

Rock, Paper, Scissors

Dominant and Recessive Traits

Purpose

The purpose of this activity is to understand the meaning of dominant and recessive genes and the concept of how genes determine the characteristics of offspring.

Time

2 forty-minute sessions

Materials

For each partnership:

- *Plant Features* Activity Sheet (page 25)
- *Rock, Paper, Scissors Recording Chart* (page 24)

For each student:

- *What Does It Look Like?* Activity Sheet (page 26)
- Crayons and scissors

For the class:

- Five “gene pool” containers made from shoe boxes or baskets

Background Information

When an offspring is formed, its traits are determined by a combination of genes from each parent. Each parent contributes one half of the genes for each trait. In the simplest cases, genes are either dominant or recessive. When a dominant gene combines with a recessive gene, the dominant gene’s characteristics are expressed in the offspring. When two recessive genes are combined, the recessive characteristic is expressed in the offspring. Co-dominance occurs when the genes for a particular trait are equally strong. In this case, the two variations of the gene are expressed in equal strength.

In agriculture there are many examples of dominant, recessive and co-dominant traits. Some examples are listed below:

- Red potato skin is dominant over white potato skin.
- Russet colored potato skin is dominant over white potato skin.
- Green peas are dominant over yellow peas.
- Red cherry tomatoes are dominant over yellow cherry tomatoes.
- Red and white snapdragon flowers are co-dominant and produce pink flowers.
- Short and tall corn plants are co-dominant and produce medium height corn plants.
- Tall sunflower plants are dominant over short sunflower plants.
- Yellowkerneled corn is dominant over whitekerneled corn.

Procedure

1. Have students list words that are associated with the words “dominant” (dominated, dominating, dominate, domain, dominance, predominant, dominator, etc.) and “recessive” (recessively, recede, recess, receded, receding, recessional, recession, etc.). Then discuss the differences between the concept of dominating a situation and receding in the same situation. For instance, if two people wanted to climb up a ladder of a slide at the same time, one person might dominate the situation by yelling it was his turn or pushing someone out of the way. Someone else might recede by walking away and playing something else. The receding person

Rock, Paper, Scissors

Dominant and Recessive Traits

Content Standards

Grade 5

Science

Investigation and
Experimentation • 6

Reading/Language Arts

Reading • 1.2

Mathematics

Mathematical Reasoning
1.0, 1.1, 1.2, 2.3

Grade 6

Science

Investigation and
Experimentation • 7, 7c

Reading/Language Arts

Reading • 1.2

Mathematics

Statistics, Data Analysis,
and Probability • 2.3,
2.4, 2.5
Mathematical Reasoning
1.1

Grade 7

Science

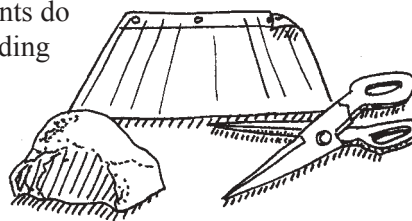
Genetics • 2, 2b, 2c, 2d
Evolution • 3, 3a
Investigation and
Experimentation • 7, 7c

Reading/Language Arts

Reading • 1.2, 1.3

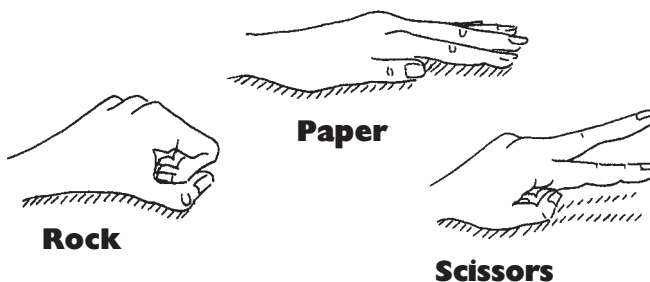
may play at the slide later when there is less competition (similar to genes). Role-play a few situations such as lining up after recess or participating in class discussions.

- Describe the activity *Rock, Paper, Scissors*, using the words “dominant” and “recessive.” Discuss that rock dominates scissors, scissors dominate paper, and paper dominates rock. Have the students do the activity with a partner, recording on a chart (provided) each partner’s contribution and each outcome for several rounds. The outcome column will say either “Rock,” “Paper,” or “Scissors.” If both people choose the same item, then it is a tie and the item that both people chose will be written in the outcome box. The procedure for the activity is described below.



How to Play Rock, Paper, Scissors

After a count of “1-2-3,” each player must symbolize a rock, paper, or scissors with one hand on a desk or tabletop. The hand symbol for rock is a fist. The hand symbol for paper is a flat hand on the desk or tabletop. The hand symbol for scissors is the first two fingers cutting the air in a scissors motion. It is important that both partners reveal their chosen hand symbols at exactly the same time.



- Discuss the outcome of the game. Are there ways of making certain one person will always dominate (win)?
- Discuss “dominant” and “recessive” in terms of genes and heredity.
- Have each partnership color and cut out the items on the *Plant Features* page. Place the features into the prepared “gene pool” containers (boxes, envelopes, etc.) labeled “Leaves,” “Fruit,”

Rock, Paper, Scissors

Dominant and Recessive Traits

Content Standards

(continued)

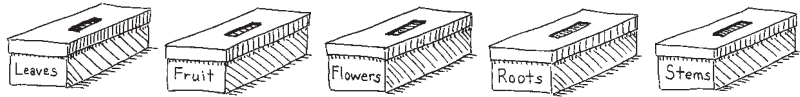
Mathematics

Statistics, Data Analysis,
and Probability • 1.0

Mathematical Reasoning

1.0, 1.1, 2.0, 2.1, 2.4,
2.5, 3.0, 3.1, 3.2, 3.3

“Flowers,” “Roots,” and “Stems.” Each partnership will contribute a dominant and recessive trait for each feature. Place the five different boxes in different locations throughout the room.



- Hand out to each pair of students *What Does It Look Like?* (page 26). From five separate “gene pool” containers, have each student randomly select one feature. Have the students fill in the gene chart of the features chosen. The partners then need to determine what their plant looks like. For example, if one partner chooses a dominant round fruit and the other partner chooses a recessive oval fruit, the plant will have round fruit. Have the students draw their plant showing the appropriate feature.
- Have the students display their plants. Discuss how many dominant traits were expressed compared to recessive traits. Discuss the wide variety of plants produced from the same gene pool and how this activity shows that it would be highly unlikely for two brothers or sisters to be exactly the same.

Variations

- Have the class design their own dominant and recessive features for the gene pool.
- Rather than working in pairs, have the class create one plant on a flannel board by randomly selecting from the gene pool.
- When discussing traits that are dominant, co-dominant, and recessive, use colored chalk and a chalkboard to illustrate. Two colors can be blended for co-dominance and a recessive color can be erased.

Extensions

- Have two pairs of students cross their plants to produce offspring. The offspring would be created by a random selection of one trait from each plant’s gene pool. Students could hold their traits behind their back while the other pair chose right or left hand to arrive at a trait. This process could continue through several generations. The plant’s family tree could be displayed on a bulletin board.
- Based on features in an offspring, discuss what the parent plants may have looked like.

Rock, Paper, Scissors Recording Chart

Name _____

Date _____

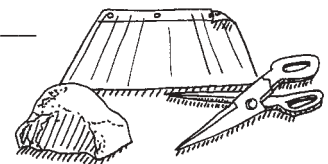
Round	Partner A	Partner B	Outcome (Paper, Rock, Scissors)
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

Possible Outcomes

- Rock dominates scissors
- Scissors dominate paper
- Paper dominates rock

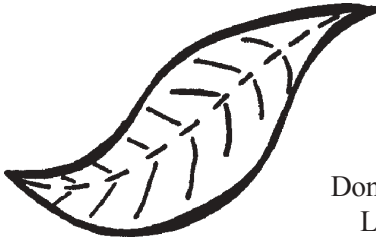

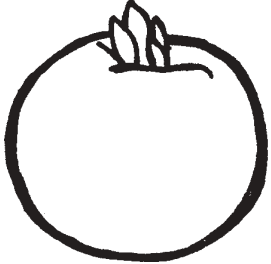
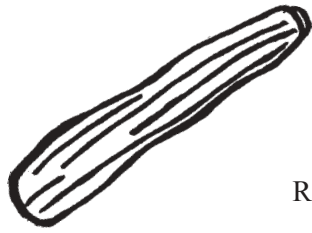
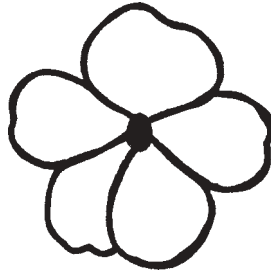
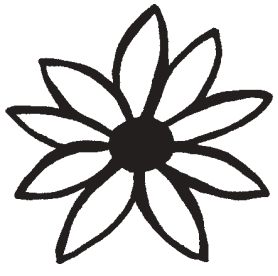
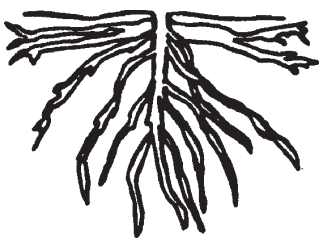



Conclusion

1. Which outcome was most common in your partnership? _____
2. Which outcome was the least common? _____
3. Were your results similar to the results of the class? _____
4. Describe one thing you learned about genetics by doing this activity. _____



Plant Features

Color and cut out the dominant and recessive features and place them in the appropriate boxes as explained by your teacher.

	Dominant	Recessive
Leaf	 <p>Dominant Leaf</p>	 <p>Recessive Leaf</p>
Fruit	 <p>Dominant Fruit</p>	 <p>Recessive Fruit</p>
Flower	 <p>Dominant Flower</p>	 <p>Recessive Flower</p>
Root	 <p>Dominant Root</p>	 <p>Recessive Root</p>
Stem	 <p>Dominant Stem</p>	 <p>Recessive Stem</p>

What Does It Look Like?

Name _____

Date _____

Complete this plant diagram by following the instructions of your teacher.

Feature	Partner A	Partner B	Outcome
Leaf			
Fruit			
Flower			
Stem			
Root			

Reminder

- Two dominant traits = dominant trait
- Two recessive genes = recessive trait
- One dominant gene and one recessive gene = dominant trait

Plant Diagram