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Level 3 Biology 2020

91603 Demonstrate understanding of the responses of plants and animals to their external environment

2.00 p.m. Tuesday 24 November 2020
Credits: Five

Achievement	Achievement with Merit	Achievement with Excellence
Demonstrate understanding of the responses of plants and animals to their external environment.	Demonstrate in-depth understanding of the responses of plants and animals to their external environment.	Demonstrate comprehensive understanding of the responses of plants and animals to their external environment.

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 room for any answer, use the extra space provided at the back of this booklet and clearly number the question.

Check that this booklet has pages 2–16 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.

TOTAL

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QUESTION ONE: GROUP BEHAVIOURASSESSOR'S
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<https://www.smithsonianmag.com/science-nature/neurochemistry-fatherhood-180969635/>

In many animal species there is some degree of parental care. In the case of the bat-eared fox, *Otocyon megalotis*, the father devotes a lot of its time to the young pups, at times playing, teaching, or guarding. The likelihood of the pups' survival can be estimated by seeing how much time the father spends with them. Behaviour such as this is more often seen in species where there is a monogamous relationship.

Bat-eared foxes live in groups. The foxes are usually non-territorial and are not aggressive to one another. In fact, there is a lot of allogrooming (grooming by close 'friends') in the groups. Group size varies throughout the year, with the largest groups forming in the winter dry season. This is when there is less food, and is just before the mating season begins.

Discuss how the behaviours outlined above can lead to the success of the bat-eared fox groups.



Include in this discussion:

- a description of what is meant by the terms monogamy and parental care
- an explanation of an advantage and a disadvantage of each of a monogamous relationship and parental care
- a discussion of how behaviours mentioned above can enable the groups to be successful, despite the potential negatives of the behaviours.

**There is more space for your
answer to this question on the
following pages.**

QUESTION TWO: ORIENTATION RESPONSES

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	<p>Tardigrades, <i>Macrobiotus hufelandi</i>, are microscopic 8-legged invertebrates that occupy moist habitats, such as water and moss. In studies they have shown photokinesis behaviours.</p>
 <p>www.vreez.net/wp-content/uploads/2011/07/MA042153.jpg</p>	<p>Cucumber, <i>Cucumis sativus</i>, tendrils wrap around a metal structure, displaying positive thigmotropism.</p>

Using the above examples, discuss how orientation responses such as these enable success in growth and reproduction for the named species.

Include in your discussion:

- descriptions of each of the orientation responses that are bolded in the table above
- an explanation of how photokinesis behaviour would differ from phototactic behaviour AND an explanation of the mechanisms for the thigmotropic response
- an evaluation of the benefits the responses provide to the species.

**There is more space for your
answer to this question on the
following pages.**

QUESTION THREE: PHOTOPERIODISM IN PLANTSASSESSOR'S
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Adapted from: <https://orbitbiotech.com/photoperiodism-short-days-plant-long-day-plant/>

One example of photoperiodism in plants is flowering. This response is controlled by the action of phytochrome.

Discuss the mechanisms of plant timing in each of the scenarios labelled A, B, and C above, and evaluate the effect of using light to interrupt night on the flowering of the plants.

In your discussion:

- describe both the terms short-day plant and long-day plant
- explain the benefits for the long-day plant, of flowering in summer
- discuss the mechanisms of the phytochrome system that results in flowering or lack of flowering, referring to A and B, and C in the diagram above.

**There is more space for your
answer to this question on the
following pages.**

Extra paper if required.
Write the question number(s) if applicable.

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