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Question: 1

The U.S. Centers for Disease Control released this 3-D graphical representation of the HINI influenza virus. Approximately five million Americans were infected with this virus during a four-month period in 2009.

Which of the following is NOT true of the HINI virus?

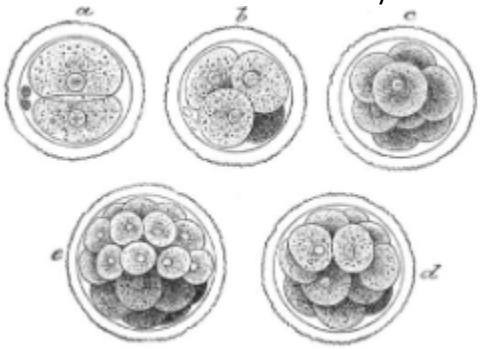
A. It cannot reproduce on its own.
B. It lacks ribosomes.
C. It lacks both DNA and RNA.
D. It does not grow or undergo division.

Answer: C

Explanation:
Unlike cells, viruses do not reproduce on their own, do not have ribosomes, and do not grow or divide. This eliminates choices A B, and D. Viruses do contain DNA or RNA (never both). Therefore, HINI does NOT lack both DNA and RNA Therefore, choice C is correct.

Question: 2

During human fertilization, a single-celled zygote is formed. This cell divides, and the daughter cells continue to divide until an embryo is formed.



Which of the following BEST describes this process of cell division?

A. It produces daughter cells with half the number of chromosomes as the parent cell.

B. It takes place during the S phase of interphase.
C. It takes place during the GI phase of interphase.
D. It produces daughter cells with the same number of chromosomes as the parent cell.

Answer: D

Explanation:
The type of cell division described in this question is mitosis, which occurs after interphase. This eliminates choices B and C. During mitosis, the daughter cells that are produced are identical to the parent cell, and contain the same number of chromosomes. This eliminates choice A. Therefore, choice D is correct.

Question: 3

Most of the cells in the human body continually undergo mitosis so that dead or damaged cells can be replaced. The diagram below shows the phases of mitosis.

Which of the following lists the four basic phases of mitosis in the order in which they occur?

A. prophase, metaphase, anaphase, telophase
B. interphase, prophase, anaphase, telophase
C. interphase, metaphase, prophase, telophase
D. metaphase, anaphase, telophase, prophase

Answer: A

Explanation:
Interphase occurs before mitosis. This eliminates choices B and C. The correct order of the phases following interphase is prophase, metaphase, anaphase, and telophase. Therefore, the correct answer is A.

Question: 4

Scientists have discovered a single-celled organism, and need to classify it as either a prokaryote or a eukaryote. Which of the following structures, if present, would indicate that the organism is a eukaryote?

A. mitochondria
B. DNA
C. plasma membrane
D. cytoplasm

Answer: A

Explanation:
Both prokaryotic and eukaryotic cells contain DNA and cytoplasm, and both are enclosed by a plasma membrane. This eliminates choices B, C, and D. Prokaryotic cells lack a nucleus and membrane-bound organelles such as mitochondria. Therefore, choice A is correct.

Question: 5

Cell membranes are selectively permeable. Some solutes move freely across cell membranes, while other solutes require assistance from special gates. Passive transport and active transport are methods of moving solutes across cell membranes. Which of the following accurately describes the difference between passive transport and active transport?

A. Passive transport can move molecules both in and out of a cell, but active transport cannot.
B. Passive transport works against a concentration gradient, but active transport does not.
C. Passive transport does not require energy, but active transport does.
D. Passive transport requires carrier proteins, but active transport does not.

Answer: C

Explanation:
Both passive transport and active transport can move molecules in and out of cells. Passive transport moves solutes along a concentration gradient, while active transport moves solutes against a concentration gradient. Both passive and active transport require carrier proteins. This eliminates choices A, B, and D. Since active transport moves solutes against a concentration gradient it requires energy. Passive transport moves solutes along a concentration gradient, and does not require energy. Therefore, choice C is correct.

Question: 6

The nervous system of an adult human consists of more than one billion nerve cells. The diagram below shows a typical neuron.
Which of the following BEST describes the functions of the neuron's structures?

A. Dendrites carry impulses toward the cell body, and axons carry impulses away from the cell body.
B. Axons carry impulses toward the cell body, and dendrites carry impulses away from the cell body.
C. Both dendrites and axons carry impulses toward the cell body.
D. Both dendrites and axons carry impulses away from the cell body.

Answer: A

Explanation:

Electrical impulses flow from the dendrites to the cell body, and then down the axon. Dendrites receive impulses and relay them to the cell body. This eliminates choices B and D. Axons carry impulses away from the cell body. This eliminates choice C. Therefore, the correct answer is A.

Question: 7

Which of the following is NOT a difference between normal cell division and cancer cell division?

A. Normal cells recognize signals that tell them to stop and start the cell cycle, but cancer cells do not.
B. Normal cells can invade other tissues, but cancer cells cannot.
C. In normal cells DNA is replicated correctly, but in cancer cells DNA is mutated.
D. Normal cells communicate with each other, but cancer cells do not.

Answer: B

Explanation:
Normal cells recognize signals that tell them to start and stop the cell cycle, they replicate DNA correctly, and they communicate with each other, while cancer cells do not. This eliminates choices A C, and D. Cancer cells can invade other tissues, but normal cells cannot.

Question: 8

Pepsin is an enzyme produced by the lining of the stomach that aids in the digestion of proteins. Which of the following BEST describes the role of pepsin in protein digestion?

A. Pepsin separates the nucleotides in base pairs.
B. Pepsin severs the peptide bonds between amino acids.
C. Pepsin separates the glycerol from fatty acids.
D. Pepsin separates the glucose from fructose.

Answer: B

Explanation:
Choice A refers to nucleotides, which are structural components of nucleic acids, not proteins. Choice C refers to glycerol and fatty acids, which are structural components of lipids, not proteins. Choice D refers to glucose and fructose, which are carbohydrates. Pepsin aids in the digestion of proteins by severing the peptide bonds that join amino acids into long chains. Therefore, choice B is correct.

Question: 9

Scientists often form hypotheses based on particular observations. Which of the following is NOT true of a good hypothesis?

A. A good hypothesis is complex.
B. A good hypothesis is testable.

C. A good hypothesis is logical.
D. A good hypothesis predicts future events.

Answer: A

Explanation:
A good hypothesis is testable and logical, and can be used to predict future events. A good hypothesis is also simple, not complex.

Question: 10

During a lab activity, a biology student was instructed to examine various prepared slides under a microscope. The student noted his observations in the chart below.

Observation	Slide 1	Slide 2	Slide 3
Nuclear Membrane	Yes	No	Yes
Cell Membrane	Yes	Yes	Yes
Cell Wall	No	Yes	Yes
Chloroplast	No	No	Yes
Ribosome	Yes	Yes	Yes

Which of the following is a valid conclusion based on the student's observations?

A. Slides I and 2 are slides of eukaryotes, and slide 3 is a slide of a prokaryote.
B. All three slides are slides of eukaryotes.
C. Slides 1 and 3 are slides of eukaryotes, and slide 2 is a slide of a prokaryote.
D. Slides 1 and 3 are slides of prokaryotes, and slide 2 is a slide of a eukaryote.

Answer: C

Explanation:
Eukaryotes have nuclear membranes, but prokaryotes do not. Therefore, slides 1 and 3 are slides of eukaryotes, and slide 2 is a slide of a prokaryote.

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