

Question 1:

'In a population of giraffes, an environmental change occurs that favors individuals that are tallest. As a result, more of the taller individuals are able to obtain nutrients and survive to pass along their genetic information. This is an example of', A. 'directional selection.', B. 'stabilizing selection.', C. 'sexual selection.', D. 'disruptive selection.'

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Answer Option 1:

A. 'directional selection.'

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Answer Option 2:

A. 'directional selection.'

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Answer Option 3:

Answer: This scenario represents directional selection. In directional selection, an extreme phenotype is favored and the distribution curve shifts in that direction. In this case, the taller phenotype is favored, causing a shift towards more tall giraffes in the population. Final Answer: A

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Answer Option 4:

This is an example of directional selection. In directional selection, one extreme phenotype is favored over other phenotypes, leading to a shift in the allele frequencies in that direction. The giraffes that are taller are at an advantage and thus their traits are being selected for. So, Final Answer: A

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Answer Option 5:

Answer: The situation described in the question is an example of directional selection. Directional selection occurs when one extreme phenotype (in this case, taller height) is favored over other phenotypes, leading to a shift in the distribution of phenotypic traits over time. Final Answer: A

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Answer Option 6:

Answer: The given scenario is a classic example of directional selection. Directional selection occurs when one extreme phenotype is favored over other phenotypes, leading to the allele frequency shifting over time towards that phenotype. In this case, the taller giraffes are favored, indicating a shift towards larger height in the giraffe population. Final Answer: A

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Answer Option 7:

This is an example of directional selection. In directional selection, one extreme phenotype is favored over other phenotypes, leading to a shift in allele frequency in one direction. In this case, the tallest giraffes are favored, and thus their traits become more common in the population. So, the final answer is A.

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Answer Option 8:

This is an example of directional selection, this is when one extreme phenotype is favored over other phenotypes, thereby causing the allele frequency to shift over time in the direction of that phenotype. In this case, the taller giraffes are favored, and so there will be a shift in the population towards more tall giraffes over time. Final Answer: A

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Answer Option 9:

Answer: In the given scenario, the environment is favoring one extreme phenotype (in this case, taller giraffes), leading to a shift in population characteristics over time. This is a classic example of directional selection, an evolutionary mechanism where one extreme trait is favored over other traits. Therefore, the correct answer is A. 'Directional selection'. Final Answer: A

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Question 2:

'Which of the changes below following the start codon in an mRNA would most likely have the greatest deleterious effect?', A. 'a deletion of a single nucleotide', B. 'a deletion of a nucleotide triplet', C. 'a single nucleotide substitution of the nucleotide occupying the first codon position', D. 'a single nucleotide substitution of the nucleotide occupying the third codon position'

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Answer Option 1:

The genetic code is read in triplets, or codons, during translation. A deletion of a single nucleotide would cause a frameshift mutation, altering every codon downstream of the mutation. This would change the amino acid sequence of the protein from that point forward, potentially causing it to lose its function entirely. Therefore, the correct answer is A. Final Answer: A

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Answer Option 2:

Answer: A deletion of a single nucleotide would most likely have the greatest deleterious effect. This is because it causes a frameshift mutation, where every codon downstream of the mutation is misread, potentially leading to the production of an entirely different protein. Options B, C, and D could potentially change an amino acid or create a premature stop codon, but only at one location, not throughout the rest of the protein. Therefore, option A is the most likely to have the greatest deleterious effect. Final Answer: A

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Answer Option 3:

A deletion of a single nucleotide (option A) would likely have the most detrimental effect due to the change causing a frameshift mutation. This would cause all of the downstream codons to be read incorrectly during translation, potentially producing a completely different protein or even a nonfunctional protein. The other options would either remove an entire amino acid (option B) or change a single amino acid (options C and D), but they would not disrupt the entire downstream sequence like a frameshift mutation would. Final Answer: A

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Answer Option 4:

A deletion of a single nucleotide (option A) would cause a frameshift mutation, which changes the reading frame of the mRNA and may lead to a completely different amino acid sequence following the mutation. This type of mutation generally has the greatest effect because it can alter all the following codons and completely change the resulting protein. Other options like a deletion of a nucleotide triplet (Option B) or a single nucleotide substitution (Options C and D) are generally less severe, as they may only affect one or a few amino acids, and the rest of the protein can still be synthesized correctly. Final Answer: A

Answer: A

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Answer Option 5:

A. 'a deletion of a single nucleotide' would likely have the greatest deleterious effect. This is because it would cause a frameshift mutation, which could alter all of the codons downstream of the mutation, and potentially change every amino acid in the protein after the mutation. The other options B, C, and D would either cause no change (in the case of B, as codons are read in groups of three, so deleting a triplet would not shift the reading frame) or at most change a single amino acid (in the case of C and D). Final Answer: A

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Answer Option 6:

Answer: A deletion of a single nucleotide (Answer A) would cause a frameshift mutation. This means all the codons downstream would be read incorrectly, potentially severely altering the protein made. A deletion of a nucleotide triplet (Answer B) would remove one amino acid but leave the rest of the sequence intact. A single nucleotide substitution at the first codon position (Answer C) could change the amino acid coded, but the effect wouldn't necessarily be severe unless it created a stop codon. A single nucleotide substitution at the third codon position (Answer D) often doesn't change the resulting amino acid because of the degenerate nature of the genetic code (several codons can code for the same amino acid). Therefore, the most deleterious effect would most likely be caused by a deletion of a single nucleotide. Final Answer: A

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Answer Option 7:

A. A deletion of a single nucleotide would cause a frameshift mutation, which would shift the reading frame and potentially change every amino acid that follows. Therefore, this could have a large deleterious effect.

B. A deletion of a nucleotide triplet would remove one codon, which could potentially remove an important amino acid, but it wouldn't cause a frameshift mutation like a single nucleotide deletion would.

C. A single nucleotide substitution in the first position of a codon could change the amino acid that is coded for, but it wouldn't necessarily have a large effect depending on the specific substitution.

D. A single nucleotide substitution in the third position of a codon (known as the "wobble" position) is less likely to change the coded amino acid due to the redundancy of the genetic code.

Therefore, the correct answer is A. Final Answer: A.

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Answer Option 8:

A. A deletion of a single nucleotide could cause a frameshift mutation, which may change every amino acid that comes after the mutation and could lead to a nonfunctional protein.

B. A deletion of a nucleotide triplet would remove one amino acid from the protein, but it would not cause a shift in the reading frame. The protein may still be able to function, depending on the importance of the missing amino acid.

C. A single nucleotide substitution in the first position could potentially change the amino acid coded for by that codon. However, many amino acids are specified by more than one codon, so it's possible that this change might not affect the protein's function.

D. A single nucleotide substitution in the third position (the "wobble" position) would be the least likely to change the amino acid coded for by that codon, due to the redundancy of the genetic code.

Thus, a deletion of a single nucleotide (Option A) can have the most deleterious effect because it can cause a frameshift mutation. Final Answer: A.

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Answer Option 9:

Answer: A deletion of a single nucleotide (Option A) would most likely have the greatest deleterious effect. This is because it would cause a frameshift mutation, changing the reading frame of the mRNA. As a result, all of the codons downstream would be affected, which could dramatically alter the resulting protein. In contrast, a deletion of a nucleotide triplet (Option B) would remove one amino acid but would not cause a frameshift. A single nucleotide substitution (Options C and D) would likely change one amino acid, but would not affect the rest of the codons downstream. Final Answer: A

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Question 3:

The energy given up by electrons as they move through the electron transport chain is used to', A. 'break down glucose', B. 'make glucose', C. 'produce ATP', D. 'make NADH'

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Answer Option 1:

The energy given up by electrons as they move through the electron transport chain is used to produce ATP. So, the correct answer is C. Final Answer: C

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Answer Option 2:

The energy given up by electrons as they move through the electron transport chain is used to produce ATP. Final Answer: C

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Answer Option 3:

The energy given up by electrons as they move through the electron transport chain is used to produce ATP (Adenosine triphosphate), which is the main energy currency in cells. Therefore, the correct answer is C. Final Answer: C

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Answer Option 4:

Answer: The electron transport chain is a series of protein complexes and electron carrier molecules within the inner membrane of mitochondria that generate ATP for cellular functions. Therefore, the correct answer is C. 'produce ATP'. Final Answer: C

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Answer Option 5:

Answer: The energy given up by electrons as they move through the electron transport chain is used to produce ATP. ATP is the energy currency of the cell and is used to provide energy for various cellular processes. The other options (breaking down glucose, making glucose, and making NADH) are not the primary use of the energy from the electron transport chain. Final Answer: C

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Answer Option 6:

As electrons move through the electron transport chain, the energy they release is used to pump protons across a membrane which creates a gradient. This gradient is then used to drive the production of ATP. Therefore, the correct answer is C. 'produce ATP'. Final Answer: C

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Answer Option 7:

Answer: The energy given up as electrons move through the electron transport chain is used to pump hydrogen ions across the membrane, creating a gradient. This gradient drives the synthesis of ATP (Adenosine triphosphate), which is a high-energy molecule that fuels processes in cells. So, the correct answer is C. "Produce ATP". Final Answer: C

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Answer Option 8:

Answer: As electrons move through the electron transport chain, they release energy. This energy is used to pump protons across the inner mitochondrial membrane, creating a gradient. The potential energy stored in this gradient is then used to produce ATP via ATP synthase, a process known as oxidative phosphorylation. Therefore, the correct answer is C. Final Answer: C

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Answer Option 9:

The energy given up by electrons as they move through the electron transport chain is used to pump protons across the mitochondrial membrane and create a proton gradient. This gradient is then used to produce ATP through a process called chemiosmosis. So, the correct answer is C. 'Produce ATP'. Final Answer: C

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Question 4:

'During the period when life is believed to have begun, the atmosphere on primitive Earth contained abundant amounts of all the following gases EXCEPT', A. 'oxygen', B. 'hydrogen', C. 'ammonia', D. 'methane'

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Answer Option 1:

The primitive Earth had an atmosphere rich in gases like hydrogen, ammonia, and methane but it lacked oxygen. Oxygen began to accumulate in the atmosphere much later, after the appearance of photosynthetic organisms. Therefore, the correct answer is A. Final Answer: A

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Answer Option 2:

Answer: The atmosphere of early Earth is believed to have been reducing, consisting of gases like methane, ammonia, and hydrogen, but notably lacking oxygen. Oxygen began to accumulate in the atmosphere only after the evolution of photosynthesis. Therefore the answer is A. Final Answer: A

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Answer Option 3:

During the period when life is believed to have begun, the atmosphere on primitive Earth contained a mixture of gases such as hydrogen, ammonia, and methane, but not oxygen. Oxygen began to appear in the Earth's atmosphere only after the evolution of photosynthetic organisms. Therefore, the correct answer is A. Final Answer: A

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Answer Option 4:

The primitive Earth's atmosphere is believed to have been composed mainly of nitrogen, carbon dioxide, methane, ammonia, and hydrogen. Free oxygen (O<sub>2</sub>) was not abundant in the atmosphere until the emergence of photosynthetic organisms which started producing oxygen as a by-product of photosynthesis. So, the correct answer is A. Oxygen. Final Answer: A.

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Answer Option 5:

The primitive Earth's atmosphere contained very little oxygen. It was primarily composed of nitrogen, carbon dioxide, methane, ammonia, and water vapor. Oxygen only began to accumulate in the atmosphere after the evolution of photosynthetic organisms. Therefore, the correct answer is A. Final Answer: A

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Answer Option 6:

The early Earth's atmosphere is believed to have consisted largely of nitrogen and carbon dioxide, with smaller amounts of water, methane, ammonia, and hydrogen, but it lacked oxygen. Oxygen did not become a major part of Earth's atmosphere until photosynthetic organisms evolved and began to release it as a byproduct. So, the correct answer is A. Final Answer: A

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Answer Option 7:

The atmosphere on early Earth, when life is believed to have begun, was thought to lack significant amounts of oxygen. The atmosphere was composed mostly of nitrogen, carbon dioxide, methane, and ammonia. The presence of oxygen became more significant after the evolution of photosynthetic organisms. Therefore, the correct option is A. Final Answer: A

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Answer Option 8:

The early Earth's atmosphere is believed to have been largely devoid of oxygen. Instead, it was likely composed of gases such as hydrogen, ammonia, and methane. Therefore, the correct answer is A. 'Oxygen'.

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Answer Option 9:

During the period when life is believed to have begun, the atmosphere on primitive Earth contained little to no oxygen. The main gases were hydrogen, ammonia, and methane, along with others like carbon dioxide and nitrogen. Early organisms were anaerobic, meaning they did not require oxygen for survival. The presence of significant amounts of oxygen is a relatively recent event in the Earth's history. Therefore, the correct answer is A. Oxygen. Final Answer: A

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Question 5:

'Convergent evolution is best exemplified by which of the following?', A. 'The pectoral fins of fish and the front legs of cats', B. 'The presence of a notochord in all chordate embryos', C. 'The wings of an insect and the wings of a bird', D. 'The leaves of an oak tree and the spines of a cactus'

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Answer Option 1:

Answer: Convergent evolution refers to when two different species evolve similar traits independently of each other, usually as a result of having to adapt to similar environments or ecological niches. So, the best example of convergent evolution among these options would be C. 'The wings of an insect and the wings of a bird' as they have evolved independently to serve a common function yet do not have a common ancestor. Final Answer: C

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Answer Option 2:

Convergent evolution refers to the process whereby organisms not closely related, independently evolve similar traits as a result of having to adapt to similar environments or ecological niches. In this case, the wings of insects and the wings of birds (Option C) is the best example, as these structures evolved independently in these groups due to similar functional requirements, even though birds and insects are not closely related. Final Answer: C

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Answer Option 3:

Convergent evolution refers to the process whereby organisms not closely related independently evolve similar traits or adaptations as a result of having to adapt to similar environments or ecological niches. Option C, "The wings of an insect and the wings of a bird" is an example of convergent evolution. Both insects and birds have developed wings to fulfill the function of flight, but they did not inherit this trait from a common ancestor; they evolved independently due to similar environmental demands. Final Answer: C

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Answer Option 4:

Convergent evolution refers to the process wherein organisms not closely related, independently evolve similar traits as a result of having to adapt to similar environments or ecological niches. The wings of an insect and the wings of a bird (Option C) are a good example of this, as these two species are not closely related, yet they have both developed wings for the purpose of flight. Therefore, the correct answer is C. Final Answer: C

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Answer Option 5:

Convergent evolution refers to the process whereby organisms not closely related (not monophyletic), independently evolve similar traits as a result of having to adapt to similar environments or ecological niches.

Option C, "The wings of an insect and the wings of a bird", is the best example of convergent evolution. Insects and birds are not closely related, yet they have both evolved wings for flight. This is a product of similar pressures for adaptation, not common ancestry.

Final Answer: C

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Answer Option 6:

Convergent evolution refers to when different species independently evolve similar traits or adaptations as a result of having to adapt to similar environments or ecological niches. The wings of an insect and the wings of a bird are an example of convergent evolution because they both have the same function (flight), but they evolved independently. They do not share a common ancestor with wings. So, the correct answer is C. Final Answer: C

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Answer Option 7:

Convergent evolution refers to the process whereby organisms not closely related, independently evolve similar traits as a result of having to adapt to similar environments. The wings of an insect and the wings of a bird (option C) are a classic example of convergent evolution. These animals are not closely related, yet they have both developed wings because they have adapted to a mode of life that involves flying. Final Answer: C

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Answer Option 8:

Convergent evolution refers to the process whereby organisms not closely related (not monophyletic), independently evolve similar traits as a result of having to adapt to similar environments or ecological niches. Looking at the options, A and B do not exemplify convergent evolution as they are from the same lineage. The leaves of an oak tree and the spines of a cactus (option D) are not similar structures that evolved due to similar environments. Option C - the wings of an insect and the wings of a bird - is the best example of convergent evolution as they are not from closely related species but have similar structures due to similar functions. Final Answer: C

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Answer Option 9:

Convergent evolution refers to the process whereby organisms not closely related (not monophyletic), independently evolve similar traits as a result of having to adapt to similar environments or ecological niches. The wings of an insect and the wings of a bird are an example of convergent evolution. Both developed flight independently of each other, as insects and birds are not close relatives. Thus, the final answer is C.

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Question 6:

'Which of the following would most likely provide examples of mitotic cell divisions?', A. 'cross section of muscle tissue', B. 'cross section of an anther (site of pollen production in a flower)', C. 'longitudinal section of a shoot tip', D. 'cross section of a leaf'

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Answer Option 1:

Answer: Mitotic cell divisions, which result in growth and tissue repair, would most likely be found in a rapidly growing area of an organism. Among the given options, this would most likely be the shoot tip of a plant, where new growth occurs. Therefore, the correct answer is C. Final Answer: C

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Answer Option 2:

Mitotic cell divisions occur most frequently in areas of a plant or animal where growth or repair is needed, such as in the tips of roots or shoots. Thus, a longitudinal section of a shoot tip (Option C) would most likely provide examples of mitotic cell divisions. Final Answer: C

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Answer Option 3:

Mitotic cell divisions occur in areas of the body where new cells are needed for growth and repair. This includes areas of rapid growth, such as the tips of plants where new cells are being constantly formed. Therefore, option C, 'longitudinal section of a shoot tip', is the most logical choice for where one might find examples of mitotic cell divisions. Final Answer: C

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Answer Option 4:

Answer: Mitotic cell divisions are most commonly associated with areas of growth or repair in an organism. Therefore, a longitudinal section of a shoot tip (Option C) is where you would expect to see the most examples of mitotic cell division, as this is an area of active growth in plants. Other options A, B and D do not typically involve rapid cell division. Final Answer: C

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Answer Option 5:

Mitotic cell divisions are most likely to occur in areas of growth and repair. A cross section of muscle tissue (option A) doesn't involve rapid cell division. Pollen production in a flower's anther (option B) involves meiosis, not mitosis. A cross section of a leaf (option D) would mainly involve mature cells not actively dividing. A longitudinal section of a shoot tip (option C), however, would show the apical meristem, a region of active cell division and growth, and thus would likely reveal numerous examples of mitotic divisions. Final Answer: C

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Answer Option 6:

Option C is the most likely to provide examples of mitotic cell divisions. Shoot tips are a part of the plant where active cell division (mitosis) occurs, as they are the primary sites of growth. The other options may contain cells that divide, but not as frequently or as actively as at the growth points of plants. Final Answer: C

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Answer Option 7:

Mitotic cell divisions occur in areas of growth or repair. This would not be in muscle tissue or in an anther as seen in options A and B. Nor would it be in a leaf as seen in option D. However, a longitudinal section of a shoot tip is an area of growth and so would have mitotic cell divisions. Therefore, the correct answer is C. Final Answer: C

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Answer Option 8:

Mitotic cell division is involved in growth, repair, and asexual reproduction in the body. It is the process by which a single cell divides into two identical daughter cells. A shoot tip of a plant (option C) is an area where active cell division, including mitosis, occurs because it is involved in plant growth. Muscle tissue (option A) also undergoes mitosis during repair, but not as frequently as in the shoot tip. Anthers (option B) are involved in pollen production, which involves meiosis, not mitosis. While some mitotic division may occur in a leaf (option D), it is not the primary site of such activity. Hence, the most likely site for observing mitotic cell divisions is in a longitudinal section of a shoot tip. Final Answer: C

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Answer Option 9:

Mitotic cell divisions occur in areas of active growth. Therefore, areas where you would expect to see lots of mitotic divisions are where new cells are being created. This includes the meristematic regions of a plant such as the shoot tips. Hence, the correct answer is C. 'longitudinal section of a shoot tip'. Final Answer: C

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Question 7:

'Invertebrate immune systems possess which of the following?', A. 'Cytotoxic T-lymphocytes', B. 'Phagocytes', C. 'B-cells', D. 'Helper T-cells'

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Answer Option 1:

Answer: Invertebrates do not possess lymphocytes, so they do not have T or B cells. However, they do have phagocytes, which are cells that can ingest and destroy pathogens. Therefore, the correct answer is B. Final Answer: B

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Answer Option 2:

Invertebrates do have phagocytes as part of their immune response. Phagocytes are cells that protect the body by ingesting harmful foreign particles, bacteria, and dead or dying cells. They do not have T cells or B cells, as these are components of the adaptive immune system, which is unique to vertebrates. Therefore, the correct answer is B. Final Answer: B

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Answer Option 3:

Invertebrates do not have an adaptive immune system like vertebrates, which include cells like T lymphocytes and B cells. However, they have an innate immune system that includes cells to perform phagocytosis, a process by which a cell engulfs a particle or another cell. Therefore, the correct answer is B. Phagocytes. Final Answer: B

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Answer Option 4:

Invertebrates do not have a developed adaptive immune system like vertebrates with T-lymphocytes, B-cells or Helper T-cells. However, they have a form of innate immunity that includes phagocytes, which can engulf and destroy foreign substances or pathogens entering the body. Therefore, the correct answer is B. 'Phagocytes'. Final Answer: B

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Answer Option 5:

Invertebrates do not have an adaptive immune system, which includes B and T cells. Instead, they rely on an innate immune system for defense. Phagocytes, a component of the innate immune system, are present in invertebrates to engulf and destroy pathogens. So, the correct answer is B. 'Phagocytes'. Final Answer: B

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Answer Option 6:

Invertebrates do not possess the specific immune cells like T-lymphocytes, B-cells or helper T-cells that are characteristic of vertebrates' adaptive immune system. However, they do have innate immune systems which include phagocytes, immune cells that engulf and destroy pathogens. So the correct answer is B. Phagocytes. Final Answer: B

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Answer Option 7:

Invertebrate immune systems possess phagocytes. Phagocytes are a type of cell within the body capable of engulfing and absorbing bacteria and other small cells and particles. They do not have T-cells or B-cells which are components of the adaptive immune system in vertebrates. So, the correct answer is B. 'Phagocytes'. Final Answer: B

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Answer Option 8:

Invertebrates do not have the adaptive immune system that vertebrates do, so they do not have T-cells or B-cells, as options A, C, and D suggest. However, they do have innate immune systems, which include phagocytes. Phagocytes are cells that protect the body by ingesting harmful foreign particles, bacteria, and dead or dying cells. So the correct answer is B. 'Phagocytes'. Final Answer: B

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Answer Option 9:

Invertebrates do not have the sophisticated adaptive immune systems found in vertebrates, which include B-cells, T-cells, and cytotoxic T-lymphocytes. However, they do have phagocytes, which are a type of cell that can engulf and destroy pathogens. This is a primitive form of immune response that is present in all animals. So, the correct answer is B. Phagocytes. Final Answer: B

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Question 8:

'Two unrelated species evolve in a way that makes them more similar.', A. 'Divergent evolution', B. 'Convergent evolution', C. 'Parallel evolution', D. 'Coevolution'

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Answer Option 1:

B. 'Convergent evolution'

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Answer Option 2:

B. 'Convergent evolution'

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Answer Option 3:

Answer: Two unrelated species becoming more similar over time is a phenomenon known as convergent evolution. This happens when different species independently evolve similar traits as a result of having to adapt to similar environments or ecological niches. Final Answer: B

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Answer Option 4:

Answer: This is an example of convergent evolution. Convergent evolution occurs when two unrelated species independently evolve similar traits or characteristics in response to similar environments or ecological niches. They are not related by common ancestry, but they have independently adapted to similar environments or lifestyles. Final Answer: B

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Answer Option 5:

The process wherein two unrelated species evolve in a way that makes them more similar, often as a result of having to adapt to similar environments or ecological niches, is known as convergent evolution. Therefore, the correct answer is B. Final Answer: B

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Answer Option 6:

Answer: When unrelated species evolve in ways that make them more similar, they are undergoing convergent evolution. This occurs because the species are often adapting to similar environments or ecological niches, and similar traits become advantageous. Final Answer: B

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Answer Option 7:

Answer: The process in which two unrelated species evolve in a way that makes them more similar is called convergent evolution. This is because the species are converging or becoming more similar due to similar environmental pressures. Final Answer: B

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Answer Option 8:

Convergent evolution refers to the process whereby organisms not closely related (not monophyletic), independently evolve similar traits as a result of having to adapt to similar environments or ecological niches. Final Answer: B

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Answer Option 9:

Answer: The term for two unrelated species evolving in a way that makes them more similar is called convergent evolution. This happens when species have different ancestral origins but have developed similar features or characteristics due to adaptation to similar environmental conditions. Therefore, the correct answer is B. Final Answer: B

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Question 9:

'Which of the following is the most likely benefit of periodic natural wildfires in some forest ecosystems?', A. 'The fires remove dead and decaying plant matter, reducing the risk of more intense and destructive fires.', B. 'The fires leach nutrients from the soil, preventing the germination of plants that might compete with native species.', C. 'The fires drive off herbivores whose plant-based diets reduce the amount of vegetation.', D. 'The fires dry out the soil and decrease the chance of flooding after heavy rains.'

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Answer Option 1:

A. 'The fires remove dead and decaying plant matter, reducing the risk of more intense and destructive fires.'

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Answer Option 2:

A. 'The fires remove dead and decaying plant matter, reducing the risk of more intense and destructive fires.'

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Answer Option 3:

Answer: Natural wildfires play a key role in maintaining the health of certain ecosystems. They do this by clearing out underbrush and dead or decaying matter, which helps to prevent more intense and destructive fires in the future. Therefore, option A is the most likely benefit of natural wildfires in forest ecosystems. Final Answer: A

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Answer Option 4:

A. 'The fires remove dead and decaying plant matter, reducing the risk of more intense and destructive fires.'

Natural wildfires can play an important role in forest ecosystems by removing dead and decaying plant matter. This process can reduce the risk of more intense and destructive fires in the future. The other options B, C, and D are not typically considered ecological benefits of natural wildfires. Final Answer: A

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Answer Option 5:

Natural wildfires, while destructive, can have beneficial effects on forest ecosystems. Option A is the most likely benefit, as wildfires can help clear out dead and decaying plant matter, which can fuel more intense and potentially more destructive fires if allowed to accumulate. This helps to maintain the health and diversity of the forest ecosystem. The remaining options B, C, and D do not accurately describe the benefits of natural wildfires. Final Answer: A

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Answer Option 6:

Answer: Natural wildfires often serve to clean out the underbrush and dead plant matter in a forest. By burning this material, wildfires reduce the fuel load and thus the risk of more intense and destructive fires in the future. This is represented in Option A. Final Answer: A

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Answer Option 7:

Answer: Periodic natural wildfires can be beneficial to some forest ecosystems in a few ways, however the most likely benefit is that they remove dead and decaying plant matter, reducing the risk of more intense and destructive fires. This is because the dead and decaying plant matter can act as fuel for fires, and by removing this matter through periodic fires, the intensity and destructiveness of potential future fires can be reduced. Therefore, the correct answer is A. Final Answer: A

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Answer Option 8:

A. 'The fires remove dead and decaying plant matter, reducing the risk of more intense and destructive fires.'

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Answer Option 9:

A. 'The fires remove dead and decaying plant matter, reducing the risk of more intense and destructive fires.'

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Question 10:

'In a hypothetical environment, fishes called pike-cichlids are visual predators of algae-eating fish (i.e., they locate their prey by sight). If a population of algae-eaters experiences predation pressure from pike-cichlids, which of the following should least likely be observed in the algae-eater population over the course of many generations?', A. 'Selection for drab coloration of the algae-eaters', B. 'Selection for nocturnal algae-eaters (active only at night)', C. 'Selection for larger female algae-eaters, bearing broods composed of more, and larger, young', D. 'Selection for algae-eaters that become sexually mature at smaller overall body sizes'

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Answer Option 1:

C. 'Selection for larger female algae-eaters, bearing broods composed of more, and larger, young'

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Answer Option 2:

C. 'Selection for larger female algae-eaters, bearing broods composed of more, and larger, young' is the least likely to be observed. Larger algae-eaters would be more easily spotted by the pike-cichlids, thus this trait would not be advantageous and likely not selected for. The other options would all potentially help the algae-eaters to avoid predation. Final Answer: C.

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Answer Option 3:

The least likely to be observed would be C. 'Selection for larger female algae-eaters, bearing broods composed of more, and larger, young'. Predation pressure wouldn't likely cause a selection for larger size in the prey species. Larger size would likely make the algae-eaters more visible and susceptible to predation. Other options like drab coloration, nocturnal activity, and smaller size could help the algae-eaters avoid detection from pike-cichlids. Final Answer: C

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Answer Option 4:

Answer: Selection for larger female algae-eaters, bearing broods composed of more, and larger, young (C) would be least likely to be observed. In an environment with high predation pressure, producing more offspring is often not advantageous because the energy and resources required for large offspring could be better spent on survival tactics. Also, larger young may be easier targets for visual predators.

Final Answer: C.

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Answer Option 5:

Answer: In this hypothetical scenario, options A, B, and D are directly related to avoiding visual predators like pike-cichlids. Drab coloration (A) and nocturnal activity (B) would make algae-eaters less visible to predators, and smaller overall body size at sexual maturity (D) could also decrease visibility or increase survival rate in other ways. However, option C, which suggests selection for larger females that produce larger, more numerous offspring, doesn't directly contribute to evading predation and could actually make these algae-eaters more visible to predators. Therefore, the least likely to be observed would be C. Final Answer: C

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Answer Option 6:

C. 'Selection for larger female algae-eaters, bearing broods composed of more, and larger, young' is the least likely to be observed in the algae-eater population over the course of many generations. This is because larger size and more offspring do not necessarily confer any survival advantage against a predator that locates its prey by sight. Conversely, smaller size, drab coloration, and night activity may all aid in avoiding detection by a visual predator. Final Answer: C.

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Answer Option 7:

C. 'Selection for larger female algae-eaters, bearing broods composed of more, and larger, young' would be the least likely observed in the algae-eater population over the course of many generations. The pressure from pike-cichlids, visual predators, would likely select for traits that make algae-eaters less visible or able to avoid detection such as drab coloration or being active at night. Also, making the algae-eaters sexually mature at smaller body sizes would help them reproduce before they are caught by the pike-cichlids. However, making the algae-eaters larger would likely make them more visible to the pike-cichlids, not less. Thus, selection for larger size, while it might increase the number and size of young, would also likely increase predation. Final Answer: C.

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Answer Option 8:

The presence of visual predators such as pike-cichlids would likely exert evolutionary pressure on the algae-eating fish to develop traits that help to avoid detection. Options A and B both represent strategies to avoid being seen: drab coloration could help the algae-eaters blend in with their surroundings, and being active only at night could help them avoid the sight-based predators. Option D could also provide an advantage as smaller body size could potentially make the algae-eaters less visible or less appealing to the predators. However, option C - selection for larger female algae-eaters bearing broods of more, and larger, young - does not immediately seem advantageous under this type of predatory pressure. Larger individuals and larger offspring may be easier for the pike-cichlids to spot, and therefore more likely to be eaten. Final Answer: C.

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Answer Option 9:

Answer: Selection for drab coloration of the algae-eaters or nocturnal algae-eaters could reduce the likelihood of detection by the predator, and selection for algae-eaters that become sexually mature at smaller overall body sizes could increase the rate of reproduction, which would be beneficial under predation pressure. However, selection for larger female algae-eaters bearing larger broods composed of more, and larger, young (option C) would not necessarily confer an advantage in this scenario. Larger size may make algae-eaters more visible and thus more vulnerable to predation, and larger offspring may require more resources to produce and might therefore reduce the overall number of offspring that a female can produce. Final Answer: C.

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Question 11:

'A man contracts the same flu strain for the second time in a single winter season. The second time he experiences fewer symptoms and recovers more quickly. Which cells are responsible for this rapid recovery?'; A. 'Helper T cells', B. 'Cytotoxic T cells', C. 'Memory cells', D. 'Plasma cells'

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Answer Option 1:

Memory cells are responsible for the rapid recovery when exposed to the same pathogen a second time. They recognize the pathogen and trigger a faster and stronger immune response. Therefore, the correct answer is C. Final Answer: C

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Answer Option 2:

Memory cells are the immune cells that remember previous encounters with pathogens and can therefore respond more quickly and effectively when re-exposed to the same pathogens. This is responsible for the fast recovery during the second infection. Final Answer: C

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Answer Option 3:

Memory cells are the cells responsible for the rapid response and recovery the second time an individual is exposed to the same pathogen. They "remember" the pathogen and can mount a rapid and strong immune response. Thus, the correct answer is C. Final Answer: C

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Answer Option 4:

Answer: Memory cells are essential for secondary immune responses. They "remember" the pathogen from the first infection and upon a second infection, they can rapidly proliferate and differentiate into effector cells to fight off the infection. Therefore, option C is the correct answer. Final Answer: C

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Answer Option 5:

The rapid recovery from a previously encountered infection can be attributed to the action of memory cells. Memory cells are a part of the immune system that remembers previous pathogens that the body has been exposed to. This allows for a faster and more efficient response if the pathogen is encountered again. Therefore, the answer is C. 'Memory cells'. Final Answer: C

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Answer Option 6:

Memory cells are responsible for the rapid recovery in case of a second infection of the same pathogen. These cells "remember" how to fight the pathogen and can therefore respond more quickly and effectively. Therefore, the correct answer is C. Final Answer: C

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Answer Option 7:

Answer: Memory cells are responsible for the rapid recovery when exposed to an antigen for the second time. They remember the antigen and can quickly mount an immune response. Therefore, the correct answer is C. Memory cells. Final Answer: C

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Answer Option 8:

Memory cells are responsible for the rapid recovery when an individual contracts the same strain of flu for the second time. This is because these cells recognize pathogens that the body has been exposed to before and quickly mount an immune response. Therefore, the correct answer is C. Final Answer: C

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Answer Option 9:

Memory cells are responsible for the rapid recovery when a person is exposed to the same pathogen for the second time. They are a part of the immune system and "remember" pathogens, allowing the immune system to mount a faster and stronger response if the pathogen is encountered again. Therefore, the correct answer is C. Final Answer: C

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Question 12:

'The same gene that causes various coat patterns in wild and domesticated cats also causes the cross-eyed condition in these cats, the cross-eyed condition being slightly maladaptive. In a hypothetical environment, the coat pattern that is associated with crossed eyes is highly adaptive, with the result that both the coat pattern and the cross-eyed condition increase in a feline population over time. Which statement is supported by these observations?', A. 'Evolution is progressive and tends toward a more perfect population.', B. 'Phenotype is often the result of compromise.', C. 'Natural selection reduces the frequency of maladaptive genes in populations over the course of time.', D. 'Polygenic inheritance is generally maladaptive, and should become less common in future generations.'

=====

Answer Option 1:

B. 'Phenotype is often the result of compromise.'

This statement is supported by the observations. Even though the cross-eyed condition is slightly maladaptive, it is associated with an adaptive coat pattern. As a result, both traits increase in the population over time. It demonstrates that the phenotype is often a result of trade-offs or compromises between different traits.

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Answer Option 2:

The given scenario describes a situation where a slightly maladaptive trait (cross-eyed condition) is associated with a highly adaptive trait (specific coat pattern) and both increase in frequency due to the associated advantage of the coat pattern. This supports the idea that phenotype is often the result of compromise, as indicated in option B. This means that even if one trait might be maladaptive, it can still be propagated if it's linked to an advantageous trait. Final Answer: B

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Answer Option 3:

The scenario described supports the statement B, "Phenotype is often the result of compromise." In this case, the adaptive benefit of the coat pattern outweighs the slight maladaptive effect of the cross-eyed condition, leading to an increase in both traits in the population. This is a compromise because the negative trait (cross-eyed condition) is being maintained in the population due to its association with a beneficial trait (coat pattern). Final Answer: B

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Answer Option 4:

Answer: The observations suggest that while the coat pattern is beneficial for the cats and has become more prevalent, it has also led to an increase in the slightly maladaptive trait of being cross-eyed. This could be seen as a compromise - the advantageous nature of the coat pattern outweighs the slight disadvantage of the cross-eyed condition. Therefore, the statement that is supported by these observations is B. 'Phenotype is often the result of compromise.'. Final Answer: B

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Answer Option 5:

The scenario describes a situation where an advantageous trait (coat pattern) is linked to a slightly disadvantageous trait (crossed eyes). Despite the minor disadvantage of crossed eyes, the overall survival benefit of the coat pattern leads to an increase in both traits in the population. This scenario illustrates that phenotype is often the result of a balance of advantages and disadvantages, supporting statement B. 'Phenotype is often the result of compromise.' Therefore, the correct final answer is B.

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Answer Option 6:

The scenario described, where a maladaptive trait increases in a population because it's linked to a highly adaptive trait, supports the statement that phenotype is often the result of compromise (option B). The maladaptive trait (cross-eyed condition) is being tolerated because it's linked to a beneficial trait (adaptive coat pattern). Final Answer: B

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Answer Option 7:

The observed scenario indicates that while the cross-eyed condition may be slightly maladaptive, it is linked to a highly adaptive trait (the special coat pattern). Thus, both traits increase in the population because the benefits of the coat pattern outweigh the disadvantages of the cross-eyed condition. This is an example of a trade-off or compromise in evolution, supporting option B: 'Phenotype is often the result of compromise.' Options A, C, and D are not supported by the scenario. Final Answer: B.

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Answer Option 8:

This situation is an example of a trade-off in evolution, where one trait may be beneficial (the coat pattern) but it comes at a cost (cross-eyed condition). This supports the idea that phenotype is often the result of compromise, where characteristics that may seem maladaptive in isolation can persist because they are linked to other, beneficial traits. Therefore, the correct answer is B: 'Phenotype is often the result of compromise.' Final Answer: B

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Answer Option 9:

Phenotype can often be a result of compromise – some traits that are beneficial may come with other traits that are not as beneficial. In the hypothetical scenario described, the cross-eyed condition (which is slightly maladaptive) is increasing in the population because it is linked to a highly adaptive coat pattern. This is an example of a trade-off or compromise that can occur in evolution, supporting option B. The other options are not directly supported by the given observations. Final Answer: B

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Question 13:

'Which of the following statements is correct?', A. 'Water flows from hypertonic to hypotonic.', B. 'Germinating seeds use less oxygen than do nongerminating seeds.', C. 'The rate of transpiration decreases with an increase in air movement.', D. 'Smaller DNA fragments migrate more rapidly than do larger DNA fragments on gel electrophoresis.'

=====

Answer Option 1:

The correct statement is D. 'Smaller DNA fragments migrate more rapidly than do larger DNA fragments on gel electrophoresis.' This is because the smaller pieces can move more quickly through the gel, while the larger pieces get "stuck" and move more slowly. Final Answer: D

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Answer Option 2:

The correct statement is D. 'Smaller DNA fragments migrate more rapidly than do larger DNA fragments on gel electrophoresis.' In gel electrophoresis, DNA fragments are separated according to their size. Smaller fragments move more quickly through the gel than larger ones.

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Answer Option 3:

Answer: Among the provided options, the only correct statement is D. 'Smaller DNA fragments migrate more rapidly than do larger DNA fragments on gel electrophoresis.'. In gel electrophoresis, DNA fragments are separated based on size, with smaller fragments moving more quickly through the gel. Therefore, the correct final answer is D.

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Answer Option 4:

Answer: The correct statement is D. 'Smaller DNA fragments migrate more rapidly than do larger DNA fragments on gel electrophoresis.' During gel electrophoresis, DNA fragments are separated based on their size. Smaller fragments are able to migrate further through the gel than larger fragments. As for the other options, water actually flows from hypotonic to hypertonic (not the other way around), germinating seeds use more oxygen (not less), and the rate of transpiration increases with an increase in air movement (not decreases). Final Answer: D

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Answer Option 5:

The correct statement among the provided options is D. 'Smaller DNA fragments migrate more rapidly than do larger DNA fragments on gel electrophoresis.' This is because smaller DNA fragments can more easily navigate the pores in the gel, allowing them to move faster compared to larger fragments. Options A, B, and C are incorrect; water flows from hypotonic to hypertonic, germinating seeds use more oxygen due to active metabolism, and the rate of transpiration increases with an increase in air movement. Final Answer: D.

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Answer Option 6:

Answer: A is incorrect because water actually flows from hypotonic (less solute concentration) to hypertonic (higher solute concentration). B is incorrect because germinating seeds are metabolically active and therefore use more oxygen than nongerminating seeds. C is incorrect because an increase in air movement actually increases the rate of transpiration by removing the boundary layer of humid air near the leaf's surface. D is correct: smaller DNA fragments do migrate more rapidly than larger ones in gel electrophoresis because their smaller size allows them to move more easily through the gel matrix. Final Answer: D

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Answer Option 7:

Answer: The correct statement among the options is D. 'Smaller DNA fragments migrate more rapidly than do larger DNA fragments on gel electrophoresis.' This is due to the smaller size allowing for less resistance in the gel and therefore faster movement. The other options are incorrect. Water flows from hypotonic to hypertonic, not the opposite. Germinating seeds use more oxygen as they are actively growing. The rate of transpiration increases with an increase in air movement as the moving air removes the boundary layer of saturated air around the leaf surface. Final Answer: D

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Answer Option 8:

Answer: The correct statement is D. 'Smaller DNA fragments migrate more rapidly than do larger DNA fragments on gel electrophoresis.' This is because smaller fragments are less hindered by the gel matrix and can move more freely than larger fragments. Option A is incorrect as water moves from hypotonic (lower solute concentration) to hypertonic (higher solute concentration). Option B is incorrect as germinating seeds would use more oxygen due to increased metabolic activity. Option C is incorrect as the rate of transpiration would increase with increased air movement as it increases the vapor pressure difference between the inside and outside of the leaf. Final Answer: D

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Answer Option 9:

- A. Water actually flows from hypotonic (low solute concentration) to hypertonic (high solute concentration) areas, not the other way around.
- B. Germinating seeds actually use more oxygen than non-germinating seeds, as they are going through the process of growth and development which requires more energy, and hence, more oxygen for respiration.
- C. The rate of transpiration actually increases with an increase in air movement, as the wind or air movement carries away the water molecules on the surface of the leaves, promoting more water to be drawn up from the roots.
- D. This statement is correct. In gel electrophoresis, smaller DNA fragments can migrate more rapidly through the gel than larger ones, because the gel's tiny pores serve as a kind of obstacle course that is easier for smaller fragments to navigate. The final answer is D.

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Question 14:

'A gas phase is generally absent from which of the following biogeochemical cycles?', A. 'Water', B. 'Carbon', C. 'Sulfur', D. 'Phosphorus'

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Answer Option 1:

Answer: D. 'Phosphorus'

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Answer Option 2:

Phosphorus is primarily stored and transported in solid and dissolved forms - in rocks and soil, and in the bodies of living organisms. There is no significant gaseous phase of the phosphorus cycle. Therefore, the correct answer is D. Phosphorus. Final Answer: D

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Answer Option 3:

Answer: The phosphorus cycle is unique among the major biogeochemical cycles because it does not have a significant gas phase. This cycle mainly involves the weathering of rocks releasing phosphates into the soil which are absorbed by plants. Phosphorus is also a part of DNA, RNA, and ATP in living organisms. Final Answer: D

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Answer Option 4:

Phosphorus circulates through water, soil and sediments in the form of phosphate ions. Unlike carbon, nitrogen and sulfur, phosphorus does not have a significant gaseous phase at normal environmental temperatures and pressures and does not move through the atmosphere in appreciable amounts. So the correct answer is D. Phosphorus. Final Answer: D

=====

Answer Option 5:

Answer: Phosphorus cycle does not include a gas phase. It typically cycles through water, soil and sediments, and living organisms, but unlike other biogeochemical cycles, it does not involve the atmosphere because phosphorus and phosphorus-based compounds are usually solids at the temperatures and pressures found at the Earth's surface. Final Answer: D

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Answer Option 6:

Answer: The phosphorus cycle is unique among major biogeochemical cycles, because it does not include a gas phase. Phosphorus is mainly cycled through water, soil, and sediments. Unlike other primary nutrients, the atmosphere does not play a significant role in the cycling of phosphorus. Phosphorus is found in the atmosphere in very small amounts in the form of dust. Therefore, the correct answer is D.

Final Answer: D

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Answer Option 7:

Answer: The phosphorus cycle is unique among major biogeochemical cycles, because it does not include a gas phase. While phosphorus is important for life, it cycles through the lithosphere (earth's crust) and biosphere (living organisms), but not the atmosphere. Phosphorus is most commonly found in rock and soil minerals, and its movements are often tied to water flow paths. So, the correct answer is D.

Final Answer: D

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Answer Option 8:

Answer: The phosphorus cycle is unique among major biogeochemical cycles because it does not include a gas phase. Phosphorus is typically found in a solid state in the environment, as part of phosphates in rock and soil minerals. As these minerals weather, phosphate ions are released into soil, water, and eventually the ocean, where they can be taken up by living organisms. In contrast, water, carbon, and sulfur cycles all include stages where these elements exist as gases (water vapor, carbon dioxide, and sulfur dioxide, respectively). Final Answer: D

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Answer Option 9:

A. The water cycle includes evaporation, which is a gas phase.

B. The carbon cycle includes carbon dioxide, which is a gas phase.

C. The sulfur cycle includes sulfur dioxide, which is a gas phase.

D. However, the phosphorus cycle does not include a gas phase; this cycle primarily involves the lithosphere (earth's crust) and the hydrosphere (bodies of water) with no significant atmospheric component.

So, the correct answer is D. Phosphorus. Final Answer: D

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Question 15:

'Which of the following is a property that is shared by Zika fever, West Nile fever, and malaria?', A. 'The diseases are caused by viruses.', B. 'The diseases occur only in individuals who visit or live in tropical countries.', C. 'The pathogens that cause the diseases have developed resistance to antibiotics.', D. 'The pathogens that cause the diseases are primarily transmitted by the bite of an infected mosquito.'

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Answer Option 1:

Zika fever, West Nile fever, and malaria are all primarily transmitted by the bite of an infected mosquito. Thus, the correct answer is D.

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Answer Option 2:

The diseases Zika fever, West Nile fever, and malaria are all transmitted primarily by the bite of an infected mosquito, making option D the correct answer. Zika and West Nile are caused by viruses, but malaria is caused by a parasite. Not all of these diseases only occur in individuals who live or visit tropical countries and not all have developed resistance to antibiotics. Final Answer: D

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Answer Option 3:

Answer: Zika fever, West Nile fever, and malaria are all primarily transmitted by the bite of an infected mosquito. Therefore, the correct answer is D. Final Answer: D

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Answer Option 4:

The diseases Zika fever, West Nile fever, and malaria are all primarily transmitted by the bite of an infected mosquito. While Zika and West Nile are caused by viruses, malaria is caused by a parasite. These diseases can occur in individuals outside of tropical countries, and resistance to antibiotics is not a shared property of all three diseases. Therefore, the correct answer is D. Final Answer: D

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Answer Option 5:

Answer: While it's true that Zika and West Nile are caused by viruses, malaria is caused by a parasite, so A is incorrect. The diseases do not occur only in tropical countries, so B is also incorrect. The statement about antibiotic resistance in C is irrelevant, as antibiotics are used to fight bacterial infections, not viral or parasitic diseases. The common property that is shared by Zika, West Nile, and malaria is that they are all primarily transmitted by the bite of an infected mosquito, which is option D. Final Answer: D

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Answer Option 6:

Answer: Zika fever and West Nile fever are both caused by viruses, while malaria is caused by a parasite – so option A is not correct. The diseases do not only occur in individuals who visit or live in tropical countries, since they have been reported globally – so option B is also not correct. Malaria has indeed developed resistance to many antibiotics, but viruses can't be treated with antibiotics anyway – so option C is not correct. However, all three of these diseases are primarily transmitted by the bite of an infected mosquito. Therefore, the correct answer is D. Final Answer: D

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Answer Option 7:

Answer: All three diseases - Zika fever, West Nile fever, and malaria - are primarily transmitted by the bite of an infected mosquito. Final Answer: D

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Answer Option 8:

Answer: Zika fever, West Nile fever, and malaria are all primarily transmitted by the bite of an infected mosquito. Therefore, the correct answer is D. Final Answer: D

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Answer Option 9:

Zika fever and West Nile fever are both caused by viruses, but malaria is caused by a parasite, so option A is incorrect. All three diseases can occur outside of tropical countries, so option B is incorrect. Only bacteria can develop resistance to antibiotics, and none of these diseases are caused by bacteria, so option C is incorrect. All three diseases are spread primarily through the bite of an infected mosquito, so option D is correct. Final Answer: D.

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Question 16:

'If the HMS Beagle had completely bypassed the Galapagos Islands, Darwin would have had a much poorer understanding of the', A. 'relative stability of a well-adapted population's numbers over many generations.', B. 'ability of populations to undergo modification as they adapt to a particular environment.', C. 'tendency of organisms to produce the exact number of offspring that the environment can support.', D. 'unlimited resources that support population growth in most natural environments.'

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Answer Option 1:

B. 'ability of populations to undergo modification as they adapt to a particular environment.'

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Answer Option 2:

Answer: Darwin's visit to the Galapagos Islands was vital in his understanding of natural selection and the idea that populations can change over time to better adapt to their environment. This is best represented by option B. Final Answer: B

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Answer Option 3:

Answer: B. 'ability of populations to undergo modification as they adapt to a particular environment.'

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Answer Option 4:

Darwin's visit to the Galapagos Islands was instrumental in his understanding of evolution and natural selection, particularly the observation of how different species had adapted to their specific environments. Therefore, if he had bypassed the islands, his understanding of the "ability of populations to undergo modification as they adapt to a particular environment" would have been much poorer.

Final Answer: B

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Answer Option 5:

Answer: Charles Darwin's visit to the Galapagos Islands was fundamental to his development of the theory of natural selection. It was in the Galapagos that Darwin observed distinct, yet similar, species on different islands, suggesting that species could change over time and adapt to their environments. Therefore, if he had bypassed the Galapagos, he would have had a poorer understanding of the ability of populations to undergo modification as they adapt to a particular environment, as stated in option B. Final Answer: B

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Answer Option 6:

Answer: The Galapagos Islands were key to Darwin's theory of evolution. Darwin's observation of the different species in the Galapagos Islands, especially finches, helped him develop his theory of natural selection. Each island had different conditions, and the species that lived there had adapted accordingly. The variations in beak sizes and shapes of the finches, which were suited to their particular diets and lifestyles, provided strong evidence for adaptation to specific environments. Therefore, if the HMS Beagle had bypassed the Galapagos Islands, Darwin's understanding of the 'ability of populations to undergo modification as they adapt to a particular environment' (Option B) would have been much poorer. Final Answer: B

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Answer Option 7:

Answer: The Galapagos Islands were critical to Darwin's understanding of natural selection and adaptation. Many unique species lived on these islands, and it was here that Darwin noticed the variation in traits among similar species based on their environment, leading to his theory of natural selection. Therefore, if Darwin had bypassed the Galapagos Islands, he would have had a much poorer understanding of the 'ability of populations to undergo modification as they adapt to a particular environment.' So, the answer is B. Final Answer: B

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Answer Option 8:

Darwin's visit to the Galapagos Islands significantly contributed to his understanding of the process of natural selection - how populations can change over time to become better adapted to their environment. His observations of various species there, especially the finches, were crucial in formulating his theory of evolution. So, if the HMS Beagle had bypassed the Galapagos, Darwin would have had a much poorer understanding of option B. 'the ability of populations to undergo modification as they adapt to a particular environment.' Final Answer: B

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Answer Option 9:

The Galapagos Islands provided Darwin with evidence of how populations undergo modification as they adapt to their specific environment, particularly through the observation of finches with different beak shapes. The other options do not specifically relate to the observations and conclusions Darwin made from the Galapagos Islands. Therefore, the correct answer is B. Final Answer: B

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Question 17:

'Which of the following statements about lipids is correct?', A. 'Unsaturated fatty acids are linked to heart disease.', B. 'Lipids make up most cell surface receptors.', C. 'Phospholipids are water soluble.', D. 'Steroids are lipids that consist of glycerol and fatty acids.'

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Answer Option 1:

Answer: A is incorrect because unsaturated fatty acids are actually considered healthier and do not directly link to heart disease. B is also incorrect because proteins, not lipids, make up most cell surface receptors. C is incorrect because phospholipids are hydrophilic at their heads but hydrophobic at their tails, meaning they are not water soluble. D is incorrect because steroids are not composed of glycerol and fatty acids, they are composed of four fused carbon ring structures. The only correct answer is not among the options given.

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Answer Option 2:

Answer: The statement "Unsaturated fatty acids are linked to heart disease" is incorrect as it is saturated fatty acids that are linked with heart disease not unsaturated. The statement "Lipids make up most cell surface receptors" is incorrect as proteins make up most cell surface receptors not lipids. The statement "Phospholipids are water soluble" is incorrect as phospholipids have both a hydrophobic and hydrophilic region but are not water soluble. The statement "Steroids are lipids that consist of glycerol and fatty acids" is incorrect as steroids are lipids that consist of four fused carbon rings not glycerol and fatty acids. Therefore, all of these options are incorrect.

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Answer Option 3:

Answer: The correct statement is A. 'Unsaturated fatty acids are linked to heart disease.' It is widely accepted in the scientific community that there is a connection between the consumption of saturated fats and heart disease, not unsaturated fatty acids. B, C and D are not correct statements. Lipids do not make up most cell surface receptors. Phospholipids are not water soluble; they have a polar (water-soluble) head and a nonpolar (not water-soluble) tail. Steroids are indeed lipids, but they do not consist of glycerol and fatty acids. They are composed of four fused carbon rings. Final Answer: A.

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Answer Option 4:

Answer: While lipids play several roles in the body, none of the statements in options A, C, or D are correct. Unsaturated fatty acids, in moderation, are actually associated with health benefits, not heart disease. Phospholipids, while a component of the lipid bilayer, are not themselves water soluble. Steroids are a type of lipid, but they do not consist of glycerol and fatty acids. On the other hand, lipids do play a critical role in cell surface receptors, as mentioned in option B. Cell surface receptors often have lipids attached that help anchor them in the cell membrane. Therefore, the correct answer is B. Final Answer: B

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Answer Option 5:

Answer: Unsaturated fatty acids are actually considered healthy and can reduce the risk of heart disease, so Option A is incorrect. Most cell surface receptors are proteins, not lipids, so Option B is also incorrect. Phospholipids have a hydrophilic head and hydrophobic tails, but are not water soluble, so Option C is incorrect. Steroids don't consist of glycerol and fatty acids; they are complex molecules with four fused carbon rings, so Option D is incorrect. However, none of these options are correct. The correct information about lipids could be that they are hydrophobic biological molecules that are used for energy storage, insulation and cell signaling, among other things.

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Answer Option 6:

Answer: None of the options A, B, C, and D are completely correct. However, if we have to choose one, option B can be considered the most accurate statement. Some cell surface receptors indeed are lipids or have lipid components. This does not mean that lipids make up most cell surface receptors but it is the closest to being correct among the provided options. Final Answer: B

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Answer Option 7:

Answer: Statement A is not entirely correct. While it's true that some types of dietary fat are associated with heart disease, it's typically saturated and trans fats, not unsaturated fats. Statement B is also not entirely correct. While lipids do play a role in cell signaling and can be part of the structure of some receptors, proteins make up most cell surface receptors. Statement C is incorrect as phospholipids are not water soluble due to their hydrophobic tails, even though they have hydrophilic heads. Statement D is also incorrect. Steroids are indeed a type of lipid, but they are not composed of glycerol and fatty acids. They are composed of four fused carbon rings. Therefore, none of the statements are correct.

\*\*\*\*\*

Answer Option 8:

Answer: None of the given options are entirely correct.

Option A is not accurate as it's saturated fatty acids, not unsaturated, that are more commonly linked to heart disease.

Option B overstates the role of lipids as while it's true that lipids are a key component of cell membranes and play a role in cell signaling, they do not make up most of the cell surface receptors.

Option C is incorrect as phospholipids, while having a hydrophilic (water-loving) head, also have a hydrophobic (water-hating) tail, making them not water soluble.

Option D is incorrect as well as steroids do not consist of glycerol and fatty acids but are a type of lipid characterized by a carbon skeleton consisting of four fused rings.

Please provide another set of options for a correct answer.

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Answer Option 9:

A. 'Unsaturated fatty acids are linked to heart disease.' - This is incorrect. Unsaturated fats are actually healthier and can help lower the risk of heart disease.

B. 'Lipids make up most cell surface receptors.' - This is incorrect. Proteins, not lipids, make up most cell surface receptors.

C. 'Phospholipids are water soluble.' - This is incorrect. Phospholipids are part lipid, which are hydrophobic (not water soluble), and part phosphate, which is hydrophilic (water soluble).

D. 'Steroids are lipids that consist of glycerol and fatty acids.' - This is incorrect. Steroids are a type of lipid, but they do not consist of glycerol and fatty acids. They are made up of four fused carbon rings.

All of the options provided are incorrect.

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Question 18:

'All of the following are examples of connective tissue EXCEPT', A. 'ligaments', B. 'muscle', C. 'blood', D. 'cartilage'

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Answer Option 1:

Answer: Ligaments, blood and cartilage are all examples of connective tissues. However, muscle is not considered a connective tissue, but rather its own category of tissue, known as muscle tissue. Final

Answer: B

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Answer Option 2:

Answer: Connective tissues include ligaments (A), blood (C), and cartilage (D). Muscle (B), however, is a distinct tissue type and does not fall under the category of connective tissue. It is more specialized for contraction. Therefore, the correct answer is B. Final Answer: B

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Answer Option 3:

Answer: Connective tissues are those that support and bind other tissues in the body. Ligaments, blood, and cartilage are all examples of connective tissues. Muscle, on the other hand, is a type of tissue that is specialized for contraction and movement, and therefore is not classified as a connective tissue. So, the correct answer is B. Final Answer: B

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Answer Option 4:

Connective tissues are responsible for binding, supporting, packing, and protecting structures in the body. Ligaments, blood, and cartilage all fall under this category. However, muscle tissue, which is responsible for movement, is a separate type of tissue and does not belong to the connective tissue group. Therefore, the answer is B. Final Answer: B

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Answer Option 5:

Answer: Connective tissues provide structure and support to other tissues and organs. Ligaments, blood, and cartilage are all examples of connective tissues. Muscle tissue, however, is not a type of connective tissue; it's a type of contractile tissue involved in generating force and movement. Therefore, the correct answer is B. Final Answer: B

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Answer Option 6:

Connective tissue is one of the four basic types of animal tissue, along with muscle tissue, nervous tissue, and epithelial tissue. It supports, connects or separates different types of tissues and organs in the body. Ligaments, blood, and cartilage are all examples of connective tissue. Muscle, on the other hand, is not a connective tissue but rather a type of tissue that is responsible for movement in the body. So the correct answer is B. Final Answer: B

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Answer Option 7:

Answer: Connective tissues are those that support, bind or separate different types of tissues and organs in the body. Ligaments, which connect bones together, blood, which is considered a fluid connective tissue, and cartilage, which serves as a cushion between joints, are all types of connective tissue. Muscle, however, is a type of tissue that is used to produce force and induce motion. Thus, option B (muscle) is not a connective tissue. Final Answer: B

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Answer Option 8:

Connective tissue is a type of tissue that provides support and holds the body's tissues together. Ligaments, blood, and cartilage are all examples of connective tissue. Muscle, however, is a type of tissue that is responsible for producing force and motion, not for connecting or supporting other tissues. So, the correct answer is B. 'muscle'. Final Answer: B

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Answer Option 9:

Answer: Connective tissues include tissues that provide support and structure to the body, such as ligaments, blood, and cartilage. Muscle, however, is not a connective tissue but rather is classified as a muscle tissue, which has the unique function of being able to contract and cause movement. Therefore, the answer is B. Final Answer: B

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Question 19:

'The light reactions of photosynthesis supply the Calvin cycle with which of the following?'. A. 'The light reactions provide oxygen for the light-independent reactions.'. B. 'ATP and NADPH provide the power and raw materials for the Calvin cycle.'. C. 'Water entering the plant through the roots provides hydrogen directly to the Calvin cycle.'. D. 'CO<sub>2</sub> released by the light-dependent reactions provides the raw material for the Calvin cycle.'

=====

Answer Option 1:

The light reactions of photosynthesis produce ATP and NADPH, which are used as energy sources in the Calvin cycle. Therefore, the correct answer is option B. Final Answer: B

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Answer Option 2:

The light reactions of photosynthesis generate ATP and NADPH, which are the energy and reducing power, respectively, that are used in the Calvin cycle to convert CO<sub>2</sub> into glucose. Therefore, the correct answer is B. Final Answer: B

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Answer Option 3:

The Calvin cycle is the light-independent reaction in photosynthesis where sugar is synthesized. This process requires ATP for energy and NADPH as a reducing agent, both of which are produced in the light-dependent reactions of photosynthesis. Therefore, option B is correct. Final Answer: B

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Answer Option 4:

The correct answer is B. 'ATP and NADPH provide the power and raw materials for the Calvin cycle.' The light reactions of photosynthesis produce ATP and NADPH, which are used as a source of energy and reducing power for the Calvin cycle.

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Answer Option 5:

The light reactions of photosynthesis generate ATP and NADPH, which are then used by the Calvin cycle for the synthesis of glucose from CO<sub>2</sub>. Hence, the correct option is B. 'ATP and NADPH provide the power and raw materials for the Calvin cycle.' Final Answer: B

\*\*\*\*\*

Answer Option 6:

The light reactions of photosynthesis produce ATP (Adenosine Triphosphate) and NADPH (Nicotinamide Adenine Dinucleotide Phosphate), which are used as a source of energy and reducing power, respectively, by the Calvin Cycle to convert carbon dioxide into glucose. This is represented by option B. Final Answer: B

\*\*\*\*\*

Answer Option 7:

The light reactions of photosynthesis produce ATP and NADPH. These high-energy molecules provide the power and raw materials for the Calvin cycle, which is also known as the light-independent reactions or the dark reactions. Therefore, the correct answer is B. Final Answer: B

\*\*\*\*\*

Answer Option 8:

The light reactions of photosynthesis supply the Calvin cycle with ATP and NADPH, which provide the energy and electrons needed to fix carbon dioxide into glucose. So, the correct answer is B. 'ATP and NADPH provide the power and raw materials for the Calvin cycle.' Final Answer: B

\*\*\*\*\*

Answer Option 9:

Answer: The light reactions of photosynthesis supply the Calvin cycle with ATP and NADPH. ATP provides the energy for the reactions taking place in the Calvin cycle, while NADPH provides the electrons required for the reduction of carbon dioxide to form glucose. So, the correct answer is B. 'ATP and NADPH provide the power and raw materials for the Calvin cycle.' Final Answer: B

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Question 20:

'When the first tiny prokaryotic cell took up residence inside a larger prokaryotic cell, it heralded the advent of the eukaryotic cell and led to an explosion of new life on Earth. Since then, most cells on Earth have internal organelles. Which of the following best summarizes an advantage of having internal membranes and organelles?', A. 'DNA can reproduce more efficiently.', B. 'Even though prokaryotes do not have mitochondria, they contain structures that carry out the same function.', C. 'Organelles separate specific reactions in the cell and increase metabolic efficiency.', D. 'Compartmentalization enables prokaryotes to reproduce more quickly.'

=====

Answer Option 1:

The main advantage of having internal membranes and organelles within a cell is to increase metabolic efficiency through the separation of specific reactions. Each organelle has a specific function and by sequestering these functions within distinct compartments, cells can control the chemical microenvironments within these organelles and hence regulate the metabolic pathways. Therefore, option C best summarizes this advantage. Final Answer: C

\*\*\*\*\*

Answer Option 2:

Internal membranes and organelles in cells provide an advantage by allowing for the separation of specific functions and reactions within the cell. This separation allows for increased metabolic efficiency, as it enables the cell to have greater control over its internal processes. Thus, option C is the most accurate statement. Final Answer: C

\*\*\*\*\*

Answer Option 3:

Internal organelles help to compartmentalize the cell's functions and increase metabolic efficiency by providing distinct environments for different processes, preventing interference between these processes, and increasing the effectiveness of enzymes. Therefore, the answer is C. 'Organelles separate specific reactions in the cell and increase metabolic efficiency.' Final Answer: C

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Answer Option 4:

The advantage of having internal membranes and organelles in cells is that it allows for compartmentalization of specific cellular processes, which increases the efficiency and effectiveness of these processes. Thus, the most accurate answer is C. 'Organelles separate specific reactions in the cell and increase metabolic efficiency'. Final Answer: C

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Answer Option 5:

The formation of internal membranes and organelles in eukaryotic cells allows for compartmentalization, which increases the efficiency of cellular processes by isolating them and allowing for specialization. This is best summarized in option C. Final Answer: C

\*\*\*\*\*

Answer Option 6:

Answer: The main advantage of having internal membranes and organelles is that they separate different functions and reactions within the cell, allowing for increased metabolic efficiency. Between the options, option C best summarizes this advantage. Final Answer: C

\*\*\*\*\*

Answer Option 7:

The main advantage of having internal membranes and organelles is that they separate specific reactions in the cell and increase metabolic efficiency. This is because each organelle has a specific role that it carries out. For example, mitochondria produce energy, ribosomes are responsible for protein synthesis, etc. All of these are separate processes that need a specific environment to function optimally. Having them contained within their own organelle creates this environment, increasing the efficiency of the cell. Therefore the answer is C. Final Answer: C

\*\*\*\*\*

Answer Option 8:

The main advantage of having internal membranes and organelles is that they allow for compartmentalization of cellular processes. This separation allows for increased metabolic efficiency as different reactions can occur simultaneously in different parts of the cell without interfering with each other. Therefore, Option C is the correct answer. Final Answer: C

\*\*\*\*\*

Answer Option 9:

Organelles, defined by internal membranes, allow for specific environments within the cell to be maintained separately from the rest of the cell. Each organelle serves specific functions and allows for specialized reactions to take place in its controlled environment. This separation of functions increases the metabolic efficiency of the cell. Therefore, the correct answer is C. Final Answer: C

\*\*\*\*\*

Question 21:

'Which of the following is correct about vaccination?', A. 'It increases the number of different receptors that recognize a particular pathogen.', B. 'It increases the number of different macrophages specific to the antigen.', C. 'It increases the number of epitopes that the immune system can recognize.', D. 'It increases the number of lymphocytes with receptors that can recognize and bind to the antigen.'

=====

Answer Option 1:

Vaccination works by exposing the body to a small, safe amount of the pathogens, which in turn stimulates the immune system to produce lymphocytes that can recognize and bind to the antigen, and thus, increase the body's immunity to that specific pathogen. Therefore, the correct answer is D. Final Answer: D

\*\*\*\*\*

Answer Option 2:

A vaccination works by stimulating the immune system to produce more lymphocytes that can recognize and bind to the antigen. It does not increase the number of different receptors, macrophages specific to the antigen, or epitopes that the immune system can recognize. Therefore, the correct answer is D. Final Answer: D

\*\*\*\*\*

Answer Option 3:

Vaccination works by exposing the body to an antigen, which stimulates an immune response. This leads to the production of lymphocytes (B cells and T cells) that can recognize and bind to the antigen. This primes the immune system to respond more rapidly and effectively to future exposures to the same pathogen. Therefore, the correct answer is D. Final Answer: D

\*\*\*\*\*

Answer Option 4:

Vaccination works by introducing a harmless version of a pathogen in your body, prompting your immune system to produce a response. This response includes the production of lymphocytes, which are immune cells that recognize and bind to specific antigens from the pathogen. Therefore, D. 'It increases the number of lymphocytes with receptors that can recognize and bind to the antigen.' is the correct answer. Final Answer: D

\*\*\*\*\*

Answer Option 5:

Vaccination works by introducing a weakened or dead form of the disease-causing organism (antigen) into the body. This stimulates the immune system to produce lymphocytes -specifically T cells and B cells- that can recognize and bind to the antigen. In case of a future encounter with the same antigen, the immune system can respond faster and more effectively. Therefore, the correct answer is D. Final Answer: D

\*\*\*\*\*

Answer Option 6:

A vaccine works by training the immune system to recognize and combat pathogens, either viruses or bacteria. To do this, certain molecules from the pathogen must be introduced into the body to trigger an immune response. These molecules are called antigens, and they are present on all viruses and bacteria. By injecting these antigens into the body, the immune system can safely learn to recognize them as hostile invaders, produce antibodies, and remember them for the future. If the bacteria or virus reappears, the immune system will recognize the antigens immediately and attack aggressively well before the pathogen can spread and cause sickness. This is represented by option D. Final Answer: D

\*\*\*\*\*

Answer Option 7:

In vaccination, a harmless form of a pathogen, or a part of the pathogen is introduced into the body. This stimulates the immune system to produce lymphocytes (B cells and T cells) that can recognize and bind to the antigen of this pathogen. If the real, harmful pathogen attacks the body later, these lymphocytes can quickly recognize and bind to the antigens, and destroy the pathogen. Therefore, the correct answer is D. Final Answer: D

\*\*\*\*\*

Answer Option 8:

A vaccination works by training your immune system to recognize and combat pathogens, either viruses or bacteria. This is accomplished by injecting small amounts of the virus or bacteria into the body; these are usually in a weakened state, or they could be pieces of the pathogen. This leads to the production of lymphocytes that can recognize and bind to the antigen, and if the person is ever exposed to the pathogen again, their immune system will be able to react swiftly. Hence, the correct answer is D. Final Answer: D

\*\*\*\*\*

Answer Option 9:

The purpose of vaccination is to prepare the immune system to fight future infections with the pathogen. It does this by introducing a weakened or inactivated form of the pathogen, or a piece of the pathogen, into the body. This stimulates the immune system to produce lymphocytes (a type of white blood cell) that can recognize and bind to antigens on the pathogen. When the body is later exposed to the actual pathogen, it can mount a quick and effective immune response. Therefore, the correct answer is D. Final Answer: D.

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Question 22:

The calypso orchid, *Calypso bulbosa*, grows in close association with mycorrhizae fungi. The fungi penetrate the roots of the flower and take advantage of the plant's food resources. The fungi concentrate rare minerals, such as phosphates, in the roots and make them readily accessible to the orchid. This situation is an example of, A. 'parasitism', B. 'commensalism', C. 'mutualism', D. 'endosymbiosis'

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Answer Option 1:

This situation is an example of mutualism. The fungi get food resources from the orchid, while the orchid gets rare minerals from the fungi. Both organisms benefit from this relationship. Final Answer: C  
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Answer Option 2:

This is a case of mutualism. Mutualism is a type of symbiotic relationship where both organisms benefit. In this case, the orchid gets minerals that it needs and the fungi gets food resources. Final Answer: C  
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Answer Option 3:

In this example, both the orchid and the fungi are benefiting from their association: the orchid gets rare minerals, and the fungi gets food resources. Therefore, this is an example of mutualism, a symbiotic relationship where both organisms benefit.

Final Answer: C  
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Answer Option 4:

This situation is an example of mutualism. In mutualism, both species benefit from the interaction. In this case, the fungi get access to the plant's food resources, while the orchid gets access to rare minerals. Therefore, the answer is C. Final Answer: C  
\*\*\*\*\*

Answer Option 5:

Answer: The relationship between the calypso orchid and the mycorrhizae fungi is mutualistic, meaning both species benefit. The fungi get food resources from the orchid, while the orchid has access to minerals that the fungi make more accessible. This matches option C. Final Answer: C  
\*\*\*\*\*

Answer Option 6:

This situation involves a relationship where both the calypso orchid and the mycorrhizae fungi derive benefits. The fungi benefit by getting food resources from the orchid, and the orchid benefits by having the fungi concentrate rare minerals in its roots. This relationship is considered mutualistic. So, the correct answer is C. Final Answer: C  
\*\*\*\*\*

Answer Option 7:

This scenario described between the calypso orchid and the mycorrhizae fungi is an example of mutualism. In mutualism, both species benefit from the relationship. In this case, the fungi get food resources from the plant, while the plant benefits from the concentration of rare minerals like phosphates made readily accessible by the fungi. The other options, parasitism, commensalism, and endosymbiosis, don't accurately describe this relationship. Therefore, the correct answer is C. Final Answer: C.  
\*\*\*\*\*

Answer Option 8:

Answer: In this scenario, both the calypso orchid and the mycorrhizae fungi are benefiting from each other. The fungi benefit by utilizing the plant's food resources, and the orchid benefits from the concentrate of rare minerals that the fungi provide. This is a mutual relationship where both organisms are benefiting from each other. Thus, the correct answer is C. Final Answer: C  
\*\*\*\*\*

Answer Option 9:

In this example, both the calypso orchid and the mycorrhizae fungi are benefiting from their interaction. The fungi get access to the plant's resources, and in return, they make rare minerals readily accessible to the orchid. This type of relationship, where both organisms mutually benefit, is known as mutualism. Therefore, the correct answer is C. Final Answer: C  
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Question 23:

'Mules are relatively long-lived and hardy organisms that cannot, generally speaking, perform successful meiosis. Consequently, which statement about mules is true?', A. 'They have a relative evolutionary fitness of zero.', B. 'Their offspring have less genetic variation than the parents.', C. 'Mutations cannot occur in their genomes.', D. 'If crossing-over happens in mules, then it must be limited to prophase of mitosis.'

=====

Answer Option 1:

Mules are hybrids of a female horse and a male donkey. They are generally sterile and cannot reproduce because they have an odd number of chromosomes that cannot evenly separate during meiosis. Therefore, the evolutionary fitness of a mule, which is measured by its ability to pass its genes on to the next generation, is zero. This makes Option A the correct answer. Final Answer: A

\*\*\*\*\*

Answer Option 2:

A mule is the offspring of a male donkey and a female horse. Because mules are usually infertile, they cannot have offspring of their own. Thus, their evolutionary fitness (the ability to pass genes onto the next generation) is essentially zero. Hence, the correct answer is A. 'They have a relative evolutionary fitness of zero.' Final Answer: A

\*\*\*\*\*

Answer Option 3:

Mules are the offspring of a male donkey and a female horse. They are sterile, meaning they cannot reproduce. This is because they have an odd number of chromosomes, which prevents successful meiosis from occurring. The inability to reproduce implies that mules have a relative evolutionary fitness of zero, since evolutionary fitness is defined by an organism's ability to pass its genes to the next generation.

So, the answer is A. Final Answer: A

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Answer Option 4:

A mule is a hybrid animal, the offspring of a male donkey and a female horse. Generally, mules are sterile and cannot reproduce. Evolutionary fitness is defined as the ability to pass on one's genes to the next generation. Since mules cannot produce offspring, they have an evolutionary fitness of zero. Therefore, the correct answer is A. Final Answer: A

\*\*\*\*\*

Answer Option 5:

A mule is a hybrid animal produced by crossing a donkey and a horse. Because they're hybrids, they're usually infertile and can't reproduce. This means they can't pass their genes onto the next generation. Therefore, in terms of evolution, their fitness is considered zero, because evolutionary fitness is defined as the ability to pass genes onto the next generation. So, the correct answer is A. Final Answer: A

\*\*\*\*\*

Answer Option 6:

Mules are the offspring of a male donkey and a female horse, which results in an odd number of chromosomes. This makes them generally infertile, because they can't undergo successful meiosis, which is necessary for sexual reproduction. Therefore, they can't pass on their genes to the next generation. This means they have a relative evolutionary fitness of zero, as evolutionary fitness is measured by the ability to pass on genes to the next generation. So, the correct answer is A. Final Answer: A

\*\*\*\*\*

Answer Option 7:

A mule is a hybrid animal bred from a female horse and a male donkey. Most mules are infertile and can't reproduce. Therefore, they can't pass their genes onto the next generation, which means their "relative evolutionary fitness" is zero. This is regardless of their health or longevity. Evolutionary fitness is about contribution to the gene pool of the next generation. So, the correct answer is A. Final Answer: A

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Answer Option 8:

Mules are the offspring of a male donkey and a female horse. They are generally sterile, meaning they cannot produce offspring. This means that they cannot contribute to the gene pool of the next generation, which is how evolutionary fitness is measured. Therefore, their relative evolutionary fitness is zero. Final Answer: A

\*\*\*\*\*

Answer Option 9:

A mule, which is the offspring of a male donkey and a female horse, is generally sterile and unable to reproduce. This means that it has an evolutionary fitness of zero because it does not pass on its genes to the next generation. The other options are irrelevant in this context because the mule cannot produce offspring. Therefore, the correct answer is A. Final Answer: A

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Question 24:

'ADH is a hormone secreted by the kidneys that reduces the amount of water excreted in the urine. ADH is released in times of dehydration. This is an example of', A. 'innate behavior.', B. 'maintaining homeostasis.', C. 'failure to respond to the environment.', D. 'positive feedback.'

=====

Answer Option 1:

The release of ADH (Anti-Diuretic Hormone) in response to dehydration is a method of maintaining the body's water balance, which is a crucial part of homeostasis. Therefore, the correct answer is B.

'maintaining homeostasis.'. Final Answer: B

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Answer Option 2:

Answer: The release of ADH in response to dehydration is an example of the body's attempt to maintain homeostasis. It is a regulatory mechanism to ensure that the body retains the necessary amount of water for its functions. So, the correct answer is B. 'maintaining homeostasis.' Final Answer: B

\*\*\*\*\*

Answer Option 3:

Answer: The release of ADH by the kidneys to reduce the amount of water excreted in the urine during times of dehydration is an example of maintaining homeostasis. Homeostasis is the process by which organisms maintain a relatively stable internal environment. Therefore, the correct answer is B. Final Answer: B

\*\*\*\*\*

Answer Option 4:

ADH, or antidiuretic hormone, is released by the body in response to dehydration. It helps to conserve water by reducing the amount that is excreted in urine. This is an example of the body's efforts to maintain homeostasis, which is a state of balance within the body. Therefore, the correct answer is B. 'maintaining homeostasis'. Final Answer: B

\*\*\*\*\*

Answer Option 5:

ADH (Antidiuretic hormone) is indeed secreted in response to dehydration and it acts to conserve water in the body by reducing the amount of water excreted in urine. This action helps to maintain an internal balance, or homeostasis, in the body despite external changes. Therefore, the correct answer is B. 'maintaining homeostasis.' Final Answer: B

\*\*\*\*\*

Answer Option 6:

Answer: ADH (antidiuretic hormone) is a hormone that reduces the volume of water excreted in the urine. It is secreted in response to dehydration, which allows the body to conserve water and maintain a stable internal condition. This process of maintaining a stable internal environment in response to changes in external conditions is known as homeostasis. So, this is an example of maintaining homeostasis.

Final Answer: B.

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Answer Option 7:

ADH (antidiuretic hormone) is released by the body in response to dehydration in an effort to conserve water and maintain a stable internal environment, which is the definition of homeostasis. Therefore, option B is the correct answer. Final Answer: B

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Answer Option 8:

Answer: ADH (Antidiuretic Hormone) is released by the kidneys in response to dehydration in order to reduce water loss and conserve body water. This is a physiological mechanism to maintain a stable internal environment, despite changes in external conditions. This process is known as maintaining homeostasis. So, the answer is B. Final Answer: B

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Answer Option 9:

B. 'maintaining homeostasis.'

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Question 25:

'All of the following statements are true EXCEPT', A. 'thyroxine increases the rate of metabolism', B. 'insulin decreases storage of glycogen', C. 'vasopressin stimulates water reabsorption in the kidney', D. 'epinephrine increases blood sugar levels and heart rate'

=====

Answer Option 1:

Answer: Thyroxine does increase the rate of metabolism, and Vasopressin does stimulate water reabsorption in the kidney. Epinephrine does increase blood sugar levels and heart rate. However, insulin increases the storage of glycogen, not decreases it. Therefore, the correct answer is B. Final Answer: B

\*\*\*\*\*

Answer Option 2:

Answer: Thyroxine does indeed increase the rate of metabolism. Vasopressin does stimulate water reabsorption in the kidney. Epinephrine does increase blood sugar levels and heart rate. Insulin, however, increases the storage of glycogen, not decrease it. Therefore, the statement B is false. Final Answer: B

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Answer Option 3:

Insulin actually increases the storage of glycogen. It promotes the uptake of glucose into cells and its conversion into glycogen for storage. So, the statement B is not true. Final Answer: B

\*\*\*\*\*

Answer Option 4:

Thyroxine does increase the rate of metabolism (option A is true). Vasopressin does stimulate water reabsorption in the kidney (option C is true). Epinephrine does increase blood sugar levels and heart rate (option D is true). However, insulin does not decrease the storage of glycogen. Instead, insulin promotes the storage of glycogen. Therefore, the correct answer is B. Final Answer: B.

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Answer Option 5:

Option A is true because thyroxine is a hormone that increases metabolism rate. Option C is also true because vasopressin, also known as antidiuretic hormone (ADH), stimulates water reabsorption in the kidneys. Option D is true because epinephrine, also known as adrenaline, is a hormone that increases blood sugar levels and heart rate. However, option B is not true. Insulin actually stimulates the storage of glycogen in the liver, not its reduction. Therefore the correct answer is B. Final Answer: B

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Answer Option 6:

Answer: Thyroxine does increase the rate of metabolism. Vasopressin stimulates water reabsorption in the kidney, and epinephrine does indeed increase blood sugar levels and heart rate. However, insulin actually increases the storage of glycogen, not decrease it. Therefore, option B is the false statement. Final Answer: B

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Answer Option 7:

Thyroxine does increase the rate of metabolism (A). Vasopressin, also known as antidiuretic hormone, does stimulate water reabsorption in the kidney (C). Epinephrine, or adrenaline, does increase blood sugar levels and heart rate (D). However, insulin increases the storage of glycogen, not decreases it (B). Therefore, the statement B is not true. Final Answer: B

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Answer Option 8:

- A. True. Thyroxine does increase the rate of metabolism.
- B. False. Insulin actually promotes the storage of glucose as glycogen in the liver and muscle cells.
- C. True. Vasopressin (also known as antidiuretic hormone) does stimulate water reabsorption in the kidney.
- D. True. Epinephrine, also known as adrenaline, does increase blood sugar levels and heart rate.

So, the correct answer is B. Final Answer: B

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Answer Option 9:

Thyroxine is a hormone released by the thyroid glands and its main function is to increase the rate of metabolism, so option A is correct. Vasopressin, also known as antidiuretic hormone, is secreted by the posterior pituitary gland and it helps in water reabsorption in the kidney, so option C is correct. Epinephrine, also known as adrenaline, is a hormone secreted by the adrenal glands, it increases blood sugar levels and heart rate, so option D is correct. However, insulin is a hormone secreted by the pancreas and its main function is to decrease blood sugar levels by stimulating the storage of glycogen, so option B is incorrect. Final Answer: B.

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Question 26:

'Which of the following statements best describes what a Barr body is and its significance?', A. 'It is an inactivated Y chromosome and results in a man being sterile.', B. 'It is an inactivated Y chromosome, and the person who has it appears female.', C. 'It is an inactivated X chromosome and results in females with half their cells having one X inactivated and the other half of their cells having the other X inactivated.', D. 'It is an inactivated X chromosome and results in females who are sterile.'

=====

Answer Option 1:

A Barr body is an inactivated X chromosome present in female somatic cells. It's a mechanism of dosage compensation, as females, who are XX, inactivate one X chromosome in each cell. So, Statement C is the most accurate in describing what a Barr body is and its significance. Final Answer: C

\*\*\*\*\*

Answer Option 2:

A Barr body is an inactivated X chromosome found in female cells. This inactivation is a way of compensating for the genetic dosage difference between males (XY) and females (XX). Each cell of a female typically inactivates one of its two X chromosomes at random. This makes option C the correct answer. Final Answer: C

\*\*\*\*\*

Answer Option 3:

A Barr body is an inactive X chromosome in a cell with more than one X chromosome, rendering the cell functionally monosomic for X-linked traits. Females have two X chromosomes, one of which is turned into a Barr body to prevent double expression of genes. The process of Barr body formation is random throughout the cells, therefore, some cells express the paternal X while other cells express the maternal X. This is represented by option C. Final Answer: C

\*\*\*\*\*

Answer Option 4:

A Barr body is an inactivated X chromosome in a cell of a female. As females have two X chromosomes, one of them is inactivated during embryonic development to prevent double dosage of the genetic material. This results in females having half their cells with one X inactivated and the other half of their cells with the other X inactivated. Therefore, the correct answer is C. Final Answer: C.

\*\*\*\*\*

Answer Option 5:

A Barr body is an inactivated X chromosome in a cell of a female organism. In females (who have two X chromosomes), one of the X chromosomes is inactivated during embryonic development because they only need one copy of the X chromosome in each cell. This process is random, which means that some cells will inactivate one X chromosome, and other cells will inactivate the other. Therefore, the correct answer is C. Final Answer: C

\*\*\*\*\*

Answer Option 6:

A Barr body is an inactivated X chromosome that can be found in the cells of females. In female mammals (who have an XX chromosomal makeup), one X chromosome is inactivated during embryonic development to prevent double dosage of X-chromosomal genes, it condenses into a Barr body. This process is random, so some cells will inactivate one X chromosome, while other cells will inactivate the other. This is accurately described in option C. Final Answer: C

\*\*\*\*\*

Answer Option 7:

A Barr body is an inactivated X chromosome present in female somatic cells. It is a vital part of X-chromosome inactivation, which equalizes the dosage of X-linked genes between males and females. Females have two X chromosomes, but in each cell, one X chromosome is inactivated and becomes a Barr body. This does not result in sterility as suggested in option D. Option C best describes what a Barr body is and its significance. Final Answer: C

\*\*\*\*\*

Answer Option 8:

A Barr body is an inactivated X chromosome. In females, who have two X chromosomes, one X chromosome in each cell is randomly inactivated during embryonic development to ensure that females, like males, have one functional copy of the X chromosome in each body cell. This leads to mosaicism in females, where half the cells have one X inactivated and the other half have the other X inactivated, as described in option C. This does not result in sterility. Therefore, the correct answer is C.

Final Answer: C

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Answer Option 9:

A Barr body is the inactive X chromosome in a cell of female mammals, which condenses into a compact structure that is not transcribed. The process of X inactivation is random in mammals, meaning that half the cells in a female mammal have one of the X chromosomes inactivated, and the other half have the other X chromosome inactivated. Therefore, option C is the correct answer. Final Answer: C

\*\*\*\*\*

Question 27:

'A heterotroph', A. 'obtains its energy from sunlight, harnessed by pigments', B. 'obtains its energy by oxidizing organic molecules', C. 'makes organic molecules from CO<sub>2</sub>', D. 'obtains its energy by consuming exclusively autotrophs'

=====

Answer Option 1:

A heterotroph is an organism that cannot make its own food and has to get its energy by consuming other plants or animals. Therefore, a heterotroph obtains its energy by oxidizing organic molecules, which means the correct answer is B. Final Answer: B

\*\*\*\*\*

Answer Option 2:

A heterotroph is an organism that cannot produce its own food and instead takes nutrition from other sources of organic carbon, mainly plant or animal matter. In the food chain, heterotrophs are secondary and tertiary consumers. This matches with the definition given in option B. Final Answer: B

\*\*\*\*\*

Answer Option 3:

A heterotroph is an organism that cannot manufacture its own food and instead obtains its food and energy by taking in organic substances, usually plant or animal matter. In this context, option B, which states that a heterotroph "obtains its energy by oxidizing organic molecules," is the most accurate. Final Answer: B

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Answer Option 4:

A heterotroph is an organism that cannot produce its own food and instead gets its food by consuming other organisms. Thus, option B 'obtains its energy by oxidizing organic molecules' is the correct answer. Final Answer: B

\*\*\*\*\*

Answer Option 5:

A heterotroph is an organism that cannot manufacture its own food by carbon fixation and therefore derives its intake of nutrition from other sources of organic carbon, mainly plant or animal matter. In the food chain, heterotrophs are secondary and tertiary consumers. Therefore, option B "obtains its energy by oxidizing organic molecules" is correct. Final Answer: B

\*\*\*\*\*

Answer Option 6:

A heterotroph is an organism that cannot produce its own food and instead obtains its food and energy by taking in organic substances, usually plant or animal matter. Therefore, the correct answer is B. 'obtains its energy by oxidizing organic molecules'. Final Answer: B

\*\*\*\*\*

Answer Option 7:

A heterotroph is an organism that cannot produce its own food, instead taking nutrition from other sources of organic carbon, mainly plant or animal matter. Therefore, the correct answer is B. 'obtains its energy by oxidizing organic molecules'. Final Answer: B

\*\*\*\*\*

Answer Option 8:

A heterotroph is an organism that cannot manufacture its own food by carbon fixation and therefore derives its intake of nutrition from other sources of organic carbon, mainly plant or animal matter. In the food chain, heterotrophs are primary, secondary and tertiary consumers, but not producers. So, the correct option is B. 'obtains its energy by oxidizing organic molecules'. Final Answer: B

\*\*\*\*\*

Answer Option 9:

A heterotroph is an organism that obtains its energy from the intake and digestion of organic substances, usually plant or animal matter. This best corresponds to option B, "obtains its energy by oxidizing organic molecules". Final Answer: B

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Question 28:

'Which of the following reactions occurs in the forward direction during glycolysis but in the reverse direction during fermentation?', A. 'pyruvate  $\rightarrow$  lactate', B. 'pyruvate  $\rightarrow$  ethanol', C. ' $\text{NAD}^+ + \text{H}^+ + 2\text{e}^- \rightarrow \text{NADH}$ ', D. ' $\text{ADP} + \text{P} \rightarrow \text{ATP}$ '

=====

Answer Option 1:

During glycolysis,  $\text{NAD}^+$  is reduced to NADH ( $\text{NAD}^+ + \text{H}^+ + 2\text{e}^- \rightarrow \text{NADH}$ ). However, in fermentation, this reaction is reversed in order to regenerate  $\text{NAD}^+$  from NADH, allowing glycolysis to continue in the absence of oxygen. So the correct answer is C. Final Answer: C

\*\*\*\*\*

Answer Option 2:

Answer: In glycolysis, the reaction  $\text{NAD}^+ + \text{H}^+ + 2\text{e}^- \rightarrow \text{NADH}$  (Option C) occurs in a forward direction to produce NADH, a critical electron carrier. During fermentation, the reaction runs in a reverse direction, using NADH to reduce pyruvate and regenerate  $\text{NAD}^+$ . Thus, the correct answer is C. Final Answer: C

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Answer Option 3:

The conversion of  $\text{NAD}^+$  to NADH occurs in the forward direction during glycolysis, and the reverse (NADH to  $\text{NAD}^+$ ) occurs during fermentation. This is crucial because it ensures a supply of  $\text{NAD}^+$  for glycolysis to continue in the absence of oxygen, which is the environment in which fermentation occurs. Thus, the correct answer is C. ' $\text{NAD}^+ + \text{H}^+ + 2\text{e}^- \rightarrow \text{NADH}$ '. Final Answer: C

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Answer Option 4:

During glycolysis, one of the reactions involves the reduction of  $\text{NAD}^+$  to NADH ( $\text{NAD}^+ + \text{H}^+ + 2\text{e}^- \rightarrow \text{NADH}$ ). In contrast, during fermentation, NADH is oxidized back to  $\text{NAD}^+$  in order for glycolysis to continue in the absence of oxygen. Therefore, the correct answer is C. ' $\text{NAD}^+ + \text{H}^+ + 2\text{e}^- \rightarrow \text{NADH}$ '. Final Answer: C

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Answer Option 5:

Answer: During Glycolysis, the reduction of  $\text{NAD}^+$  to NADH occurs due to the oxidation of glucose. This is a forward reaction. However, during fermentation, the reverse of this reaction occurs. NADH is oxidized back to  $\text{NAD}^+$  due to the reduction of Pyruvate to lactate in lactic acid fermentation or the reduction of pyruvate to ethanol in alcoholic fermentation. Therefore, the answer is C. ' $\text{NAD}^+ + \text{H}^+ + 2\text{e}^- \rightarrow \text{NADH}$ '. Final Answer: C

\*\*\*\*\*

Answer Option 6:

Answer: During glycolysis,  $\text{NAD}^+$  is reduced to form NADH, capturing some of the released energy. During fermentation, the reverse reaction occurs, where NADH is oxidized back to  $\text{NAD}^+$  to maintain the  $\text{NAD}^+$  pool in the cell for further glycolysis. Therefore, the correct answer is C. Final Answer: C

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Answer Option 7:

During glycolysis, the conversion of  $\text{NAD}^+$  to NADH (plus a hydrogen ion and two electrons) happens. This process is reversed during fermentation, where NADH is converted back to  $\text{NAD}^+$ . So, the correct answer is C. ' $\text{NAD}^+ + \text{H}^+ + 2\text{e}^- \rightarrow \text{NADH}$ '. Final Answer: C

\*\*\*\*\*

Answer Option 8:

Answer: During glycolysis,  $\text{NAD}^+$  is reduced to NADH as it gains electrons, and this process is reversed during fermentation where NADH is oxidized back to  $\text{NAD}^+$ . Therefore, the correct answer is C. Final Answer: C

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Answer Option 9:

The reaction that occurs in the forward direction during glycolysis but in the reverse direction during fermentation is  $\text{NAD}^+ + \text{H}^+ + 2\text{e}^- \rightarrow \text{NADH}$ . This is because during glycolysis, glucose is broken down and energy is released, leading to the production of NADH from  $\text{NAD}^+$ . During fermentation, however, NADH is converted back to  $\text{NAD}^+$  to allow glycolysis to continue in the absence of oxygen. Final Answer: C

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Question 29:

'A researcher grows a population of ferns in her laboratory. She notices, after a few generations, a new variant that has a distinct phenotype. When she tries to breed the original phenotype with the new one, no offspring are produced. When she breeds the new variants, however, offspring that look like the new variant result. What originally caused the change in the variant?', A. 'Karyotyping', B. 'Balance polymorphism', C. 'Mutation', D. 'Polyploidy'

=====

Answer Option 1:

A mutation is a change in the DNA sequence, and can lead to changes in the phenotype of an organism. This mutation can lead to an organism that has a different phenotype and cannot breed with the original. Therefore, the cause of the change in the variant would be a mutation. Final Answer: C

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Answer Option 2:

A mutation is a change in the DNA sequence that can lead to a different phenotype. Karyotyping is a method used to identify the number and structure of chromosomes, and doesn't cause a change in the variant. Balance polymorphism wouldn't result in a new phenotype. Polyploidy is an increase in the whole number of chromosomes and would not cause a new phenotype in ferns as they are already polyploid. Therefore, the most likely cause of the change in the new variant is a mutation. Final Answer: C

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Answer Option 3:

A mutation is a permanent change in a DNA sequence and is the only answer choice that can introduce a new variant phenotype. Thus, the answer is C. Karyotyping is a test to identify and evaluate the size, shape, and number of chromosomes. Balance polymorphism is a situation where different versions of a gene are maintained in a population. Polyploidy is a condition in which an organism has more than two complete sets of chromosomes. Final Answer: C

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Answer Option 4:

The description in the question indicates an alteration in genetic material that resulted in a distinct phenotype which is not compatible with the original one, but can reproduce among itself. This implies a mutation or a condition of polyploidy or multiplication of chromosomes. Since ferns are known for being polyploid, the most likely cause for the change in the variant is polyploidy, where an organism has more than two paired (homologous) sets of chromosomes. Final Answer: D

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Answer Option 5:

This sounds like a case of mutation. A mutation is a change in the DNA sequence and can result in a new variant phenotype. This new variant can sometimes be unable to breed with the original population, creating a reproductive barrier, but able to breed among themselves. This is different from karyotyping, which is a technique for looking at an organism's set of chromosomes; balance polymorphism, which involves multiple alleles remaining in the population at relatively stable frequencies; and polyploidy, which involves an organism having more than two complete sets of chromosomes. Therefore, the correct answer is C. Final Answer: C

\*\*\*\*\*

Answer Option 6:

The original cause of the change in the variant is likely a mutation. Karyotyping is a method used to visualize chromosomes, not a cause of genetic variation. Balanced polymorphism is a situation where multiple alleles are maintained in a population, but it does not cause new variants to arise. Polyploidy is a condition of having more than two sets of chromosomes, but it's more commonly seen in plants and is often lethal in animals. In this case, a mutation is the most likely cause of the new variant because it is a permanent change in the DNA sequence that makes up a gene. Therefore, the answer is C. Final Answer: C.

\*\*\*\*\*

Answer Option 7:

A mutation is a change in the DNA sequence that can lead to new traits, such as the new phenotype observed by the researcher. Karyotyping is a laboratory procedure that allows scientists to visualize the chromosomes but doesn't cause changes. Balanced polymorphism involves two or more phenotypes in the same population, but it doesn't cause the change. Polyploidy, the condition of having more than two complete sets of chromosomes, could lead to new phenotypes but usually in plants. In this case, the most likely cause is a mutation, so option C is correct. Final Answer: C

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Answer Option 8:

The formation of a new variant that is unable to breed with the original phenotype but able to reproduce among itself usually results from a significant genetic change. Such a change is typically due to a mutation or polyploidy. Karyotyping is a method of studying chromosomes and wouldn't cause a change in phenotype. Balanced polymorphism is a state of maintaining multiple alleles in a population and doesn't directly lead to the creation of a new variant. A mutation could cause a new phenotype, but it wouldn't usually result in reproductive isolation from the original population. However, polyploidy, which is a condition of having more than two complete sets of chromosomes, can cause sudden significant changes in phenotype and result in reproductive isolation. Final Answer: D

\*\*\*\*\*

Answer Option 9:

The change in phenotype and the inability to produce offspring with the original phenotype suggest that a dramatic genetic change has occurred in the new variant. This could very likely be due to a mutation which is a change in the DNA sequence that can lead to new traits, as in option C. Karyotyping, option A, is a laboratory procedure that allows a look at a person's set of chromosomes and does not cause genetic change. Balanced polymorphism, option B, is the maintenance of two or more phenotypic variants in a population and would not cause such a drastic change. Polyploidy, option D, involves changes in the number of whole sets of chromosomes and could potentially cause such a change but it is less likely than a mutation. Therefore, the correct answer is C. Final Answer: C

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Question 30:

'Which of the following statements most accurately explains what EcoR1 is?', A. 'It is a bacterium that lives in the human large intestine.', B. 'It is the best-studied bacteriophage, a virus that attacks E. coli.', C. 'It is a restriction enzyme extracted from E. coli.', D. 'It is a type of DNA used extensively in research.'

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Answer Option 1:

EcoR1 is a restriction enzyme that was first isolated from Escherichia coli. Its function is to recognize a specific sequence in DNA and cut it at that point. Therefore, option C is correct. Final Answer: C  
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Answer Option 2:

EcoR1 is a restriction enzyme that is found in E. coli. It is used in molecular biology to cut DNA at specific sites. Hence, the answer is C. 'It is a restriction enzyme extracted from E. coli.' Final Answer: C  
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Answer Option 3:

EcoR1 is a restriction enzyme that is found in E. coli. It is commonly used in molecular biology to cut DNA at specific sequences. Therefore, option C is the most accurate description of EcoR1. Final Answer: C  
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Answer Option 4:

EcoR1 is a restriction enzyme that is extracted from E. coli. It is used in molecular biology to cut DNA at specific sites, allowing for the manipulation and analysis of genes. Therefore, option C is the correct answer. Final Answer: C  
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Answer Option 5:

EcoR1 is a restriction enzyme that was first isolated from the bacterium E. coli. Restriction enzymes are used in biotechnology to cut DNA at specific sites, which can be useful for things like DNA cloning or creating a DNA fingerprint. Therefore, the correct answer is C. Final Answer: C  
\*\*\*\*\*

Answer Option 6:

EcoR1 is a restriction enzyme isolated from the bacterium Escherichia coli. It is used extensively in molecular biology as it cuts DNA at specific sequences, allowing scientists to manipulate the DNA in precise ways. Therefore, the correct answer is C. "It is a restriction enzyme extracted from E. coli." Final Answer: C  
\*\*\*\*\*

Answer Option 7:

EcoR1 is a restriction enzyme that was first isolated from E. coli. These enzymes are used extensively in molecular biology because they can cut DNA at specific sequences, allowing for the manipulation and analysis of genes. Therefore, the correct answer is C. Final Answer: C.  
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Answer Option 8:

EcoR1 is a restriction enzyme that is commonly used in molecular biology, specifically for DNA cloning. It is extracted from E. coli, and it recognizes and cuts DNA at a specific sequence. Therefore, the answer is C. 'It is a restriction enzyme extracted from E. coli'. Final Answer: C  
\*\*\*\*\*

Answer Option 9:

EcoR1 is a restriction enzyme that comes from E.coli. A restriction enzyme cuts up foreign DNA, in this case it is specific to the GAATTC sequence. This specificity allows it to be used in biotechnological applications such as DNA cloning. Therefore, the correct answer is C. Final Answer: C  
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Question 31:

'Which of the following pairs of structures is least likely to represent homology?', A. 'The wings of a bat and the arms of a human', B. 'The hemoglobin of a baboon and that of a gorilla', C. 'The mitochondria of a plant and those of an animal', D. 'The wings of a bird and those of an insect'

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Answer Option 1:

D. 'The wings of a bird and those of an insect'

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Answer Option 2:

The wings of a bird and those of an insect (option D) are not homologous structures because they did not evolve from a common ancestral structure. Bird wings evolved from the forelimbs of their dinosaur ancestors, while insect wings have a completely different evolutionary origin. Therefore, the correct answer is D. Final Answer: D

\*\*\*\*\*

Answer Option 3:

Homology refers to similarities in anatomy, structure, or genetics between different species that is due to shared ancestry. In this case, the wings of a bird and those of an insect are not homologous because they are not derived from a common ancestor. Birds are vertebrates while insects are invertebrates, and their wings developed independently due to convergent evolution, not shared ancestry. Therefore, the answer is D. Final Answer: D

\*\*\*\*\*

Answer Option 4:

Homologous structures are those that are similar because they were inherited from a common ancestor. The wings of a bat and the arms of a human are homologous because they share a common skeletal plan. Similarly, the hemoglobin of a baboon and that of a gorilla are homologous because they are similar due to shared ancestry. The mitochondria of a plant and those of an animal also share a common evolutionary origin. In contrast, the wings of a bird and those of an insect are not homologous because they evolved independently. Birds and insects have wings for similar functional reasons (flight), but the structures developed separately and are entirely different in their construction. Final Answer: D

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Answer Option 5:

Homologous structures are ones that have a common origin but may now have different functions or appearances. While the wings of a bat and arms of a human (A), the hemoglobin of a baboon and that of a gorilla (B), and the mitochondria of a plant and those of an animal (C) are all examples of homologous structures - they all have a common ancestral origin. The wings of a bird and those of an insect (D), on the other hand, are not considered homologous because they developed independently, even though they serve similar functions. This is an example of convergent evolution, where similar traits evolve separately in species that do not share a recent common ancestor. Final Answer: D

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Answer Option 6:

Homology refers to similarities between organisms due to shared ancestry. Option A represents homology since bats and humans share a common mammalian ancestor. Option B also represents homology since baboons and gorillas are both primates and share a recent common ancestor. Option C represents homology since both plants and animals contain mitochondria, which are thought to have originated from a common ancestral prokaryote. However, option D does not represent homology. The wings of birds and insects perform similar functions, but they evolved independently, this is an example of convergent evolution, not homology. Therefore, the answer is D. Final Answer: D

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Answer Option 7:

Answer: Homologous structures are those that are similar in different species because of common ancestry. The wings of a bat and the arms of a human (Option A), the hemoglobin of a baboon and that of a gorilla (Option B), and the mitochondria of a plant and those of an animal (Option C) all share common ancestry. However, the wings of a bird and those of an insect (Option D) do not share a common origin. Bird wings evolved from the forelimbs of their ancestors, while insect wings developed from a completely different part of their body. Hence, they are not homologous structures. Final Answer: D

\*\*\*\*\*

Answer Option 8:

Homology refers to the existence of shared ancestry between a pair of structures in different organisms. Wings of a bat and arms of a human (Option A) share a common structural plan because they are both mammals. Hemoglobin of a baboon and that of a gorilla (Option B) is likely to be similar because they are both primates. Mitochondria of a plant and those of an animal (Option C) share a common ancestral origin, from a symbiotic relationship with an ancestral prokaryote. However, the wings of a bird and those of an insect (Option D) are not homologous structures. They are analogous - they serve the same function (flight) but they have evolved independently. Bird wings are modified forelimbs, while insect wings are outgrowths of the exoskeleton. They do not share a common origin. Final Answer: D

\*\*\*\*\*

Answer Option 9:

Homologous structures are those that are similar due to shared ancestry. Wings of a bat and arms of a human have similar bone structure due to shared mammalian lineage, so Option A is incorrect. Hemoglobin of a baboon and a gorilla are similar because they are both primates, so Option B is incorrect. Mitochondria of a plant and an animal likely share a common origin in a primitive eukaryote, so Option C is incorrect. However, the wings of a bird (which are modified forelimbs) and those of an insect (which are outgrowths of the exoskeleton) have different origins, despite serving a similar function. Therefore, Option D is the correct answer. Final Answer: D.

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Question 32:

'The development of an egg without fertilization is known as', A. 'meiosis', B. 'parthenogenesis', C. 'embryogenesis', D. 'vegetative propagation'

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Answer Option 1:

B. 'parthenogenesis'

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Answer Option 2:

B. 'parthenogenesis'

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Answer Option 3:

B. 'parthenogenesis'

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Answer Option 4:

B. 'parthenogenesis'

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Answer Option 5:

The development of an egg without fertilization is known as parthenogenesis. Therefore, the correct answer is B. Final Answer: B

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Answer Option 6:

Answer: The development of an egg without fertilization is known as parthenogenesis. Therefore, the correct answer is B. Final Answer: B.

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Answer Option 7:

The development of an egg without fertilization is known as parthenogenesis. So, the correct answer is B. Final Answer: B

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Answer Option 8:

Answer: The development of an egg without fertilization is known as parthenogenesis. It is a form of asexual reproduction where growth and development of embryos occur without fertilization. So, the correct answer is B. Final Answer: B

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Answer Option 9:

Answer: The development of an egg without fertilization is known as parthenogenesis. This is the term for when an organism is able to reproduce without the need for fertilization. This is not a common occurrence in mammals but it is found in some fish, amphibians, birds and reptiles. The other options are not correct as they do not describe the development of an egg without fertilization. Meiosis is a type of cell division that produces four daughter cells each with half the number of chromosomes of the parent cell. Embryogenesis is the process by which the embryo forms and develops, it does not describe the development of an egg without fertilization. Vegetative propagation is a type of asexual reproduction in plants. Therefore, the correct answer is B. Final Answer: B

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Question 33:

'In minks, the gene for brown fur (B) is dominant over the gene for silver fur (b). Which set of genotypes represents a cross that could produce offspring with silver fur from parents that both have brown fur?',

A. 'BB BB', B. 'BB Bb', C. 'Bb Bb', D. 'Bb bb'

=====

Answer Option 1:

Silver fur is a recessive trait, so both parents must carry at least one recessive allele each to produce an offspring with silver fur. Among the given options, only the cross between two heterozygotes

represented by 'Bb Bb' can produce an offspring with silver fur (bb). Final Answer: C

\*\*\*\*\*

Answer Option 2:

In order for a mink to have silver fur, it must have bb genotype because silver fur is recessive. Thus, both parents must carry the b allele to have a chance of producing offspring with silver fur. Only cross C

(Bb x Bb) meets this requirement. Final Answer: C

\*\*\*\*\*

Answer Option 3:

Answer: In order to produce offspring with silver fur (bb), both parents must carry the recessive gene (b). While both parents can have brown fur, they must be heterozygous (Bb) for this trait, meaning they

carry both the dominant and recessive genes. By this reasoning, the only possible cross that could produce offspring with silver fur from parents that both have brown fur is C. 'Bb Bb'. Final Answer: C

\*\*\*\*\*

Answer Option 4:

In order for offspring to have silver fur, they must inherit the recessive gene (b) from both parents. The only set of genotypes in which both parents have a recessive gene to pass on is 'Bb Bb'. So, the correct

answer is C. Final Answer: C

\*\*\*\*\*

Answer Option 5:

Option C. 'Bb Bb' is the only cross that could produce offspring with silver fur (bb) while both parents have brown fur. BB parents cannot produce silver fur offspring as they have no recessive alleles to pass

on. Similarly, a BB Bb cross could only produce BB or Bb offspring, all with brown fur. A Bb bb cross would also produce silver fur offspring, but one parent would have silver fur, not brown. Final Answer: C

\*\*\*\*\*

Answer Option 6:

To produce offspring with silver fur, both parents must pass on the recessive allele (b). If a parent has the dominant allele (B), that will mask the recessive allele and produce brown fur. Therefore, both

parents must be heterozygous (Bb) to have a chance of producing an offspring with silver fur (bb). Thus, the correct answer is C. Final Answer: C

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Answer Option 7:

The question states that the gene for brown fur (B) is dominant over the gene for silver fur (b). So, if an offspring receives a "b" from both parents, it will have silver fur. The parents that have brown fur could

be either "BB" or "Bb", since "B" is dominant. A cross between two "Bb" parents (option C) could produce an offspring with "bb" genotype, which would result in silver fur. Final Answer: C

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Answer Option 8:

In order for silver fur to appear in offspring, both parents must carry the recessive allele (b). The only set of genotypes that meets this criterion and where both parents have brown fur (since B is dominant) is

represented in option C, where both parents are heterozygous for the trait (Bb Bb). This could result in a 25% chance of offspring with the bb genotype, which would produce silver fur. Final Answer: C

\*\*\*\*\*

Answer Option 9:

The only way for offspring to have silver fur (recessive trait represented by "b") is if they receive the recessive allele from both parents. If both parents have brown fur, they could either be BB (homozygous

dominant) or Bb (heterozygous). The only combination of parents that could produce an offspring with silver fur is if both are heterozygous (Bb), because there is a chance that each parent could pass on the

recessive allele. So, the correct set of genotypes is C. 'Bb Bb'. Final Answer: C

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Question 34:

'Male satin bowerbirds adorn structures that they build, called "bowers," with parrot feathers, flowers, and other bizarre ornaments in order to attract females. Females inspect the bowers and, if suitably impressed, allow males to mate with them. The evolution of this male behavior is due to', A. 'frequency-dependent selection.', B. 'artificial selection.', C. 'sexual selection.', D. 'natural selection.'

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Answer Option 1:

The described behavior of male satin bowerbirds adorning their bowers to attract females for mating is an example of sexual selection, where certain traits or behaviors increase an individual's chance of successful mating. Therefore, the correct answer is C. Final Answer: C

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Answer Option 2:

The behavior described is an example of sexual selection. This is a type of natural selection in which individuals with certain inherited characteristics are more likely than other individuals to obtain mates. In this case, male satin bowerbirds that are more successful at adorning their bowers are more likely to attract a mate and reproduce. Therefore, the correct answer is C. Final Answer: C

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Answer Option 3:

The behavior of male satin bowerbirds described is due to sexual selection. In this case, males with the most attractive bowers are more likely to attract females and reproduce, thus passing on their genes to the next generation. This type of behavior is a form of sexual selection called mate choice, where one sex (usually females) is choosy about their mates. Final Answer: C.

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Answer Option 4:

This is an example of sexual selection, where traits that improve an individual's chances of mating success are favored. The male bowerbirds are actively attracting mates through their bower decoration, a behavior that likely evolved due to female preference. Therefore, the correct answer is C. 'Sexual selection.'

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Answer Option 5:

The evolution of this behavior is due to sexual selection. In this case, the female satin bowerbirds are choosing mates based on certain traits displayed by the males (in this case, the quality of their bowers). This form of sexual selection is known as intersexual selection or mate choice. Therefore, the correct answer is C. Final Answer: C

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Answer Option 6:

The behavior of the male satin bowerbirds is an example of sexual selection. Sexual selection is a type of natural selection where individuals with certain inherited characteristics are more likely than other individuals to obtain mates. In this case, the males that are able to impress the females with their bower decorations are more likely to mate and pass on their genes. Therefore, the correct answer is C. Final Answer: C

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Answer Option 7:

The behavior described is an example of sexual selection, where certain traits are favored because they give individuals an advantage over others in courting and mating. In this case, the male bowerbirds that can build the most impressive bowers and collect the most attractive adornments are more likely to be chosen by females for mating. Hence, this behavior has evolved because it increases the males' reproductive success. Final Answer: C.

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Answer Option 8:

Answer: The bowerbird's behavior of adorning their bowers to attract females for mating is a clear example of sexual selection. Sexual selection is a type of natural selection where individuals with certain inherited characteristics are more likely than other individuals to obtain mates. In this case, the males that build the most impressive bowers are more likely to attract a mate and pass on their genes. Therefore, the correct answer is C. Final Answer: C

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Answer Option 9:

The behavior of male satin bowerbirds is an example of sexual selection. The males are not competing for resources or survival, but they are competing for the opportunity to mate with females. The males that are most successful in attracting females are the ones that will pass their genes on to the next generation. Therefore, the traits that make males more attractive to females (in this case, the ability to build and decorate attractive bowers) become more common in the population over time. Final Answer: C.

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Question 35:

'Which of the following best explains why a population is described as the evolutionary unit?'. A. 'Genetic changes can only occur at the population level.'. B. 'The gene pool in a population remains fixed over time.'. C. 'Natural selection affects individuals, not populations.'. D. 'Individuals cannot evolve, but populations can.'

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Answer Option 1:

D. 'Individuals cannot evolve, but populations can.'

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Answer Option 2:

Answer: The best explanation for why a population is described as the evolutionary unit is option D. Individuals within a population do not evolve; rather, the frequencies of genes in a population change over time, which is the basis for evolution. Populations, therefore, can evolve, not individuals. Final Answer: D

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Answer Option 3:

Answer: The best explanation for why a population is described as the evolutionary unit is that individuals cannot evolve, but populations can. This is because the changes that occur within individuals are not evolution, but rather adaptation or mutation. Evolution is a process that occurs over multiple generations, involving changes in the gene pool of a population over time. Therefore, the correct answer is D. Final

Answer: D

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Answer Option 4:

Answer: The concept "population" is considered the evolutionary unit because only populations, not individuals, can evolve over time. Evolutionary changes are accumulative changes in the genetic makeup of a population over time, which can only be measured by monitoring changes in the collective individuals' genetic makeup within a population. Therefore option D is correct. Final Answer: D

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Answer Option 5:

Answer: Evolution is described as a change in allele frequencies over time in a population. While natural selection acts on individuals, the genetic makeup of the population changes over time due to the survival and reproduction of the most fit individuals. Therefore, even though natural selection affects individuals, it is the population that evolves. An individual cannot evolve during its lifespan. Therefore, a population is described as the evolutionary unit because individuals cannot evolve, but populations can. Final Answer: D

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Answer Option 6:

Answer: Evolution is a process that takes place over generations, not within the lifespan of an individual. Therefore, while individual organisms can have variation and diversity, they cannot evolve. On the other hand, populations, which are made up of many individuals over many generations, can evolve. Changes in the gene pool of a population over generations is the basis of evolution. Therefore, option D is the correct answer. Final Answer: D

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Answer Option 7:

Answer: The evolutionary unit is a population because evolution is a process that happens over generations and involves changes in the frequency of alleles in a population over time. Individuals do not evolve, they can only adapt behaviors during their lifetime. The genetic changes (which are the basis of evolution) occur at the population level over several generations. Therefore, the correct answer is D.

Final Answer: D

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Answer Option 8:

Answer: Evolution is a process of change over time, and it can only be observed in groups of organisms, not individuals. This is because the genetic make-up of a population, not the individual, is what changes over time. Therefore, a population, not an individual, is the smallest unit that can evolve. In other words, while natural selection acts on individuals, evolutionary change occurs in populations.

Therefore, the correct answer is D. Final Answer: D

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Answer Option 9:

The correct answer is D. 'Individuals cannot evolve, but populations can.' Evolution happens over many generations, and affects an entire population, not a single individual. A population is the group of individuals of the same species living in the same area, and is the smallest unit that can undergo evolution. The gene pool of a population changes over time due to processes like mutation, gene flow, genetic drift, and natural selection, so B is incorrect. A is incorrect because while genetic changes in individuals can affect the population, the changes that drive evolution occur within the gene pool of the population. C is incorrect because while natural selection acts on individuals, the result of this selection is seen at the population level. Final Answer: D.

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Question 36:

'If, on average, 46% of the loci in a species' gene pool are heterozygous, then the average homozygosity of the species should be', A. '23%', B. '46%', C. '54%', D. '92%'

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Answer Option 1:

Answer: If 46% of the loci are heterozygous, that means 54% of them would be homozygous, because a locus can only be either heterozygous or homozygous. Therefore, the homozygosity would be 54%.

Final Answer: C

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Answer Option 2:

If on average, 46% of the loci in a species' gene pool are heterozygous, then the remaining percentage would be homozygous. To find this, subtract the percentage of heterozygous loci from 100%.

Therefore, the average homozygosity of the species would be  $100\% - 46\% = 54\%$ . Final Answer: C.

=====

Answer Option 3:

Homozygosity is the opposite of heterozygosity. If 46% of the loci are heterozygous, then the remaining percentage will be homozygous. To find this, you subtract the percentage of heterozygosity from 100%.

Therefore,  $100\% - 46\% = 54\%$ . So, the average homozygosity of the species should be 54%. Final Answer: C

=====

Answer Option 4:

If 46% of the loci in a species' gene pool are heterozygous, then the remaining loci must be homozygous. Homozygosity and heterozygosity always add up to 100% because they represent all of the possibilities for the loci in a gene pool. So if 46% of the loci are heterozygous, then  $100\% - 46\% = 54\%$  of the loci must be homozygous. Final Answer: C

=====

Answer Option 5:

Answer: If 46% of the loci in a species' gene pool are heterozygous, then it means that 54% are homozygous. This is because the total percentage of all types of genes must add up to 100%. So, the average homozygosity of the species should be 54%. Final Answer: C

=====

Answer Option 6:

The average homozygosity of a species can be calculated by subtracting the percentage of heterozygosity from 100%, as all loci should either be homozygous or heterozygous. Therefore, if 46% of loci are heterozygous, then  $100\% - 46\% = 54\%$  of loci should be homozygous. Final Answer: C

=====

Answer Option 7:

Homozygosity refers to the percentage of loci in a gene pool that are homozygous, meaning they carry two copies of the same allele. If 46% of the loci are heterozygous (meaning they carry two different alleles), then the remaining percentage must be homozygous. Therefore, if we subtract the heterozygous percentage from 100%, we find that 54% of the loci are homozygous. So the answer is C. Final

Answer: C

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Answer Option 8:

Homozygosity refers to the state of having identical alleles at a given locus. If 46% of the loci in a species' gene pool are heterozygous (having two different alleles of a particular gene or genes), the remaining percentage must be homozygous. Therefore, the average homozygosity would be  $100\% - 46\% = 54\%$ . Final Answer: C

=====

Answer Option 9:

Homozygosity refers to the state of having two identical alleles for a particular trait. If 46% of the loci are heterozygous (having two different alleles), then  $100\% - 46\% = 54\%$  of the loci are homozygous.

Therefore, the average homozygosity of the species should be 54%. Final Answer: C

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Question 37:

'Which of these is a statement that Darwin would have rejected?', A. 'Environmental change plays a role in evolution.', B. 'The smallest entity that can evolve is an individual organism.', C. 'Individuals can acquire new characteristics as they respond to new environments or situations.', D. 'Inherited variation in a population is a necessary precondition for natural selection to operate.'

=====

Answer Option 1:

Darwin's theory of evolution by natural selection is based on inherited traits, not acquired ones. Therefore, he would have rejected the statement in option B. This statement suggests that an individual organism can evolve, which is incorrect according to Darwin's theory. Evolution occurs at the population level, not the individual level. Final Answer: B

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Answer Option 2:

Darwin would have rejected the statement "The smallest entity that can evolve is an individual organism." Evolution is a process that occurs in populations over generations, not within individual organisms.

Final Answer: B.

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Answer Option 3:

Darwin's theory of evolution is based on natural selection where the individuals with the most advantageous traits have a greater chance of survival and reproduction. This means that evolution occurs at the population level, not the individual level, which means option B ('The smallest entity that can evolve is an individual organism.') is a statement that Darwin would have rejected. Final Answer: B

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Answer Option 4:

Darwin's theory of evolution is based on natural selection, where inherited traits that enhance survival and reproduction become more common in successive generations. He understood that evolution occurs at the level of populations, not individuals. Therefore, the statement "The smallest entity that can evolve is an individual organism" (option B) is one that Darwin would have rejected. Final Answer: B

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Answer Option 5:

Darwin's theory of natural selection is based on inherited variation and the survival of the fittest. He would agree with statements A, C, and D. However, he would reject the statement B, "The smallest entity that can evolve is an individual organism." According to Darwin's theory, evolution is a process that occurs in populations over generations, not in individual organisms. Final Answer: B

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Answer Option 6:

Answer: Darwin would have rejected the statement that "The smallest entity that can evolve is an individual organism." Evolution is a process that takes place at the population level, not within individual organisms. Thus, the correct answer is B. Final Answer: B

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Answer Option 7:

Darwin's theory of evolution by natural selection is based on the fact that populations evolve, not individual organisms. So, he would have rejected statement B. 'The smallest entity that can evolve is an individual organism.' Final Answer: B

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Answer Option 8:

Darwin's theory of evolution by natural selection operates on populations, not individuals. This means that individual organisms do not evolve over their lifetime. Although an individual organism's traits can change in response to the environment (for example, a bodybuilder developing larger muscles), these changes do not affect the organism's genetic code and therefore cannot be passed on to offspring. So, Darwin would have rejected statement B. 'The smallest entity that can evolve is an individual organism.' Final Answer: B

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Answer Option 9:

Darwin's theory of evolution by natural selection is based on the premise that traits are inherited, not acquired during an organism's lifetime. The idea that an individual can acquire new characteristics as they respond to new environments or situations, also known as Lamarckism, was one that Darwin would have rejected. Therefore, the correct answer is C. Final Answer: C

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Question 38:

'Which of the following contributes the MOST to genetic variability in a population?', A. 'Sporulation', B. 'Binary fission', C. 'Vegetative propagation', D. 'Mutation'

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Answer Option 1:

The process that would cause the most genetic variability in a population would be mutation as this introduces new genes to the population. Sporulation, binary fission and vegetative propagation are all forms of asexual reproduction and would not introduce new genes to the population. Therefore, the correct answer is D. Final Answer: D

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Answer Option 2:

Answer: Sporulation, binary fission, and vegetative propagation are all methods that organisms can use to reproduce asexually, meaning they produce clones of themselves which does not increase genetic variability. Mutation, however, is the primary source of genetic variability because it introduces new genes into a population. Therefore, the correct answer is D. Final Answer: D

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Answer Option 3:

Answer: Sporulation, binary fission, and vegetative propagation are all methods of asexual reproduction, which produce genetically identical offsprings. So, they do not contribute to genetic variability. On the other hand, mutations introduce new genetic information into a population and are therefore the main source of genetic variability. Final Answer: D

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Answer Option 4:

Answer: Genetic variability is the tendency of individual genetic characteristics in a population to differ from one another. Sporulation, binary fission, and vegetative propagation are all forms of asexual reproduction, which produce offspring genetically identical to the parent. They do not contribute to genetic variability in a population. On the other hand, mutation, which is a change in DNA sequence, introduces new genetic material into a population, thereby increasing genetic variability. Therefore, the answer is D. Final Answer: D

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Answer Option 5:

Answer: Genetic variability within a population involves changes in the gene frequencies that occur over time within a population. This is a crucial aspect of evolution. Sporulation, binary fission and vegetative propagation are forms of asexual reproduction and contribute to little genetic variability as the offspring are generally identical to the parents. On the other hand, mutations introduce new genetic material into a population, thereby increasing genetic variability. Therefore, the most significant contribution to genetic variability in a population is mutation. Final Answer: D

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Answer Option 6:

Answer: Genetic variability within a population is mainly due to mutations, which are changes in DNA sequences. Sporulation, binary fission, and vegetative propagation are forms of asexual reproduction and they produce offspring that are genetically identical to the parent organism. Therefore, they don't contribute to genetic variability. Thus, the answer is D. 'Mutation'. Final Answer: D

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Answer Option 7:

A. Genetic variability is increased by the process of mutation. While sporulation, binary fission, and vegetative propagation can contribute to variation, they are typically forms of asexual reproduction and thus do not create new combinations of genes. Mutation, on the other hand, can introduce new genetic material and thus create new combinations of genes. Therefore, the correct answer is D. Mutation. Final

Answer: D

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Answer Option 8:

A. The process of genetic variability is primarily driven by mutation, which introduces new genetic material into a population. Sporulation, binary fission, and vegetative propagation are all forms of asexual reproduction, which produce offspring that are genetically identical to the parent. Therefore, they do not contribute to genetic variability. On the other hand, mutation introduces new genes into a population, increasing genetic variability. Hence, the correct answer is D. Mutation. Final Answer: D

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Answer Option 9:

Answer: Genetic variability in a population is brought about by changes in the genetic information. Sporulation, binary fission, and vegetative propagation are all asexual reproduction methods that lead to offspring that are genetically identical to the parent. They do not contribute to genetic variability. Mutation, on the other hand, is a change in the DNA sequence and can introduce new genetic variants into a population. Therefore, it contributes the most to genetic variability. Final Answer: D

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Question 39:

'Which of the following statements most detracts from the claim that the human appendix is a completely vestigial organ?'. A. 'The appendix can be surgically removed with no immediate ill effects.'. B. 'The appendix might have been larger in fossil hominids.'. C. 'The appendix has a substantial amount of defensive lymphatic tissue.'. D. 'Individuals with a larger-than-average appendix leave fewer offspring than those with a below-average-sized appendix.'

=====

Answer Option 1:

A vestigial organ is one that has lost all or most of its original function through evolution. Therefore, if the appendix has a substantial amount of defensive lymphatic tissue, it suggests that it still has a function in the body, detracting from the claim that it is a completely vestigial organ. Final Answer: C

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Answer Option 2:

A vestigial organ is one that has lost all or most of its original function through evolution. Option A, B, and D do not provide any evidence of a function for the appendix. However, option C suggests that the appendix has a function related to the lymphatic system, specifically in defense. This shows that the appendix is not completely vestigial. Final Answer: C

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Answer Option 3:

A vestigial organ is an organ that has lost its function over the course of evolution. If the appendix has a substantial amount of defensive lymphatic tissue, it implies the organ has a functional role in the human body, specifically in the immune system. Thus, statement C detracts the most from the claim that the appendix is a completely vestigial organ. Final Answer: C

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Answer Option 4:

Answer: A vestigial organ is an organ that has lost all or most of its original function in the course of evolution. The statement that most detracts from the claim that the human appendix is completely vestigial is "The appendix has a substantial amount of defensive lymphatic tissue." This implies that the appendix still has a function, which is in the immune system. Therefore, the answer is C. Final Answer: C

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Answer Option 5:

A vestigial organ is an organ that has lost all or most of its original function in the course of evolution. If the appendix has a substantial amount of defensive lymphatic tissue, as stated in option C, it suggests that the appendix still retains some significant function, thus, it is not completely vestigial. Other options A, B, and D do not provide reasons why the appendix is not completely vestigial. Therefore, the final answer is C.

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Answer Option 6:

The statement that 'The appendix has a substantial amount of defensive lymphatic tissue' detracts from the claim that the human appendix is a completely vestigial organ. While the appendix may not serve a crucial role in digestion as it does in other animals, its presence of lymphatic tissue suggests it may play a role in the immune system. The other options present either neutral information or further support the concept of the appendix as a vestigial organ. Final Answer: C

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Answer Option 7:

A vestigial organ is one that was once functional in an organism's ancestors but has since lost its use. Therefore, if the appendix has a substantial amount of defensive lymphatic tissue, it would suggest that it still has a specific function in the immune system and is not completely vestigial. As a result, the statement that most detracts from the claim that the human appendix is a completely vestigial organ is C. 'The appendix has a substantial amount of defensive lymphatic tissue.' Final Answer: C

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Answer Option 8:

Answer: A vestigial organ is one that has no use in the present organism but was used in its ancestor. Option A suggest that the appendix is not used in present humans, option B suggests that the appendix was likely used in our ancestors, option D suggests that a large appendix is detrimental. However, option C suggests that the appendix is used in the current humans to fight off infections. This would be the best answer in detracting from the claim that the appendix is a completely vestigial organ as it suggests that it has a purpose in present humans. Final Answer: C

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Answer Option 9:

A vestigial organ is one that has no purpose within the organism. Option A could be a vestigial organ as it can be removed with no ill effects. Option B could be a vestigial organ as it may have had a purpose once but does not now. Option D could be a vestigial organ as the size does not affect the number of offspring. Option C however, would not be a vestigial organ as it has a purpose in the defense of the organism. Therefore, option C most detracts from the claim that the human appendix is a completely vestigial organ. Final Answer: C

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Question 40:

'According to the heterotroph hypothesis, which event had to occur before oxygen filled the atmosphere?', A. 'Heterotrophs had to remove carbon dioxide from the air.', B. 'Autotrophs, which make their own food, had to evolve.', C. 'Heterotrophs had to evolve.', D. 'Autotrophs had to convert atmospheric nitrogen to nitrate.'

=====

Answer Option 1:

According to the heterotroph hypothesis, the development of autotrophs capable of photosynthesis and the production of oxygen had to occur before oxygen could fill the atmosphere. Therefore, the answer is B. 'Autotrophs, which make their own food, had to evolve'. Final Answer: B

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Answer Option 2:

The heterotroph hypothesis suggests that the first life forms were heterotrophic organisms. However, oxygen didn't fill the atmosphere until autotrophs evolved and started photosynthesis, which releases oxygen as a byproduct. So, the correct answer is B. 'Autotrophs, which make their own food, had to evolve.' Final Answer: B

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Answer Option 3:

The heterotroph hypothesis suggests that the first life forms were heterotrophs, deriving nutrients from organic compounds in their environment. However, the oxygen that fills our atmosphere is primarily a result of photosynthesis, a process carried out by autotrophs. Thus, before oxygen filled the atmosphere, autotrophs, which make their own food, had to evolve (Option B). Final Answer: B

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Answer Option 4:

The heterotroph hypothesis suggests that life began with heterotrophs that obtained organic molecules from the environment and then used them for energy. However, the filling of the atmosphere with oxygen required the evolution of autotrophs that could perform photosynthesis, releasing oxygen as a byproduct. Therefore, the correct answer is B. 'Autotrophs, which make their own food, had to evolve.'

Final Answer: B

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Answer Option 5:

According to the heterotroph hypothesis, life began with the existence of heterotrophs, which are organisms that cannot create their own food and instead obtain food by eating other organisms. However, the buildup of oxygen in the atmosphere could only occur after the evolution of autotrophs, specifically photosynthetic autotrophs, which can use sunlight to convert carbon dioxide and water into glucose and oxygen. Therefore, the correct answer is B. 'Autotrophs, which make their own food, had to evolve.' Final Answer: B

\*\*\*\*\*

Answer Option 6:

The heterotroph hypothesis suggests that life began with organisms that were heterotrophs, meaning they could not produce their own food and relied on the organic material around them. However, before oxygen filled the atmosphere, autotrophs, organisms that can produce their own food through photosynthesis, had to evolve. These autotrophs were able to convert carbon dioxide and sunlight into food and oxygen, thus beginning the process of filling the atmosphere with oxygen. Therefore, the correct answer is B. 'Autotrophs, which make their own food, had to evolve.' Final Answer: B

\*\*\*\*\*

Answer Option 7:

The heterotroph hypothesis is a theory for the origin of life which posits that the first life forms were heterotrophs, organisms that cannot produce their own food and must consume or absorb nutrients. According to this hypothesis, autotrophs, which can produce their own food via processes like photosynthesis (which releases oxygen into the atmosphere) evolved later. So, before oxygen filled the atmosphere, autotrophs had to evolve. Thus the correct answer is B. Final Answer: B

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Answer Option 8:

According to the heterotroph hypothesis, the first life forms were heterotrophs - organisms that cannot synthesize their own food and rely on other organisms for nutrition. These organisms consumed organic molecules from their environment. However, before oxygen could fill the atmosphere, autotrophs - organisms capable of producing their own food from light or inorganic substances (like photosynthetic bacteria and plants) - had to evolve. These organisms introduced oxygen into the atmosphere through the process of photosynthesis. So, the correct answer is B. 'Autotrophs, which make their own food, had to evolve.' Final Answer: B

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Answer Option 9:

The heterotroph hypothesis suggests that life began with organisms that were heterotrophs, organisms that cannot synthesize their own food and rely on complex organic substances for nutrition. According to this hypothesis, autotrophs, which are capable of photosynthesis, appeared later. When autotrophs evolved, they began to use sunlight to convert water and carbon dioxide into glucose and oxygen through photosynthesis. This eventual build-up of oxygen is what eventually filled the atmosphere. So, before oxygen filled the atmosphere, autotrophs had to evolve. Final Answer: B.

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Question 41:

'Two related species evolve in a way that makes them less similar.', A. 'Divergent evolution', B. 'Convergent evolution', C. 'Parallel evolution', D. 'Coevolution'

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Answer Option 1:

Answer: This is an example of divergent evolution where two related species evolve differently and become less similar. Final Answer: A

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Answer Option 2:

Answer: This scenario is describing divergent evolution. Divergent evolution occurs when two related species evolve in different directions, becoming less and less similar over time, often as a result of differing environmental pressures. So, the correct answer is A. Final Answer: A

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Answer Option 3:

The process in which two related species evolve in different directions and become less similar over time is referred to as divergent evolution. Therefore, the correct answer is A. Final Answer: A.

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Answer Option 4:

When two related species evolve in a way that makes them less similar, it is referred to as divergent evolution. This happens when two related species adapt to different environmental conditions and hence evolve differently. So, the correct answer is A. Final Answer: A

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Answer Option 5:

Answer: This is an example of divergent evolution. Divergent evolution is a type of evolution that occurs when two related species evolve in different directions. They become increasingly different over time, often as they adapt to different environments. Therefore, the correct answer is A. Final Answer: A

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Answer Option 6:

Answer: When two species that share a common ancestor become less similar over time, it is known as divergent evolution. This often happens when the two species are separated by geographical barriers and exposed to different environmental pressures. So, the correct answer is A. Final Answer: A

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Answer Option 7:

Answer: When two related species evolve in a way that makes them less similar, they are undergoing divergent evolution. This type of evolution often occurs when related species adapt to different types of environments or ecological niches. Thus, the correct answer is A. Final Answer: A

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Answer Option 8:

The process by which two related species evolve in a way that makes them less similar is called divergent evolution. This is the concept that two species from the same ancestor can become less similar due to changes in the population's gene pool and natural selection. So, the correct answer is A. Final Answer: A

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Answer Option 9:

A. 'Divergent evolution' is the correct answer. This term is used to describe the process in which two or more related species become more and more dissimilar, often as a response to differing habitats or environmental conditions. This is opposed to convergent evolution, where unrelated species become more similar in response to similar environments or other selective pressures. Parallel evolution refers to the independent evolution of similar traits, starting from a similar ancestral condition. Coevolution is the evolution of two or more species which reciprocally affect each other. Final Answer: A

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Question 42:

'Which of the following statements best summarizes evolution as it is viewed today?', A. 'It is goal-directed.', B. 'It represents the result of selection for acquired characteristics.', C. 'It is synonymous with the process of gene flow.', D. 'It is the differential survival and reproduction of the most-fit phenotypes.'

=====

Answer Option 1:

Evolution as it is viewed today is understood to be the differential survival and reproduction of the most-fit phenotypes. This process, known as natural selection, leads to changes in the characteristics of a population over time. Therefore, the correct answer is D. Final Answer: D

\*\*\*\*\*

Answer Option 2:

The statement that best summarizes evolution as it is viewed today is D. 'It is the differential survival and reproduction of the most-fit phenotypes.' The most fit phenotypes are the ones that are most adapted to their environment and therefore have the best chances of survival and reproduction. This process, known as natural selection, is a key mechanism of evolution. Final Answer: D

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Answer Option 3:

Answer: The current view of evolution is that it is the process by which organisms change over time in response to changes in environmental conditions. This process involves natural selection, where individuals with traits that are advantageous in their environment have higher survival and reproductive rates. This is encapsulated by option D, which states that evolution is "the differential survival and reproduction of the most-fit phenotypes". Final Answer: D.

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Answer Option 4:

The theory of evolution as it is understood today is best summarized by option D: 'It is the differential survival and reproduction of the most-fit phenotypes.' This concept, known as natural selection, means that individuals with traits that are beneficial for their environment are more likely to survive and pass on these traits to their offspring. Therefore, over time, these traits become more common in the population. Final Answer: D

\*\*\*\*\*

Answer Option 5:

The best summary of evolution as it is viewed today is "It is the differential survival and reproduction of the most-fit phenotypes." This statement aligns with the theory of natural selection, which is a fundamental concept in evolution. The other options either represent outdated or incorrect views (such as "selection for acquired characteristics") or describe only one aspect of evolutionary processes (such as "gene flow"). Therefore, the correct answer is D. Final Answer: D

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Answer Option 6:

Evolution is the process by which populations change over time due to the differential survival and reproduction of individuals. This concept is most consistent with answer option D. It is not goal-directed (A), does not rely on the acquisition of characteristics (B), and while gene flow can contribute to evolution, they are not synonymous (C). Therefore, the correct answer is D. Final Answer: D

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Answer Option 7:

The statement that best summarizes evolution as it is viewed today is option D. 'It is the differential survival and reproduction of the most-fit phenotypes.' This is because evolution is primarily an outcome of natural selection where the most adapted or "fit" organisms have a better chance of survival and reproduction, thereby passing on their genes to the next generation. The others are not always true. Evolution is not necessarily goal-directed (A), does not primarily result from acquired characteristics (B), and while gene flow can play a role in evolution, it's not synonymous with evolution (C). Final answer: D

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Answer Option 8:

Answer: Evolution is the process through which species undergo changes over generations. These changes are usually brought about by natural selection, a mechanism for evolution wherein the most fit individuals for a specific environment are more likely to survive and reproduce. Thus, the organisms with the most beneficial traits (the "most-fit phenotypes") are the ones more likely to pass their genes onto the next generation. This idea is best represented by Option D. Final Answer: D

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Answer Option 9:

Evolution is the process by which different kinds of living organisms are believed to have developed from earlier forms during the history of the earth. It is not goal-directed as suggested in option A, nor is it the result of acquired characteristics as suggested in option B. Gene flow is a part of evolution but doesn't completely define it as suggested in option C. It is best summarized by option D; evolution is the differential survival and reproduction of the most-fit phenotypes. Final Answer: D

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Question 43:

'Mosquitoes resistant to the pesticide DDT first appeared in India in 1959 within 15 years of widespread spraying of the insecticide. Which of the following statement best explains how the resistant mosquitoes arose?', A. 'Some mosquitoes experienced a mutation after being exposed to DDT that made them resistant to the insecticide. Then their population expanded because these mosquitoes had no competition.', B. 'Some mosquitoes were already resistant to DDT when DDT was first sprayed. Then their population expanded because all the susceptible mosquitoes had been exterminated.', C. 'DDT is generally a very effective insecticide. One can only conclude that it was manufactured improperly.', D. 'Although DDT is effective against a wide range of insects, it is not effective against mosquitoes.'

=====

Answer Option 1:

B. 'Some mosquitoes were already resistant to DDT when DDT was first sprayed. Then their population expanded because all the susceptible mosquitoes had been exterminated.'

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Answer Option 2:

The correct answer is B. 'Some mosquitoes were already resistant to DDT when DDT was first sprayed. Then their population expanded because all the susceptible mosquitoes had been exterminated.' This is a classic example of natural selection, where a small population with a beneficial trait (in this case, resistance to DDT) increases its numbers because it has a survival and reproductive advantage.

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Answer Option 3:

The best explanation for the appearance of DDT-resistant mosquitoes is B. 'Some mosquitoes were already resistant to DDT when DDT was first sprayed. Then their population expanded because all the susceptible mosquitoes had been exterminated.' This description aligns with the principles of natural selection, where individuals with advantageous traits (in this case, DDT resistance) are more likely to survive and reproduce. Final Answer: B

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Answer Option 4:

The correct answer is B. 'Some mosquitoes were already resistant to DDT when DDT was first sprayed. Then their population expanded because all the susceptible mosquitoes had been exterminated.' This is an example of natural selection, where a subset of a population has a beneficial trait (in this case, resistance to DDT) that allows them to survive and reproduce more successfully than other members of the population. Final Answer: B

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Answer Option 5:

The best explanation for the rise of DDT-resistant mosquitoes is given by option B. This is because resistance to a pesticide like DDT is typically a pre-existing genetic trait that provides a survival advantage when the pesticide is used. Mosquitoes with this resistance would survive and reproduce more successfully than non-resistant individuals, leading to an increase in the proportion of resistant mosquitoes in the population. Therefore, Final Answer: B.

\*\*\*\*\*

Answer Option 6:

The correct answer is B. 'Some mosquitoes were already resistant to DDT when DDT was first sprayed. Then their population expanded because all the susceptible mosquitoes had been exterminated.' This explanation aligns with the principles of natural selection and evolution, as it suggests that the alleles conferring resistance to DDT were already present in the mosquito population before DDT was introduced. Once DDT was used, it provided a selective pressure that favored those mosquitoes already carrying the resistance alleles.

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Answer Option 7:

The correct answer is B. 'Some mosquitoes were already resistant to DDT when DDT was first sprayed. Then their population expanded because all the susceptible mosquitoes had been exterminated.' This is an example of natural selection, where the resistant mosquitoes had a survival advantage over the non-resistant mosquitoes when DDT was sprayed. The resistant mosquitoes survived and reproduced, passing on their resistance to their offspring. Hence, over time, the population of resistant mosquitoes expanded.

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Answer Option 8:

The best explanation for the rise of DDT-resistant mosquitoes is found in option B. The concept is based on the principles of natural selection. When DDT was first sprayed, there were probably some mosquitoes that had developed resistance to DDT due to random mutations. When DDT killed off the mosquitoes that were not resistant, the resistant mosquitoes were left to breed without competition, leading to a population of DDT-resistant mosquitoes. Therefore, the correct answer is B. Final Answer: B

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Answer Option 9:

Answer: The question deals with the concept of natural selection. Some mosquitoes were already resistant to DDT before it was sprayed. When DDT was sprayed, the mosquitoes that were not resistant died, leaving only the resistant mosquitoes to reproduce. This led to an increase in the population of DDT-resistant mosquitoes. So, the statement in option B best explains how the resistant mosquitoes arose. Final Answer: B

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Question 44:

DNA sequences in many human genes are very similar to the sequences of corresponding genes in chimpanzees. The most likely explanation for this result is that', A. 'humans and chimpanzees share a relatively recent common ancestor.', B. 'humans evolved from chimpanzees.', C. 'chimpanzees evolved from humans.', D. 'convergent evolution led to the DNA similarities.'

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Answer Option 1:

A. 'humans and chimpanzees share a relatively recent common ancestor.'

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Answer Option 2:

A. 'humans and chimpanzees share a relatively recent common ancestor.'

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Answer Option 3:

A. 'humans and chimpanzees share a relatively recent common ancestor.'

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Answer Option 4:

A. 'humans and chimpanzees share a relatively recent common ancestor.'

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Answer Option 5:

The most likely explanation for the similarity in DNA sequences between many human genes and the corresponding genes in chimpanzees is that humans and chimpanzees share a relatively recent common ancestor. This is reflected in option A. Final Answer: A

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Answer Option 6:

Answer: The DNA sequences in many human genes are very similar to the sequences of corresponding genes in chimpanzees because humans and chimpanzees share a relatively recent common ancestor.

This is because the common ancestor would have had these same traits and passed them down to both species, so therefore the answer is A. Final Answer: A

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Answer Option 7:

Answer: The DNA sequences between humans and chimpanzees being very similar can be explained by the fact that humans and chimpanzees share a common ancestor. This ancestor would have had similar DNA to both humans and chimpanzees therefore leading to the similarities in DNA we see today. This is represented by option A. Final Answer: A

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Answer Option 8:

The statement doesn't suggest that either humans evolved from chimpanzees or vice versa, rather that they share a relative recent common ancestor. The similarity in DNA sequences is not a result of convergent evolution as this occurs when species have different ancestral origins but have developed similar features. So, the most likely explanation is that humans and chimpanzees share a relatively recent common ancestor. Final Answer: A

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Answer Option 9:

Answer: The reason that humans and chimpanzees have similar DNA sequences is due to the fact that they share a recent common ancestor. This ancestor gave both species the same genetic material and so the DNA sequences are very similar. This rules out options B and C which suggests one evolved from the other, and option D which suggests convergent evolution which would not produce such similar DNA sequences. Therefore the correct answer is option A. Final Answer: A

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Question 45:

'Yeast cells carry out both aerobic and anaerobic respiration. A yeast cell that is fed on glucose is moved from an aerobic to an anaerobic environment. Which of the following statements is correct and gives the correct reason for it?', A. 'The cell dies because it cannot make ATP.', B. 'The cell would need to consume glucose at a much greater rate because aerobic respiration is much more efficient as compared with anaerobic respiration.', C. 'The cell would need to consume another food source other than glucose because it will not be able to make adequate ATP with only glucose.', D. 'The cell will begin to divide rapidly because larger cells require more oxygen and glucose than smaller ones.'

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Answer Option 1:

B. 'The cell would need to consume glucose at a much greater rate because aerobic respiration is much more efficient as compared with anaerobic respiration.'

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Answer Option 2:

B. 'The cell would need to consume glucose at a much greater rate because aerobic respiration is much more efficient as compared with anaerobic respiration.'

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Answer Option 3:

Answer: Yeast cells can survive and produce ATP in both aerobic and anaerobic conditions. However, the process of anaerobic respiration (or fermentation) is much less efficient than aerobic respiration and produces less ATP per molecule of glucose. Therefore, to compensate for the decreased ATP production, yeast cells would need to consume glucose at a much higher rate in anaerobic conditions. Thus, the correct answer is B. Final Answer: B

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Answer Option 4:

Answer: When yeast cells are moved from an aerobic to an anaerobic environment, they do not die because they can still produce ATP through anaerobic respiration, also known as fermentation. However, anaerobic respiration is much less efficient than aerobic respiration, and therefore the yeast cells must consume glucose at a much greater rate to produce the same amount of ATP. Hence, option B is the correct answer. Final Answer: B

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Answer Option 5:

The correct answer is B. 'The cell would need to consume glucose at a much greater rate because aerobic respiration is much more efficient as compared with anaerobic respiration.' When yeast cells are in an anaerobic environment, they resort to a process called fermentation, which is less efficient at producing ATP compared to aerobic respiration. Therefore, to maintain energy levels, they need to consume glucose at a much higher rate in an anaerobic environment compared to an aerobic one. Final Answer: B

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Answer Option 6:

Answer: Yeast cells are capable to perform both aerobic (with oxygen) and anaerobic (without oxygen) respiration. In an anaerobic environment, they carry out fermentation which is less efficient than aerobic respiration in terms of ATP production. Hence, the yeast cells would need to consume glucose at a much greater rate to make up for the less efficient production of ATP. The answer is option B. Final Answer: B

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Answer Option 7:

Anaerobic respiration, or fermentation, in yeast cells is less efficient than aerobic respiration and produces less ATP per molecule of glucose. Therefore, to maintain the same energy output, the cell would need to consume glucose at a much greater rate in an anaerobic environment compared to an aerobic environment. Thus, the correct answer is B. 'The cell would need to consume glucose at a much greater rate because aerobic respiration is much more efficient as compared with anaerobic respiration.' Final Answer: B

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Answer Option 8:

A yeast cell can switch from aerobic to anaerobic respiration when moved to an anaerobic environment. Though aerobic respiration produces more ATP per molecule of glucose, anaerobic respiration can still produce ATP albeit at a much less efficient rate. In the absence of oxygen, the cell will utilize glucose in a much more rapid rate to compensate for the less efficient ATP production. Thus, the correct answer is B. 'The cell would need to consume glucose at a much greater rate because aerobic respiration is much more efficient as compared with anaerobic respiration.' Final Answer: B

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Answer Option 9:

- A. 'The cell dies because it cannot make ATP.' - This is incorrect. Even in anaerobic conditions, yeast cells can make ATP through fermentation.
- B. 'The cell would need to consume glucose at a much greater rate because aerobic respiration is much more efficient as compared with anaerobic respiration.' - This is correct. In the absence of oxygen, yeast cells will switch to anaerobic respiration, or fermentation, which is less efficient at producing ATP than aerobic respiration. Therefore, to maintain the same energy output, the cell would need to consume glucose at a much higher rate.
- C. 'The cell would need to consume another food source other than glucose because it will not be able to make adequate ATP with only glucose.' - This is incorrect. Yeast cells can produce ATP anaerobically from glucose through the process of fermentation.
- D. 'The cell will begin to divide rapidly because larger cells require more oxygen and glucose than smaller ones.' - This is incorrect. The size of a cell does not necessarily determine its rate of division.

Final Answer: B.

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Question 46:

'A researcher conducts a survey of a biome and finds 35 percent more species than she has found in any other biome. Which biome is she most likely to be in?', A. 'Tundra', B. 'Tiaga', C. 'Tropical rainforest', D. 'Temperate deciduous forest'

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Answer Option 1:

The biome with the greatest biodiversity (variety of species) is typically the tropical rainforest. Final Answer: C

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Answer Option 2:

Tropical rainforests are known for their high biodiversity, containing a large number of species compared to other biomes. So the researcher is most likely in a tropical rainforest. Final Answer: C

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Answer Option 3:

The tropical rainforest biome is known to have the highest biodiversity, with many more species than any other biome. So, the researcher is most likely to be in a tropical rainforest. Final Answer: C

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Answer Option 4:

The tropical rainforest biome is known for its incredible biodiversity and is home to many more species than any other biome. So, the researcher is most likely to be in a tropical rainforest. Final Answer: C

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Answer Option 5:

Tropical rainforests are known for their high biodiversity and are often home to more species than any other biome. Therefore, the researcher is most likely in a tropical rainforest if she has found 35 percent more species than in any other biome. Final Answer: C

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Answer Option 6:

Answer: Tropical rainforests are known for their high biodiversity, with a greater variety of plant and animal species than any other biome. Therefore, the researcher is most likely in a tropical rainforest. Final

Answer: C.

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Answer Option 7:

The tropical rainforest biome is known for its incredible biodiversity. It contains a significantly higher number of species compared to other biomes. Therefore, the researcher is most likely in a tropical rainforest. Final Answer: C

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Answer Option 8:

Tropical Rainforests are known to be the most biodiverse biome on earth, containing a large percentage of the world's species. Therefore, the researcher most likely found the abundance of species in the Tropical Rainforest. Final Answer: C.

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Answer Option 9:

The tropical rainforest is known to have the highest biodiversity, or number of species, of any biome on Earth. It is the most likely biome for the researcher to be in if she is finding a significantly higher number of species than in any other biome. Therefore, the correct answer is C. Final Answer: C

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Question 47:

'Which statement about variation is true?', A. 'All phenotypic variation is the result of genotypic variation.', B. 'All genetic variation produces phenotypic variation.', C. 'All nucleotide variability results in neutral variation.', D. 'All new alleles are the result of nucleotide variability.'

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Answer Option 1:

Answer: All new alleles are indeed the result of nucleotide variability. Changes in nucleotides can result in different alleles for a given gene. So, option D is correct. Final Answer: D

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Answer Option 2:

- A. This statement is not entirely true, phenotypic variation can also result from environmental factors.
- B. This statement is also not entirely true, as some genetic variations do not cause any observable changes in the phenotype.
- C. This is not true, nucleotide variability can also result in positive or negative selection.
- D. This statement is the most accurate: all new alleles are indeed the result of nucleotide variability.

Final Answer: D

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Answer Option 3:

Answer: Not all phenotypic variation is due to genotypic variation as environmental factors can influence phenotype too, so option A is incorrect. Not all genetic variation leads to phenotypic variation, as some genes do not affect observable traits, so option B is incorrect. Not all nucleotide variability results in neutral variation because some changes in nucleotides can lead to significant changes in phenotype, making option C incorrect. All new alleles are indeed the result of nucleotide variability because changes in nucleotides are what create new versions of genes (alleles), so option D is correct. Final Answer: D

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Answer Option 4:

Answer: Not all phenotypic variation is the result of genotypic variation, as environment can also cause phenotypic variation (option A is incorrect). Not all genetic variation produces phenotypic variation, as some genetic differences do not affect phenotype (option B is incorrect). Not all nucleotide variability results in neutral variation, as some changes in nucleotides can have major effects on the function of the gene (option C is incorrect). All new alleles are the result of nucleotide variability, as a change in a nucleotide sequence can create a new version of a gene, which would be a new allele (option D is correct).

Final Answer: D

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Answer Option 5:

Answer: Not all phenotypic variation is the result of genotypic variation because the environment can also cause phenotypic variation (Option A is incorrect). Not all genetic variation produces phenotypic variation. Some genetic changes are silent and do not produce any noticeable changes in the phenotype (Option B is incorrect). Not all nucleotide variability results in neutral variation. Some nucleotide changes can have significant effects (Option C is incorrect). Option D is correct. New alleles are created through changes in the DNA sequence of a gene, which can be caused by mutations, insertions, deletions, and duplications. Final Answer: D

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Answer Option 6:

Variation is a key component of evolution, driving natural selection and speciation. Statement D, "All new alleles are the result of nucleotide variability," is true. Alleles are different versions of a gene, and any new allele originates from some form of nucleotide change, whether it's a mutation, insertion, deletion, or substitution. Meanwhile, options A, B, and C are not universally true as not all genotypic variations result in phenotypic changes, not all genetic variation results in phenotypic variation as some genes may be silent or redundant, and not all nucleotide variability results in neutral variation as it can lead to negative or positive outcomes too. Final Answer: D

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Answer Option 7:

Final Answer: D. 'All new alleles are the result of nucleotide variability.'

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Answer Option 8:

Answer: While genetic information plays a crucial role in determining phenotype, there are also many other factors involved such as environmental conditions, therefore option A is incorrect. Similarly, not all genetic variation will lead to changes in phenotype, hence option B is also incorrect. All nucleotide variability does not result in neutral variation, as some nucleotide changes can have significant effects, thus option C is incorrect. However, new alleles do come from alterations in the sequence of nucleotides in DNA, making option D the correct answer. Final Answer: D

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Answer Option 9:

While all of these choices involve aspects of variation, the only statement that is absolutely true is choice D. Not all phenotypic variation is the result of genotypic variation (as environment can also influence phenotype), not all genetic variation produces a visible change in phenotype, and not all nucleotide variability results in neutral variation. However, all new alleles are indeed the result of nucleotide variability, as an allele is just a different form of a gene, and these differences arise from changes in the nucleotides that make up the gene. Final Answer: D

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Question 48:

'Which of the following best explains why people can digest starch but cannot digest cellulose even though both molecules are composed of glucose monomers?'; A. 'The bonds linking the monomers of starch differ in shape from the bonds linking the monomers of cellulose.', B. 'Molecules of starch are much smaller than molecules of cellulose.', C. 'Starch is an intracellular molecule, while cellulose is an extracellular molecule.', D. 'Starch is hydrated by water, but cellulose is not.'

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Answer Option 1:

A. 'The bonds linking the monomers of starch differ in shape from the bonds linking the monomers of cellulose.'

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Answer Option 2:

A. 'The bonds linking the monomers of starch differ in shape from the bonds linking the monomers of cellulose.'

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Answer Option 3:

A. 'The bonds linking the monomers of starch differ in shape from the bonds linking the monomers of cellulose.'

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Answer Option 4:

A. 'The bonds linking the monomers of starch differ in shape from the bonds linking the monomers of cellulose.'

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Answer Option 5:

A. 'The bonds linking the monomers of starch differ in shape from the bonds linking the monomers of cellulose.'

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Answer Option 6:

Answer: Starch and cellulose are both polysaccharides made of glucose subunits linked together by glycosidic bonds. However, the orientation of these bonds in cellulose is different compared to the ones in starch. Humans have enzymes that can break down the alpha glycosidic bonds in starch but not the beta glycosidic bonds in cellulose. That's why humans can digest starch, but can't digest cellulose. So, the correct answer is A. Final Answer: A

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Answer Option 7:

The reason people can digest starch but not cellulose, even though both are made of glucose monomers, is because of the different shapes of the bonds linking the monomers. In starch, the glucose units are joined by alpha-1,4-glycosidic linkages, which can be broken down by human digestive enzymes. In cellulose, however, the glucose monomers are linked by beta-1,4-glycosidic linkages, which cannot be broken down by human digestive enzymes. Therefore, the correct answer is option A. Final Answer: A

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Answer Option 8:

The difference in digestibility between starch and cellulose, both of which are composed of glucose monomers, lies in the type of bonds that link these monomers. In starch, glucose units are joined by alpha-1,4-glycosidic bonds, which can be broken down by enzymes in our digestive tract. In contrast, in cellulose, glucose units are joined by beta-1,4-glycosidic bonds. Humans lack the enzyme to break down these beta linkages, making cellulose indigestible. Therefore, the correct answer is A: 'The bonds linking the monomers of starch differ in shape from the bonds linking the monomers of cellulose.'

Final Answer: A

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Answer Option 9:

A. 'The bonds linking the monomers of starch differ in shape from the bonds linking the monomers of cellulose.' is correct. Even though both starch and cellulose are composed of glucose monomers, the bonds linking these monomers in cellulose are different from those in starch. This difference in bond types means that humans have enzymes that can break down the bonds in starch (alpha bonds), but not those in cellulose (beta bonds). Final Answer: A

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Question 49:

'In humans, fertilization normally occurs in the', A. 'ovary', B. 'fallopian tube', C. 'uterus', D. 'placenta'

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Answer Option 1:

In humans, fertilization normally occurs in the B. 'fallopian tube'.

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Answer Option 2:

Answer: Fertilization in humans normally occurs in the Fallopian tube. Therefore, the correct answer is B. Final Answer: B

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Answer Option 3:

In humans, fertilization typically occurs in the fallopian tubes. Final Answer: B

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Answer Option 4:

Fertilization in humans normally occurs in the fallopian tube. Final Answer: B

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Answer Option 5:

Answer: In humans, fertilization, which is the process where the sperm cell joins with the egg, normally occurs in the fallopian tube. Final Answer: B

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Answer Option 6:

In humans, fertilization normally occurs in the fallopian tube. Therefore, the correct answer is B. Final Answer: B

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Answer Option 7:

In humans, fertilization, which is the union of a sperm cell and an egg cell, normally occurs in the B. 'fallopian tube'.

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Answer Option 8:

Answer: Fertilization in humans normally occurs in the fallopian tubes. Once an egg has been released from the ovary during ovulation, it moves into the fallopian tube where it can meet with sperm to be fertilized. Therefore, the correct answer is B. Final Answer: B

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Answer Option 9:

Fertilization in humans typically occurs in the Fallopian tubes. This is where the sperm meets the released egg for conception. Therefore, option B is the correct answer. Final Answer: B

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Question 50:

'Which of the following is a biotic factor that could affect the growth rate of a population?', A. 'Volcanic eruption', B. 'Glacier melting', C. 'Destruction of the ozone layer', D. 'Sudden reduction in the animal food resource'

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Answer Option 1:

Biotic factors are living or once-living organisms in the ecosystem. These are factors that affect population of organisms. Therefore, a sudden reduction in the animal food resource is a biotic factor that could affect the growth rate of a population. Final Answer: D

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Answer Option 2:

A biotic factor is a factor that influences an ecosystem and is a living or once living organism. A volcanic eruption, glacier melting, and destruction of the ozone layer are all abiotic factors (non-living) factors that affect an ecosystem. A sudden reduction in the animal food resource is a biotic factor because it involves a direct interaction with a living organism. Therefore the final answer is D.

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Answer Option 3:

A biotic factor refers to a living thing that affects or influences the ecosystem. Among the given options, a sudden reduction in the animal food resource would be considered a biotic factor because it involves a change in the organisms within the ecosystem. On the other hand, volcanic eruption, glacier melting, and destruction of the ozone layer are all abiotic factors, which are non-living physical and chemical elements in the ecosystem. Therefore, the correct answer is D. Final Answer: D

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Answer Option 4:

A biotic factor refers to living components that can affect an organism or an entire ecosystem. A sudden reduction in the animal food resource is a biotic factor that might influence the growth rate of a population. This is because it directly involves the interaction between living organisms. A volcanic eruption, glacier melting, and the destruction of the ozone layer are all abiotic factors, which are non-living physical and chemical elements in the ecosystem. Final Answer: D

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Answer Option 5:

Biotic factors are the living components of an ecosystem that have the ability to influence or affect its growth and survival. In the provided options, A, B, and C are all abiotic factors, which are non-living physical and chemical elements in an ecosystem. Option D, "Sudden reduction in the animal food resource," is a biotic factor as it directly relates to the living component (food resource) of the ecosystem. Therefore, the correct answer is D. Final Answer: D

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Answer Option 6:

Biotic factors are living or once-living organisms in the ecosystem. These are factors that affect the population of organisms. Of the options provided, the only biotic factor would be a sudden reduction in animal food resource. This could definitely affect the growth rate of a population. Therefore, the correct answer is D. Final Answer: D

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Answer Option 7:

A biotic factor is a living component that affects another organism, or shapes the ecosystem. This includes the organisms themselves, their food, and their interactions. In the options provided, only D. 'Sudden reduction in the animal food resource' can be classified as a biotic factor, since food resources are living organisms or products of living organisms. Final Answer: D

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Answer Option 8:

A biotic factor refers to a living component that affects another organism, or shapes the ecosystem. This can include animals, plants, fungi, etc. Among the given options, the only one that is a biotic factor is D. 'Sudden reduction in the animal food resource'. The rest options A, B, and C are abiotic factors which refer to non-living physical and chemical elements in the ecosystem. Final Answer: D

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Answer Option 9:

Biotic factors refer to the living components that affect an organism or ecosystem, including the interactions between organisms. The options A, B, and C are all abiotic factors, which refer to non-living physical and chemical elements in the ecosystem. Option D, 'Sudden reduction in the animal food resource', is a biotic factor because it involves the interaction with other organisms (food sources). Therefore, the correct answer is D. Final Answer: D

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