

Name _____ Period _____

Scientists have been investigating the genetic makeup of Elves at the North Pole. Use the information provided and your knowledge of genetics to answer each question.

1. Use the information for Buddy's traits to write the phenotype (physical appearance) for each item.

Characteristic	Dominant Gene	Recessive Gene
Hair Type	Curly (C)	Straight (c)
Tastebuds	Sugar-liking (S)	Salt-liking (s)
Toy-Making Abilities	Can make toys quickly (T)	Cannot make toys quickly (t)
Snowball Fighting	Can throw and make snowballs quickly (M)	Cannot throw and make snowballs quickly (m)

- a. CC _____ b. Ss _____ c. Tt _____ d. mm _____
 e. ss _____ f. MM _____ g. Cc _____ h. tt _____

2. Use the information in the chart in #1 to write the genotype (or genotypes) for each trait below.

- a. Sugar-liking _____ b. Cannot make toys quickly _____
 c. Can throw and make snowballs quickly _____ d. Straight hair _____
 e. Salt-liking _____ f. Can make toys quickly _____
 g. Cannot throw and make snowballs quickly _____ h. Curly Hair _____

3. Determine the genotypes for each using the information in the chart in #1.

- a. Heterozygous can make toys quickly _____ b. Homozygous Curly Hair _____
 c. Purebred Sugar-liking _____ d. Hybrid Can throw snowballs _____

4. Buddy's cousin, Sporcle recently met a quick toy-making elf named Peppermint at a local toy-making convention and fell in love. Use your knowledge of genetics to answer the questions below.

a. If Peppermint's father is a heterozygous toy-maker (can make toys quickly) and her mother cannot make toys quickly, what is her genotype? Complete the Punnett square to show the possible genotypes that would result to help you determine Peppermint's genotype.

What is Peppermint's genotype? _____

b. Sporcle is heterozygous for his toy-maker abilities. What is his genotype? _____

c. Complete the Punnett Square on the next page to show the possibilities that would result if Sporcle and Peppermint had children.

d. List the possible genotypes and phenotypes for the kids.

e. What is the probability of kids with toy-maker abilities (can make toys quickly)? _____%

f. What is the probability of kids without toy-maker abilities (cannot make toys quickly)? _____%

5. Buddy and Jovie get married. Buddy has the best sugar-liking tastebuds in the family. Jovie is believed to be heterozygous for her sugar-liking tastebuds, while Buddy's family brags that they are a pure line. Complete the Punnett square to show the possibilities that would result if Buddy and Jovie had children.

- a. Give the genotype for each person. Buddy - _____ Jovie- _____
b. Complete the Punnett square to show the possibilities that would result if they had children.

c. List the possible genotypes and phenotypes for the kids.

d. What is the probability that the kids would have sugar-liking tastebuds? _____%

e. What is the probability that the kids would have salt-liking tastebuds? _____%

6. Buddy's mother is so proud of her son and his new wife, Jovie, as they are expecting a little baby. She is hoping the new arrival will not be able to throw snowballs quickly (she hates violence) like Jovie and many members of her family. If Buddy is heterozygous for throwing snowballs quickly, what are the chances that the baby will not be able to throw snowballs quickly? Create a Punnett square to help you answer this question.

7. Buddy's aunt is famous around town for her very straight hair! She recently met a cute fellow who also has straight hair, which is a recessive trait. Would it be possible for them to have a child with curly hair? Why or why not? Create a Punnett square to help you answer this question.

8. If Buddy's aunt described in #7 wanted children with curly hair, what type of fellow would she need to marry in order to give her the best chances? Create a Punnett square to help you answer this question.