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WGU Introduction to Biology (KBC1, C190) Exam

WGU Introduction-to-Biology

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QUESTION NO: 1

A freshwater plant cell is placed in a solution containing a much higher solute concentration than the cell's cytoplasm. The cell membrane is permeable to water but not to the dissolved solute. What will most likely happen first?

A. Water moves out of the cell.

B. Water moves into the cell.

C. Solute moves into the cell by osmosis.

D. The cell wall dissolves into the solution.

ANSWER: A

Explanation:

Water moves out of the cell is correct. The surrounding solution is hypertonic relative to the cytoplasm because it contains a higher concentration of nonpenetrating solute. By osmosis, water moves across the selectively permeable membrane from the region with lower solute concentration to the region with higher solute concentration. As water leaves, the plant cell loses turgor pressure, and its plasma membrane may pull away from the cell wall. Water would move into the cell only if the external solution were hypotonic.

QUESTION NO: 2

Two populations of the same bird species live in the same forest. One population breeds only in early spring, while the other breeds only in late summer. The birds rarely produce offspring together even though they could physically mate. What type of reproductive isolation is occurring?

A. Behavioral isolation

B. Geographic isolation

C. Temporal isolation

D. Reduced hybrid fertility

ANSWER: C

Explanation:

Temporal isolation is correct because the populations reproduce at different times. Their different breeding seasons prevent gene flow before fertilization can occur, making this a prezygotic reproductive barrier. Behavioral isolation would involve differences in courtship signals or mating behaviors. Geographic isolation would require a physical barrier separating the populations. Reduced hybrid fertility occurs after offspring are produced and therefore would not explain the lack of mating described here.

QUESTION NO: 3

A biologist is comparing evidence for common ancestry among several vertebrate species. Which **two** observations would provide the strongest evidence that two species share a relatively recent common ancestor? **Select two.**

A. Highly similar DNA sequences in the same genes

B. Homologous limb bones with a similar underlying arrangement

C. Use of the same habitat and food source

D. Similar body mass as adults

E. Structures with similar functions but different internal anatomy

ANSWER: A B

Explanation:

A highly similar DNA sequence and homologous anatomical structures with the same underlying arrangement are correct. Species that diverged more recently generally have had less time to accumulate differences in inherited DNA sequences. Homologous structures share an underlying anatomical pattern because they were inherited from a common ancestor, even when their current functions differ. Similar habitats can produce analogous structures through convergent evolution, so a shared function alone is weaker evidence of close ancestry. Similar body size can result from many environmental and developmental influences and does not directly establish common ancestry.

QUESTION NO: 4

Which **two** observations provide evidence supporting the endosymbiotic origin of chloroplasts? **Select two.**

A. Chloroplasts contain circular DNA

B. Chloroplasts divide in a manner similar to binary fission

C. Chloroplasts are assembled from endoplasmic reticulum vesicles

D. Chloroplast DNA is enclosed in a membrane-bound nucleus

ANSWER: A B

Explanation:

Chloroplasts contain their own **circular DNA** and reproduce by a process resembling **binary fission**, both features shared with bacteria. These observations support the hypothesis that chloroplasts descended from photosynthetic prokaryotes that became incorporated into ancestral eukaryotic cells. Chloroplasts are not assembled as vesicles from the endoplasmic reticulum, and their genetic material is not organized as linear chromosomes within a nucleus. Although many chloroplast proteins are encoded by nuclear genes and imported into the organelle, that fact does not eliminate the organelle's bacterial features.

QUESTION NO: 5

A gardener performs a **monohybrid cross** on two **heterozygous** orange-fruited tomato plants. The **recessive phenotype** is yellow fruit. What percentage of offspring will produce **yellow** tomatoes?

A. 25%

B. 50%

C. 75%

D. 100%

ANSWER: A

Explanation:

25% is correct. Let O represent the dominant allele for orange fruit and o represent the recessive allele for yellow fruit. Because each orange-fruited parent is heterozygous, each has the genotype Oo. In a monohybrid cross of Oo × Oo, each parent can pass either O or o to an offspring. The possible offspring genotypes are OO, Oo, Oo, and oo. Only the oo genotype has two recessive alleles and therefore produces the recessive yellow-fruit phenotype. One of the four equally likely genotype combinations is oo, which corresponds to 1/4, or 25%, of the offspring. This illustrates Mendel's principle of

segregation: the two alleles for a gene separate during gamete formation, so each gamete carries one allele. The predicted 25% is a probability for a large number of offspring; the actual result in a small group may differ by chance. For an overview of Mendelian inheritance and monohybrid crosses, see OpenStax Biology 2e: Characteristics and Traits and NHGRI: Genotype.