

TEST 11

BIOLOGY E/M TEST

FOR BOTH BIOLOGY-E OR BIOLOGY-M

ANSWER QUESTIONS 1-60

Directions: Each set of lettered choices below refers to the numbered questions or statements immediately following it. Select the one lettered choice that best answers each question or best fits each statement and then fill in the corresponding circle on the answer sheet. A choice may be used once, or not at all in each set.

Questions 1-4

- (A) Parasitism
- (B) Mutualism
- (C) Commensalism
- (D) Mimicry
- (E) Altruism

1. A tickbird feeds on harmful parasites it pulls from the skin of a rhinoceros
2. A ground squirrel gives an alarm call, which may make the squirrel's position more conspicuous to a predator, but which alerts other ground squirrels to approaching danger
3. An egret follows a cow, eating the insects that are dispersed as the cow walks
4. An ant protects and cares for aphids, which in turn produce a secretion that the ant eats.

Questions 5-9

- (A) Phototropism
- (B) Photorespiration
- (C) Photoperiodism
- (D) Photosynthesis
- (E) Phototaxis

5. Green plants make carbohydrates from carbon dioxide and water
6. A planarian moves toward a light source
7. Some plants flower in the spring, others flower in the summer
8. Plants stems grow toward a light source
9. The long days of spring initiates reproductive behaviour in many birds

Questions 10-12 refer to the following structures

- (A) Nephron
- (B) Red Blood Cells
- (C) Epidermis
- (D) Microfilament
- (E) Neuron

- 10. Protects organism from desiccation and from invasion by microorganisms
- 11. Filters blood to make urine
- 12. Transmits electrical impulses away from sensory structures

Directions: each of the questions or incomplete statements below is followed by five suggested answers or completion. Some questions pertain to a set that refers to a laboratory or experimental situation. For each question, select the one choice that is the best answer to the question and then fill in the corresponding circle on the answer sheet.

13. Chloroplasts are the organelles in which

- (A) There is a net gain of water
- (B) Cell division
- (C) Large molecules are packaged for export
- (D) Light energy is converted to chemical energy
- (E) Degradation of organelles occurs

14. Which of the following summarizes an advantage of sexual reproduction over asexual reproduction?

- (A) Genetic variation in a population is decreased
- (B) Mating increases the likelihood of parental care
- (C) More offspring are produced at a time
- (D) Adaptive mutations are more likely to arise
- (E) Alleles can be shuffled into new combinations

15. Which of the following is a characteristics of enzymes?

- (A) They are complex carbohydrate macromolecules
- (B) The lower the activation energy required for metabolic reactions to occur
- (C) They require the addition of heat energy for proper function
- (D) They can only be used once
- (E) They function only in a living cell

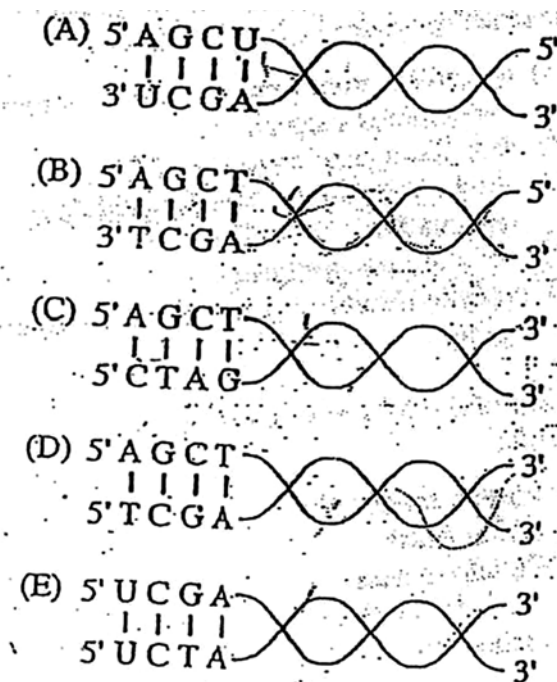
16. Which of the following molecules would most likely be excreted by a reptile that lives in a hot dry habitat?

- (A) Amino acids
- (B) Uric acid
- (C) Ammonia
- (D) Urea
- (E) Pyrimidines

17. Bacterial, fungal, algal, and plant cells have fixed shapes because they have
- (A) A plasma membrane
 - (B) A cell wall
 - (C) A large central vacuole
 - (D) Mitochondria
 - (E) chloroplasts
18. which of the following is a step of translation?
- (A) A cell makes new mRNA
 - (B) A cell makes new copies of DNA
 - (C) An RNA molecule is read to make tRNA
 - (D) An RNA molecule is read to make DNA
 - (E) An RNA molecule is read to make a polypeptide
19. All of the following are characteristics of birds EXCEPT
- (A) Teeth
 - (B) A four-chambered heart
 - (C) Efficient lungs
 - (D) Internal fertilization
 - (E) Amniotic eggs
20. In the inheritance of human blood groups, it is known that the alleles for blood types A and B are dominant to the alleles for type O, and that the alleles for types A and B are codominant. Children of two parents of blood type O are most likely to be
- (A) Type O only
 - (B) Any type but O
 - (C) Types A and B only
 - (D) Type AB only
 - (E) Any one of the four types, A,B,AB, or O
21. Fertilizers that are applied to soils contain which of the following substances essential for the growth and development of plants?
- (A) Vitamins
 - (B) Inorganic compounds
 - (C) Carbohydrates
 - (D) Proteins
 - (E) Lipids

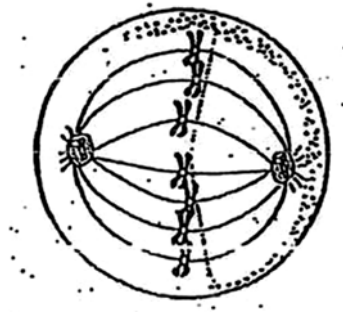
22. Which of the following occurs in many angiosperms, but not in many vertebrates?
- (A) Sexual reproduction
 - (B) Carbohydrate storage
 - (C) Cellular respiration
 - (D) Protein synthesis
 - (E) Asexual reproduction
23. Starch-digestion enzymes are secreted into the
- (A) Esophagus only
 - (B) Small intestine only
 - (C) Small intestine and large intestine
 - (D) Mouth and esophagus
 - (E) Mouth and small intestine
24. Which of the following pairs of organisms are LEAST likely to be found at the same trophic level in a food web?
- (A) Cow and grasshopper
 - (B) Fox and Hawk
 - (C) Rabbit and cow
 - (D) Sheep and wolf
 - (E) Toad and anteater
25. Which of the following biological processes, converts atmospheric nitrogen , N_2 , into a form of nitrogen that can be used by green plants
- (A) Nitrification
 - (B) Denitrification
 - (C) Nitrogen fixation
 - (D) Ammonification
 - (E) Phosphorylation

26. The biome that supplies the largest amount of food for humans is the
- (A) Tundra
 - (B) Taiga
 - (C) Grassland
 - (D) Deciduous forest
 - (E) Tropical rain forest
27. If an evergreen variety of wood fern is crossed with a nearby deciduous variety of wood fern, all of the offspring are deciduous. This evidence suggests that the inheritance of this trait is most likely a case of
- (A) Sex-linked inheritance
 - (B) Multiple allelic inheritance
 - (C) Simple dominance
 - (D) Codominance
 - (E) Mutation
28. Which of the following provides the most accurate picture of a DNA molecule?



29. Many bog plants are carnivorous as an adaptation to living in soils that are especially poor in which of the following?
- (A) Oxygen
 - (B) Salt
 - (C) Nitrogen
 - (D) Carbon
 - (E) Water
30. A man in his early twenties learns that his father has been diagnosed with Huntington's disease. This rare disease is caused by a dominant allele and usually does not manifest itself until middle age. There is no history of the disease in the young man's mother's family. What is the probability that the young man will develop the symptoms of the disease when he is older?
- (A) 0%
 - (B) 25%
 - (C) 50%
 - (D) 66%
 - (E) 75%
31. Mendel is frequently called the "father of Genetics" because he was the first to
- (A) Describe sexual reproduction in common vegetables such as peas
 - (B) Describe a gene as made of DNA
 - (C) Use a quantitative experimental approach in genetics
 - (D) Study human pedigree
 - (E) Apply agricultural principles to studying genes.
32. Which of the following structures is common to all cells?
- (A) Plasma membrane
 - (B) Chloroplasts
 - (C) Cellulose wall
 - (D) Nuclear envelope
 - (E) Flagellum
33. An angiosperm may have all of the following EXCEPT:
- (A) A fibrous root system
 - (B) Seeds
 - (C) Parallel venation
 - (D) Flowers
 - (E) Cones

34. A critical change accompanying the evolution of plants from a water environment to a land environment involved the
- (A) Loss of cells with thick walls
 - (B) Development of the ability to reproduce sexually
 - (C) Formation of a wax-like layer on epidermal cells
 - (D) Development of flagellated sperm
 - (E) Loss of stomata



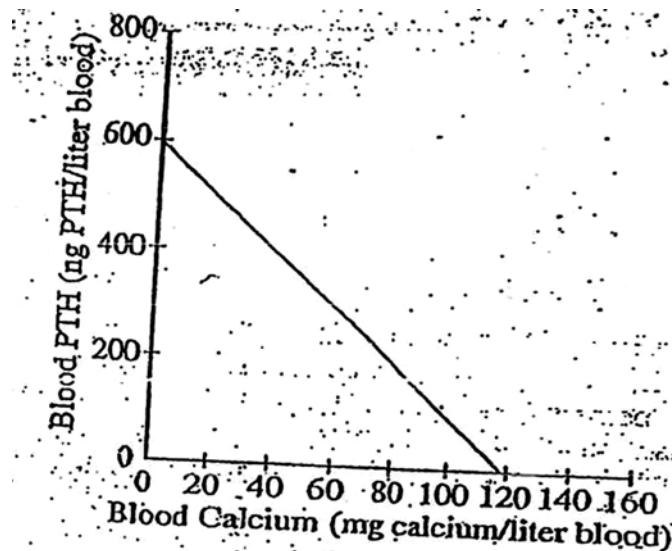
35. Which part of the cell cycle is illustrated above?
- (A) Prophase
 - (B) Anaphase
 - (C) Metaphase
 - (D) Telophase
 - (E) Interphase
36. A skunk that eats grubs, insects, worms, berries, and roots of plants can be best described as
- (A) A producer
 - (B) A herbivore
 - (C) A carnivore
 - (D) An omnivore
 - (E) A decomposer
37. Two different cells begin division at the same time, each replicates its chromosomes and divides once. Cell 1 stops at that point, but Cell 2 divides again without replicating its chromosomes. Which of the following is the most likely explanation for these observations?
- (A) Cell 1 is a dying cell
 - (B) Cell 1 is an abnormal cell whose daughter cells will have too much DNA
 - (C) Cell 2 is an abnormal cell whose daughter cells will have too little DNA
 - (D) Cell 2 is found in an ovary
 - (E) Cell 2 is a liver cell

38. Each of the two islands is found to have a distinct species of land snail. The two species of snails are believed to have evolved from a common ancestor because they share numerous common features. Which of the following processes would NOT be consistent with this hypothesis?
- (A) Isolation
 - (B) Natural selection
 - (C) Mutation
 - (D) Convergence
 - (E) Genetic drift
39. Which of the following organisms lacks a defined nucleus?
- (A) Cyanobacteria
 - (B) Amoeba
 - (C) Diatom
 - (D) Green algae
 - (E) Yeast
40. Which of the following statements is true of both fermentation and cellular respiration?
- (A) Both yield ATP for cell activities
 - (B) Both use oxygen
 - (C) Both produce ethanol
 - (D) Both produce lactic acid
 - (E) Both take place in mitochondria
41. Which of the following is common to both adult insects and crustaceans?
- (A) Gas exchange through gills
 - (B) Six legs
 - (C) Dorsal nerve cord
 - (D) Chitinous exoskeleton
 - (E) External fertilization of eggs

42. Acid rain is a serious environmental problem. A sample of rainwater collected in the Adirondack Mountains had an H^+ concentration of 10^{-4} M. the pH of this sample was
- (A) -4
 - (B) 0,0001
 - (C) 4
 - (D) 7.40
 - (E) 10,000
43. Which of the following roles do maple trees fill in a community?
- (A) Primary consumer
 - (B) Secondary consumer
 - (C) Tertiary consumer
 - (D) Decomposers
 - (E) Producers
44. Sap, extracted from a diseased tomato plant and passed through an ultrafine filter, is found to still retain disease-inducing properties when injected into healthy tomato plants. It is most probable that the disease-causing agent in the sap is a
- (A) Protozoan
 - (B) Virus
 - (C) Fungus
 - (D) Blue-green algae
 - (E) Bacterium
45. Which of the following structures are characteristics of both gymnosperms and angiosperms?
- (A) Fruits
 - (B) Cones
 - (C) Inflorescences
 - (D) Seeds
 - (E) Flowers

Questions 46-48

Parathyroid hormone (PTH) is secreted from parathyroid gland. Under normal conditions, PTH and blood calcium levels are regulated by negative feedback, the normal PTH value is about 100ng PTH/liter blood, and normal calcium value is about 100mg calcium/liter of blood. The results of an experiment with PTH are shown below.



46. Which of the following would happen to the PTH level if the parathyroid glands were removed?

- (A) Blood PTH would increase
- (B) Blood PTH would decrease
- (C) Blood PTH would fluctuate regularly
- (D) Blood PTH would be secreted by another endocrine gland
- (E) Blood PTH would no longer be needed

47. Which of the following would happen to the calcium level if the parathyroid glands were removed?

- (A) Blood calcium level would increase
- (B) Blood calcium level would decrease
- (C) Blood calcium level would fluctuate regularly
- (D) Calcium would be secreted into the blood by another gland
- (E) Calcium from the blood would be deposited in teeth

48. What would most likely happen if blood calcium fell to 50 mg calcium/liter blood due to a low calcium diet?
- (A) Blood PTH would decrease
 - (B) Blood PTH would not change
 - (C) The body would begin processes that would make blood calcium decrease further
 - (D) The body would begin processes that would make blood calcium increase
 - (E) The body could not regulate calcium properly, so there would be no change in the various processes that regulate blood calcium

Questions 49-53

A study of a species of flowering plant indicated that tall (T) is dominant over dwarf (t). it was also found that in this species, plants homozygous for the R allele have red flowers, plants homozygous for the r allele have white flowers, and plants heterozygous for the allele have pink flowers.

49. The traits under study are inherited according to which of the following patterns?
- (A) Complete dominance for both traits
 - (B) Incomplete dominance for both traits
 - (C) Incomplete dominance for one trait and complete dominance for the other trait
 - (D) Sex linkage in the gene for height and complete dominance for color
 - (E) Sex linkage in the color gene and complete dominance for height
50. A white-flowered plant homozygous for tallness is crossed with a red-flowered dwarf plants. Which of the following gives the expected genotype and phenotype for the first generation?
- (A) $ttRr$ – dwarf, pink
 - (B) $ttrr$ – dwarf, white
 - (C) $Ttrr$ – tall, red
 - (D) $TtRr$ – tall, pink
 - (E) $TTrr$ – tall, pink
51. If two plants of genotypes $ttRr$ and $TtRR$ are crossed and no mutations occur, what percent of the offspring is expected to be dwarf white- flowered plants?
- (A) 0%
 - (B) 25%
 - (C) 50%
 - (D) 75%
 - (E) 100%

52. If pollen from a plant heterozygous for height is used to fertilize a dwarf plant, which of the following would be the expected ratios of the offspring?

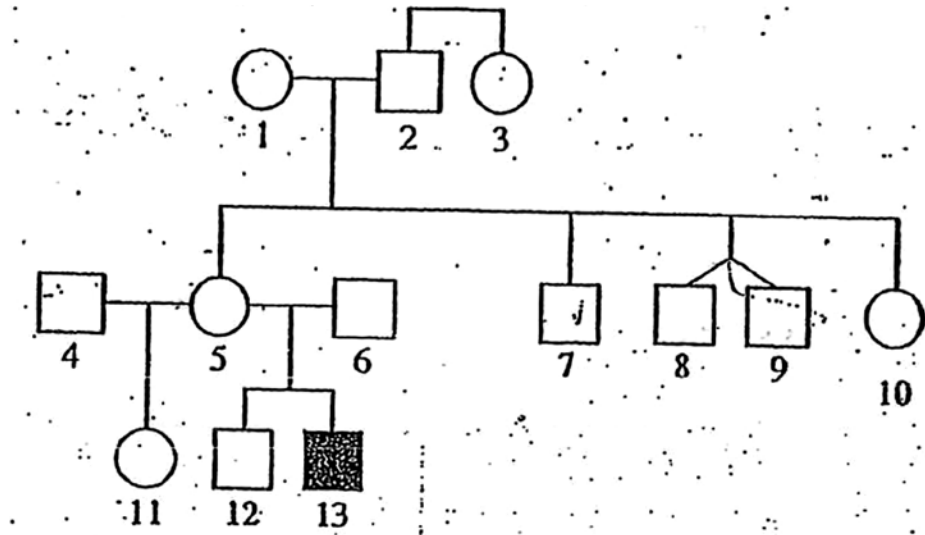
- (A) All tall
- (B) All dwarf
- (C) $\frac{1}{4}$ tall, $\frac{3}{4}$ dwarf
- (D) $\frac{1}{2}$ tall, $\frac{1}{2}$ dwarf
- (E) All of intermediate height

53. If two pink-flowered plants are crossed, the expected percentage of pink-flowering plants in the first generation is

- (A) 100%
- (B) 75%
- (C) 50%
- (D) 25%
- (E) 0%

Questions 54-55

The pedigree below shows the occurrence of an autosomal genetic condition in a particular family. Squares represent males, circles represent females. Shaded figures represent individuals with the genetic condition



54. Which of the following is true with respect to individuals 8 and 9?
- (A) They are sisters to 10
 - (B) They are twin brothers
 - (C) They are brothers to 6
 - (D) They are children of 2 and 3
 - (E) They are grandchildren of 1 and 2
55. Individuals 13 has the genetic condition, alleles for this disorder MUST also be present in which of the following individuals?
- (A) 6 only
 - (B) 12 only
 - (C) 1 and 5
 - (D) 5 and 6
 - (E) 7,8,9,and 10

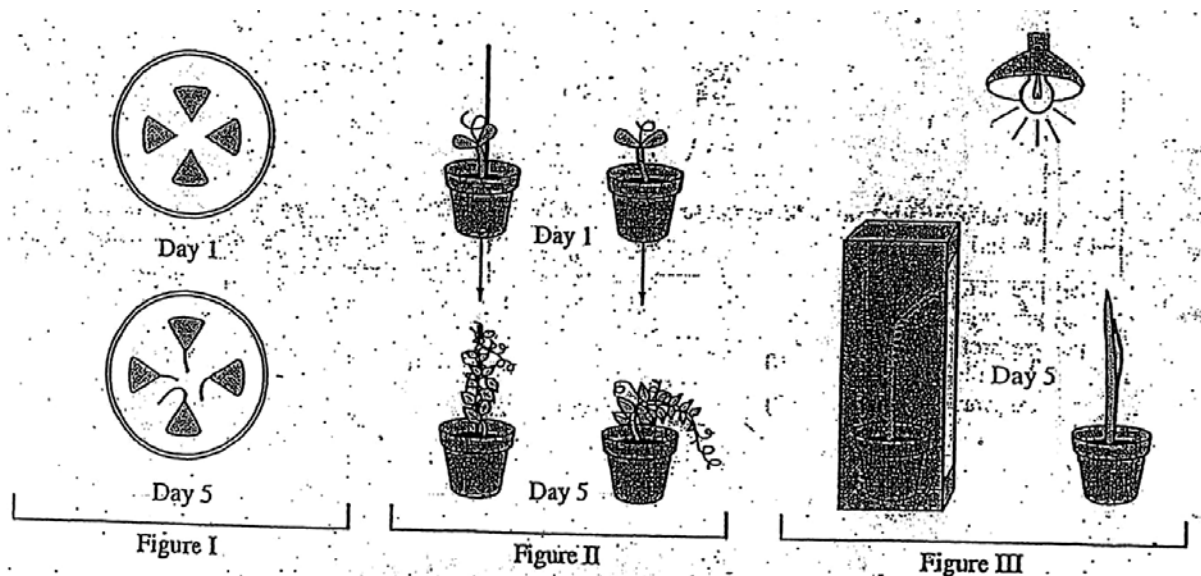
Questions 56-58

Students exploring plant responses to physical stimuli set up three experiments.

Experiment I. Four seeds were placed on moist paper in a petri dish placed on its edge in the dark. An illustration of the seeds on the first day and the fifth day is shown in Figure I.

Experiment II. A vertical stake was placed in the pot with a young pea plant in a lighted area. A second potted pea plant without a stake was placed next to the first. An illustration of the two plants after five days is shown in Figure II.

Experiment III. A 6-inch onion plant was placed in a box on a table with only one vertical side open to a lighted room. A second 6-inch onion plant was placed near the box on the same table. The light was on twenty four hours a day. An illustration of the plants at the end of five days is shown in Figure III.



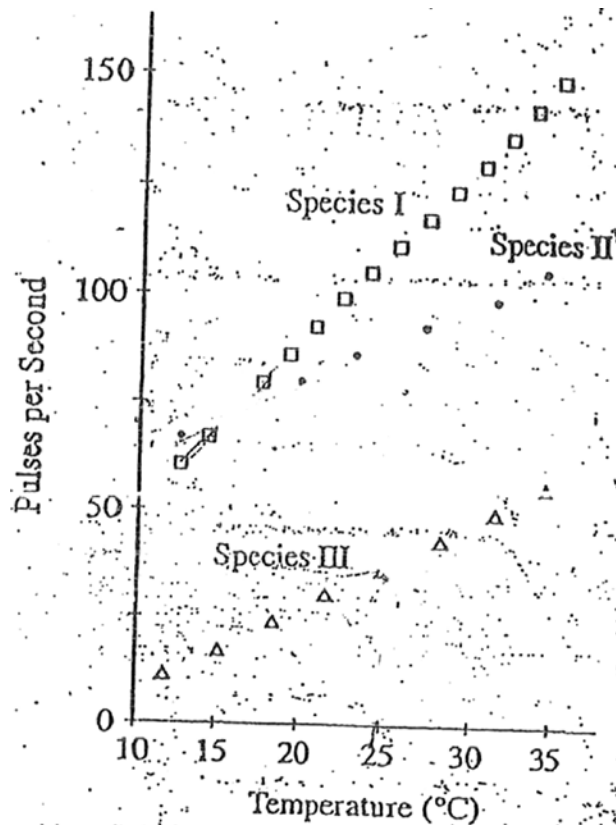
56. Experiment I demonstrates a response to

- (A) Light
- (B) Touch
- (C) Gravity
- (D) pH
- (E) temperature

57. Experiment II demonstrates a response to
- (A) Light
 - (B) Touch
 - (C) Temperature
 - (D) pH
 - (E) water
58. The growth response shown in all three experiments are controlled at the cellular level by
- (A) Electrical impulse
 - (B) Salts
 - (C) Oxygen
 - (D) Plant hormone
 - (E) Transpiration

Questions 59-60

Crickets recognize potential mates by the frequency at which sound pulses are emitted by other crickets while chirping. For each species, the number of pulses per second also varies with the temperature, as shown in the graph below.



59. About how many pulses per second do crickets of species III produce at 25°C?
- (A) 10
 - (B) 25
 - (C) 35
 - (D) 50
 - (E) 75
60. In the laboratory, species I and II can be induced to interbreed. This attempt is most likely to be successful at
- (A) 0°C
 - (B) 15°C
 - (C) 25°C
 - (D) 35°C
 - (E) 75°C

If you are taking the Biology-E test, Continue with questions 61-80.

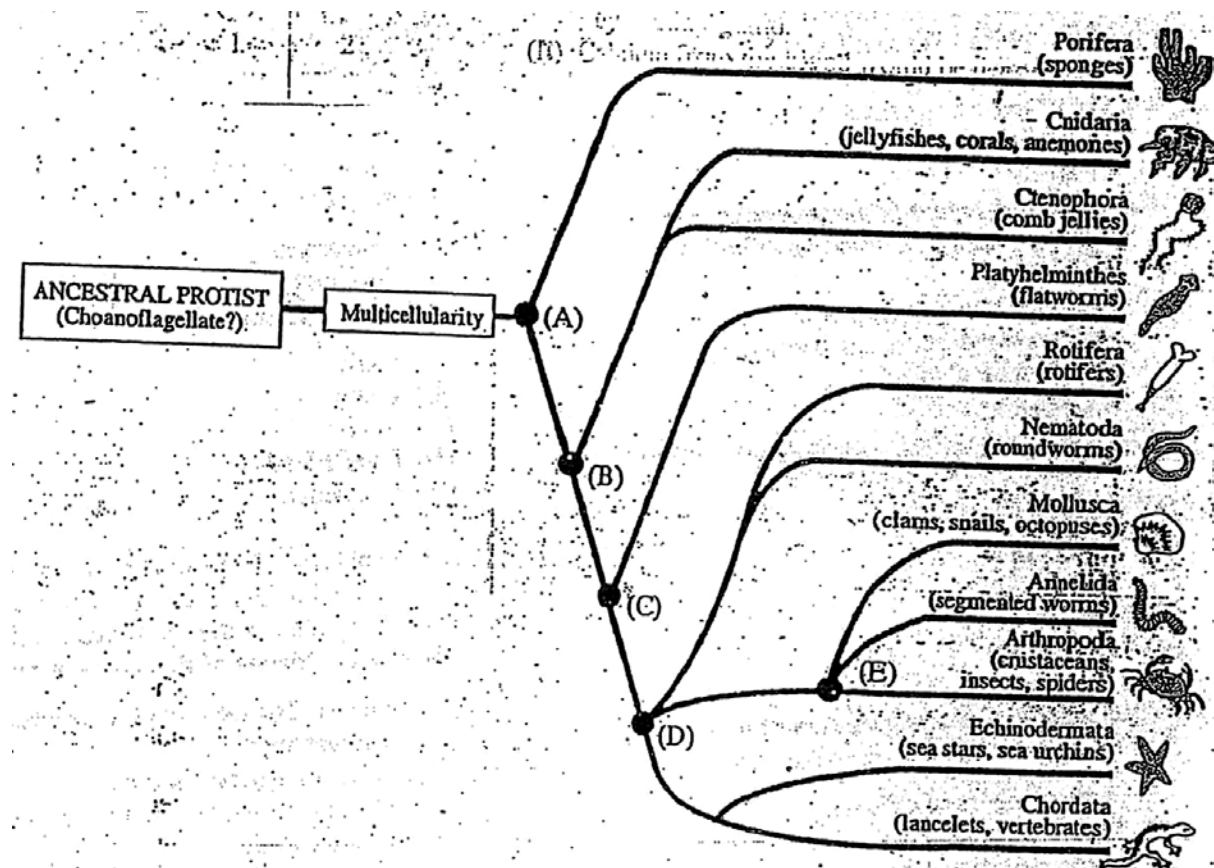
If you are taking the Biology –M test, go to question 81 now

BIOLOGY-E SECTION

Directions: Each of the questions or incomplete statements below is followed by five suggested answers or completions. Some questions pertain to a set that refers to a laboratory or experimental situation. For each question, select the one choice that is the best answer to the question and then fill in the corresponding circle on the answer sheet.

Questions 61-62

The figure below represents proposed relationships among the animal phyla. Selected nodes are labelled.



61. Node that represents separation of those animals with no true tissues from all others.

62. Node where protostomes are separated from deuterostomes

63. Which of the following is the most likely explanation for the evolution of golden moles without eyes?

- (A) The moles did not need eyes underground and so did not develop them.
- (B) Those moles with small eyes lost them as they matured
- (C) The moles' strong sense of smell and hearing caused them to use sight less than other senses
- (D) A mutation resulting in eyelessness in moles gave rise to a more successful variation of moles
- (E) The moles' eyes, which were continually irritated by desert sand, became infected and degenerated

64. Any characteristics of an organism that increases its evolutionary fitness is described as

- A. Analogous
- B. Homologous
- C. Symbiotic
- D. Adaptive
- E. Vestigial

65. Characteristics of the tapeworm, as internal parasite, include which of the following?

- I. Large numbers of offspring
- II. Ability to produce large amounts of toxins
- III. Absence of digestive system

- A. I only
- B. II only
- C. I and III only
- D. II and III only
- E. I, II, and III

66. Which of the following factors is LEAST likely to change the frequency of alleles in a population?
- (A) Random mating
 - (B) Mutation
 - (C) Migration
 - (D) Disease
 - (E) Natural selection
67. Which of the following would be the most acidic (low pH)?
- A. Gastric juice
 - B. Blood
 - C. Milk
 - D. Distilled water
 - E. Seawater
68. Fungi can act in ecosystems in which of the following roles?
- I. Autotrophs
 - II. Parasites
 - III. Decomposers
- A. I only
 - B. II only
 - C. III only
 - D. II and III only
 - E. I, II, and III
69. Mature phloem cells from the root of a wild carrot can differentiate into a mature plant when grown in a tissue culture under appropriate conditions. The best explanation of this phenomenon is that
- A. Phloem cells have a haploid number of chromosomes
 - B. Root cells can act as gametes
 - C. Cells from the shoot cannot develop into a mature plant
 - D. All genes remain active in mature phloem cells
 - E. Inactive genes can be reactivated

70. Which of the following is derived from the ectoderm of a vertebrate embryo?

- (A) Nervous system
- (B) Lining of small intestine
- (C) Muscles
- (D) Reproductive system
- (E) Blood vessels

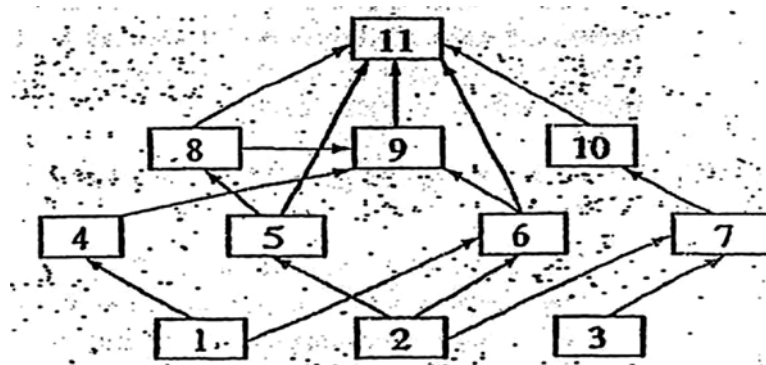
71. Which of the following statements concerning the modern theory of evolution is FALSE?

- (A) Sexual reproduction is necessary for evolution to occur
- (B) More individuals are produced than the environment can support
- (C) There is competition for food and space – a struggle for survival
- (D) The environment will select for survivors on the basis of favourable variations
- (E) If favourable variations are heritable, they are likely to be passed on to the next generation

72. Which of the following best describes a climax community?

- (A) It does not depend on decomposers for the recycling of nutrients
- (B) It contains more secondary consumers than primary consumers
- (C) It consists of a single dominant species thriving in its habitat
- (D) Its species composition remains stable over time
- (E) It does not retain inorganic chemicals

Questions 73-76 refer to the following diagram of a terrestrial food web, in which of the arrows indicate the direction of energy flow among the species.



73. Of the following, which species is most likely photosynthetic?

- (A) 1
- (B) 6
- (C) 7
- (D) 9
- (E) 11

74. Which of the following organisms receives the largest share of the energy contained in species 3?

- (A) 4
- (B) 6
- (C) 7
- (D) 10
- (E) 11

75. Of the following species, which is most likely a herbivore?

- (A) 2
- (B) 5
- (C) 8
- (D) 10
- (E) 11

76. When species 9 feeds on species 8, species 9 acts as a

- (A) Producer
- (B) Decomposer
- (C) Omnivore
- (D) Predator
- (E) Herbivore

Questions 77-80

A 5-liter glass tank is set up as a terrarium, and 5 centimetres of soil rich in organic matter is placed on the bottom. A rotting piece of wood is added that covers 25% of the soil surface. Grass and clover plants, earthworms, a termite colony, and salamanders are added the terrarium is placed near a window and sprinkled with distilled water weekly so that the soil surface stays slightly moist to the touch. The top of terrarium is open to the air

77. The energy for growth of the clover plants comes from

- (A) Light entering the terrarium
- (B) Carbon dioxide (CO_2) in the atmosphere
- (C) Decomposition of the rotting wood
- (D) Excretion by worms
- (E) Methane (CH_4) produced in the guts of the termites

78. If the top of the terrarium is covered with a glass lid and tightly sealed, the oxygen concentration of the air in the tank will

- (A) Remain constant over 24 hours
- (B) Steadily decrease over 24 hours
- (C) Fluctuates with a maximum during the day and a minimum at night
- (D) Fluctuate with a minimum during the day and a maximum at night
- (E) Steadily increase over 24 hours

79. How many trophic levels are present in the terrarium and which level contains which species?

- (A) Five levels, where 1 = grass, 2= clover, 3= worms, 4= termite, 5= salamanders.
- (B) Four levels, where 1= grass, 2= clover, 3= worms and termite, 4= salamanders
- (C) Three levels, where 1 = grass and clover, 2= worms and termite, 3= salamanders.
- (D) Two levels, where 1 = grass, worms and termite, 2= clover and salamanders
- (E) One levels, where 1 = grass, clover, worms and termite, and salamanders

80. If the experimenter placed the terrarium in a dark room, which of the following would happen first?

- (A) The salamanders would reproduce
- (B) The termite population would decrease dramatically
- (C) The earthworms would become autotrophic
- (D) The clover would survive, but the grass would not
- (E) Plant growth would be impaired

STOP

IF YOU FINISH BEFORE TIME IS CALLED, YOU MAY CHECK YOUR WORK
ON THE ENTIRE BIOLOGY-E TEST

BIOLOGY-M SECTION

If you are taking the Biology-M test, continue with questions 81-100.

Be sure to start this section of the test by filling in circle 81 on your answer sheet.

Directions: Each of the questions or incomplete statements below is followed by five suggested answers or completions. Some questions pertain to a set that refers to a laboratory or experimental situation. For each question, select the one choice that is the best answer to the question and then fill in the corresponding circle on the answer sheet.

81. If the function of a molecule is catalytic, the molecule is most likely a

- (A) Lipid
- (B) Nucleotide
- (C) Cellulose molecule
- (D) Protein
- (E) Carbohydrate

82. Which of the following does NOT represent a mutation?

- (A) A chromosomal aberration
- (B) A substitution of a DNA nucleotide
- (C) A deletion of a DNA nucleotide
- (D) A deletion of a DNA triplet
- (E) A post-transcriptional change in RNA

83. From a cross of 2 tall, cut-leaved tomato plants, the following offspring are obtained

917 tall, cut-leaved
 219 tall, potato-leaved
 308 dwarf, cut-leaved
 105 dwarf, potato-leaved

Which of the following is consistent with the data above?

- I. Tall is dominant over dwarf
- II. Cut-leaved is dominant over potato-leaved
- III. The genes for size and leaf shape are located on the same chromosome

- (A) I only
- (B) II only
- (C) I and II only
- (D) II and III only
- (E) I, II, and III

84. Which of the following functions directly in cell locomotion?

- (A) lysosome
- (B) Golgi apparatus
- (C) Microtubule
- (D) Chloroplast
- (E) Cell wall

85. In the fluid mosaic model of the plasma membrane, which of the following is true of the hydrophobic tails of the phospholipids?

- A. They face the outside of the cell
- B. They are found in the middle of the bilayer
- C. They float freely in the cytoplasm
- D. They push proteins through the membrane
- E. They are composed of proteins

86. In fruit flies, the allele for red eyes is dominant over the allele for sepia eyes. This trait is not sex-linked. If a heterozygous red-eyed fruit fly mated with a sepia-eyed fruit fly, what percentage of the offspring would have sepia eyes?

- A. 0%
- B. 25%
- C. 50%
- D. 75%
- E. 100%

87. The cells of individuals with Tay-Sachs disorder are unable to code for an enzyme that breaks down lipid molecule in the membranes of nerve cells. Which cellular organelles are probably unable to function properly in the cells of persons with this disorder?

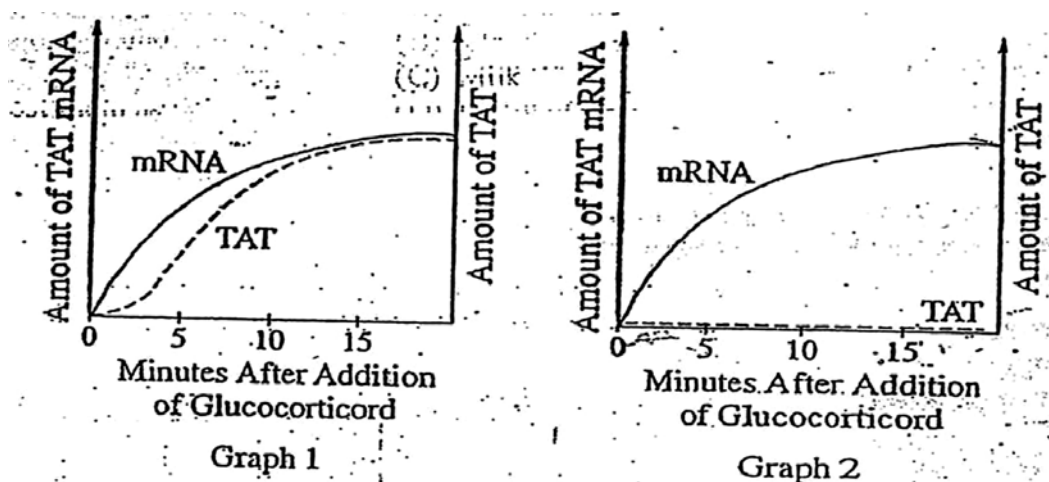
- (A) Nucleoli
- (B) Lysosomes
- (C) Centrioles
- (D) Ribosomes
- (E) Microtubules

88. Functions of lipids include which of the following?

- I. Formation of parts of cell membranes
 - II. Cushioning of organs in the body
 - III. Conservation of body heat
- (A) I only
 - (B) II only
 - (C) I and III only
 - (D) II and III only
 - (E) I, II, and III

Questions 89-93

In liver cells, expression of the gene for the enzyme tyrosine aminotransferase (TAT) depends on the presence of the hormone glucocorticoid. In an experiment, liver cells were treated with glucocorticoid. One half of the liver cells were used to measure TAT; the other cells were used to measure TAT mRNA. The results are shown in Graph 1. In a second experiment, an inhibitor of protein synthesis was added immediately before the hormone, and then the experiment was performed as before. The results are shown in Graph 2



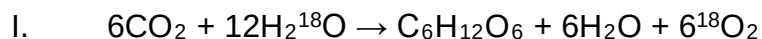
89. According to the data in Graph 1, which of the following is correct?

- (A) The amount of TAT mRNA increases after the treatment with glucocorticoid
- (B) The amount of TAT mRNA is unaffected by treatment with glucocorticoid
- (C) TAT mRNA and protein show identical response to glucocorticoids
- (D) Glucocorticoid increases the rate of transcription of many genes
- (E) Glucocorticoid increases the rate of translation of many genes

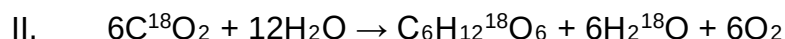
90. The three-minute lag between addition of glucocorticoid and the increase in TAT is most likely explained by which of the following hypothesis?
- (A) TAT synthesis is not dependent on mRNA
 - (B) TAT is expressed in only 10% of liver cells
 - (C) The cell must first synthesize TAT mRNA
 - (D) The TAT gene cannot be transcribed
 - (E) TAT is not exported from the nucleus efficiently
91. The data in Graph 2, showing the effect of inhibition of protein synthesis, indicate which of the following?
- I. TAT is a protein
 - II. Glucocorticoid hormone is a protein
 - III. The enzyme needed to synthesize TAT mRNA are present in cells before exposure to inhibitor
- (A) I only
 - (B) II only
 - (C) I and II only
 - (D) I and III only
 - (E) I, II, and III
92. In the experiment shown in Graph 2, which of the following processes has most likely been interrupted?
- (A) Transcription
 - (B) Translation
 - (C) Cellular respiration
 - (D) Mitosis
 - (E) DNA replication
93. If a third experiment were performed in which glucocorticoid was added to cells growing in the presence of an inhibitor of RNA synthesis, which of the following would be the likely result?
- (A) The data would be similar to those of the experiment shown in Graph 1
 - (B) The data would be similar to those of the experiment shown in Graph 2
 - (C) TAT levels would increase, but TAT mRNA levels would not
 - (D) Neither TAT mRNA levels nor TAT levels would increase
 - (E) Translation of mRNA already present would cease

Questions 94-97

In the 1950's plant biologists did the following two experiments to determine the source of oxygen produced during photosynthesis. In experiment I, plants were supplied with water labelled with the isotope ^{18}O



In experiment II, plants were supplied with carbon dioxide labelled with the isotope ^{18}O



94. The results of the two experiments support which of the following statements?

- (A) Water is not a source of oxygen production in photosynthesis
- (B) The oxygen in the sugar comes from water
- (C) The breakdown of water releases oxygen as a waste product
- (D) Only carbon dioxide is needed to make sugar
- (E) The oxygen produced comes from carbon dioxide

95. The experiment support which of the following conclusions?

- (A) Chloroplasts use more ^{18}O than O
- (B) ^{18}O interferes with photosynthesis
- (C) Plants can use either O or ^{18}O in making sugar
- (D) Labelled sugar is not usable by the plant
- (E) Carbon dioxide containing ^{18}O is avoided by plants

96. Experiment I suggests that which of the following occurs during photosynthesis?

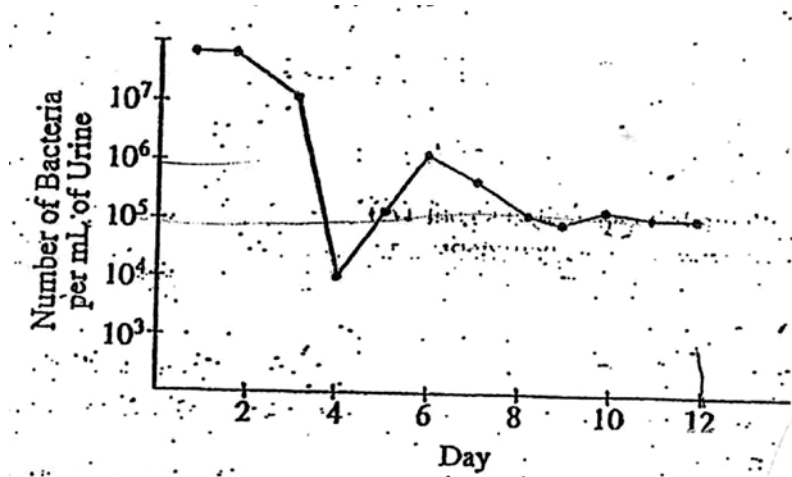
- (A) Oxygen from carbon dioxide is incorporated into water molecules
- (B) Water is left over from the original water supplied
- (C) Sugar and oxygen are the only product
- (D) Not all the oxygen in water is released as oxygen gas
- (E) Labelled carbon dioxide produces only labelled water

97. In the photosynthesis reaction shown in either experiment I or experiment II, how many molecules of carbon dioxide provide the carbon that is incorporated into the molecule of carbohydrate?

- (A) None
- (B) Two
- (C) Six
- (D) Twelve
- (E) Twenty-four

Questions 98-100

A hospital patient suffering from a chronic internal infection caused by a bacterium was treated daily injections of the antibiotic streptomycin (0.5 mg/mL) over a period of 12 days, with the result shown in the figure below



98. The greatest decline in the bacterial population was observed on which of the following days?

- (A) 1
- (B) 2
- (C) 4
- (D) 6
- (E) 8

99. How much more bacteria is present per mL of urine on day 12 than on day 4?

- (A) 2 times as much
- (B) 5 times as much
- (C) 10 times as much
- (D) 20 times as much
- (E) 100 times as much

100. Which of the following conclusions might be drawn from the data?

- (A) By day 8, the number of bacteria had steadily declined
- (B) Streptomycin caused a genetic mutation for antibiotic resistance that manifested itself on about day 4
- (C) Initiating treatment with an alternate antibiotic on day 4 or 5 would have been ineffective in eliminating the bacteria
- (D) Some of the bacteria that caused the infection were resistant to streptomycin
- (E) By day 12, the amount of bacteria in the urine had returned to normal.

Test 11; Parasitism I:

- | | | |
|-------|-------|--------|
| 1. B | 46. B | 91. D |
| 2. E | 47. A | 92. B |
| 3. C | 48. D | 93. D |
| 4. B | 49. C | 94. C |
| 5. D | 50. D | 95. C |
| 6. E | 51. A | 96. A |
| 7. C | 52. D | 97. C |
| 8. A | 53. C | 98. C |
| 9. C | 54. B | 99. C |
| 10. C | 55. D | 100. B |
| 11. A | 56. A | |
| 12. E | 57. B | |
| 13. D | 58. D | |
| 14. E | 59. C | |
| 15. B | 60. B | |
| 16. B | 61. A | |
| 17. B | 62. E | |
| 18. E | 63. D | |
| 19. A | 64. D | |
| 20. A | 65. E | |
| 21. B | 66. D | |
| 22. E | 67. A | |
| 23. E | 68. D | |
| 24. D | 69. D | |
| 25. C | 70. A | |
| 26. E | 71. B | |
| 27. C | 72. D | |
| 28. B | 73. A | |
| 29. C | 74. C | |
| 30. C | 75. B | |
| 31. C | 76. D | |
| 32. A | 77. A | |
| 33. E | 78. C | |
| 34. C | 79. C | |
| 35. C | 80. E | |
| 36. D | 81. D | |
| 37. D | 82. A | |
| 38. D | 83. C | |
| 39. A | 84. C | |
| 40. A | 85. B | |
| 41. D | 86. C | |
| 42. C | 87. B | |
| 43. E | 88. C | |
| 44. B | 89. A | |
| 45. D | 90. C | |