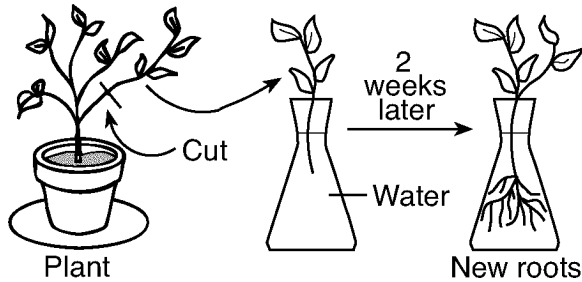


Name: _____

UNIT: REPRODUCTION AND DEVELOPMENT

TOPIC: ASEXUAL REPRODUCTION

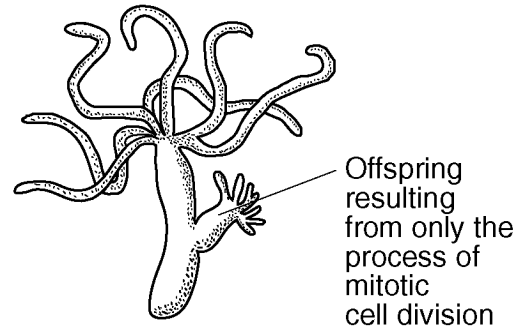
- 1) A technique used to reproduce plants is shown in the diagram below.



This technique is a form of

- 1) gene manipulation
 - 2) sexual reproduction
 - 3) asexual reproduction
 - 4) gamete production
- 2) Strawberries can reproduce by means of runners, which are stems that grow horizontally along the ground. At the region of the runner that touches the ground, a new plant develops. The new plant is genetically identical to the parent because
- 1) it was produced sexually
 - 2) it was produced asexually
 - 3) there were no other strawberry plants in the area to provide fertilization
 - 4) nuclei traveled to the new plant through the runner to fertilize it
- 3) When a planarian (a type of worm) is cut in half, each half usually grows back into a complete worm over time. This situation most closely resembles
- 1) sexual reproduction in which each half represents one parent
 - 2) sexual reproduction of a single-celled organism
 - 3) asexual reproduction of a single-celled organism
 - 4) asexual reproduction in which a mutation has occurred

- 4) The organism represented below is multicellular, heterotrophic, and completely aquatic.



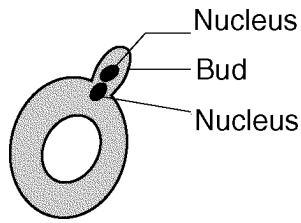
Which other characteristics could be used to describe this organism?

- 1) deposits cellular wastes on land and decomposes dead organisms
 - 2) carries out photosynthesis and needs oxygen
 - 3) reproduces in a water habitat and is a producer
 - 4) reproduces asexually and is a consumer
- 5) Which row in the chart below *best* describes asexual reproduction?

Row	Number of Parents	Comparison of Offspring to Parents
(1)	one	identical
(2)	one	different
(3)	two	identical
(4)	two	different

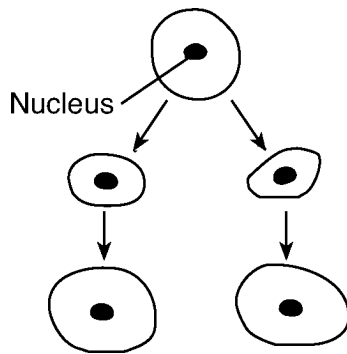
- 1) 1 2) 2 3) 3 4) 4
- 6) A tree produces only seedless oranges. A small branch cut from this tree produces roots after it is planted in soil. When mature, this new tree will most likely produce
- 1) oranges and other kinds of fruit
 - 2) oranges with seeds, only
 - 3) oranges without seeds, only
 - 4) a majority of oranges with seeds and only a few oranges without seeds

- 7) The diagram below represents a yeast cell that is in the process of budding, a form of asexual reproduction.



Which of the following statements describes the outcome of this process?

- 1) The two cells that result will each contain half the species number of chromosomes.
 - 2) The bud will start to divide by the process of meiotic cell division.
 - 3) The bud will develop into a zygote.
 - 4) The two cells that result will have identical DNA.
- 8) A pattern of reproduction and growth in a one-celled organism is shown below.



Which statement *best* describes this pattern of reproduction?

- 1) All genetic material comes from one parent.
- 2) The size of the parent determines the source of the genetic material.
- 3) Only some of the genetic material comes from one parent.
- 4) The size of the parent determines the amount of genetic material.

- 9) Asexually reproducing organisms pass on hereditary information as

- 1) chains of complex amino acids
- 2) simple inorganic sugars
- 3) folded protein molecules
- 4) sequences of A, T, C, and G

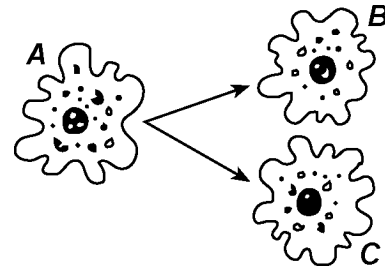
- 10) Viruses frequently infect bacteria and insert new genes into the genetic material of the bacteria. When these infected bacteria reproduce asexually, which genes would most likely be passed on?

- 1) both the original and the new genes
- 2) only the original genes
- 3) neither the original nor the new genes
- 4) only the new genes

- 11) A certain bacterial colony originated from the division of a single bacterial cell. Each cell in this colony will most likely

- 1) have a resistance to different antibiotics
- 2) synthesize the same proteins and enzymes
- 3) express adaptations unlike those of the other cells
- 4) replicate different numbers of genes

- 12) The diagram below represents single-celled organism *A* dividing by mitosis to form cells *B* and *C*.

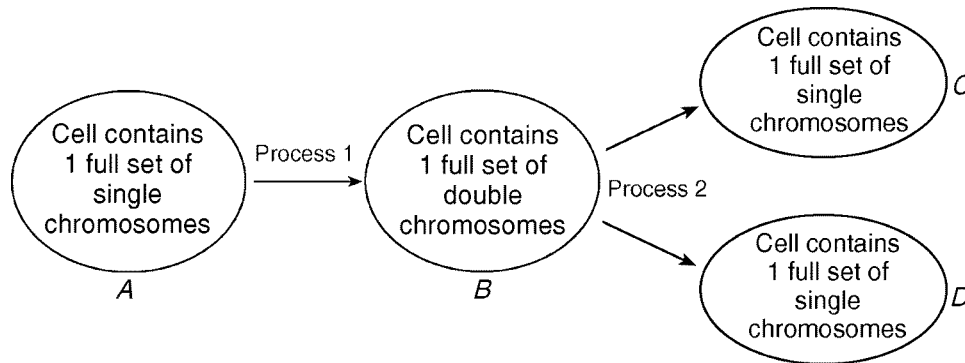


Cells *A*, *B*, and *C* all produced protein *X*. What can *best* be inferred from this observation?

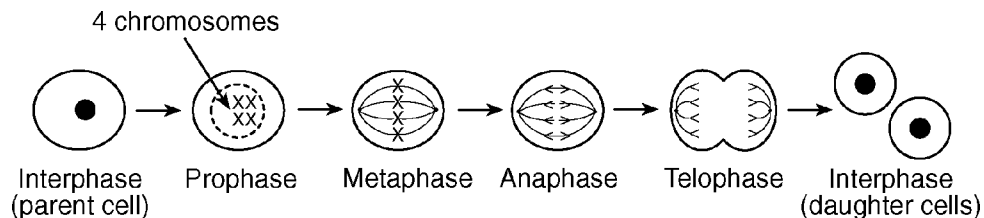
- 1) The gene to produce protein *X* was passed from cell *A* to cells *B* and *C*.
- 2) Cells *A*, *B*, and *C* ingested food containing the gene to produce protein *X*.
- 3) Protein *X* is found in all organisms.
- 4) The gene for protein *X* is found in single-celled organisms, only.

Questions 13 through 16 refer to the following:

The diagram below represents a single-celled organism, such as an amoeba, undergoing the changes shown.



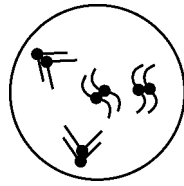
- 13) As a result of the processes shown, the single-celled organism accomplishes
- 1) sexual reproduction
 - 2) gamete production
 - 3) asexual reproduction
 - 4) energy production
- 14) In the diagram shown, process 1 is known as
- 1) digestion
 - 2) replication
 - 3) differentiation
 - 4) meiosis
- 15) In the diagram shown, process 1 and process 2 are directly involved in
- 1) recombination
 - 2) meiotic cell division
 - 3) fertilization
 - 4) mitotic cell division
- 16) In the diagram shown, the genetic content of C is usually identical to the genetic content of
- 1) D but not A
 - 2) both A and D
 - 3) both B and D
 - 4) B but not D
- 17) The sequence of events occurring in the life cycle of a bacterium is listed below.
- (A) The bacterium copies its single chromosome.
 - (B) The copies of the chromosome attach to the cell membrane of the bacterium.
 - (C) As the cell grows, the two copies of the chromosome separate.
 - (D) The cell is separated by a wall into equal halves.
 - (E) Each new cell has one copy of the chromosome.
- This sequence most closely resembles the process of
- 1) recombination
 - 2) zygote formation
 - 3) mitotic cell division
 - 4) meiotic cell division
- 18) The *least* genetic variation will probably be found in the offspring of organisms that reproduce using
- 1) internal fertilization to produce an embryo
 - 2) fusion of eggs and sperm to produce zygotes
 - 3) meiosis to produce gametes
 - 4) mitosis to produce a larger population
- 19) The diagram below illustrates the process of cell division.



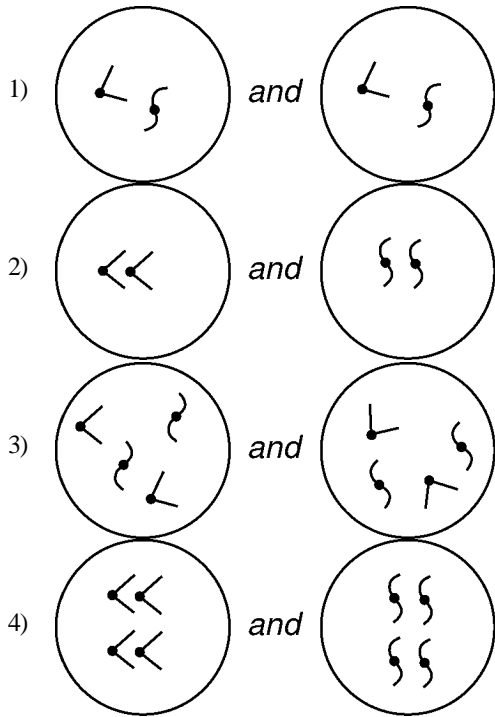
What is the significance of anaphase in this process?

- 1) In anaphase, the DNA is being replicated.
- 2) Anaphase usually ensures that each daughter cell has the same number of chromosomes as the parent cell.
- 3) Anaphase usually ensures that each daughter cell has twice as many chromosomes as the parent cell.
- 4) In anaphase, the cell splits in half.

20) The chromosome content of a skin cell that is about to form two new skin cells is represented in the diagram shown.



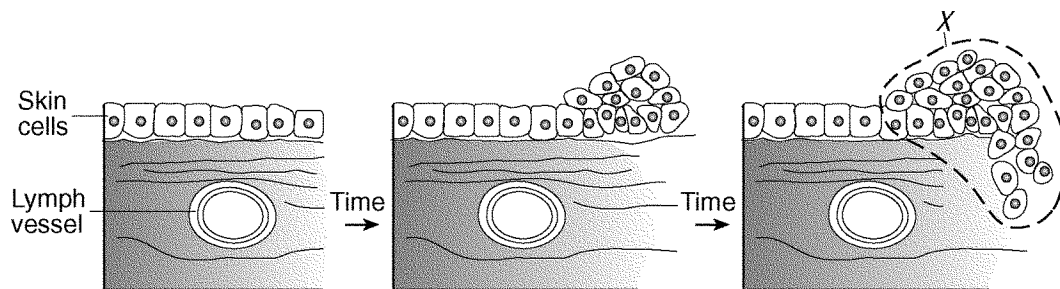
Which diagram *best* represents the chromosomes that would be found in the two new skin cells produced as a result of this process?



21) Marine sponges contain a biological catalyst that blocks a certain step in the separation of chromosomes. Which cellular process would be directly affected by this catalyst?

- 1) mitosis
- 2) diffusion
- 3) photosynthesis
- 4) respiration

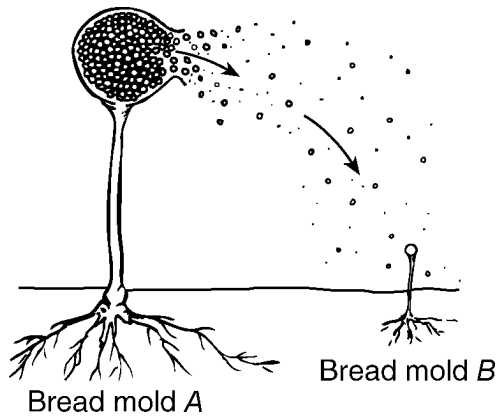
22) The diagram below shows the growth pattern of some skin cells in the human body after they have been exposed to ultraviolet radiation.



The cells in area X are most likely

- 1) red blood cells
- 2) white blood cells
- 3) cancer cells
- 4) sex cells

- 23) The diagram below illustrates asexual reproduction in bread mold. Reproductive structures known as spores were released from bread mold *A*. One of these spores developed into bread mold *B*.



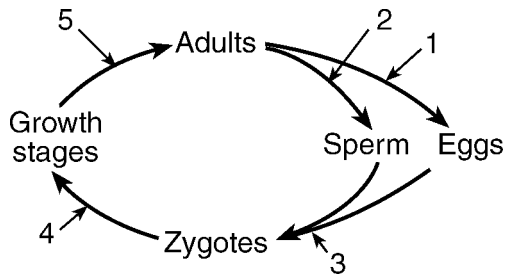
State how the genetic information in the nuclei of cells in bread mold *B* compares to the genetic information in the nuclei of cells in bread mold *A*.

- 24) Sexually produced offspring often resemble, but are not identical to, either of their parents. Explain why they resemble their parents, but are *not* identical to either parent.

TOPIC: SEXUAL REPRODUCTION

- 25) Which cell process occurs only in organisms that reproduce sexually?
- 1) mitosis
 - 2) replication
 - 3) mutation
 - 4) meiosis
- 26) Which sequence represents the correct order of processes that result in the formation and development of an embryo?
- 1) meiosis → fertilization → mitosis
 - 2) fertilization → mitosis → meiosis
 - 3) mitosis → fertilization → meiosis
 - 4) fertilization → meiosis → mitosis
- 27) A child has brown hair and brown eyes. His father has brown hair and blue eyes. His mother has red hair and brown eyes. The *best* explanation for the child having brown hair and brown eyes is that
- 1) gene expression must change in each generation so evolution can occur
 - 2) the child received genetic information from each parent
 - 3) cells from his mother's eyes were present in the fertilized egg
 - 4) a gene mutation occurred that resulted in brown hair and brown eyes
- 28) A single pair of goldfish in an aquarium produced a large number of offspring. These offspring showed variations in body shape and coloration. The most likely explanation for these variations is that the
- 1) parent fish had not reproduced sexually
 - 2) offspring were adapting to different environments
 - 3) parent fish had not been exposed to mutagenic agents
 - 4) offspring were produced from different combinations of genes
- 29) Which statement is true of *both* mitosis and meiosis?
- 1) Both occur only in reproductive cells.
 - 2) Both are involved in asexual reproduction.
 - 3) DNA replication occurs before the division of the nucleus.
 - 4) The number of chromosomes is reduced by half.
- 30) Some cells involved in the process of reproduction are represented in the diagram below.
- 1 2 3
- The process of meiosis formed
- 1) cells 1 and 2, only
 - 2) cell 1, only
 - 3) cells 2 and 3, only
 - 4) cell 3, only
- 31) Offspring that result from meiosis and fertilization each have
- 1) gene combinations different from those of either parent
 - 2) gene combinations identical to those of each parent
 - 3) twice as many chromosomes as their parents
 - 4) one-half as many chromosomes as their parents
- 32) Variation in the offspring of sexually reproducing organisms is the direct result of
- 1) replication and cloning
 - 2) the need to adapt and maintain homeostasis
 - 3) overproduction of offspring and competition
 - 4) sorting and recombining of genes
- 33) Reproduction in humans usually requires
- 1) the external fertilization of sex cells
 - 2) gametes with chromosomes that are not paired
 - 3) the process of cloning
 - 4) mitotic cell division of gametes
- 34) Changes in the genetic code of a human can be transmitted to offspring if they occur in
- 1) antibodies
 - 2) cancer cells
 - 3) cell membranes
 - 4) gametes
- 35) Which process can produce new inheritable characteristics within a multicellular species?
- 1) gene alterations in gametes
 - 2) cloning of the zygote
 - 3) mitosis in muscle cells
 - 4) differentiation in nerve cells
- 36) Which cell is normally produced as a direct result of meiosis?
- 1) a zygote having the full species number of chromosomes
 - 2) an egg having the full species number of chromosomes
 - 3) a sperm having half the normal species number of chromosomes
 - 4) a uterine cell having half the normal species number of chromosomes
- 37) Which of the following statements correctly describes the genetic makeup of the sperm cells produced by a human male?
- 1) Each cell has half the normal number of chromosomes and the cells are usually genetically identical.
 - 2) Each cell has half the normal number of chromosomes and the cells are usually genetically different.
 - 3) Each cell has pairs of chromosomes and the cells are usually genetically identical.
 - 4) Each cell has pairs of chromosomes and the cells are usually genetically different.

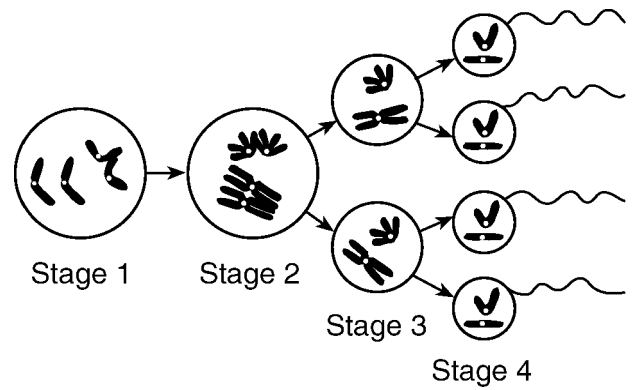
38) The arrows in the diagram shown illustrate processes in the life of a species that reproduces sexually.



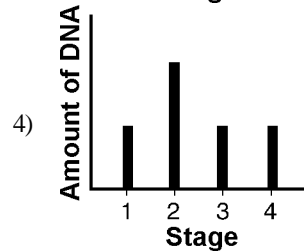
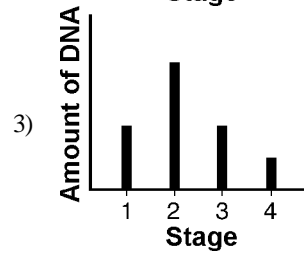
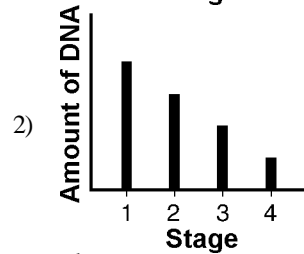
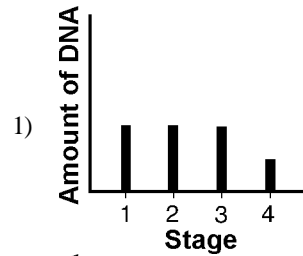
Which processes result directly in the formation of cells with half the amount of genetic material that is characteristic of the species?

- 1) 4 and 5
- 2) 1 and 2
- 3) 2 and 3
- 4) 3 and 4

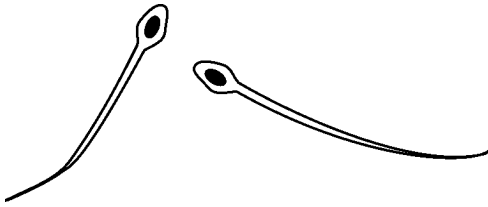
39) The diagram below illustrates some of the changes that occur during gamete formation.



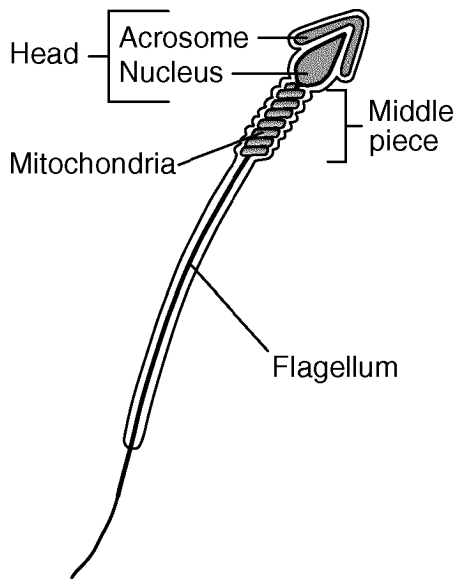
Which graph below *best* represents the changes in the amount of DNA in one of the cells at each stage?



40) Which statement about the gametes represented in the diagram below is correct?



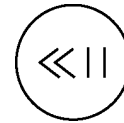
- 1) They are fertilized in an ovary.
 - 2) They transport genetic material.
 - 3) They are produced by mitosis.
 - 4) They are produced by females.
- 41) A sperm cell from an organism is represented in the diagram below.



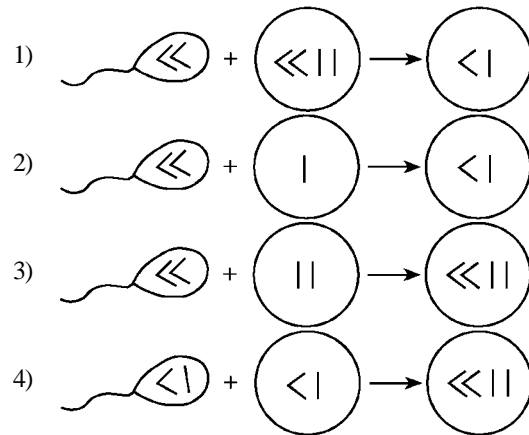
Which statement regarding this sperm cell is *not* correct?

- 1) This cell can unite with another cell resulting in the production of a new organism.
- 2) Energy to move the flagellum originates in the middle piece.
- 3) The acrosome contains half the normal number of chromosomes.
- 4) The head may contain a mutation.

42) The diagram below represents a nucleus containing the normal chromosome number for a species.

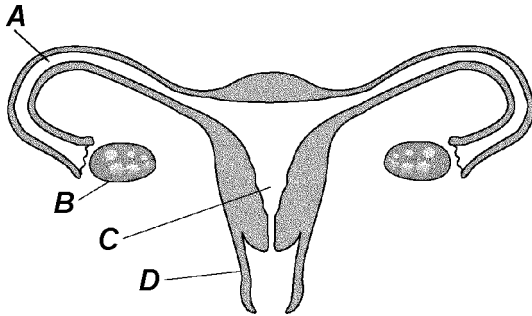


Which diagram *best* illustrates the normal formation of a cell that contains all of the genetic information needed for growth, development, and future reproduction of this species?



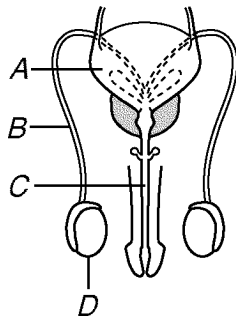
TOPIC: HUMAN REPRODUCTION

- 43) The diagram below shows human female reproductive structures.



Which structure is correctly paired with its function?

- 1) A — releases estrogen and progesterone
 - 2) B — produces and releases the egg
 - 3) C — provides the usual site for fertilization
 - 4) D — nourishes a developing embryo
- 44) Removal of one ovary from a human female would most likely
- 1) decrease her ability to provide essential nutrients to an embryo
 - 2) make carrying a fetus impossible
 - 3) make fertilization impossible
 - 4) affect the production of eggs
- 45) The diagram below represents a human reproductive system.



Within which structure does meiosis occur?

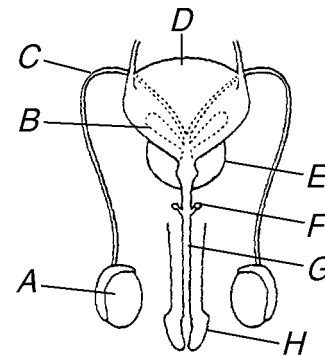
- 1) A
- 2) B
- 3) C
- 4) D

- 46) Which statement describes the reproductive system of a human male?

- 1) It synthesizes progesterone that regulates sperm formation.
- 2) It shares some structures with the excretory system.
- 3) It releases sperm that can be used only in external fertilization.
- 4) It produces gametes that transport food for embryo formation.

Questions 47 through 49 refer to the following:

The diagram below represents systems in a human male.



- 47) Based on the given diagram, which sequence represents the path of sperm leaving the body?
- 1) A → C → G
 - 2) D → F → G
 - 3) E → F → H
 - 4) A → C → B
- 48) Which structures in the diagram aid in the transport of sperm by secreting fluid?
- 1) B and E
 - 2) A and H
 - 3) C and D
 - 4) D and H
- 49) Which structure in the diagram has *both* reproductive and excretory functions?
- 1) D
 - 2) A
 - 3) G
 - 4) C
- 50) Which reproductive structure is correctly paired with its function?
- 1) uterus — usual site of fertilization
 - 2) sperm — transports genetic material
 - 3) ovary — delivers nutrients to the embryo
 - 4) testis — usual location for egg development

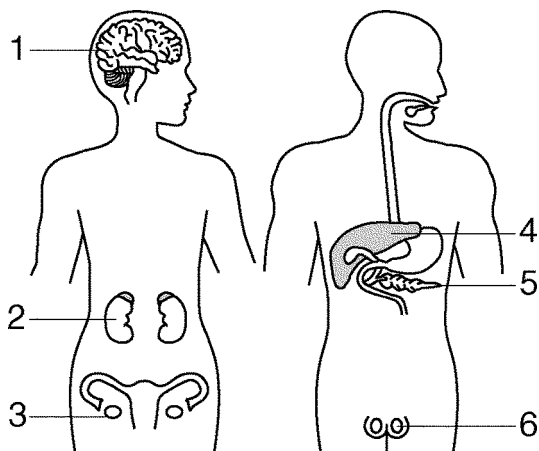
- 51) The data in the table below indicate the presence of specific reproductive hormones in blood samples taken from three individuals. An **X** in the hormone column indicates a positive lab test for the appropriate levels necessary for normal reproductive functioning in that individual.

Data Table

Individuals	Hormones Present		
	Testosterone	Progesterone	Estrogen
1		X	X
2			X
3	X		

Which of the following processes could occur in individual 3?

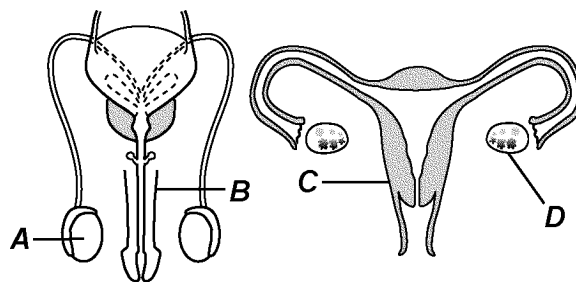
- 1) production of sperm and production of eggs
 2) production of eggs, only
 3) production of eggs and embryonic development
 4) production of sperm, only
- 52) Some human body structures are represented in the diagram below.



In which structures would the occurrence of mutations have the *greatest* effect on human evolution?

- 1) 2 and 5
 2) 1 and 3
 3) 3 and 6
 4) 4 and 6

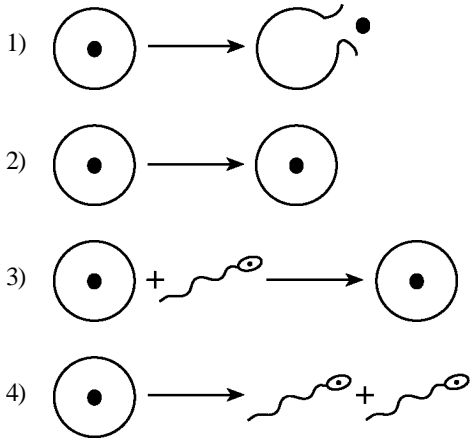
- 53) The diagram below represents human reproductive systems.



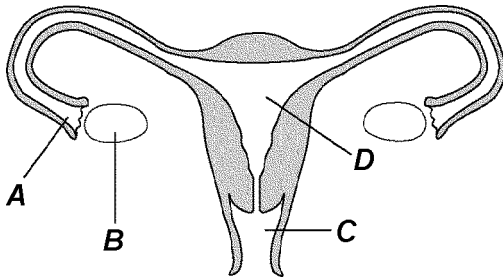
Which statement *best* describes part of the human reproductive process?

- 1) Testosterone produced in A is transferred to D, where it influences embryonic development.
 2) Testosterone produced in D influences formation of sperm within B.
 3) Progesterone stimulates the division of the egg within C.
 4) Estrogen and progesterone influence the activity of C.
- 54) Estrogen has a direct effect on the
- 1) development of a placenta within the ovary
 2) changes within the uterus
 3) movement of an egg toward the sperm
 4) formation of a zygote
- 55) As women age, their reproductive cycles stop due to decreased
- 1) levels of specific hormones
 2) production of ATP
 3) digestive enzyme production
 4) heart rate

56) Which diagram *best* illustrates an event in sexual reproduction that would most directly lead to the formation of a human embryo?



57) The diagram below represents the human female reproductive system.



Exposure to radiation or certain chemicals could alter the genetic information in the gametes that form in structure

- 1) A 2) B 3) C 4) D

58) Human reproduction is influenced by many different factors.

Identify *one* reproductive hormone and state the role it plays in reproduction.

Questions 59 and 60 refer to the following:

The reproductive cycle in a human female is not functioning properly. An imbalance of hormones is diagnosed as the cause.

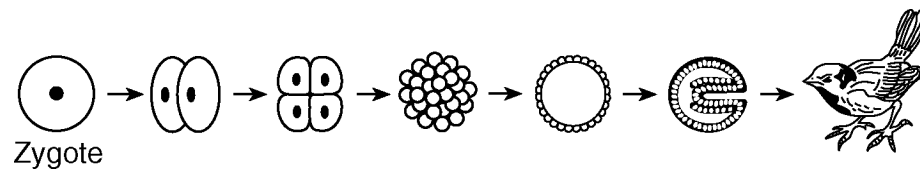
59) Identify *one* hormone directly involved in the human female reproductive system that could cause the problem described.

60) Explain why some cells in a female's body respond to reproductive hormones while other cells do not.

TOPIC: EMBRYONIC DEVELOPMENT

- 61) Most mammals have adaptations for
- 1) internal fertilization and internal development of the fetus
 - 2) internal fertilization and external development of the fetus
 - 3) external fertilization and external development of the fetus
 - 4) external fertilization and internal development of the fetus

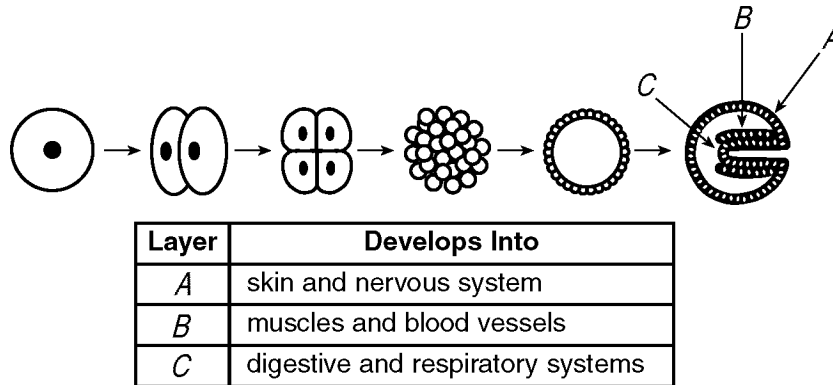
- 62) The diagram below represents a series of events in the development of a bird.



Which of the following series of terms *best* represents the sequence of processes shown?

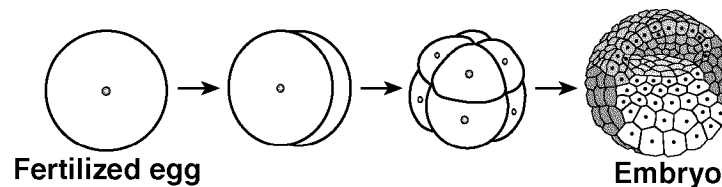
- 1) meiosis → differentiation → growth
 - 2) mitosis → differentiation → growth
 - 3) meiosis → growth → differentiation
 - 4) mitosis → meiosis → differentiation
- 63) Kangaroos are mammals that lack a placenta. Therefore, they must have an alternate way of supplying the developing embryo with
- 1) genetic information
 - 2) enzymes
 - 3) carbon dioxide
 - 4) nutrients
- 64) The diagram below represents stages in the processes of reproduction and development in an animal.
-
- Cells containing only half of the genetic information characteristic of this species are found at
- 1) A
 - 2) B
 - 3) C
 - 4) D
- 65) All cells in an embryo have the same DNA. However, the embryonic cells form organs, such as the brain and the kidneys, which have very different structures and functions. These differences are the result of
- 1) having two types of cells, one type from each parent
 - 2) certain genes being expressed in some cells and not in others
 - 3) new combinations of cells resulting from meiosis
 - 4) rapid mitosis causing mutations in embryo cells
- 66) A cell resulting from the fertilization of an egg begins to divide. Two cells are formed that normally remain attached and could develop into a new individual. If the two cells become separated, which statement describes what would most likely occur?
- 1) The cells would each have all of the needed genetic information, and both could survive.
 - 2) Each cell would have some of the needed genetic information, but would be unable to share it, so both would die.
 - 3) The cells would each have only one-half of the needed genetic information, so both would die.
 - 4) One cell would have all of the needed genetic information and would survive, but the other would have none of the needed genetic information and would die.

- 73) The diagram and chart below represent some of the changes a zygote undergoes during its development.



The processes that are most directly responsible for these changes are

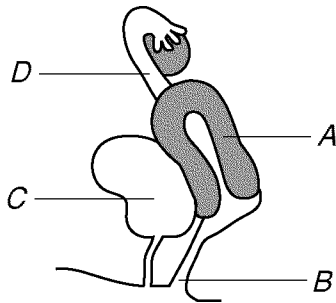
- 1) sorting and recombination of genetic information
 - 2) meiosis and adaptation
 - 3) mitosis and differentiation
 - 4) fertilization and cycling of materials
- 74) Part of embryonic development in a species is illustrated in the diagram below.



Which set of factors plays the most direct role in controlling the events shown in the diagram?

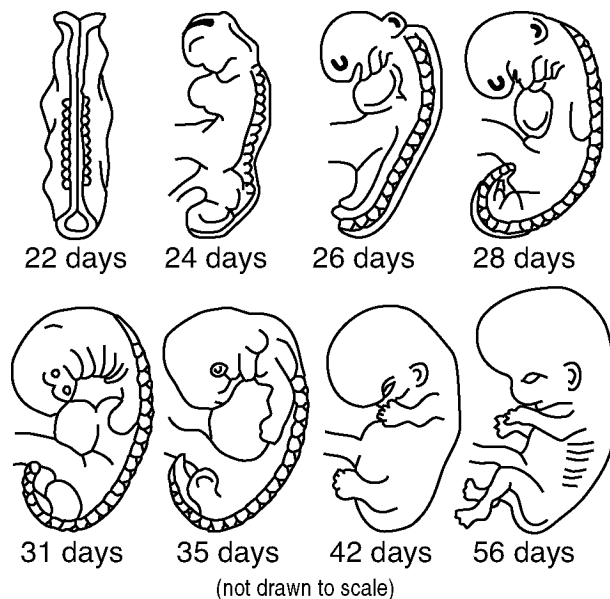
- 1) ATP, amino acids, and inorganic compounds
 - 2) antibodies, insulin, and starch
 - 3) genes, hormones, and cell location
 - 4) abiotic resources, homeostasis, and selective breeding
- 75) Although all of the cells of a human develop from one fertilized egg, the human is born with many different types of cells. Which statement *best* explains this observation?
- 1) Some cells develop more fully before other cells.
 - 2) Mutations occur during development as a result of environmental conditions.
 - 3) All cells have different genetic material.
 - 4) Developing cells may express different parts of their identical genetic instructions.
- 76) Which statement describes one function of the placenta in mammals?
- 1) It removes waste products that are produced in the cells of the fetus.
 - 2) It allows blood of the mother to mix with the blood of the fetus.
 - 3) It contains fluid that protects the embryo from harm.
 - 4) It synthesizes food for the embryo.
- 77) Which of the following substances usually passes in the *greatest* amount through the placenta from the blood of the fetus to the blood of the mother?
- 1) oxygen
 - 2) carbon dioxide
 - 3) glucose
 - 4) amino acids
- 78) The human female reproductive system is adapted for
- 1) production of milk for a developing embryo
 - 2) production of zygotes in ovaries
 - 3) transport of oxygen through a placenta to a fetus
 - 4) external fertilization of gametes
- 79) Toxins can harm a developing fetus. They usually enter the fetus by the process of
- 1) diffusion across placental membranes
 - 2) recombination of genes from the fetus and mother
 - 3) active transport from the ovary
 - 4) blood flow from the mother to the fetus
- 80) Which of the following statements about embryonic organ development in humans is accurate?
- 1) It is affected primarily by the eating habits and general health of the father.
 - 2) It is not affected by conditions outside the embryo.
 - 3) It will not be affected by any medication taken by the mother in the second month of pregnancy.
 - 4) It may be affected by the diet and general health of the mother.

- 81) Which hormones most directly influence the uterus during pregnancy?
- 1) testosterone and insulin
 - 2) estrogen and insulin
 - 3) progesterone and estrogen
 - 4) progesterone and testosterone
- 82) The letters in the diagram below represent structures in a human female.



Estrogen and progesterone increase the chance for successful fetal development by regulating activities within which structure?

- 1) A
 - 2) B
 - 3) C
 - 4) D
- 83) The development of an embryo is represented in the diagram below.



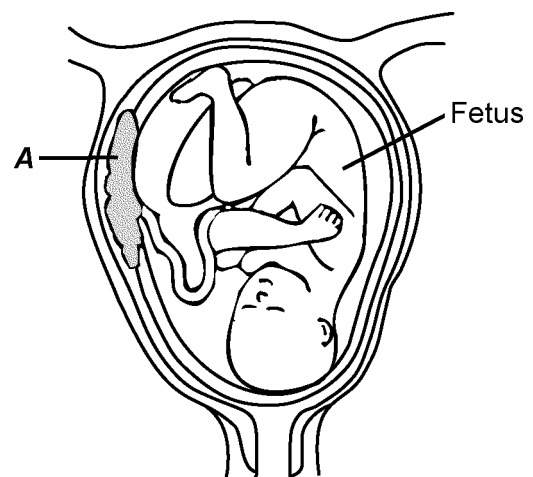
These changes in the form of the embryo are a direct result of

- 1) uncontrolled cell division and mutations
- 2) differentiation and growth
- 3) antibodies and antigens inherited from the father
- 4) meiosis and fertilization

- 84) Define fertilization and describe the resulting development of a human embryo. In your answer, be sure to include a definition of fertilization and the functions of the ovary, uterus, and placenta. Circle the terms *fertilization*, *ovary*, *uterus*, and *placenta* in your description.
- 85) Explain how harmful substances in the blood of a pregnant female can enter a fetus even though the blood vessels of the mother and fetus are *not* directly connected.
- 86) To prevent harm to the fetus, women should avoid tobacco, alcohol, and certain medications during pregnancy. State *one* specific way that one of these substances could harm the fetus.
- 87) Human reproduction is influenced by many different factors.
- (a) Identify the structure in the uterus where the exchange of material between the mother and the developing fetus takes place.
 - (b) Identify *one* harmful substance that can pass through this structure and describe the *negative* effect it can have on the fetus.

Questions 88 and 89 refer to the following:

Women are advised to avoid consuming alcoholic beverages during pregnancy.



- 88) Identify the structure labeled A in the diagram and explain how the functioning of structure A is essential for the normal development of the fetus.

- 89) Explain why consumption of alcoholic beverages by a pregnant woman is likely to be more harmful to her fetus than to herself.