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QUESTION 1

Gauguin\\'s attitude toward art marked a break from the past and a beginning to modern art. Like all Post- Impressionist artists, he passed through an Impressionist phase but became quickly dissatisfied with the limitations of the style, and went on to discover a new style that had the directness and universality of a symbol and that concentrated on impressions, ideas and experiences. The beginning of his modern tradition lay in his rejection of Impressionism. He considered naturalism an error to be avoided. He was preoccupied with suggestion rather than description, seeking to portray not the exterior, but the essence of things in their purest, simplest, and most primitive form, which could only be achieved through simplification of the form. He firmly believed throughout his life that "art is an abstraction" and that "this abstraction [must be derived] from nature while dreaming before it." One must think of the creation that will result rather than the model, and not try to render the model exactly as one sees it. This was the birth of "Synthetism" or rather Synthetist-Symbolic, as Gauguin referred to it, using the term "symbolic" to indicate that the forms and patterns in his pictures were meant to suggest mental images or ideas and not simply to record visual experience.

Symbolism flourished around the period of 1885 to 1910 and can be defined as the rejection of direct, literal representation in favor of evocation and suggestion. Painters tried to give a visual expression to emotional experiences, and therefore the movement was a reaction against the naturalistic aims of Impressionism. Satisfying the need for a more spiritual or emotional approach in art, Symbolism is characterized by the desire to seek refuge in a dreamworld of beauty and the belief that color and line in themselves could express ideas. Stylistically, the tendency was towards flattened forms and broad areas of color, and features of the movement were an intense religious feeling and an interest in subjects of death, disease, and sin.

Similarly, "Synthetism" involved the simplification of forms into large-scale patterns and the expressive purification of colors. Form and color had to be simplified for the sake of expression. This style reacted against the "formlessness" of Impressionism and favored painting subjectively and expressing one\\'s ideas rather than relying on external objects as subject matters. It was characterized by areas of pure colors, very defined contours, an emphasis on pattern and decorative qualities, and a relative absence of shadows.

Gauguin\\'s new art form merged these two movements and succeeded in freeing color, form, and line, bringing it to express the artists\\' emotions, sensibilities, and personal experiences of the world around them. His style created a break with the old tradition of descriptive naturalism and favored the synthesis of observation and imagination. Gauguin sustained that forms are not discovered in nature but in one\\'s wild imagination, and it was in himself that he searched rather than in his surroundings. For this reason, he scorned the Impressionists for their lack of imagination and their mere scientific reasoning. Furthermore, Gauguin used color unnaturalistically for its decorative or emotional effect and reintroduced emphatic outlines. "Synthetism" signified for him that the forms of his pictures were constructed from symbolic patterns of color and linear rhythms and were not mere scientific reproductions of what is seen by the eye.

Dempsey, A., and Dempsey, A. (2010). Styles, Schools and Movements: The Essential Encyclopaedic Guide to Modern Art. London: Thames and Hudson.

Which of these quotes from fellow painters would Gauguin be LEAST likely to agree with, based on passage information?

A. "Treat nature in terms of the cylinder, the sphere, and the cone." (Paul Cezanne)

B. "There is only one true thing: instantly paint what you see. When you\\'ve got it, you\\'ve got it. When you haven\\'t, you begin again." (ouard Manet)

C. "Paintings have a life of their own that derives from the painter\\'s soul." (Vincent van Gogh)

D. "Painting is a blind man\\'s profession. He paints not what he sees, but what he feels, what he tells himself about what he has seen." (Pablo Picasso)

Correct Answer: B

This Reasoning Beyond the Text question asks you to consider how quotes from artists relate to what we know about Gauguin\\'s ideas. The quote from Manet suggests seeing the external world and capture it immediately in a painting. This runs contrary to the ideas presented in the passage. The first paragraph says Gauguin was "preoccupied with suggestion rather than description" and that Symbolism is defined as the "rejection of direct, literal representation in favor of evocation and suggestion." This quote would thus align Manet with Impressionism, which Gauguin rejects. A ?incorrect. This quote from Cezanne presents another principle of simplification, which is consistent with the idea of the passage about Synthetism as well as Gauguin\\'s reintroduction of "emphatic outlines." C ?incorrect. This quote does not concern itself with the external world but the internal experience or soul of the artist. This is in accordance with Gauguin\\'s views as these were described in the passage. D ?incorrect. This quote suggests that painting should be based on expressing feelings, which is one of Symbolism\\'s principles.

QUESTION 2

...Squeaking sand produces sounds with very high frequencies -- between 500 and 2,500 hertz, lasting less than a quarter of a second. The peals are musically pure, often containing four or five harmonic overtones. Booming sand makes louder, low-frequency sounds of 50 to 300 hertz, which may last as long as 15 minutes in larger dunes (although typically they last for seconds or less). In addition, they are rather noisy, containing a multitude of nearby frequencies. Booms have never been observed to contain more than one harmonic of the fundamental tone. These dramatic differences once led to a consensus that although both types of sand produce acoustic emissions, the ways in which they do so must be substantially different.... In the late 1970s, however, Peter K. Haff, then at the California Institute of Technology, produced squeaks in booming sand, suggesting a closer connection between the two. Both kinds of sand must be displaced to make sounds. Walking on some sand, for example, forces the sand underfoot to move down and out, producing squeaks. In the case of booming sand, displacement occurs during avalanches. It is within the avalanche that sound begins and where the answers must be hiding. Before an avalanche can occur, winds must build a dune up to a certain angle, usually about 35 degrees for dry desert sand. Once an angle is achieved, the sand on the leeward side of the dune begins to slump. Intact layers of sand slip over the layers below, like a sheared deck of cards. At the same time, the individual grains in the upper layers tumble over the grains underneath, momentarily falling into the spaces between them and bouncing out again to continue their downward journey. Their concerted up-and-down motion is believed to be the secret source of sound. Fully developed avalanches, in which sliding plates of sand remain intact for most of their motion, have the greatest acoustic output. In some places, where large amounts of sand are involved, booming can be heard up to 10 kilometers away. Because it is caused by large volumes of shearing sand, the roaring is also loud. In fact, sounds made by booming sand can be nearly deafening, and the vibrations causing them can be so intense that standing in their midst is nearly impossible. A good place to start in exploring the vibrational properties of sand is with the grains themselves. The mean diameter of most sand grains, whether acoustically active or not, is about 300 microns. Usually the grains in a booming dune are very similar in size, especially near the leeward crest, where the sound most often originates; such uniformity allows for more efficient shearing. Otherwise, the smaller grains impede the smooth motion of the larger ones. Similar sizes do not alone allow sand to boom. On the contrary, the booming sands of Korizo and Gelf Kebib, also in Libya, feature an uncharacteristically broad range of particle sizes. Moreover, silent dune sand often contains grains somewhat similar to nearby booming sand. Grains of booming sand also tend to have uncommonly smooth surfaces, with protrusions on the scale of mere microns. Booming dunes are often found at the downwind end of large sand sources; having bounced and rolled across the desert for long distances, the sand grains in these dunes are usually highly polished. Over time a grain can also be polished by repeated shifts within a moving dune. And squeaking sand as well tends to be exceptionally smooth.... ...Another important factor is humidity, because moisture can modify the friction between grains or cause sand to clump together, thus precluding shearing. Sounds occur in those parts of the dune that dry the fastest. Precipitation may be rare in the desert, but dunes retain water with remarkable efficiency. Sand near the surface dries quickly, however, and sand around a dune\\'s crest tends to dry the fastest.

Which of the following discoveries would give the most support to the hypothesis that squeaking sand and booming sand differ only in the mechanism by which the sounds are produced?

A. Avalanches can be induced in squeaking sand.

B. Squeaking sand can be made to generate booming sounds.

C. Booming sounds made by dunes can be generated by mechanisms other than avalanches.

D. Smooth grains are not a requirement for booming sand.

Correct Answer: B

Paragraph two of the passage contains a rather tantalizing piece of information about the two kinds of sand: squeaking sounds can be produced by sand that normally "booms." This is however not developed in the rest of the passage. In this

QUESTION 3

Hypoxia refers to a physiological condition in which the body lacks sufficient oxygen for normal cellular functioning. Prolonged hypoxia generally leads to an inhibition of mental capacity and a reduction in the work capacity of muscle. Severe cases of hypoxia can lead to coma or even death. Depending on the cause, hypoxia can be classified into four general types:

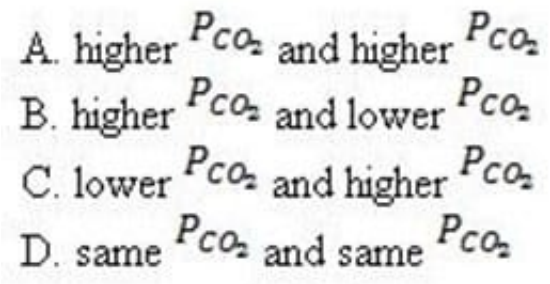
Hypoxic hypoxia is a type of hypoxia that occurs when the partial pressure of oxygen in the blood is too low. For example, climbers at high altitude, where the air contains less oxygen, might experience hypoxic hypoxia because the partial pressure of oxygen in the air inhaled is very low, leading to insufficient partial pressure of oxygen in the blood.

Anemic hypoxia describes a diminished ability of the blood to transport oxygen. Several factors can influence the oxygen-carrying capacity of the blood. Primary causes of anemic hypoxia include a lower than normal number of functional erythrocytes or an insufficient quantity of hemoglobin, the oxygen- carrying molecules of the blood. Abnormal hemoglobin can also decrease the blood\\'s capacity to carry oxygen and lead to anemic hypoxia.

Ischemic hypoxia is caused by a decreased delivery of blood to the tissues. Localized circulatory deficiencies, such as blood clots, and global circulatory deficiencies, such as heart failure, decrease the delivery of blood to the tissues, and can therefore cause ischemic hypoxia.

Histotoxic hypoxia results from the inability of cells to utilize the oxygen available in the blood. Causes of histotoxic hypoxia include the poisoning of cellular enzymes involved in aerobic respiration, as well as the decreased metabolic capacity of the oxidative enzymes due to vitamin deficiency. Cyanide poisoning causes histotoxic hypoxia by blocking the action of cytochrome oxidase in the electron transport chain so that tissues cannot use oxygen even though it is available.

The passages of the respiratory tract which do not participate in gas exchange are called the physiological dead space. Compared to air in the alveoli, air in the physiological dead space will have:



A. Option A

B. Option B

C. Option C

D. Option D

Correct Answer: C

The question stem states that the physiological dead space is not involved in gas exchange. This means that the composition of air in the dead space is virtually identical to that of atomospheric air. In the alveoli, where gas exchange occurs, oxygen is taken up by the blood and carbon dioxide is released. Thus, the air in the alveoli will have a lower pO2 and a higher pCO2 than dead space air. Conversely, dead space air will have a higher pO2 and a lower pCO2 than alveolar air. Choices A, B, and D are incorrect because they do not indicate that the alveolar air will have a higher concentration of carbon dioxide and a lower concentration of oxygen.

QUESTION 4

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 5

Hemoglobin (Hb) and myoglobin (Mb) are the O2-carrying proteins in vertebrates. Hb, which is contained within red blood cells, serves as the O2 carrier in blood and also plays a vital role in the transport of CO2 and H+. Vertebrate Hb consists of four polypeptides (subunits) each with a heme group. The four chains are held together by noncovalent attractions. The affinity of Hb for O2 varies between species and within species depending on such factors as blood pH, stage of development, and body size. For example, small mammals give up O2 more readily than large mammals because small mammals have a higher metabolic rate and require more O2 per gram of tissue.

The binding of O2 to Hb is also dependent on the cooperativity of the Hb subunits. That is, binding at one heme facilitates the binding of O2 at the other hemes within the Hb molecule by altering the conformation of the entire molecule. This conformational change makes subsequent binding of O2 more energetically favorable. Conversely, the unloading of O2 at one heme facilitates the unloading of O2 at the others by a similar mechanism.

Figure 1 depicts the O2-dissociation curves of Hb (Curves A, B, and C) and myoglobin (Curve D), where saturation, Y, is the fractional occupancy of the O2-binding sites. The fraction of O2 that is transferred from Hb as the blood passes through the tissue capillaries is called the utilization coefficient. A normal value is approximately 0.25.

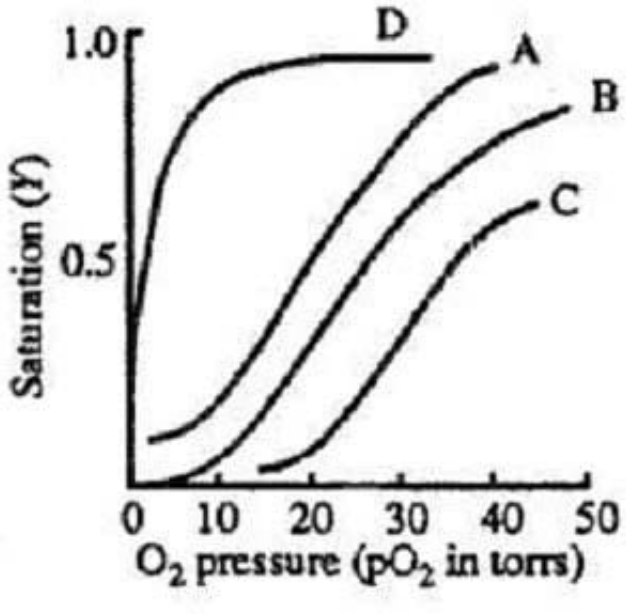


Figure 1 Myoglobin facilitates transport in muscle and serves as a reserve store of O2. Mb is a single polypeptide chain containing a heme group, with a molecular weight of 18 kd. As can be seen in Figure 1, Mb (Curve D) has a greater affinity for than Hb.

A sample of human adult Hb is placed in an 8 M urea solution, resulting in the disruption of noncovalent interactions. After this procedure, the chains of Hb are isolated. Which of the four curves most closely resembles the O2-dissociation curve for the isolated chains? [Note: Assume that Curve B represents the O2-dissociation curve for human adult Hb in vivo.]

A. Curve A

B. Curve B

C. Curve C

D. Curve D

Correct Answer: D

From the passage you know that the four subunits in Hb are held together by noncovalent interactions. So placing a sample of human adult hemoglobin in an 8 M urea solution, which you\\'re told disrupts noncovalent interactions, will cause the subunits to break apart. You\\'re also told in the question stem that the alpha chains of this sample of hemoglobin were isolated. So you need to figure out what the oxygen dissociation curve of a single peptide chain would look like. From the passage you also know that myoglobin consists of a single polypeptide chain. Therefore, the oxygen-dissociation curve for one polypeptide chain of Hb would be expected to look similar to the curve for myoglobin. In fact, both the individual alpha chains and the beta chains of hemoglobin resemble the tertiary structure of myoglobin. Thus, the curve for the alpha chain will look like Curve D and so, choice D is correct. The single chain of Hb will NOT look like Curves A, B or C because these curves have a unique shape due to the cooperativity of the four hemoglobin subunits. And since you\\'re now dealing with a single chain, because of that treatment with an 8 M urea solution, no cooperativity is possible.

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