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QUESTION 1

How many solutions does the equation have?

$\sqrt{2+x} \quad x = 0$

A. 3

B. 2

C. 1

D. 0

Correct Answer: C

A solution to an equation is a value that when plugged in yields a true statement. Begin by isolating the square root and squaring both sides to eliminate it:

$\sqrt{2+x} - x \rightarrow 2 + x - x^2$

Move all of the terms to one side and factor to solve for x:

x2 ? x ? 2 = 0 –andgt; (x + 1) (x ? 2) = 0 –andgt; x = ?1, x = 2

Check for extraneous solutions by plugging both solutions into the original equation:

$\sqrt{2+(-1)} - (-1) - 0$

–andgt; 2 ? 0, so x = ?1 is extraneous. –andgt; 0 = 0, so x = 2 is a solution. The equation has only 1 solution.

QUESTION 2

Coughs that linger after a cold or sinus problem cause constant disruption in the home, school, and workplace. Often, these dry, nonproductive coughs become increasingly troublesome although other symptoms ?fever, congestion, and fatigue ?resolved days or weeks ago. This stubborn cough persists for weeks, and plagues its victim and the victim\\'s family night and day. The diagnosis might be a common, but overlooked cause of lingering cough: atypical pneumonia caused by mycoplasma. Mycoplasma ? pleomorphic bacteria that lack a cell wall ?are the smallest and simplest self-replicating organisms known to humans. They probably evolved from gram-positive, walled eubacteria by degenerative evolution. Smaller than amoebas, these 0.1-micrometer organisms grow and reproduce slowly and require no oxygen or host cell. They also change shapes asymmetrically, appearing as long, thin filaments, tiny spheres, or branches. Scientists have identified more than 100 mycoplasma species. Fifteen species are known to live in humans, most as normal symbiotic flora. Mycoplasma pneumoniae, previously called "walking pneumonia," is pathogenic in humans. Mycoplasma pneumoniae glides freely and uses its specialized filamentous tips to burrow between cilia within the respiratory epithelium, causing the respiratory epithelial cells to slough. It also produces hydrogen peroxide, which causes initial cell disruption in the respiratory tract and damages erythrocyte membranes. Researchers have determined that more than 40% of infants younger than 1 year old have had a mycoplasma infection. By age 5, approximately 65% of children have been infected. Nearly all adults have been infected at least once, often repeatedly. Mycoplasma pneumonia usually affects people younger than 40 years of age. The highest incidence is found in the 5- to 9-year age group. The risk of contracting mycoplasma pneumonia is greatest for people who live or work in crowded areas, such as daycare facilities, schools, homeless shelters, long-term care units, and military and prison environments. However, many people who develop mycoplasma infections have no identifiable risk factor. Most mycoplasma infections cause mild to moderate clinical symptoms, but the infection incubates over 3 weeks and can last weeks without treatment. This

infection cannot be diagnosed based on symptoms alone; laboratory testing is essential. Infection can also cause ear infections, sinus infections, bronchitis, croup, severe sore throats, infectious asthma, and 1 type of the common cold. When mycoplasma infects children, about 25% of them develop nausea, vomiting, or diarrhea.

The tone of the passage can best be described as:

A. contemptuous

B. judgmental

C. matter-of-fact

D. solemn

Correct Answer: C

For the most part, the author refrains from injecting personal opinion or emotion and solely deals with the topic of mycoplasma and its pathogenesis in an objective manner. Statistics and facts are presented without additional commentary on those facts. This is indicative of a matter-of-fact treatment of the subject.

QUESTION 3

In photosynthesis, high-energy electrons in Photosystem II are transferred along an electron transport chain and eventually end up in high-energy molecules used in the Calvin Cycle. Which molecule provides electrons to replace those lost by Photosystem II after light stimulation?

A. CO2

B. FADH2

C. NADPH

D. ATP E. H2O

Correct Answer: E

Water and carbon dioxide are the two essential consumable molecules in photosynthesis. First, water is split into oxygen, protons, and electrons, and then carbon dioxide is used in the Calvin cycle to create glucose. The electrons from splitting water are used in photosystem II, the protons are used to create NADPH, and oxygen is a waste product of the splitting of water.

QUESTION 4

Solve for y in the following equation if x = -3 y = x + 5

A. y = -2

B. y = 2

C. y = 3

D. y = 8

Correct Answer: B

y = x + 5, and you were told that x = -3. Fill in the missing information for x, then solve: y = (-3) + 5y = 2

QUESTION 5

Find:

$$\lim_{x \to 2} \frac{x^2 - x - 4}{2x^2 + 4x + 5}$$

A. -2/21

B. 10

C. -5/3

D. 35

Correct Answer: A

$$\lim_{x \to 2} \frac{x^2 - x - 4}{2x^2 + 4x + 5}$$

$$\lim_{x \to 2} \frac{2^2 - 2 - 4}{2(2)^2 + 4(2) + 5}$$

$$\lim_{x \to 2} \frac{-2}{21}$$