AP Biology **Name** _____

Date _____

Hardy-Weinberg Quick & Easy

Purpose: To present an easy, foolproof approach to calculating square root or square of a percent.

Here's how: When you take the square root of a number, the square root will always be **smaller** than the number.

For example:

The Square root of 81 is _____ The Square root of 36 is _____

The Square root of 64 is _____ The Square root of 16 is _____

BUT when you take the square root of a percent, you are really asking the question: "What % can be multiplied by itself to produce the squared %?"

So:

The Square root of 81% is_____ The Square root of 36% is_____

The Square root of 64% is_____ The Square root of 16% is_____

Notice: The Square root of a % is always a **LARGER %.**

Bottom line: Here is a quick way to calculate square roots of percentages that are "perfect squares":

1. Take the square root of the digits in the percent
2. Add a zero
3. That's it. Try it, it works.

Got it? Good, let's apply that to some Hardy-Weinberg problems

Step 1: Set up the following two equations on a piece of paper:

Gene Pool:

p = _____ + q = _____ = 100% of the genes

Population:

P_2=_____ + 2pq=_____ + q_2=_____ = 100% of the population

Procedure:

1. Start with whatever value you have and work your way around the table.
   Ex. If 70 percent of the genes in the pool are dominant, then put 70% (or .7) in for p. The power of subtraction tells us that q = 30% (or .3). Now, q_2 is equal to 9% (.09), p_2 = 49%(.49) and 2pq = 2(70%)(30%) = 42% (.42)

Am I correct? How can I check? Well, easily: p_2, 2pq and q_2 should equal 100% when I add them up (1.00 if you are playing with decimals). And they do! Man I am smart!

The only thing you can never use to start this process is the 2pq value, because there are 2 variables.

Try some problems:

1. If 16% of the individuals in a population exhibit the recessive appearance, what % of the gene pool is dominant?

2. A population contains individuals, 64% of whom show the recessive trait. What % of the population is pure dominant? What % of the gene pool is recessive? What percent of the population is hybrid?

3. If 20% of the genes in a pool are recessive, what % of the population will be homozygous dominant? Recessive? Hybrid?

4. If 91% of a population shows the dominant phenotype, what % of the population should be hybrid? Should be recessive?

5. If 16 out of 100 individuals show the recessive traits, what % of the population will be hybrid? What % of the gene pool is recessive?

6. If R = 70% of the gene pool, what is the % of hybrid individuals in the population? The % of pure dominant individuals?