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QUESTION 1

Which of the following would you not expect to find autotrophs?

- A. Aphotic Zone
- B. Photic Zone
- C. Intertidal Zone
- D. Littoral Zone
- E. There are autotrophs in all of the above

Correct Answer: A

The Aphotic Zone receives no sunlight, thus photosynthesis cannot occur, which means autotrophs cannot exist.

QUESTION 2

A circuit contains a 2 and a 5 resistor, connected in parallel to each other. What is the equivalent resistance in this circuit?

- A. 7
- B. 10
- C. 0.7
- D. 10/7
- E. 5/2

Correct Answer: D

Resistors in parallel add via: $1/R_{eq} = 1/R + 1/R...$ $1/R_{eq} = 1/2 + 1/5$ Finding a common denominator: $5/10 + 2/10 = 7/10 = 1/R_{eq}$ Flipping it to attain $R_{eq} = 10/7$

QUESTION 3

What is the total number of orbitals in the third shell ($n = 3$)?

- A. 1
- B. 4
- C. 9
- D. 16
- E. 25

Correct Answer: C

The number of orbitals per level can be expressed with the equation: n^2

Where $n = 3$.

$$3^2 = 9$$

9 total orbitals exist. (1 from s-orbital, 3 from p-orbitals, 5 from d-orbitals).

QUESTION 4

A population of 1000 individuals has 110 births and 10 deaths in a year. Its growth rate (r) is equal to:

- A. 0.01 per year
- B. 0.11 per year
- C. 0.1 per year
- D. 0.09 per year
- E. 0.009 per year

Correct Answer: C

The growth rate is equal to the difference between births and deaths divided by population size.

QUESTION 5

A dog learns that if it does not bite its bone toy, it will receive treats. This example is best categorized under:

- A. Positive reinforcement
- B. Negative reinforcement
- C. Positive punishment
- D. Negative punishment
- E. Extinction

Correct Answer: B

Negative reinforcement relates the lack of an action or behavior with a reward (in this case, the lack of biting the toy). If it was positive reinforcement, the scenario would have the dog receiving a treat for biting the toy.

QUESTION 6

In a sample with 46 homologous pairs of chromosomes, what is the total number of chromatids present in the sample?

- A. 23
- B. 46
- C. 92
- D. 184
- E. 256

Correct Answer: D

If there are 46 homologous chromosomes present, it means there is a total of 92 chromosomes. 46 come from the father, 46 from the mother. Thus with 92 chromosomes, there is a total of 184 chromatids.

QUESTION 7

Leaves have parallel veins:

- A. Monocots
- B. Nonvascular plants
- C. Gymnosperms
- D. Dicots
- E. Angiosperms

Correct Answer: A

Monocots differ from dicots in that they have one cotyledon, or embryonic leaf in their embryos. They also have parallel venation, fibrous roots, petals in multiples of three, and a random arrangement of vascular bundles in their stems.

QUESTION 8

Which of the following processes is an example of deposition?

- A. $\text{H}_2\text{O}(\text{s}) \rightarrow \text{H}_2\text{O}(\text{l})$
- B. $\text{H}_2\text{O}(\text{l}) \rightarrow \text{H}_2\text{O}(\text{g})$
- C. $\text{H}_2\text{O}(\text{s}) \rightarrow \text{H}_2\text{O}(\text{g})$
- D. $\text{H}_2\text{O}(\text{g}) \rightarrow \text{H}_2\text{O}(\text{l})$
- E. $\text{H}_2\text{O}(\text{g}) \rightarrow \text{H}_2\text{O}(\text{s})$

Correct Answer: E

QUESTION 9

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

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

Correct Answer: B

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

QUESTION 10

If 8 people can eat 6 bags of chips, how many people will it take to eat 15 bags of chips?

- A. 22
- B. 18
- C. 16
- D. 20

Correct Answer: D

Use a proportion to solve the problem. $\frac{8}{6} = \frac{x}{15}$, $60 = 3x$, $x = 20$.

QUESTION 11

Sutures are:

- A. Bone to bone connectors, such as the knee joint
- B. Points of attachment for skeletal muscle to bone
- C. Immovable joints, such as in the human skull
- D. The replacement of cartilage by bone
- E. None of the above

Correct Answer: C

This is the definition of sutures. Tendons are what attaches muscle to bone. Endochondral ossification is replacing existing cartilage with bone

QUESTION 12

A vessel contains 0.50 moles of nitrogen, 0.40 moles of carbon and 0.10 moles of chlorine at a total pressure of 4.0 atm. What is the partial pressure of the chlorine?

- A. 0.40 atm
- B. 2.00 atm
- C. 1.60 atm
- D. 1.00 atm
- E. Cannot be calculated with this information.

Correct Answer: A

Begin by calculating the mole fraction of the chlorine: Moles of Cl / Total Moles \rightarrow 0.10 mol Cl / 1.0 mol = 0.10
Then multiply the fraction by the total pressure of the system: 0.10 \times 4 atm = 0.4 atm

QUESTION 13

Which of the following is false regarding SN2 reactions?

- A. SN2 occurs in one step.
- B. Common solvents include DMSO and acetone.
- C. Steric hindrance increases from primary to secondary to tertiary.
- D. SN2 prefers to proceed with strong nucleophiles.
- E. None of the above.

Correct Answer: E

All of the answer choices accurately represent SN2 reactions.

QUESTION 14

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.

As used in this passage, the word oppositional most nearly means:

- A. Uncooperative
- B. Violent
- C. Passive aggressive
- D. Altruistic

Correct Answer: A

QUESTION 15

What is the product of 0.34×0.06 ?

- A. 0.0204
- B. 2.04
- C. 0.204
- D. 20.4

Correct Answer: A

The product of 0.34 and 0.06 is 0.0204. Remember to count the number of places to the right of the decimal.

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