# Moth Wing Mystery

Trace inherited alleles to explain differences between offspring.

**7.11** "Develop and use models to demonstrate how genetic variations between parents and offspring result from differences in inherited genes located on chromosomes."

NAME _____ DATE _____

## 1 READ AND MARK

Read it twice

**YOUR JOB** Underline sentences that explain how chromosome-carried alleles pass from parents to young moths, and circle the four allele pairings in the last paragraph to track the cause of different wing patterns.

### How Can Two Speckled Moths Have a Plain-Winged Young Moth?

1. At a school greenhouse, two fictional moths have speckled wings. Their wing pattern makes a useful model of inheritance. In this simple model, a gene for wing pattern sits at the same place on each of two matching chromosomes. Each parent has two versions, or alleles, of the gene: S for speckles and s for plain wings. A moth with SS or Ss has speckled wings because S is dominant. A moth with ss has plain wings. Real wing patterns can involve many genes, but this one-gene model helps us trace inheritance.

2. Both greenhouse parents have Ss. One parent's matching chromosomes carry S and s, and the other parent's matching chromosomes carry S and s, too. During the formation of egg or sperm cells, the chromosome pair separates. Each egg or sperm receives one chromosome from that pair, carrying either S or s. At fertilization, an egg and a sperm join. The young moth then has two alleles for wing pattern, one from each parent. The parents' speckled wings do not tell us which allele each will pass on.

3. To model the possible young moths, write S and s as choices from the egg parent and S and s as choices from the sperm parent. Pair each egg choice with each sperm choice. The four pairings are SS, Ss, sS, and ss. Ss and sS describe the same allele combination, even though the letters came from different parents. Three pairings lead to speckled wings, while one leads to plain wings. A plain-winged young moth can appear even when both parents have speckled wings because each parent can pass on s.

## 2 ANSWER WITH EVIDENCE

Use the passage

1. An egg carries s. Which two allele pairs could result, depending on the sperm's allele, and what wing pattern would each show?

2. A young moth has SS. Which allele did each parent pass on, and what wing pattern results?

3. Why can two Ss parents have a plain-winged young moth even though neither parent has plain wings?

4. The four pairings include Ss and sS. Why do these pairings produce the same wing pattern?

## 3 YOUR TURN

Your own words

In a fictional fish species, F gives striped fins and is dominant to f, which gives plain fins. Model a cross between an Ff parent and an ff parent: list every different offspring allele pair, show which allele comes from each parent's chromosome, name each fin pattern, and explain how inheritance causes the difference.

**ANSWER KEY** # Moth Wing Mystery

**GRADE 7 · 7.11**

## PART 1 · READ AND MARK

Underline sentences that explain how chromosome-carried alleles pass from parents to young moths, and circle the four allele pairings in the last paragraph to track the cause of different wing patterns. Accept any marking that follows this job and points at the right text.

## PART 2 · ANSWERS

| # | QUESTION | ANSWER |
|---|---|---|
| 1 | An egg carries s. Which two allele pairs could result, depending on the sperm's allele, and what wing pattern would each show? | **S from the sperm makes sS, with speckled wings. s from the sperm makes ss, with plain wings.** |
| 2 | A young moth has SS. Which allele did each parent pass on, and what wing pattern results? | **Each parent passed on S. The young moth has speckled wings.** |
| 3 | Why can two Ss parents have a plain-winged young moth even though neither parent has plain wings? | **Each parent can pass on s. A young moth that inherits s from both parents has ss and plain wings.** |
| 4 | The four pairings include Ss and sS. Why do these pairings produce the same wing pattern? | **Both contain one dominant S allele and one s allele, so both produce speckled wings.** |

## PART 3 · YOUR TURN (SAMPLE ANSWER)

The Ff parent can pass on F or f, while the ff parent can pass on only f. F from the first parent and f from the second make Ff, which has striped fins. f from each parent makes ff, which has plain fins. The offspring differ because they inherit different chromosome-carried alleles from the Ff parent.

Accept sS or Ss for the same allele combination when parent sources are clear. In Part 3, look for both possible offspring pairs, correct parent sources, and a link between inherited alleles and fin patterns.