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SCIENCE BOWL LIGHTNING: BIOLOGY

1) BIOLOGY Short Answer: Which protein helps relieve strain of unwinding DNA strands by breaking, swiveling, and rejoining the strands?  
ANSWER: Topoisomerase  
  
2) BIOLOGY Multiple Choice: Which statement is false?  
W)Primase synthesizes RNA primers for DNA replication.  
X) DNA polymerase 3 adds nucleotides to the 5 prime end of the primer.  
Y) Nucleotides added to growing DNA strands were originally nucleoside triphosphates.  
Z) Rate of elongation in DNA, or DNA polymerase 3 adding nucleotides, is faster in bacteria than in humans.  
ANSWER: X  
  
3) BIOLOGY Multiple Choice How many hydrogen bonds does guanine make with cytosine?  
W) 1  
X) 2  
Y) 3  
Z) 4  
ANSWER: 3  
  
4) BIOLOGY Short Answer: Using name or number, indicate which of the following amino acids are hydrophilic: Methionine, phenylanine glycine, isoleucine.  
ANSWER: none or 0  
  
5) BIOLOGY Multiple Choice: You want to track DNA in phages. What radioactive element would you have the phages grow in, to distinguish the DNA from other substances like protein?  
W) Sulfur-35  
X) Carbon-14  
Y) Phosphorus-32  
Z) Nitrogen-15  
ANSWER: Y  
  
6) BIOLOGY Multiple Choice: Phages are grown with radioactive sulfur (S-35). Which amino acids will be labelled?  
W) Serine  
X) Methionine  
Y) Threonine  
Z) Aspartic acid  
ANSWER: X  
  
7) BIOLOGY Short Answer: What is the term that describes having one chromosome as a result of aneuploidy?  
ANSWER: Monosomic  
  
8) BIOLOGY Multiple Choice: Which of the following is true?  
W) Recombination frequencies give the distance between the genes, not the relative location.  
X) If genes on the same chromosome are far enough, they appear genetically unlinked.   
Y) The maximum recombination frequency is 100%.  
Z) Adding recombination frequencies of intermediate genes equals the recombination frequency of two genes at the ends.  
ANSWER: X  
  
9) BIOLOGY Short Answer: Children with phenylketonuria or PKU accumulate what toxic substance which can lead to mental retardation?  
ANSWER: Phenylpyruvate  
  
10) BIOLOGY By name or number, indicate which of the following four are caused by dominant alleles.  
Cystic fibrosis, Achondrioplasia, Polydactyly, Huntington’s disease  
ANSWER: 2, 3, 4 (all but cystic fibrosis)  
  
11) Short Answer: If two individuals heterozygous for two traits are crossed, how many individuals of 48 offspring are expected to be dominant with respect to just one trait?  
ANSWER: 18

12) BIOLOGY Short Answer: Name the term that describes one gene affecting multiple phenotypic characters (example: albinism and color deposition in mice).   
ANSWER: Pleiotropy

13) BIOLOGY Multiple Choice: In which phase of meiosis does crossing over occur?  
W) Metaphase I  
X) Prophase II  
Y) Anaphase II  
Z) Prophase I  
ANSWER: Z  
  
14) BIOLOGY Short Answer: What is the haploid number of dogs, given their diploid number is 78?  
ANSWER: 39

15) BIOLOGY Short Answer: To become active in order to regulate the cell cycle, kinases must be attached to what other protein? It is named for its cyclically fluctuating concentration in the cell.   
ANSWER: Cyclin  
  
16) BIOLOGY Multiple Choice: Which of the following is a growth factor for fibroblasts?  
W) MPF  
X)  PDGF  
Y) Cdk  
Z) Cyclin  
ANSWER: X

17) BIOLOGY Multiple Choice: If a cell takes 24 hours to go through the cell cycle, what could be the possible time it takes to complete the S phase?  
W) less than 1 hour  
X) 6 hours  
Y) 12 hours  
Z) 18 hours  
ANSWER: Y  
  
18) BIOLOGY Multiple Choice: The protein that helps separate two bacterial daughter cells (like a cleavage furrow in animals) most closely resembles  
W) Myoglobin  
X) Actin  
Y) Myosin  
Z) Tubulin  
ANSWER: Z

19) BIOLOGY Short Answer: Name one of the three products that the Calvin cycle reactions return to the light reactions for reuse.   
ANSWER: NADP +, ADP, or inorganic phosphate ions  
  
20) BIOLOGY Short Answer: When ephinephrine causes a signal transduction pathway to cleave glycogen, what is the product?  
ANSWER: Glucose-1-phosphate

21) BIOLOGY Mult Choice Ruption of which of the following organelles leads to leakage of proteins that behave like Ced-3, Ced-4, and Ced-9 of C. elegans?  
W) Mitochondria  
X) ER  
Y) Golgi apparatus  
Z) Nucleus  
ANSWER: W

22) BIOLOGY Multiple Choice: Which is embedded in the archegonia of bryophyte sporophytes and is responsible for absorbing nutrients from the gametophyte?  
W) Foot  
X) Seta  
Y) Capsule  
Z) Peristome

ANSWER: W

23) BIOLOGY Multiple Choice: Which stage follows the eight-cell stage in zygote development?  
W) Gastrula  
X) Blastula  
Y) Metamorphosis  
Z) Larval  
ANSWER: X

24) BIOLOGY Multiple Choice: What is the approximate value of the mammalian neuron threshold in millivolts?  
W) 89 mV  
X) 42 mV  
Y) -55 mV  
Z) -99 mV

ANSWER: Y

25) BIOLOGY Multiple Choice: Animals who cannot tolerate large changes in external osmolarity are said to be what?  
W) Osomoconformer  
X) Osmoregulator   
Y) Stenohaline  
Z) Euryhaline

ANSWER: Y