

EST II – Individual Subject Test

Student's Name _____

National ID _____

Test Center: _____

Subject: Biology

Duration: 60 minutes

80 Multiple Choice Questions

Instructions:

- Place your answer on the answer sheet. Mark only one answer for each of the multiple choice questions.
- Avoid guessing. Your answers should reflect your overall understanding of the subject matter.
- Calculator is not allowed.

1. What is the role of diatoms in any food chain?
 - A. Primary consumers
 - B. Secondary consumers
 - C. Tertiary consumers
 - D. Producers
 - E. Decomposers
2. All of the following are correct about evolution EXCEPT:
 - A. Geographic isolation can cause the formation of new species.
 - B. The best-adapted organisms survive.
 - C. If the environment changes suddenly and an organism is not adapted for the new environment, it might die.
 - D. New combinations of alleles can produce new phenotypes.
 - E. Single individuals, not populations, can change in response to a changing environment.
3. In a family of three boys, the probability of having a girl in a subsequent pregnancy is:
 - A. 100%
 - B. 75%
 - C. 50%
 - D. 25%
 - E. 0%
4. One of the following proteins is not an enzyme. Which one?
 - A. The intestinal lipase
 - B. The salivary amylase
 - C. The pancreatic insulin
 - D. The gastric pepsin
 - E. The pancreatic trypsin
5. In a medullar reflex action, the spinal motor nerve transmits nerve impulses from:
 - A. The spinal cord to the effector organ
 - B. The sensory receptor to the effector organ
 - C. The effector organ to the spinal cord
 - D. The sensory receptor to the spinal cord
 - E. The effector organ to the sensory receptor

Questions 6-8: Each set of lettered choices below refers to the numbered questions or statements immediately following it. Select one lettered choice that best answers each question. A choice may be used once, more than once, or not at all in each set.

Choose from the list of terms below:

- A. Cnidarians
 - B. Chordates
 - C. Annelids
 - D. Roundworms
 - E. Flatworms
6. Radial symmetry
 7. Two cell layers thick
 8. Three cell layers thick and acoelomates

9. Snails are hermaphrodites. Each snail has both male and female genitalia. Assume that each snail lays 40 eggs in theory; the number of eggs laid by five couples would be:
- A. 80
 - B. 200
 - C. 240
 - D. 320
 - E. 400
10. Following fertilization, parts of the flower fades. One flower structure is transformed into fruit. Which one?
- A. Petals
 - B. Sepals
 - C. Stamens
 - D. Ova
 - E. Ovary
11. A whole gene codes for the following tetrapeptide:

Arginine- Lysine- Proline- Valine

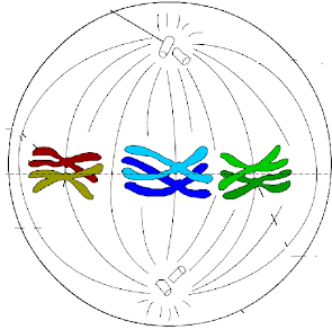
Given the following table:

| Arg | Lys | Met | Pro | Gly | Val | His | Stop codon |
|-----|-----|-----|-----|-----|-----|-----|------------|
| CGU | AAA | AUG | CCC | GGU | GUU | CAU | UGA |
| CGC | AAG | | CCU | GGC | GUC | CAC | UAA |
| CGA | | | CCA | GGA | GUA | | UAG |
| CGG | | | CCG | GGG | GUG | | |

The possible sequence of nucleotides on the transcribed strand of the gene is:

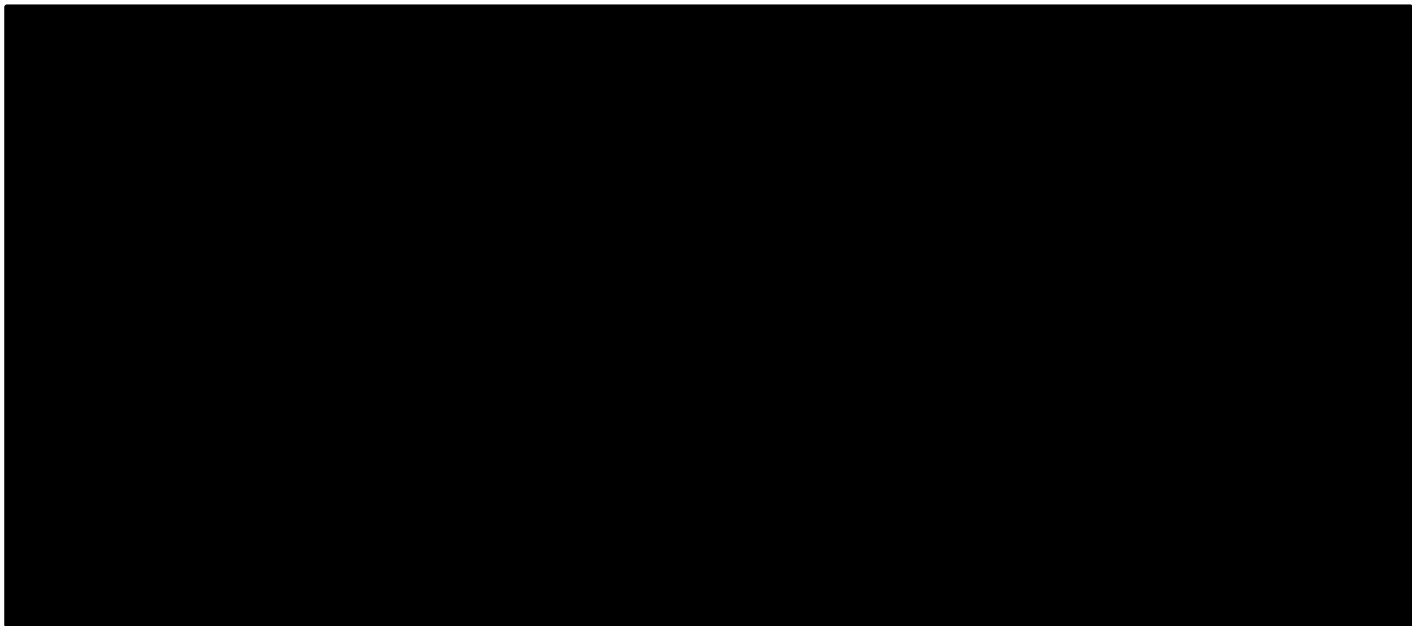
- A. GGTAACCTGTTTAA
- B. AUGCGUAAACCCGUUUA
- C. TACGCATTTGGACAAATT
- D. CGUAAACCCGUU
- E. TACCGTAAACCTGTTTAAATT

12. The diploid number of chromosomes in an insect cell is $2n=6$. The following figure shows a cell taken from the testicles of this insect during spermatogenesis.



This cell is in:

- A. Meiosis I
- B. Meiosis II
- C. Multiplication phase
- D. Growth phase
- E. Spermiogenesis



18. During lactic acid fermentation, the conversion of the pyruvic acid to lactic acid:
- A. Needs an oxidation reaction of the pyruvate to lactate by the NADH₂
 - B. Needs a reduction reaction of the pyruvate to lactate by the NADH₂
 - C. Needs an oxydo-reduction reaction of the pyruvate to lactate by the NADPH₂
 - D. Is accompanied by the synthesis of one mole of ATP
 - E. Can't happen in the absence of oxygen
19. We cross two pure-bred drosophila: one with long wings and grey body, the second with vestigial wings and ebony body. The obtained F1 have long wings and grey body. We cross a female from F1 with a male having vestigial wings and ebony body. We obtained the following results:

| Phenotype | Number of drosophila having this phenotype |
|--------------------------------|--|
| long wings and grey body | 154 |
| vestigial wings and grey body | 147 |
| Long wings and ebony body | 153 |
| vestigial wings and ebony body | 146 |

These results show:

- A. The vestigial character is determined by an allele which the expression is dominant.
 - B. The ebony body character is determined by an allele in which the expression is dominant.
 - C. F1 drosophilas have the same genotype: they are heterozygous
 - D. F1 drosophilas have the same genotype: they are homozygous
 - E. The proportions obtained in F2 show that these two genes are linked.
20. Lamprey eels attach to the skin of certain trout and absorb nutrients from the body of the trout. Which symbols best represent this relationship?
- A. (+/+)
 - B. (+/0)
 - C. (+/-)
 - D. (0/-)
 - E. (-/0)
21. Which of the following exhibits internal fertilization, external development of the embryo, few eggs, and much parenting?
- A. Mammals
 - B. Amphibians
 - C. Reptiles
 - D. Birds
 - E. Fish

22. Given the following experiments done in two test tubes:

| | | | |
|---|--|--|---|
| | Tube 1: 10 ml of starch solution 1% + 1 ml of salivary amylase solution at room temperature | Tube 2: 10 ml of starch solution 1% + 1 ml of salivary amylase solution heated at 150°C | Tube 2 brought to room temperature again |
| Reaction with Fehling solution (done 30 min later) | + | - | - |

What can you deduce from the above experiments?

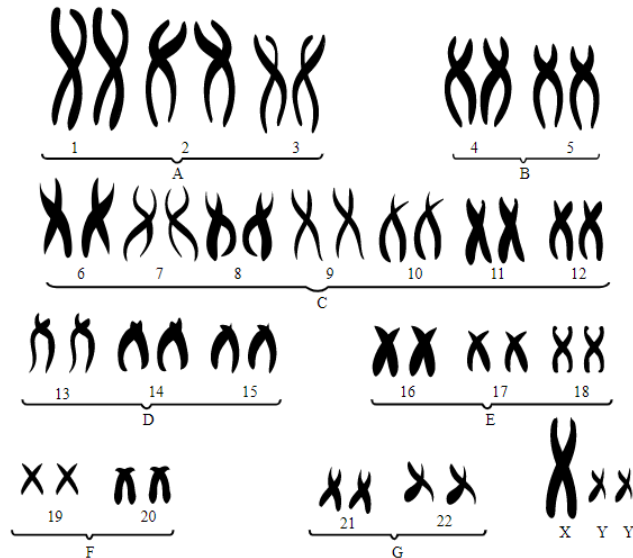
- A. Amylase enzyme doesn't work at room temperature.
 - B. High temperature deactivates the enzyme.
 - C. High temperature destroys the enzyme.
 - D. High temperature has no effect on the enzyme activity.
 - E. Insufficient data
23. Klinefelter syndrome is a genetic disorder that affects males. Turner syndrome is a genetic disorder that affects females. The following table shows these two diseases:

| Sex chromosomes in female gametes | Sex chromosomes in male gametes | Result |
|-----------------------------------|---------------------------------|----------------------------------|
| X | Y or X | Normal male or female |
| XX | Y or X | Klinefelter or triple X syndrome |
| X | XY or XX | Klinefelter or triple X syndrome |
| - | Y or X | Turner |
| X | - Or - | Turner |

What is the main cause of these two diseases?

- A. Changes in the genomic sequence
 - B. Mutation
 - C. Abnormal distribution of chromosomes
 - D. Bacterial infection
 - E. Changes in the genomic sequence and abnormal distribution of chromosomes
24. The percussion of Achilles' tendon by a reflex hammer:
- A. Induces the flexion of the leg
 - B. Induces the extension of the leg
 - C. Induces the extension and the flexion of the leg
 - D. Stimulates the cutaneous receptor
 - E. Stimulates the receptor of the antagonist muscle

25. The complete oxidation of one mole of NADH_2 gives:
- 45 kJ
 - 60 kJ
 - 90 kJ
 - 135 kJ
 - 180 kJ
26. After taking a one-week course of an antibiotic for an ear infection, a woman was told that she still had the infection and that she would have to take a course of a different antibiotic. What is the best explanation for the fact that the first antibiotic did not work?
- The woman became immune to the antibiotic.
 - The bacteria that caused the infection became immune to the antibiotic.
 - Taking the first antibiotic killed off all the bacteria that were susceptible to it, leaving only those that were resistant.
 - The woman contracted another infection because there are no bacteria that are resistant to antibiotics.
 - The woman's hormones probably interfered with the functioning of the antibiotic.
27. An echography done to a pregnant woman shows that the fetus has phenotypic abnormalities. The amniocentesis test done on embryonic cells obtained from the amniotic sac shows the following karyotype.



The cause of this abnormality is that the zygote results from the union of sperm and oocyte II where the:

- Oocyte has $(n+1)$ chromosomes
- Sperm has $(n+1)$ chromosomes
- Sperm has n chromosomes
- Oocyte has n chromosomes
- Sperm or oocyte has $2n$ chromosomes

Questions 28-30: Each set of lettered choices below refers to the numbered questions or statements immediately following it. Select one lettered choice that best answers each question. A choice may be used once, more than once, or not at all in each set.

Choose from the names of the biomes below:

- A. Tropical rain forest
- B. Taiga
- C. Temperate grasslands
- D. Marine
- E. Tundra

28. Called the permafrost

29. Characteristic organisms: large mammals including black bear and elk, and conifer trees

30. Covers less than 4% of Earth's land surface but has more than 50% of the Earth's terrestrial species

Questions 31-32:

Restriction enzymes cut the DNA molecules at specific sites called restriction sites within a sequence of nucleotides which is called the recognition sequence. For example:

| Restriction enzyme | Recognition sequence | Cleavage site |
|--------------------|--------------------------------------|--|
| Hae III | 5'---GGCC---3' 3'---CCGG---5' | 5'---GG CC---3' 3'---CC GG---5' |
| Eco RI | 5'---GAATTC---3' 3'---CTTAAG---5' | 5'---G AATTC---3' 3'---CTTAA G---5' |
| Bam H1 | 5'---GGATCC---3' 3'---CCTAGG---5' | 5'---G GATCC---3' 3'---CCTAG G---5' |

31. One property of the recognition sequence of restriction enzymes is that they are palindromic. The meaning of palindromic is that the recognition sequence reads the same on both DNA strands from:

- A. 5' to 3' on one strand and 3' to 5' on the opposite strand
- B. 3' to 5' on one strand and 5' to 3' on the opposite strand
- C. 5' to 3' direction only on one strand
- D. 3' to 5' direction only on one strand
- E. 5' to 3' direction on both strands or 3' to 5' on both strands

32. Based on question 31, you can infer that a specific enzyme has the following recognition sequence:

- A. 5'---TAGC---3'
3'---ATCG---5'
- B. 5'---TCGA---3'
3'---AGCT---5'
- C. 5'---TCCA---3'
3'---AGGT---5'
- D. 5'---ACGA---3'
3'---TGCT---5'
- E. 5'---TATC---3'
3'---ATAG---5'

33. In rabbits, the gene coding for hair color and that for the hair length are independent. Grey female rabbits having long hair are crossed with grey male rabbits having long hair. The resulting offspring have the following phenotype:

- 90 grey body with long hair
- 30 white body with long hair
- 30 grey body with short hair
- 10 white body with short hair

The results show that:

- A. There exists a lethal allele.
- B. It is the normal result of a self-cross where the allele grey is dominant over the allele for white hair.
- C. It is the normal result of a self-cross where the allele for white is dominant over the allele for grey hair.
- D. The allele for grey is dominant over the allele for white hair and the allele for long is dominant over the allele for short hair.
- E. The allele for grey is dominant over the allele for white hair and the allele for short hair is dominant over the allele for long hair.

Questions 34-35:

The following table represents the percentage of nitrogenous bases present in the whole DNA molecules extracted from two differentiated body cells of a horse A and a horse B.

| % of nitrogenous bases in DNA | A | T | C | G |
|--------------------------------------|----------|----------|----------|----------|
| Thyroid cell of horse A | 28.2 | 28.3 | 21.4 | 21.6 |
| Skin cell of horse A | 28.2 | 28.3 | 21.4 | 21.6 |
| Thyroid cell of horse B | 26.5 | 26.5 | 23.5 | 23.5 |
| Skin cell of horse B | 26.5 | 26.5 | 23.5 | 23.5 |

34. By comparing the % of nitrogenous bases present in the thyroid cell of horse A to that in the thyroid cell of horse B, one can infer that:
- A. All somatic cells of the same species have the same % of nitrogenous bases.
 - B. Cells of different animals of the same species have different % of nitrogenous bases.
 - C. In somatic cells, only the % of adenine is equal to % of thymine, and the % of guanine is equal to the % of cytosine.
 - D. In any cell, the % of adenine is equal to the % of guanine and the % of thymine is equal to the % of cytosine.
 - E. In gamete cell, only the % of adenine is equal to % of thymine, and the % of guanine is equal to the % of cytosine.
35. By comparing the % of nitrogenous bases present in the thyroid cell of horse A with the % of nitrogenous bases present in the skin cell of horse A, one can infer that:
- A. All somatic cells of the same animal have the same % of nitrogenous bases.
 - B. Cells of different animals of the same species have different % of nitrogenous bases.
 - C. All somatic cells of the same species have the same % of nitrogenous bases.
 - D. In any cell, the % of adenine is equal to the % of guanine and the % of thymine is equal to the % of cytosine.
 - E. In any cell, the % of adenine is equal to the % of cytosine and the % of thymine is equal to the % of guanine.
36. Several species of rhododendron are growing in the same area. All of the plants are capable of hybridization, but none ever do because some of them produce pollen in early June while others produce pollen in late June. This best describes an evolutionary process known as:
- A. Survival of the fittest
 - B. Overpopulation
 - C. Reproductive isolation
 - D. Artificial selection
 - E. Stabilizing selection

37. All of the following are density-independent factors EXCEPT:

- A. Floods
- B. Famine
- C. Earthquake
- D. Tsunami
- E. Naturally occurring fires

38. A 12-year-old boy wanted to color his father's plant. He brought a red thick paint solution and started to color the lower surface of the leaves. On the next day, the father got angry, but he was asking himself why the plant was wilting.

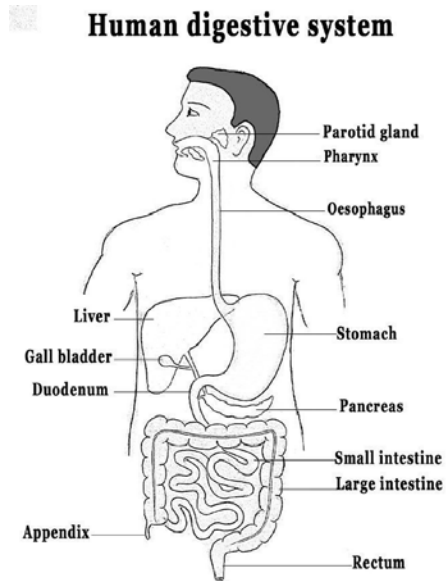
Consider the listed statements to answer the following question:

- I. The thick paint that covered the stomata affected photosynthesis leading to plant's wilting.
- II. The thick paint destroyed the chloroplast thus affecting photosynthesis.
- III. The thick paint affected the nutritional status of the plant.
- IV. There wasn't enough data to determine the cause of wilting.

What was the cause of wilting?

- A. I
- B. II
- C. III
- D. IV
- E. I and III

39. The digestive **system** is made up of the digestive **tract** which is a series of hollow organs joined together. The organs of the digestive system are indicated in the given figure.



Make use of the following statements to answer the question that follows:

- I. All the given organs are part of the digestive system.
- II. All the given organs secrete digestive juices.
- III. All the given organs are part of the digestive tract.
- IV. All the given organs participate in the process of digestion.

Which of the given statement(s) is/are true?

- A. I
- B. II
- C. III
- D. IV
- E. I and IV

40. The following table includes incorrect information about DNA and RNA.

| DNA | RNA |
|---|--|
| It is found in the nucleus | It is found in the nucleus and in the cytoplasm |
| Its sugar is ribose | Its sugar is deoxyribose |
| It is typically a double-stranded molecule with a long chain of nucleotides | It is a single-stranded molecule in most of its biological role and has a shorter chain of nucleotides |
| Its bases are A, U, C, G | Its bases are A, T, C, G |
| It is a medium of long-term storage and transmission of genetic information | Its main job is to transfer the genetic code needed for the synthesis of proteins from the nucleus to the ribosome |

Consider the following statements to answer the question that follows:

- I. Sugar of DNA is deoxyribose and that of RNA is ribose.
- II. DNA can also be present in the cytoplasm.
- III. Bases of DNA are A, T, C, G and those of RNA are A, U, C, G.
- IV. DNA can sometimes play a role of RNA and transfer the genetic code from the nucleus to the ribosome.

Which statement(s) correct(s) the table above?

- A. I
 - B. III
 - C. I and III
 - D. I and II
 - E. II and IV
41. Certain organochlorine insecticide disturbs the functioning of the synapse by blocking the acetylcholinesterase. This disruption can be explained by:
- A. A prolonged effect of the acetylcholine
 - B. A blockage of acetylcholine receptors
 - C. An inhibition of acetylcholine
 - D. A blockage of the synthesis of acetylcholine
 - E. An over synthesis of acetylcholine
42. A fungus infection affected nearly all the oak trees in a particular forest so that the coloration of the bark turned almost black. Scientists studying the ill trees discovered that a moth population that inhabited the forest changed from being light brown to being almost black.

Which of the following would best explain that color change of the moth population?

- A. The moth developed darker wings to blend in with the trees.
- B. The fungus infected the moth as well as the oak trees.
- C. The almost black moth, within the population, were the only ones to survive once the trees darkened because of the fungus infection.
- D. The moth were the first to change color, which caused the trees to darken.
- E. The fungus caused mutations to occur in the moth as well as the oak trees.

Questions 43-45:

Three identical DNA molecules, made up of 40 nucleotides each, all have their thymine nucleotides radioactive on both strands. They are cultured independently in 3 test tubes containing different contents and placed in a water bath at 37°C for a designated time to undergo DNA replication 3 times. In these tubes, the added nucleotides contain non-radioactive nitrogenous bases. The following table presents the content of tubes:

| Tubes | Nucleotides | Energy molecules | DNA polymerase |
|--------------|--------------------|-------------------------|-----------------------|
| 1 | + | + | + |
| 2 | + | + | - |
| 3 | + | - | + |

43. In which of the above tube(s), will DNA replication take place?
- A. In tube 1
 - B. In tube 2
 - C. In tube 3
 - D. In tubes 1 and 3
 - E. In tubes 1, 2, and 3
44. At the end of the experiment the number of DNA molecules in the tube(s) that undergo(es) DNA replication will be
- A. 1
 - B. 2
 - C. 4
 - D. 6
 - E. 8
45. The % of DNA molecules which are radioactive at the end of the experiment, in question 43, will be:
- A. 6.25%
 - B. 12.5%
 - C. 25%
 - D. 32%
 - E. 50%
46. During karyotype preparation, the dividing cells are blocked at:
- A. Prophase
 - B. Metaphase
 - C. Anaphase
 - D. Telophase
 - E. Interphase

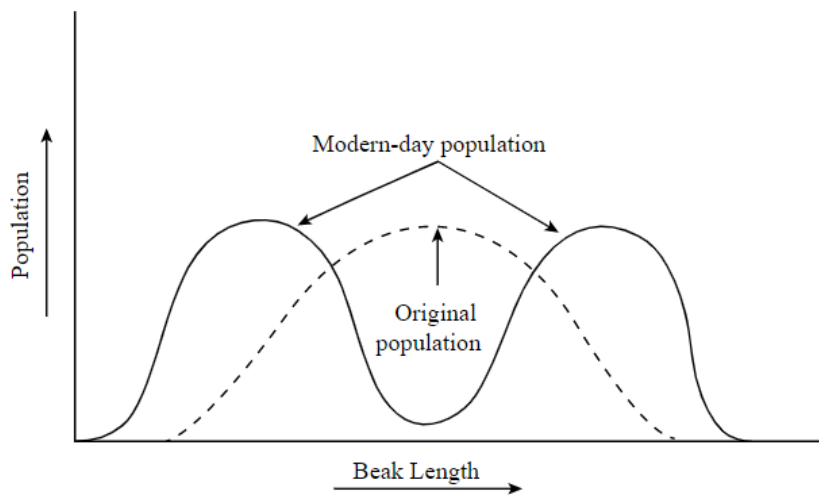
47. A gene pool in a population of jackrabbits in a field remained constant for many generations. The most probable reason for this stable gene pool is that:
- A. No migration occurred in a large population with random mating and no mutations.
 - B. No migration occurred in a small population with random mating and no mutations.
 - C. No migration occurred in a large population and no mutations but mating was random.
 - D. There was much migration into and out of the large population, but mating was random and there were few mutations.
 - E. The population was small with no mutations, no migrations, and nonrandom mating.

Questions 48-49:

When two species of paramecium, *P. caudatum* and *P. aurelia*, are grown in separate culture dishes, each population grows rapidly and then levels off at the carrying capacity for its environment. When they are combined in one culture dish, *P. aurelia* survives but *P. caudatum* does not.

48. This is most likely because:
- A. *P. caudatum* suffers a mutation that prevents its survival
 - B. *P. caudatum* was attacked by a pathogenic virus or bacteria
 - C. *P. aurelia* must have evolved into a superior organism
 - D. The two populations are competing with each other, and *P. aurelia* can outcompete *P. caudatum*
 - E. *P. aurelia* is a predator, and *P. caudatum* is its prey
49. Which of the following statements is true about the two populations of paramecium grown in culture together?
- A. They compete in the same niche.
 - B. This is an example of commensalism.
 - C. The two population do not interact.
 - D. This is an example of divergent evolution.
 - E. This is an example of primary ecological succession.
50. The mean survival time of spermatozoid in the female reproductive system of the Human species is:
- A. One hour
 - B. One day
 - C. Four days
 - D. One week
 - E. Two weeks

51. Farmers have successfully bred Brussels sprouts, broccoli, kale, and cauliflower from the mustard plant. This demonstrates:
- A. Convergent evolution
 - B. Coevolution
 - C. Adaptive radiation
 - D. Natural selection
 - E. Artificial selection
52. Curare is a natural substance that has the effect of fixing on the receptor of the motor endplate. This can have a result:
- A. To activate this synapse
 - B. To block the action of acetylcholine
 - C. To contract the muscle
 - D. No effect on this synapse
 - E. Synthesis of acetylcholine
53. Two distinctly different beak sizes occur in a single population of finch called the black-bellied seed cracker. These birds live in an isolated region in West Africa; the oldest inhabitants of the region remember that all these finches used to have the same length beak. This change in the population is shown by this graph.



The best explanation for the change in beak length is:

- A. Mutation
- B. Stabilizing selection
- C. Convergent evolution
- D. Genetic drift
- E. Diversifying selection

Questions 54-56: Each set of lettered choices below refers to the numbered questions or statements immediately following it. Select one lettered choice that best answers each question. A choice may be used once, more than once, or not at all in each set.

Choose from the listed phenomena:

- A. Imprinting
- B. Classical conditioning
- C. Fixed action pattern
- D. Altruism
- E. Operant conditioning

54. Geese hatchlings follow the first thing they see.

55. Innate, highly stereotypical behavior, which, once begun, is continued to completion no matter how useless.

56. Trial and error learning

57. Scientists believe that the giraffe originally had a short neck that has grown longer over time. The most likely explanation of this is
- I. Natural selection
 - II. Adaptive radiation
 - III. Divergent selection
- A. I
 - B. I and II
 - C. I and III
 - D. II and III
 - E. I, II, and III
58. We inject antibodies into an infected subject to attack immediately the infectious agent. This technique is called
- A. Vaccination
 - B. Serotherapy
 - C. Chemotherapy
 - D. Radiotherapy
 - E. Antibiotics shots
59. Which of the following contains organisms is capable of surviving extreme conditions of heat and salt concentration?
- A. Archaea
 - B. Animalia
 - C. Protista
 - D. Fungi
 - E. Plants

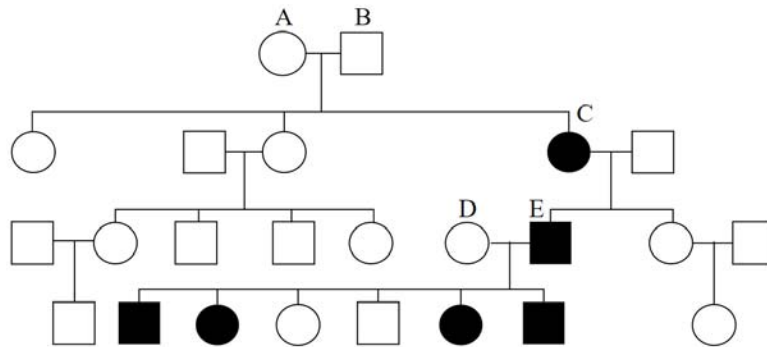


61. Pangaea is a:

- A. Transition fossil
- B. Molecule that is commonly analyzed and used to show which organisms are related
- C. Species of bacteria that is resistant to all antibiotics
- D. Vestigial structure
- E. Single supercontinent that existed 200 million years ago

Questions 62-63:

The following pedigree shows the inheritance of the color of eyes.

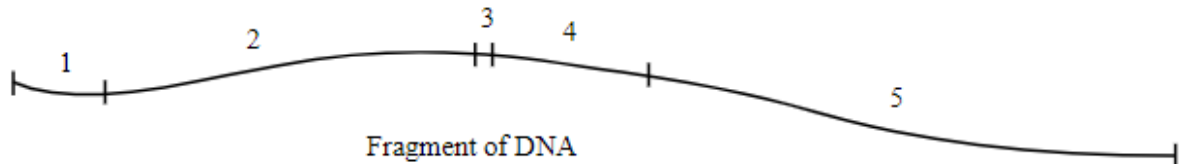


62. Which is true of the shaded-in trait?
- The trait is autosomal recessive.
 - The trait is autosomal dominant.
 - The trait is sex-linked dominant.
 - The trait is sex-linked recessive.
 - The trait is inherited as incomplete dominance.
63. What is the most likely genotype for person C?
- AA
 - Aa
 - aa
 - $X^A X^A$
 - $X^A X^a$
64. Two brothers were under medical treatment for infertility. Microscopic examination of their semen shows that although the sperm looked normal, they did not move properly. The doctors studying the cases decided that both men had a problem with one particular cell organelle. Which one?
- Endoplasmic reticulum
 - Golgi body
 - Ribosomes
 - Microtubules
 - Mitochondria
65. Concerning the blood groups, the gene of the ABO system is located on the chromosome 9 and the gene of the rhesus system is located on the chromosome 1. What is the genotype of an individual whose Rh is negative and has AB blood type?
- A//B, Rh-//Rh-
 - A//A, B//B, Rh-//Rh-
 - A//Rh-, B//Rh-
 - A Rh-//B Rh-
 - A//B, Rh+//Rh-

66. A cell containing 46 chromosomes with 2 chromatids each. Each cell contains:

- A. 46 DNA molecules
- B. 23 DNA molecules
- C. 92 DNA molecules
- D. 184 DNA molecules
- E. 48 DNA molecules

67. Here is a fragment of DNA that has been cut at certain points and will be run through a gel.



At the end of the experiment, which choice represents the correct order of DNA fragments, starting from the wells toward the positive end?

- A. 1,2,3,4,5
- B. 5,4,3,2,1
- C. 5,2,4,1,3
- D. 5,2,3,1,4
- E. 3,1,4,2,5

Questions 68-70: Each set of lettered choices below refers to the numbered questions or statements immediately following it. Select one lettered choice that best answers each question. A choice may be used once, more than once, or not at all in each set.

Choose from the terms below:

- A. Auxins
- B. Gibberellins
- C. Abscisic acid
- D. Ethylene
- E. Cytokinins

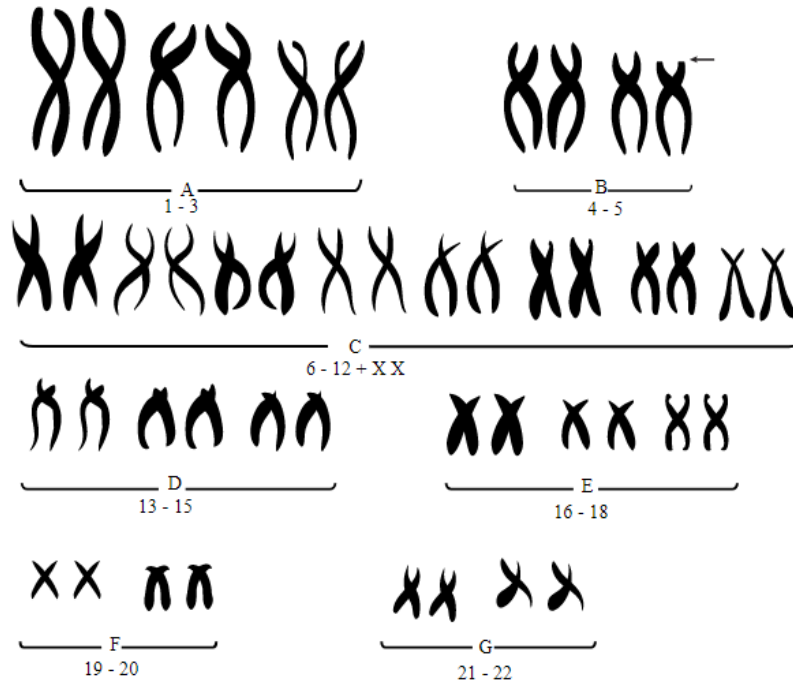
68. Close(s) stomata during times of stress, inhibits growth

69. Enhance(s) apical dominance

70. Induce(s) bolting, the rapid growth of a floral stalk

71. A farmer planted 1000 seeds of corn. The offspring was 544 tall with yellow seeds, 188 tall with green seeds, 183 short with yellow seeds, and 64 short with green seeds. What were the genotypes of the parents?
- A. TTYy x ttyy
 - B. TtYy x ttyy
 - C. ttyy x ttyy
 - D. ttyy x Ttyy
 - E. TtYy x TtYy
72. The absorption coefficient of the principal photoreceptor pigments is maximal for the following radiations:
- A. Blue and red
 - B. Green and yellow
 - C. Violet and orange
 - D. Violet and green
 - E. Violet and yellow
73. A subject with the following genotype: A//a, B//B, c//c, D//d, can form a number of genetically different gametes equal to:
- A. 2
 - B. 4
 - C. 6
 - D. 8
 - E. 16
74. Which of the following propositions is INCORRECT?
- A. The hydrolysis of ATP needs ATPase.
 - B. The hydrolysis of ATP gives ADP+ Pi+ energy.
 - C. The synthesis of ATP is made in the ribosome.
 - D. The synthesis of ATP is made from ADP+ Pi.
 - E. ATP is a molecular vector of energy.

75. The karyotype of an infant having “cri du chat syndrome” presents an abnormality in one of the two chromosomes 5.



This abnormality is called:

- A. Inversion
- B. Translocation
- C. Deletion
- D. Trisomy
- E. Substitution

Questions 76-78:

Five beakers are used in an experiment about osmosis. Each beaker contains 50 ml of a sucrose solution of varying concentration. Pieces of fresh potato (each 10 g in mass) are cut up, weighed, and placed into the beakers. After 12 hours, the potatoes are carefully removed from each beaker and weighed again. See the data in the table below.

| Beaker | Concentration of sucrose solution | Mass of potato at time zero | Mass of potato after 12 hours |
|--------|-----------------------------------|-----------------------------|-------------------------------|
| 1 | 0.2 M | 10 g | 13.6 g |
| 2 | 0.4 M | 10g | 11.5 g |
| 3 | 0.6 M | 10 g | 10.8 g |
| 4 | 0.8 M | 10 g | 9.4 g |
| 5 | 1.0 M | 10 g | 8.2 g |

76. In this experiment:
- A. Water flowed into the potato only.
 - B. Water flowed out of the potato only.
 - C. Sucrose flowed into the potato only.
 - D. Sucrose flowed both into and out of the potato depending on the concentration of sucrose solution.
 - E. Water flowed both into and out of the potato depending on the concentration of sucrose solution.
77. Given the results of this experiment, what is the molarity (concentration) within the potato cell?
- A. Less than 0.2 M
 - B. Less than 0.4 M but greater than 0.2 M
 - C. Less than 0.6 M but greater than 0.4 M
 - D. Less than 0.8 M but greater than 0.6 M
 - E. Greater than 0.8 M
78. The results of this experiment give support to the theory that:
- A. Water diffuses down a gradient.
 - B. Water can be actively transported against a gradient.
 - C. Solutes will diffuse from high concentration to low concentration.
 - D. Living cells respond in different ways to the same conditions.
 - E. Potato cells respond differently from other living cells.

79. A college student studying genetics is assigned a semester-long project by her professor, who gives her 4 black and 4 white guinea pigs. There are 2 male and 2 female guinea pigs of each color. The professor tells the student that the guinea pigs in each group are all of the same genotype. The project is to determine the genotype of the black guinea pigs. The student does some preliminary library research and discovers that white fur in guinea pigs is recessive and that black fur is dominant. Which of the following procedures would be the best for the student to carry out to determine the genotype of the black guinea?
- A. Karyotype
 - B. Blood analysis of the chromosomes to see if there is evidence of nondisjunction
 - C. Analysis with an electron microscope to see if any of the black fur contains any white flecks that cannot be seen with the eye or with the light microscope
 - D. Cross any two of the black animals to see if any offspring are white
 - E. Cross any of the black animals with a white animal to see if any of the offspring are white
80. A man with hemophilia marries a woman who has normal hemoglobin and is not a carrier. Which of the following is true?
- A. None of their children will have the disease nor will they be carriers.
 - B. All the boys will have the disease.
 - C. All the girls will have the disease.
 - D. All the boys will be carriers.
 - E. All the girls will be carriers.