Assessment Schedule – 2012

Biology: Demonstrate understanding of genetic variation and change (91157)

Evidence Statement

QUESTION ONE

Expected coverage	Achievement	Merit	Excellence
Gene pool is (all) the genes or alleles (held by the individuals) in a population. **Mutation** can be defined as a (permanent) change in the DNA. **Somatic** mutations occur in any cells of the body other than in the gametes **Gametic** mutations only occur in sex cells, eg, sperm/eggs (accept pollen). Explanation of why these are different in terms of producing new alleles that can enter the gene pool include: • A mutation which changes the DNA / base sequence might occur (by, eg substitution / deletion / mutagenic influence) which creates a new allele. • Somatic mutations are not passed on from one generation to the next / Somatic mutations only affect the individual organism in which the cells have mutated. • Gametic mutations are (heritable) transferred to the next (& possibly subsequent) generations OR Gametic mutations are not limited to the individual in which the original mutation has occurred. Not all gametic mutations will enter the gene pool – • redundancy of gametes eg chance of fertilisation • a lethal allele.	• Defines mutation. • Describes somatic mutations. • Describes gametic mutations. • Defines gene pool.	Good explanations of: • A change in the DNA / base sequence which creates a new allele. • The result of somatic mutations. • The result of gametic mutations. OR How gametic mutations may be inherited.	Clear explanations of factors that prevent the gametic mutation entering the gene pool. • Mutation needs to get into a new individual through fertilisation (gamete redundancy). • Once fertilisation has occurred (fertilised egg / embryo / zygote) has to develop into an individual in the population (lethal genes). MUST also include somatic mutation is not passed on to next generation.

NØ	N1	N2	A3	A4	M5	M6	E7	E8
Statements from Achievement incorrect.	Provides ONE correct statement from Achievement.	Provides TWO correct statements from Achievement.	Provides THREE correct statements from Achievement.	Provides FOUR correct statements from Achievement.	Provides TWO correct statement from Merit.	Provides THREE correct statements from Merit.	Provides ONE bullet point from Excellence.	Provides BOTH bullet points from Excellence.

QUESTION TWO

<table>
<tr><th>Evidence</th><th colspan="2">Achievement</th><th colspan="2">Merit</th><th colspan="2">Excellence</th></tr>
<tr>
<td>Multiple alleles are alleles of which there are more than two alternatives available at one locus / for one gene.
M^R restricted
M wild type, Mallard
m^d dusky
$M^R > M > m^d$

To obtain a dusky, m^d m^d, both parents must carry a dusky allele ie. m^d
To obtain a mallard, M, one parent must have an M allele (neither parent must have M^R).
To obtain a restricted, M^R , one parent must have M^R allele.

Therefore parents must have genotypes M^R m^d X Mm^d.

<table>
<tr><td></td><td>M^R</td><td>m^d</td></tr>
<tr><td>M</td><td>M^RM</td><td>Mm^d</td></tr>
<tr><td>m^d</td><td>M^Rm^d</td><td>m^dm^d</td></tr>
</table>

Phenotypes: 2 restricted : 1 Mallard : 1 dusky
Genotypes:
1 M^RM or 25% 1 Mm^d or 25% 1 m^dm^d or 25% 1 M^Rm^d or 25%</td>
<td colspan="2">• Provides evidence to show understanding that all THREE alleles must be present in parents.
• Punnett square completed correctly.
• Genotype (2 alleles needed) and proportions or percentages given.
• Phenotypes and proportions or percentages given.</td>
<td colspan="2">• Each parent must contribute a dusky allele m^d to give dusky offspring.
• Restricted most dominant and therefore to produce restricted M^R allele must be present in one parent.
• Explains how restricted parents could produce alternative forms of offspring.
• Mallard allele must be present in one parent.
• Mallard allele will be expressed when restricted allele is not present.</td>
<td colspan="2">• Links explanations of all three phenotype offspring patterns to discuss why there is only one parental combination.
• Discussion is supported by reference to parental genotypes.
and genotype proportions / percentages of offspring.</td>
</tr>
<tr><td>NØ</td><td>N1</td><td>N2</td><td>A3</td><td>A4</td><td>M5</td><td>M6</td><td>E7</td><td>E8</td></tr>
<tr><td>Statements from Achievement incorrect.</td><td>ONE Achievement BP.</td><td>TWO Achievement BPs.</td><td>THREE Achievement BPs.</td><td>FOUR Achievement BPs.</td><td>THREE correct Merit BPs.</td><td>FOUR OR MORE correct Merit BPs.</td><td>FIRST Excellence BP (NOT 2nd on its own).</td><td>BOTH Excellence BPs.</td></tr>
</table>

QUESTION THREE

<table>
<tr><th colspan="3">Evidence</th><th colspan="2">Achievement</th><th colspan="2">Merit</th><th colspan="2">Excellence</th></tr>
<tr><td colspan="3">Genetic drift: Chance change in allele frequency of a population.
Natural selection: Individuals most adapted to the environment will survive and reproduce.
Migration: Individuals moving into or away from the area.
EXPLANATIONS:
Genetic drift:
• Frequency of the alleles can change through chance especially if the population is or becomes small
Natural Selection:
• Many individuals with alleles most adapted to the environment will survive and reproduce and pass these favourable genes to their offspring
Migration:
• If added alleles are inheritable (implies breeding), the frequency of these will increase or vice versa.
Gene frequency is the % of each allele in a gene pool.
Note: accept use of “gene” if “allele” has been used and clearly understood</td><td colspan="2">Defines
• genetic drift
• natural selection
• migration.</td><td colspan="2">Explain how these contribute to changes in gene pool:
• genetic drift
• natural selection
• migration
using the named species or other NZ examples.</td><td colspan="2">In discussion provide links between:
• genetic drift
• natural selection
• migration
using the named species or other NZ examples.</td></tr>
<tr><td>NØ</td><td>N1</td><td>N2</td><td>A3</td><td>A4</td><td>M5</td><td>M6</td><td>E7</td><td>E8</td></tr>
<tr><td>No relevant information.</td><td>Statements from Achievement incorrect.</td><td>Provides ONE correct statement from Achievement.</td><td>Provides TWO correct statements from Achievement.</td><td>Provides THREE correct statements from Achievement.</td><td>Explains TWO correct processes from Merit each using a NZ example.</td><td>Explains THREE correct processes from Merit each using a NZ example.</td><td>Links TWO processes with a NZ example(s).</td><td>Links THREE processes with a NZ example(s).</td></tr>
</table>

Judgement Statement

	Not Achieved	Achievement	Achievement with Merit	Achievement with Excellence
Score range	0 – 7	8 – 12	13 – 18	19 – 24