Assessment schedule: practice paper 2026

AS 91157 Demonstrate understanding of genetic variation and change · Vertex Academy practice paper, not an NZQA paper

QUESTION ONE

Part	Evidence	Achievement (u)	Merit (r)	Excellence (t)
(a)	gametes: W, w from each parent WW, Ww, Ww, ww genotypes 1 : 2 : 1	Correct Punnett square. Correct genotype ratio (1 : 2 : 1). Correct phenotype ratio (3 white : 1 black).		
(b)	cross with black ww ewes WW × ww Ww × ww any black lamb	Describes crossing the ram with black (ww) ewes. Describes the expected lambs for one possible genotype.	Explains the outcomes for both possible genotypes (all white if WW; about half black if Ww) and how they show the ram's genotype, including the need for enough lambs.	
(c)	gametes: C^RP, C^Rp, C^WP, C^Wp colour 1 red : 2 roan : 1 white horns 3 polled : 1 horned independent assortment random fertilisation, small sample	Correct gametes for one parent. Correct colour ratio (1 : 2 : 1). Correct horn ratio (3 : 1).	Combines the two genes to give the six phenotypes in the correct 3 : 6 : 3 : 1 : 2 : 1 ratio, explaining codominance and dominance.	Correct six-phenotype ratio with explanation, AND discusses why actual results differ (fertilisation is random; small numbers; linkage would change the ratio).

QUESTION TWO

Part	Evidence	Achievement (u)	Merit (r)	Excellence (t)

(a)	mutation: change in DNA base sequence gametic: in gamete-making cells somatic: in body cells	Describes a mutation as a change in DNA. Describes a gametic mutation as passed on to offspring. Describes a somatic mutation as not passed on.		
(b)	crossing over, prophase I independent assortment, metaphase I 2^{23} > 8 million combinations in humans every gamete different + random fertilisation	Describes crossing over as exchange of sections between homologous chromosomes. Describes independent assortment as random arrangement of chromosome pairs.	Explains how both crossing over and independent assortment produce new combinations of alleles in gametes, linked to siblings being different.	
(c)	woman's father X^bY $X^BX^b \times X^BY$ daughters: X^BX^B or X^BX^b sons: X^BY or X^bY males one X	Gives the woman's genotype as X^BX^b (carrier). Gives the man's genotype as X^BY. States that sons have a 50% chance.	Explains the outcomes for both sons (50% colour-blind) and daughters (none colour-blind, half carriers) from the cross.	Discusses the outcomes for sons and daughters from the cross, AND justifies why males are affected more often (one X chromosome, so a single recessive allele is expressed; females need two copies).

QUESTION THREE

Part	Evidence	Achievement (u)	Merit (r)	Excellence (t)
(a)	total copies = 250 × 2 = 500 a copies = 2 × 20 + 70 = 110 frequency of a = 110 ÷ 500 = 0.22	Describes a gene pool. Describes allele frequency. Calculates the frequency of a as 0.22.		

(b)	bottleneck: 5 birds, 1 breeding pair all descended from one pair genetic drift: random change in allele frequency little variation	Describes a bottleneck as a sudden large fall in population size. Describes genetic drift as random change in allele frequency. Describes the black robin as having low genetic diversity.	Explains how the bottleneck (one breeding pair) reduced genetic diversity, AND how genetic drift has a large effect in a small population.	
(c)	normally: rim eggs fail workers pushed eggs back small inbred population, drift help stopped	Describes natural selection as individuals with a favourable trait surviving and reproducing more. Describes rim eggs failing without help.	Explains how pushing eggs back removed selection against rim-laying so the alleles increased, OR explains how selection reduced the alleles after help stopped.	Discusses both changes (increase when the selection pressure was removed, with drift in a small population; decrease when natural selection returned), linking reproductive success to allele frequency.

Judgement for each question

N0	N1	N2	A3	A4	M5	M6	E7	E8
No response, or nothing relevant.	One Achievement point, partly described.	Two Achievement points.	Three Achievement points.	Four Achievement points.	One Merit point.	Two Merit points.	One Excellence point, with a minor error or omission.	One Excellence point, complete.

Grade score out of 24 (each question's grade: N0 = 0 to E8 = 8): Not Achieved 0 to 6, Achieved 7 to 12, Merit 13 to 18, Excellence 19 to 24 (the 2025 exam's cut scores).