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**QUESTION 1**

How many solutions does the equation have?

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

- 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:

$$x^2 - x - 2 = 0 \text{ --andgt; } (x + 1)(x - 2) = 0 \text{ --andgt; } x = -1, x = 2$$

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

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

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

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**QUESTION 2**

Which cells make up the insulated wrapping on axons?

- A. Schwann cells
- B. astrocytes
- C. microglia
- D. macrocytes

Correct Answer: A

Axons are surrounded by insulating cells called Schwann cells. This insulation enables action potentials to travel rapidly throughout the nervous system.

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**QUESTION 3**

Which algebraic expression best represents the following statement: the number of books Brian read over the summer

(B) is 2 less than 3 times the number of books his brother Adam read over the summer (A)?

A.  $B = 3A - 2$

B.  $B = 3A + 2$

C.  $A = 3B - 2$

D.  $A = 3B + 2$

Correct Answer: A

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#### QUESTION 4

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.

It is probable that mycoplasma pneumonia is most common in crowded areas because:

A. they evolved from eubacteria primarily infect children.

B. they lack a cell wall, they glide freely, and they produce hydrogen peroxide.

C. they require no oxygen or host cell, they are very small, and they are able to burrow between cilia.

D. they have no identifiable risk factor and incubate over 3 weeks.

Correct Answer: C

As the passage states, mycoplasma "require no oxygen or host cell," "glides freely," and "uses its specialized filamentous tips to burrow between cilia within the respiratory epithelium." It is implied that mycoplasma's point of contact with humans is via the respiratory tract. In crowded areas, large groups of people share a small amount of air, and sneezes, coughs, etc., can very easily lead to the transmission of mycoplasma.

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**QUESTION 5**

Since 1997, the American Heart Association (AHA) has attempted to increase awareness about cardiovascular disease (CVD) among women. Fortunately, great progress has been made to educate individuals about CVD and its consequences. According to the AHA's 2011 Guidelines for Prevention of Cardiovascular Disease in Women, the misconception that CVD is a "man's disease" has been somewhat disproved, as awareness among the general public increased from 30% in 1997 to 54% in 2009. Unfortunately, CVD continues to be the leading cause of death in the United States for both men and women. Since 1984, the number of deaths related to CVD in women exceeded those in men. In the United States, CVD death rates among women aged 35 to 54 years appear to be increasing by 1% annually, which is most likely attributable to the escalating obesity epidemic. According to the AHA, even though CVD is the number 1 cause of death among women, only 13% of women perceive CVD as a health threat. CVD is responsible for more deaths among women than the next 3 leading causes of death combined, including all forms of cancer. Due to the ongoing prevalence of CVD, increasing awareness and understanding of CVD, especially among the female population, is still a top priority for many health care professionals. As one of the most accessible health care professionals, pharmacists are in a pivotal position to educate and inform their patients of the risks associated with CVD, possible drug therapies, and preventive measures. The AHA has set a goal for 2020 to improve cardiovascular health in all Americans by 20%, while reducing deaths from CVD and stroke by 20%. According to the American Heart Association, in the United States a woman dies of some form of CVD every minute and more than 1 in 3 females have some form of CVD. Studies have demonstrated that gender differences may play an important role in the diagnosis, treatment, and prevention of CVD. Unfortunately, many women may not always recognize the warning signs and symptoms of a heart attack because they sometimes appear more subtle when compared with those typically experienced by men. Results from a study of 515 women who had heart attacks report that 43% did not experience any type of chest pain or pressure during the heart attack. Although the classic symptoms include chest pain, tingling in the left arm, sweating, and shortness of breath, women may also experience some "atypical" symptoms, such as extreme fatigue, nausea, dizziness, indigestion, vomiting, and pain in the neck or back. By learning and recognizing the warning signs, women can take a proactive approach to their cardiovascular health and get treatment earlier to prevent further complications.

The main idea of the passage can best be summarized as

- A. raising awareness of the dangers of CVD to women.
- B. educating Americans on the importance of cardiovascular health.
- C. providing women with statistics regarding CVD.
- D. describing the causes, effects, and treatment of CVD.

Correct Answer: A

While the introductory paragraph states the importance of raising awareness in the general public, it also mentions the misconception that CVD is a "man's disease," and goes on to describe the subtle differences between the experiences of males and females when suffering from CVD. The author makes a point of these differences and highlights the importance of educating women in particular on the subject.

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