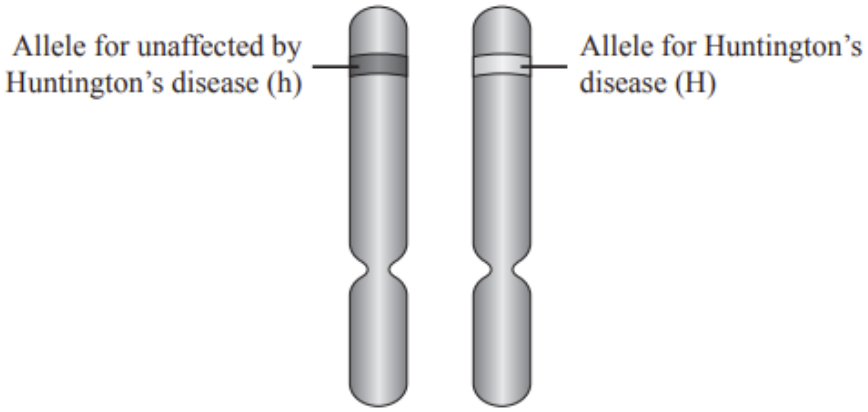
COLLATED QUESTIONS – DNA and the role of DNA

2020:1

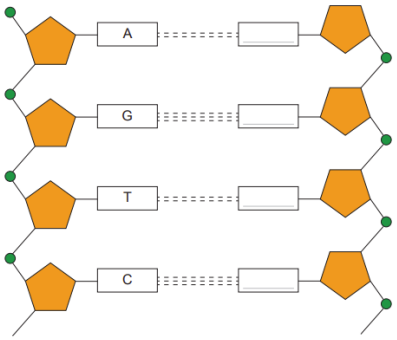
Huntington's disease occurs when a mutation causes a dominant affected allele (H). The normal allele is recessive (h)



Using Huntington's disease as an example and the diagram above, explain the relationship between DNA, genes, alleles, mutations, and phenotype. A labelled diagram may assist you.

2019:1

(a) Label the blank bases A, G, T or C in the diagram of DNA shown below



Some adults can digest milk, but the majority 65% cannot. The ability to digest milk as an adult is caused by a DNA mutation.

(b) What is a mutation?

(c) Explain how a mutation can give adults the ability to digest milk. You should include the terms **DNA, gene, allele, phenotype,** and **mutation**.

(d) Explain how a mutation can be passed on to the next generation.

2018:3

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

Normal tūī

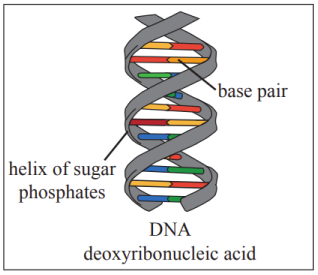
(a) How could a change in a gene result in the phenotype of a **white** tūī? Your answer should include the terms DNA and allele. *Punnett squares are not required.*

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

2017:1

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.

(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.

2016:2

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

(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.

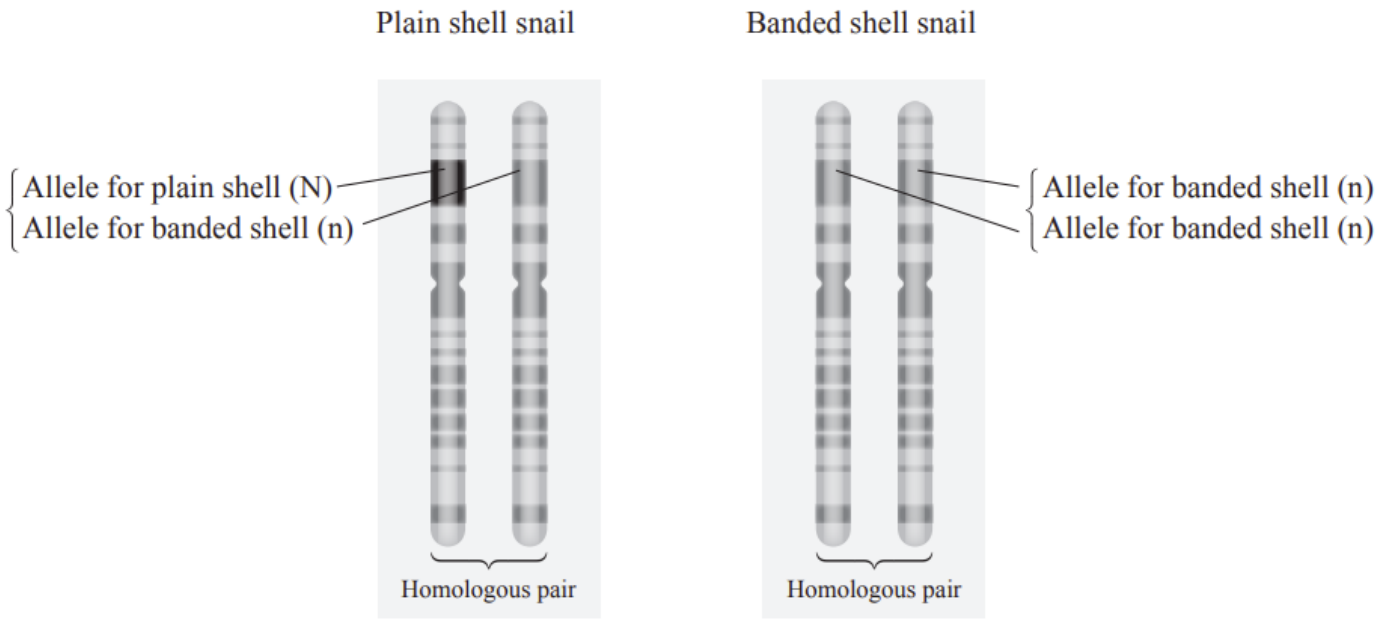
(b) In rock pocket mice, dark fur colour (D) is dominant to light fur colour (d). Each mouse has two alleles for fur colour. Explain how they inherit these two alleles, and explain how the two alleles interact to produce different phenotypes.
In your answer you should:

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

2015:2

A snail known as *Cepaea nemoralis* can have either a plain shell or a banded shell.

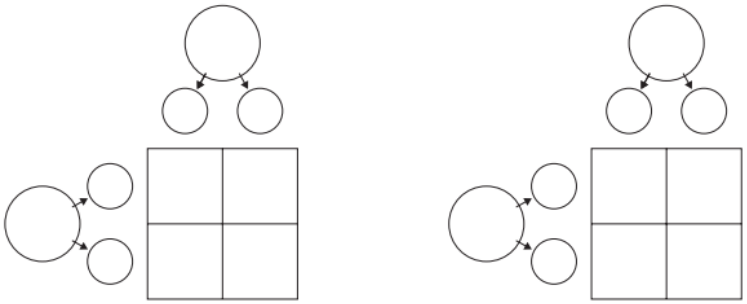

The diagrams below show the homologous chromosomes that contain the gene for shell pattern for each of the snails in the photographs above. Assume the allele for plain shell (N) is dominant over the allele for banded shell (n).



(a) In the diagram above, which snail is heterozygous for shell pattern? Explain why you chose this snail.

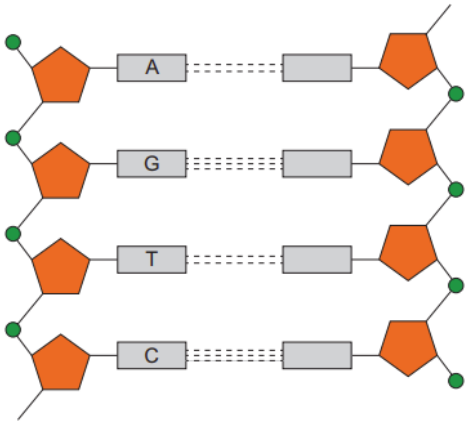
(b) Referring to the examples shown previously for shell pattern, explain the difference between an allele and a gene.

(c) These two snails were produced by sexual reproduction from the same male and female. Discuss how they have inherited different alleles for shell pattern.
In your answer you should:
- explain where the homologous chromosomes have come from
- give the possible genotypes of both parents and explain how you determined these possible genotypes.



2014:1 *(Part question)*

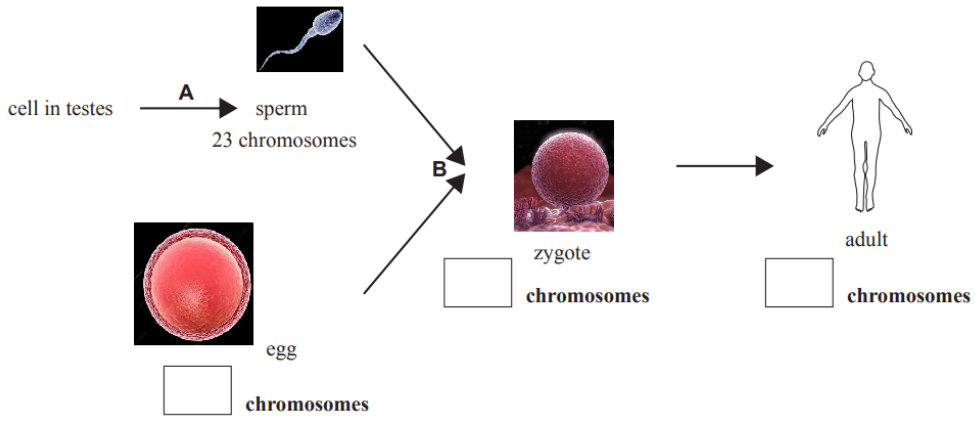
(a) Label the unlabelled bases A, G, C, or T in the diagram of DNA shown below.



(b) Explain the relationship between DNA, a gene, and an allele.

2014:2 *(Part question)*

The diagram below shows the relationship between gametes (sex cells), zygotes, and chromosome number in humans.



(a) Name the processes represented by A and B: Process A: Process B:

(b) Complete the diagram above by writing the numbers of chromosomes in the boxes.

(c) Compare the chromosome number of the egg, sperm, zygote and adult, AND explain any differences and similarities in the numbers.