

Investigation Two – Paint’s Family Tree

Standard V Students will understand that traits are passed from the parent organisms to their offspring, and that sometimes the offspring may possess variations of these traits that may help or hinder survival in a given environment.
Objective 1 Using supporting evidence, show that traits are transferred from a parent organism to its offspring.
Intended Learning Outcomes <ol style="list-style-type: none">1. Use science process and thinking skills2. Manifest scientific attitudes and interests.3. Understand science concepts and principles.4. Communicate effectively using science language and reasoning

Standard V

Objective 1

Background Information

Throughout history, many animals and plants have been bred to perpetuate certain traits. Cows, horses, tomatoes, corn and strawberries are just a few examples of living things that have been selectively bred by humans. Horse breeders are very aware of family traits. The traits for which they breed horses can be visible, such as hair coloring and muscularity, or invisible, such as temperament and health characteristics.

Instructional Procedure

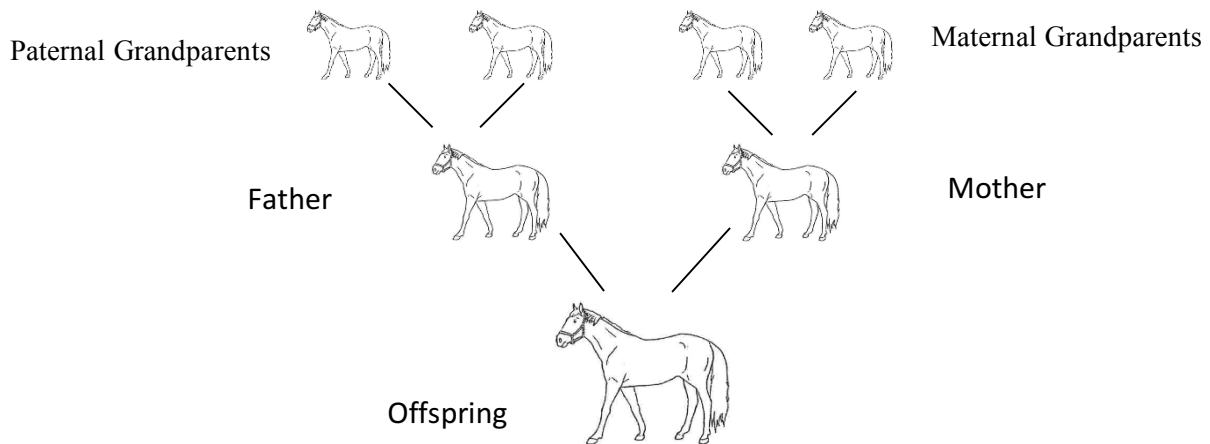
* The idea for this lesson plan was adapted from the “Where’d You Get Those Genes” curriculum, developed by California Agriculture in the Classroom (http://www.cfaitc.org/Resource_Materials/Lesson_Plans/lessonplans4_6.html)

1. Choose four students (two girls and two boys) to play the roles in the skit, *Paint’s Family Tree*. Have them read and act out the skit.
2. Give each student a copy of the skit and a “Trait Summary for Paint’s Relatives” worksheet. Allow each student to read the skit and fill out his/her summary sheet individually.
Teaching Tip: For more directed student instruction, copy the trait summary worksheet and place asterisks in the boxes for characteristics for which they will need to use deductive reasoning. (See “Trait Summary Key.”) This activity is excellent for enhancing reading comprehension.
3. After students have completed their summaries, give each student a copy of the “Model Family Tree.” Have them color this sheet according to how they filled out the information in the summary.
4. When each student has completed his/her family tree, divide the students into seven groups. Give each team a “Family Tree Horse”. Assign each group a different member of Paint’s family. The group must come to consensus on how to color their family member using their previously colored family trees. They may need to refer back to the skit for verification.
5. Direct the groups to label their horses with the horse’s name, its relationship to Paint, and any invisible traits.

Materials

- 1 copy of *Paint’s Family Tree* skit dialogue for each student
- 1 copy of *Trait Summary for Paint’s Relatives* for each student
- 1 copy of *Family Tree Horse* for each team of students
- 1 copy of *Model Family Tree* on overhead acetate
- 1 large sheet of butcher or chart paper
- Glue or glue sticks
- Markers, crayons, or colored pencils for each team of students

6. Show the overhead of the *Model Family Tree* and discuss its organization as shown below.



7. Post the large sheet of butcher or chart paper in an accessible location. Have each student team place their horse on the paper in the appropriate location to form a family tree. Ask the team to describe their horse's traits. Have students draw lines between the horses as appropriate to show lines of descent between generations.
8. As a class, discuss the similarities and differences in traits among the family members and how each trait might have been inherited. Point out to students that traits are inherited from both parents. However, these traits are not always expressed in every generation (such as the blue eyes that Paint and his maternal grandmother have).
9. Additional questions for discussion:
- What traits were unique to Paint?
 - If another animal were chosen would you be able to determine from which parent its traits may have been inherited? How would you do it?
 - Can you name other inherited traits that may not be visible?

Curriculum Extensions

Science –

- Invite a horse breeder as a guest speaker to talk about different types of horses and characteristics they all have that are the same and different. (ILOs 2, 3, 5)

Assessment Suggestions

- From which relatives did Paint get the black on his tail and mane?
- From which relatives did Paint get his white face?
- From which relatives did Paint get his temperament?

Reference to Assessment Section:

	Multiple Choice	Constructive Response	Performance Test
Unit Test	1, 2, 5	1, 2	Raising Seeds

Paint's Family Tree

Heather, Jose, Zamen and Kuan are studying heredity in their fifth grade science class. They have been assigned, as a team, to investigate and report on the family traits of an animal one of them owns. They have decided to learn about Kuan's horse Paint, and have met at her family's ranch.

Kuan: Lots of horses are almost all one color on their faces, bodies, legs and even their manes and tails. Here's my horse Paint. I like him because he has areas of white that make him unique. What traits do you see that he has?

Zamen: His body is black with white patches and he has white legs.

Kuan: Right. He's called a pinto.

Jose: His tail is white with a black tip. His mane is white with a black forelock, which is the part that hangs down on his forehead.

Heather: His face is all white, but his ears are black.

Kuan: A white face is called a "bald" face on horses.

Zamen: His eyes are blue.

Kuan: One thing you can't see by looking at him is his well-mannered but lively personality.

Jose: Kuan, do you know who Paint's mother and father are?

Kuan: Yes, his mother is right over there. Her name is "Fancy Lady."

Heather: Her body, face, and mane are black, but she has white legs.

Zamen: Her tail is white with a black tip.

Jose: She has brown eyes. What's her personality like, Kuan?

Kuan: She is very gentle.

Heather: Who is Paint's father, Kuan?

Kuan: His father is "Blazing Away." He's in the separate pasture over there. He's a very calm horse.

Jose: Blazing Away is a different color. He's a light reddish brown.

Kuan: That color is called corral.

Jose: His mane and tail are the same color as his body.

Heather: He has a white stripe on his sorrel face that runs between his eyes down to his nose.

Kuan: That white stripe is called a blaze.

Heather: Oh! That's how he got his name!

Zamen: He has brown eyes, just like Paint's mother. That's a surprise, since Paint's eyes are blue.

Kuan: Yes, blue eyes are a trait that appears and disappears in Paint's family tree. His Grandparents are getting rather old, but we're lucky to still have all four of them. His father's mother is "Pretty Gal." She's over there under the tree.

Jose: She's dark red with a black mane and tail.

Zamen: Her legs are black except that she looks like she's wearing little white socks. She has brown eyes too.

Kuan: She's very gentle. But Paint's father's father is a bit wild and difficult to work with. His name is "Daredevil," and he's in the pasture with Paint's father.

Heather: He's a sorrel with white socks only on his hind legs.

Zamen: He has brown eyes, too, just like most of the horses in Paint's family tree.

Jose: What about Paint's grandparents on his mother's side?

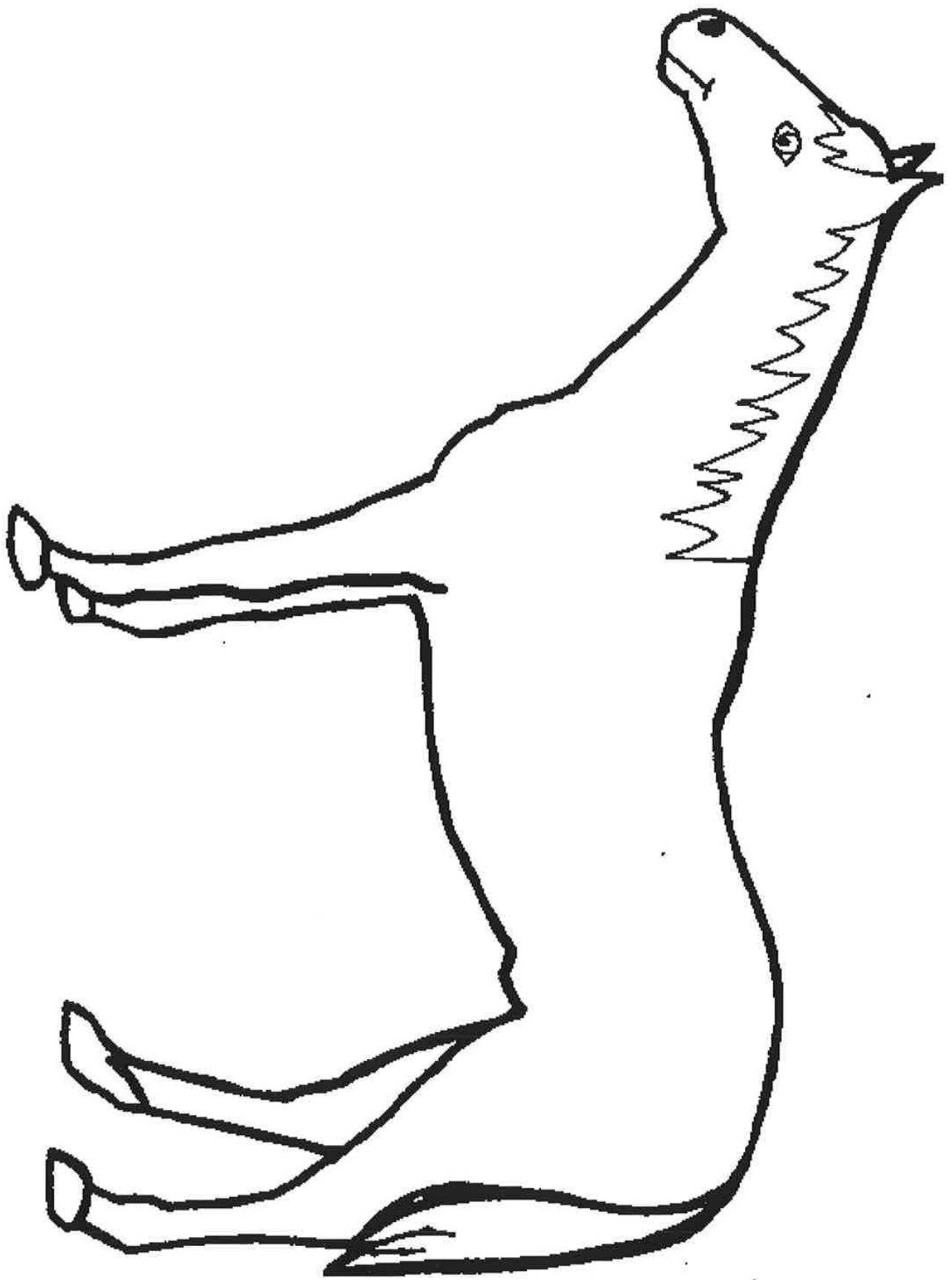
Kuan: Paint's mother's mother is right over there. Her name is "Spotted Beauty." We liked to ride her when we were younger because she was so gentle.

Jose: Her body is black with white patches, and she has a black mane and tail.

Heather: She has a white face and four white legs.

Kuan: High Stepper" is the father of Paint's mother. He's also very gentle.

Zamen: He's a sorrel with four white socks on his lower legs.



Name _____

TRAIT SUMMARY FOR PAINT'S RELATIVES

As you listen and read the skit, fill in the charts below with as many facts as you can about the traits of Paint and his relatives.

Trait	Paint	Mother	Father
Horse's name			
Body color			
Face color			
Leg color			
Tail color			
Mane color			
Eye color			
Temperament			

Trait	Father's Mother	Father's Father	Mother's Mother	Mother's Father
Horse's name				
Body color				
Face Color				
Leg color				
Tail color				
Mane color				
Eye color				
Temperament				

PAINT'S RELATIVES TRAIT SHEET

Key

Note: Traits in parentheses are inferred from the information presented in the skit.

Trait	Paint	Mother	Father
Horse's name	Paint	Fancy Lady	Blazing Away
Body color	Black	Black	Sorrel-light reddish brown
Face Color	White, black ears	Black	Sorrel with white blaze
Leg color	White	White	(Sorrel)
Tail color	White, black tip	White, black tip	Sorrel
Mane color	White, black forelock	Black	Sorrel
Eye color	Blue	Brown	Brown
Temperament	Well-mannered and lively	Gentle	Calm

Trait	Father's Mother	Father's Father	Mother's Mother	Mother's Father
Horse's name	Pretty Gal	Daredevil	Spotted Beauty	High Stepper
Body color	Dark Red	Sorrel	Black with white patches	Sorrel
Face Color	Dark Red	Sorrell	White	Sorrel
Leg color	Black with 4 white socks	Sorrel with white socks on hind legs	White	Sorrel with 4 white socks
Tail color	Black	Sorrel	Black	Sorrel
Mane color	Black	Sorrel	Black	Sorrel
Eye color	Brown	Brown	Blue	Brown
Temperament	Gentle	Wild	Gentle	Gentle

Model Family Tree

