Assessment Schedule – 2019

Science: Demonstrate understanding of biological ideas relating to genetic variation (90948)

Evidence Statement

Q	Evidence	Achievement	Merit	Excellence
ONE (a)	A-T G-C T-A C-G	• Any A-T or G-C correct base pairing.		
(b)	A mutation is a change in the order of DNA bases that causes a new allele.	• Mutation causes a new allele. OR Mutation is a change in DNA.		
(c)	A mutation is a change in the order of DNA bases that causes a new allele. DNA carries genetic information as a base code. A gene is a section of DNA that codes for 1 trait / protein – in this case digesting milk. An allele is a different form /version / expression of a gene. A mutation is a change in the order of DNA bases that causes a new allele. The new allele codes for the phenotype 'ability to digest milk as an adult'.	• Defines DNA as genetic material. • Gene as a section of DNA that codes for a trait. • Allele is a different form of a gene. • Define phenotype (physical expression of genotype / gene / 'ability to digest milk').	• A mutation is a change in the order of DNA bases that creates an allele causing a AND new phenotype/protein.	• A mutation is a change in the order of DNA bases that creates a new allele. The new allele codes for the phenotype 'ability to digest milk'. • DNA can be passed down in the gametes when sperm and egg fuse (zygote) (fertilisation). AND Comparison of somatic cell / body cell .
(d)	A mutation coding for the ability to digest milk as an adult can be passed down in the DNA from either parent when sperm and egg (gametes) fuse.	• Described as passing on in the sperm / egg.	• Can be passed down in the DNA when sperm and egg (gametes) fuse / fertilisation.	

NØ	N1	N2	A3	A4	M5	M6	E7	E8
No response, or no relevant evidence.	ONE Achievement point.	TWO Achievement points.	THREE Achievement points.	FOUR Achievement points.	ONE Merit point.	TWO Merit points.	ONE Excellence point	Two Excellence points

Q	Evidence	Achievement	Merit	Excellence
TWO (a)	<table><tr><td></td><td colspan="3">I-1</td></tr><tr><td rowspan="3">I-2</td><td></td><td>T</td><td>t</td></tr><tr><td>T</td><td>TT</td><td>Tt</td></tr><tr><td>t</td><td>Tt</td><td>tt</td></tr></table>	• 2 correct genotypes in same row or same column		
(b)	I-1 Tt (heterozygous) I-2 Tt (heterozygous) I-5 tt (homozygous recessive)	• Any correct genotype (can be taken from Punnett).		
(c)	Expected ratio 3:1 unaffected to CF respectively (accept 75% unaffected to 25% CF or 3/4 unaffected and 1/4 affected). Actual ratio 2:2 or 1:1 Unaffected to CF respectively (accept 50% or 1 / 2 unaffected to 50% or 1 / 2 CF). I-1 and I-2 have more CF than expected. This is because each offspring is the product of a random event/fertilisation. Each offspring is unaffected by previous outcomes. Since I-1 and I-2 are both heterozygous (Tt), each individual has 50% chance of inheriting either allele from each parent. With a larger number of offspring, we would expect a ratio very close to 3:1 unaffected to CF respectively.	• Expected ratio. • Actual ratio. • Describes random fertilisation. • Describes Punnet Square as only showing possible / predicted outcomes. • Mentions small sample size.	• Explains actual ratio of CF is different than expected. And difference depends on chance / random. • Explains expected/predicted ratio is same for each offspring as each fertilisation is a random / independent event. • Since I-1 and I-2 are both heterozygous Tt, each offspring has a 25% chance of having CF by inheriting a recessive allele from both parents.	• Explains actual ratio of CF is different than expected because each offspring is the result of random fertilisation AND each offspring is unaffected by previous outcomes. • With a larger number of offspring, we would expect a ratio very close to 3:1 unaffected to CF respectively.

NØ	N1	N2	A3	A4	M5	M6	E7	E8
No response, or no relevant evidence.	ONE Achievement point.	TWO Achievement points.	THREE Achievement points.	FOUR Achievement points.	ONE Merit point.	TWO Merit points.	ONE Excellence point.	TWO Excellence points.

Q	Evidence	Achievement	Merit	Excellence
THREE (a) (b)	Defines genetic variation as differences in (DNA / genes / alleles). Gamete formation by meiosis. Random assortment/segregation / crossing of chromosomes over in meiosis Description of meiosis: produces gametes / sex cells that have half the normal number of chromosomes as body cells. Process of fertilisation: Random male and female gametes join, each with unique DNA producing a genetically unique zygote / offspring. Role of sexual reproduction: produce new combinations of alleles and thus genetic variation between individuals. Explanation: The advantage of genetic variation to a species is that it may enable some individuals to survive kauri dieback to reproduce, passing on favourable alleles / genes to the next generation. Over many generations this genetic advantage / genes / alleles will rise in the population, allowing survival of the kauri species.	• Defines genetic variation differences in DNA / genes / alleles / physical appearance of kauri trees. • Defines meiosis as the process of halving chromosome number. • Defines gamete as a cell (sperm (pollen)/egg) with half chromosome number. • Define sexual reproduction as mixing DNA from two individuals • Defines fertilisation as sperm and egg joining / combining. • Describes the advantage of sexual reproduction is to produce variation. OR Describes an advantage of sexual reproduction as some will survive the disease.	• How random assortment of DNA / chromosomes during meiosis creates genetic variation. • Explains fertilisation and how its random nature / 2 parents creates genetic unique offspring. • Individuals are genetically varied and some survive the kauri dieback disease and reproduce.	• Explains the role of sexual reproduction causing genetic variation and HOW **genetic** variation in a population leads some individuals to survive kauri dieback and reproduce, passing on favourable alleles / genes to the next generation. • Over many generations, the favourable genetic advantage / genes / alleles will rise in number in the population, allowing the survival of the kauri species.

NØ	N1	N2	A3	A4	M5	M6	E7	E8
No response, or no relevant evidence.	ONE Achievement point.	TWO Achievement points.	THREE Achievement points.	FOUR Achievement points.	ONE Merit point.	TWO Merit points.	ONE Excellence point	TWO Excellence points.

Cut Scores

Not Achieved	Achievement	Achievement with Merit	Achievement with Excellence
0 – 6	7 – 13	14 – 18	19 – 24