

## PHENOMENA, DRIVING QUESTIONS AND SEPUP STORYLINE

### REPRODUCTION

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**Unit Issue:** The use of genetic information to make medical and health-related decisions.

**Anchoring Phenomenon:** Most people have features more like their biological relatives than most other people, but even within a family, each person is unique. Examples explored include physical traits like eye color, genetic conditions like Marfan syndrome, the role of genes and the environment, and behavioral traits in humans and model organisms. Students generate and answer questions such as: What explains the similarities and differences between related individuals, from parents, to siblings, to identical twins?

Investigative Phenomena	Driving Questions	Guiding Questions	Activities	PE	Storyline
Some health conditions can be passed from parents to offspring.	What determines whether a person will have a genetic condition and how they will be affected?	What questions should Joe ask his doctor and the genetic counselor? (Activity 1)	1*, 14*	MS-LS3-2	What does an individual with a genetic condition need to know about the science related to their condition?
Organisms tend to resemble their biological relatives, yet each individual is unique.	How do organisms inherit traits from their biological parents?	How are simple inherited traits passed from parents to their offspring and then to the next generation? (Activity 2)	1*, 2, 3*, 4, 5, 6, 8*, 9*	MS-LS3-2	In some way, information is passed from parents to offspring.
		What do cells have to do with sexual and asexual reproduction? (Activity 3)			Cells transmit the genetic information that determines traits to offspring cells.
		What happens when two parents with different traits have offspring? Why? (Activity 4)			Patterns can be observed in the offspring from a cross, and these patterns provide evidence of how genes are passed on and interact.
		How can we model and predict the ratios of traits observed in the offspring of parents with two versions of a trait? (Activity 5)			We can use models to predict the ratios of traits in offspring.
		What causes the patterns that can be observed when two parents with different traits have offspring? (Activity 6)			Similar patterns of inheritance have been found for many traits in a variety of organisms, and are useful in understanding heredity.

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## REPRODUCTION (continued)

Investigative Phenomena	Driving Questions	Guiding Questions	Activities	PE	Storyline
Even genetically identical organisms aren't exactly the same.	What other factors besides genes cause the differences between genetically related organisms?	How do sex cells transmit genetic information for determining traits to their offspring? (Activity 8)			The location of genetic information on chromosomes, and the behavior of chromosomes during formation of eggs and sperm, explain the patterns of inheritance observed for many traits.
		What causes variation between offspring of the same parents? (Activity 9)			In addition to differences in genes inherited from parents, environmental differences can lead to variation.
Specialized structures and behaviors are important for organisms to survive and reproduce.	How do inherited behaviors and structures increase the likelihood of successful reproduction?	What causes the differences between genetically identical organisms? (Activity 7)	1*, 7, 9*	MS-LS1-5	Environmental factors can lead to differences between organisms, even when those organisms share the same genetic information.
		What causes variation between offspring of the same parents? (Activity 9)			Both genetic and environmental factors can cause variation.
		How do animal behaviors and other traits affect the probability of successful reproduction? (Activity 10)	9*, 10, 11	MS-LS1-4	Genetic factors can affect traits, including animal behavior and structures, needed for successful reproduction of animals.

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### REPRODUCTION (continued)

Investigative Phenomena	Driving Questions	Guiding Questions	Activities	PE	Storyline
		How do specialized plant structures and traits affect the probability of successful reproduction in plants? (Activity 11)			Genetic factors can affect traits, including animal behaviors and animal and plant structural features (including plant color and scent and animals' ability to detect color and scent), needed for successful reproduction of plants.
Mutations can cause changes in an organism's structure and function, including the changes observed in hereditary health conditions.	How do mutations cause changes?	How does a gene produce a trait? (Activity 12)	1*, 3*, 8*, 12, 13, 14*	MS-LS3-1	A gene codes for a protein, and the structure of that protein is important for proper function. In Marfan syndrome, the gene affects a protein called fibrillin.
		How can a change in a gene, like the gene linked to Marfan syndrome, lead to a change in the function of a person's body? (Activity 13)			A change in a gene can change the structure and function of a protein, such as fibrillin. This explains how the gene affects a person's body.
Some health conditions can be passed from parents to offspring.	What determines whether a person will have a genetic condition and how they will be affected?	What have you learned that could help Joe understand and make choices about his situation if he does have Marfan syndrome? (Activity 14)	1*, 14*	MS-LS3-2	Understanding how genetic and environmental factors interact helps people understand and manage genetic conditions.

\* This activity relates to multiple phenomena and driving questions in the unit and appears in more than one position in this table.