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90948



NEW ZEALAND QUALIFICATIONS AUTHORITY
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SUPERVISOR'S USE ONLY

Level 1 Science, 2017

90948 Demonstrate understanding of biological ideas relating to genetic variation

9.30 a.m. Wednesday 15 November 2017

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.

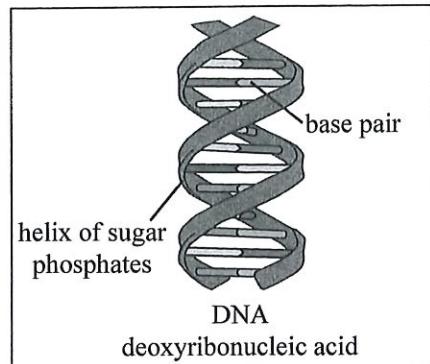
Achievement

TOTAL

08

ASSESSOR'S USE ONLY

QUESTION ONE



<https://pixabay.com/en/panter-leopard-black-spotted-359245/>

Adapted from: <https://commons.wikimedia.org/wiki/File:Dna-base-flipping.svg>

Some leopards or jaguars have a **mutation** causing them to have a black coat. These are known as "black panthers".

- (a) How can this **mutation** cause the coat colour to be different?

In your answer you should use the terms DNA, gene, allele, phenotype, and mutation to explain how this colour change occurs. The DNA diagram above may help you.

A mutation is a change in the base sequence to allow variation to occur, it ensures survival and a difference in species. The colour change occurs that the parents would have both had to have a dominant and recessive phenotype to allow it to occur. When the parents mated the offspring would have dominant alleles but there is one chance that a parent was heterozygous, meaning their parents both had dominant and ~~or~~ recessive alleles allowing their offspring to be heterozygous therefore the offspring of the heterozygous parents could be heterozygous as recessive traits are present which means the mutation was able to occur. The DNA of the parents had to be both dominant and recessive to allow the mutation to be present.

- (b) Leopards in the wild commonly have scars, especially around their faces.

Explain why the leopard cubs can be born with black coats but not with scars.

As the parents of that offspring may be holding heterozygous traits only for the black coats and not for the scars meaning that recessive trait is present only for one recessive trait and not for the other in which makes it still heterozygous offspring.

www.wilderness-safaris.com/media/blog/camp-news/chitabe-leopard-identikits/copy-of-01-mosadi-mogolo-web.jpg

QUESTION TWO

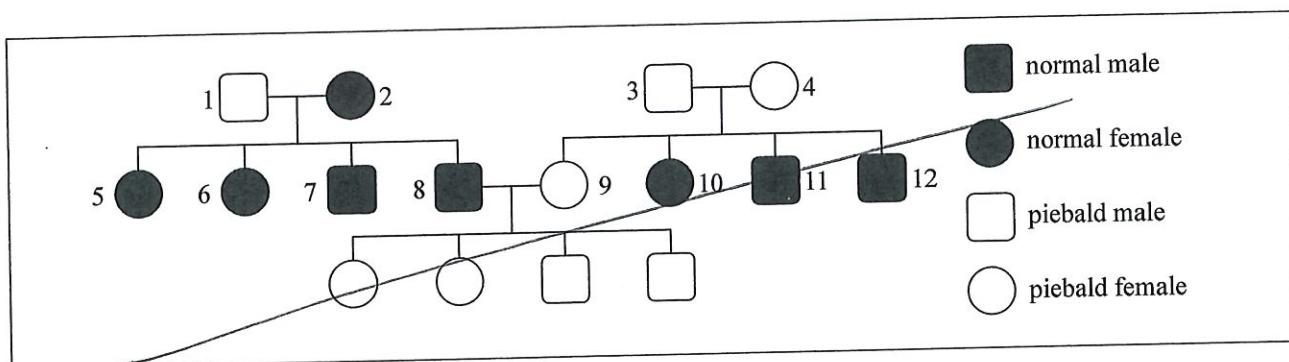


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[www.mybligr.com/wp-content/uploads/
2017/02/beautiful-Black-horse-images-pictures-
photos-13.jpg](http://www.mybligr.com/wp-content/uploads/2017/02/beautiful-Black-horse-images-pictures-photos-13.jpg)

Piebaldism is a genetic condition causing a white patch on the head and body of horses. In horses piebaldism is a **dominant trait (H)**, and “normal” colour is recessive (*h*).



- (a) From the pedigree chart above, list **all** the possible phenotypes and genotypes of horses 3, 8, and 9.

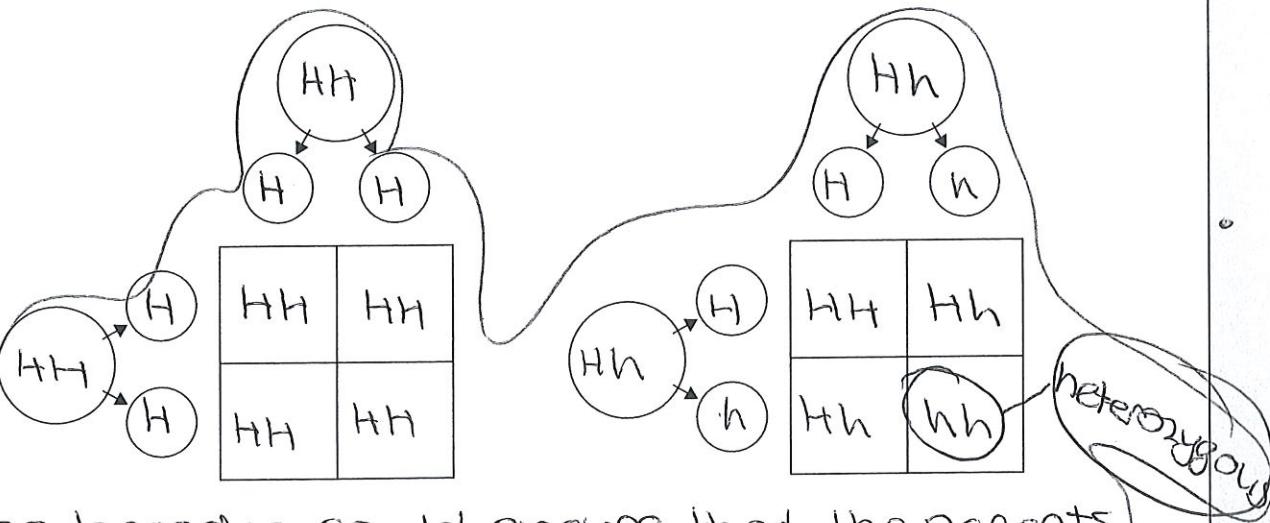
Use the letter H for the dominant trait and h for the recessive.

Individual	Phenotype (normal or piebald)	Genotype (HH, Hh, or hh)
3	Piebald	HH, Hh
8	normal	hh, Hh, HH
9	Piebald	HH, Hh

- (b) A breeder wants to produce only **dominant** (piebald) offspring from a breeding pair of horses. The breeder has piebald and normal horses to breed from.

How could the breeder use crosses to make sure that the pair of horses were **pure breeding**?

Show crosses using Punnett squares to support your answer.



The breeder could ensure that the parents they were using to produce the offspring all had dominant alleles and that none of them were carrying recessive or heterozygous traits that could make any possible chance that the recessive trait could become present.

And only making sure that just the homozygous traits were present, and making sure that the dominant offspring do not mate with heterozygous or recessive offspring.

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QUESTION THREE

Wild bananas, showing seeds.

<https://commons.wikimedia.org/w/index.php?curid=1867879>

A "banana pup" growing.

www.promusa.org/Banana+sucker

Wild bananas have large seeds, and reproduce sexually.

Farmed bananas are produced asexually, from suckers called "banana pups".

- (a) How does the production of **gametes** result in variation for the wild banana plants?

Variation creates difference in species to ensure survival and that multiple sexual reproduction occurs. When two parents reproduce the male and female gametes (sperm and egg) cell create the offspring in which both parents would have different phenotypes and genotypes allowing their offspring to be varied. The gametes allow different traits and cells to be crossed over to ensure that the offspring are all different, it also allows the species be able to survive and to be able to keep reproducing.

- (b) Suggest a possible problem that may arise with farmed bananas (produced from suckers), and explain why this problem would not occur in wild bananas (produced sexually)?

A possible problem that could occur is that there is no variation in the farmed bananas because they are produced from suckers. It means that the parent would all have had the same traits to be able to produce the offspring to all be the same. There is no variation and that means it's difficult for them to be able to survive as they all require the same needs. Compared to the wild bananas which ensure their is variation because of the different exposures and environments, it means the offspring could be homozygous or heterozygous as there is a lot of variation from the parent. It ensures their survival compared to the farmed bananas which have no variation for survival.

A3

Achieved Exemplar for 90948. 2017			Total score	08
Q	Grade score			
1	N1	This is an N1 because they have only described what a mutation is. No other genetics term has been described satisfactorily. In (b) they have only inferred that scars are genetic.		
2	A4	This is an A4 because they have correctly given the phenotypes in (a). They have correctly completed a Punnett square. They mentioned that the parents had to be homozygous dominant. They knew the difference between dominance and recessive by their statement that they did not want them to carry recessive trait. It is not M5 because they have not referred to or explained the use of a test cross.		
3	A3	This is an A3 because in (a) they have explained variation by saying there is differences in a species. They have also described fertilisation. In (b) they have said that farmed bananas have the same traits and it will be difficult for them to survive as they have the same needs. This is not an A4 because there is no strong description of chromosome shuffling or in (b) no mention of wild bananas have resistance or that farmed bananas have the same DNA/ equivalent statement.		