

## GENETICS PROBLEMS SET 2

- 1) For peaches and nectarines, the gene for fuzzy skin is dominant to the gene for smooth skin (resulting in peaches and nectarines, respectively). Two trees with fuzzy fruit are crossed and the offspring were in a ratio of 942 fuzzy to 298 smooth. What are the genotypes of the parents?
- 2) Alvin has free earlobes (caused by a dominant gene) and is unable to taste PTC (ability to taste is dominant). Alvin's father had attached earlobes. Alvin marries Katrina, who has free earlobes and is a taster of PTC (homozygous for both traits). Will all of their children be tasters? Will the children all have free earlobes? Could they expect a child with attached earlobes who is a taster?
- 3) You are a PTC taster, your brother is not, your father is, your mother is not. What is your genotype for this trait?
- 4) Tallness in a particular plant is caused by a dominant allele, the flower color is determined by genes which exhibit incomplete dominance (resulting in the colors purple, lavender, and white). A tall, purple-flowered plant (heterozygous for height) is crossed with a tall, lavender-flowered plant (also heterozygous for height). What is the genotypic ratio of the offspring? What is the phenotypic ratio? Are there any two offspring from this cross that could produce short, white flowered plants?
- 5) Olga is married for the second time. Her first husband was blood type A and their child was type O. Her new husband is blood type B and their child is blood type AB. What is Olga's blood type and genotype?
- 6) Is it possible for a type O woman to have a type A child? Is it possible for a type B woman to have a type A child? Is it possible for a type O man to have a type AB child?
- 7) A woman has parents with normal color vision and a red-green colorblind brother. She marries a colorblind man and they have a colorblind daughter. What is the probability that a son will also be colorblind?
- 8) In leghorn chickens, colored feathers are due to a dominant gene, C, and white feathers due to the recessive allele, c. The presence of a dominant gene, P, however, prevents color in feathers from producing an entirely white chicken (the recessive allele (p) has no effect on color). A colored rooster is mated with a white hen and all the chicks (400 so far) are colored. What are the probable genotypes of the parents and the offspring?
- 9) Can two white chickens ever produce a colored offspring? (Show the possible genotypes).

ANSWERS: 1) Ff x Ff 2) yes, yes, no 3) Tt 4) Genotypic ratio = 1 TTPP: 2 TtPP: 1 TTPP': 1 ttPP'; 1 ttPP' phenotypic ratio = 3 tall purple: 3 tall lavender: 1 short purple: 1 short lavender YES - TtPP' x ttPP' 5) I<sup>A</sup>i, type A 6) yes, yes, no 7) 50% 8) Rooster is CCpp, hen is ccpp, offspring are CcPp 9) Possibilities = CCPp x ccpp, CcPp x ccpp, CcPp x CCPp

Parent Genotypes	Possible Gametes	Punnett Square	Typical Question
♀ LI ♂ LL			Genotypic ratio
♀ BB ♂ bb			% offspring BB
♀ AADD ♂ aaDD			% offspring AaDD
♀ RrGg ♂ rrgg			Genotypic ratio
♀ FfEe ♂ Ffee			Genotypic ratio
♀ BbQq ♂ BbQq			% offspring Bbqq