Year 12 Science: Meiosis, mutation and inheritance

Name: _____ Date: _____

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

Practice

1. A human skin cell has 46 chromosomes. How many does a human sperm cell have?

2. In guinea pigs, black (B) is dominant to brown (b). What percentage of the offspring of Bb × bb would you expect to be brown?

3. A pink snapdragon (C^RC^W) is crossed with a white snapdragon (C^WC^W). Give the phenotype ratio.

4. Two yellow mice (A^ya) are crossed and 12 pups survive. How many would you expect to be yellow, and how many non-yellow (agouti)?

5. Genes A and B are on different chromosomes. What percentage of the offspring of AaBb × aabb would be aabb?

6. Two parents are both carriers (Aa) of a recessive condition. What is the chance their next child is affected?

Exam-style question: Shorthorn cattle

A Waikato farmer breeds Shorthorn cattle. Coat colour shows codominance: RR is red, WW is white and RW is roan, with red and white hairs mixed. Polled (no horns, P) is dominant to horned (p). The two genes are on different chromosomes.

7. Describe codominance, using roan cattle as the example.

8. Two roan cattle are mated many times. Give the expected ratio of coat colours in their calves, using a Punnett square.

9. The farmer's new bull is polled. Explain how a test cross would show whether he is PP or Pp.

10. The bull is mated with three horned cows and all three calves are polled. Discuss whether the farmer can now be sure the bull is PP, using probabilities.

Fix the mistake

11. Correct this statement: "Crossing over happens between sister chromatids."

12. Correct this statement: "A 3 : 1 ratio means a family with four children will have exactly three with the dominant trait."

13. Correct this statement: "Codominance and incomplete dominance are the same, because the heterozygote looks different from both parents."

14. Correct this statement: "Independent assortment creates new alleles."