

# Quiz 7 - Evolution: Population Genetics (Hardy Weinberg Equilibrium)

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**Due** Mar 12 at 11:59pm      **Points** 13      **Questions** 7  
**Available** until Mar 13 at 12pm      **Time Limit** 60 Minutes  
**Allowed Attempts** 2

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## Instructions

This quiz asks questions about Hardy-Weinberg Equilibrium and some of the assumptions that must be met for a population to be in HWE for a specific gene.

The relevant textbook pages are pp 470-474. (Frog on cover: 270-274; Stellar Jay on cover: 478-482).

You have 2 attempts at this quiz. The highest marks counts.

You have 60 minutes to complete each quiz

This quiz will remain open until Sunday, March 12 @ 11:59 pm

This quiz was locked Mar 13 at 12pm.

## Attempt History

	Attempt	Time	Score
KEPT	<a href="#">Attempt 2</a>	6 minutes	13 out of 13
LATEST	<a href="#">Attempt 2</a>	6 minutes	13 out of 13
	<a href="#">Attempt 1</a>	11 minutes	11.6 out of 13

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❗ Correct answers are no longer available.


Score for this attempt: **13** out of 13

Submitted Mar 8 at 4:15pm

This attempt took 6 minutes.

<b>Question 1</b>	<b>1 / 1 pts</b>

Watch the first couple of minutes of the Hardy-Weinberg video:

[Solving Hardy Weinberg Problems](http://www.youtube.com/watch?v=xPkOAnK20kw)  (<http://www.youtube.com/watch?v=xPkOAnK20kw>)



(<http://www.youtube.com/watch?v=xPkOAnK20kw>)

What do the red and blue blobs/dots in the video represent?

- ☐ Alleles of a gene of interest in an individual.
- ☒ Alleles of a gene of interest in a population.
- ☐ Individuals in a population.
- ☐  $p$  and  $q$ .

## Question 2

1 / 1 pts

Watch the rest of the video:

<http://www.youtube.com/watch?v=xPkOAnK20kw>   
(<http://www.youtube.com/watch?v=xPkOAnK20kw>)



(<http://www.youtube.com/watch?v=xPkOAnK20kw>)

When showing us how to solve “Hardy Weinberg problems”, the speaker makes a big assumption (which he should have stated, and which you should always state). What is this assumption?

- ☐ He assumes that  $p+q=1$ .

☐ He assumes that 1/4 of the population is homozygous recessive.

☒ He assumes that the population in question is in Hardy-Weinberg equilibrium.

### Question 3

1 / 1 pts

ABO blood types are governed by three alleles of the "I" gene: the I[A] allele, the I[B] allele, and the i allele. People with genotype i/i have blood type O; people with genotypes I[A]/I[A] or I[A]/i have blood type A, people with genotypes I[B]/I[B] or I[B]/i have blood type B, and people genotype I[A]/I[B] have blood type AB.

If the vast majority of people worldwide have blood type O. What can be concluded from this information?

☐ The i allele must be dominant.

☐ The i allele must be advantageous.

☒ The i allele is the most frequent of the three worldwide.

☐ The world population is not in Hardy-Weinberg equilibrium for ABO blood types.

### Question 4

5 / 5 pts

Determine the genotype frequencies in a population at equilibrium where the frequency of the A allele is 0.4. Check all the answers that apply.

☒ AA genotype: 0.16

☐ AA genotype: 0.42

☐ AA genotype: 0.5

☒ aa genotype: 0.36

☐ aa genotype: 0.50

☐ aa genotype: 0.33

☐ Aa genotype: 0.50

☒ Aa genotype: 0.48

☐ Aa genotype: 0.25

### Question 5

2 / 2 pts

What determines the frequency of a particular (and genetically determined) phenotype in a given population? Select all the answers that apply.

☒ The frequency of the alleles controlling that phenotype.

☒ Selection in favour or against the phenotype in question.

☒ Migrations in and out of the population.

☒ Whether individuals mate randomly or not.

### Question 6

2 / 2 pts

The Hardy-Weinberg theorem always works for populations that have

a certain set of characteristics. What are these characteristics?  
Select all the answers that apply.

☒ There is no selection for or against the trait under investigation.

☒  
The trait under investigation is controlled by genes that are not ever subject to mutation.

☒ Mating is random with respect to the trait under investigation.

☐ The frequency of the recessive allele is not zero.

☒  
The population size is so large that genetic drift and migrations do not affect the frequencies of alleles or genotypes.

☒ All individuals have equal fitness with respect to the trait of interest.

Good job, you can recognize the conditions under which the theorem is always applicable!

## Question 7

1 / 1 pts

A population is in equilibrium if...

☐  $p+q=1$

☐  $p^2 + 2pq + q^2 = 1$

☒  
The expected genotypic frequencies calculated assuming equilibrium are equal (or very close to) the observed genotypic frequencies.

☐ There are equal proportions of each genotype.

☐ There are more heterozygotes than homozygotes.

Good work! Make sure you can justify your answers.

Quiz Score: **13** out of 13