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**QUESTION 1**

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 primary purpose of this passage is:

A. to give background information about mycoplasma

B. to describe the dangers of mycoplasma

C. to provide details on how mycoplasma primarily infects children

D. to trace the cause of the common cold

Correct Answer: A

The passage starts with a possibly unknown connection between a lingering cough and mycoplasmic bacteria. It then moves into a description of mycoplasma, its size, shape, and prevalence, before then describing who it infects and where these infections are likely to occur. All of this serves as general, background information of mycoplasma.

**QUESTION 2**

A 50mL solution of HCl is diluted to 250mL at 10M. What was the initial concentration of the HCl?

A. 500M

B. 50M

C. 5M

D. 0.5M

Correct Answer: B

The product of the initial concentration and the initial volume is equal to the product of the final concentration and the final volume of the solution. This can be remembered as: c1 ?v1 = c2 ?v2 Substitute the known quantities and solve for the unknown: c1 : c1 ?50mL = 10M ?250mL ?gt; c1 = 50M

**QUESTION 3**

What is the osmotic pressure of a 2M NaCl solution at 0 degrees C?

A. 44.8 atm

B. 45.5 atm

C. 0 atm

D. 97 atm

Correct Answer: A

Calculate osmotic pressure using: ? = MRT, where ? is pressure, M is the molar concentration of the dissolved solution, R is the ideal gas constant (0.08206 L atm mol?1 K?1), and T is temperature in Kelvins. Substituting and solving: ? = 2 × 0.08206 × 273.15 = 44.8 atm.

**QUESTION 4**

What is the slope of the line passing through (2, 5) and (-1, -4) points?

A. 5

B. 6/5

C. 3

D. -1/2

Correct Answer: C

The slope (m) of the line can be calculated by using the following equation:

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

$$m - \frac{-4 - 5}{-1 - 2}$$

$$m = \frac{-9}{-3} = 3$$

**QUESTION 5**

Which is the most inferior structure?

A. stomach

B. sigmoid colon

C. pancreas

D. small intestine

Correct Answer: B

Inferior refers to the area nearest the feet. Its opposite is superior, which refers to the area nearest the top of the head. In this case, the stomach is superior to both the pancreas and the small intestine which are both superior to the sigmoid colon. The sigmoid colon is nearest the feet of the options.