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QUESTION 1

In animals, consuming glucose causes insulin release from the pancreas, which causes the liver and muscles to take in glucose from the blood stream. This is an example of:

A. Thermoregulation

B. Negative feedback

C. Receptor feedback

D. Circulatory feedback

E. Positive feedback

Correct Answer: B

In negative feedback, when a pathway\'s output (increased blood glucose) exceeds normal limits, a mechanism is activated that reduces inputs to the pathway (reduction of blood glucose). Conditions are monitored by a control center, and when homeostasis returns, the corrective action is discontinued.

QUESTION 2

What is the probability of rolling a prime number in each roll in 4 consecutive rolls of a 6 sided die?

A. 1/4

B. 1/8

C. 1/16

D. 1/32

Correct Answer: C

The prime numbers in the range are: 2, 3, 5. On any roll, the probability of rolling a prime number is:

$$\frac{(3\ primes)}{(6\ total)} = \frac{1}{2}$$

The probability of rolling this 4 times in a row is:

$$\frac{1}{2} \times \frac{1}{2} \times \frac{1}{2} \times \frac{1}{2} = \frac{1}{16}$$

QUESTION 3

The hybridization of the oxygen in CO_2 is:

A. s

B. sp

C. sp2

D. sp3

Correct Answer: C

QUESTION 4

If the pI of a specific protein is 6, what is the charge on the protein when it is in a solution of pH 9?

A.

B. 0

C. +

D. Cannot be determined.

Correct Answer: A

The pI, or the isoelectric point, is the pH at which a molecule exhibits a net charge of 0. When the pI of a molecule is less than the pH of the surrounding solution, the molecule is deprotonated and its charge is negative. The 3 situations:

pH pI = deprotonated (- charge) pH = pI = neutral charge.

QUESTION 5

What is the osmotic pressure of a 2M NaCl solution at 0 degrees C?

A. 44.8 atm

B. 45.5 atm

C. 0 atm

D. 97 atm

Correct Answer: A

Calculate osmotic pressure using: ? = MRT, where ? is pressure, M is the molar concentration of the dissolved solution, R is the ideal gas constant (0.08206 L atm mol?1 K?1), and T is temperature in Kelvins. Substituting and solving: ? = 2 × 0.08206 × 273.15 = 44.8 atm.