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91603

916030

NZQA

NEW ZEALAND QUALIFICATIONS AUTHORITY
MANA TOHU MĀTAURANGA O AOTEAROA

QUALIFY FOR THE FUTURE WORLD
KIA NOHO TAKATŪ KI TŌ ĀMUA AO!

Level 3 Biology, 2015

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

2.00 p.m. Monday 23 November 2015
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 2–12 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.

Not Achieved

TOTAL 4

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QUESTION ONE

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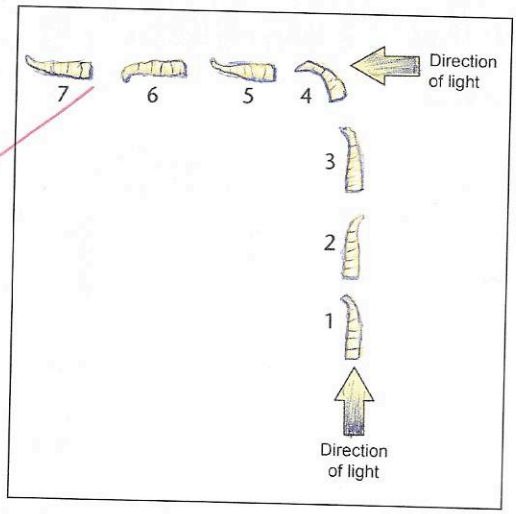
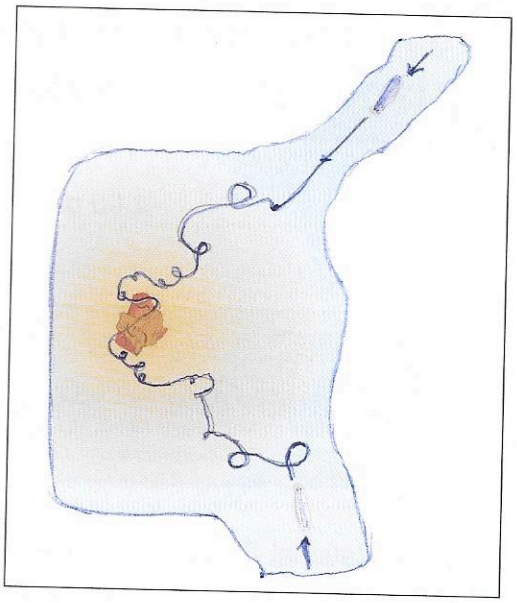
Some animals display innate behaviours.

As green bottle fly maggots (*Phaenicia sericata*) crawl, they turn their heads, comparing the light intensity from each side. They always turn towards the darker side, taking them away from light.



Maggot response to light stimulus.

A piece of meat in water causes a chemical gradient. Flatworms, such as *Planaria torva*, move along a straight path until they detect an increase in chemical concentration. The flatworms increase their rate of turning in the area until they touch the meat and start feeding.



Flatworm response to chemical stimulus.

Compare these responses, the adaptive advantages gained for the animals that display them, and how these animals come to have them.

In your answer:

- identify the full term given for both responses, and define these terms
- using the information above, justify the types of orientation you have described, and explain how they operate in both the maggots and the flatworm
- compare the adaptive advantages these animals gain by displaying these behaviours.

U polyaxide is the way of light to which will help guid maggots. Both these responce help guid the worms and maggots. This is beneficial for the worm as its being guided towards a food source. An adaptive advantage for the maggots is they will be harder to bee seen by predators if they are in the dark U

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Therefore having a better survival rate. A advantage for the worms is they can easily find food source. This also lowers the rate in which he could be attacked by a predator since they are not roaming freely looking for food. They know where it is and what pathway to follow to reach this food.
Chemical oritentan is what occurs with the worm. The worm is able to sense the chemicals and get drawn towards it.

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

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N1

QUESTION TWO

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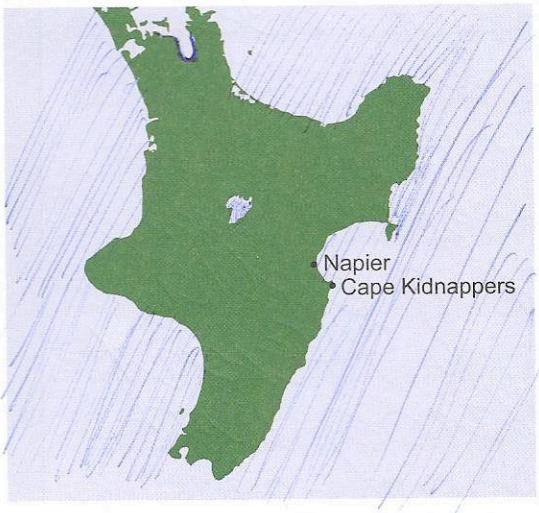
Cape Kidnappers on the coast of Hawke's Bay is an exposed headland, which hosts the largest mainland gannet *(Morus serrator)* colony in New Zealand, with around 6500 breeding pairs arriving in early August each year. The birds remain until the young fledglings are mature enough to leave, and then return to Australia in March the following year.

Gannets usually have the same mate over many breeding seasons and re-establish their relationship at the beginning of each breeding season. During the breeding season, the area is densely occupied by the gannets which actively defend their nesting sites.

Females lay a single pale blue egg, the size of a large hen's egg, any time from mid-September till mid-December. It is laid in a nest prepared from dried seaweed, cemented with guano (bird droppings), and incubated by each parent in turn. After 43 days, a blind, naked chick hatches, and is fed and cared for by both parents.



https://upload.wikimedia.org/wikipedia/commons/e/e9/Gannet_colony_cape_kidnappers.jpg

Evaluate the behaviours the gannet displays, using the given information above.

In your answer:

- identify and describe THREE behaviours displayed by the gannets
- explain the costs and benefits of the behaviours you have identified
- discuss how the combination of behaviours provides adaptive value to the gannets.

The gannets are territoryal as they produce and live in the same territory / area year after year. This benits are, its a familiar area for the gannets and they can all stick together which will eliminate the threat

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

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of predators. An advantage to is that humans know that this is the gannets territories so can put out sign and warn public in response to the gannets being here. Another behaviour displayed is the fact that stay use the same partner to mate. This could cost as there is not as much genetic variation as they could have if the use different mates. The bad thing with genetical similar gannets is if a disease comes along and the genetics could be wiped out as they had similar genetics. A cost of having a territory is if predators did come the gannets would find it hard to leave and go find another territory to live in.

Another behaviour is that where their area is full of

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gonets during breeding season this is beneficial as they can help collect food for the females as the females can stay behind and care for the ofspring, also so they will have a bigger "army" to fight of predators as they need to protect their offspring. These behaviours give advantages to the species as it helps support and ensure the safty off offspring therefore the popultion can grow and by having many gamets guarding the territary can help care for the territary and ensure no predator will try and take the territary away. U

N2

QUESTION THREE

Mutualistic relationships exist between New Zealand's native birds and trees, but introduced mammalian predators can affect this.

Maungatautari in the Waikato is a large area of forest where mammalian predators have been eradicated and a perimeter fence has been built to keep it predator free. The area has been used to study the effect of predator removal on the ability of birds to successfully pollinate species of native plants.

The New Zealand fuchsia, (kōtukutuku) – *Fuchsia excorticata*, was used as an indicator species, and comparisons were made with nearby Pirongia Forest Park, where mammalian predators are present.

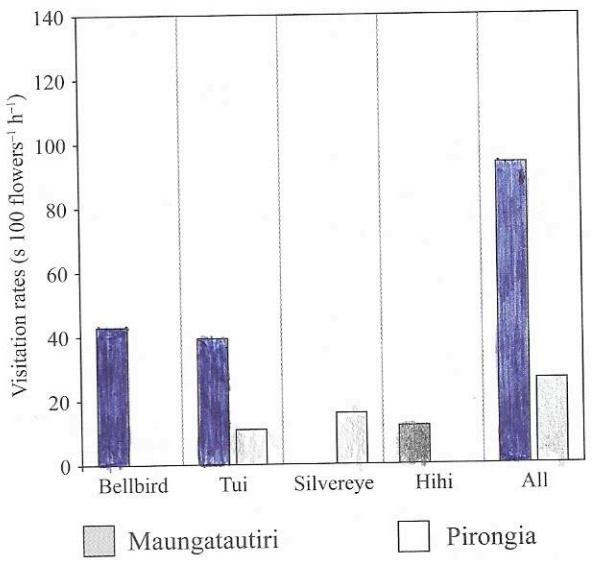
Fuchsia excorticata trees have one of two flower types:

- female flowers which need pollination
- hermaphrodites (male and female) which can self-pollinate.

Successful pollination results in formation of fruit.

Some results from the study are summarised below.

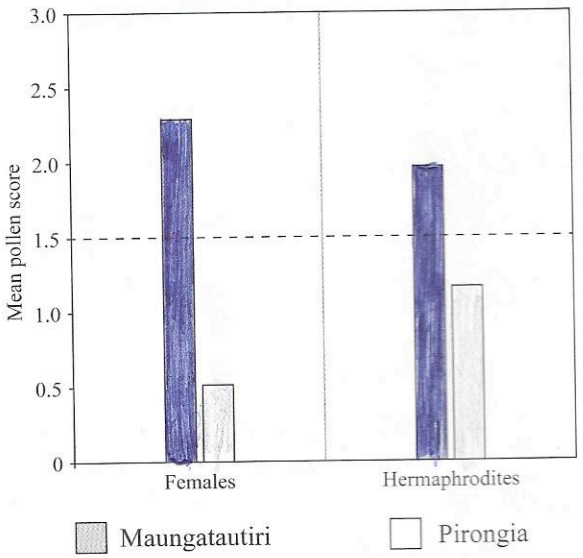
Visitation rates of pollinating birds to *Fuchsia excorticata* flowers



(Mean seconds of bird activity per 100 flowers per hour)

Adapted from Iles J.M. & Kelly D. School of Biological Sciences, Canterbury. Published online 9 April 2014.

Pollen scores of female and hermaphrodite *Fuchsia excorticata*



A pollen score index of at least 1.5 (dashed line) indicates a good pollination score, based on the relationship between pollen load and formation of fruit.

Adapted from Iles J.M. & Kelly D. School of Biological Sciences, Canterbury. Published online 9 April 2014.

Discuss the ecological relationships between the fuchsia trees, the bird species, and the presence or lack of mammals within the two forests, using the information given above to support your discussion.

In your answer:

- define the terms mutualism, predation, and interspecific competition
- explain the importance of pollination for both the fuchsia and the native birds
- use the data to compare, with reasons, the outcomes for *Fuchsia excorticata* and the key native bird species involved at the two sites.

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mutualism is when both plants or organism benifits from one another. ~~for example~~ Predation is predator after one specific organism. Interspecific camaption is comption within a species.
Native birds and flowers both benifit that how its mutalism Native birds benifit from pollination because they they eat the flowers. The flowers benifit from the polination as they can spread to produce more flowers.
The art comes are best for both to all birds with maungaturtiri as the birds are benificial to the flowers as they pollinate them

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

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NI

Not Achieved exemplar for 91603 2015		Total score	04
Q	**Grade score**	**Annotation**	
1	N1	This response insufficient evidence towards Achievement. The candidate has shown some knowledge with a partial point in describing an adaptive advantage of the behaviours. No definitions given that are worthy of credit.	
2	N2	The candidate proides evidence for one point from Achievement in providing costs and benefits for two behaviours. Further evidence describing at least one behaviour in more detail would be needed for further credit towards achievement and the possibility of an A3.	
3	N1	A very limited answer with credit given for one definition only. A partial point for Achievement credit, in this case mutualism is just sufficient. The other definitions are incomplete or inaccurate. Significant improvement in definitions or a description of the differences between the forest would be needed to raise this answer to A3 or higher.	