Name _____   Period _____

AP Biology   Date _____

GENETICS PRACTICE 1: BASIC MENDELIAN GENETICS

Solve these genetics problems. Be sure to complete the Punnett square to show how you derived your solution.

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

	A	**a**
A	**AA**	**Aa**
a	**Aa**	**aa**

normal pigment:

75% chance of AA & Aa

albino:

25% chance of aa

   a. **If the child is normal**, what is the chance that it is a carrier (heterozygous) for the albino allele? (***CAREFUL!***) _____ **2/3 or 67%** _____

2. In purple people eaters, one-horn is dominant and no horns is recessive. Show the cross of a purple people eater that is heterozygous for horns with a purple people eater that does not have horns. Summarize the genotypes & phenotypes of the possible offspring?

	H	**h**
h	**Hh**	**hh**
h	**Hh**	**hh**

50% chance of Hh (horned)

50% chance of hh (no horn)

3. In humans, the brown-eye (B) allele is dominant to the blue-eye allele (b). If two heterozygotes mate, what will be the likely genotype and phenotype ratios of the offspring.

	B	**b**
B	**BB**	**Bb**
b	**Bb**	**bb**

75% chance of brown-eyed

25% chance of blue-eyed

25% chance of BB

50% chance of Bb

25% chance of bb

4. In seals, the gene for the length of the whiskers has two alleles. The dominant allele (W) codes long whiskers & the recessive allele (*w*) codes for short whiskers. What percentage of offspring would be expected to have short whiskers from the cross of two long-whiskered seals, one that is homozygous dominant and one that is heterozygous?

	W	***w***
W	**WW**	**W*w***
W	**WW**	**W*w***

0% chance of short whiskers

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

	GT	**Gt**	**gT**	**gt**
GT	**GGTT**	**GGTt**	**GgTT**	**GgTt**
Gt	**GGTt**	**GGtt**	**GgTt**	**Ggtt**
gT	**GgTT**	**GgTt**	**ggTT**	**ggTt**
gt	**GgTt**	**Ggtt**	**ggTt**	**ggtt**

Tall plant, green seeds:
9/16

Tall plant, yellow seeds:
3/16

Short plant, green seeds:
3/16

Short plant, yellow seeds:
1/16

6. Now let's try a shortcut way of solving that same dihybrid cross. Because of Mendel's (2nd) Law of Independent Assortment, you can work with the color gene and the height gene separately… so set up two separate monohybrid crosses from those same parents:

	G	**g**
G	**GG**	**Gg**
g	**Gg**	**gg**

	T	**t**
T	**TT**	**Tt**
t	**Tt**	**tt**

Now use the laws of probability to calculate your frequencies of each trait alone and combined:

	height	color	= P		height	color	= P
Tall plant, green seeds	¾	¾	**9/16**	Short plant, green seeds	¼	¾	**3/16**
Tall plant, yellow seeds	¾	¼	**3/16**	Short plant, yellow seeds	¼	¼	**1/16**