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1 | THE STUDY OF LIFE

REVIEW QUESTIONS

1 What is a suggested and testable explanation for an event called?

A Discovery

B Hypothesis

C Scientific method

D Theory

Solution The solution is (B). A hypothesis is a testable explanation for an event.

2 Which branch of science is NOT considered a natural science?

A Astronomy

B Biology

C Computer science

D Physics

Solution The solution is (C). Computer science is a practical and scientific approach to computation and its application. It is not considered a natural science.

3 What is the name for the formal process through which scientific research is checked for originality, significance, and quality before being accepted into the scientific literature?

A Publication

B Public speaking

C Peer review

D Scientific method

Solution The solution is (C). Peer review is the process in which scientific papers are reviewed by experts in the scientist's field to ensure that a scientist's research is original, significant, logical, and thorough.

4 What are (i) two topics that are likely to be studied by biologists and (ii) two areas of scientific study that would fall outside the realm of biology?

A (i) diseases affecting humans, pollution affecting species' habitat; (ii) calculating surface area of rectangular ground, functioning of planetary orbits

B (i) calculating surface area of rectangular ground, functioning of planetary orbits; (ii) formation of metamorphic rocks, galaxy formation and evolution

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C (i) plant responses to external stimuli, functioning of planetary orbits; (ii) formation of metamorphic rocks, galaxy formation and evolution

D (i) plant responses to external stimuli, study of the shape and motion of physical objects; (ii) formation of metamorphic rocks, galaxy formation and evolution

Solution The solution is (A). Diseases affecting humans and pollution affecting species are two topics that can be studied by biologists, while calculating the surface area of a rectangular plot of land and the function of planetary orbits are two topics that fall outside of the realm of biology.

5 Which statement is an example of deductive reasoning?

A Most swimming animals use fins; therefore, fins are an adaptation to swimming.

B Mitochondria are inherited from the mother; therefore, maternally inherited traits are encoded by mitochondrial DNA.

C Small animals lose more heat than larger animals. One would not expect to find wild mice in the North and South Poles.

D Water conservation is a major requirement to survive in the desert. Large leaves increase loss of water by evaporation. Therefore, desert plants should have smaller leaves.

Solution The solution is (D). Water conservation is a major requirement to survive in the desert. On plants, broad, thin leaves lose more water to evaporation than smaller, thicker leaves. Therefore, desert plants should have smaller leaves. The answer best demonstrates how a general principle or law is used to forecast specific results.

6 Why are viruses NOT considered living?

A Viruses are not made of cells.

B Viruses do not have genetic material.

C Viruses have DNA and RNA.

D Viruses are obligate parasites and require a host.

Solution The solution is (A). Viruses are not made up of cells. They are made up of DNA or RNA surrounded by a protein coat. Biologists characterize living organisms as being composed of cells.

7 The presence of a membrane-enclosed nucleus is a characteristic of what?

A Bacteria

B Eukaryotic cells

C All living organisms

D Prokaryotic cells

Solution The solution is (B). Unlike prokaryotic cells, eukaryotic cells contain a membrane-bound nucleus.

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8 What is a group of individuals of the same species living in the same area called?

A A community

B An ecosystem

C A family

D A population

Solution The solution is (D). A population is a group of individuals that belong to the same species, live in a particular geographical area, and have the capability to interbreed.

9 Which sequence represents the hierarchy of biological organization from the most inclusive to the least complex level?

A Biosphere, ecosystem, community, population, organism

B Organelle, tissue, biosphere, ecosystem, population

C Organism, organ, tissue, organelle, molecule

D Organism, community, biosphere, molecule, tissue, organ

Solution The solution is (A). The biosphere is the highest level, which is the most inclusive, and the organism is the lowest level and least inclusive in the given hierarchy.

10 Where in a phylogenetic tree would you expect to find the organism that had evolved most recently?

A At the base

B At the nodes

C At the branch tips

D Within the branches

Solution The solution is (C). The "tips" of the tree branches represent the recently evolved taxa.

11 What is a characteristic that is NOT present in all living things?

A Homeostasis and regulation

B Metabolism

C Nucleus containing DNA

D Reproduction

Solution The solution is (C). A nucleus containing DNA is not present in all living organisms.

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CRITICAL THINKING QUESTIONS

12 Is mathematics a natural science? Explain your reasoning.

A No, it is not a natural science because it is not used in the study of the natural world.

B No, it is not a natural science. Mathematics focuses on understanding mathematical relations and calculations, which is useful in natural sciences but which is distinct.

C Yes, it is a natural science. Mathematics deals with verifying the experimental data.

D Yes, it is a natural science. It uses chemical and physical measurements.

Solution The solution is (B). No, it is not a natural science. Mathematics does not involve measuring aspects of the natural world.

13 Although the scientific method is used by most of the sciences, it can also be applied to everyday situations. A situation is given below. Using the scientific method try to arrange the given steps in the correct order. Situation:

1. If the car doesn't start the problem might be in the battery.

2. Car doesn't start.

3. After changing the battery. Car starts working.

4. The car should start after charging the battery or changing the battery.

5. The car doesn't start because the battery is dead.

6. The car doesn't start even after charging the battery, the battery must have stopped working.

A 1, 2, 3, 4, 5, 6

B 2, 1, 3, 4, 5, 6

C 2, 1, 5, 4, 6, 3

D 2, 1, 5, 6, 3, 4

Solution The solution is (C). 2, 1, 5, 4, 6, 3 is the correct sequence of the situation given.

14 Read questions 1 through 4.

Question 1. Is macaroni and cheese tastier than broccoli soup?

Question 2. Are hummingbirds attracted to the color red?

Question 3. Is the moon made out of green cheese?

Question 4. Is plagiarism dishonest?

Which questions lend themselves to investigation using scientific methods? In other words, is the hypothesis falsifiable (can be proven false)?

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