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Topic Break Down

Topic	No. of Questions
Topic 1, Reading Comprehension	18
Topic 2, Physics	50
Topic 3, Quantitative Reasoning	46
Topic 4, Survey of the Natural Sciences	160
Total	274

QUESTION NO: 1

What property of a sound wave in air corresponds to the frequency of the sound?

- A. pitch
- B. high and low
- C. timbre
- D. overtones

ANSWER: A**Explanation:**

The frequency of a sound wave directly determines its pitch. We say the pitch of 480 Hz is higher than the pitch of 440 Hz. High and low are the words we use to describe pitch. Overtones refer to the frequencies above the fundamental frequency in a musical instrument. Two singers singing the same note at the same loudness will sound differently because their voices have different timbres.

QUESTION NO: 2

Which structure is responsible for a sperm cell's motility?

- A. Cilia
- B. Flagellum
- C. Mitochondria
- D. Acrosome
- E. A & B

ANSWER: B**Explanation:**

The flagellum is responsible for propelling the sperm. The acrosome contains the digestive enzymes that break down the ovum membrane.

QUESTION NO: 3

On a bad day, have you ever been irritable? Have you ever used a harsh tone or even been verbally disrespectful to your parents or teachers? Everyone has a short temper from time to time, but current statistics indicate that between 16% and 20% of a school population suffer from a psychological condition known as Oppositional Defiance Disorder, or ODD.

ODD symptoms include difficulty complying with adult requests, excessive arguments with adults, temper tantrums, difficulty accepting responsibility for actions, low frustration tolerance, and behaviors intended to annoy or upset adults. Parents of children with ODD can often feel as though their whole relationship is based on conflict after conflict.

Unfortunately, ODD can be caused by a number of factors. Some students affected by ODD suffer abuse, neglect, and severe or unpredictable discipline at home. Others have parents with mood disorders or have experienced family violence. Various types of therapy are helpful in treating ODD, and some drugs can treat particular symptoms. However, no single cure exists.

The best advice from professionals is directed toward parents. Therapists encourage parents to avoid situations that usually end in power struggles, to try not to feed into oppositional behavior by reacting emotionally, to praise positive behaviors, and to discourage negative behaviors with timeouts instead of harsh discipline.

Which of the following statements can be inferred from paragraph 4?

- A. Parents of children with ODD are bad parents.
- B. ODD is not a real psychological disorder.
- C. Medication can worsen ODD.
- D. Reacting emotionally to defiant behavior might worsen the behavior.

ANSWER: D

QUESTION NO: 4

Which of the following can reduce an acid chloride to an alcohol?

- A. NaBH_4
- B. DIBALH
- C. LiAlH_4
- D. Heat
- E. A & C

ANSWER: E

Explanation:

Both NaBH_4 and LiAlH_4 can reduce an acid chloride to a first-degree alcohol.

DIBALH reduces an ester to an aldehyde.

QUESTION NO: 5

On a bad day, have you ever been irritable? Have you ever used a harsh tone or even been verbally disrespectful to your parents or teachers? Everyone has a short temper from time to time, but current statistics indicate that between 16% and 20% of a school population suffer from a psychological condition known as Oppositional Defiance Disorder, or ODD.

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According to the passage, which of the following is a cause of ODD?

- A. Poor diet
- B. Low IQ
- C. Excessive television viewing
- D. Severe or unpredictable punishment

ANSWER: D**QUESTION NO: 6**

Which of the following statements is incorrect regarding the circulatory system?

- A. Aorta is the heart's largest blood vessel.
- B. Blood passes from the left atrium to the left ventricle via the mitral valve.
- C. Circulating lymph is picked up and returned to the lymphatic system.
- D. The sinoatrial node is found in the right atrium.
- E. All of the above are correct.

ANSWER: C**Explanation:**

Circulating lymph is returned to the circulatory system! All the other answer choices are indeed correct.

QUESTION NO: 7

What is the hydrostatic pressure in a pond at a depth of 100 m? (Density of water = 1000 kg/m³)

- A. 1.0×10^6 Pa
- B. 1.0×10^6 atm
- C. 1.0×10^5 Pa
- D. 1.0×10^5 atm
- E. 300 Pa

ANSWER: A**Explanation:**

Hydrostatic Pressure = $\rho g D$ where:

ρ = Density of fluid (1000 kg/m³ here, as given) g = Gravity (unless stated otherwise, this is 10 m/s²) D = Depth (100 m, as given)

Simply plug and chug. Remember the SI unit of pressure is Pascal (Pa). Since all given units are in their respective SI formats, no conversion is needed.

QUESTION NO: 8

What is the sum of the interior angles of a regular nonagon?

- A. 900°
- B. 1080°
- C. 540°
- D. 1260°
- E. 1440°

ANSWER: D**Explanation:**

The sum of interior angles for any regular shaped polygon can be determined with the following equation:

$$(n - 2) \times 180^\circ$$

Where n is # of sides. In this case, a nonagon is a 9-sided polygon. Plugging in 9 in the equation gives 1260° for all 9 sides combined. If asked for EACH angle, then you would just divide 1260° by 9.

QUESTION NO: 9

It is most likely that you have never had diphtheria. You probably don't even know anyone who has suffered from this disease. In fact, you may not even know what diphtheria is. Similarly, diseases like whooping cough, measles, mumps, and rubella may all be unfamiliar to you. In the nineteenth and early twentieth centuries, these illnesses struck hundreds of thousands of people in the United States each year, mostly children, and tens of thousands of people died. The names of these diseases were frightening household words. Today, they are all but forgotten. That change happened largely because of vaccines.

You probably have been vaccinated against diphtheria. You may even have been exposed to the bacterium that causes it, but the vaccine prepared your body to fight off the disease so quickly that you were unaware of the infection. Vaccines take advantage of your body's natural ability to learn how to combat many disease-causing germs, or microbes. What's more, your body remembers how to protect itself from the microbes it has encountered before. Collectively, the parts of your body that remember and repel microbes are called the immune system. Without the proper functioning of the immune system, the simplest illness – even the common cold – could quickly turn deadly.

On average, your immune system needs more than a week to learn how to fight off an unfamiliar microbe. Sometimes, that isn't enough time. Strong microbes can spread through your body faster than the immune system can fend them off. Your body often gains the upper hand after a few weeks, but in the meantime you are sick. Certain microbes are so virulent that they can overwhelm or escape your natural defenses. In those situations, vaccines can make all the difference.

Traditional vaccines contain either parts of microbes or whole microbes that have been altered so that they don't cause disease. When your immune system confronts these harmless versions of the germs, it quickly clears them from your body. In other words, vaccines trick your immune system in order to teach your body important lessons about how to defeat its opponents.

Which statement is not a detail from the passage?

- A. Vaccines contain microbe parts or altered microbes.
- B. The immune system typically needs a week to learn how to fight a new disease.
- C. The symptoms of disease do not emerge until the body has learned how to fight the microbe.
- D. A hundred years ago, children were at the greatest risk of dying from now-treatable diseases.

ANSWER: C**Explanation:**

This passage does not state that the symptoms of disease will not emerge until the body has learned to fight the disease. On the contrary, the passage implies that a person may become quite sick and even die before the body learns to effectively fight the disease.

QUESTION NO: 10

A liquid is held at its freezing point and slowly allowed to solidify. Which of the following statements about this event are true?

- A. During freezing, the temperature of the material decreases.
- B. While freezing, heat is given off by the material.
- C. During freezing, heat is absorbed by the material.

D. During freezing, the temperature of the material increases.

ANSWER: B

Explanation:

Freezing is an exothermic event; therefore, heat must be given off. The temperature of the material remains unchanged at the freezing point during the process.

QUESTION NO: 11

While veins are usually associated with carrying deoxygenated blood, which of the following veins carries oxygenated blood?

- A. Great saphenous vein
- B. Axillary vein
- C. Hepatic vein
- D. Brachial vein
- E. Pulmonary vein

ANSWER: E

Explanation:

Pulmonary veins carry oxygenated blood from the lungs to the left atrium of the heart. It is one of the few veins that carries oxygenated blood (umbilical vein is another).

QUESTION NO: 12

Which of the following elements do not belong with the others?

- A. Boron
- B. Aluminium
- C. Silicon
- D. Germanium
- E. Arsenic

ANSWER: B

Explanation:

The answer choices are all metalloids except Aluminium.

QUESTION NO: 13

A mythical atom has isotopes: 10X, 11X and 12X with masses 10, 11, and 12 respectively. 10X has an abundance of 80%, 11X of 15% and 12X of 5%. What is the atomic mass of this X atom?

- A. 10
- B. 10.25
- C. 10.75
- D. 11
- E. 11.25

ANSWER: B**Explanation:**

Logically you should be aware the answer is going to be a low 10 number due to the vast abundance of the 10 atom. However, to calculate it mathematically: $(0.80 \times 10) + (0.15 \times 11) + (0.05 \times 12) = 10.25$

QUESTION NO: 14

Which of the following gives the correct order of electromagnetic radiation from the lowest frequency to the highest frequency?

- A. microwaves, UHF radio waves, x-rays, visible light
- B. UHF radio waves, microwaves, visible light, x-rays
- C. microwaves, visible light, x-rays, UHF radio waves
- D. microwaves, x-rays, visible light, UHF radio waves

ANSWER: B**Explanation:**

Radio waves have the lowest frequency and the longest wavelength. Microwaves also have low frequencies and long wavelengths compared to visible light. X-rays are highly energetic and have higher frequencies and smaller wavelengths than visible light.

QUESTION NO: 15

Diverging lenses always produce what type of image?

- A. Virtual
- B. Upright
- C. Smaller than the object
- D. All of the above
- E. None of the above

ANSWER: D

Explanation:

All of these characteristics are indeed relevant to diverging lenses as the location of the object is irrelevant compared to converging lenses.