

- \_\_\_\_\_ occurs when one lineage splits into two or more groups of organisms.
  - Natural selection
  - Molecular evolution
  - Anagenesis
  - Cladogenesis
- The following information concerning a population of organisms is given below. Find the genotypic frequency of the genotype "bb" represented in the population  
BB- 715 individuals  
Bb- 750 individuals  
bb- 200 individuals
  - 0.12
  - 0.36
  - 0.43
  - 0.45
- What is the allelic frequency of the dominant allele in the population described in question #2?
  - 0.35
  - 0.65
  - 0.43
  - 0.45
- When a geographic barrier splits a population, which eventually results in the formation of two separate species?
  - Sympatric speciation
  - Allopatric speciation
  - Anagenesis
  - Cladogenesis
- What gene is responsible for the formation of the morphogen proteins in body development.
  - Pair-rule genes
  - Homeotic genes
  - Gap genes
  - Egg-polarity genes
- Cancer is caused by a single mutation.
  - True
  - False Knudson's multistep model of cancer
- \_\_\_\_\_ and \_\_\_\_\_ are normally present in cells but are typically mutated in cancer cells.
  - Proto-oncogenes; tumor suppressor genes
  - Oncogenes; tumor suppressor genes
  - Proto-oncogenes; silenced tumor suppressor genes
  - Oncogenes; silenced tumor suppressor genes
- Proto-oncogenes function in \_\_\_\_\_.
  - The onset of cancer
  - Stimulating cell growth and division

- c. Inhibiting cell growth and division –tumor suppressor gene
  - d. Silencing tumor-suppressor genes
9. If a population has an allelic frequency of 0.6 for the allele “A”, and has 4000 alleles total in the population, how many copies of “a” does the population contain?
- a. 800
  - b. 1200
  - c.  $1600 \text{ AF (dom)} + \text{AF (recess)} = 1$  therefore  $0.4 = \text{“a”} / 4000$
  - d. 2400
10. For a continuous trait, typically \_\_\_\_\_ gene(s) are involved.
- a. Discrete
  - b. Nondiscrete
  - c. Multiple
  - d. Single
11. In a normal distribution curve, the majority of individuals exhibit \_\_\_\_\_ phenotypes.
- a. Dominant
  - b. Recessive
  - c. Intermediate
  - d. Extreme
12. The variance of a study
- a. Provides information about the center of a distribution mean
  - b. States how far the data values lie from the center of a distribution
  - c. Estimates the likelihood that the data is correct confidence interval
  - d. Examines if a change in one characteristic is associated with a change in another characteristic correlation
13. Cancer is a disease that would be best described as
- a. A disease in which only genes affect the phenotype of an individual.
  - b. A disease in which only the environment effects the phenotype of an individual.
  - c. A disease in which both genes and the environment play a role in producing the cancer phenotype.
  - d. A disease in which neither genes nor the environment play a role in producing the cancer phenotype.
14. P53 is an example of a(n)\_\_\_\_\_.
- a. Proto-oncogene
  - b. Oncogene
  - c. Tumor suppressor gene
  - d. Tumor suppressor protein
15. Because oncogenes exhibit \_\_\_\_\_ inheritance, most cancer cells typically have \_\_\_\_\_ mutated copy/ copies of the gene.
- a. Dominant; one
  - b. Recessive; two
  - c. Dominant; two
  - d. Recessive; one

16. Which of the following concepts are used to follow genetic variations in DNA sequences.
- Restriction-site variation
  - Microsatellite variation
  - DNA sequencing
  - All of the above
17. The \_\_\_\_\_ effect occurs due to random, dramatic reduction of the size of a population.
- Founder
  - Migratory
  - Bottleneck
  - Allopatric
18. All cancer cells
- Have a mutated version of P53
  - Contain oncogene ras
  - Are malignant
  - Proliferate uncontrollably
19. What is the process of programmed cell death in which DNA is first degraded by caspases and is then engulfed by macrophages?
- Necrosis
  - Apoptosis
  - Autophagy
  - Excitotoxicity
20. Which hypothesis of evolution supports natural selection?
- Neutral-mutation hypothesis
  - Balance hypothesis
  - Both A and B
  - Neither A or B
21. Explain how the development of the flower structures would be affected by the mutation of the following genes.
22. Mutation of A → ONLY stamen and carpel expression
23. Mutation of B → ONLY sepals and carpel expression
24. Mutation of C → ONLY sepals and petals expression

25. Explain the three segmentation genes and their function.

Segmentation Gene	Effect of Mutation
Gap Genes	Delete adjacent segments (maybe deletion of anterior segments)
Pair-rule genes	Delete same part of pattern in every other segment/ alternating segments.
Segment-Polarity genes	Affect polarity of segment; part of segment replaced by mirror image of part of another segment (replace posterior half with anterior half).

26. Give an example of the different modes of speciation that include allopatric speciation and sympatric speciation.

Allopatric- includes a barrier. Maybe animals move to different island.

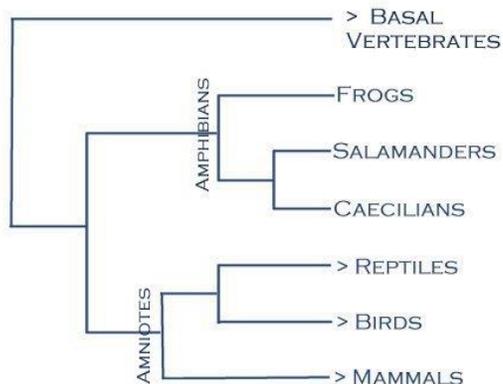
Sympatric- excludes a barrier. Maybe animals mate at different times which allows for the same species to evolves.

27. Explain how both oncogenes and tumor-suppressor genes contribute to cancer.

Proto-oncogenes normally produce factors that stimulate cell division. Mutant alleles (oncogenes) tend to be dominant; one copy of the mutant allele is sufficient to induce excessive cell proliferation.

Tumor-suppressor genes normally produce factors that inhibit cell division. Mutant alleles are recessive (both alleles must be mutated to produce excessive cell proliferation).

28. Explain the following phylogenetic tree using the following terms: clade, common ancestor, node, branches, root, and whatever else you feel will help you accurately explain the purpose of the phylogenetic tree.



Salamanders and caelians are considered considered a clade. Species are the nodes and the lines/relationship is the edges/branches. The root is the ancestor node.

Purpose- to observe relationship between species using genetic variation.