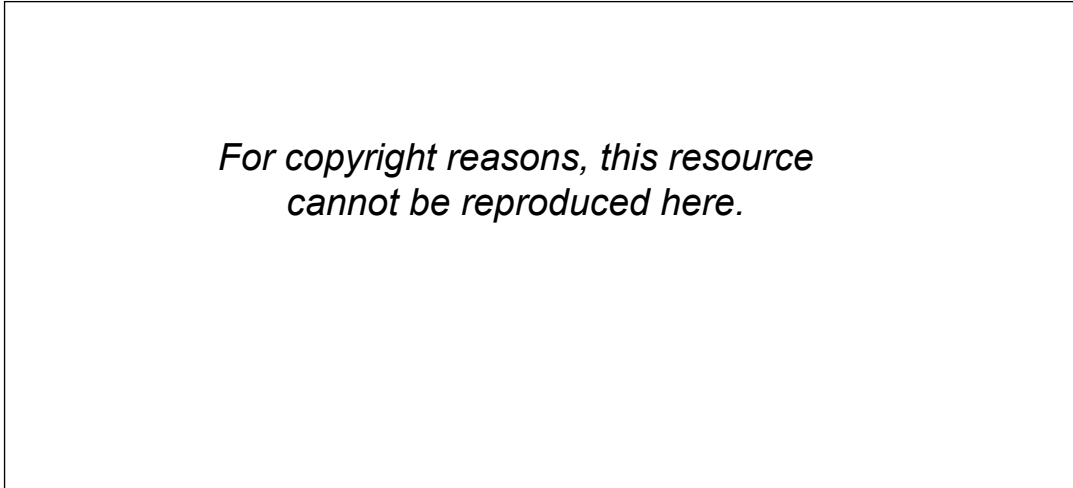


Figure 1: Growth of wheat coleoptiles in response to a directional light source.

Campbell, Reece & Mitchell, *Biology*, 5th edition (Benjamin Cummings, 1999)

- (a) Name the **response** shown by the bent coleoptiles AND identify the **hormone** that regulates plants' growth responses to light.

Response: _____

Hormone: _____

- (b) Give a reason, based on evidence from Figure 1, for concluding that this hormone is produced by cells at the tip of the coleoptile.

QUESTION TWO: ANIMAL BEHAVIOUR – ORIENTATIONAssessor's
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Much of animal behaviour is innate, or inborn. Such behaviour patterns may be quite simple, or are produced in response to simple stimuli. They include kinesis and taxis.

- (a) Describe an example of kinesis in a **named** animal.

- (b) Explain why this behaviour would be an **advantage** to your named animal in its normal environment.

Figure 2 shows the results of an experiment carried out to study homing behaviour in a hunting wasp. This wasp digs a burrow and then flies off to capture a caterpillar, which it will leave in the burrow as food for its own young.

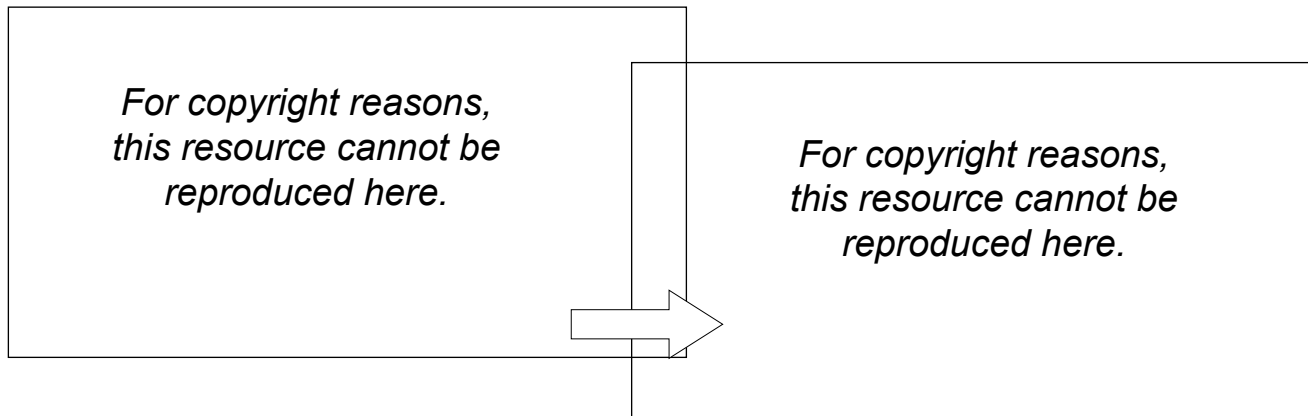


Figure 2:

- (1) Pine cones placed round burrow while wasp inside; wasp leaves and returns to nest;**
(2) Pine cones moved while wasp away on hunting trip.

N. Campbell & J. B. Reece, *Biology*, 6th edn. (Benjamin Cummings, 2002)

- (c) Explain how the wasp finds its way when returning to its burrow from a hunting expedition.

In North America, monarch butterflies perform one of the longest migrations known in insects. They spend the northern hemisphere summer in the northern United States, but migrate south to Mexico for the winter. The butterflies feed extensively during the migration.

- (d) Describe a change in an **environmental cue** that could trigger the monarch's migrations.

QUESTION FOUR: SOCIAL BEHAVIOURAssessor's
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Black swans were introduced to New Zealand in the 1800s and have since spread throughout the country. On smaller ponds and lagoons, they occupy territories during the breeding season.

- (a) Describe TWO **advantages** of holding a territory.

Newly hatched black swan cygnets have very short necks, and are unable to feed in deeper water. As the adult birds do not actively feed their young, this restricts the areas in which cygnets can feed. The swans breed in territories on Pukepuke Lagoon, a 15 ha wetland in the Manawatu. The size of their territories varies considerably, from 0.1 ha to 1.5 ha.

- (b) Explain why the territories vary so much in size.

Black swans use a range of aggressive displays to defend their territories, to settle disputes with other swans, or to indicate position in a social hierarchy.

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(c) Explain why the swans use these displays, rather than fighting over resources.

**Note that this question
continues on the next page.**

Breeding by black swans is seasonal in New Zealand. Sexual activity is spread over much of the year (see Figure 3 below). Cygnets usually appear in August, after an incubation period of 33 days.



Figure 3: Copulatory activity in black swans on Pukepuke Lagoon, 1981 breeding season.

A. M. Bimler, unpublished PhD thesis

(d) Describe the pattern of sexual activity shown in this graph.
