Year 11 Science: Where genetic variation comes from

Name: _____ Date: _____

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

Practice

1. A woman who is a carrier for albinism (Aa) has children with a man who is homozygous dominant (AA). What is the chance that a child has albinism?

2. In question 1, what fraction of the children are expected to be carriers?

3. Two parents with normal pigment have a child with albinism, then a second child with normal pigment. What is the chance that the second child is a carrier?

4. A man's skin cell mutates after years of sunburn. Can the mutation be passed to his children? Explain.

5. Name the two events in meiosis that make each gamete different, and say which one swaps parts between chromosomes.

Exam-style question: drinking milk as an adult

Context: Lactase is the enzyme that breaks down lactose, the sugar in milk. Most mammals stop making it after weaning, and so do many people. In some human populations, a mutation in a stretch of DNA that switches the lactase gene on lets people keep making lactase as adults. This allele for lactase persistence (L) is dominant over the allele for lactase non-persistence (l).

6. Describe the difference between genotype and phenotype, using lactase persistence as your example.

7. Two adults who both digest milk easily have a son who, as an adult, gets sick after drinking milk. Explain how this happened, using a Punnett square, and give the chance for each of their children.

8. Discuss how the L allele first appeared and why it became common in populations with a long history of keeping dairy animals but stayed rare in others. In your answer, explain why the first mutation must have happened in a gamete-making cell, and link the nature of the allele to survival.

Fix the mistake

9. Correct this statement: "A gene and an allele are the same thing."

10. Correct this statement: "Their first child had albinism, so the next three will not."

11. Correct this statement: "Getting skin cancer from the sun is a mutation, so the person's children can inherit it."

12. Correct this statement: "Meiosis makes new alleles."