

Biology 1001 Final Exam

Questions

By: The Education Team at Webstraw



Introduction

Hi! Thanks for checking out this Biology 1002 at Western University resource!

The Western biology team at WebStraw has combed through the Biology 1001A course and has come together to present to you this practice final exam. You should save this exam until the end of your studying, so that you can identify gaps in your knowledge and concepts you need to go back and reinforce. The questions are designed to challenge your fundamental understanding of lecture/reading ideas and facilitate your thinking as you apply these concepts.

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We will do our best to update this resource if there are any drastic changes.

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Practice Final Exam Questions

- 1. Which of the following reasons support the hypothesis that viruses are alive?**
 - a. Viruses require the host cell to be able to reproduce
 - b. Viruses can reproduce and evolve
 - c. Viruses have no phospholipid bilayer and cytoplasm
 - d. Viruses have no metabolic system

- 2. Which of the following statements accurately describes the role of reverse transcriptase in the context of viruses and the central dogma of molecular biology?**
 - a. Reverse transcriptase converts DNA to RNA, allowing viruses to replicate their genetic material.
 - b. Reverse transcriptase converts RNA to DNA, enabling viruses to integrate their genetic material into the host cell genome.
 - c. Reverse transcriptase repairs damaged DNA in the host cell, preventing virus-induced mutations.
 - d. Reverse transcriptase regulates the translation of viral RNA into proteins within the host cell.

- 3. A population of birds come in various colours, ranging from vibrant red to deep blue. Over time, the population has seen a shift in the predominant colour of the birds. Initially, there were more red-colored birds, but now, the majority of the population consists of blue-colored birds. Researchers suspect that natural selection might be at play. What could be a potential explanation for the shift in the predominant color of the Rainbow Flyers population?**
 - a. The blue-colored birds are more social and prefer to mate with each other, leading to an increase in the blue coloration over generations.
 - b. The red-colored birds have developed a stronger immunity to local diseases, causing their population to decline in favor of the more disease-resistant blue-colored birds.
 - c. The availability of red-colored fruits, which are the primary food source for Rainbow Flyers, has decreased, leading to a decline in the red-colored bird population.
 - d. The forest's lighting conditions have become more favorable for blue-colored birds to evade predators, giving them a survival advantage and leading to their increased population.

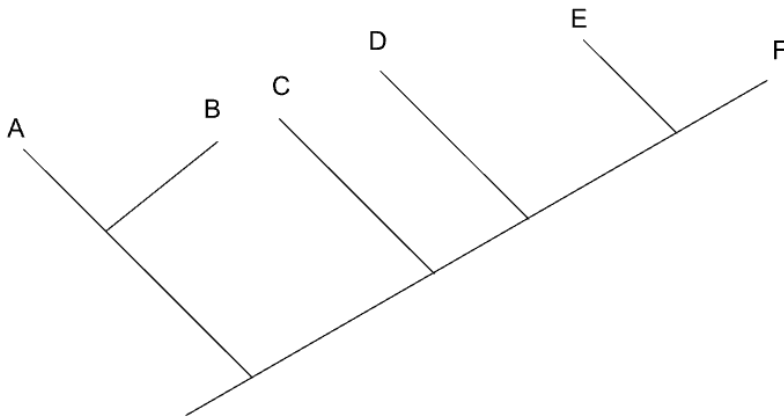
- 4. The mountainous region of the Himalayas is home to a population of a small rodent species. These mice are found at different elevations on the mountains, ranging from the low valleys to the highest peaks. Researchers have noticed distinct differences in the size and fur color of these Altitude Mice as they inhabit**

different elevations. What term best describes the observed differences in size and fur color of the Altitude Mice population across different elevations?

- a. Ecological speciation
 - b. Allopatric divergence
 - c. Clinal variation
 - d. Disruptive selection
 - e. Convergent evolution
- 5. In a comparative study of different bird species, researchers noticed that both hummingbirds and certain species of bats have developed wings with a similar streamlined shape, despite the fact that they evolved from different ancestors and belong to separate lineages. What term best describes this phenomenon?**
- a. Homology
 - b. Homoplasies
 - c. Convergent evolution
 - d. Analogous structures
 - e. Genetic drift
- 6. Which of the following best describes secondary contact?**
- a. The interaction between two different species that share a common ancestor.
 - b. The initial encounter between two isolated populations of the same species.
 - c. The exchange of genetic material between two unrelated species
 - d. The competition between individuals within a population for limited resources.
- 7. In a remote island ecosystem, a population of rabbits has experienced exponential growth for several years due to the absence of predators and abundant resources. Which of the following scenarios is most likely to result from this exponential growth over time?**
- a. The population will stabilize as the birth rate and death rate become equal, maintaining a consistent population size.
 - b. The population will experience a sudden decline in numbers as predators immigrate to the island and start preying on the rabbits.
 - c. The population will continue to grow exponentially without any constraints, as resources are abundant and predators are absent.
 - d. The population will eventually face resource scarcity and increased competition, leading to a decrease in birth rates and an increase in death rates.
- 8. In a forest ecosystem, a species of bird is observed regularly perching near a group of grazing deer. The bird hops onto the backs of the deer and picks off ticks and other parasites from their fur, providing a cleaning service to the deer. In return, the cleaner bird gains easy access to a food source while also reducing its risk of predation due to its association with the larger and more alert deer. What type of species interaction does this scenario best illustrate?**
- a. Predation

- b. Competition
 - c. Parasitism
 - d. Mutualism
- 9. The One Health Concept focuses on promoting the well-being of which interconnected elements through collaborative problem-solving?**
- a. People, plants, and minerals
 - b. People, animals, and machines
 - c. People, animals, and the environment
 - d. People, animals, and technology
- 10. In various populations of monarch butterflies, the spotted patterns are determined at the W locus. Which of the following populations is most likely to be mating assortatively?**
- a. 10 GG, 70 Gg, 20 gg
 - b. 50 GG, 125 Gg, 50 gg
 - c. 30 GG, 80 Gg, 40 gg
 - d. 80 GG, 40 Gg, 80 gg
- 11. You were driving when you passed a farm and noticed that the horses weren't the same colour. The colour is determined by the genotype at the B locus. You decided to count the horses and realized that there were 64 brown horses (BB), 32 light brown horses (Bb), and 4 white horses (bb). Which of the following statements about this population of horses is correct?**
- a. The population is in Hardy-Weinberg equilibrium.
 - b. The future population will exhibit disassortative mating.
 - c. The genotype frequency does not add up to 1.
 - d. The frequencies of allele B and b are equal
- 12. There are two alleles, S1 and S2, at the D locus in a population of sharks (ignore the effects of genetic drift).. Which of the following scenarios will eventually result in both alleles remaining in the population and not disappearing completely?**
- 1. $w_{S1S1} = w_{S1S2} = w_{S2S2}$
 - 2. $w_{S1S1} > w_{S1S2} = w_{S2S2}$
 - 3. $w_{S1S1} < w_{S1S2} > w_{S2S2}$
 - 4. $w_{S1S1} > w_{S1S2} > w_{S2S2}$
- a. 1, 2, and 3 only
 - b. B. 1 and 3 only
 - c. C. 2 and 4 only
 - d. D. 4 only
 - e. E. All of 1, 2, 3 and 4 are correct.

Use this tree to answer the next two questions (q.13-14):



13. According to the tree above, which species is species C most closely related to?

- a. Species D
- b. Species B
- c. Equally closely related to species D, A, and B
- d. Equally closely related to species D, E, and F
- e. Equally closely related to species A,B, D, E, and F

14. How many possible groups of species are monophyletic?

- a. 3
- b. 4
- c. 5
- d. 6
- e. 7

15. You found five DNA samples from five different species and wanted to make an evolutionary tree. Which species would you most likely choose as your outgroup?

Species A	AAGACGATGAGAGGAGGATT
Species B	AACACGAAGAG_GGAGGATT
Species C	AAGACGATGAGAGGGTTATT
Species D	AAGACGATGAGAGTAGTATT
Species E	AACACGATGAGAGTAGTATT

- a. Species A
- b. Species B
- c. Species C
- d. Species D
- e. Species E

16. According to the Theory of Endosymbiosis, why does mitochondria have circular DNA?

- a. The mitochondria mutated over time and developed circular DNA
- b. A virus infected the original protoeukaryote causing the development of circular DNA
- c. A protoeukaryote formed a relationship with a prokaryotic cell
- d. All organelles have circular DNA
- e. All of the above

17. You are visiting the zoo with your friend when he notices that even though humans share a common ancestor with chimpanzees, human brains are much larger in relation to their body size. What is a possible explanation for this phenomenon that you would explain to your friend?

- a. Your friend is wrong and chimpanzees have equal size brains as humans
- b. The bigger brain in humans arose due to greater sexual selection for this trait
- c. Bigger brains are more costly and thus, chimpanzees have evolved to have smaller brains
- d. There was a mutation in humans that directly gave rise to a bigger brain
- e. None of the above

18. Which of the following statements about LUCA is correct?

- 1. It is the last common ancestor of life on Earth
- 2. It was likely able to synthesize proteins
- 3. It was able to create its own food
- 4. It was eukaryotic

- a. 1, 2, and 3
- b. 1 and 3
- c. 2 and 4
- d. 4 only
- e. All statements are correct

19. XXY syndrome is a genetic condition called Klinefelter syndrome where an individual has two X chromosomes and one Y chromosome. Assuming the XXY karyotype resulted from a single error in chromosome partitioning, in which of the following stages of meiosis might the error have occurred?

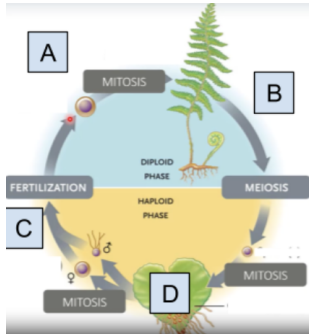
- 1. Meiosis I in the mother
- 2. Meiosis II in the mother
- 3. Meiosis I in the father
- 4. Meiosis II in the father

- a. 1, 3, and 4
- b. 1 and 3
- c. 2 and 4

- d. 4 only
- e. All of 1, 2, 3, and 4 are correct

20. This image illustrates the life cycle of plants and most fungi. The letters represent phases of the life cycle. Which of the following statements are correct?

- 1. Phase A is haploid
- 2. Phase B is a single division event
- 3. Phase C is a fertilization event
- 4. Phase D is a double division event



- a. 1, 3, and 4
- b. 1 and 3
- c. 2 and 4
- d. 4 only
- e. All of 1, 2, 3, and 4 are correct

21. Cells use positive regulation to control when cells divide. Using your knowledge from the lecture, select the correct order of steps needed to perform positive regulation of the cell cycle.

- 1. The target protein drives the cell from one phase to another
- 2. Active cyclin-CDK complex donates a phosphate to a target protein
- 3. A phosphate donating protein binds to the CDK
- 4. Target protein undergoes a conformational change
- 5. CDK and cyclin bind together

- a. 2, 4, 3, 5, 1
- b. 3, 2, 4, 5, 1
- c. 3, 5, 2, 4, 1
- d. 2, 3, 5, 4, 1

22. Using your knowledge from the lectures, select the response(s) that is/are incorrect regarding DNA repair mechanisms

- 1. Ionizing radiation is repaired through excision repair
- 2. Thymine dimers are caused by damage from UV light
- 3. Non homologous end joining repairs double strand breaks
- 4. Mismatch errors are caused by synthesis mistakes from DNA ligase

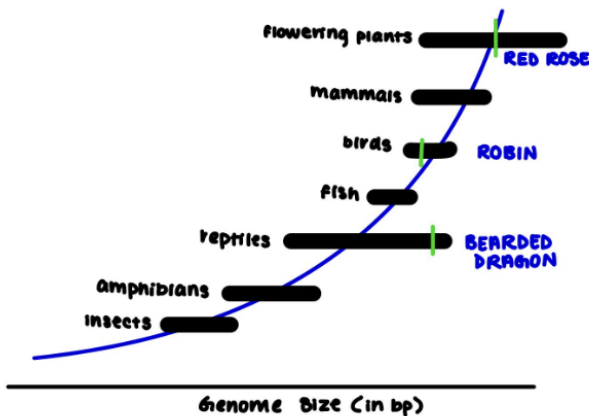
- a. 1, 2, 3
- b. 2 and 3
- c. 1 and 4
- d. 4 only
- e. 1, 2, 3, 4 are all correct

23. Which statement(s) is/are incorrect regarding proofreading repair mechanism?

1. DNA polymerase III error rate is very low
2. DNA polymerase can reverse its mistake by using a built-in 5'-3' exonuclease activity to remove mistakes
3. Mismatch repair proteins detect that the base has been mispaired
4. DNA polymerase III error rate is very high

- a. 2 and 3 only
- b. 4 only
- c. 1 and 3 only
- d. 2, 3 and 4
- e. All are correct

24. The graph below arranges organisms according to their genome sizes. There are three species to note: the red rose, robin and bearded dragon. The relative genome sizes of these three species can be determined by comparing the green lines in the graph. Using this graph, which of the following statements can be inferred?



1. The red rose has more genes than the bearded dragon and robin
2. The robin is less complex than the bearded dragon because it has a smaller genome size
3. The red rose has more copies of its genome than the robin
4. The bearded dragon has more transposable elements than the robin

- a. 1, 2, 3

- b. 1 and 3
- c. 2 and 4
- d. 4 only
- e. All statements are correct

25. Using your knowledge of monoecious animals, which of the following examples describe a sequential hermaphrodite?

- 1. Earthworms
- 2. Clownfish
- 3. Flowering plants
- 4. Snails

- a. 1, 2, 3
- b. 1 and 3
- c. 2 and 4
- d. 2 only
- e. 1, 2, 3 and 4

26. Using your knowledge of the size advantage model of sex change, which of the following statements regarding the blue headed wrasse are incorrect?

- 1. The blue headed wrasse begins as a male and transitions into a female once the female sex surpasses the male sex in reproductive success
- 2. The blue headed wrasse begins as a female and transitions to a male once the female sex surpasses the male sex in reproductive success
- 3. The blue headed wrasse begins as a male and transitions into a female once the male sex surpasses the female sex in reproductive success
- 4. The blue headed wrasse begins as a female and transitions to a male once the male sex surpasses the female sex in reproductive success

- a. 1, 2 and 3
- b. 1 and 3
- c. 2 and 4
- d. 4 only
- e. 1, 2, 3 and 4

27. Assuming that females are more involved in parental care than males, which of the following statements regarding potential fitness are correct?

- 1. Males have a lower potential fitness because they can contribute to the population as much or as little as desired
- 2. Females have a lower potential fitness because they have a smaller number of gametes and must spend time growing offspring
- 3. Males have a lower potential fitness because they are more choosy with their mates
- 4. Females have a higher potential fitness because they contribute to the population by growing and producing a lot of offspring

- a. 1, 2 and 3
- b. 1 and 3
- c. 2 and 4
- d. 4 only
- e. All statements are correct