

Copy or Combine

Models show how alleles move from parents to offspring.

MS-LS3-2 "Develop and use a model to describe why asexual reproduction results in offspring with identical genetic information and sexual reproduction results in offspring with genetic variation..."

NAME _____

DATE _____

1 READ AND MARK _____ Read it twice

YOUR JOB Underline each phrase that explains how genetic information moves from parent or parents to offspring. Circle the sentences that explain why copying usually leads to sameness or combining alleles can lead to variation.

Two Ways to Make Offspring

- ① Some strawberry plants grow new plants from runners, thin stems that extend across the ground. A runner can form a new plant without a second parent. In a model, draw one parent plant with two copies of each gene, then show a runner cell copying its DNA before the new plant grows. The new plant receives a copied set of genetic information from that one parent. Because the information is copied, the parent and offspring usually have the same gene versions, called alleles. A DNA copying mistake, or mutation, can create a difference.
- ② Sexual reproduction begins when two parents each make sex cells, such as eggs or sperm. Each sex cell carries one allele for a gene, not the pair found in most body cells. During meiosis, alleles are separated into different sex cells. Fertilization joins one sex cell from each parent, so an offspring gets one allele from each. A Punnett square can model these possible combinations. For example, if one parent can pass B or b and the other can pass B or b, the square shows BB, Bb, bB, and bb.
- ③ The two symbols Bb and bB both represent an offspring with one B allele and one b allele, even though the order is written differently. A model can group them as the same genetic combination. The Punnett square predicts possible offspring. Sexual reproduction creates variation because different sex cells can carry different alleles and fertilization can join them in several combinations. Asexual reproduction does not mix alleles from two parents. Comparing the two models helps explain the cause: copying one parent's DNA usually preserves information, while combining parental alleles creates new combinations.

2 ANSWER WITH EVIDENCE _____ Use the passage

1 What would you draw in an asexual reproduction model to show why a strawberry offspring usually has the same genetic information as its parent?

2 What happens to alleles during meiosis, and what happens during fertilization?

3 Use the Punnett square described in paragraph 2. After grouping Bb and bB as the same combination, how many different genetic combinations are possible? Name them.

4 How does the passage explain the cause of genetic variation in sexual reproduction compared with asexual reproduction?

3 YOUR TURN _____ Your own words

Choose a gene with alleles A and a. Draw an asexual model showing one parent and one offspring, then draw a Punnett square for two parents. Label how alleles move, and write two cause-and-effect sentences explaining why the first model usually keeps genetic information the same and the second can produce variation.

PART 1 • READ AND MARK

Underline each phrase that explains how genetic information moves from parent or parents to offspring. Circle the sentences that explain why copying usually leads to sameness or combining alleles can lead to variation. Accept any marking that follows this job and points at the right text.

PART 2 • ANSWERS

#	QUESTION	ANSWER
1	What would you draw in an asexual reproduction model to show why a strawberry offspring usually has the same genetic information as its parent?	Draw one parent, a cell copying its DNA, and one offspring receiving the copied set of alleles from that parent.
2	What happens to alleles during meiosis, and what happens during fertilization?	During meiosis, alleles are separated into different sex cells. During fertilization, one sex cell from each parent joins, giving the offspring one allele from each parent.
3	Use the Punnett square described in paragraph 2. After grouping Bb and bB as the same combination, how many different genetic combinations are possible? Name them.	Three combinations are possible: BB, Bb, and bb.
4	How does the passage explain the cause of genetic variation in sexual reproduction compared with asexual reproduction?	Sexual reproduction can combine different alleles from two parents in several ways. Asexual reproduction copies genetic information from one parent and does not mix alleles from two parents.

PART 3 • YOUR TURN (SAMPLE ANSWER)

Asexual model: parent Aa → DNA copied → offspring Aa. Sexual model: Parent 1 Aa gives A or a; Parent 2 aa gives a or a. a a Aa Aa a aa aa Because the asexual offspring receives a copied set of DNA from one parent, it usually has the same alleles, Aa. Because sexual offspring can receive A or a from Parent 1 and a from Parent 2, fertilization can produce Aa or aa, creating variation.

Accept accurate labeled diagrams that show copied alleles from one parent in the asexual model and one allele from each parent in the sexual model. Accept different allele letters or parent genotypes if the explanation correctly connects copying to sameness and allele combinations to variation.