

Genes, Traits, and Family Clues

Use Punnett squares and a pedigree to find possible genotype and phenotype probabilities.

Name: _____ Date: _____

Part 1 - Punnett Square Probabilities

Listen as your teacher reads the directions. In this fictional beetle model, **S** = spotted shell and **s** = plain shell. One S is enough for spots: SS and Ss are spotted; ss is plain. Each parent gives one allele to an offspring. Fractions show possible outcomes in this model; they do not promise exact results in a small family.

1. Cross Ss x Ss. Write the genotype in each inside cell. Then find the probability of each genotype and phenotype.

	S	s
S		
s		

Genotypes: SS = ____ / 4; Ss = ____ / 4; ss = ____ / 4

Phenotypes: spotted = ____ / 4; plain = ____ / 4

2. Cross Ss x ss. Write the genotype in each inside cell. Then find the probability of each genotype and phenotype.

	s	s
S		
s		

Genotypes: SS = ____ / 4; Ss = ____ / 4; ss = ____ / 4

Phenotypes: spotted = ____ / 4; plain = ____ / 4

Explain: Choose one fraction above. How did the four square cells help you find it?

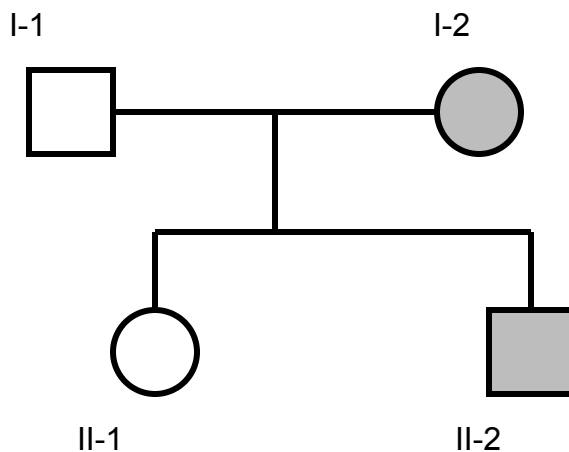
Genes, Traits, and Family Clues

Use Punnett squares and a pedigree to find possible genotype and phenotype probabilities.

Name: _____ Date: _____

Part 2 - Read a Pedigree

In this fictional family model, **T** = tail tuft and **t** = no tail tuft. T is dominant, so TT and Tt have a tail tuft; tt does not. In the pedigree, a square is male, a circle is female, and gray means the trait appears.



3. Use the pedigree evidence. Write every genotype that is possible for each person. Then give a clue from the diagram that supports your choice.

Person	Possible genotype(s)	Pedigree clue
I-1		
I-2		
II-1		
II-2		

4. Why can I-2 not be TT?

Genes, Traits, and Family Clues

Use Punnett squares and a pedigree to find possible genotype and phenotype probabilities.

Answer Key and Teaching Notes

Materials and setup: Supply one printed two-page worksheet and one pencil per student. The worksheet supplies the two blank 2-by-2 Punnett squares, allele assumptions, and pedigree legend. No other materials are needed. Seat students where they can first work independently. Allow about 8 minutes for Part 1 and 7 minutes for Part 2.

Teacher script (read aloud): “Today, capital and lowercase letters stand for allele versions in a simplified model. Fill every Punnett-square cell by combining one allele from the top with one from the side. A genotype is the letter pair. A phenotype is the trait that appears. In the pedigree, use both the shading and family connections as evidence. Write all genotypes that the evidence allows.”

Observation method: While students work, use a clipboard to mark whether each student (a) fills all four cells in each square, (b) keeps genotype letters separate from trait names, and (c) uses the unshaded child as evidence about I-2. Prompt once only: “What does an unshaded person’s genotype have to be in this model?” Do not supply an answer.

1. Ss x Ss cells: SS, Ss, Ss, ss. Genotype probabilities: SS = 1/4, Ss = 2/4, ss = 1/4. Phenotype probabilities: spotted = 3/4; plain = 1/4.

2. Ss x ss cells: Ss, Ss, ss, ss. Genotype probabilities: SS = 0/4, Ss = 2/4, ss = 2/4. Phenotype probabilities: spotted = 2/4; plain = 2/4. Accept equivalent simplified fractions such as 1/2. Explanation should say that each of the four equally modeled cells is counted; for example, “Two of four cells are Ss, so Ss has probability 2/4.”

3. I-1 = tt because he does not show the dominant trait. I-2 = Tt: she shows the trait, and her tt child proves she provided t. II-1 = tt because she does not show the trait. II-2 = Tt: I-1 can provide only t, so the shaded son must receive T from I-2 and t from I-1. Award credit for genotype evidence that is accurate and complete.

4. If I-2 were TT, she could provide only T. With a tt partner, every child would be Tt and show a tail tuft. II-1 is unshaded/tt, so I-2 must carry t.

Source credit: Practice model and pedigree are original instructional content. Standard reference supplied for this task: Florida SC.7.L.16.2, <https://lessonmakerpro.com/standards/fl-science/sc-7-l-16-2>