ANSWER KEY.

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Non-Mendelian Inheritance

Biology | ANSWER KEY

Show your work in the blank space. Write probabilities as fractions.

1. Classify each scenario as complete dominance, incomplete dominance, or codominance.

Scenario	Type of inheritance
Red and white flowers cross. All offspring have pink flowers.	
Two heterozygous tall plants cross. Offspring are about 3 tall : 1 short.	
A red cow and a white cow have a calf with red and white hairs mixed together.	

Row 1: incomplete dominance. Row 2: complete dominance. Row 3: codominance.

2. In snapdragons, R = red and W = white, and RW flowers are pink. Two pink plants are crossed.

(a) Draw the Punnett square and give the genotype ratio.

(b) What fraction of the offspring are pink?

(c) Out of 200 offspring, about how many are pink?

(a) RW x RW gives RR, RW, RW, WW: **1 RR : 2 RW : 1 WW**.

(b) 1/2 are pink.

(c) 1/2 x 200 = **100 pink plants**.

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3. Blood type is controlled by three alleles: I^A, I^B, and i. I^A and I^B are both dominant over i, and a person with I^A I^B has type AB. A parent with genotype I^A I^B has a child with a parent of genotype ii.

(a) List the possible blood types of the child and the probability of each.

(b) A different couple has a child with type O. Can either parent have type AB? Explain.

(a) I^A I^B x ii gives I^Ai and I^Bi. **Type A: 1/2. Type B: 1/2.**

(b) No. A child with type O has genotype ii, so each parent gave an i. A person with type AB (I^A I^B) has no i allele to give.

4. Heterozygous parents produce offspring in the ratio 1 : 2 : 1 for three phenotypes.

(a) Does this ratio show complete dominance? Explain what ratio you would see instead.

(b) Roan cattle (RW) show both red hairs and white hairs. Explain why this is codominance, not incomplete dominance.

(a) No. Complete dominance gives 3 : 1 with two phenotypes. A 1 : 2 : 1 ratio with three phenotypes means the heterozygote looks different from both homozygotes.

(b) In codominance both alleles are expressed fully and separately: each hair is red or white. In incomplete dominance the heterozygote shows a blend, such as pink.

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