

Hardy-Weinberg Practice Worksheet (Dinoflagellates) –optional

1. As part of your graduate studies, you are studying a lab population of diploid dinoflagellates (a type of marine plankton). Spots are a dominant trait in this species; presence or absence of spots is controlled by a single gene with two alleles. There are a total of 200 individuals in this population, and 175 of these individuals have spots.

a. What is the frequency of homozygous recessive individuals in this population? Show all your work. (3 marks)

b. Assume this population is in Hardy-Weinberg equilibrium. Based on this assumption, calculate the frequency of the recessive allele in the population. Show all your work. (2 marks)

Hint: When a population is in H-W equilibrium, if we know that $\text{freq}(a) = p$, then we can assume that $\text{freq}(a/a) = p^2$.

c. Still assuming the population is in H-W equilibrium, what is the frequency of the dominant allele? (2 marks)

Hint: Because there are only two alleles in the population, that means $p + q = 1$.

d. Using the allele frequencies you have calculated above, how many of the 200 individuals in this population should be heterozygotes? (3 marks)

2. After further research, you discover that homozygous dominant individuals have twice as many spots as heterozygous individuals (i.e., spots actually show incomplete dominance instead of complete dominance). Based on this information, you determine that 45 individuals in the population are heterozygotes.
- a. Is this population in Hardy-Weinberg equilibrium with regards to the "spot-or-no-spot" locus? (i.e., does the observed frequency of heterozygotes match the predicted frequency)? Briefly explain your reasoning. (2 marks)

- b.** Are you surprised by this result? Please explain why or why not. Your answer should make reference to the assumptions of the Hardy-Weinberg equilibrium model. (4 marks)

3. You are helping one of your friends with homework from another biology class. They are also learning about population genetics and Hardy-Weinberg equilibrium. This is the question they are working on:

“There are 200 individuals in the population: 20 are homozygous dominant (A/A), 20 are heterozygous (A/a) and 160 are homozygous recessive (a/a). Is this population in Hardy-Weinberg equilibrium with respect to Gene A?

Your friend thinks the population is in HWE. Are they correct? Explain your answer.

