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本科目試題共 16 頁

單選題：請從 ABCDE 選項中選出一個最正確的答案 答錯不倒扣。第 1-15 題 每題 1 分；第 16-45 題 每題 2 分；第 46-70 題 每題 3 分。

1. Glutamic acid contains two carboxylic acid groups ( $pK_a = 2.2$  and  $4.2$ ) and an amine group ( $pK_a = 9.7$ ). What is the  $pI$  for glutamic acid? What is glutamic acid's net charge in a solution with  $pH = 7.4$ ?
  - A) 3.2, negative charge
  - B) 6.0, negative charge
  - C) 6.5, no charge
  - D) 7.0, positive charge
  - E) none of the above
2. Which is the description about an allosteric interaction between a ligand and a protein?
  - A) binding of a molecule to a binding site affects binding of additional molecules to the same site
  - B) binding of a molecule to a binding site affects binding properties of another site on the protein
  - C) binding of the ligand to the protein is covalent
  - D) multiple molecules of the same ligand can bind to the same binding site
  - E) two different ligands can bind to the same binding site
3. Which of the following is an irreversible form of inhibition?
  - A) suicide inhibitor
  - B) competitive inhibitor
  - C) noncompetitive inhibitor
  - D) uncompetitive inhibitor
  - E) none of the above
4. Amphetamine and mescaline cause hallucinogenic effect by stimulating the central nervous system. They are the agonist of
  - A) acetylcholine
  - B) GABA
  - C) NMDA
  - D) glutamate
  - E) dopamine
5. Steroid hormones, such as glucocorticoids, affect their action by:
  - A) binding to a plasma membrane receptor and then activating the kinases cascade.
  - B) binding the plasma membrane receptor, which stimulates the receptor to enter the cell.
  - C) entering into the cell and affecting the production of secondary messengers.
  - D) entering into the cell and then acting as transcription regulators.
  - E) none of the above.

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6. Which of the following, when paired with its complementary strand, would have the highest  $T_m$ ?
- AAGTTCCAGTAA
  - ATTACGAGCTAT
  - GCAGCAGCATTT
  - GCGAAATCAATA
  - TGACCTTGAATT
7. Diphtheria toxin kills cells by inactivating EF-2 proteins. Which process is inhibited by the diphtheria toxin?
- Movement of DNA polymerase on the template DNA
  - Promoter clearance of the RNAPII
  - Movement of RNAPII on the template DNA
  - Ribosome assembling on the mRNA
  - Ribosome translocation
8. Glycerol generated from hydrolysis of triacylglycerols enters which one of the following intermediates in glycolysis?
- glyceraldehyde-3-phosphate.
  - 2-phosphoglycerate.
  - 3-phosphoglycerate.
  - dihydroxyacetone phosphate.
  - 1,3-bisphosphoglycerate.
9. The common product produced by Complex I and Complex II in the electron transport chain is:
- $NAD^+$ .
  - FAD.
  - reduced  $O_2$ .
  - reduced cyt c.
  - reduced coenzyme Q.
10. Which one of the following factors is NOT an antioxidant to cope with oxidative stress?
- catalase.
  - uric acid.
  - vitamin B6.
  - vitamin C.
  - SOD.
11. The coenzymes used by acetyl-CoA carboxylase is/are:
- biotin.
  - pyridoxal phosphate and TPP.
  - folic acid and TPP.
  - NADH.
  - FAD.

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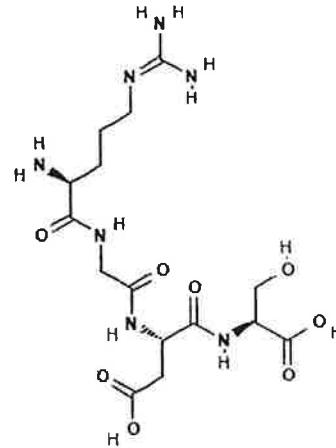
12. How are glutamic acid, arginine, and proline related in the process of amino acid biosynthesis?
- A) All are derived from acetyl CoA.
  - B) All are derivatives of  $\alpha$ -KG.
  - C) All are derivatives of pyruvate.
  - D) All are derived from aspartate.
  - E) All are derivatives of 3-phosphoglycerate.
13. Which one of the following is NOT the substrate of carbamoyl phosphate synthetase II (CPS-II)?
- A) ATP.
  - B)  $H_2O$ .
  - C)  $HCO_3^-$ .
  - D) glutamine.
  - E)  $NH_4^+$ .
14. What is the coenzyme responsible for the addition of two single carbon in purine biosynthesis?
- A) biotin.
  - B) SAM.
  - C) THF.
  - D) TPP.
  - E) none of the above.
15. During the fasting or starvation, the brain will
- A) convert endogenous fatty acids into  $\beta$ -hydroxybutyrate.
  - B) utilize  $\beta$ -hydroxybutyrate from the blood stream.
  - C) utilize its glycogen stores as a first responding source of fuel.
  - D) utilize amino acids for fuel from degradation of brain protein.
  - E) all of the above.
16. The pH of a blood sample is 7.4, while gastric juice is pH 1.4. Which of the following is *true*?
- 1) the  $[H^+]$  in the blood sample is higher than in the gastric juice
  - 2) the difference of  $[H^+]$  between the gastric juice and the blood sample is one million times
  - 3) the  $[H^+]$  in a blood sample is lower than in the gastric juice
  - 4) the difference of  $[H^+]$  between the gastric juice and the blood sample is 5.29 times
  - 5) the difference of  $[H^+]$  between the gastric juice and the blood sample is 6000 times
- A) 1, 4
  - B) 3, 5
  - C) 2, 3
  - D) 1, 2
  - E) 3, 4

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17. What is the amino acid sequence of the following peptide starting from the N-terminal end?

- A) KDS
- B) RDT
- C) SDGR
- D) RGDS
- E) KGDS



18. Which of the following type of mutations is correctly defined?

- A) silent: change of a single base in the non-coding region of a gene
- B) missense: substitution of a single base results in a premature stop codon
- C) nonsense: substitution of a single base results in a complete change of amino acid sequence
- D) frameshift: deletion of a single base results in a single amino acid change
- E) none of the above

19. An enzyme-catalyzed reaction was carried out with the substrate concentration initially a thousand times greater than the  $K_m$  for that substrate. After 12 minutes, 1% of the substrate had been converted to product, and the amount of product formed in the reaction mixture was  $20 \mu\text{mol}$ . If, in a separate experiment, 30 % as much enzyme and twice as much substrate had been combined, how long would it take for the same amount of product to be formed?

- A) 6 min
- B) 12 min
- C) 40 min
- D) 18 min
- E) 4 min

20. About DNA replication in eukaryotic cells, which of the following statement is correct?

- 1) There are multiple replication origins.
- 2) Two strands of the DNA are replicated independently
- 3) DNA could only be synthesized in a 5' to 3' direction
- 4) Semi-conservative replication describes that two DNA copies in diploid cells are replicated separately.
- 5) Misincorporation of ribonucleotides during replication is possible.

- A) 1, 3, 5
- B) 2, 3, 4
- C) 1, 2, 3
- D) 1, 3
- E) All of the above

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21. Post-translational modifications are critical for the regulation of biological processes. Which of the followings are the examples of post-translational modifications of proteins?

- 1) activation of pro-caspase 3 to caspase 3
- 2) converting PIP2 to PIP3 by PI3 kinase
- 3) activation of protein kinase A by cAMP
- 4) activating NF- $\kappa$ b through I $\kappa$ b kinase
- 5) epigenetic regulation by histone codes

- A) 1, 3, 4, 5
- B) 1, 2, 4, 5
- C) 1, 4, 5
- D) 2, 3, 4
- E) All of the above

22. The Crispr/Cas9 is the approach using DNA damage and repair to modify the genomic DNA. Select the type of DNA damage and the type of repair mechanism involved in this approach.

1) single-strand breakage, 2) double-strand breakage, 3) DNA adduct, 4) inter-strand crosslinking, 5) gap-filling, 6) homologous recombination, 7) nucleotide excision repair, 8) base excision repair, 9) non-homologous end joining

- A) 1, 6
- B) 2, 5
- C) 3, 7
- D) 4, 9
- E) None of the above

23. Which of the following is known to be involved in transcription initiation by eukaryotic RNA polymerase II?

- 1) DNA helicase activity
- 2) DNA polymerase activity
- 3) Formation of an open complex
- 4) Protein binding to specific DNA sequences
- 5) Protein phosphorylation

- A) 1, 2, 3, 4
- B) 2, 3, 4, 5
- C) 1, 3, 4
- D) 1, 3, 4, 5
- E) All of the above

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24. In transforming the Michaelis-Menten equation into a straight-line equation,  $y = mx + b$ , the Lineweaver-Burk double reciprocal plot, which of the following is a true representation?
- 1) slope =  $K_m/V_{max}$
  - 2) y-intercept is  $1/V_{max}$
  - 3)  $x = [S]$
  - 4)  $y = 1/V$
  - 5) x-intercept is  $1/K_m$
- A) 1, 2, 3  
 B) 1, 2, 4  
 C) 2, 3, 5  
 D) 3, 4, 5  
 E) All of the above
25. Transcription initiation requires the formation of pre-initiation complex (PIC). Which of followings are NOT required for the formation of PIC on the TATA box? 1) enhancer, 2) TAF, 3) RNAPII, 4) TBP, 5) TFIIF, 6) TFIIC
- A) 1, 2, 5  
 B) 1, 6  
 C) 4, 5  
 D) 1, 3, 6  
 E) All of the above are required
26. Which of the following antibiotics function by interfering with the translational process?  
 1) Chloramphenicol, 2) Vancomycin, 3) Penicillin, 4) Puromycin, 5) Streptomycin
- A) 1, 4, 5  
 B) 2, 4, 5  
 C) 1, 2, 3  
 D) 2, 3, 4  
 E) All of the above
27. Which of the following is true of the lac operon?
- 1) It is negatively controlled via the lac repressor
  - 2) Lactose is an allosteric regulator of lac repressor
  - 3) Lactose represses the lac operon
  - 4) It is positively controlled via cAMP activator protein (CAP)
  - 5) Glucose has no effect on the regulation of lac operon
- A) 1, 3, 4  
 B) 1, 2, 4  
 C) 1, 3, 5  
 D) 1, 2, 3  
 E) All of the above

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28. Which of the following is NOT an example of epigenetic regulation?
- 1) X chromosome inactivation
  - 2) Genomic imprinting
  - 3) Somatic recombination in B cells
  - 4) RNA interference
  - 5) chromatin remodeling
- A) 1, 5  
B) 2, 4  
C) 4  
D) 3, 4  
E) All of the above are the examples of epigenetic regulation
29. Which one of the following descriptions about the electron number that can be transferred by one FAD or one  $\text{NAD}^+$  is correct?
- A) 2 for  $\text{NAD}^+$ ; 1 for FAD.  
B) 1 or 2 for  $\text{NAD}^+$ ; 2 for FAD.  
C) 1 or 2 for  $\text{NAD}^+$ ; 1 for FAD.  
D) 2 for  $\text{NAD}^+$ ; 1 or 2 for FAD.  
E) 1 for  $\text{NAD}^+$ ; 1 or 2 for FAD.
30. Which one of the following enzymes catalyzes a reversible reaction that is an equilibrium control step of glycolysis?
- A) pyruvate kinase  
B) glucokinase  
C) phosphofructokinase-1  
D) aldolase  
E) none of the above
31. Please order the following coenzymes according to their sequential involvement in the pyruvate dehydrogenase complex.
- I.  $\text{NAD}^+$
  - II. CoA-SH
  - III. TPP
  - IV. Lipoate (lipoamide)
  - V. [FAD]
- A) III, II, I, IV, V  
B) III, II, I, V, IV  
C) III, IV, II, V, I  
D) II, IV, V, I, III  
E) III, V, IV, II, I

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32. Which three reactions catalyzed by the enzymes in the citric acid cycle have large negative  $\Delta G$  values?
- I. succinyl-CoA synthetase.
  - II. fumarase.
  - III.  $\alpha$ -ketoglutarate dehydrogenase.
  - IV. isocitrate dehydrogenase.
  - V. citrate synthase.
  - VI. malate dehydrogenase.
  - VII. aconitase.
  - VIII. succinyl-CoA dehydrogenase.
- A) I, III, V  
B) III, IV, V  
C) IV, VI, VIII  
D) I, III, VI  
E) IV, V, VIII
33. Which one of the following descriptions about the property of uncouplers such as the uncoupling protein-1 is correct?
- I. They were briefly used as weight-loss drugs.
  - II. ATP/ADP ratio increases.
  - III. Electron transport continues.
  - IV. They dissipate the proton gradient.
  - V. Heat is produced.
- A) I, II, III, IV  
B) I, II, III, V  
C) I, III, IV, V  
D) II, III, IV, V  
E) I, III, IV
34. Which one of the following is the characteristic of the glycerophosphate shuttle?
- A) It only operates efficiently when the [NADH] in the cytoplasm is higher than in the matrix.  
B) It shuttles "NADH electron equivalents" across the mitochondrial membrane to yield 1.5 ATP/NADH.  
C) It shuttles NADH across the mitochondrial membrane to yield 2.5 ATP/NADH  
D) Aspartate is a key component in the shuttle process.  
E) Malate is a key component in the shuttle process.
35. Please order the following components of malate-aspartate shuttle into an appropriate sequence.
- I. OAA trans-aminated to aspartate
  - II. OAA reduced to malate
  - III. Malate oxidized to OAA
  - IV. Malate translocated to matrix
  - V. Aspartate translocated to cytosol
  - VI. Aspartate trans-aminated to OAA



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- A) I, VI, III, II, IV, V  
 B) II, I, IV, VI, III, V  
 C) II, V, IV, III, VI, I  
 D) III, IV, VI, V, I, II  
 E) II, IV, III, I, V, VI
36. Which of the following reactions is/are catalyzed by a transketolase in the pentose phosphate pathway?
- I. sedoheptulose-7-P + glyceraldehyde-3-P  $\leftrightarrow$  ribose-5-P + xyulose-5-P  
 II. erythrose-4-P + fructose-6-P  $\leftrightarrow$  sedoheptulose-7-P + glyceraldehyde-3-P  
 III. fructose-6-P + glyceraldehyde-3-P  $\leftrightarrow$  xylulose-5-P + erythrose-4-P
- A) I only  
 B) II and III  
 C) II only  
 D) I and III  
 E) I and II
37. The first three reactions of  $\beta$ -oxidation of saturated fatty acids are analogous to which sequence of the following metabolic reactions?
- A) succinate  $\rightarrow$  fumarate  $\rightarrow$  malate  $\rightarrow$  oxaloacetate  
 B) oxaloacetate  $\rightarrow$  citrate  $\rightarrow$  isocitrate  $\rightarrow$   $\alpha$ -ketoglutarate  
 C) isocitrate  $\rightarrow$   $\alpha$ -ketoglutarate  $\rightarrow$  succinate  $\rightarrow$  fumarate  
 D) phosphoenolpyruvate  $\rightarrow$  pyruvate  $\rightarrow$  acetyl-CoA  $\rightarrow$  citrate  
 E)  $\alpha$ -ketoglutarate  $\rightarrow$  succinyl-CoA  $\rightarrow$  succinate  $\rightarrow$  fumarate
38. The HMG-CoA lyase in ketone body biosynthesis is mechanistically the reverse of the first half of the reaction catalyzed by:
- A) aconitase.  
 B)  $\beta$ -hydroxybutyrate dehydrogenase.  
 C) pyruvate dehydrogenase.  
 D) citrate synthase.  
 E) succinyl-CoA synthase.
39. CDP-diacylglycerols are NOT the precursors for the synthesis of:
- A) phosphatidylethanolamine.  
 B) phosphatidyl glycerol.  
 C) phosphatidylinositol.  
 D) cardiolipins.  
 E) all of the above are false.

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40. The correct sequence of enzyme activity being used to catalyze reactions in fatty acid synthase is:
- $\beta$ -ketoacyl-ACP synthase
  - $\beta$ -ketoacyl reductase
  - $\beta$ -hydroxyacyl dehydratase
  - enoyl reductase
  - acetyl transferase
- A) I, II, III, IV, V  
B) III, II, IV, V, I  
C) II, I, III, IV, V  
D) I, III, II, V, IV  
E) IV, V, I, II, III
41. The appropriate sequence for the intermediates generated from mevalonate to the synthesis of squalene are:
- geranyl pyrophosphate
  - isopentenyl pyrophosphate
  - 5-phosphomevalonate
  - farnesyl pyrophosphate
  - dimethylallyl pyrophosphate
- A) I, III, IV, II, V  
B) III, II, V, I, IV  
C) III, V, I, IV, II  
D) V, III, II, IV, I  
E) II, III, IV, I, V
42. Which one of the following is directly served as one of the nitrogen atoms of a urea molecule in the Urea cycle?
- A) the amide N of Asn  
B) the amide N of Gln  
C) the R-group N of Lys  
D) the N of glucosamine  
E) none of the above
43. Which of the following statements of transamination are CORRECT?
- It is characterized by the transfer of an  $\alpha$ -amino group from an amino acid to the  $\alpha$ -keto position of an  $\alpha$ -keto acid.
  - The amino donor becomes an  $\alpha$ -keto acid.
  - The coenzyme needed is thiamin pyrophosphate (TPP).
  - Humans are capable of synthesizing the  $\alpha$ -keto acid analog of nonessential amino acids and using transamination to form the amino acids, but are not able to construct carbon skeletons of the essential amino acids.
  - The  $\alpha$ -keto acid acceptor becomes an  $\alpha$ -amino acid.

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- A) I, II, III  
B) I, II, IV  
C) I, II, III, IV  
D) II, III, IV, V  
E) I, II, IV, V
44. During the de novo biosynthesis of the purine ring, the generation of AICAR is accompany with the formation of
- A) Asp  
B) malate  
C) fumarate  
D) CO<sub>2</sub>  
E) H<sub>2</sub>O
45. Which of the following comments regarding resveratrol is CORRECT?
- I. activates SIRT1 NAD<sup>+</sup>-dependent deacetylase activity  
II. produced in plants, particularly in grape skins, in response to stress  
III. inhibits AMPK in the brain  
IV. has many of the same effects as caloric restriction
- A) I, II, III, IV  
B) I, II, III  
C) I, III, IV  
D) I, II, IV  
E) II, III, IV
46. What types of cells carry out ATP synthesis by chemiosmosis?
- A) all cells, exclusively using oxygen as the electron acceptor  
B) only eukaryotic cells, exclusively using oxygen as the electron acceptor  
C) only eukaryotic cells, using either oxygen or other electron acceptors such as elemental sulfur  
D) all respiring cells, using either oxygen or other electron acceptors such as elemental sulfur
47. In which cellular structure are the enzymes of the Calvin cycle localized?
- A) chloroplast stroma  
B) thylakoid space  
C) mitochondrial intermembrane space  
D) mitochondrial matrix

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48. Assuming independent assortment at all loci, what is the probability that a cross between the following parents, AABbCc  $\times$  AaBbCc, will produce an AaBbCC offspring?
- A) 1/2
  - B) 1/8
  - C) 1/16
  - D) 3/4
49. Why are males more often affected by X-linked traits than females?
- A) Genomic imprinting
  - B) X-chromosome inactivation
  - C) Aneuploidy of sex chromosome
  - D) Hemizyosity of the X chromosome
50. Which of the following statements correctly describes the difference between the leading strand and the lagging strand in DNA replication?
- A) Both of the leading strand and lagging strand require an DNA primer.
  - B) The leading strand is synthesized continuously in the 5'  $\rightarrow$  3' direction, while the lagging strand is synthesized discontinuously in the 5'  $\rightarrow$  3' direction.
  - C) The leading strand is synthesized in the 3'  $\rightarrow$  5' direction in a discontinuous fashion, while the lagging strand is synthesized in the 5'  $\rightarrow$  3' direction in a continuous fashion.
  - D) There are different DNA polymerases involved in elongation of the leading strand and the lagging strand.
51. Gene expression is often assayed by measuring the level of mRNA produced from a gene. Which of the following levels of the control of gene expression can be analyzed by this type of assay?
- A) DNA replication control
  - B) transcriptional control
  - C) translational control
  - D) post-translational control
52. Which of the following enzymes is required to make complementary DNA (cDNA) from RNA?
- A) RNA replicase
  - B) RNA-dependent RNA polymerase
  - C) Reverse transcriptase
  - D) RNA ligase

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53. What is believed to be the most significant result of the evolution of the amniotic egg?
- A) Tetrapods are no longer tied to the water for reproduction.
  - B) Tetrapods can now function with just lungs.
  - C) Newborns are much less dependent on their parents.
  - D) Embryos are protected from predators.
54. In humans, the follicular cells that remain behind in the ovary following ovulation become \_\_\_\_.
- A) the ovarian endometrium that is shed at the time of the menses
  - B) a steroid-hormone synthesizing structure called the corpus luteum
  - C) the thickened portion of the uterine wall
  - D) the placenta, which secretes cervical mucus
55. The outer-to-inner sequence of tissue layers in a post-gastrulation vertebrate embryo is \_\_\_\_.
- A) endoderm → ectoderm → mesoderm
  - B) mesoderm → endoderm → ectoderm
  - C) ectoderm → mesoderm → endoderm
  - D) ectoderm → endoderm → mesoderm
56. A common feature of action potentials is that they
- A) cause the membrane to hyperpolarize and then depolarize.
  - B) can undergo temporal and spatial summation.
  - C) are triggered by a depolarization that reaches threshold.
  - D) move at the same speed along all axons.
57. The following description about plants emitting volatile signals is incorrect.
- A) Volatile signals may have evolved for intra-plant communication
  - B) Having defensive neighbors can enhance the emitter's fitness
  - C) Some volatiles are also inhibitory allelochemicals that reduce competition
  - D) Volatile hormones (ethylene) and possibly derivatives (jasmonate and salicylate) contribute to the systemic response
58. Most of the ATP supplies for a skeletal muscle undergoing one hour of sustained exercise come from \_\_\_\_\_.
- A) creatine phosphate
  - B) glycolysis
  - C) substrate phosphorylation
  - D) oxidative phosphorylation

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59. What is the biological significance of genetic diversity between populations?
- A) Genes for traits conferring an advantage to local conditions are unlikely.
  - B) The population that is most fit would survive by competitive exclusion.
  - C) Genetic diversity reduces the probability of extinction.
  - D) Diseases and parasites are not spread between separated populations.
60. What, approximately, is the fraction of genetic variation in the nuclear genome is that is expected to have a harmful effect on gene function?
- A) 50%.
  - B) 25%.
  - C) 10%.
  - D) 1%.
61. Mutations are important because they bring about \_\_\_\_\_.
- A) death of the organism in which they develop
  - B) genetic variation needed for a population to evolve
  - C) benefits for the individual, not for the population
  - D) Hardey-Weinberg equilibrium within a population
62. When organisms with disadvantageous traits die out early before much, if any reproduction, this is called?
- A) speciation
  - B) macroevolution
  - C) gene flow
  - D) natural selection
63. Which fundamental tissue types are included in all three basic vascular plant organs?
- A) Dermal, vascular, and ground
  - B) Mesophyll, chlorophyll, and microphylls
  - C) Sclerenchyma, collenchyma, and parenchyma
  - D) Xylem, Xylene, and phloem
64. The group of molluscs, which possess eyes similar to vertebrates
- A) cephalopoda
  - B) gastropoda
  - C) bivalvia
  - D) pelecypoda

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65. Plant cell with a  $\Psi_s$  of -0.5 MPa maintains a constant volume when bathed in a solution that has a  $\Psi_s$  of -0.3 MPa and is in an open container. The cell has a:
- A)  $\Psi_p$  of +0.5 MPa
  - B)  $\Psi_p$  of +0.2 MPa
  - C)  $\Psi_p$  of 0 MPa
  - D)  $\Psi$  of -0.5 MPa
66. What would be the most effective method of reducing the incidence of blood flukes in a human population?
- A) Reduce the mosquito population.
  - B) Reduce the freshwater snail population.
  - C) Purify all drinking water.
  - D) Avoid contact with rodent droppings.
67. Which animal has a complete digestive system?
- A) jellyfish
  - B) roundworm
  - C) sponge
  - D) coral
68. Which of the following shows the correct direction of blood flow through the chambers of the heart?
- A) left atrium  $\rightarrow$  left ventricle  $\rightarrow$  right ventricle  $\rightarrow$  right atrium
  - B) left atrium  $\rightarrow$  right atrium  $\rightarrow$  left ventricle  $\rightarrow$  right ventricle
  - C) right atrium  $\rightarrow$  right ventricle  $\rightarrow$  left atrium  $\rightarrow$  left ventricle
  - D) right atrium  $\rightarrow$  left atrium  $\rightarrow$  left ventricle  $\rightarrow$  right ventricle
69. Put the step of the life cycle of a mushroom-forming basidiomycete in the order.
1. Karyogamy in each basidium produces a diploid nucleus
  2. Two haploid mycelia of different mating types undergo plasmogamy
  3. Environmental cues induce the dikaryotic mycelium to form basidiocarps
  4. The basidiospores germinate and grow into short-lived haploid mycelia
  5. When mature, the basidiospores are ejected and dispersed
- A) 4,2,3,5,1
  - B) 1,2,3,4,5
  - C) 2,3,1,5,4
  - D) 2,3,4,1,5

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70. The following description about the apoptosis in the *Caenorhabditis elegans* is incorrect.
- A) Three proteins, Ced-3, Ced-4, and Ced-9, are critical to apoptosis and its regulation in the nematode.
  - B) As long as Ced-9, located in the outer mitochondrial membrane.
  - C) When a cell receives a death signal, Ced-9 is activated, relieving its inhibition of Ced-4.
  - D) Active Ced-4 activates Ced-3, a protease, which triggers a cascade of reactions leading to the activation of nucleases and other proteases.