

Lesson Plan Title: Sled Dog Genetics

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Discipline / Subject: Science

Topic: Genetics

Grade Level: Seventh

Resources / References / Materials Teacher Needs: disk with pictures of sled dogs which display characteristics such as brown and blue eyes, bushy and non-bushy tails, long hair coats and short hair coats, coat color, and pointed or floppy ears; technology to show pictures; <http://www.pbs.org/wnet/nature/sleddogs/>; worksheet of genetic problems for sled dogs; punnett squares.

Lesson Summary

Students have learned about phenotypes, genotypes, dominant and recessive genes, heterozygous and homozygous organisms, and how to construct punnett squares in previous lessons. This lesson provides review and practice in using the previously learned skills with genetic problems based on Alaskan husky characteristics.

Standard's Addressed: (Local, State, or National) NC Standard Course of Study

1. 5.02 Explain the significance of reproduction:

- Sorting and recombination of parents' genetic material.
- Potential variation among offspring.

2. 5.03 Identify examples and patterns of human genetic traits:

- Dominant and recessive.
- Incomplete dominance.

3. 5.04 Analyze the role of probability in the study of heredity:

- Role of each parent in transfer of genetic traits.
- Analysis of pedigrees.

4. **Alaska State Standard, Grade Eight** The student demonstrates an understanding of how science explains changes in life forms over time, including genetics, heredity, the process of natural selection, and biological evolution

5. **National Standards** As a result of their activities in grades 5-8, all students should develop understanding in reproduction and heredity.

Learning objectives: 1. The learner will apply knowledge of genetics and genetics terminology to solve genetics problems using sled dog characteristics. 2. The learner will create punnett squares to demonstrate possibilities of breeding results. 3. The learner will illustrate the result of a dog according to the genetic problem's answer.	Assessment: Method of assessment for learning 80% accuracy on the problems
Procedural Activities 1. Review genetics terminology (heterozygous, homozygous, dominant/recessive genes, genotype and phenotype) 2. Give students the punnett square worksheet and the genetic problems of Alaskan huskies. 3. Students work as teacher prefers (independently, pairs, small groups) to solve problems. 4. Students illustrate one of the dogs that result from the breeding.	
Materials Students Need: worksheet of problems, punnett square worksheet, colored pencils	
Technology Utilized to Enhance Learning: web site http://www.pbs.org/wnet/nature/sleddogs/	
Other Information	
Modifications for special learners/ Enrichment Opportunities Work in pairs to provide support for special learners and/or use pictures of the dogs' characteristics in the punnett squares to represent the traits; create matching exercise which matches an illustration of the resultant dog with the genetic problem that produced the dog.	

Sleddog Genetics Worksheet

<http://www.pbs.org/wnet/nature/sleddogs/>

Scientists in Alaska have been trying to determine the genetic make-up of a great sled dog. These dogs are called Alaskan Huskies by the locals and are not recognized as an official breed.

Scientists have noticed some physical characteristics that have shown up in dogs that are top sled runners. Use the information provided and your knowledge of genetics to answer each question.

CHARACTERISTICS INFORMATION

Grey fur color is dominate over black. (G, g)
Bushy tail hair is dominate to non bushy tail hair. (B, b)
Long hair coat is dominate to short hair coat. (L, l)

1. For each genotype below, indicate whether it is a heterozygous (He) or a homozygous (Ho).

LL____ Ll____ ll____ BB____ Bb____ bb____ GG____ Gg____ gg____

Which genotypes in #1 would be considered purebred? _____

Which genotypes in #1 would be considered hybrids? _____

2. Determine the phenotype for each genotype using the information provided about the Alaskan Huskies.

Bushy tail hair is dominate to non bushy tail hair.

BB____ Bb____ bb____

Long hair coat is dominate to short hair coat.

LL____ Ll____ ll____

3. For phenotype, give the 4 genotypes possible for a sled dog named Trouble. Trouble has grey fur, a bushy tail, and a short hair coat.

Grey fur color is dominate over black. (G, g)
Bushy tail hair is dominate to non bushy tail hair. (B, b)
Long hair coat is dominate to short hair coat. (L, l)

4. Trouble's owners have decided to let her have puppies because she is such a great runner. They have chosen the father of the puppies to be Cello because he is such a good swing dog.

Trouble is heterozygous for grey fur color while Cello is homozygous for black. Create a punnett square to show the possibilities that would result if Trouble and Cello had puppies.

5. Imagine if one of Cello and Trouble's daughters who is heterozygous for grey color had puppies with a dog that was also heterozygous for grey color. Create a punnett square to show the results of all the puppies.

6. A son of Trouble and Cello's is homozygous for short coat length. Trouble's owners have decided to breed him with the best lead dog they have who is homozygous for long coat length. Create a punnett square to show the resulting puppies of Flint and Daisy.

7. Taz is homozygous for a non bushy tail and has had puppies with Honey who is heterozygous for a non bushy tail. Create a punnett square to show how the puppies would look.

In Alaskan Huskies, eye color and ear shape do not have dominate traits. They have a mixing of the traits which are called incomplete dominance.

Give the genotypes of the following phenotypes.

Blue eyes_____ Brown eyes _____ a blue and brown eye_____

Pointed ears_____ Floppy ears _____ a pointed and floppy ear_____

8. One of Taz's daughters and Trouble's sons has had puppies. Taz's daughter Bluebell has pure blue eyes while Trouble's son Jack has pure brown eye color. Create a punnett square to show how the puppies would look.

9. Trouble has a pointed ear and a floppy ear while Cello is pure for pointed ears. Create a punnett square to show what the possible puppies would look like.

10. A daughter of Taz who has a blue eye and a brown eye has had puppies with a great wheel dog named Chief. Chief has a blue eye and a brown eye also. Create a punnett square to show how the puppies of Rose and Chief would look.

11. Illustrate one of the dogs from one of the answers to a problem above. Label the illustration with the problem number. Use another sheet of paper for your illustration.