LESSON MAKER PRO

Predict the Traits

Use probability to make sense of inheritance data.

HIGH SCHOOL · GEN.4

GEN.4 "Students will analyze and interpret data collected from probability calculations to explain the inheritance of traits within a population..."

NAME _____ DATE _____

FROM GENES TO CHANCES

Each parent passes one allele for each gene to an offspring. List the possible allele pairs, then use their frequencies to predict a genotype or phenotype. For two independently assorting genes, multiply the probability of each trait to find the probability of both traits together.

WORKED EXAMPLE

In beetles, D gives a dark shell and is dominant to d. If two Dd beetles have 12 offspring, how many are expected to have dark shells?

POSSIBLE OFFSPRING

	D	d
D	DD	Dd
d	Dd	dd

1. Three of the four possible allele pairs give dark shells.
2. The probability of a dark shell is 3/4.
3. 12 × 3/4 = 9.

Answer: 9 offspring

PRACTICE 4 problems

1 C gives a curled tail and is dominant to c. For Cc × cc, how many of 20 offspring are expected to have curled tails?

ANSWER _____

2 B is dominant to b. For Bb × Bb, how many of 32 offspring are expected to have the recessive phenotype?

ANSWER _____

3 For Aa × Aa, how many of 28 offspring are expected to have the genotype Aa?

ANSWER _____

4 For Ee × Ee, what is the expected genotype ratio EE:Ee:ee?

ANSWER _____

APPLY IT Show your work

1 A school greenhouse crosses two Pp plants. Purple flowers (P) are dominant to white flowers (p). Of 40 new plants, how many are expected to have purple flowers, and how many are expected to have white flowers?

WORK SPACE

ANSWER _____

2 A garden club crosses two CcSs plants. Colored seeds (C) are dominant to pale seeds (c), and smooth seeds (S) are dominant to wrinkled seeds (s). The genes assort independently. Among 64 seeds, how many pale, smooth seeds are expected? How does that compare with the observed count in the table?

OBSERVED SEEDS

Phenotype	Count
Colored, smooth	35
Colored, wrinkled	13
Pale, smooth	11
Pale, wrinkled	5

ANSWER _____

CHALLENGE One step up

Two AaBb plants are crossed. A and B are dominant, and the genes assort independently. Of 160 offspring, how many are expected to show the recessive phenotype for at least one trait? Show how you found the probability.

WORK SPACE AND ANSWER

Predict the Traits

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	C gives a curled tail and is dominant to c. For Cc × cc, how many of 20 offspring are expected to have curled tails?	**10 offspring**
2	B is dominant to b. For Bb × Bb, how many of 32 offspring are expected to have the recessive phenotype?	**8 offspring**
3	For Aa × Aa, how many of 28 offspring are expected to have the genotype Aa?	**14 offspring**
4	For Ee × Ee, what is the expected genotype ratio EE:Ee:ee?	**1:2:1**

PART 2 · APPLY IT

1. **30 purple; 10 white** A Pp × Pp cross gives purple with probability 3/4 and white with probability 1/4. Multiply each probability by 40.
2. **12 expected; 1 more than observed** The probability of pale is 1/4, and the probability of smooth is 3/4. Multiply 1/4 × 3/4 × 64 to get 12, then compare it with the observed count of 11.

CHALLENGE

70 offspring. The probability of showing both dominant phenotypes is 3/4 × 3/4 = 9/16, so the probability of at least one recessive phenotype is 7/16. Then 160 × 7/16 = 70.

Accept equivalent fraction-based work. Expected counts are probability predictions, so observed counts may differ.