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NZQA

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Level 1 Science, 2016

90944 Demonstrate understanding of aspects of acids and bases

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

Achievement	Achievement with Merit	Achievement with Excellence
Demonstrate understanding of aspects of acids and bases.	Demonstrate in-depth understanding of aspects of acids and bases.	Demonstrate comprehensive understanding of aspects of acids and bases.

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.

Pull out Resource Booklet 90944R from the centre of 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.

Achievement

TOTAL 12

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Paper annotation

SCORE 12

HIGH ACHIEVED

Question	Grade	Annotation
1	A3	The candidate the 4 correct genotypes correctly given. The candidate had the punnet square for 11 and 12 correct. They also gave the correct punnet square ratios for the expected cross for 1:1
2	A4	The candidate identified that different alleles or bases on different DNA base sequences and gave the related colour as well. The candidate described the term phenotype correctly and gives the 3 genotype for rock pocket mice colour.
3	M5	The candidate correctly describes fertilisation and links this to survival. Inheritable and non-inheritable variation is understood.

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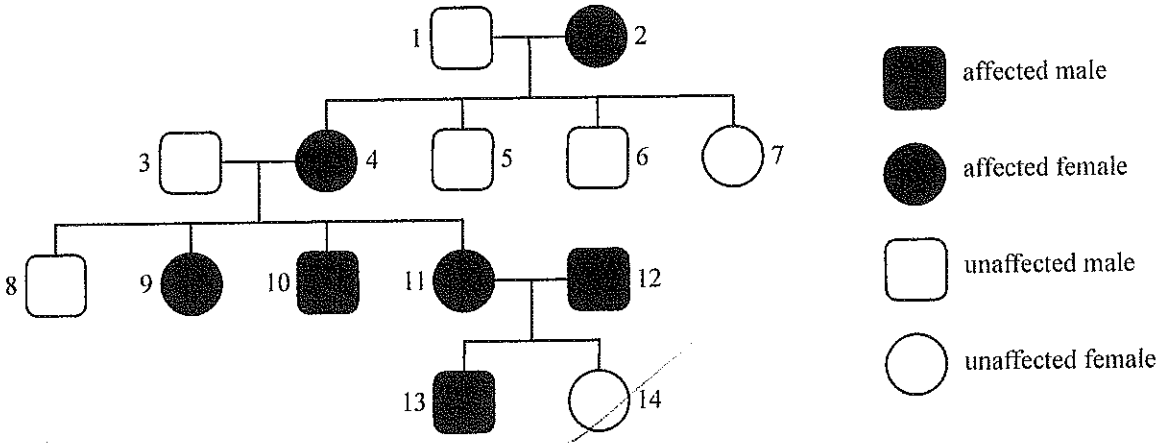
QUESTION ONE

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 aa

2 Aa

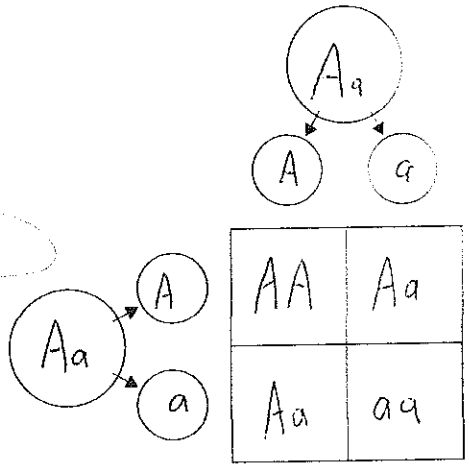
11 Aa

12 Aa

(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.

We cannot determine the genotype of individual 13 because we are unsure exactly of what individual 12's genotype is, since it is not blood related and apart of the family. We can test with multiple genotypes to see what offspring are produced but we will still be uncertain of individual 13's genotype, mainly because we do not know for sure what genotype individual 12 has!



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

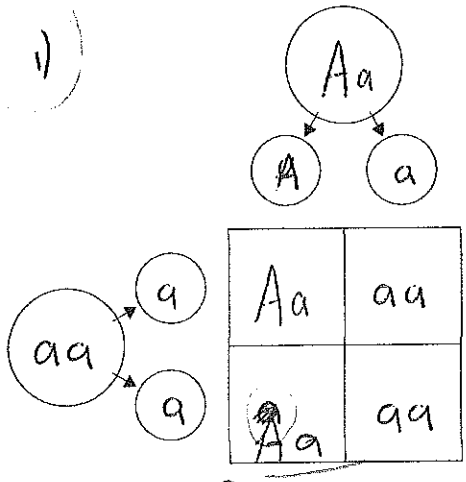
The cross between 3 and 4 in the pedigree chart has **three affected sneezing** offspring.

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

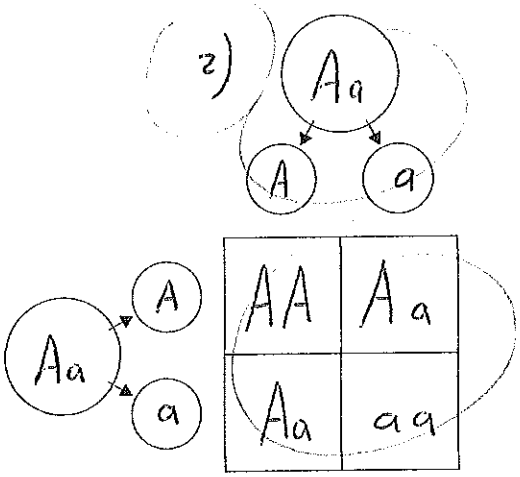
In your answer you should:

- 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.

1)



2)



For the first cross, the offspring could either be affected or non affected, it has a 50/50 chance or 1:1 ratio. For the second cross, the offspring is expected to be affected because the genotypes have more dominant alleles in them, they have a 3/4 chance of producing affected offspring, or a 3:1 ratio. For the first cross the phenotypic ratio would be 1 affected : 1 non-affected, and for the second cross the phenotypic ratio would be 3 affected : 1 non affected.

12

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.

The way the DNA base sequence is coded determines a certain characteristic or trait for an organism, so the rock pocket mice have dna coded exactly for dark brown fur in their genes. Sometimes when the DNA replicates during breeding, we get the same gentic information being passed over, but sometimes it can be slightly different, so the ~~colour~~ allele for ~~dark~~ brown fur is changed slightly and it produces offspring with light brown fur instead of the dominant allele of dark brown fur. //

(b) In rock pocket mice, dark fur colour (D) is dominant to light fur colour (d).
Each mouse has two alleles for fur colour.

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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.

Genotype is what determines the phenotype, this is due to what genetic information the alleles carry. Phenotype is what allele is expressed in the offspring. The mice inherit the alleles from their parents. The dominant alleles are expressed and the recessive alleles are in the phenotype, they just arent shown. So the mice could have the recessive allele of d, they just might not express it, but when they breed with another mouse, their offspring could be a completly different colour due to the parents phenotypes and if they are dominant or resessive. The three possible genotypes for the mice would be DD and Dd for dark fur and dd for light fur.

A4

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.

Sexual reproduction is when two organisms mate and form offspring. Fertilization is an important process during the reproduction because it produces varition in the offspring. This is because random genes from both parents are fused together which creats a completly different offspring. Variation can benefit the venus fly trap because this means with different genes from each parent, it is more likely to survive in different conditions, e.g. quality of soils, then if it were the exact same copy of another venus fly trap plant. If they were all the same and the conditions changed, then all of the plants could die out so variation is beneficial to the plants survival.

(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.

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

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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.**

In your answer you should:

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

Inheritable variation is when an organism can inherit certain traits and characteristics from its parents, non-inheritable variation is where an organism may be affected by factors, e.g. weather, but this can not be inherited to its offspring or by its parents. The leaf length of the plants are due to how much sun they are recieving, this is a non-inheritable factor, which causes variation but cannot be passed on. The colour of the plants leaves can be passed on. This is because it is an inheritable variation which is occuring in the plants DNA.

N5

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

QUESTION NUMBER

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