

STAAR Spring 2026 Biology Rationales

Item Position	Rationales	
1	Option C is correct	Three amino acids in this species' sequence are the same as the amino acids for the unknown species. Therefore, these species are the most closely related.
	Option A is incorrect	None of the amino acids in this species' sequence are the same as the amino acids for the unknown species. Therefore, these species are not the most closely related.
	Option B is incorrect	Only two amino acids in this species' sequence are the same as the amino acids for the unknown species. Therefore, these species are not the most closely related.
	Option D is incorrect	Only one amino acid in this species' sequence is the same as the amino acids for the unknown species. Therefore, these species are not the most closely related.

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Item Position	Rationales	
2	Option A is correct	The heart rate indicates that the circulatory system is involved, and the breathing rate indicates that the respiratory system is involved, where both heart rate and breathing rate increase during exercise.
	Option B is incorrect	The digestive system breaks down/absorbs nutrients and transports waste out of the body. The integumentary system regulates body temperature and protects the internal organs.
	Option C is incorrect	The endocrine system produces hormones that help regulate other body systems, and the nervous system sends signals throughout the body.
	Option D is incorrect	The circulatory system is involved because the heart rate is shown on the graph, but the immune system involves defending the body from damage and infection.

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Item Position	Rationales	
3	Option C is correct	Introduction of new genes into the gene pool would produce both light and dark beetles and neither has an advantage in the environment.
	Option A is incorrect	The environment would not select for just light bodies to survive, because it contains both light and dark-colored plants.
	Option B is incorrect	A mix of colors in the environment would not select for only dark bodies.
	Option D is incorrect	The genes are for body color only and codominance is not a factor to produce coloration of different body parts.

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Item Position	Rationales	
4	Option C is correct	There is a 50% chance of the genotype <i>RW</i> appearing in the offspring because the red bull will provide the <i>R</i> allele and there is a 50% chance that the roan cow will provide the <i>W</i> allele.
	Option A is incorrect	This would be the probability of the genotype <i>WW</i> appearing in the offspring, as the red bull is guaranteed to provide an <i>R</i> allele, so all offspring will either be red or roan.
	Option B is incorrect	This would be the probability of either red or white offspring appearing from a cross between two roan cattle.
	Option D is incorrect	This would be the probability of the genotype <i>RR</i> appearing from a cross between two red cattle or the genotype <i>WW</i> appearing from a cross between two white cattle.

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Item Position	Rationales	
5	2 pts	The student identifies that the missing nucleotide component is a nitrogenous base, AND the sequence of the nitrogenous bases in a DNA molecule (adenine, cytosine, guanine, thymine) determines the traits of an organism.
	1 pt	The student answers half of the questions correctly.
	0 pts	The response is incorrect or irrelevant.

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Item Position	Rationales	
6	Option D is correct	The abrupt appearance of new species without many transitional fossils is evidence of punctuated equilibrium.
	Option A is incorrect	The well-preserved fossil record and the second period of stability in the fossil record indicate that there are many fossils, even though the fossil record is always incomplete.
	Option B is incorrect	The abrupt appearance of a new species after a period of stasis in the fossil record could best be described as punctuated equilibrium.
	Option C is incorrect	The abrupt appearance of a new species is not evidence of the slow and steady changes of gradualism.

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Item Position	Rationales	
7	Option B is correct	Enzymatic activity is highest at 45 °C.
	Option A is incorrect	The enzyme is still active at these temperatures.
	Option C is incorrect	The enzyme is still active at temperatures outside of this range.
	Option D is incorrect	The enzyme is still active at 70 °C.

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Item Position	Rationales	
8	1 pt	The student selects the 'No' under 'Nucleus Present?'.
	0 pts	The response is incorrect or irrelevant.

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Item Position	Rationales	
9	Option A is correct	The exchange of information between chromosome 9 and chromosome 22 is an example of a translocation mutation.
	Option B is incorrect	A deletion mutation would show an overall loss of genetic information.
	Option C is incorrect	An insertion mutation would show an overall increase in genetic information.
	Option D is incorrect	Nondisjunction describes the failure of homologous chromosomes or sister chromatids to properly separate during meiosis.

Item Position	Rationales	
10	Part A	
	Option B is correct	More gray mice are appearing in successive generations, indicating that there is a survival advantage to having the gray phenotype.
	Option A is incorrect	Gray mice that are heterozygous (Aa) are still surviving.
	Option C is incorrect	Mice that are gray would need to have at least one A allele, but the black (aa) mice would not mutate an a allele into an A allele.
	Option D is incorrect	The proportion of mice with the black phenotype is decreasing in successive generations, indicating that mice with this phenotype have lower reproductive success.
	Part B	
	Option A is correct	An increase in the proportion of gray mice over successive generations indicates that mice with this phenotype have greater reproductive success.
	Option B is incorrect	Although this is accurate, the third generation demonstrates that the gray phenotype gives mice greater reproductive success, regardless of whether these mice have the recessive allele.
	Option C is incorrect	Each generation has a different set of mice.
	Option D is incorrect	The recessive allele becomes dramatically less common over the successive generations.

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Item Position	Rationales	
11	Option B is correct	Cancer is the result of an unregulated increase in cell division.
	Option A is incorrect	ATP is needed for cell division to occur in all cells.
	Option C is incorrect	Cancer cells go through the S phase to replicate DNA for cell division.
	Option D is incorrect	The checkpoints regulating cell division are ignored or overridden in cancer cells.

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Item Position	Rationales	
12	2 pts	Because numbers of nitrifying bacteria decrease after a fire, there is a buildup of <u>ammonium</u> ions that cannot be converted into <u>nitrite</u> ions and then into <u>nitrate</u> ions. The results of this process would likely be <u>a decrease</u> in levels of nitrogen in the form that plants can use and <u>a decrease</u> in ecosystem stability.
	1 pt	Half or more than half of the answers are correct.
	0 pts	The response is incorrect or irrelevant.

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Item Position	Rationales	
13	2 pts	The roots have high <u>surface area</u> , which enables the <u>absorption</u> of nitrates transported by <u>xylem</u> to other parts of the plant. One effect of fungi is <u>an increase</u> in structural components that contribute to proper root functioning.
	1 pt	Half or more than half of the answers are correct.
	0 pts	The response is incorrect or irrelevant.

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Item Position	Rationales	
14	2 pts	The processes of crossing-over and independent assortment occur during <u>meiosis</u> in <u>fungi but not in bacteria</u> . These processes <u>increase</u> genetic diversity by producing <u>unique</u> gametes that allow some of the individuals in the population to survive following an environmental change such as a fire.
	1 pt	Half or more than half of the answers are correct.
	0 pts	The response is incorrect or irrelevant.

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Item Position	Rationales	
15	Option A is correct	Activators turn on specific genes to be expressed in cells leading to cell differentiation.
	Option B is incorrect	The malfunction of genes is not the mechanism for regulating gene expression.
	Option C is incorrect	Nitrogenous bases are the same in nucleic acids, but mutations are not the mechanism for regulating gene expression.
	Option D is incorrect	This statement describes a mechanism of gene expression that does not address why cells have different functions.

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Item Position	Rationales	
16	Option C is correct	The presence of Chinese tallow indicates lower biodiversity and ecosystem stability in an area.
	Option A is incorrect	Chinese tallow is not a good food source for animals in the ecosystem due to its poisonous nature.
	Option B is incorrect	Invasive species decrease ecosystem stability by out-competing native organisms for resources.
	Option D is incorrect	Chinese tallow has a negative effect on biodiversity and ecosystem stability, despite its ability to perform photosynthesis.

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Item Position	Rationales	
17	Option A is correct	The darker mutation is a beneficial mutation and would have an evolutionary advantage and increase in frequency within the moth population which could lead to the formation of a new, distinct species.
	Option B is incorrect	The sooty conditions favor the darker moth which would increase in frequency and chances of speciation; the white moth frequency would decrease because they would be easy prey against the darker trees.
	Option C is incorrect	The sooty conditions favor the darker moth which would increase in frequency and possibility of forming a new species.
	Option D is incorrect	The sooty conditions favor the darker moth which would mean the white phenotype would decrease in frequency.

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Item Position	Rationales	
18	Option B is correct	Cell-cycle checkpoints ensure that only normal cells continue through the cell cycle, whereas abnormal cells are destroyed by apoptosis.
	Option A is incorrect	An abnormal cell would undergo apoptosis, while a normal cell would be allowed to continue dividing.
	Option C is incorrect	Normal cells would be allowed to proceed if cell cycle checkpoints function properly.
	Option D is incorrect	Abnormal cells would undergo apoptosis if cell cycle checkpoints function properly.

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Item Position	Rationales	
19	2 pts	The ecosystem would become less stable because sea urchins would consume much more of the kelp forests.
	1 pt	The student answers half of the questions correctly.
	0 pts	The response is incorrect or irrelevant.

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Item Position	Rationales	
20	Option D is correct	All the sunflowers will be orange because incomplete dominance results in a blending of phenotypes.
	Option A is incorrect	Roughly one quarter of the sunflowers would be yellow if this were a cross between two hybrid red plants with a dominant/recessive inheritance pattern.
	Option B is incorrect	Roughly half the sunflowers would be red if this were a cross between a hybrid red plant and a recessive yellow plant with a dominant/recessive inheritance pattern.
	Option C is incorrect	All the sunflowers would have a mix of red and yellow petals if this were a codominant inheritance pattern.

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Item Position	Rationales	
21	Option B is correct	The species has experienced stasis over millions of years, which shows a highly resilient lineage despite environmental changes.
	Option A is incorrect	Glacial disturbances would lead to evolutionary pressures in the species to change.
	Option C is incorrect	The volcanic disturbances would lead to evolutionary pressures that would change the species, unless it were resilient. Option B is the best answer.
	Option D is incorrect	Being submerged by a sea would lead to evolutionary pressures that would change the species.

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Item Position	Rationales	
22	1 pt	DNA damage is found. → DNA repair is attempted. → DNA repair fails. → Apoptosis takes place.
	0 pts	The response is incorrect.

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Item Position	Rationales	
23	Option A is correct	Birthing many offspring is one way that rabbits survive the heavy predation from coyotes, bobcats, foxes, and other predators because birthing more offspring than are likely to survive increases the likelihood that some offspring will have survival characteristics that are selected for by natural selection.
	Option B is incorrect	Not caring for the offspring does not contribute to the survival of young rabbits.
	Option C is incorrect	Birthing multiple offspring does not guarantee adaptation to the habitat.
	Option D is incorrect	The breeding season, seven months, is long, not short.

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Item Position	Rationales	
24	Option D is correct	The change in pH will denature the amylase enzyme so it will no longer function.
	Option A is incorrect	The pH change will cause amylase to stop functioning and it will no longer affect reactions that break down sugars.
	Option B is incorrect	Amylase will not digest proteins because the change in pH will alter the enzyme so it is no longer functional.
	Option C is incorrect	The pH change will alter amylase and it will no longer function.

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Item Position	Rationales	
25	Option B is correct	A frameshift mutation changes the reading frame of the DNA that is being transcribed and may result in a protein with a completely different amino acid sequence and shape.
	Option A is incorrect	This refers to an inversion mutation, where the order of bases in a stretch of a DNA sequence appears in the reverse order.
	Option C is incorrect	Although a substitution mutation can result in an early stop codon, a substitution mutation is not a frameshift mutation.
	Option D is incorrect	This describes a silent mutation, not a frameshift mutation, because the same amino acid occurs without affecting the protein.

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Item Position	Rationales	
26	Option D is correct	Prokaryotes have plasmids, eukaryotes have linear chromosomes, and both have nucleic acids.
	Option A is incorrect	Linear chromosomes are found in eukaryotes, while plasmids are found in prokaryotes.
	Option B is incorrect	Eukaryotes have linear chromosomes, prokaryotes have plasmids, and both have nucleic acids.
	Option C is incorrect	Both prokaryotes and eukaryotes have nucleic acids, but only eukaryotes have linear chromosomes.

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Item Position	Rationales	
27	Option D is correct	Feeding on the different types of food would decrease competition between the two populations.
	Option A is incorrect	Though the species do have distributions that do not completely overlap, this does not explain how the species have adapted to exist in overlapping areas.
	Option B is incorrect	Species may partition a niche, but will compete if they share the same niche, leading to extinction of one species in a given area.
	Option C is incorrect	While the diagram shows different coloration between the two species, this type of adaptation would occur at the population level, not at the individual level.

Item Position	Rationales	
28	Part A	
	Option C is correct	There are 18 atoms of oxygen on both sides of the reaction, but they are found in different chemicals on each side.
	Option A is incorrect	Oxygen is not an energy source for cellular respiration.
	Option B is incorrect	Oxygen atoms are not lost during cellular respiration. They are incorporated into new molecules.
	Option D is incorrect	Oxygen atoms are not split during chemical reactions. Oxygen molecules may be split.
	Part B	
	Option A is correct	The same number of oxygen atoms appear on each side of the equation, and the chemical formula shows that the oxygen is in glucose and oxygen on the reactant side and in carbon dioxide and water on the product side.
	Option B is incorrect	Oxygen is conserved and is not a source of energy.
	Option C is incorrect	Oxygen is conserved but it is not converted into glucose.
	Option D is incorrect	Oxygen is not released during cellular respiration but is consumed, and oxygen atoms are conserved during this process.

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Item Position	Rationales	
29	Option C is correct	The scenario described here results in formation of two species, as the hummingbirds better able to acquire food would be more likely to be selected for by natural selection, resulting in speciation.
	Option A is incorrect	Genetic diversity increases as a result of speciation.
	Option B is incorrect	The number of genes (traits) does not change as a result of this process. The prevalence of traits changes, but not the number.
	Option D is incorrect	The prevalence of particular gene sequences in the population changes, but not the number.

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Item Position	Rationales	
30	Option B is correct	Biodiversity is lowered because the shade trees provide food and shelter.
	Option A is incorrect	Predators are unlikely to be eating the vegetation that the existing trees provided.
	Option C is incorrect	Removing the trees impacts biodiversity by removing food and habitats for animals, and different crops often require different pollinators.
	Option D is incorrect	Biodiversity is reduced when trees are removed because so many animals live in the trees.

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Item Position	Rationales	
31	1 pt	The presence of certain microorganisms enhances the health of rice plants. The difference in plant characteristics in the presence and absence of bacterial endophytes supports a claim that the rice plants and microorganisms are part of a <u>symbiotic relationship</u> .
	0 pts	One or more of the responses is incorrect.

Item Position	Rationales	
32	Option C is correct	The graph shows that more anthocyanin is produced when UV radiation is present at warm temperatures, so mRNA is most active and producing messages for protein synthesis.
	Option A is incorrect	The graph shows that less anthocyanin is produced when UV radiation is absent but that more is produced at warm temperatures, so expression of genes involved in anthocyanin production is likely to be less under these conditions than under optimal conditions.
	Option B is incorrect	The graph shows that more anthocyanin is made with warmer temperatures and UV radiation, so it is likely that the genes involved in the production of anthocyanin are more active at warmer temperatures and not at cooler temperatures.
	Option D is incorrect	The graph shows that less anthocyanin is produced without UV radiation and at cool temperatures, so the expression of genes involved in anthocyanin production is likely to be less under these conditions.

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Item Position	Rationales	
33	Option B is correct	Having access to sunlight allows a plant to produce sugars, and the water needed for photosynthesis is absorbed by the roots that are pulled down by gravity into soil.
	Option A is incorrect	Upward growth of the stem allows a plant to better access sunlight needed for photosynthesis.
	Option C is incorrect	The roots absorb water from the soil, while the stem allows the plant to perform photosynthesis.
	Option D is incorrect	Gravitropism is unrelated to predation, and hormone production occurs in the shoot system, not the roots.