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Exam Name:Medical College Admission Test: Verbal Reasoning, Biological Sciences, Physical Sciences, Writing Sample

Version:Demo

QUESTION 1

Saul Hoffman's scientific journal paper published in 2015 in *Societies* explores the relationship between two topics that at the surface are very distant from each other. As he goes on to state, "It is relatively easy, at least for an economist, to see why economists would be attracted to issues like teen pregnancy and teen childbearing, despite their apparent distance from the core topics of economics. First, economics — especially microeconomics — is fundamentally the study of choices that individuals make, traditionally and most often in formal markets with monetary prices, but now more and more frequently outside that sphere. Viewed from that perspective, choices involving sexual and fertility behavior among teens are an incredibly challenging, but inviting, target. Is it possible to identify the role of economic incentives, including government policy, on these behaviors? Is it sensible to apply traditional models of rational choice decision-making to teens?"

Second, the traditional concern about teen fertility was predicated on the notion that it was an economically catastrophic act. In a famous and oft-quoted 1968 article, Arthur Campbell wrote that "The girl who has an illegitimate child at the age of 16 suddenly has 90 percent of her life's script written for her," including reduced opportunities for schooling, the labor market, and marriage. But it doesn't take too much reflection to appreciate that more may be going on in leading to these poor outcomes than just a teen birth. Disentangling the causal effect of teen childbearing on subsequent socio-economic outcomes from its correlational effect is another deliciously inviting and challenging target, this time well-suited for the applied economist or econometrician.

Just to make all this yet more inviting, the two research strands are closely related. Suppose it could be demonstrated that for some teens the socio-economic impact of a teen birth was negligible. For example, maybe future prospects for some teens were equally poor with or without a birth or perhaps government programs provided substantial benefits, so that the net impact on socio-economic well-being was consequently small or even positive. Then, it might well be "rational" in an economic sense to have a teen birth in the first place, thereby linking the research on the causal impact of a teen birth with the research on the choice determinants of a teen birth. So what came to be known as the teen birth "causes" literature and the teen birth "consequences" literature were clearly interrelated.

And then, to add yet another layer of challenge, the teen fertility rate in the U.S. has fallen at a rate that is totally unprecedented. Teen fertility was once widespread, with most of it occurring within early and sometimes not entirely voluntary marriage. In 1960, the teen fertility rate was approximately 90 births per 1000, which implied that more than 40% of women ever had a teen birth. When I published my first article on teen births 25 years ago, the teen fertility rate was 60 births per 1000, down one-third from 1960, but it had increased six years in a row in what turned out to be a deviation from the downward trend. Since then the rate has declined every single year, except for a short but puzzling uptick between 2005 and 2007. In 2014, the teen fertility rate was 24.2 births per 1000, the lowest teen fertility rate ever recorded in the U.S., though still shockingly high by European standards. Thus, the rate fell by more than 50% during my professional association with the topic and by 70% since 1960. Of course, at the same time teen marital births largely disappeared, falling from 85% of teen births to 12%.

This adds yet another focus for economic research. Why did the rate fall? Did it have anything to do with changes in the costs of teen childbearing or changes in policy? Is it a good thing or not?

In this article I try to make sense out of these various research strands by providing a personal narrative through the economics literature on teen childbearing, with a special emphasis on the three issues discussed above. My goal is to make the literature, including some reasonably technical content, accessible and valuable to a non-economist."

Hoffman, S. (2015). Teen Childbearing and Economics: A Short History of a 25-Year Research Love Affair. *Societies*, 5(3), 646-663. doi:10.3390/soc5030646

According to passage information, a scholar interested in microeconomics might study all of the following EXCEPT:

- A. which environmental factors make a city dweller more likely to litter.
- B. the reasons behind college students' choices to spend their time studying vs. socializing.

C. how divorce influences real estate prices and choices.

D. how recent college graduates prioritize cost versus convenient location in choosing an apartment.

Correct Answer: C

This Reasoning-Beyond-the-Text question asks you to understand the passage definition of microeconomics. We are told it is "the study of choices that individuals make, traditionally and most often in formal markets with monetary prices, but now more and more frequently outside that sphere." This option mentions choices, but is primarily focused on large-scale markets, (not on the reasons behind individual actions) and their relationship to the variable "divorce". A ?incorrect. This concerns individual choices and outside influence on them. B ?This is incorrect. This concerns a cost-benefit analysis over how to use a limited resource, in this case, time, and how this influences the choice that college students ultimately make. D ?incorrect. This is another example of studying how people with limited resources rank various priorities in order to arrive at an economic choice.

QUESTION 2

In which part of the spectrum is an electromagnetic wave with wavelength 532 nm?

A. visible

B. infrared

C. microwave

D. ultraviolet

Correct Answer: A

The wavelength 532 nm is used for green laser pointers.

QUESTION 3

Our sense of smell is arguably the most powerful of our five senses, but it also the most elusive. It plays a vital yet mysterious role in our lives. Olfaction is rooted in the same part of the brain that regulates such essential functions as body metabolism, reaction to stress, and appetite. But smell relates to more than physiological function: its sensations are intimately tied to memory, emotion, and sexual desire. Smell seems to lie somewhere beyond the realm of conscious thought, where, intertwined with emotion and experience, it shapes both our conscious and unconscious lives.

The peculiar intimacy of this sense may be related to certain anatomical features. Smell reaches the brain more directly than do sensations of touch, sight, or sound. When we inhale a particular odor, air containing volatile odiferous molecules is warmed and humidified as it flows over specialized bones in the nose called turbinates. As odor molecules land on the olfactory nerves, these nerves fire a message to the brain. Thus olfactory neurons render a direct path between the stimulus provided by the outside environment and the brain, allowing us to rapidly perceive odors ranging from alluring fragrances to noisome fumes.

Certain scents, such as jasmine, are almost universally appealing, while others, like hydrogen sulfide (which emits a stench reminiscent of rotten eggs), are usually considered repellent, but most odors evoke different reactions from person to person, sometimes triggering strong emotional states or resurrecting seemingly forgotten memories. Scientists surmise that the reason why we have highly personal associations with smells is related to the proximity of the olfactory and emotional centers of our brain. Although the precise connection between emotion and olfaction remains a mystery, it is clear that emotion, memory, and smell are all rooted in a part of the brain called the limbic lobe.

Even though we are not always conscious of the presence of odors, and are often unable to either articulate or remember their unique characteristics, our brains always register their existence. In fact, such a large amount of human brain tissue is devoted to smell that scientists surmise the role of this sense must be profound. Moreover, neurobiological research suggests that smell must have an important function because olfactory neurons can regenerate themselves, unlike most other nerve cells. The importance of this sense is further supported by the fact that animals experimentally denied the olfactory sense do not develop full and normal brain function.

The significance of olfaction is much clearer in animals than in human beings. Animal behavior is strongly influenced by pheromones, which are odors that induce psychological or behavioral changes and often provide a means of communicating within a species. These chemical messages, often a complex blend of compounds, are of vital importance to the insect world. Honeybees, for example, organize their societies through odor: the queen bee exudes an odor that both inhibits worker bees from laying eggs and draws drones to her when she is ready to mate. Mammals are also guided by their sense of smell. Through odors emitted by urine and scent glands, many animals maintain their territories, identify one another, signal alarm, and attract mates.

Although our olfactory acuity can't rival that of other animal species, human beings are also guided by smell. Before the advent of sophisticated laboratory techniques, physicians depended on their noses to help diagnose illness. A century ago, it was common medical knowledge that certain bacterial infections carry the musty odor of wine, that typhoid smells like baking bread, and that yellow fever smells like meat. While medical science has moved away from such subjective diagnostic methods, in everyday life we continue to rely on our sense of smell, knowingly or not, to guide us.

The passage implies that physicians no longer make diagnoses based on odors because:

- A. the human sense of smell has considerably diminished over time.
- B. the association of odors with disease proved largely fictitious.
- C. such subjective diagnostic methods were shown to be useless.
- D. the medical profession today favors more objective techniques.

Correct Answer: D

This asks why physicians no longer make diagnoses based on odors. The fact that doctors used to use their noses to sniff out disease is discussed in the last paragraph of the passage. In the very last sentence of this paragraph, the author says that medical science has moved away from such subjective diagnostic methods. From this point, it can be inferred that contemporary medical science considers such diagnostic procedures too subjective, and prefer more objective methods, such as laboratory analyses. This is reflected in choice (D) -- the medical profession today favors more objective techniques. As for the wrong answers, choice (A) says that physicians no longer make diagnoses based on odors because the human sense of smell has considerably diminished over time. There's nothing stated or implied in the passage about the sense of smell changing at all, and this answer choice is inapplicable. Choice (B) suggests that physicians no longer favor diagnoses based on odors because the association of odors with disease proved largely fictitious. This is not implied in the passage either. The author's tone in the last paragraph, where this issue is discussed, is not at all disparaging of these old subjective techniques. So (B) is wrong. Choice (C) says that such subjective diagnostic methods were shown to be useless. Again, the author never says anything disparaging about these subjective techniques. (C) then, is also wrong, and choice (D) is the answer.

QUESTION 4

In an SDS-PAGE procedure, the SDS serves as a detergent.

Why are the proteins treated with a detergent before being run through the electrophoresis gel?

- A. To coat the proteins with a large positive charge, since amino acid side chains may have positive, negative, or neutral

charges, and a large uniform charge is necessary to get good separation in the gel.

B. To allow the electrophoresis to separate the proteins solely on the basis of the length of the primary sequence.

C. To prevent the protein from denaturing so that the electrophoresis can accurately resolve the proteins on the basis of tertiary structure.

D. To break the intramolecular bonds holding the tertiary and primary structure of the protein together, thereby generating linear fragments that may be sorted on size.

Correct Answer: B

SDS is a detergent which denatures the tertiary and secondary structure of a protein. It also coats the protein with a very large negative charge. This electrostatic repulsion pushes the protein in a single long rod shape, allowing the gel to sort various proteins on the basis of primary structure length. Thus (B) is the right answer.

A: This answer choice is right except it says positive charge. SDS creates a negative charge.

C: Detergents cause denaturing, rather than preventing it.

D: SDS will break down tertiary and secondary structure, not primary.

QUESTION 5

A researcher in a molecular biology lab planned to carry out an extraction procedure known as an alkaline plasmid prep, which is designed to purify plasmids, small pieces of the hereditary material DNA, from bacterial cells. The bacteria are first placed into a test tube containing liquid nutrient medium and allowed to grow until they reach a high population density. The culture, which consists of solid cells suspended in the medium, is then centrifuged; a solid pellet is formed. The supernatant is poured out, leaving the pellet behind, and the cells are resuspended in a mL of lysis buffer solution (50 mM glucose, 25 mM Tris buffer and 10 mM ethylenediaminetetraacetic acid (EDTA), with 5 mg of the enzyme lysozyme added). They are then incubated for 30 minutes at 0°C, during which time the bacterial cell walls break down and the cell contents are released into the solution. After incubation, 1 mL of 0.4 N sodium hydroxide and 1 mL of 2% sodium dodecyl sulfate (SDS) are added, and the solution is again incubated on ice for 10 minutes. 2 mL of 3 M sodium acetate are added and the mixture is incubated for 30 minutes at 0°C. The test tube is centrifuged once more and the supernatant is decanted into a clean tube, leaving behind the protein and most other cell components in the pellet. Finally, 10 mL of pure ethanol are added to the supernatant from the previous step to precipitate out the DNA, and the test tube is incubated at -20°C for 60 minutes, during which the mixture remains liquid. The mixture is centrifuged a final time and the supernatant removed. The translucent precipitate that results is washed with 70% ethanol (70% ethanol and 30% water by volume), allowed to dry, and resuspended in 1 mL of TE buffer (10 mM Tris, 1 mM EDTA). In preparation for this experiment, the researcher prepared stock solutions of the various chemicals that she will need in the experiment. Stock solutions are highly concentrated solutions of commonly used chemicals in water from which dilute solutions are prepared for daily use. Table 1 shows the chemicals, their molecular formulas and weights, and the composition of commonly used stock solutions.

Table 1

Compound	Formula	MW	Stock
Tris	$(\text{CH}_2\text{OH})_3\text{CNH}_2$	121	1M (pH 8)
EDTA	$(\text{HOOCCH}_2)_4(\text{CNH}_2)_2$	292	0.5 M (pH 8)
Sodium hydroxide	NaOH	40	5 N
SDS	$\text{C}_{11}\text{H}_{23}\text{CH}_2\text{OSO}_3^-\text{Na}^+$	288	10%
Sodium acetate	$\text{CH}_3\text{COO}^-\text{Na}^+$	82	3 M (pH 5.2)
Ethanol	$\text{CH}_3\text{CH}_2\text{OH}$	46	95%

Tris (Tris(hydroxymethyl)aminomethane) is generally used as a buffer. If pH 8.0 is a good buffering region for Tris, then:

I) the pKa of Tris must be near pH 8.0

II) if Tris is titrated with acid, the titration curve will possess a steep region near pH 8.0.

III) a great deal of NaOH would have to be added to pH 8.0 Tris in order to significantly affect the pH.

A. I only

B. III only

C. I and II only

D. I and III only

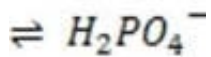
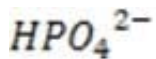
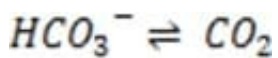
Correct Answer: D

A buffer is a mixture of either a weak base and its conjugate acid, or a weak acid and its conjugate base. Tris, as it happens, is a base. Buffer solutions resist changes in pH when acid or base is added. If pH 8 is a good buffering region for Tris, the ratio of base (Tris) to its conjugate acid (protonated Tris) will be near to 1. The pH of this solution is equal to the $\text{pKa} + \log [\text{base}]/[\text{conjugate acid}]$. Therefore, if the ratio of base to its conjugate acid is near to 1, the pKa must be near to the pH. Thus Roman numeral I is a true statement. To evaluate Roman numeral II, we have to recall what a titration curve looks like. Titration is a procedure used for determining the normality of an acid or base. The procedure consists of adding an acid to a base, or a base to an acid, until the pH of the mixture reaches 7. The titration curve is a plot showing the pH of the solution as a function of the amount of acid or base added. Since the pH, as the dependent

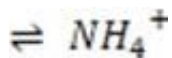
variable, is plotted on the y axis, a steep part of a titration curve represents a rapid change in pH. But we just said that a buffer solution in its effective pH range, such as a pH 8 Tris solution, resists pH change, so the titration curve for Tris will actually be quite flat near pH 8, and so Roman numeral II is false. Adding sodium hydroxide, which is a base, to a pH 8.0 Tris solution also wouldn't change the pH easily, so a large amount of the base would have to be added to affect the pH very much, and Roman numeral III is true. Since I and III are true, the correct answer choice is D.

QUESTION 6

It is critical for the human body blood to maintain its pH at approximately 7.4. Decreased or increased blood pH are called acidosis and alkalosis respectively; both are serious metabolic problems that can cause death. The table below lists the major buffers found in the blood and/or kidneys. Table 1 Buffer pKa of a typical conjugate acid: * + Histidine side chains



Organic phosphates N-terminal amino groups



6.1

6.3

6.8

7.0

8.0

9.2

pK_a

*For buffers in many of these categories, there is a range of actual values.

pK_a

The relationship between blood pH and the of any buffer can be described by the Henderson-Hasselbalch equation:

pK_a

$\text{pH} = + \log\left(\frac{[\text{conjugate base}]}{[\text{conjugate acid}]}\right)$ Equation 1

CO_2

Bicarbonate, the most important buffer in the plasma, enters the blood in the form of carbon dioxide, a byproduct of metabolism, and leaves in two forms: exhaled and excreted bicarbonate. Blood pH can be adjusted rapidly by changes

CO_2

in the rate of exhalation. The reaction given below, which is catalyzed by carbonic anhydrase in the erythrocytes, describes how bicarbonate and interact in the blood.

CO_2

+ + Reaction 1

If the pH of blood were to increase to 7.6, what would be the likely outcome?

- A. An increase in carbonic anhydrase activity
- B. A decrease in carbonic anhydrase activity
- C. An increase in the rate of CO_2 exhalation
- D. A decrease in the rate of CO_2 exhalation

A. Option A

B. Option B

C. Option C

D. Option D

Correct Answer: D

If the pH of blood increases to 7.6, it becomes more alkaline, and the pH of blood must be kept at approximately pH 7.4. Since it is stated in the second sentence of the last paragraph that blood pH can be adjusted rapidly by changes in the rate of CO_2 exhalation, choice A and choice B can be eliminated. In order to bring the pH of blood back to its normal value of 7.4, it must become more acidic; it becomes more acidic by increasing the concentration of H^+ . Reaction 1 has H^+ as a product, and according to Le Chatelier's principle, you should know that a reaction will proceed in a direction that will consume an added reactant or product. In other words, the concentration of a product can be increased by increasing the concentration of a reactant. If the concentration of carbon dioxide is allowed to increase, it will react to produce more H^+ , resulting in a lowering of the pH. The concentration of carbon dioxide will increase if it is not exhaled, making choice D the correct response.

QUESTION 7

Glycogen storage disease type V, also known as GSD-V or McArdle disease, is an autosomal recessive disease that results in the deficiency of myophosphorylase, an isoform of glycogen phosphorylase found in muscle cells. Patients

with GSD-V experience severe muscle cramps after strenuous exercise and exercise intolerance.

Physicians may order two histology stains of the patient's muscle tissue in order to aid in the diagnosis (see Figure 1):

(A)

A Periodic acid-Schiff (PAS) stain uses periodic acid to detect carbohydrates in tissues. The reaction of the acid with sugar cleaves vicinal diols creating ketone and/or aldehyde fragments, the latter of which then reacts with the Schiff reagent to give a purple color;

(B)

A phosphorylase stain identifies the presence of the enzyme using a dark blue color indicator.

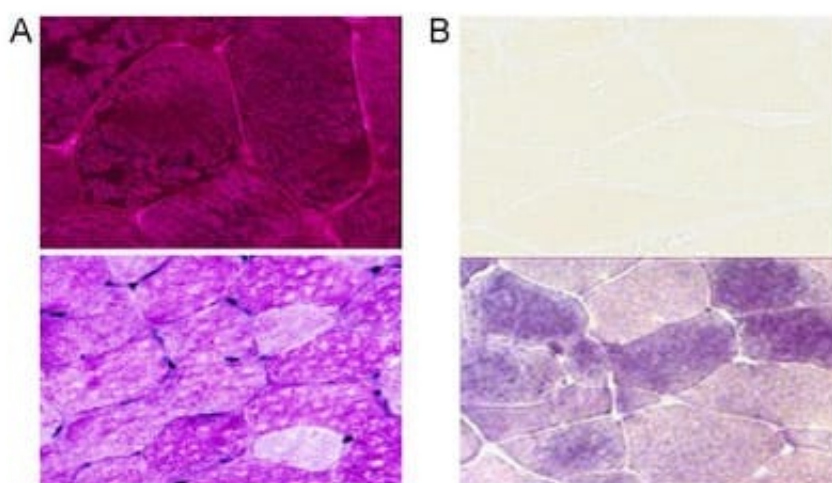


Figure 1A. Comparative histochemistry of GSD-V and healthy individual.

PAS stain of muscle tissue shows an accumulation of glycogen in the GSD-V individual (top) compared to the control (bottom). B) Phosphorylase stain of muscle tissue reveals an absence of phosphorylase in the GSD-V individual (top).

Despite initial pain during exercise, many patients with GSD-V have been able to increase their exercise tolerance by engaging in moderate periods of aerobic exercise. Muscle pain and fatigue subsides after a few minutes, a response that

researchers call the "second wind" phenomenon.

Patients who experienced "second wind" typically experienced lowered heart rate and a reported decrease in exercise effort after 7-10 minutes. A similar effect was seen in the same patients after an intravenous infusion of glucose.

	Heart rate [BPM] (minutes after exercise)					
	Initial (0)	Initial (7)	SW (14)	SW (21)	Glucose (28)	Glucose (35)
Subject A	70	175	125	175	150	175
Subject B	75	170	90	165	100	170

Figure 2. Measured heart rates in two GSD-V patients during sustained exercise.

Two subjects were asked to ride stationary bicycles at a steady rate over the course of 40 minutes. The subjects' heart rates were measured continuously, with high and low values coinciding with 7-minute intervals. Glucose was injected intravenously after 21 minutes. SW = Second Wind.

Adapted from Bhavaraju-Sanka R, Howard J. Jr, Chahin N (2014). SOJ Neurol 1(1), 1-3. and Haller RG, Vissing J. Arch Neurol. 2002;59(9):1395-1402.

For a patient affected by GSD-V, which one of these scenarios describes the concentrations of metabolism products in muscle cells after exercise?

- A. Increased concentrations of ADP, but decreased concentrations of Pi.
- B. Increased concentrations of ATP, but decreased concentrations of Pi.
- C. Decreased concentrations of ATP, and increased concentrations of Pi.
- D. Decreased concentrations of ADP, and increased concentrations of Pi.

Correct Answer: C

Because of the deficiency in glycogen phosphorylase, glucose is not released from glycogen, which decreases the production of ATP by glycolysis. Thus, any ATP used in muscles during exercise is not replenished, leading to an accumulation of ADP and Pi.

QUESTION 8

Although we know more about so-called Neanderthal men than about any other early population, their exact relation to present-day human beings remains unclear. Long considered sub-human, Neanderthals are now known to have been fully human. They walked erect, used fire, and made a variety of tools. They lived partly in the open and partly in caves. The Neanderthals are even thought to have been the first humans to bury their dead, a practice which has been interpreted as demonstrating the capacity for religious and abstract thought. The first monograph on Neanderthal anatomy, published by Marcelling Boule in 1913, presented a somewhat misleading picture. Boule took the Neanderthals' lowvaulted cranium and prominent brow ridges, their heavy musculature, and the apparent overdevelopment of certain joints as evidence of a prehuman physical appearance. In postulating for the Neanderthal

such "primitive" characteristics as a stooping, bent-kneed posture, a rolling gait, and a forward-hanging head, Boule was a victim of the rudimentary state of anatomical science. Modern anthropologists recognize the Neanderthal bone structure as that of a creature whose bodily orientation and capacities were very similar to those of present-day human beings. The differences in the size and shape of the limbs, shoulder blades, and other body parts are simply adaptations which were necessary to handle the Neanderthal's far more massive musculature. Current taxonomy considers the Neanderthals to have been fully human and thus designates them not as a separate species, *Homo neanderthalensis*, but as a subspecies of *Homo sapiens*: *Homo sapiens neanderthalensis*. The rise of the Neanderthals occurred over some 100,000 years -- a sufficient period to account for evolution of the specifically Neanderthal characteristics through free interbreeding over a broad geographical range. Fossil evidence suggests that the Neanderthals inhabited a vast area from Europe through the Middle East and into Central Asia from approximately 100,000 years ago until 35,000 years ago. Then, within a brief period of five to ten thousand years, they disappeared. Modern human, not found in Europe prior to about 33,000 years ago, thenceforth became the sole inhabitants of the region. Anthropologists do not believe that the Neanderthals evolved into modern human beings. Despite the similarities between Neanderthal and modern human anatomy, the differences are great enough that, among a population as broad-ranging as the Neanderthals, such an evolution could not have taken place in a period of only ten thousand years. Furthermore, no fossils of types intermediate between Neanderthals and moderns have been found. A major alternative hypothesis, advanced by E. Trinkaus and W.W. Howells, is that of localized evolution. Within a geographically concentrated population, free interbreeding could have produced far more pronounced genetic effects within a shorter time. Thus modern human could have evolved relatively quickly, either from Neanderthals or from some other ancestral type, in isolation from the main Neanderthal population. These humans may have migrated throughout the Neanderthal areas, where they displaced or absorbed the original inhabitants. One hypothesis suggests that these "modern" humans immigrated to Europe from the Middle East. No satisfactory explanation of why modern human beings replaced the Neanderthals has yet been found. Some have speculated that the modern humans wiped out the Neanderthals in warfare; however, there exists no archeological evidence of a hostile encounter. It has also been suggested that the Neanderthals failed to adapt to the onset of the last Ice Age; yet their thick bodies should have been heat-conserving and thus well-adapted to extreme cold. Finally, it is possible that the improved tools and hunting implements of the late Neanderthal period made the powerful Neanderthal physique less of an advantage than it had been previously. At the same time, the Neanderthals' need for a heavy diet to sustain this physique put them at a disadvantage compared to the less massive moderns. If this was the case, then it was improvements in human culture -- including some introduced by the Neanderthals themselves -- that made the Neanderthal obsolete.

According to the passage, the latest that any Neanderthal might have existed was:

- A. 100,000 years ago.
- B. 35,000 years ago.
- C. 33,000 years ago.
- D. 25,000 years ago.

Correct Answer: D

According to the third paragraph, Neanderthals inhabited a vast area from 100,000 to 35,000 years ago and then disappeared within a period of five to ten thousand years. If they actually took the whole 10,000 years to disappear, that means the latest any Neanderthal could have existed was 25,000 years ago (Choice D).

QUESTION 9

The Russia which emerged from the terrible civil war after the 1917 Revolution was far from the Bolsheviks' original ideal of a non-exploitative society governed by workers and peasants. By 1921, the regime was weakened by widespread famine, persistent peasant revolts, a collapse of industrial production stemming from the civil war, and the consequent dispersal of the industrial working class -- the Bolsheviks' original base of support. To buy time for recovery, the government in 1921 introduced the New Economic Policy, which allowed private trade in farm products (previously banned) and relied on a fixed grain tax instead of forced requisitions to provide food for the cities. The value

of the ruble was stabilized. Trade unions were again allowed to seek higher wages and benefits, and even to strike. However, the Bolsheviks maintained a strict monopoly of power by refusing to legalize other parties. After the death of the Revolution's undisputed leader, Lenin, in January 1924, disputes over the long-range direction of policy led to an open struggle among the main Bolshevik leaders. Since open debate was still possible within the Bolshevik Party in this period, several groups with differing programs emerged in the course of this struggle. The program supported by Nikolai Bukharin -- a major ideological leader of the Bolsheviks with no power base of his own -- called for developing agriculture through good relations with wealthy peasants, or "kulaks." Bukharin favored gradual industrial development, or "advancing towards Socialism at a snail's pace." In foreign affairs, Bukharin's policy was to ally with non-Socialist regimes and movements that were favorable to Russia. A faction led by Leon Trotsky, head of the Red Army and the most respected revolutionary leader after Lenin, called for rapid industrialization and greater central planning of the economy, financed by a heavy tax on the kulaks. Trotsky rejected the idea that a prosperous, human Socialist society could be built in Russia alone (Stalin's slogan of "Socialism in One Country"), and therefore called for continued efforts to promote working-class revolutions abroad. As time went on, he became bitterly critical of the new privileged elite emerging within both the Bolshevik Party and the Russian state. Joseph Stalin, General Secretary of the Bolshevik Party, was initially considered a "center," conciliating figure, not clearly part of a faction. Stalin's eventual supremacy was ensured by three successive struggles within the party, and only during the last did his own program become clear. First, in 1924-25, Stalin isolated Trotsky, allying for this purpose with Grigori Zinoviev and Lev Kamenev, Bolshevik leaders better known than Stalin himself, whom Trotsky mistakenly considered his main rivals. Stalin maneuvered Trotsky out of leadership of the Red Army, his main potential power base. Next, Stalin turned on Zinoviev and Kamenev, using his powers as head of the Party organization to remove them from party leadership in Leningrad and Moscow, their respective power bases. Trotsky, Zinoviev, and Kamenev then belatedly formed the "Joint Opposition" (1926-27). With Bukharin's help, Stalin easily outmaneuvered the Opposition: Bukharin polemicized against Trotsky, while Stalin prevented the newspapers from printing Trotsky's replies, organized gangs of toughs to beat up his followers, and transferred his supporters to administrative posts in remote regions. At the end of 1927, Stalin expelled Trotsky from the Bolshevik Party and exiled him. (Later, in 1940, he had him murdered.) Zinoviev and Kamenev, meanwhile, recanted their views in order to remain within the Party. The final act now began. A move by kulaks to gain higher prices by holding grain off the market touched off a campaign against them by Stalin. Bukharin protested, but with the tradition of Party democracy now all but dead, Stalin had little trouble silencing Bukharin. Meanwhile, he began a campaign to force all peasants -- not just kulaks -- onto state-controlled "collective farms," and initiated a crash industrialization program during which he deprived the trade unions of all rights and cut real wages by 50%. Out of the factional struggle in which he emerged by 1933 as sole dictator of Russia, Stalin's political program of building up heavy industry on the backs of both worker and peasant emerged with full clarity.

The main feature of the New Economic Policy of 1921 was:

- A. a strict economic centralization.
- B. stimulation of the economy through deliberate inflation.
- C. a limitation of trade union activity.
- D. a relaxation of economic controls.

Correct Answer: D

The author describes the details of the New Economic Policy at the end of Paragraph 1. The author lists the permission of private trade -- which was previously banned -- as one feature of the policy. Forced requisitions were eliminated and trade unions were allowed to be active again. In other words, the New Economic Policy relaxed economic controls -- Choice D.

Economic centralization (Choice A) and deliberate inflation (Choice B) can be ruled out because they are not mentioned in the first paragraph. C directly contradicts the fact that trade unions were once again allowed to fight for higher wages and benefits and to strike.

QUESTION 10

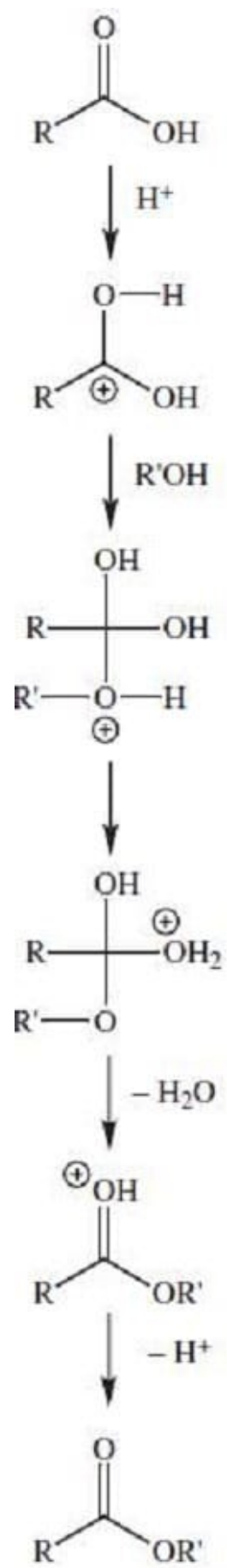
Which of following must be present in human's diet to prevent thyroxin deficiency?

- A. Iron
- B. Calcium
- C. Iodine
- D. Phosphorus

Correct Answer: C

QUESTION 11

The mechanism for the acid-catalyzed esterification of a carboxylic acid, carried out with $R-OH$, is shown below. The tagged alcohol $R-^{18}OH$ is used to study the reaction mechanism. The resulting ester is separated from the reaction mixture; the water from the reaction mixture is then distilled off completely and collected as a separate fraction.



Which of the following alkyl halides would be most likely to react with sodium butanoate to form an ester?

- A. $\text{CH}_3\text{CH}_2\text{CH}_2\text{Cl}$
- B. CH_3Cl
- C. $(\text{CH}_3)_2\text{CHCl}$
- D. $\text{CH}_3\text{CH}_2\text{Cl}$

- A. Option A
- B. Option B
- C. Option C
- D. Option D

Correct Answer: B

In this question, you are asked to decide which alkyl halide would be most likely to react with sodium butanoate and form an ester. The reaction between a carboxylate anion and an alkyl halide is an $\text{S}_{\text{N}}2$ reaction. Because this reaction involves partial bonding between the attacking nucleophile (carboxylate) and substrate (alkyl halide), it will not occur easily with bulky substrates. Bulky substrates sterically hinder the reaction, by shielding the susceptible carbon atom from the attacking nucleophile. Choice B, methyl chloride, has only hydrogen and chlorine substituents, whereas all the other choices have bulkier alkyl substituents. This makes B the least sterically hindered of all the choices, and it will therefore react most easily with sodium butanoate.

QUESTION 12

The process by which individuals decide and choose to seek assistance for health or mental health problems is called help-seeking. Table 1 displays the percentage of American Indian/Alaska Native and non-Hispanic White adults who received mental health or counseling treatment in 2008

Help-seeking is a complex process and individuals will choose to obtain treatment for a variety of reasons. One of the strongest individual-related help-seeking predictors amounts to perceiving the need to do so. Other individual-related factors are the educational and the socioeconomic status. There may also be systematic factors that prevent people from doing so, such as general mistrust of health, mental health, and social service institutions, particularly among racial and ethnic minorities. It has been speculated that some of the mistrust stems from research studies, sponsored by medical establishments, where racial and ethnic minorities express concerns of being recruited for the purpose of serving as guinea pigs. Focus groups with African Americans and Chinese immigrants confirmed this anxiety and fear.

Thus, cultural factors also play a role in the help-seeking process. Western cultural norms about medicine are premised on norms of individualism. However, individuals from other cultures and racial and ethnic minority groups tend to be both more collectivistic and fatalist. Disease, both medical and mental, is believed to occur because of fate. It is not something where one should spend much time and effort fighting; the needs of the family and even of the extended family are to come first.

Table 1 Access to health care: Percentage of adults who received mental health treatment or counseling in the past year, 2008

	American Indian/Alaska Native	Non-Hispanic White	American Indian/Alaska Native/Non-Hispanic White Ratio
Male	8.8	10.8	0.8
Female	10.2	20.8	0.5
Total	9.6	16.0	0.6

Source: Adapted from U.S. Department of Health and Human Services, "Mental Health and American Indians/ Alaska Natives" Research makes a strong case that racial minorities\' mistrust in the healthcare system stems from historical incidents, including:

- A. Shays\' Rebellion.
- B. the Tuskegee Syphilis Study.
- C. the publication of the Diagnostic and Statistical Manual of Mental Disorders, 5th Edition (DSM-5).
- D. the glass ceiling effect.

Correct Answer: B

B is the correct answer. Starting in 1932, the Public Health Service conducted a study on syphilis with African American men in Tuskegee, Alabama. This study is now known as the Tuskegee Study. The objective of the research was to observe how the disease progressed over time among African American men. However, none of research subjects was informed they had syphilis. Over the course of the study, penicillin became the accepted course of treatment in 1945, but researchers also did not inform the research subjects of the available treatment. Thus, the ethical principles that presently regulate research, and include the requirement of gathering informed consent, or allow for non-disclosure of intents in very specific circumstances, censor the procedures adopted at the time. This study, along with alike now deemed unethical studies, are argued to have generated mistrust in the system among minorities. A. This is incorrect. Shays\' Rebellion related to general economic and civil rights. It was not a rebellion against racial disparities in the healthcare system. C. This is incorrect. The Diagnostic and Statistical Manual of Mental Disorders, 5th Edition (DSM-5) was never subjected to race-related criticism or mentioned as a cause of racial minorities\' mistrust in healthcare system. D. This is incorrect. The glass ceiling effect is a term used to describe the barriers women encounter in their careers that impede them from attaining higher positions. It is not concerned with racial minorities and their distrust in health systems.