Name_____ Class_____ Date _____

Investigating Inherited Traits

Introduction

Heredity is the passing on of traits from parent to offspring. The genetic makeup of an individual is known as its genotype. The physical characteristics of an individual, which are the result of its genotype and its environment, are known as its phenotype.

Some alleles are expressed only when the genotype is homozygous. These alleles are said to produce recessive phenotypes. Alleles that are expressed whether the genotype is homozygous or heterozygous produce dominant phenotypes. An allele that codes for a dominant trait is represented by a capital letter, while an allele that codes for a recessive trait is represented by a lowercase letter. Sometimes when the genotype is heterozygous, neither the dominant nor the recessive phenotype occurs. In this situation, called incomplete dominance, an intermediate phenotype is produced.

In humans, the sex of an individual is determined by the particular combination of two chromosomes called the sex chromosomes. Individuals who have two X chromosomes (XX) are females, whereas those who have an X and a Y chromosome (XY) are males. In this investigation, you will observe how the results of different allele combinations produce certain traits.

Problem

How are traits inherited?

Pre-Lab Discussion

Read the entire investigation. Then, work with a partner to answer the following questions.

1. What does a single side of a double-sided coin or disk represent?

_____

_____

2. What is the probability, in percent, that a single coin toss will result in heads? In tails?

_____

_____

_____

3. Why is a coin toss a good way to represent allele combinations that occur in nature?

_____

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_____

4. For the traits explored in this lab, do all heterozygous pairs of alleles produce an intermediate phenotype?

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5. Can you accurately determine an organism's genotype by observing its phenotype? Explain your answer.

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Materials *(per group)*

3 textbooks
2 coins

Procedure

1. Place the textbooks on the laboratory table so that they form a triangular well.

2. Determine which partner will toss for the female and which will toss for the male. Remember that there are two genes per trait.

3. Have the partner who is representing the male flip a coin into the well to determine the sex of the offspring. If the coin lands heads up, the offspring is a female. If the coin lands tails up, the offspring is a male. Record the sex of the offspring in the blank at the top of page 111.

4. For all the coin tosses you will now make, heads will represent the dominant allele and tails will represent the recessive allele.

5. You and your partner should now flip your coins into the well at the same time to determine the phenotype of the first trait, the shape of the face. Note: *The coins should be flipped only once for each trait.*

6. Continue to flip the coins for each trait listed in the table in Figure 1. After each flip, record the trait of your offspring by placing a check in the appropriate box in the table. (Note: Some information in Figure 1 has been simplified. Some listed traits are actually produced by two or more genes.)

7. Using the recorded traits, draw the facial features for your offspring in the space on page 111.
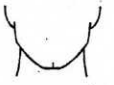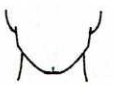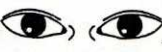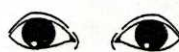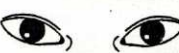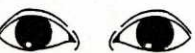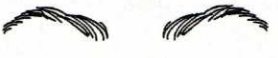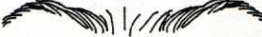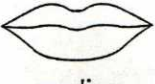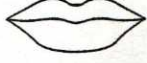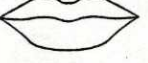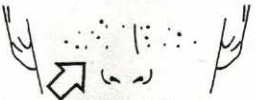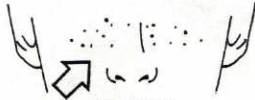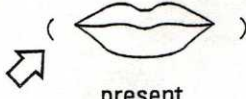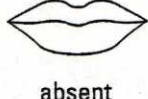
Traits	Dominant (both heads)	Hybrid (one head, one tail)	Recessive (both tails)
Shape of face	round RR	round Rr	Square rr
Cleft in chin	present CC	present Cc	absent cc
Texture of hair	curly HH	wavy Hh	straight hh
Widow's peak	present WW	present Ww	absent ww
Spacing of eyes	close together EE	medium distance Ee	far apart ee
Shape of eyes	almond AA	almond Aa	round aa
Position of eyes	straight SS	straight Ss	slant upward ss
Size of eyes	large LL	medium Ll	small ll

Figure 1

Traits	Dominant (both heads)	Hybrid (one head, one tail)	Recessive (both tails)
Length of eyelashes	long LL	long Ll	short ll
Shape of eyebrows	bushy BB	bushy Bb	fine bb
Position of eyebrows	not connected NN	not connected Nn	connected nn
Size of nose	large LL	medium Ll	small ll
Shape of lips	thick TT	medium Tt	thin tt
Size of ears	large LL	medium Ll	small ll
Size of mouth	large LL	medium Ll	small ll
Freckles	present FF	present Ff	absent ff
Dimples	present DD	present Dd	absent dd

Figure 1 *continued*