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Mixed Genetics Practice Problems

Part of the difficulty of this unit is knowing what type of problems you are being asked to solve and being able to solve it correctly. The following problems are a mix of basic genetic, incomplete dominance, codominance, and dihybrid crosses. Complete each of the problems below.

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1. ***In humans the allele for albinism is recessive to the allele for normal skin pigmentation.*** If two heterozygous parents have children, what is the chance that a child will have normal skin pigment? What is the chance that a child will have albinism?

Normal pigment? \_\_\_\_\_\_\_\_\_\_\_\_ %

Albinism? \_\_\_\_\_\_\_\_\_\_\_\_ %

2. ***In pea plants, the green allele (G) is dominant over the yellow color allele (g) for seed color and tall (T) is the dominant allele in plant height over short (t).*** Parent pea plants, both heterozygous for both traits, are cross-pollinated. Determine the frequency for the four different phenotypes of the offspring.

**Parent genotypes: \_\_\_\_\_\_\_\_\_\_\_ x \_\_\_\_\_\_\_\_\_\_\_**

Green seeds, tall plant:\_\_\_\_\_\_\_\_\_\_\_\_

Green seeds, short plant:\_\_\_\_\_\_\_\_\_\_\_\_

Yellow seeds, tall plant:\_\_\_\_\_\_\_\_\_\_\_

Yellow seeds, short plant:\_\_\_\_\_\_\_\_\_\_\_

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3. ***Pure-breeding red radishes crossed with pure-breeding white radishes make pink radishes.*** What are the genotypic and phenotypic ratios when you cross pink radish with a white radish?

**This is an example of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ inheritance.**

Genotype Ratio?\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Phenotype Ratio?\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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4. ***In certain fish, red and blue fish when mated create offspring with a patchwork of blue AND red scales.*** What would be the genotypic and phenotypic probabilities for a cross between a blue fish and a fish with patchwork red/blue scales?

**This is an example of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ inheritance.**

What percentage of the fish will be red?\_\_\_\_\_\_\_\_\_ %

What percentage of the fish will be blue?\_\_\_\_\_\_\_\_\_ %

What percentage of the fish will be red and blue?\_\_\_\_\_\_\_\_ %

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| Genotypic Ratio?\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Phenotypic Ratio?\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ | Genotypic Ratio?\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Phenotypic Ratio?\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |
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5. ***In seals, long whiskers (W) are dominant over short whiskers (w).*** What is the genotype and phenotype ratio for the offspring from two long-whiskered seals, one that is homozygous and one that is heterozygous?

Genotype Ratio?\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Phenotype Ratio?\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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| Genotypic Ratio?\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Phenotypic Ratio?\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ | Genotypic Ratio?\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Phenotypic Ratio?\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |
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6. ***When pure breeding red cows are bred with pure breeding white cows, the offspring are roan (a pinkish coat color).*** Give the genotype and phenotype probabilities for the cross between a roan cow and a roan bull.

What percentage of the offspring will be red?\_\_\_\_\_\_\_\_\_\_ %

What percentage of the offspring will be white?\_\_\_\_\_\_\_\_\_\_ %

What percentage of the offspring will be roan?\_\_\_\_\_\_\_\_\_\_ %

7. ***In summer squash, white fruit color (W) is dominant over yellow fruit (w) and disk-shaped fruit (D) is dominant over sphere-shaped fruit (d).*** If a squash plant is true-breeding for white, disk-shaped fruit is crossed with a plant true-breeding for yellow, sphere-shaped fruit, determined the frequency of the four different phenotypes.

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|  |  |  | **Genotypes of parents: \_\_\_\_\_\_\_\_\_\_\_ x \_\_\_\_\_\_\_\_\_\_**White, disk-shaped:\_\_\_\_\_\_\_\_\_\_ %White, sphere:\_\_\_\_\_\_\_\_\_\_\_ %Yellow, disk-shaped:\_\_\_\_\_\_\_\_\_ %Yellow, sphere:\_\_\_\_\_\_\_\_ % |
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8. ***Saguaro cacti have two L-shaped arms, one on each side. Having both arms the same length (A) is dominant over having two different length arms (a).*** A cactus that is homozygous for same length arms is crossed with a cactus with different length arms. What is the probability of having a cactus with these two phenotypes?

Same length arms?\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Different length arms?\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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9. ***Lubber grasshoppers are black with either red stripes, yellow stripes, or red AND yellow stripes.*** A red-striped grasshopper is crossed with red & yellow striped grasshopper. List the genotypic and phenotypic ratios for this cross.

**This is an example of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ inheritance.**

Genotypic ratio:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Phenotypic ratio:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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