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NZQA

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Level 1 Science, 2018

90948 Demonstrate understanding of biological ideas relating to genetic variation

9.30 a.m. Thursday 15 November 2018
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.

Merit

TOTAL 15

ASSESSOR'S USE ONLY

QUESTION ONE

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Single comb on a chicken
https://pixabay.com/en/hahn-cockscomb-comb-teeth-farm-66341/

Rose comb on a chicken
www.flickr.com/photos/archer10/7815488864

The allele for rose comb (R) is **dominant** to the allele for single comb (r) in chickens.

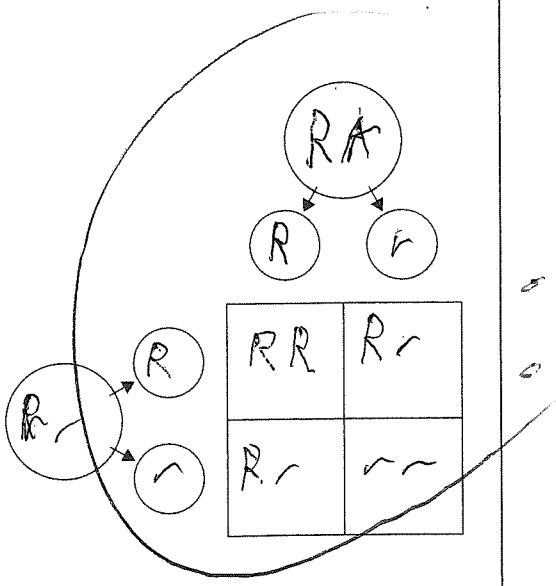
(a) Two rose comb chickens produce a single comb offspring.

Explain how it is possible for two rose comb chickens to produce a single comb offspring.

In your answer you should:

- define dominant allele
- explain the genotypes of the parents and offspring
- use a Punnett square to help your explanation.

This is possible because even though the rose comb carry the dominant allele they also carry a ressesive allele meaning they are Hetrozaigas dominant (Rr) in the process of crossing over the baby chicken (zygote) will will get both the ressesive alleles from its parents making it homozaigas ressesive (rr)



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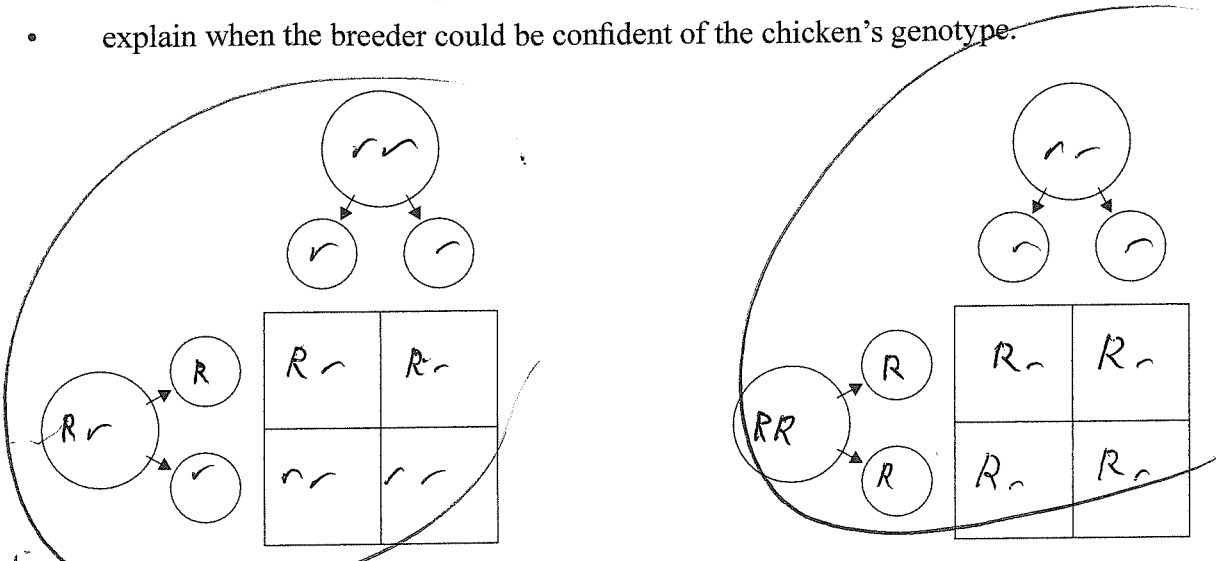
(b) Explain how a breeder could use crosses to find out if a rose comb chicken has a pure breeding genotype for the trait.

In your answer:

- define pure breeding and genotype
- use Punnett squares to help you explain
- explain when the breeder could be confident of the chicken's genotype.



If the breeder had a single comb chicken (rr) he can be sure that this chicken is only going to reproduce the single comb genotype because it does not carry a dominant allele If the breeder had a rose comb chicken he could not tell straight away if it carried a recessive allele because it could be either RR or Rr RR meaning it would only reproduce rose comb chickens and Rr meaning it has a chance of both one way he could figure out a rose combs genotype is by breeding it with a single comb chicken this is because if the rose comb was homozaigas dominant it would only produce dominant allele off spring (rose comb) because it only had the dominant allele to give (go to back)

M5

QUESTION TWO

ASSESSOR'S USE ONLY

Italian ryegrass in a cornfield

http://agfaxweedsolutions.com/2017/02/03/mississippi-corn-control-italian-ryegrass-planting/

Herbicides are chemicals that are used to kill weeds. Over many years, Italian ryegrass (a common weed) has developed a resistance to some herbicides (it is no longer killed by them).

(a) Explain how **variation** in the Italian ryegrass **population** can help the population develop herbicide resistance.

Some of the weeds were affected by the herbicides at first but the more affected ones killed the more none ~~less~~ effected weeds will be alive too - when the none affected weeds reproduce the zygote will inherit the immunity to the herbicides from its parent and the affected weeds will keep dying until only the none affected remains.

(b) Explain how sexual reproduction increases variation in the Italian ryegrass population.
Your answer should include **gamete formation** and **fertilisation**.

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In the process of sexual reproduction you will recieve a gamete from the father and a gamete from the mother each carrying their own genes and alleles in the process of fertilization these genes and alleles will be switched and crossed over to form the zygotes genes and alleles the zygote would grow up and then reproduce its self carrying on the genes it has. So if the herbicides keep killing the affected weeds there will be none left to reproduce to carry on those affect genes therefore only the non affected genes will be left to reproduce.

1/5

QUESTION THREE

ASSESSOR'S USE ONLY

A coloured tūī
https://www.flickr.com/photos/sidm/6557924841

A white tūī
http://mandyart.blogspot.co.nz/2009/07/white-tui-albino-slug.html

Leucism is a genetic condition caused by a gene mutation that results in some (or all) of an animal being white.

(a) How could a change in a **gene** result in the **phenotype** of the white tūī shown above?

Your answer should include the terms **DNA** and **allele**.

Punnett squares are not required.

once a zygote is created you connot grow anther gene or allele Then only way this is possible is by changing the base sequence. You can change your base sequance ~~by~~. by being exposed to mutagens such as Ciggarettes chemicals uv light and radiation. being exposed to these can create an new gene or allele known as a Mutation In this case the mutation is Leucism the mutation does not harm the bird but it must alter the DNA to cause a change in the phenotype //

(b) Explain whether the white colouration would be inheritable or not.
Your answer should include the terms **inheritable** and **non-inheritable**.

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It would be inheritable once the mother or father bird has the mutation if the birds gets the mutation from being exposed to mutagens then it would be non inheritable but if that bird with the mutation reproduced the zygote it creates would have an inheritable mutation.

M5

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

QUESTION NUMBER

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Question one (b)

if the rose crown however was heterozigous dominant it would produce both types of offspring because it has a resceive allele and a dominant allele to give. So a way farmers could figure out the genotype of a rose crown is to breed it with a single comb

Subject	Science	Standard	90948	Total score	15

Q	Grade score	Annotation
1	M5	In (a) the candidate describes the heterozygous parents and gives a correct punnet square. The candidate does not explain the influences of the alleles in the genotype. In (b) the punnet squares are correct. The candidate mentions the cross of RR x rr giving only dominant offspring and then that the Rr x rr will give both types (ie means single comb = rr) = M. There is nothing about the number of crosses and the likelihood of offspring.
2	M5	In (a) there are no links between the DNA and it being passed onto the offspring. In (b) the candidate makes the link between the alleles and the mother and the father and how they are switched around and mentions crossing over. The candidate then makes the link to the non-affected being able to reproduce (survive). The inference here is that they have new resistance.
3	M5	In (a) the candidate makes the links between a change in the base sequence creating new genes or alleles and then a change in the phenotype (M). (Naming white is not needed)