TEST 5

BIOLOGY E/M TEST

FOR BOTH BIOLOGY-E OR BIOLOGY-M

ANSWER QUESTIONS 1-60

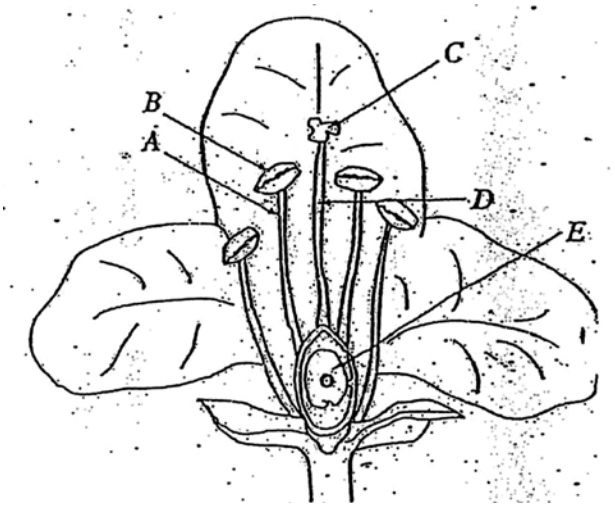
Directions: Each set of lettered choices below refers to the numbered questions or statements immediately following it. Select the one lettered choice that best answers each question or best fits each statement and then fill in the corresponding circle on the answer sheet. A choice may be used once,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

Questions 1-4 refer to the following components in mammalian blood:

(A) Blood plasma
(B) Platelets
(C) White blood cells
(D) Red blood cells
(E) Fibrinogen

1. Responsible for transporting minerals between cells.
2. Cells that contain haemoglobin and function in oxygen transport
3. Cells that function in the production of antibodies
4. Cell fragments that function in the blood clotting process

Questions 5-7 refer to the diagram below of an idealized flower

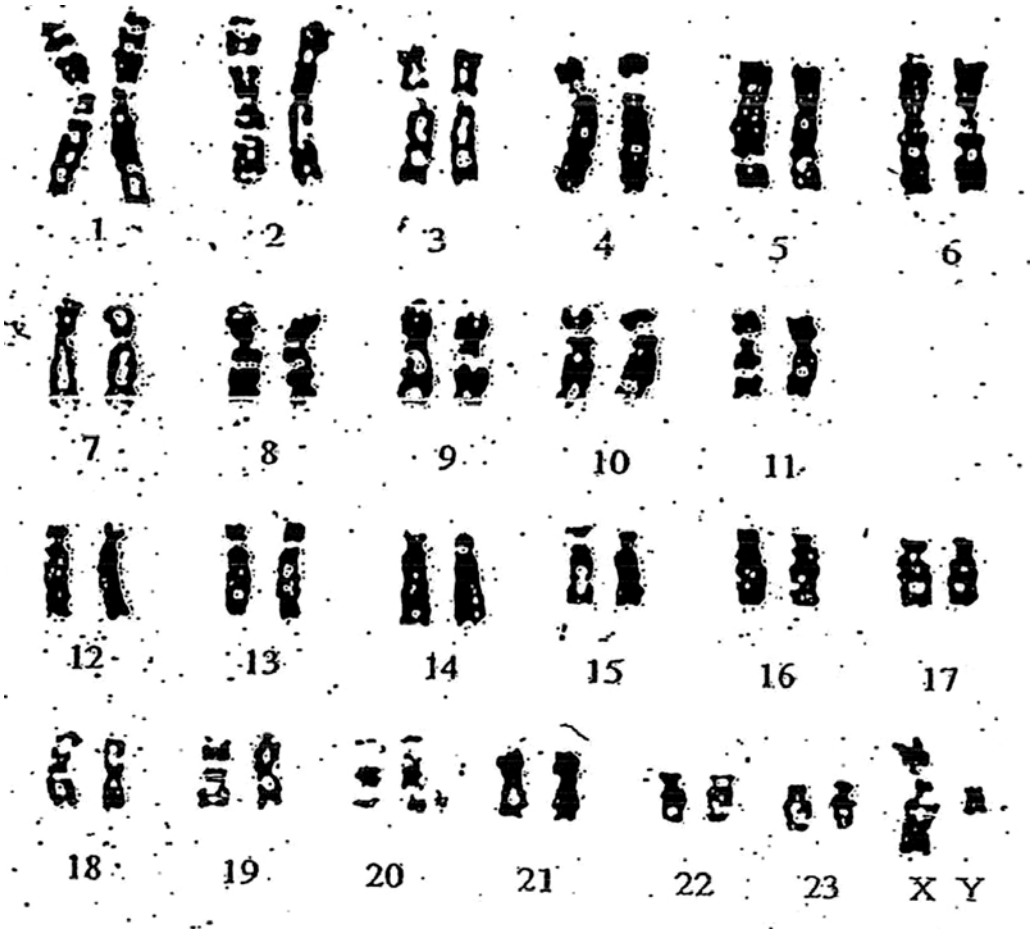


5. What part of the flower produces pollen grains
6. What part of the flower contains the female gametophyte
7. In what part of the flower does fertilization

Questions 8-11 refer to the following karyotype of the chromosomes in a mammalian cell and to the various numbers of chromosomes listed in the table

Table

(A) 23
(B) 24
(C) 25
(D) 48
(E) 49



8. How many chromosomes are in a somatic (body) cell of this species

9. How many chromosomes of this individual came from its mother

10. A zygote displaying trisomy would be produced by the fusion of a normal gamete from this individual with an abnormal gamete that has how many chromosomes

11. How many of these chromosomes would be in a normal gamete produced by this individual?

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.

12. Which of the following structures is found in all eukaryotic cells during some portion of their life cycle?

(A) Centriole
(B) Chloroplast
(C) Flagellum
(D) Nucleus
(E) Vacuole

13. Which of the following phyla contains the largest number of animal species?

(A) Arthropoda
(B) Chordata
(C) Echinodermata
(D) Mollusca
(E) Porifera

14. The sum of all alleles present in a population at a given time is known as the
(A) Gene pool
(B) Mutation load
(C) Allele size
(D) Genotype
(E) Fitness

15. Which of the following does NOT contain a membrane as part of its structure?

(A) Chromosome
(B) Mitochondrion
(C) Golgi body
(D) Chloroplast
(E) Endoplasmic reticulum

16. The oxygen produced during photosynthesis comes from which of the following molecules?

(A) SO_2
(B) CO_2
(C) H_2O
(D) $C_6H_{12}O_6$
(E) NO_3

17. Huddling, shivering, and counter current exchange may be all mechanisms of which of the following forms of homeostasis?

(A) Osmoregulation
(B) Hormonal regulation
(C) Thermoregulation
(D) Blood gas regulation
(E) Blood pH regulation

18. Which of the following plant cell types is dead at maturity, yet functional?

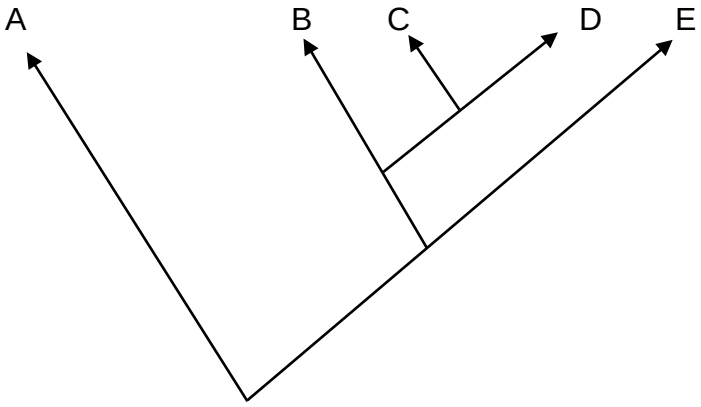
(A) Parenchyma
(B) Collenchyma
(C) Phloem
(D) Xylem
(E) Companion cell

19. All of the following functions are performed by roots EXCEPT:

(A) Storage
(B) Mineral absorption
(C) Cell reproduction
(D) Anchorage
(E) Leaf production

20. The biochemical cycling of nutrients is essential for living organisms because:

(A) It is the only way that organic nutrients are converted to inorganic nutrients
(B) Nutrients are available in the ecosystem in finite amounts
(C) The sun provides limited nutrients
(D) Organisms have to get all of their nutrients from the soil
(E) Bacteria are necessary to fix carbon dioxide from the air



21. In the polygenetic tree shown, which of the following statements best represents the relationships among species A through E?

(A) Species A is most closely related to species C and species D
(B) Species A and species E coevolved
(C) Species B, species C, and species D evolved from species E
(D) Species C and D are more closely related than are species B and E
(E) Species E has recently become extinct

22. Meiosis in diploid organisms result in which of the following?

(A) The production of haploid cells
(B) The generation of new alleles
(C) The formation of a zygote
(D) The transmission of adaptive phenotypes
(E) The creation of triploid gametes

23. Trees, earthworms, fungi, mosses, and insects are examples of which of the following factors in a forest ecosystem?

(A) Geologic
(B) Abiotic
(C) Biotic
(D) Biogeochemical
(E) Physical

24. Which of the following concepts did Mendel describe?

I. Dominant/recessive inheritance
II. Independent assortment
III. Segregation of characteristics

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

25. Speciation results in new species. Which of the following would be the best evidence that speciation has occurred?

(A) The new species does not live in the same part of the world as the old species
(B) The two species look completely different
(C) Mating between the two species cannot produce fertile offspring
(D) Mating between the two species produce offspring with similar characteristics
(E) The new species' nutritional properties are different than those of the old species

Green algae → sea urchin larvae → minnows

26. Which of the following accurately describes a role of the different organisms in the ocean food chain shown above?

(A) The green algae are primary producers
(B) The minnows are primary consumers
(C) The sea urchin larvae are decomposers
(D) The sea urchin larvae are at a higher trophic level than the minnows
(E) The biomass of the minnows is greater than that of the sea urchin larvae

27. Several human cancers are caused by mutations induced by chemical or environmental agents. Generally these mutations are not inherited by offspring because

(A) Mutations causing cancers do not appear in people of childbearing age
(B) Mutations are not induced in DNA
(C) Mutations can be removed from gametes during maturation
(D) Mutations cannot occur in gametes or gamete-producing cells
(E) Only mutations in gametes or gamete-producing cells can be inherited

28. In animals, mitosis is LEAST likely to play a significant role in which of the following?

(A) Reproduction of cells
(B) Repair of damaged cells
(C) Growth of embryonic tissues
(D) Regeneration of limbs
(E) Reduction of chromosome number

29. Which of the following statements is true of the carbon cycle?
(A) The seasonal surge in CO_2 in the atmosphere is a result of increased numbers of animals born in spring
(B) The burning of wood and fossil fuel take CO_2 from the atmosphere
(C) Photosynthesis and respiration are responsible for major transformations in carbon
(D) CO_2 is returned to the atmosphere by photosynthesis
(E) Assimilation of O_2 by plants is greater than the return of CO_2 to the atmosphere from respiration, decomposition, and combustion

30. A species of *Acacia* tree in Central America is protected from insects and climbing vines by a species of ant, which consumes a nectar substance produced by the tree in specialized chambers. Such a relationship between two species is a result of

(A) Convergence
(B) Adaptive radiation
(C) Succession
(D) Coevolution
(E) Differentiation

31. Which of the following describes the time in the menstrual cycle when a woman is most likely to conceive?

(A) When the lining of the uterus is thinnest
(B) 14 days before the egg is released
(C) Immediately following menstruation
(D) Shortly after the release of an egg
(E) Any time during the cycle

32. The Niobara Chalk is a rock layer that is exposed in western Kansas. The presence of 70-million-year-old fossils of marine reptiles (mosasaurs) and giant clams indicates that

(A) This area was once under water
(B) Some clams are adapted to survive on grasslands
(C) Prairie clams have become extinct
(D) The chalk formation was formed recently
(E) A meteor impact is responsible for the extinction of the mosasaurs

33. Which of the following hypothetical scenarios is NOT consistent with the mechanism of natural selection?

(A) A species of insect inherits a coloration pattern that resembles the leaves on which it feeds
(B) Some females of a particular species of fish release twice the number of eggs during mating as do others
(C) The bill of a species of bird is shaped like a chisel point, making it well adapted for breaking open the shells of nuts
(D) The cubs of a certain female bear have extra-long forelimbs because their mother continually stretched her own forelimbs
(E) A few male deer of a certain species have larger antlers, allowing them to defend their territory better

34. Which of the following would have the LEAST direct effect on the population density of a species?

(A) Predators
(B) Competitors
(C) Decomposers
(D) Parasites
(E) Nutrients

35. An organism possessing the following characteristics is observed: asexual reproduction, eukaryotic, heterotrophic, chitinous cell walls. This organism most likely belongs to which of the following taxonomic groups?

(A) Bacteria
(B) Archaea
(C) Fungi
(D) Plantae
(E) Animalia

36. Which of the following is a kidney function that is replaced by dialysis?
(A) Production of urea from amino acids
(B) Regulation of oxygen concentration
(C) Removal of metabolic wastes
(D) Disposal of used red blood cells
(E) Secretion of ammonia

37. Which of the following does NOT occur in the adult mammalian liver?

(A) Production of bile
(B) Storage of glucose as glycogen
(C) Detoxification of toxic chemicals like alcohol
(D) Deamination of amino acids to form urea
(E) Formation of red blood cells

3' ……A-G-T-T-G-A……..5'

38. The DNA base sequence above directs the synthesis of which of the following base sequences in messenger RNA?

(A) 5'…….-A-G-T-T-G-A…….3'
(B) 5'…….-U-C-A-A-C-U…….3'
(C) 5'…….-U-T-A-A-T-U…….3'
(D) 5'…….-T-C-A-A-C-T…….3'
(E) 5'…….-C-A-T-T-A-C…….3'

39. Of the following, the best indicator of the rate of photosynthesis in green plants is the rate at which

(A) Water is produced
(B) Carbon dioxide is given off
(C) Oxygen is consumed
(D) Sugar is consumed
(E) Carbon dioxide is consumed

40. True statements about linked genes include which of the following?
I. The alleles for linked genes may recombine due to crossing over
II. Linked genes are on the same chromosome
III. Linked genes occur only on the sex chromosome

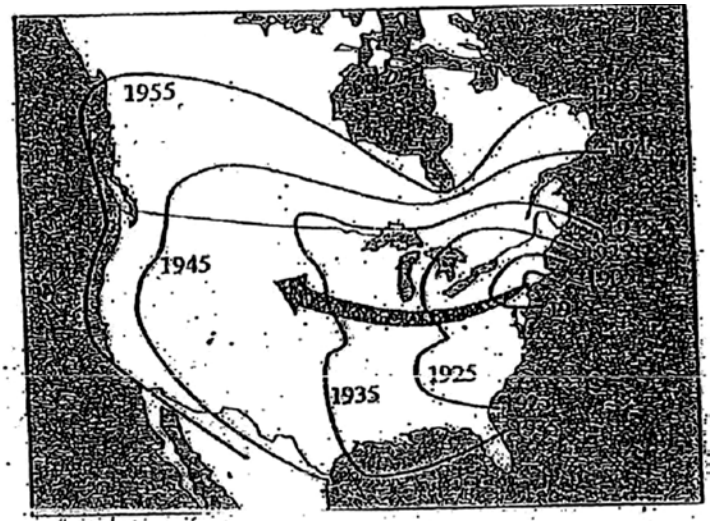
(A) I only
(B) II only
(C) III only
(D) I and II only
(E) I,II and III

41. A person with type B blood should not be given a transfusion of type A blood because

(A) Type AB blood would be formed
(B) The transfused blood would agglutinate
(C) Anti-A antibodies destroy anti-B antibodies
(D) Type A antigens destroy type B antigens
(E) The type B person would become susceptible to infections

Questions 42-45

In 1905 a city-adapted songbird, the starling (*Stumus vulgaris*), was introduced into the United States from Europe. Since that time, starlings have expanded their geographic range to cover the entire continental United States and parts of Canada and Mexico (see map distribution). The starling is now abundant throughout the United States



42. In which decade did the range of Starling expand the most in the United States?

(A) 1905-1915
(B) 1915-1925
(C) 1925-1935
(D) 1935-1945
(E) 1945-1955

43. To preserve the avian ecological diversity of North America, the first step scientists should take in
(A) Legislate bounty hunting for starlings
(B) Set up feeding stations for starlings
(C) Trap starlings in areas where they are overpopulated and release them into areas where they are underpopulated
(D) Install electrified wires on the roosting sites of the facades of buildings in urban areas
(E) Study the population dynamics and ecology of starlings

44. Which of the following would be the most effective means of biological control of the starling population?
(A) Trapping and relocating
(B) Using loud noise to break up big flocks of starlings
(C) Using chemical repellents to disperse starlings
(D) Introducing a lethal virus specific to starlings in areas where starlings congregate
(E) Introducing another species of exotic songbird to compete with starlings

45. Which of the following is a significant ecological problem resulting from the introduction of starlings?
(A) The loss of starling habitat as a result of human activity
(B) Competition for resources between starlings and native North American bird species
(C) The starling droppings on buildings facades in urban areas
(D) The noise pollution in the ecosystem by large starling flocks
(E) The increase in all North American bird caused by the presence of starlings

Questions 46-48

The respiration rates (mL O_2/ min) of a single white laboratory mouse and 50 crickets were measured at 15ºC and at 25ºC using respirometer. The basal metabolic rate (BMR) was then calculated by dividing the respiration rate by the mass in grams. The results for the mouse and for the group of crickets are presented in the table below.

Specimens (mass)	Temperature (ºC)	BMR (mL O_2/ min/g) 10^{-3}
Mouse (19.5g)	15 25	3.21 1.95
Crickets (2.35g)	15 25	1.26 1.41

46. Which of the following is best supported by the data

(A) Metabolic activity increased in the crickets to maintain a constant body temperature
(B) Metabolic activity in the crickets correlates with temperature
(C) Metabolic activity increases as the size of the organism decreases
(D) Metabolic activity in the mouse is directly proportional to temperature
(E) Crickets have a regulated body temperature while the mouse has a variable body temperature

47. Which of the following is the dependent variable of this experiment

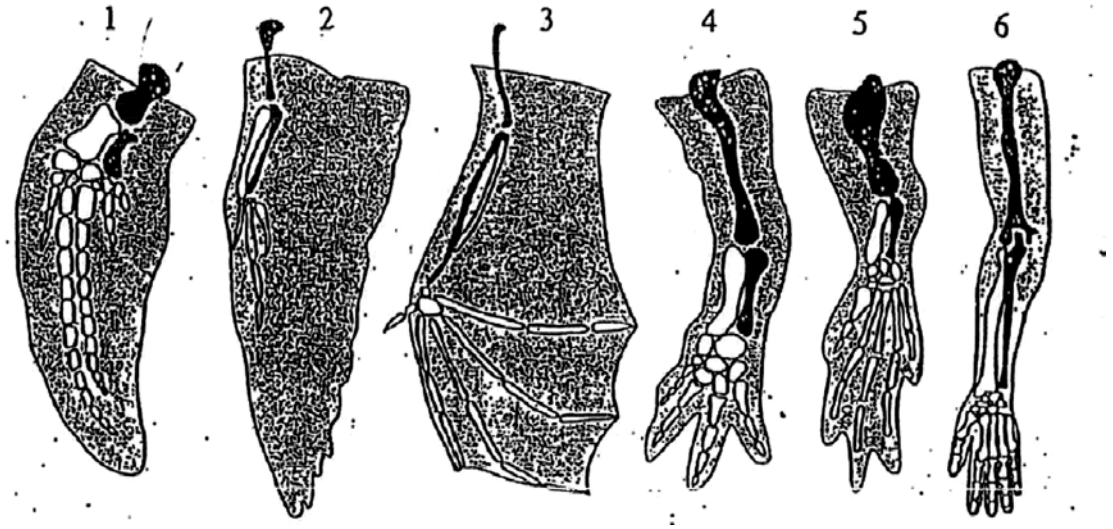
(A) Number of specimens
(B) Temperature
(C) Basal metabolic rate
(D) Time
(E) Mass of specimen

48. Which of the following statements best explains why the Basal Metabolic Rate (BMR) of the mouse increased as the temperature decreased?

(A) The concentration of the atmospheric oxygen is greater at lower atmospheric pressure
(B) Respiration of ectotherms decreases at lower temperatures
(C) Ectotherms require less energy to maintain metabolism at lower temperatures
(D) Endotherms decrease oxygen consumption to meet metabolic needs at lower temperatures
(E) Endotherms maintain a constant body temperature

Questions 49-51

Bones of the forelimbs of six vertebrates are shown below. The structure of each forelimb demonstrates adaptations to the animal's way of life.



49. Based on the structure of the forelimb, which of the following vertebrates is most likely to use the forelimbs for grasping?

(A) 1
(B) 2
(C) 4
(D) 5
(E) 6

50. Based on the structure of the forelimb, which of the following pairs of vertebrates is most likely to use the forelimbs in flying?

(A) 1 and 2
(B) 1 and 3
(C) 2 and 3
(D) 2 and 5
(E) 4 and 5

51. Based on the structure of the forelimb, which of the following vertebrates is best adapted for swimming?

(A) 1
(B) 2
(C) 3
(D) 4
(E) 6

Questions 52-54

Three similar geranium plants were exposed to the following conditions

Plant I: 24 hours of continuous darkness

Plant II: 24 hours of continuous bright light

Plant III: 23 hours of continuous darkness followed by 1 hour of bright light

Several green leaves were then removed from each of these plants and placed in separate beakers of boiling alcohol. When the leaves became white, they were removed and tested with iodine for the presence of starch. The results of the iodine test of the leaves are summarized in the table below

Leaves from Plant	*Leaf color after iodone test*
I	Yellow color
II	Dark blue color
III	Light blue color

52. The information given suggests that one effect of boiling alcohol on a leaf is to

(A) Hydrolyze starch to glucose
(B) Convert glucose to starch
(C) Catalyse the iodine reaction
(D) Open the stomata
(E) Remove the chlorophyll

53. The results obtained from the iodine test with the leaves of plant II suggests that plant II

(A) Lacked chlorophyll
(B) Had no cellulose
(C) Produced carbohydrates during experiment
(D) Produced DNA during the experiment
(E) Released CO_2 during the experiment

54. Which of the following processes would be expected to take place continuously in plant I?

I. Oxygen production
II. The Calvin cycle (dark) reactions of photosynthesis
III. Respiration

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

Questions 55-56

The punnet square below shows the possible distribution of alleles that determine earlobe shape from one cross. Earlobes in humans may be free (*E-*) or attached (*ee*)

	E	*e*
e	*Ee*	*ee*
e	*Ee*	*ee*

55. The genetic cross shown is most likely between

A. One parent with a sex-linked trait and one who is homozygous dominant
B. One parent with attached earlobe and one with free earlobe
C. Two parents with genotype *Ee*
D. Two parents with the recessive trait
E. Two parents with attached earlobe

56. All of the following are true EXCEPT:

A. *E* represents the dominant allele
B. One of the parents is heterozygous
C. The probability that the offspring will have attached earlobe is 75%
D. None of the offspring will be homozygous dominant
E. *Ee* individuals have free earlobes

Questions 57-60

A group of students extracted an enzyme from rutabaga stems and examined its rate of reaction at different temperatures and different substrate concentrations. The results are shown in the tables

Table I. THE EFFECT OF TEMPERATURE ON RATE OF REACTION

Substrate concentration (mg/mL)	Temperature (ºC)	Rate of Reaction (µg product produced per minute)
2.5	25	14.5
2.5	30	21.2
2.5	35	28.3
2.5	40	26.2
2.5	45	17.5
2.5	50	4.3

Table II. THE EFFECT OF SUBSTARTE ON RATE OF REACTION

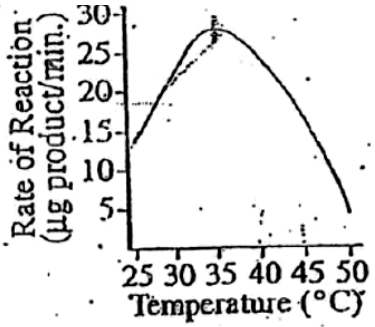
Substrate concentration (mg/mL)	Temperature (ºC)	Rate of Reaction (µg product produced per minute)
0.1	25	0.6
0.5	25	3.0
2.5	25	14.8
10.0	25	18.3
50.0	25	19.8

57. From the data in table II, can be inferred that the rate of reaction

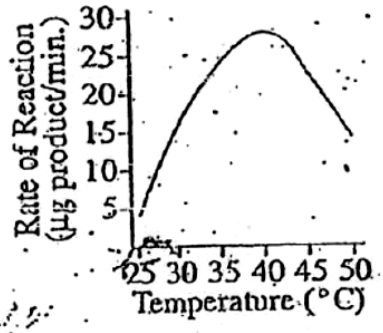
(A) Is dependent of substrate concentration
(B) Increases linearity with substrate concentration
(C) Is inversely proportional to substrate concentration
(D) Is proportional to substrate concentration only at a low substrate concentration
(E) Is proportional to substrate concentration only at high substrate concentration

58. The data on the effects of temperature would be best represented by which of the following graphs?

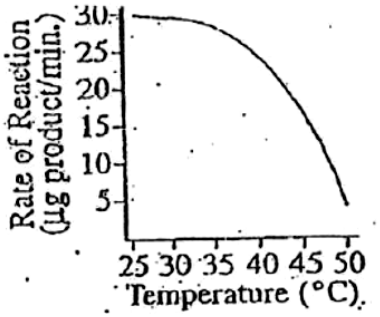
(A)



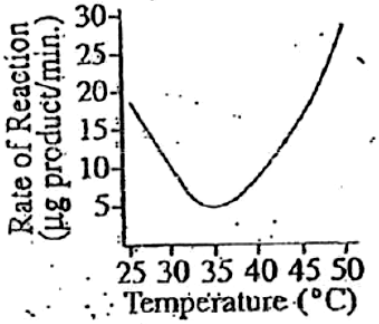
(B)



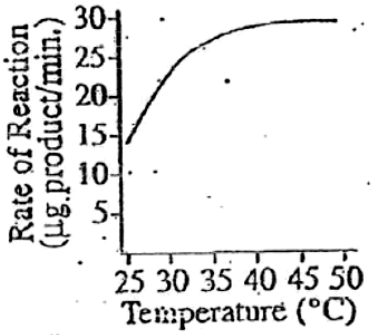
(C)



(D)



(E)



59. The effects of temperatures greater than 40ºC on enzyme activity can best be explained by which of the following?

(A) The substrate becomes more soluble in a warmer solution
(B) The product of the reaction precipitate in a warmer solution
(C) The enzyme catalyzes the reaction too rapidly to make the product
(D) The peptide bonds are broken by the high temperatures
(E) The high temperatures denature the enzyme, inactivating it

60. Which of the following is true about the effect of temperatures between 25 ºC and 35 ºC on enzyme activity?

I. The rate of diffusion increases with temperatures, allowing substrate and enzyme molecules to encounter one another more frequently
II. The reaction catalysed by the enzyme proceeds more rapidly at higher temperatures
III. Increased temperature hydrolyzes peptide bonds, causing the formation of an enzyme fragment that works more efficiently

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

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.

61. Fungi are typically found in which of the following ecological roles?

A. Producers only
B. Primary consumers only
C. Secondary consumers only
D. Both producers and consumers
E. Decomposers

62. Dolphins and sharks have streamlined body structures, making both animals well adapted for life in a marine environment. This common trait is best explained by which of the following?

A. Mimicry
B. Genetic drift
C. Convergent evolution
D. Stabilizing selection
E. Founder effect

63. Which of the following is a key point in Charles Darwin's theory?

(A) Biological structures that have become better suited to the environment by their constant use are most likely to be inherited
(B) Mutations that occur are those that will help future generations fit into their environments
(C) Slight variations among individuals significantly affect the chance that a given individual will survive in its environment and be able to reproduce
(D) Genes change in order to help organisms cope with problems encountered within their environments
(E) Extinction in nature's way to weed out undeserving organisms

64. Which of the following is a density-independent factor in population growth?

A. Predation
B. Availability of food
C. Disease
D. Mating
E. Severe weather

65. Which of the following is characteristic of mollusc shells?

A. They are secreted by the mantle
B. They are secreted by the digestive system
C. They are primary composed of silica
D. They are produced by metabolism of the foot
E. They are found in all molluscs

66. In a food chain, the concentration of some environmental pollutants increases with trophic level. For example, in a particular food chain, the DDT concentration in zooplankton is 0.04 ppm, in small fish it is 0.5 ppm, and in fish-eating birds it is 25 ppm. This phenomena is referred to as

A. Active concentration
B. Active transport
C. Bioremediation
D. Bio-magnification
E. Primary production

67. Which of the following would be an example of predation?
I. Bacteria fixing nitrogen
II. An ameba engulfing a paramecium
III. A lobster eating brine shrimp

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

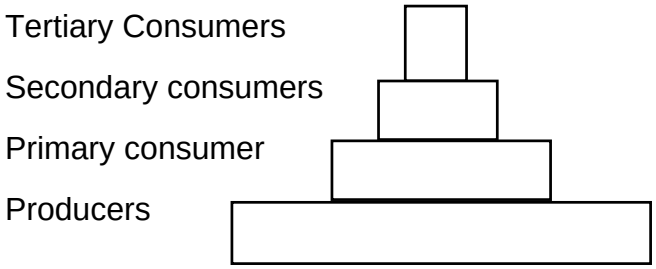
68. In a small population of animals, only six individuals possess a certain allele. A large storm randomly kills many individuals of this population, including the six individuals. The gene pool of this population has been affected by

A. Natural selection
B. Speciation
C. Variation
D. Genetic drift
E. Genetic recombination

69. Which of the following is a characteristic of a four-chambered heart that confers an evolutionary advantage?

A. Blood mixes in the ventricles
B. If one ventricle fails, the other can compensate
C. The arteries from the heart are smaller
D. There is separate circulation to the lungs
E. The muscle cells in the heart do not need oxygen

70. The diagram below represents a biomass pyramid



Which of the following is a true statement concerning the energy in this pyramid?

A. Decomposers are the main source of energy for this pyramid
B. Compared to the other trophic levels, the producers contain the least amount of energy
C. The amount of energy available to tertiary consumers is considerably less than for primary consumers
D. Stored chemical bond energy is greater in tertiary consumers than in primary consumers
E. Tertiary consumers contain the greatest amount of energy in the system

71. In a population of frogs at equilibrium, the frequency of dominant allele for green color is 0.8. the Hardey-Weinberg equation would predict what percentage of this population to have the homozygous recessive genotype?

(A) 0%
(B) 4%
(C) 32%
(D) 64%
(E) 100%

72. A variety of the clover *Trifolium repens* produces cyanide; the cyanide provides protection against herbivores. Cattle can detect cyanide and avoid this variety. However, when frost occurs, the cell membrane bursts and the cyanide is released into the plant's tissues, thereby killing the plant. Evolutionary theory predicts which of the following trends?

(A) In frost-free areas, the population of the cyanide-producing variety of clover will continue to increase
(B) As the cattle population increases, the population of non-cyanide-producing clover will increase.
(C) The mutation rate in this clover variety will increase, resulting in convergent evolution with a different clover variety
(D) Cattle will develop immunity to the cyanide, and this variety will decrease in number
(E) Herbivores feeding on the clover will become extinct, disrupting the entire food web.

73. Evolution by natural selection will occur when certain conditions are present. These conditions include which of the following?

I. Heritable traits
II. Genetic variation
III. Differential reproductive success

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

74. Which of the following plant groups does NOT produce seeds?

(A) Conifers
(B) Cycads
(C) Dicots
(D) Ferns
(E) Monocots

Questions 75-76

A particular branch joins to the trunk of a tree four feet above the ground. A year later, the tree has grown two feet taller

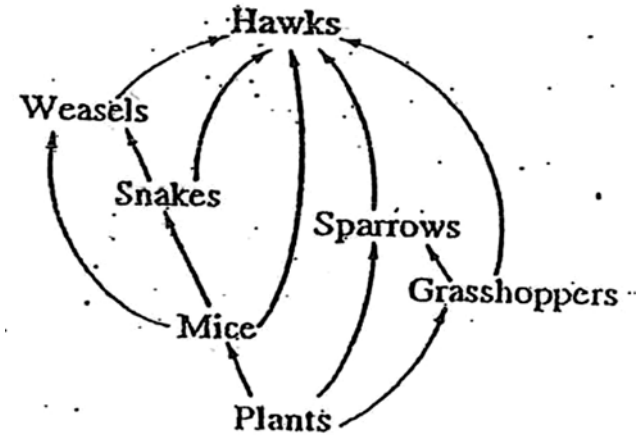
75. How far above the ground is the same branch now?
A. 2 feet
B. 3 feet
C. 4 feet
D. 5 feet
E. 6 feet

76. During the year, where did the vertical growth occur in this tree?

(A) Only in the leaves
(B) At the base of the trunk
(C) Uniformly throughout the trunk
(D) At the root and shoot meristem
(E) Between the first and second branch

Questions 77-80

In the following diagram of a food web, arrows indicate the direction of energy flow.



77. Which of the following organisms behave as omnivores in the food web?

(A) Hawks
(B) Sparrows
(C) Weasels
(D) Snakes
(E) Grasshoppers

78. Of the following pairs of organisms in the food web, which are involved both in a predator prey relationship with each other and in competition with each other for food?

(A) Snakes and mice
(B) Snakes and sparrows
(C) Plants and grasshoppers
(D) Hawks and grasshoppers
(E) Hawks and weasels

79. All of the following organisms may act as secondary consumers in the food web EXCEPT:

(A) Sparrows
(B) Snakes
(C) Mice
(D) Weasels
(E) Hawks

80. What is the maximum number of trophic levels seen in this food web?

(A) 3
(B) 4
(C) 5
(D) 7
(E) 12

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. Of the following elements, which is most abundant, by weight, in living organisms?

A. Phosphorous
B. Carbon
C. Nitrogen
D. Hydrogen
E. Sulfur

82. Which of the following is produced during cellular respiration and supplies energy for cellular work?

A. H_2O
B. ATP
C. DNA
D. CO_2
E. $C_6H_{12}O_6$

83. Which of the following cellular organelles is LEAST likely to be visible with a light microscope?

A. Chloroplasts
B. Mitochondria
C. Nucleus
D. Ribosomes
E. vacuole

84. sexual reproduction has evolutionary importance because it results in

A. the production of gametes
B. the only method by which species can perpetuate themselves
C. genetic variation among offspring
D. lower survival rates for mutants
E. offspring that are identical to the parents

85. Which of the following allows strands of cytoplasm to stream between adjacent plant cells?

A. Gap junctions
B. Desmosomes
C. Tight junctions
D. Plasmodesmata
E. Phloem

86. There is usually a time lag of several days between the initial exposure of a person to a foreign protein and the large-scale production of antibodies that specifically recognize that protein. What event occurs during that time interval to permit an adequate immune response?

A. Alterations in chromosomal DNA to generate a novel gene that encodes the needed antibody
B. Differentiation in the spleen of a novel class of lymphocyte cells capable of interacting with the newly introduced protein.
C. Proliferation in the number of already differentiated lymphocyte cells capable of synthesizing the needed antibody
D. An unchanged number of lymphocytes, each producing greatly increased numbers of ribosomes to meet the needs for antibody synthesis
E. Gene amplification in which multiple copies of the genes encoding the needed protein and replicated in pre-existing lymphocyte cells

87. Which of the following is a product of the hydrolysis of glycogen?

A. RNA.
B. Glucose
C. Fats
D. Amino acids
E. Proteins

88. In which of the following cell structures would a glucose molecule be attached to a protein before it was secreted?

A. Ribosome
B. Lysosome
C. Peroxisome
D. Golgi apparatus
E. Plasma membrane

89. A single strand of DNA was base-paired with a single strand of RNA. Which of the following processes must have occurred to produce the RNA strand?

A. Replication
B. Transcription
C. Translation
D. Protein synthesis
E. Production of anticodons

90. In male mammals, meiosis takes place in the

A. Prostate
B. Epididymis
C. Vas deferens
D. Peritoneal cavity
E. Seminiferous tubules

Questions 91-93

A student studied two indicators in order to determine their possible use. The following table represents her results

Test tube	Indicators Used	Added Substances	Starting Condition	After Substance added
1	Bromothymol Blue	Known base	Blue	Blue
2	Bromothymol Blue	Known acid	Blue	Yellow
3	Bromothymol Blue	Known CO_2 source	Blue	Yellow
4	Bromothymol Blue	Student's breath	Blue	Yellow
5	Limewater	Known acid	Clear	Clear
6	Limewater	Known CO_2 source	Clear	Cloudy white
7	Limewater	Student's breath	Clear	Cloudy white

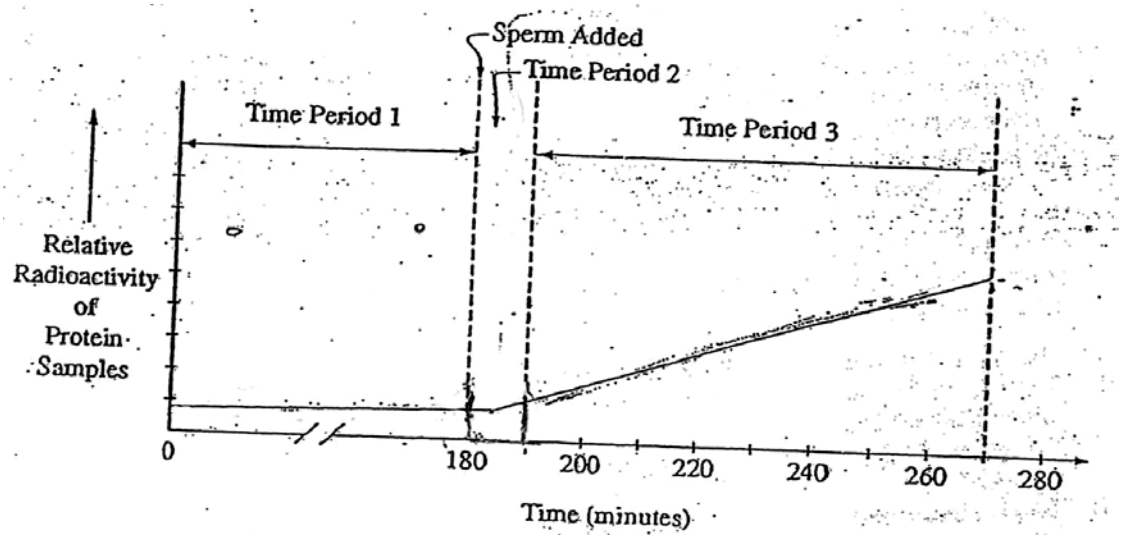
91. Results from which of the following tubes establish that limewater is a better indicator for CO_2 than for acid?
(A) 5 only
(B) 6 only
(C) 7 only
(D) 2 and 5 only
(E) 5 and 6 only

92. The student was able to conclude that a product of her breath made the solution acidic from test tubes
(A) 2 and 3
(B) 2 and 4
(C) 3 and 4
(D) 5 and 6
(E) 5 and 7

93. The best evidence that the student's breath contains CO_2 is obtained from test tubes
(A) 2 and 3
(B) 2 and 4
(C) 4 and 7
(D) 5 and 7
(E) 6 and 7

Questions 94-96

The following experiment was designed to test whether protein synthesis increases in sea urchin eggs after fertilization. A mixture of radioactive amino acids was added to a beaker containing unfertilized sea urchin eggs suspended in sea water. Samples of the eggs were taken at 30-minute intervals over a 3-hour period. At the end of the 3 hours, sperm were added to the beaker, fertilization took place immediately, and samples were taken at 5-minute intervals for another 90 minutes. The radioactivity in the proteins from the eggs and embryos was then measured. The graph below shows the results obtained



94. Based on the data in the graph, a reasonable explanation for the results obtained in the experiment is the

(A) Poor permeability of cell membranes to any radioactive material after fertilization
(B) Synthesis of proteins that occurs in the eggs after fertilization
(C) Synthesis of the new DNA in the eggs after fertilization
(D) Increased rate of mitosis of the eggs that occurs after prolonged exposure to radioactivity
(E) Radioactive decay of the amino acids in the beaker upon exposure to seawater

95. From the data in the graph, which of the following can be concluded about the rate of incorporation of radioactivity in embryos in the experiment?

(A) The rate is the same for all three time periods
(B) The rate undergoes an abrupt change at the beginning of time period 2
(C) The rate undergoes a change during time period 2
(D) The rate increases exponentially from about 10 minutes after fertilization until the end of the experiment
(E) The data do not provide enough information to make any conclusions

96. Of the following, which would be the most useful control to include in the experiment?

(A) Take samples at 30-minute intervals throughout the experiment
(B) Take samples at 5-minute intervals throughout the experiment
(C) Repeat the experiment with the eggs suspended in distilled water instead of seawater
(D) Perform the experiment in a buffer solution and add nutrients at 30-minute intervals throughout the experiment
(E) Add sperm to only one-half of the eggs after time period I and leave the other half unfertilized

Questions 97-100 refer to the following terms

(A) Reverse transcriptase
(B) Retrovirus
(C) Capsid
(D) Phage
(E) Viroid

97. Type of virus that infects bacteria
98. Protein shell that encloses a viral genome
99. Used by a type of RNA virus to make DNA from RNA
100. Infections agent that causes AIDS

Answers:

Test; Blood Plasma:

1.	A	16.	C	31.	D	46.	B
2.	D	17.	C	32.	A	47.	C
3.	C	18.	D	33.	D	48.	E
4.	B	19.	E	34.	C	49.	E
5.	B	20.	B	35.	C	50.	C
6.	E	21.	D	36.	C	51.	A
7.	E	22.	A	37.	E	52.	E
8.	D	23.	C	38.	B	53.	C
9.	B	24.	E	39.	E	54.	B
10.	C	25.	C	40.	D	55.	B
11.	B	26.	A	41.	B	56.	C
12.	D	27.	E	42.	D	57.	D
13.	A	28.	E	43.	E	58.	A
14.	A	29.	C	44.	E	59.	E
15.	A	30.	D	45.	B	60.	D

E-Section:

61.	E	66.	D	71.	B	76.	D
62.	C	67.	D	72.	A	77.	B
63.	C	68.	D	73.	E	78.	E
64.	E	69.	D	74.	D	79.	C
65.	A	70.	C	75.	C	80.	B/C

M-Section:

81.	B	86.	C	91.	E	96.	E
82.	B	87.	B	92.	B	97.	D
83.	D	88.	D	93.	E	98.	C
84.	C	89.	B	94.	B	99.	A
85.	D	90.	E	95.	C	100.	B