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Level 1 Science, 2016

90948 Demonstrate understanding of biological ideas relating to genetic variation

9.30 a.m. Monday 14 November 2016
Credits: Four

Achievement	Achievement with Merit	Achievement with Excellence
Demonstrate understanding of biological ideas relating to genetic variation.	Demonstrate in-depth understanding of biological ideas relating to genetic variation.	Demonstrate comprehensive understanding of biological ideas relating to genetic variation.

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 2–8 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.

TOTAL

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QUESTION ONE

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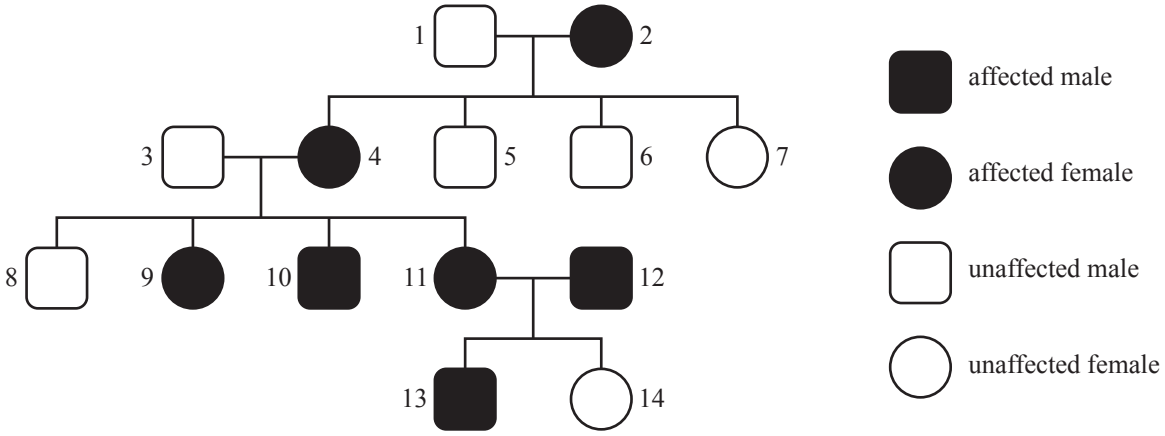
Photic sneezing is a condition which causes affected people to sneeze due to bright light. It can be traced through a family, as shown in the pedigree chart. Photic sneezing (A) is dominant to unaffected (a).



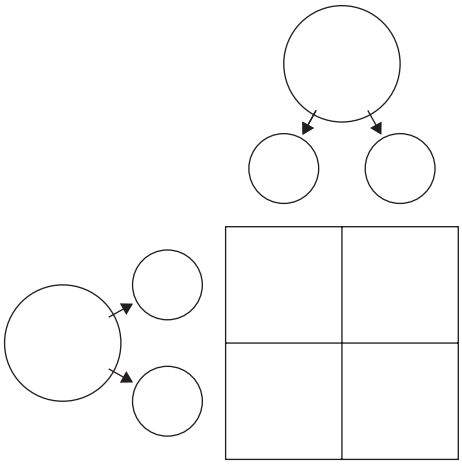
(a) Work out the genotypes of the following four individuals:

1 _____ 2 _____

11 _____ 12 _____

(b) Explain how the pedigree chart can be used to show that Photic sneezing is dominant, but it cannot be used to determine the genotype of individual 13.

You may use the Punnett square.



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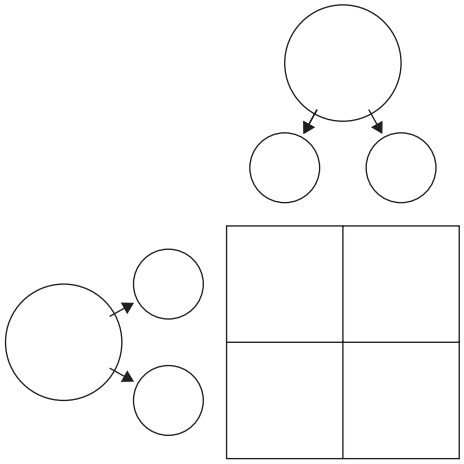
(c) The cross between 1 and 2 in the pedigree chart has **one affected sneezing** offspring.

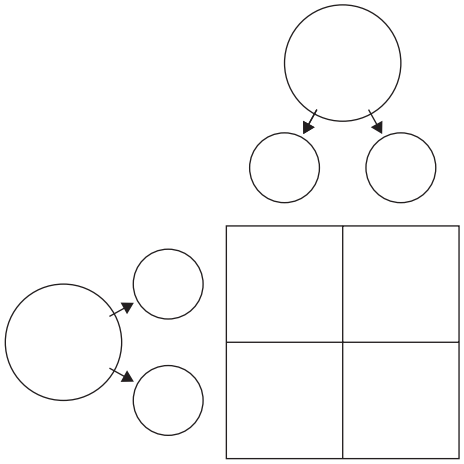
The cross between 3 and 4 in the pedigree chart has **three affected sneezing** offspring.

Explain the difference in the number of affected offspring (photic sneezers) in these 2 crosses.

In your answer you should:

- complete Punnett squares
- give the expected phenotype ratio for each cross
- account for any difference between the expected ratio and the actual phenotype ratio for each of the crosses.





QUESTION TWO

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Rock pocket mice can have dark fur or light fur, as shown below.

www.discoverlife.org/mp/20q?search=Chaetodipus+intermedius&mobile=close&flags=glean:

www.flickriver.com/photos/tags/broadcanyonbioblitz/interesting/

(a) Using the example of rock pocket mouse fur colour, explain how information carried on the DNA controls the appearance.

In your answer you should refer to DNA base sequence, genes and alleles.

(b) In rock pocket mice, dark fur colour (D) is dominant to light fur colour (d).

Each mouse has two alleles for fur colour.

Explain how they inherit these two alleles, and explain how the two alleles interact to produce different phenotypes.

In your answer you should:

- define phenotype and genotype
- explain how the alleles are inherited from the parents
- state the three possible fur colour genotypes for rock pocket mice.

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QUESTION THREE

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Venus flytraps (*Dionaea muscipula*) are plants that live in poor quality soils. They have specially adapted leaves that snap shut to catch insects.

The plants reproduce sexually, involving the production of flowers.

www.flickr.com/photos/david_jones/5256437760

(a) Discuss the advantages of sexual reproduction.

In your answer you should:

- define sexual reproduction
- explain how ONE important process in sexual reproduction helps to produce variation in offspring
- explain how variation as a result of sexual reproduction can benefit the Venus flytrap plant population over generations.

(b) The Venus flytrap plants come in a number of different types, such as the "B-52" with a red leaf.

A teacher brought two identical plants to class and put them in different parts of the classroom. The Venus flytrap put near a window grew short leaves and the Venus flytrap in the shade grew long leaves.

Colour variation in the leaves of the Venus flytraps can be passed on to a plant's offspring, but the different leaf length cannot. **Explain why.**

https://commons.wikimedia.org/wiki/File:Venus_Flytrap_-_B-52.jpg

In your answer you should:

- define inheritable and non-inheritable variation
- explain what causes inheritable and non-inheritable variations.

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

QUESTION NUMBER

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