Year 11 Science: Variation in populations and gene tracking

Name: _____ Date: _____

Try these without your notes first, then check the answer key.

Practice

1. A flock of 40 birds has 20 copies of allele b. What is the frequency of b?

2. Two unaffected parents have a child with a genetic condition. Is the allele for the condition dominant or recessive?

3. A flood kills most of a beetle population at random. Which population source is this, and what can happen to the allele frequencies?

4. Why were Richard Henry's chicks so valuable to Kākāpō Recovery, and which population source does this show?

5. In the PKU pedigree, what is the chance that individual 8 is a carrier, and how could it be confirmed?

Exam-style question: albino chicks in a sanctuary

Context: A predator-free island sanctuary breeds a rare flightless bird, all descended from a few founders. Albinism in this bird is caused by a recessive allele (a); the normal allele (A) is dominant. Male 5 was moved in from another island where no albino chick has ever been recorded.

6. Give the genotypes of birds 1, 2 and 3, and the possible genotypes of bird 4.

7. Explain why the genotype of bird 4 cannot be confirmed from the pedigree, and calculate the chance that she is a carrier.

8. The rangers plan to pair female 6 with her uncle, bird 3. Discuss this plan. Include the chance that a chick from the pair is albino (assume bird 5 is AA), why this is non-random mating, and how a DNA test for the a allele would change the decision. Evaluate how reliable your answer is.

Fix the mistake

9. Correct this statement: "Allele frequency of b = number of bb individuals ÷ population size."

10. Correct this statement: "An unaffected child of two carriers has a ¾ chance of being a carrier."

11. Correct this statement: "Non-random mating and inbreeding mean the same thing."

12. Correct this statement: "If a recessive allele becomes more common, more individuals will show the trait."