**MCAT Biological Sciences Practice 02**

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## Biological Sciences

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**Verbal Reasoning**

**Number of Items: 40**

**Time Allowed: 60 minutes**

**DIRECTIONS:** There are seven passages in the Verbal Reasoning test. Each passage is followed by several questions. After reading a passage, select the one best answer to each question. If you are not certain of an answer, eliminate the alternatives that you know to be incorrect then select an answer from the remaining alternatives. Indicate your selection by clicking on the answer bubble next to it.

**Passage I**

Turbulent flow over a boundary is a complex phenomenon for which there is no really complete theory even in simple laboratory cases. Nevertheless, a great deal of experimental data have been collected on flows over solid surfaces, both in the laboratory and in nature, so that, from an engineering point of view at least, the situation is fairly well understood. The force exerted on a surface varies with the roughness of that surface and approximately with the square of the wind speed at some fixed height above it. A wind of 10 meters per second (about 20 knots, or 22 miles per hour) measured at a height of 10 meters will produce a force of some 30 tons per square kilometer on a field of mown grass or of about 70 tons per square kilometer on a ripe wheat field. On a really smooth surface, such as glass, the force is only about 10 tons per square kilometer.

When the wind blows over water, the whole thing is much more complicated. The roughness of the water is not a given characteristic of the surface but depends on the wind itself. Not only that, the elements that constitute the roughness - the waves - themselves move more or less in the direction of the wind. Recent evidence indicates that a large portion of the momentum transferred from the air into the water goes into waves rather than directly into making currents in the water; only as the waves break, or otherwise lose energy, does their momentum become

 available to generate currents, or produce Ekman layers. Waves carry a substantial amount of both energy and momentum (typically about as much as is carried by the wind in a layer about one wavelength thick), and so the wave-generation process is far from negligible.

A violently wavy surface belies its appearance by acting, as far as the wind is concerned, as though it were very smooth. At 10 meters per second, recent measurements seem to agree, the force on the surface is quite a lot less than the force over mown grass and scarcely more than it is over glass; some observations in light winds of two or three meters per second indicate that the force on the wavy surface is less than it is on a surface as smooth as glass. In some way the motion of the waves seems to modify the airflow so that air slips over the surface even more freely than it would without the waves. This seems not to be the case at higher wind speeds, above about five meters per second, but the force remains strikingly low compared with that over other natural surfaces.

One serious deficiency is the fact that there are no direct observations at all in those important cases in which the wind speed is greater than about 12 meters per second and has had time and fetch (the distance over water) enough to raise substantial waves. The few indirect studies indicate that the apparent roughness of the surface increases somewhat under high-wind conditions, so that the force on the surface increases rather more rapidly than as the square

of the wind speed.

Assuming that the force increases at least as the square of the wind speed, it is evident that high-wind conditions produce effects far more important than their frequency of occurrence would suggest. Five hours of 60-knot storm winds will put more momentum into the water than a week

of 10-knot breezes. If it should be shown that, for high winds, the force on the surface increases appreciably more rapidly than as the square of the wind speed, then the transfer of momentum to the ocean will turn out to be dominated by what happens during the occasional storm rather than by the long-term average winds.

53. According to the passage, several hours of storm winds (60 miles per hour) over the ocean would

A) be similar to the force exerted by light winds for several hours over glass.

B) create an ocean roughness which reduces the force exerted by the high winds.

C) eventually affect ocean current.

D) create a force not greater than 6 times the force of a 10 mile-per-hour wind.

54. According to the passage, a rough-like ocean surface

A) is independent of the force of the wind.

B) has the same force exerted against it by high and light winds.

C) is more likely to have been caused by a storm than by continuous light winds.

D) is a condition under which the approximate square of wind speed can never be an accurate figure in measuring the wind force.

55. The author indicates that, where a hurricane is followed by light winds of 10 meters per second or less,

I. ocean current will be unaffected by the light winds

II. ocean current will be more affected by the hurricane winds than the following light winds

III. the force of the light winds on the ocean would be less than that exerted on a wheat field

The correct combination is:

A) I only

B) II and III

C) I and III

D) II only

56. The main purpose of the passage is to discuss

A) oceanic momentum and current.

B) the effects of wind on bodies of water.

C) wind blowing over water as related to causing tidal flow.

D) experiments in wind force.

57. The author would be incorrect in concluding that the transfer of momentum to the ocean is dominated by the occasional storm if

A) high-speed winds slipped over waves as easily as low speed winds.

B) waves did not move in the direction of wind.

C) the force exerted on a wheat field was the same as on mown grass.

D) the force of wind under normal conditions increased as the square of wind speed.

**Passage II**

There are four arguments that may be used in the justification of euthanasia.

*Compassion*

This argument maintains that when a patient is faced with a situation of intolerable misery and distress arising from an incurable disease, it is kinder to end his life rather than to allow him to continue to suffer.

*The right to die*

The right to demand his death is often regarded as part of human autonomy by which a patient

has the right to make decisions about their treatment by health care professionals.

*Social progress*

This argument claims that society has a eugenic obligation to eliminate the physically and mentally unfit from amongst its members.

*Economic necessity*

This argument has been added in recent years with the recognition of the high cost of the medical and social care of those people who might be candidates for euthanasia.

We have now set out briefly the arguments used in favor of the practice of euthanasia. Let us now consider the important assumptions that underlie these arguments, which may be set out in three separate categories: philosophical, medical, and legal.

*Philosophical*

That man has a right to die

That the value of human life is measurable

That human life can be dealt with in the same way as animal life

That suffering can have no beneficial function

That an unmixed motive of compassion can be guaranteed

That a request for euthanasia is always rational and reliable

*Medical*

That medical diagnosis and prognosis are always certain

That the degree of suffering of another person can always be realistically and objectively assessed

That effective alternative methods for the relief of suffering are not available

That euthanasia is the justifiable duty of a doctor

*Legal*

That the legalization of euthanasia can control its abuse

That euthanasia can be clearly distinguished from murder

Any decision to legalize the practice of euthanasia is one that will have serious ethical, legal, social, and professional implications. The third and fourth arguments in favor of euthanasia have implications that do much to weaken their force. The argument from social progress has been destroyed by the racial policies and genocidal activities of Nazi Germany. The argument from economic necessity is not acceptable because it reduces human life and personal happiness to the impersonal terms of money and expediency, which are not the terms in which the human situation should be assessed. The argument based on an alleged right to die arises from a confusion of rights and liberties. Man is free to end his life when he chooses, but this does not mean that he has a right to do so. Such a right does not exist ethically, legally, or socially.

We are left then with the argument from compassion. This is especially strong in cases where relatives have been obliged to watch a loved one suffer unbearable agony and to listen to repeated requests for them to end it all by euthanasia. Nevertheless, it remains doubtful how far

compassion can be allowed to over-ride the other principles that govern human behavior in any given situation. If an action is ethically wrong, or even legally wrong, then it is clearly doubtful whether an appeal to a motive of compassion can make it ethically or legally right.

If we look at the assumptions that we have suggested underlie the practice of euthanasia, it is clear that a number of them are of questionable validity. This is particularly true of those we have classified as medical. In addition to these considerations there are a number of arguments which can be advanced against the practice of euthanasia.

*Euthanasia is unnecessarily radical*. It destroys the problem rather than solving it. By ending the life of the patient, it deprives him of hope and any opportunity of regretting or reversing his decision.

*Euthanasia is ethically indefensible*. There is an ethical principle of totality that allows a part to be sacrificed for the sake of the whole. There is no corresponding principle that allows the whole to he sacrificed for the sake of the part. That would be an illogical position and certainly an unethical one.

*Euthanasia is legally inadmissible*. No country has so far legalized euthanasia, although The Netherlands has come very near to doing so. The danger in the legalization of euthanasia lies in the possibility of its abuse. Legalization of abortion has failed to control the abuse of abortion, and similar legislation on euthanasia cannot be expected to control its abuse either. The legal problem is how to distinguish euthanasia from murder.

*Euthanasia is increasingly unnecessary*. When euthanasia was first advocated in the 1930s, the concept and practice of palliative medicine was unknown. Doctors had no guidance and little experience in the alleviation of distressing symptoms arising from incurable disease. The most effective use of opioids to control pain was not understood and other methods of relieving pain and other symptoms were not known. The situation is very different today.

Even if we reject euthanasia as inadmissible ethically, this cannot be the end of the matter. The problem of the control of suffering still remains. What then ought we to do? We can make available to our patients all the methods of relief and control of distressing symptoms that are available. And we can promote research aimed at the improvement of the means of relief of suffering. Finally, we must recognize that the care of the sufferer is not a purely medical concern, and we must provide for his physical, mental, and spiritual welfare by involving all the caring professions in an effective and sensitive approach to the patient and his family.

58. According to the passage, the essential element in euthanasia is

A) the alleviation of distressing symptoms arising from incurable disease.

B) the intention to kill.

C) to provide no heroic measures.

D) to make remaining life as happy and fulfilling as possible.

59. From the passage, it can be inferred that

I. there are 12 assumptions underlying the concept of euthanasia.

II. there are 4 arguments used to justify euthanasia.

III. euthanasia is absolutely unacceptable regardless of a patient’s situation.

IV. euthanasia is illegal.

A) I, II, and III are correct.

B) I and II are correct.

C) I, II, and IV are correct.

D) All are correct.

60. Which of the following statements is supported by the passage?

A) Patients have the right to die.

B) Incurable patients have the duty to die an early death.

C) Patients have the freedom to die.

D) Patients have the privilege to die.

61. Generally, the author seems to be

A) against euthanasia.

B) supportive of euthanasia.

C) neither for nor against euthanasia.

D) ignorant of the main issues surrounding euthanasia.

62. According to the passage, arguments in favor of euthanasia include all of the following except

A) eugenics.

B) scarce resources could be put to better use.

C) human autonomy.

D) a patient’s inability to pay for health care.

63. Which of the following statements is not supported by the passage?

A) Some countries have legalized euthanasia.

B) Pain and suffering can be controlled.

C) The part can be sacrificed for the whole.

D) The strongest argument for euthanasia is compassion.

**Passage III**

Cardiac radionuclide imaging is easily tolerated, relatively easy to perform, requires only relatively moderately expensive equipment, and exposes patients to less radiation than X-ray studies that give comparable information. The procedures fall into 2 broad categories: those that show myocardial perfusion, and those that allow evaluation of ventricular function and wall motion (ventriculography).

Myocardial perfusion imaging usually uses thallium-201, a radioactive cation that is useful because it behaves as a potassium analog. Other, newer radiopharmaceuticals include technetium-99m sestamibi and technetium-99m tetrophosmin. Following IV administration, thallium-201 rapidly leaves the vascular compartment and enters the cells in proportion to initial blood flow. About 4% of the dose enters the myocardium temporarily; this small accumulation shows the heart in relief against the low surrounding background of lung activity. After thallium-201 reaches its initial distribution, an equilibrium occurs between myocardial thallium-201 and that in the blood and other structures (e.g., skeletal muscles, liver, kidneys, etc). When thallium-201 is injected into someone who is exercising, defects in the myocardial distribution will occur in nonviable areas (e.g., infarct) and in viable regions with reduced blood flow (e.g., an ischemic zone distal to a hemodynamically significant coronary stenosis). Subsequently, after several hours with the patient at rest, the distribution will change. If the original thallium-201 myocardial defect was caused by a nonviable scar, it will appear unchanged. However, if it was an ischemic area, the late image is likely to show disappearance or diminution of the initial defect. This is the basis for detecting regions of exercise-induced ischemia by sequential thallium-201 studies.

The exercise test usually is done on a conventional treadmill using the Bruce protocol or a similar exercise schedule. If no contraindications arise, exercise is increased to at least 85% of the age-predicted maximum, and thallium-201 chloride is injected. The patient continues at this level for an additional 30 to 60 seconds to allow for distribution of radioactivity under the influence of exercise-related blood flow patterns.

An alternative to exercise testing is the use of dipyridamole. This drug increases myocardial blood flow in normal coronary arteries but not in arteries distal to a stenosis. The resulting image thus appears similar to one following exercise. Imaging of thallium-201 injected 3 to 5 minutes after intravenously administered dipyridamole has a sensitivity for coronary artery disease (CAD) similar to that of exercise testing. Oral dipyridamole also has been used but is less reliable because of variability in drug absorption.

Imaging of thallium-201 distribution may be done as a series of planar images using a conventional scintillation camera or as a tomographic reconstruction following acquisition by a rotating camera system, using single photon emission computed tomography (SPECT).

Compared with coronary angiography as the standard, the sensitivity of planar thallium-201 imaging for significant CAD is 80 to 85% and its specificity is more than 90%. Thallium-201 imaging is more sensitive and specific than ECG stress testing. When thallium-201 imaging and stress ECG findings are coupled, the sensitivity for CAD increases to more than 90%.

SPECT improves the sensitivity for CAD to at least 90%, with most of the gain in the detection of inferior and posterior abnormalities that are not well visualized on planar images. Identification of the vessels responsible for the defects also is improved. In addition, the volume of infracted, ischemic, and normal myocardium can be quantified, which is valuable in determining prognosis.

64. Which of the following statements is not supported by the passage?

A) Patients who cannot exercise may be given dipyridamole.

B) A disadvantage of cardiac radionuclide imaging is the considerable exposure to ionizing radiation.

C) SPECT is more sensitive than planar imaging.

D) Oral dipyridamole is less reliable than intravenous dipyridamole.

65. On the whole, the author seems to be

A) against the use of cardiac radionuclide imaging.

B) indifferent about whether cardiac radionuclide imaging should be used or not.

C) not very knowledgeable about the subject.

D) supportive of the judicious use of cardiac radionuclide imaging.

66. Which of the following statements are supported by the passage?

I. Cardiac radionuclide imaging requires a very heavy investment in equipment.

II. Cardiac radionuclide imaging consists of two broad subgroups: perfusion studies and ventriculography.

III. Thallium-201 emits radiation, which is detected by special cameras.

IV. To a certain extent, cardiac radionuclide perfusion imaging, coronary angiography and ECG stress testing could be considered substitutes for each other.

A) II, III, IV

B) I, II, III

C) I, III, IV

D) I, II, IV

67. In performing cardiac perfusion studies, the passage implies that

A) the patient is injected with thallium-201, scanned, exercised, then scanned again.

B) the patient is scanned, injected with thallium-201, exercised, then scanned again.

C) the patient is exercised, injected with thallium-201, scanned, then scanned again after resting.

D) the patient is injected with thallium-201, exercised, scanned, then scanned again after resting.

68. Which of the following statements is not supported by the passage?

A) Thallium-201 is radioactive.

B) Thallium-201 can be used for ventriculography.

C) Thallium-201 can be used to assess the functional significance of coronary artery disease.

D) Thallium-201 is a cation.

69. Which of the following statements are supported by the passage?

I. To a certain extent cardiac radionuclide imaging and ECG stress testing complement each other.

II. The concentration of thallium-201 may be the same in normal and ischemic myocardium when the patient is at rest.

III. SPECT is more specific than planar cardiac radionuclide imaging.

IV. The purpose of exercise in cardiac radionuclide imaging is to detect viable regions of myocardium with reduced blood flow.

A) II, III, IV

B) I, II, III

C) I, III, IV

D) I, II, IV

**Passage IV**

Though the modern history of oil begins in the latter half of the nineteenth century, it is the twentieth century that has been completely transformed by the advent of petroleum. In particular, three great themes underlie the story of oil.

The first is the rise and development of capitalism and modern business. Oil is the world’s biggest and most pervasive business. Of the top twenty companies in the Fortune 500, seven are oil companies. The expansion of the business in the twentieth century encompassing everything from wildcat drillers, smooth-talking promoters, and domineering entrepreneurs to great corporate bureaucracies and state-owned companies embodies the twentieth-century evolution of business, of corporate strategy, and indeed of both national and international economies. Until some alternative source of energy is found, oil will still have far reaching effects on the global economy; major price movements can fuel economic growth or, contrarily, drive inflation and kick off recessions.

The second theme is that of oil as a commodity intimately intertwined with national strategies and global politics. World War I established the importance of petroleum when the internal combustion engine overtook the horse and the coal-powered locomotive. Petroleum was central to the course of World War II. The Japanese attacked Pearl Harbor to protect their flank as they grabbed for the petroleum resources of the East Indies. Among Hitler’s most important objectives in the invasion of the Soviet Union was the capture of the oil fields in the Caucasus. But America’s predominance in oil proved decisive, and by the end of the war German and Japanese fuel tanks were empty. In the Cold War years, the battle for control of oil between international companies and developing countries was a major part of decolonization and emergent nationalism. The Suez Crisis of 1956 was as much about oil as about anything else. Oil power loomed very large in the 1970s, catapulting states heretofore peripheral to international politics into positions of great wealth and influence. And oil was at the heart of the first post-Cold War crisis – Iraq’s invasion of Kuwait. With the end of the Cold War, a new world order is taking shape. Regional struggles and ethnic rivalries may replace ideology as the focus of international and national conflict. But whatever the evolution of this new international order, oil will remain the strategic commodity. Today, the USA must import half of the oil it consumes, a precarious situation for a great power.

A third theme illuminates how we have become, in the language of anthropologists, “Hydrocarbon Man.” In its first decades, the oil business provided an industrializing world with a product called kerosene. At the end of the nineteenth century, John D. Rockefeller had become the richest man in the United States, mostly from the sale of kerosene. Gasoline was then an almost useless by-product. But just as the invention of the incandescent light bulb seemed to signal the obsolescence of kerosene, a new era opened with the development of the internal combustion engine powered by gasoline. The oil industry had a new market, and a new civilization was born.

In the twentieth century, oil, supplemented by natural gas, toppled King Coal from his throne as the power source for the industrial world. Oil also became the basis of the great postwar suburbanization movement. Oil and natural gas are the essential components in the fertilizer on which world agriculture depends; oil makes it possible to transport food to the totally non-self-sufficient megacities of the world. Oil also provides the plastics and chemicals that are the

bricks and mortar of contemporary civilization.

For most of the twentieth century, growing reliance on petroleum was almost universally celebrated as a symbol of human progress. But no longer. With the rise of the environmental movement, the basic tenets of industrial society are being challenged. Efforts are mounting around the world to curtail the combustion of all fossil fuels - oil, coal, and natural gas - because of the resultant air pollution, acid rain, and ozone depletion, and the specter of climate change.

Yet Hydrocarbon Man shows little inclination to give up his cars, his suburban home, and what he takes to be the essentials of his way of life. Also, the peoples of the developing world give no indication that they want to deny themselves the benefits of an oil-powered economy. And any notion of scaling back the world’s consumption of oil will be influenced by the expected extraordinary population growth ahead. In the meantime, the stage has been set for one of the great and intractable clashes between the support for greater environmental protection and a commitment to economic growth.

70. By “Hydrocarbon Man,” the author means

A) our society’s daily life is pervaded by and dependent on oil.

B) Man’s advanced understanding of the chemistry and uses of oil.

C) Man is a terrible polluter.

D) Man is chemically composed mainly of carbon and hydrogen.

71. Which of the following statements can be inferred from the passage?

I. The USA’s position as a super power would be strengthened if it were less dependent on oil.

II. Oil has been an important commodity throughout recorded history.

III. If the world population explosion can be controlled, the future environmental challenges anticipated can be more easily overcome.

A) I only

B) I and II

C) I and III

D) I, II and III

72. Which of the following is not described as a disadvantage of the oil industry?

A) Environmental pollution

B) The deterioration of inner cities

C) Potential political instability

D) Potential economic instability

73. The main purpose of the passage is to

A) discuss possible alternative energy sources.

B) analyze the economics of oil.

C) discuss the role oil has had in the rising nationalism of former colonies.

D) discuss the impact oil has had in modern history.

74. Which of the following statements is not supported by the passage?

A) Seven oil companies are part of the top twenty companies in the Fortune 500.

B) Before the internal combustion engine, the horse and coal-powered locomotive were predominantly in use.

C) The USA imports a third of its oil supply.

D) J.D. Rockefeller became rich primarily from the sale of kerosene.

**Passage V**

Many readers assume that, as a neoclassical literary critic, Samuel Johnson would normally prefer the abstract, the formal, and the regulated to the concrete, the natural, and the spontaneous in a work of literature. Yet any close reading of Johnson’s criticism shows that Johnson is not blind to the importance of the immediate, vivid, specific detail in literature; rather, he would underscore the need for the telling rather than the merely accidental detail.

In other ways, too, Johnson’s critical method has much in common with that of the Romantics, with whom Johnson and, indeed, the entire neoclassical tradition, are generally supposed to be in conflict. Johnson was well aware, for example, of the sterility of literary criticism that is legalistic or pedantic, as was the case with the worst products of the neoclassical school. His famous argument against the slavish following of the “three unities” of classical drama is a good example, as is his defense of the supposedly illegitimate tragicomic mode of Shakespeare’s latest plays. Note, in particular, the basis of that defense: “That this is a practice contrary to the rules of criticism,” Johnson wrote, “will be readily allowed; but there is always an appeal from criticism to nature.”

The sentiment thus expressed could easily be endorsed by any of the Romantics; the empiricism it exemplifies is a vital quality of Johnson’s criticism, as is the willingness to jettison “laws” of criticism when to do so makes possible a more direct appeal to the emotions of the reader. Addison’s Cato, highly praised in Johnson’s day for its “correctness,” is damned with faint praise by Johnson: “Cato affords a splendid exhibition of artificial and fictitious manners, and delivers just and noble sentiments, in diction easy, elevated, and harmonious, but its hopes and fears communicate no vibration to the heart.” Wordsworth could hardly demur.

Even on the question of poetic diction, which, according to the usual interpretation of Wordsworth’s 1800 Preface to the Lyrical Ballads, was the central area of conflict between Romantic and Augustan, Johnson’s views are surprisingly “modern.” In his Life of Dryden, he defends the use of a special diction for poetry, it is true; but his reasons are all important. For Johnson, poetic diction should serve the ends of direct emotional impact and ease of comprehension, not those of false profundity or grandiosity. “Words too familiar,” he wrote, “or too remote, defeat the purpose of a poet. From those sounds which we hear on small or on coarse occasions, we do not easily receive strong impressions, or delightful images; and words to which we are nearly strangers, whenever they occur, draw that attention on themselves which they should transmit to things.” If the poetic diction of the neoclassical poets, at its worst, erects needless barriers between reader and meaning, that envisioned by Johnson would do just the opposite: it would put the reader in closer contact with the things that are the poem’s subject.

75. The author of the passage demonstrates his ideas concerning Johnson mainly by

A) contrasting Johnson’s critical methods with those of his contemporaries.

B) citing specific illustrations drawn from Johnson’s work.

C) alluding to contemporary comments concerning Johnson’s theories.

D) quoting Johnson’s remarks about the critical approaches prevalent in his own day.

76. The passage implies that the judging of literary works according to preconceived rules

A) tends to lessen the effectiveness of much modern literary criticism.

B) is the primary distinguishing mark of the neoclassical critic.

C) was the primary neoclassical technique against which the Romantics rebelled.

D) characterizes examples of the worst neoclassical criticism.

77. The passage implies that the neoclassical critics generally condemned

A) Shakespeare’s use of the tragicomic literary mode.

B) the slavish following of the “three unities” in drama.

C) attempts to judge literary merit on the basis of correctness.

D) artificiality and abstraction in literary works.

78. According to the passage, Johnson’s opinion of Addison’s Cato was

A) roundly condemnatory.

B) somewhat self-contradictory.

C) ultimately negative.

D) effusively adulatory.

79. According to the passage, Johnson’s views concerning the use of a special diction in the writing of poetry were

A) “modern” in their rejection of a clear-cut division between the diction of poetry and that of prose.

B) “neoclassical” in their emphasis on the use of language with a direct emotional appeal for the reader.

C) “Romantic” in their defense of the idea that a special diction for poetry could be stylistically effective.

D) “Modern” in their underlying concern for the impact of the literary work on the sensibility of the reader.

80. Which one of the following statements best summarizes the main point of the passage?

A) Although many of Johnson’s critical opinions resemble those of the neoclassical critics, his basic concerns are closer to those of the Romantics.

B) The usual classification of Johnson as a member of the neoclassical school of criticism is based on an inaccurate evaluation of his critical theories and ideals.

C) The Romantic critics were mistaken in their belief that the critical ideas they formulated represented a departure from those propounded by Johnson.

D) Although many of Johnson’s critical opinions resemble those of the Romantic critics, his basic concerns are closer to those of the neoclassical critics.

**Passage VI**

In the USA, the medical care system has developed without strong direction from the local, state, or federal governments. The result is a confusing mix of ways in which services are organized and paid for. The per capita cost of medical care and the proportion of the gross domestic product used for medical care are higher in the USA than anywhere else in the world, yet approximately 15% of Americans still have no financial protection from the costs of medical care. Moreover, the medical care cost inflation rate is one of the highest in the world. Consequently, a variety of cost-containment strategies have been developed. Two that are used extensively today in the USA are the prospective payment system (PPS) and managed care.

The PPS has changed the way hospitals are reimbursed and the way hospitals and physicians think about the provision of care. Each hospital admission is classified into a diagnosis-related group (DRG). A DRG may consist of a single diagnosis or procedure, or it may consist of several diagnoses or procedures that, on average, have similar hospital costs per admission.

DRGs were first developed to enable hospitals to look for cost “outliers.” For example, hospitals could analyze and identify those physicians who regularly generated greater than average costs for a given DRG. The federal government decided to go further and use the DRG system to pay hospitals on the basis of a prospectively determined average cost for each of the DRGs. This system began to be used in the treatment of Medicare patients in 1983. Although there is no federal requirement that hospital payers other than Medicare use the DRG system for reimbursement, several states requested and received federal permission to incorporate DRGs into their own prospectively determined rate-setting programs. When this happened, all third-party payers in the state had to conform to the same prospectively determined rates. If a hospital can find a way to reduce the costs and provide the care for less than the amount reimbursed by the PPS, it can retain the excess amount. If a hospital is inefficient and has higher than average costs for a hospital admission, it will lose money on that admission.

There have been some good results from the PPS. For example, there are now more and better data, and hospitals have a greater ability to find unnecessary costs. The full impact of the PPS on the quality of medical care has not been determined. There is evidence that some patients are being discharged sooner than desirable, but no major change in medical care quality has been clearly discernible. Often, early discharge merely passes the medical care problems (and therefore costs) down the line to the care institutions receiving the patients from the hospital: the home, home care agencies, and nursing homes.

In an analysis of the social structure of medical care, Freidson claimed that the characteristic that uniquely defines the professions, including medicine, is autonomy in practice. With the advent of managed care, also known as utilization management, the trend appears to be away from physician autonomy in some aspects of medical practice, such as deciding which patients can be admitted to the hospital and how long they may remain there. Managed care is a system of administrative controls, the goal of which is to reduce the costs of medical care. In managed care, hospitalizations will be reimbursed by a third-party payer only if the payer has approved the

admission beforehand (pre-admission review and certification). If a patient is admitted through the emergency department, this admission is reviewed the next day and if not approved by the third-party payer, reimbursement may not be paid.

Once a patient is in the hospital, the length of stay is closely monitored, and the patient may be forced to leave the hospital as soon as possible. Other aspects of managed care include second opinions before elective surgery; use of primary care physicians as gatekeepers (all referrals to specialists are required to be approved by the patient’s primary care practitioner); high-cost case management; benefit design; and the provision of financial incentives for physicians to practice economically.

The current medical care system in the USA has many costly inefficiencies which may not be correctable without major changes, such as national or regional health insurance, a single-payer system, or a combination of both. Nevertheless, the possibly high initial costs of shifting to a new system, the uncertainty of its benefits, and the complex political compromises that would be required suggest that, in the immediate future, there will be no major, rapid change in the organization or financing of medical care in the USA.

81. Managed care

I. reduces the autonomy of physicians

II. is a system of administrative controls

III. seeks to better manage the utilization of health services

A) I and II are correct.

B) II and III are correct.

C) I, II, and III are correct.

D) None are correct.

82. According to the passage, the primary purpose of PPSs and managed care is

A) to ensure more Americans have financial protection from health care costs.

B) to control health care costs.

C) to improve the quality of health care.

D) to make greater profits.

83. If the costs of hospitalization for two medical different conditions are approximately the same, then

A) they would be in the same DRG.

B) they would be in different DRGs.

C) they may or may not be in the same DRG.

D) they would be in the same DRG but in different subsections.

84. Which of the following is supported by the passage?

A) The PPS has resulted in a decrease in the quality of care.

B) The PPS has helped stimulate the trend from inpatient care to outpatient care.

C) DRGs are groups of diagnoses in which the same organs and organ systems are affected.

D) DRGs were first used for Medicaid patients.

85. The passage indicates that

A) while managed care endeavors to prevent unnecessary use of health services, PPSs endeavor to keep the cost of each hospital stay within reasonable bounds.

B) while PPSs endeavor to prevent unnecessary use of health services, managed care endeavors to keep the cost of each hospital stay within reasonable bounds.

C) Managed care and PPSs endeavor to prevent unnecessary use of health services.

D) Managed care and PPSs endeavor to keep the cost of each hospital stay within reasonable bounds.

86. Managed care and PPSs

A) are mutually exclusive.

B) can co-exist in the same health care system.

C) necessarily occur together.

D) are unique to the USA.

**Passage VII**

The large majority of our fellow citizens care as much about literature as they care about archaeology or the program of the legislature. They do not entirely ignore it; they are not quite indifferent to it. But their interest in it is faint and perfunctory; or, if their interest happens to be intense, it is spasmodic. Ask the two hundred thousand persons whose enthusiasm made the vogue of a popular novel ten years ago what they think of that novel now, and you will gather that they have utterly forgotten it.

In the face of this, one may ask: Why does the great and universal fame of classic authors continue? The answer is that the fame of classic authors is entirely independent of the majority. Do you suppose that if the fame of Shakespeare depended on the man in the street it would survive for a fortnight? The fame of classic authors is originally made, and it is maintained, by a passionate few.

Even on those rare occasions when a first class author has enjoyed immense success during his lifetime, the majority has never appreciated him so sincerely as they have appreciated second-rate writers. The first-class author has always been reinforced by the ardor of the passionate few. And in the case of an author who emerged into glory after his death, this has been due solely to the obstinate perseverance of the few. They kept on savoring him, and talking about him, and buying him, and they generally behaved with such eager zeal, and they were so authoritative and sure of themselves, that at last the majority grew accustomed to the sound of his name and placidly agreed to the proposition that he was a genius. The majority really did not care very much either way.

What causes the passionate few to make such a fuss about literature? There can be only one reply. They find a keen and lasting pleasure in it. They enjoy literature as some people enjoy beer. And what are the qualities of a book that give keen and lasting pleasure to the passionate few? This is a question so difficult that it has never yet been completely answered. You may talk lightly about truth, insight, knowledge, wisdom, humor, and beauty, but these comfortable words do not really carry you very far, for each of them has to be defined, especially the first and last.

It is all very well for Keats in his airy manner to assert that beauty is truth, truth beauty, and that is all he knows or needs to know. I, for one, need to know a lot more. And I shall never know. Nobody, not even a great critic like Hazlitt or Sainte-Beuve, has ever finally explained why he thought a book beautiful.

A classic is a work that gives pleasure to the minority that is intensely and permanently interested in literature. It lives on because the minority, eager to renew the sensation of pleasure, is eternally curious and is therefore engaged in an eternal process of rediscovery. A classic does not survive for any ethical reason. It does not survive because it conforms to certain canons or rules. It survives because it is a source of pleasure.

87. Which of the following would be the most appropriate title for the passage above?

A) The Laws of Literary Greatness

B) What Makes a Classic a Classic?

C) The Sources of Shakespeare’s Reputation.

D) The Indifferent Majority and the Fate of Literature

88. According to the passage, the most fundamental source of value in a work of literature is its

A) evocation of beauty.

B) truth to nature.

C) ability to give pleasure.

D) adherence to aesthetic canons or rules.

89. According to the passage, the role of the majority in establishing certain literary works as classics is primarily

A) antagonistic.

B) passive.

C) supportive.

D) commercial.

90. It can be inferred that the author of the passage would probably consider the novel mentioned in the first paragraph as an example of

A) the kind of classic work that attains genuine renown only after its author’s death.

B) a work that unites truth and beauty in the Keatsian sense.

C) the work of a “second-rate” writer.

D) the kind of book that is truly appreciated only by the passionate few.

91. It can be inferred from the passage that the author considers the aesthetic principle embodied in Keats’ assertion that “beauty is truth, truth beauty” to be

A) mysteriously apt.

B) vague and inadequate.

C) unorthodox but refreshingly simple.

D) closely akin to the aesthetic principles of Hazlitt and Sainte-Beuve.

92. With which of the following statements would the author be most likely to agree?

A) A great work of literature embodies admirable moral as well as artistic qualities.

B) A book that the average reader can appreciate is one that is likely to be of lasting value.

C) Those who truly love literature share certain tastes, though they cannot clearly define them.

D) If an author is destined to attain classic status, his worth is usually immediately obvious.

**STOP.** IF YOU FINISH BEFORE TIME IS CALLED, CHECK YOUR WORK. YOU MAY GO BACK TO ANY QUESTION IN THE VERBAL REASONING TEST BOOKLET.

**Writing Sample**

Time: 60 minutes total;

30 minutes per essay, each separately timed.

93. Essay Topic 1

**The function of the press should be to report only the facts of daily events, not to influence the public’s opinion about those facts.**

Write a unified essay in which you perform the following tasks. Explain what you think the above statement means. Describe a specific situation when the press might be justified in attempting to influence the public’s opinion. Discuss what you think determines whether or not the press should attempt to influence public opinion.

94. Essay Topic 2

**Technology solves many problems, but in the process often creates new problems.**

Write a unified essay in which you perform the following tasks. Explain what you think the above statement means. Describe a specific situation in which a technology might not create a new problem. Discuss what you think determines when a technology’s benefits outweigh its potential problems.

**Biological Sciences**

**Number of Items: 52**

**Time Allowed: 70 minutes**

**DIRECTIONS:** Most questions in the Physical Sciences test are organized into groups, each preceded by a descriptive passage. After studying the passage, select the one best answer to each question. Some questions are not based on a descriptive passage and are also independent of each other. You should also select the one best answer to these independent questions. A periodic table is provided and you may consult it whenever you wish.

**Periodic Table of the Elements**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| IA | IIA |  |  |  |  |  |  |  |  |  |  | IIIA | IVA | VA | VIA | VIIA | VIIA |
| 1**H**1.0 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 2**He**4.0 |
| 3**Li**6.9 | 4**Be**9.0 |  |  |  |  |  |  |  |  |  |  | 5**B**10.8 | 6**C**12.0 | 7**N**14.0 | 8**O**16.0 | 9**F**17.0 | 10**Ne**20.2 |
| 11**Na**23.0 | 12**Mg**24.3 |  |  |  |  |  |  |  |  |  |  | 13**Al**27.0 | 14**Si**28.1 | 15**P**31.0 | 16**S**32.1 | 17**Cl**35.5 | 18**Ar**39.9 |
| 19**K**39.1 | 20**Ca**40.1 | 21**Sc**45.0 | 22**Ti**47.9 | 23**V**50.9 | 24**Cr**52.0 | 25**Mn**54.9 | 26**Fe**55.8 | 27**Co**58.9 | 28**Ni**58.7 | 29**Cu**63.5 | 30**Zn**65.4 | 31**Ga**69.7 | 32**Ge**72.6 | 33**As**74.9 | 34**Se**79.0 | 35**Br**79.9 | 36**Kr**83.8 |
| 37**Rb**85.5 | 38**Sr**87.6 | 39**Y**88.9 | 40**Zr**91.2 | 41**Nb**92.9 | 42**Mo**95.9 | 43**Tc**(98) | 44**Ru**101.1 | 45**Rh**102.9 | 46**Pd**106.4 | 47**Ag**107.9 | 48**Cd**112.4 | 49**In**114.8 | 50**Sn**118.7 | 51**Sb**121.8 | 52**Te**127.6 | 53**I**126.9 | 54**Xe**131.3 |
| 55**Cs**132.9 | 56**Ba**137.3 | 57**La**\*138.9 | 72**Hf**178.5 | 73**Ta**180.9 | 74**W**183.9 | 75**Re**186.2 | 76**Os**190.2 | 77**Ir**192.2 | 78**Pt**195.1 | 79**Au**197.0 | 80**Hg**200.6 | 81**Tl**204.2 | 82**Pb**207.2 | 83**Bi**209.0 | 84**Po**(209) | 85**At**(210) | 86**Rn**(222) |
| 87**Fr**(223) | 88**Ra**(226) | 89**Ac**†(227) | 104**Rf**(261) | 105**Db**(262) | 106**Sg**(266) | 107**Bh**(264) | 108**Hs**(277) | 109**Mt**(268) | 110**Ds**(281) | 111**Uuu**(272) | 112**Uub**(261) |  | 114**Uuq**(289) |  | 116**Uuh**(289) |  |  |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| \* | 58**Ce**140 | 59**Pr**140 | 60**Nd**144 | 61**Pm**144 | 62**Sm**150 | 63**Eu**152 | 64**Gd**157 | 65**Tb**158 | 66**Dy**162 | 67**Ho**164 | 68**Er**167 | 69**Tm**168 | 70**Yb**173 | 71**Lu**175 |
| † | 90**Th**232 | 91**Pa**231 | 92**U**238 | 93**Np**237 | 94**Pu**244 | 95**Am**243 | 96**Cm**247 | 97**Bk**247 | 98**Cf**251 | 99**Es**252 | 100**Fm**257 | 101**Md**258 | 102**No**259 | 103**Lr**262 |

**Biological Sciences**

**Passage I**

The kidneys adjust loss of water and electrolytes from the body to keep body fluids constant in amount and composition. They excrete wastes and foreign substances, secrete the hormones erythropoietin and rennin into the blood, and convert vitamin D into its active form.

95. Which of the following substances are mostly reabsorbed in the proximal convoluted tubule?

I. water

II. glucose

III. amino acids

IV. urea

A) I and II are correct.

B) II and III are correct.

C) I, II, and III are correct.

D) All are correct.

96. The consumption of oxygen by the kidneys

A) is greatest in the medulla.

B) remains constant as blood flow increases.

C) is regulated by antidiuretic hormone.

D) is proportional to the level of sodium transport.

97. Glomerular filtration rate would be increased by

A) a decrease in plasma oncotic pressure.

B) a narrowing in the renal artery.

C) disease resulting in fewer functioning glomeruli.

D) an increase in plasma proteins.

98. Renin

A) causes loss of sodium and water from plasma.

B) is secreted by the cells of the proximal tubule.

C) converts angiotensinogen to angiotensin I.

D) converts angiotensin I to angiotensin II.

99. Which of the following is the least important in controlling the synthesis and secretion of aldosterone?

A) ACTH

B) Angiotensin II

C) Plasma sodium concentration

D) Blood pressure

100. The tubules (mainly proximal) of the nephron secrete ammonia into lumen to enhance the excretion of hydrogen ions. Ammonia is an effective urinary buffer because

I. its production can be increased if necessary

II. it has a low pKb (4.8)

III. the walls of the tubules are impermeable to NH4+

A) I and II are correct.

B) I, II, and III are correct.

C) II and III are correct.

D) I and III are correct.

**Passage II**

Carbohydrates are polyhydroxyaldehydes or polyhydroxyketones. However, in actuality, the carbonyl groups are often present as hemiacetals and acetals. Below are the structures of some carbohydrates.

 

101. The stereochemical relationship of compounds (3) and (4) is that they are

I. diastereomers

II. enantiomers

III. epimers

A) III only

B) I and II

C) I and III

D) II and III

102. If the (-) enantiomer of each compound is oxidized by bromine water to yield the corresponding dicarboxylic acid, which will still be optically active?

A) 2 and 3

B) 3 and 4

C) 1 and 2

D) 1 and 4

103. To convert these compounds to riboses (five-carbon sugars), one must

A) cyclize the chain by forming a hemiacetal with the C-4 hydroxyl and the C-1 aldehyde.

B) oxidize the C-1 aldehyde to a carboxylic acid.

C) reduce the C-5 carboxylic acid to an alcohol.

D) reduce the C-5 carboxylic acid to an aldehyde.

104. Referring to the previous question, when compound 1 is converted to a ribose, the cyclic hemiacetal it forms is

 

105. Which of the following compounds will give a negative Benedict’s test?

 

**Questions 106 to 109 are independent of any passage and of each other.**

106. Which of the following RNA sequences would be transcribed if the sequence of the DNA coding strand were TATTGCATCAA?

A) UAUUGCAUCAA

B) AUAACGUAGUU

C) TTGUTGCUUTU

D) AUAAGCAUCAA

107. What is the main product of the following reaction, which is carried out in a weakly basic solution?

 

 

108. In humans, essential fatty acids are required for the synthesis of

A) estrogen.

B) bile acids.

C) purines.

D) prostaglandins.

109. You have at your disposal benzene, bromine, nitric acid, and sulfuric acid. How would you produce m-bromonitrobenzene?

A) m-bromonitrobenzene cannot be made with these materials.

B) Brominate the benzene, then nitrate.

C) Nitrate the benzene, then brominate.

D) Do either B or C.

**Passage III**

Single-gene defects may be autosomal or X-linked, and either dominant or recessive. A specialist in medical genetics encounters the following cases.

110. A family history is obtained from a person affected with a suspected genetic disease. It shows a pattern of inheritance in which:

1. every affected person had at least one affected parent

2. normal persons had normal offspring, who in turn also had normal offspring

3. about the same number of males as females were affected.

What type of inheritance is this likely to be?

A) Autosomal dominant

B) Autosomal recessive

C) X-linked dominant

D) X-linked recessive

111. Another patient has a family history in which:

1. nearly all affected persons were males

2. all daughters of an affected male seemed to be carriers

3. none of the sons of an affected male were affected

What type of inheritance is this likely to be?

A) Autosomal dominant

B) Autosomal recessive

C) X-linked dominant

D) X-linked recessive

112. Another patient has a family history in which:

1. the disease was equally distributed among the male and female offspring of affected females

2. all daughters of an affected male were affected

3. none of the sons of an affected male and unaffected female were affected

What type of inheritance is this likely to be?

A) Autosomal dominant

B) Autosomal recessive

C) X-linked dominant

D) X-linked recessive

113. Another patient has a family history in which:

1. carrier females transmit the trait to half of their sons

2. none of the carrier females. daughters were affected, but half were carriers

What type of inheritance is this likely to be?

A) Autosomal dominant

B) Autosomal recessive

C) X-linked dominant

D) X-linked recessive

114. Another patient has a family history in which:

1. males and females were equally affected

2. two of the offspring from two unaffected parents were affected, while the other six offspring were unaffected.

What type of inheritance is this likely to be?

A) Autosomal dominant

B) Autosomal recessive

C) X-linked dominant

D) X-linked recessive

**Passage IV**

In various scientific pursuits, it is important to be able to purify substances so that they can be better studied or better used. Common methods of separating substances are extraction, recrystalization, distillation, and chromatography.

A mixture contains the three compounds shown in the table below.



 

115. The mixture is dissolved in a small amount of ether. To this is added an equal volume of 0.01 M HCl(aq). After shaking, two layers are formed: an aqueous layer and an ether layer. The layers are then separated. Which of the compounds will be found in the aqueous layer?

A) 1 only

B) 2 only

C) 3 only

D) 2 and 3

116. To the ether layer is added an equal volume of 0.01 M NaOH(aq). Again, two layers are formed. After separating them, which of the compounds will be found in the aqueous layer?

A) 1 only

B) 3 only

C) 1 and 3

D) 2 and 3

117. This aqueous layer is evaporated to dryness leaving a solid residue of mass 0.31 g. Ten milliliters of aqueous acid of pH 3 are added. After stirring, the residue is smaller. What is the identity of the residue?

A) 1 only

B) 2 only

C) 3 only

D) 1 and 3

118. In extractions, the distribution constant is the ratio of the concentrations of a particular species between two solvents at equilibrium. If the distribution constant for an organic acid (HA) between chloroform and water is 100, i.e. [HA]CHCl3 / [HA]H2O = 100, and the dissociation constant of the acid in water is 10-5, increasing the pH of the aqueous phase from 4 to 10 will have what effect on the quantity of HA in the chloroform phase? (Assume HA does not dissociate or dimerize in the chloroform phase.)

A) The quantity is reduced to less than half of what it was.

B) The quantity is reduced but remains more than half of what it was.

C) The quantity is increased but is not more than double what it was.

D) The quantity is more than double what it was.

119. A mixture of toluene (methyl benzene) and aniline (amino benzene) is subjected to liquid column chromatography with alumina (Al2O3) as the solid phase. Which is most likely to occur?

A) Toluene will be eluted first since it has a lower boiling point.

B) Separation will not occur since the molecules are about the same size.

C) Aniline will be eluted first since it is more polar than toluene.

D) Toluene will be eluted first since it is less polar than aniline.

**Passage V**

The theory of evolution maintains that all species came into existence by gradual and continuous changes from earlier forms. Evidence of the descent of separate species from a common ancestor can be found from various sources such as comparing anatomical structures, examining DNA, and studying the fossil record.

120. The best definition of an organism’s fitness in the evolutionary sense is its

A) probable genetic contribution to future generations.

B) ability to perform optimally in its environment.

C) chance of surviving to maturity.

D) reproductive health.

121. Which of the following conditions would not be susceptible to natural selection?

A) A dominant allele in the homozygous condition

B) A dominant allele in the heterozygous condition

C) A recessive allele in the homozygous condition

D) A recessive allele in the heterozygous condition

122. Selection acts upon

A) species.

B) populations.

C) genes.

D) individual phenotypes.

123. If selection acts to remove one extreme in a distribution of phenotypes, this is called

A) genetic drift.

B) natural selection.

C) balancing selection.

D) directional selection.

124. Random fluctuations in gene frequencies in small populations is called

A) mutagenic disequilibrium.

B) genetic drift.

C) selection.

D) heterogenesis.

125. Which of the following is not a distinguishing characteristic of a species?

A) Sharing of a common gene pool

B) Reproductive isolation from all other groups

C) Ability to mate within the group

D) A genetically distinct group of natural populations

**Questions 126 to 130 are independent of any passage and of each other.**

126. Removal of the adrenal glands would be expected to have all of the following consequences except

A) poor mobilization and use of adipose tissue.

B) hyperglycemia.

C) excessive loss of sodium in the urine.

D) poor resistance to infection.

127. An infrared absorption spectrum is obtained from a compound known to have a hydroxyl group and a carbonyl group. Absorption due to hydroxyl group O-H bond stretching occurs at 3,620 cm-1. At what wavenumber would absorption due to C=O stretching likely occur at?

A) 3,620 cm-1

B) 7,200 cm-1

C) 1,700 cm-1

D) 9,560 cm-1

128. Hyperglycemia can be induced by all of the following except

A) thyroxine.

B) aldosterone.

C) ACTH.

D) glucagon.

129. A hospital has possibly switched the babies of couples X and Y. Their blood types are as follows:

Couple X: type A and type A

Couple Y: type AB and type O

Baby 1: type O

Baby 2: type B.

Which baby belongs to which couple?

A) Both babies belong to Couple Y.

B) Baby 1 belongs to Couple Y and Baby 2 belongs to Couple X.

C) Baby 1 belongs to Couple X, but Baby 2 could belong to either couple.

D) Baby 1 belongs to Couple X and Baby 2 belongs to Couple Y.

130. Cholesterol is a precursor in the biosynthesis of all of the following except

A) aldosterone.

B) cortisol.

C) endorphins.

D) testosterone.

**Passage VI**

Reactions in living systems have basically the same mechanisms as those carried out in laboratories. To make reactions proceed more rapidly, enzymes take the place of heat and inorganic catalysts. Also, these enzymes allow only specific reactions to occur and not numerous other possible reactions. An important metabolic pathway in the catabolism of proteins is the transamination of amino acids. Tansaminations use pyridoxal phosphate, a derivative of vitamin B6, as a cofactor. Part of this pathway is shown below.

 

131. Which of the following is/are true?

I. Pyridoxal phosphate has an aromatic ring.

II. Pyridoxal phosphate has a net positive charge.

III. Pyridoxal phosphate has an ester linkage.

A) Only III is true.

B) I and II are true.

C) II and III are true.

D) I and III are true.

132. Step 1 involves

A) condensation.

B) nucleophilic addition followed by elimination of water.

C) decarboxylation.

D) an aldol reaction.

133. Step 2 involves

A) hydration.

B) oxidation.

C) decarboxylation.

D) deprotonation of an acid followed by bond rearrangements.

134. Step 3 involves

A) hydrolysis.

B) oxidation.

C) decarboxylation.

D) hydration.

135. Step 4 involves

A) condensation.

B) tautomerization.

C) phosphorylation.

D) an aldol reaction.

136. The overall effect of this pathway is that

A) An amino acid is oxidized to a β-keto acid.

B) An amino acid is reduced to a β-keto acid.

C) An amino acid is oxidized to an α-keto acid.

D) An amino acid is reduced to an α-keto acid.

137. This pathway actually carries on for many more steps. What is likely to occur further along the pathway?

A) Pyridoxal phosphate is regenerated

B) Oxidative phosphorylation

C) Substrate-level phosphorylation

D) Glycolysis

**Passage VII**

Since frog embryos are easily available and easy to work with, they are often used in studies of animal development. After fertilization of a frog egg, the zygote divides many times forming a ball of cells called a morula. Gradually, this becomes hollow and the structure is called a blastula. During gastrulation, an area on the blastula, called the blastopore, invaginates. The cells of the dorsal lip of the blastopore migrate into the blastopore forming a three-layered gastrula. The three layers are the ectoderm, mesoderm, and endoderm. Following this is neurulation. A thick plate of cells forms a ridge along the ectoderm, which folds over itself forming a buried tube called the neural tube. The embryo at this stage is called a neurula. Eventually, the end of the neural tube farthest away from the blastopore will form the brain.

138. When a frog gastrula is cut in half, the side containing the blastopore develops into a mature frog while the other side dies. The most plausible explanation is that

A) cells lacking a distinct morphology are unimportant to development.

B) the blastopore is necessary to induce proper development.

C) the side that did not contain the blastopore failed to undergo any determination.

D) the side that did not contain the blastopore was destined to become the placenta.

139. When the dorsal lip of the blastopore is microsurgically transplanted into the blastocoele of another frog gastrula, a siamese twin tadpole (joined at the belly) sometimes results. This is because

A) the transplanted dorsal lip induces a second gastrulation in addition to the first one.

B) the transplanted dorsal lip carries different genetic information.

C) the gastrula is very sensitive to disturbances; even agitation with a fine needle would produce the same result.

D) the transplanted dorsal lip causes dedifferentiation and redevelopment of the cells around it.

140. Referring to the previous question, the hypothesis that cells within the blastocoele induce the transplanted dorsal lip cells to dedifferentiate is

A) supported by the data.

B) contradicted by the data.

C) neither supported nor contradicted by the data.

D) None of the above.

141. In the mature frog, the blastopore will have given rise to

A) the anus.

B) the brain.

C) the mouth.

D) the liver.

142. In the neurula, neural crest cells eventually become detached. In an experiment, these cells were injected with a dye and their migrations were followed. The dye was later found in cartilage, Schwann cells, adrenal glands, and sensory neurons. This indicates that

A) neural crest cells are insensitive to induction.

B) neural crest cells are relatively undetermined when they leave the neural tube.

C) these four types of cells have the same basic function.

D) these four types of cells have the same basic structure.

**Questions 143 to 146 are independent of any passage and of each other.**

143. Which of the following molecules are diastereomers?

 

A) 1 and 2; 3 and 4

B) 1 and 3; 1 and 4; 2 and 3; 2 and 4

C) 1 and 4; 2 and 3;

D) 1 and 3; 1 and 4; 2 and 4

144. A woman who is heterozygous for brown eyes (blue is recessive) and heterozygous for brown hair (blond is recessive) marries a man who has blond hair and is heterozygous for brown eyes. What is the probability they will have a son who has brown hair and brown eyes, and who is capable of fathering children with blue eyes?

A) 1/4

B) 1/2

C) 1/8

D) 1/16

145. Physiologically-active thyroxine exists in which of the following forms?

A) Bound to prealbumin

B) Bound to albumin

C) Bound to thyroxine-binding globulin

D) Unbound

146. What is the major product of the following reaction?

 

 

**STOP.** IF YOU FINISH BEFORE TIME IS CALLED, CHECK YOUR WORK. YOU MAY GO BACK TO ANY QUESTION IN THE BIOLOGICAL SCIENCES TEST BOOKLET.

**END OF MCAT EXAM**