LESSON MAKER PRO

Trait Chance Check

Use probability to predict trait patterns.

HIGH SCHOOL · HS-LS3-3

HS-LS3-3 "Apply concepts of statistics and probability to explain the variation and distribution of expressed traits in a population. Clarification Statement: Emphasis is on the use of mathematics to describe the probability of traits as it relates..."

NAME _____ DATE _____

PREDICTING TRAITS

For equally likely offspring, probability equals favorable outcomes divided by total outcomes. Multiply a probability by the number of individuals to predict a distribution, then compare groups to identify possible environmental effects.

WORKED EXAMPLE

In a cross Aa x Aa, A causes a dominant trait. Predict how many of 16 offspring will show the dominant trait.

1. Possible genotypes: AA, Aa, Aa, aa.
2. 3/4 show the dominant trait.
3. 16 x 3/4 = 12.

Answer: 12 offspring

PRACTICE 5 problems

1 R is dominant. For Rr x rr, what is the probability of the dominant trait?

ANSWER _____

2 In Kk x Kk, how many of 28 offspring are predicted to show the recessive trait?

ANSWER _____

3 A survey finds that 10 of 30 plants express a trait. What is the observed fraction in simplest form?

ANSWER _____

4 Two groups of cloned plants differ only in temperature. Their mean heights are 14 cm and 19 cm. What is the difference, and what factor likely affects height?

ANSWER _____

5 N is dominant. In Nn x nn, how many of 36 offspring are predicted to show the dominant trait?

ANSWER _____

APPLY IT Show your work

1 A school garden club crosses Pp x pp pepper plants, where P gives purple stems. The club plants 40 seeds, with 20 seeds in each equally watered bed. How many purple-stem seedlings are predicted altogether? Bed A has 11 purple-stem seedlings and Bed B has 9. Does this show a clear difference in the observed distribution between beds?

WORK SPACE

ANSWER _____

2 A student team tests LED lights for an indoor garden fundraiser. They grow genetically identical cuttings, 14 under each light. Under Light A, 10 reach 15 cm. Under Light B, 4 reach 15 cm. What fraction reaches 15 cm under each light, and which factor most likely explains the difference?

WORK SPACE

ANSWER _____

CHALLENGE One step up

CHALLENGE

In a cross Tt x tt, 1/2 of seedlings are expected to have at least one T allele. During drought, only 2/3 of seedlings with at least one T allele express waxy leaves. Out of 48 seedlings grown during drought, how many are predicted to express waxy leaves? Explain with a calculation.

_____

_____

ANSWER KEY

Trait Chance Check

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	R is dominant. For Rr x rr, what is the probability of the dominant trait?	**1/2**
2	In Kk x Kk, how many of 28 offspring are predicted to show the recessive trait?	**7 offspring**
3	A survey finds that 10 of 30 plants express a trait. What is the observed fraction in simplest form?	**1/3**
4	Two groups of cloned plants differ only in temperature. Their mean heights are 14 cm and 19 cm. What is the difference, and what factor likely affects height?	**5 cm; temperature likely affects height.**
5	N is dominant. In Nn x nn, how many of 36 offspring are predicted to show the dominant trait?	**18 offspring**

PART 2 · APPLY IT

1. **20 predicted; no clear difference is shown.** The cross predicts 1/2 purple stems, so 40 x 1/2 = 20. Each bed is expected to have about 10, and 11 versus 9 is a small difference.
2. **Light A: 5/7; Light B: 2/7; the light environment most likely explains the difference.** Simplify 10/14 to 5/7 and 4/14 to 2/7. Because the cuttings are genetically identical, the different light conditions are the likely cause.

CHALLENGE

16 seedlings; 48 x 1/2 x 2/3 = 16.

Accept equivalent fractions. For environmental comparisons, accept answers that identify the controlled environmental difference and avoid claiming that environment changes the inheritance probability.