Vendor:PCAT

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Exam Name: Pharmacy College Admission Test

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QUESTION 1

Lead ?non-biodegradable, soft, malleable, as well as heat and corrosion resistant ?is environmentally omnipresent. Its known properties make it an ideal metal for automobiles, paint, smelting, ceramics, and plastics. Not many years ago, it was also utilized in the toy industry. Unfortunately, lead is toxic to humans. Humans neither need lead nor derive benefits from it. Although lead toxicity has been a global concern since the industrial revolution in the late 1800s, civilization has been unable to prevent or control it satisfactorily. Overall incidence of lead poisoning among American children has fallen from 4.4% in the early 1990s to 1.4% in 2004. In 2002, around 10 out of every 100,000 of adults had lead toxicity. Venous blood lead levels (BLLs) of 10 mcg/dL and 25 mcg/dL were considered toxic in children and adults, respectively. But, since any level of lead can cause toxicity, the CDC announced a new, lower reference value for children in June 2012: 5 mcg/dL. Infants and children absorb a higher fraction of lead than adults do when exposed, increasing their vulnerability. Approximately 450,000 American children have BLLs >5 mcg/dL. Consequently, lead poisoning is still a problem. Lead exposure can start with prenatal maternal-fetal transmission. Outside the womb, children may inhale (or eat) lead dust, often present in street debris, soil, and most frequently, aged house paint. Lead-based paint was phased out in the 1970s, lowering, but not eliminating, risk of exposure. Old pipes sometimes leach lead into drinking water. Lead hazards are disproportionately found in low-income housing. Adults rarely develop lead poisoning, but risk is increased for industrial workers who use or manufacture lead-based products. Health care providers use many tests to identify lead poisoning. In addition to the BLL, a blood smear may show basophilic stippling ribosomal clusters. Increased urinary aminolaevulinic acid concentrations are also reliable indicators. Plain film radiographs can reveal visible lead lines in patients\\' long bones. Astute clinicians sometimes diagnose lead poisoning after seeing a blue line along patients\\' gums (Burton\\'s line) that forms when lead reacts with sulfur ions released by oral bacteria. Lead affects every organ system and causes an unpredictable variety of symptoms. The nervous system is most sensitive (centrally in children, peripherally in adults), but lead affects hematopoietic, hepatic, and renal systems, producing serious disorders. Acute lead poisoning\\'s classic symptoms include colic, encephalopathy, anemia, neuropathy, and Fanconi syndrome (abnormal glucose, phosphates, and amino acid excretion). Sometimes, classic signs and symptoms are absent, confusing the clinical picture.

Why are infants and children more vulnerable to lead poisoning?

A. They can absorb a greater fraction of lead than adults with the same exposure.

B. The CDC announced a new, lower reference value for children.

C. They can become exposed through prenatal maternal-fetal transmission.

D. Because 450,000 American children have BLLs >5 mcg/dL.

Correct Answer: A

The passage mentions that children exposed can absorb a "higher fraction of lead."

QUESTION 2

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.

In context, the word "pivotal" in paragraph 3 most nearly means

A. determining

B. crucial

C. important

D. central

Correct Answer: D

The author describes pharmacists as being in a pivotal position to educate and inform patients of the risks associated with CVD due to their accessibility. While pharmacists are certainly important in transmitting this information, because of their accessibility, they are crucial, or central, to raising awareness of CVD.

QUESTION 3

What will be the genotype of the gametes produced by a Tt individual?

A. All Tt

B. 1/2 T and 1/2 t

C. 1/2 Tt and 1/2 tT

D. All t

E. All T

Correct Answer: B

Gametes are haploid and have only one allele. Half the gametes from this individual will have the T allele and half will have the t allele.

QUESTION 4

255 feet of fencing is needed to enclose a rectangular-shaped back yard. If the yard is 32 feet wide, what is the length?

A. 121 ft

B. 36.56 ft

C. 95.5 ft

D. 0.521 ft

Correct Answer: C

The perimeter of a rectangle can be calculated by using the following equation:

P = 2L + 2W, where P = perimeter, L = length, W = width

P = 2L + 2W 255 = 2L + 2 ?32 255 - 64 = 2L 191 = 2L L = 95.5 ft

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QUESTION 5

Lead ?non-biodegradable, soft, malleable, as well as heat and corrosion resistant ?is environmentally omnipresent. Its known properties make it an ideal metal for automobiles, paint, smelting, ceramics, and plastics. Not many years ago, it was also utilized in the toy industry. Unfortunately, lead is toxic to humans. Humans neither need lead nor derive benefits from it. Although lead toxicity has been a global concern since the industrial revolution in the late 1800s, civilization has been unable to prevent or control it satisfactorily. Overall incidence of lead poisoning among American children has fallen from 4.4% in the early 1990s to 1.4% in 2004. In 2002, around 10 out of every 100,000 of adults had lead toxicity. Venous blood lead levels (BLLs) of 10 mcg/dL and 25 mcg/dL were considered toxic in children and adults, respectively. But, since any level of lead can cause toxicity, the CDC announced a new, lower reference value for children in June 2012: 5 mcg/dL. Infants and children absorb a higher fraction of lead than adults do when exposed, increasing their vulnerability. Approximately 450,000 American children have BLLs >5 mcg/dL. Consequently, lead poisoning is still a problem. Lead exposure can start with prenatal maternal-fetal transmission. Outside the womb, children may inhale (or eat) lead dust, often present in street debris, soil, and most frequently, aged house paint. Lead-based paint was phased out in the 1970s, lowering, but not eliminating, risk of exposure. Old pipes sometimes leach lead into drinking water. Lead hazards are disproportionately found in low-income housing. Adults rarely develop lead poisoning, but risk is increased for industrial workers who use or manufacture lead-based products. Health care providers use many tests to identify lead poisoning. In addition to the BLL, a blood smear may show basophilic stippling ribosomal clusters. Increased urinary aminolaevulinic acid concentrations are also reliable indicators. Plain film radiographs can reveal visible lead lines in patients\\' long bones. Astute clinicians sometimes diagnose lead poisoning after seeing a blue line along patients\\' gums (Burton\\'s line) that forms when lead reacts with sulfur ions released by oral bacteria. Lead affects every organ system and causes an unpredictable variety of symptoms. The nervous system is most sensitive (centrally in children, peripherally in adults), but lead affects hematopoietic, hepatic, and renal systems, producing serious disorders. Acute lead poisoning\\'s classic symptoms include colic, encephalopathy, anemia, neuropathy, and Fanconi syndrome (abnormal glucose, phosphates, and amino acid excretion). Sometimes, classic signs and symptoms are absent, confusing the clinical picture.

What is NOT a test to detect lead poisoning?

A. aminolaevulinic

B. blood smear

C. BLL

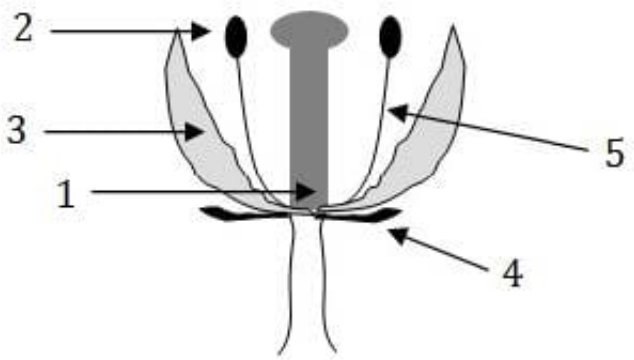
D. radiographs

Correct Answer: A

This is not the name of a test or a method for detecting lead poisoning. It may be a word from the passage, but it does not answer the specific question posed. The other answer choices are all mentioned as tests for detecting lead poisoning.

QUESTION 6

The structures composed solely of diploid cells:



A. 1, 2, and 3

B. 3, 4, and 5

C. 1, 4, and 5

D. 2, 3, and 4

E. 1, 2, and 4

Correct Answer: B

In flowering plants, the anthers house the male gametophytes (which produce sperm) and the pistils house the female gametophytes (which produce eggs). Eggs and sperm are haploid. All other tissues are solely diploid.

QUESTION 7

What is the third derivative of -3sin(x)?

A. -3cosx

B. 3cosx

C. -3sinx

D. 3sinx

Correct Answer: B

Recall that the derivative of sin(x) = cos(x) and the derivative of cos(x) = -sin(x). First derivative: -3 ?cos(x). Second

derivative: -3 ?(-sin(x)) = 3sin(x). Third derivative: 3 ?cos(x).

QUESTION 8

$\int_{\pi}^{2\pi} \sin x \, dx =$

A. $2\int_0^{\pi/2} \cos x \, dx$

B. $\int_{\pi}^{2\pi} \cos x \, dx$

C. $-2\int_0^{\pi/2} \cos x \, dx$

D. $\int_0^{\pi} \cos x \, dx$

=

A. Option A

B. Option B

C. Option C

D. Option D

Correct Answer: C

QUESTION 9

Cyanide is a poison that binds to the active site of the enzyme cytochrome c and prevents its activity. Cyanide is a(n):

A. Prosthetic group

B. Cofactor

C. Reverse regulator

D. Coenzyme

E. Inhibitor

Correct Answer: E

Enzyme inhibitors attach to an enzyme and block substrates from entering the active site, thereby preventing enzyme activity. As stated in the question, cyanide is a poison that irreversibly binds to an enzyme and blocks its active site, thus fitting the definition of an enzyme inhibitor.

QUESTION 10

When blood flow to human tissue is interrupted, the lack of sufficient blood supply is called ischemia. If ischemia is not restored quickly, the affected tissue may undergo a process called infarction, which involves a series of chemical changes that damage the tissue. The lack of blood supply results in lack of oxygen, and thus lactic acidosis. Mitochondrial dysfunction results. Microscopic examination and chemical analysis of ischemic cells reveal membrane degeneration, excessive calcium (Ca+) inside the cell, and free radical formation, accompanied by a reactive inflammation and free fatty acid formation. A research experiment is designed to evaluate the response of infarcted tissue to intra-arterial administration of an antioxidant. Preliminary results demonstrate that follow-up evaluation of tissue exposed to intra-arterial antioxidant injection resulted, on average, in a smaller area of infarcted tissue after seven days when compared to controls without exposure to the antioxidant. It was noted that 70% of the patients who demonstrated smaller areas of infarction also had a notable decease in edema of the ischemic tissue lasting about 6 to 10 hours after injection.

How could lactic acid production and free fatty acid formation contribute to organelle dysfunction?

A. The acidity of these molecular products, when uncorrected, alters the cell\\'s pH beyond that which the cell can compensate for. Organelles, containing proteins, denature as a result.

B. Lactic acid production and free fatty acid formation function like free radicals, altering the structure of the molecular components of the organelles.

C. Lactic acids and free fatty acids crowd the organelles within the cells, preventing them from communicating with each other in the cytoplasm.

D. Lactic acids and free fatty acids are hydrophobic and thus can enter the membranes of the organelles, disrupting their function.

Correct Answer: A

In small quantities, lactic acids and free fatty acids are tolerable due to the cell\\'s ability to buffer mild pH changes. However, in an ischemic setting, the cell cannot correct the pH changes, and thus the proteins that form the structural and functional components of the organelles begin to denature. Lactic acids and free fatty acids are acidic, meaning that they contribute hydrogen atoms to the environment, whereas free radicals are deficient in electrons. Although the volume of acidic molecules within the cell is not beneficial for the organelles, their pH is their most harmful characteristic and thus the most immediately damaging consequence. Free fatty acids are hydrophobic and thus may be able to pass through organelle membranes, but they cause organelle dysfunction from outside the organelle in the cytoplasm as well.

QUESTION 11

If (x) = 3x and g(x) = 2x2, what is g((-2))?

A. 24

B. -72

C. 48

D. 72

Correct Answer: D

First evaluate f(?2): 3(?2) = ?6

Next evaluate g(?6): 2(?6)2 = 2 × 36 = 72

QUESTION 12

Bile mainly helps in the digestion of:

A. Fats

B. Proteins

C. Carbohydrates

D. Bile pigments

Correct Answer: A

Bile (or gall) is a bitter, greenish-yellow alkaline fluid secreted by the liver of most vertebrates. It helps in the complete digestion of fats by reducing surface tension. It also activates the enzyme lipase. It serves as a good solvent for fats and fat-splitting enzymes. Bile also helps in absorption of carbohydrates, fats, fat soluble vitamins and proteins.