

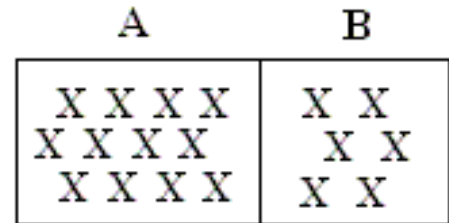
Name: \_\_\_\_\_ Date: \_\_\_\_\_

### BioT3

- 1) Which of the following terms describes the movement of gas molecules from an area of high concentration to an area of low concentration?
  - A. osmosis
  - B. active transport
  - C. filtration
  - D. diffusion
- 2) Which cell would contain the most mitochondria?
  - A. skin cell
  - B. muscle cell
  - C. hair cell
  - D. blood cell
  - E. all cells contain the same number of mitochondria
- 3) What cell structure makes it possible for the internal environment of a cell to differ from the external environment?
  - A. endoplasmic reticulum
  - B. cell wall
  - C. middle lamella
  - D. cell membrane
  - E. nucleus
- 4) In order to function, cells must maintain a constant internal environment. The maintenance of a relatively stable internal condition is...
  - A. metabolism
  - B. homeostasis
  - C. active transport
  - D. osmosis
  - E. respiration
- 5) One important characteristic of prokaryote cells is that they
  - A. have no nucleus or any membrane-bound organelles
  - B. lack cell walls
  - C. have no DNA
  - D. have no cell membrane
  - E. have no cytoplasm
- 6) Microscopic fossils of ancient protozoa are found in the rocks of Earth's crust. What evidence would indicate that they could make their own food?
  - A. Flagella
  - B. Chloroplasts
  - C. Cell wall
  - D. Calcium carbonate shell
- 7) Which of the following is a main function of the cell wall?
  - A. to store carbohydrates for later use
  - B. to give the cell a rigid structure
  - C. to package proteins for export
  - D. to carry out photosynthesis
- 8) What is it called when carbon dioxide moves into the leaves of plants?
  - A. plasmolysis
  - B. turgor pressure
  - C. endocytosis
  - D. diffusion
  - E. active transport
- 9) A cell has a defect that results in the loss of its ability to regulate the passage of water, food, and wastes into and out of the cell. In which of the following cell structures is this defect **most likely** to be located?
  - A. ribosomes
  - B. chloroplasts
  - C. cell membrane
  - D. endoplasmic reticulum
- 10) Which of the following statements is NOT part of the Cell Theory?
  - A. Cells reproduce by mitosis
  - B. All organisms are composed of cells
  - C. Cells are the basic unit of life
  - D. Cells come from other living cells
  - E. All plants are made of cells

11) Refer to the following diagram. The X's represent solutes dissolved in the water. In which direction will the net movement of water occur?

- A. A ----> B
- B. B ----> A
- C. equal in both directions
- D. not enough information to know
- E. it depends on the temperature



12) Which side of the membrane contains the hypotonic (low concentration) solution?

- A. A
- B. B
- C. both
- D. neither

13) The cell theory states that all living things are made of cells. Viruses are not made of cells, but some scientists argue nonetheless that viruses are alive. What may occur, new evidence is discovered about viruses, that the cell theory does not explain?

- A. The cell theory may be modified in light of this new evidence.
- B. The cell theory will be abandoned for a new theory.
- C. Nothing. The cell theory is a hypothesis and does not need to be supported by new evidence.
- D. Nothing. The cell theory is scientists' best idea so it remains valid.

14) Which cellular organelle uses oxygen and glucose to provide energy to the cell?

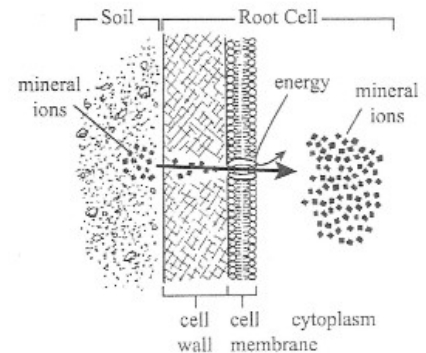
- A. mitochondrion
- B. nucleus
- C. ribosome
- D. vacuole

15) Osmosis refers to

- A. the movement of solutes through a selectively permeable membrane
- B. the active transport of water through a membrane
- C. diffusion of water through a cell wall
- D. diffusion of gases
- E. diffusion of water through a selectively permeable membrane

16) The diagram below illustrates how plant root cells take in mineral ions from the surrounding soil. Which process is illustrated?

- A. active transport
- B. diffusion
- C. osmosis
- D. passive filtration



17) A biologist dilutes blood cells with water on a glass slide and observes them through a microscope. The cells appear to burst. The biologist wants to observe these blood cells in a dilute solution without the cells bursting. He should investigate

- A. other types of cells to see if the bursting continues
- B. the amount of salts in the water used to dilute the blood and the amount of salts in the blood plasma
- C. the age of the blood sample used by the biologist
- D. the chemical make-up of the cell membrane of the blood cells

18) Some cells, such as human nerve and muscle cells, contain many more mitochondria than do other cells, such as skin cells. Why do some cells have more mitochondria than others?

- A. The cells use more energy.
- B. The cells store more nutrients.
- C. The cells degrade more proteins.
- D. The cells divide more frequently.

19) What causes vegetables to get crispy when soaked in fresh water?

- A. turgor pressure
- B. endocytosis
- C. diffusion
- D. active transport

20) Your skin replaces the cells that it is continually losing by using the process of:

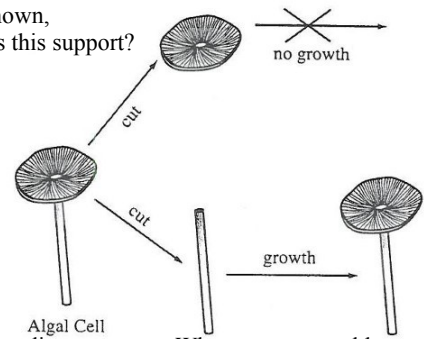
- A. transduction
- B. mitosis
- C. meiosis
- D. glycolysis

21) Which of the following examples does NOT illustrate homeostasis?

- A. breathing harder during exercise
- B. removing excess fluids through the kidneys
- C. coordinating body processes through the nervous and endocrine systems
- D. passing genetic characteristics from one generation to another
- E. taking nutrients from the blood stream into cells

22) The algal cell pictured is a single-celled organism. When the algal cell is cut in two as shown, the bottom part can grow into a complete cell, but the top part cannot. What conclusion does this support?

- A. The ribosomes are found in the top of the cell.
- B. The nucleus is found in the bottom of the cell.
- C. The top of the cell contains most of its chromosomes.
- D. The bottom of the cell contains most of its cytoplasm.



23) When the turgor pressure of a cell is high, a plant cell will

- A. explode
- B. be firm or rigid
- C. plasmolyze
- D. die
- E. be limp

24) Some brown algae will contain iodine in concentrations 2000 times greater than the surrounding sea water. What process would account for this?

- A. osmosis
- B. diffusion
- C. plasmolysis
- D. exocytosis
- E. active transport

25) In 1665, Robert Hooke used a simple microscope to observe thin slices of cork. He saw many little boxes which reminded him of the places where monks lived. Based on the information, how did he most likely assist in the development of the cell theory?

- A. He studied plants and concluded that all plants are made of cells.
- B. He gave these structures the name "cells."
- C. He formulated the entire cell theory.
- D. He observed cells producing other cells.

26) The pancreas is an organ that creates the protein insulin. Which organelle in its cell packages insulin to be secreted out of the cell?

- A. golgi apparatus
- B. ribosomes
- C. mitochondria
- D. vacuoles
- E. nucleus

27) Which of the following functions does active transport perform in a cell?

- A. packaging proteins for export from the cell
- B. distributing enzymes throughout the cytoplasm
- C. moving substances against a concentration gradient
- D. equalizing the concentration of water inside and outside the cell

28) An amoeba takes in food particles too large to pass through the membrane, what is the name for this?

- A. turgor pressure
- B. endocytosis
- C. diffusion
- D. active transport

29) Which of the following is an example of sexual reproduction?

- A. division of an amoeba
- B. growth of an organism
- C. joining of egg and sperm
- D. mitosis

30) When gametes are produced from a parent cell during normal meiosis, which of the following describes the number of chromosomes in each resulting cell?

- A. Each resulting cell has the same number of chromosomes as the parent cell.
- B. Each resulting cell has twice the number of chromosomes as the parent cell.
- C. Each resulting cell has one-half the number of chromosomes as the parent cell.
- D. Each resulting cell has one-fourth the number of chromosomes as the parent cell.

31) When an egg and sperm combine, a(n) \_\_\_ is formed.

- A. fetus
- B. gestation
- C. ovary
- D. zygote

32) A human zygote, like most other human cells, contains 46 chromosomes. How many chromosomes did it receive from the mother?

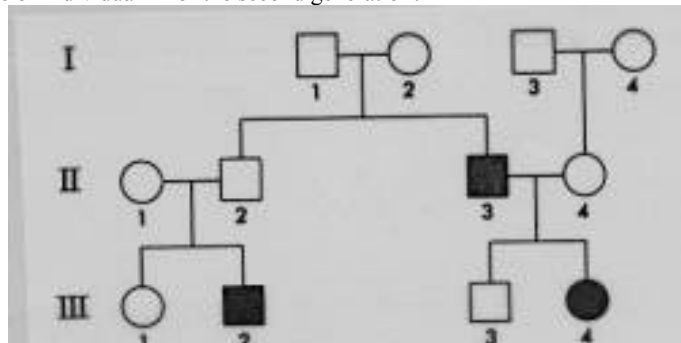
- A. 0
- B. 23
- C. 46
- D. 92

33) Which of the following is the primary advantage of sexual reproduction when compared to asexual reproduction?

- A. There is a greater number of offspring.
- B. There is more food available to offspring.
- C. There is greater genetic variety in offspring.
- D. There is a longer development time for offspring.

34) The following pedigree chart shows sex-linked inheritance of color blindness for three generations of a family. Review the pedigree chart. Answer the following question. What is genotype of Individual #4 of the second generation?

- A. XCXc
- B. XCXC
- C. XCY
- D. Xcy



35) According to the pedigree, who is passing on the genes for color-blindness to Individual #4 of the third generation?

- A. Individual #3 of the second generation
- B. Individual #4 of the second generation
- C. Individuals #3 and #4 of the second generation
- D. Individuals #2 and #3 of the second generation

36) What is the genotype of #2 of the third generation?

- A. XCXc
- B. XCXC
- C. XC
- D. XcY

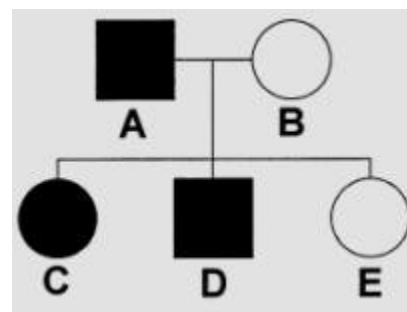
37) What is the genotype of Individual #2 in the first generation?

- A. XCXc
- B. XCXC
- C. XCY
- D. Xc

38) In the pedigree above, the shaded individuals are homozygous recessive.

What is the genotype of individual E?

- A. heterozygous
- B. homozygous recessive
- C. homozygous dominant
- D. can not tell from the diagram



39) If individual E married an individual who is homozygous recessive, what is the probability that their first child will be homozygous recessive?

- A. 1/8
- B. 1/4
- C. 1/2
- D. 1

40) What is the genotype of individual B?

- A. heterozygous
- B. homozygous recessive
- C. homozygous dominant
- D. can not tell from the diagram

41) In which part of a plant would meiosis occur?

- A. root
- B. stem
- C. leaf
- D. flower
- E. seed

42) How does asexual reproduction help the survival of a species?

- A. Asexual reproduction combines the strong, useful genes of both parents.
- B. Asexual reproduction allows a species to continue to reproduce, thus eliminating harmful characteristics.
- C. Asexual reproduction may result in many offspring with the same strong useful characteristics as the parent.
- D. Asexual reproduction results in fewer offspring so the harmful, deadly genes cannot be passed on to the next generation.

43) Which of the following is an example of codominance in genetic traits?

- A. A tall pea plant and a short pea plant produce tall pea plants.
- B. An orange cat and a black cat produce an orange-and-black kitten.
- C. A blue-eyed man and a brown-eyed woman produce a blue-eyed child.
- D. A color-blind woman and a man with normal vision produce a color-blind son.

44) Which of the following genetic conditions results from a problem with segregation?

- A. **Trisomy 16**: a condition caused when a zygote receives three copies of chromosome 16
- B. **Huntington's disease**: a condition caused when a zygote receives a mutated dominant allele
- C. **Hemophilia**: a condition caused when a zygote receives an X chromosome with a particular recessive allele
- D. **Sickle cell anemia**: a condition caused when a zygote receives a recessive allele for hemoglobin from each parent

- 45) Using  $T = \text{tall}$  and  $t = \text{short}$ . If a heterozygous male crosses with a heterozygous female, what is the genotype ratio?
- 2:2
  - 4:0
  - 3:1
  - 3:3
  - 1:2:1

- 46) Which of the following is a form of sexual reproduction?
- A sponge forming from a piece of the parent
  - A Yeast cell undergoing budding
  - A Raspberry bush growing from a piece of buried stem
  - A Rose flower producing seeds
  - A Hydra producing a bud from its side

- 47) From the information shown, if the red phenotype is dominant, what % of the offspring will show the red phenotype?
- 75
  - 50
  - 25
  - 100
  - 0

	R	r
R	RR	Rr
r	Rr	rr

- 48) What % of the offspring from above will be heterozygous?
- 0
  - 25
  - 50
  - 75
  - 100

- 49) In pigeons, the allele **B** produces ash-red feathers. The allele **b** produces blue feathers. The **B** allele is dominant to the **b** allele. A pigeon with genotype **Bb** is crossed with a pigeon with genotype **bb**. What percent of the offspring are expected to have ash-red feathers?
- 0%
  - 25%
  - 50%
  - 100%

- 50) Which breeding system reduces genetic variation in a population?
- Crossbreeding
  - Inbreeding
  - Outcrossing
  - Outbreeding

- 51) Mary has natural blonde hair. Both of her parents have natural brown hair. In humans, brown is dominant and blonde is recessive. Choose the genotype that best describes Mary's parents.

- Bb and Bb
- BB and Bb
- BB and BB
- bb and BB
- bb and bb

- 52) Human blood types are genetically determined. The  $I^A$  and  $I^B$  alleles are codominant, resulting in blood type AB in individuals heterozygous for the two alleles. A male and a female both have blood type AB. If they have a child, what is the probability that the child will also have blood type AB?

- 1/4
- 1/2
- 3/4
- 1/1

**Two Alleles Controlling Human Blood Type**

Symbol	Allele Description
$I^A$	produces antigen A on red blood cells
$I^B$	produces antigen B on red blood cells

- 53) Similar structures are present in the embryos of fish, chickens, and rabbits. In fish, these structures develop into gills, but in chickens and rabbits, they either disappear or develop into other body parts later in embryonic development. Which statement below **best** explains the presence of these structures in the embryos of all three species?

- The embryos of the three species are similar in size.
- Breathing structures are similar among the young of the three species.
- The three species have a common ancestor with these embryonic structures.
- The reproductive mechanisms are similar among the adults of the three species.

- 54) In pea plants, the genes for seed color and seed shape are on different chromosomes. Which principle explains why the genes for these traits are not inherited together?

- natural selection
- artificial selection
- the law of segregation
- the law of independent assortment

55) These karyotypes are of

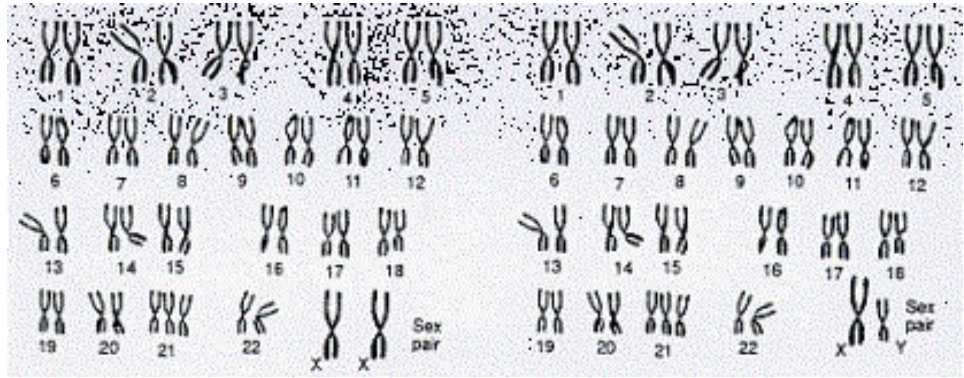
- A. 2 females
- B. 2 males
- C. 1 female, 1 male
- D. You can't tell

56) Which chromosome is abnormal or carries a genetic mutation?

- A. 23rd pair
- B. 21st pair
- C. 18th pair
- D. 13th pair

57) What is this genetic condition known as?

- A. Trisomy 18
- B. Down Syndrome
- C. Klinefelter Syndrome
- D. Trisomy 21



58) In 1973 Stanley Cohen and Herbert Boyer isolated a section of DNA from an African Clawed Toad and inserted it into bacteria. The bacteria started producing toad RNA instead of the bacteria RNA, making Cohen and Boyer the first to produce bacteria genetically for an isolated gene from another species. What is this process of manipulating DNA called?

- A. Translation
- B. Genetic Engineering
- C. DNA replication
- D. Mutation

59) Sickle cell anemia is caused by an abnormal type of hemoglobin, the oxygen-carrying protein in blood cells. The cause of the abnormal protein is the replacement of the amino acid valine with the amino acid lysine. What is this kind of alteration called?

- A. malnutrition
- B. transgenic
- C. radiation
- D. nondisjunction
- E. mutation

60) Why is the particular sequence of bases in a segment of DNA important to cells?

- A. Some base sequences code for protein production.
- B. Some base sequences cause the release of lipids from the nucleus.
- C. Some base sequences contain the order of sugars in polysaccharides.
- D. Some base sequences produce electrical signals sent to the cytoplasm.

61) A carrot cell contains 18 chromosomes. Which of the following diagrams illustrates the correct number of chromosomes in new cells produced by mitosis?

- A. 9 in each daughter cell
- B. 18 in each daughter cell
- C. 36 in each daughter cell
- D. 54 in each daughter cell

62) Chemically inserting genes from one organism into another is an example of

- A. crossbreeding
- B. genetic engineering
- C. hybridization
- D. inbreeding

63) A crime was committed in the 1970s. The investigators collected evidence at the scene including a hair. At the time, investigators did not have enough evidence to link the crime to a suspect. Several years later, a similar crime is committed. The investigators collect evidence at the new crime scene. The hair from the first crime matches the suspect in the second. The suspect was charged with both crimes. How has science allowed the investigators to determine that the same person committed both crimes?

- A. If the method by which the two crimes were committed is the same, it is enough to convict the suspect of both crimes.
- B. Gene splicing allows new genes to be inserted to determine differences between the victim's and the criminal's blood.
- C. Genetic engineering created new computer data files to be able to link one suspect with both crimes.
- D. Technology has improved so DNA from the evidence can be sequenced and matched to the suspect's DNA.

64) What is the process called when an egg is removed, fertilized outside of the body, and then implanted in the womb?

- A. artificial insemination
- B. cloning
- C. in vitro fertilization
- D. surrogate motherhood

65) Which of the following statements **best** describes a DNA molecule?

- A. It is a double helix.
- B. It contains the sugar ribose.
- C. It is composed of amino acids.
- D. It contains the nitrogenous base uracil.