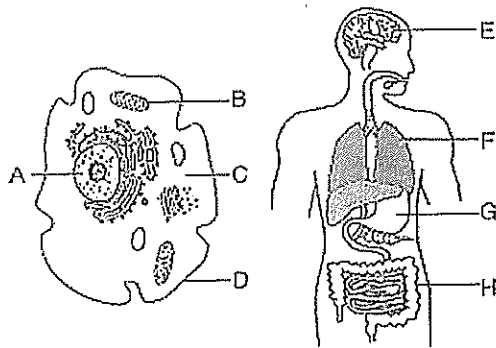
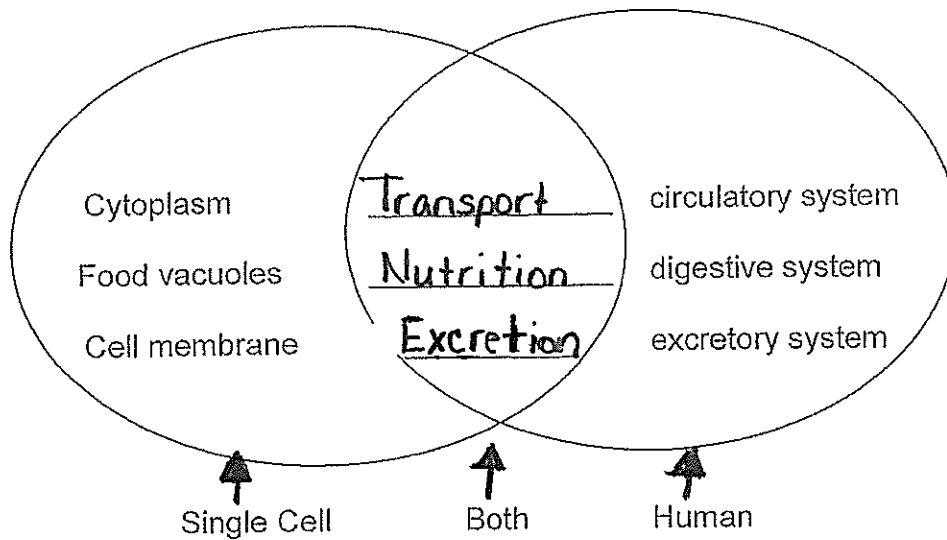


Topic 10: Body Systems

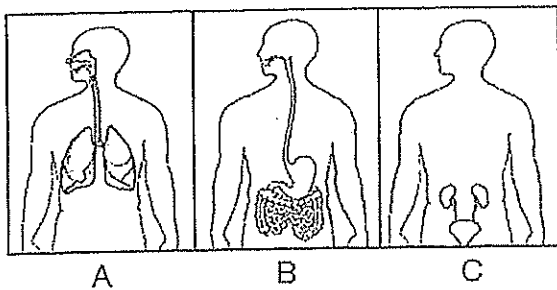
Human and one celled organisms have similarities:

Directions: List the life function that links the 2 organisms.



Pick an organelle and organ in this diagram that help to accomplish the same life function:

Organel. **Nucleus**  
 Organ. - **Brain**  
 Function **Regulation**



Which row in the chart below correctly shows what systems A, B, and C provide for the human body?

Row	System A	System B	System C
(1)	blood cells	glucose	hormones
(2)	oxygen	absorption	gametes
(3)	gas exchange	nutrients	waste removal
(4)	immunity	coordination	carbon dioxide

Humans and other multi-cellular organisms have similarities:

THINK:

a. A human with diabetes can take pig insulin... WHY?

**Share a recent common ancestor (Both mammals)**

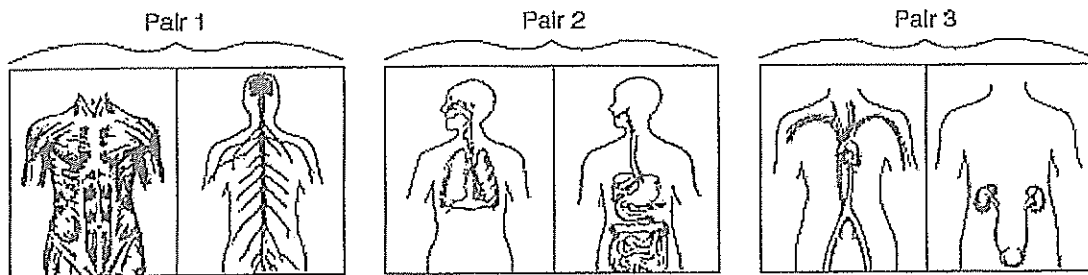
b. The DNA (gene) from a human can be inserted into the DNA of a bacteria... WHY?

**DNA uses a (universal) code system**

Human Body Systems:

Body systems	Description	Life Functions
1. Digestive System	-mouth → esophagus → stomach → small intestine → large intestine -food never enters cells -mechanical and chemical digestion -undigested food is egested	Nutrition
2. Respiratory System	-exchange of gases between blood and environment	Provides oxygen for cellular respiration and removes carbon dioxide (waste) <i>Respiration</i>
3. Circulatory System	-movement of materials inside and between cells -carries digested food and oxygen to cells -carries wastes away from cells	Transport
4. Excretory System	-Removal of cellular waste products -lungs, liver, kidneys, skin	Excretion
5. muscular and skeletal systems	-move and support the body -avoid danger, find food, mates and shelter	..... Locomotion
6. nervous system and endocrine system	-respond to and send messages	Regulation
7. Immune System	-Ability to resist disease -WBC's	..... Regulation
8. Reproductive System	-Produce new organisms -sex cells and hormones	Reproduction

The diagrams below represent some of the systems that make up the human body.



- Select one of the pairs of systems and write its number here: 2
- For the pair selected, identify each system and state one function of that system.
- Explain how the two systems work together to help maintain homeostasis in an individual.
- How can a malfunction of each system disrupt the maintenance of homeostasis?

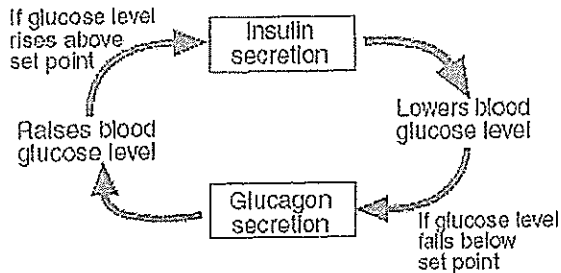
Respiratory System and Digestive System

Respiratory system absorbs O<sub>2</sub> into the bloodstream. Digestive System absorbs nutrients into the bloodstream. Cells use both O<sub>2</sub> and nutrients to make energy (ATP)

Feedback and Homeostasis:

- Organisms use a variety of mechanisms to maintain Homeostasis.

Regulating Blood Sugar:

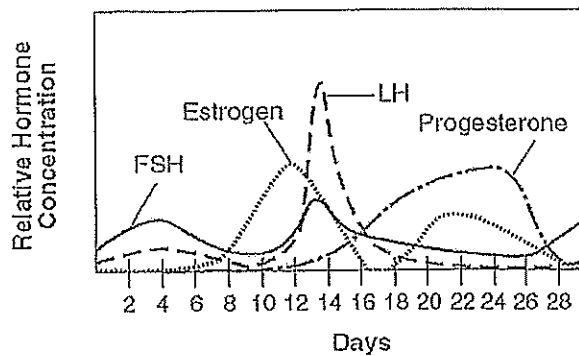


Describe how your body works to maintain your body temperature in both cold and hot conditions:

- Hot, nerves cause sweat glands to release more sweat onto the skin (evaporative cooling occurs)
- Cold, nerves cause small muscles under the skin to contract (shivering) releases heat.

Negative Feedback:

Hormones involved in controlling the menstrual cycle are also an example of a feedback mechanism. It begins at puberty. The hormones estrogen and progesterone help thicken the wall of the uterus so that a fertilized egg can embed itself in the uterine wall. At the end of the cycle, if an egg is not fertilized, the levels of estrogen and progesterone decrease, and the lining of the uterus breaks down.



Immune System:

- Immunity: the body's ability to resist disease
- Immune system: body's primary defense against disease-causing pathogens
- Macrophage: specialized cells that surround and engulf pathogens of foreign cells
- Foreign antigen: molecules on the outer surfaces of pathogens that trigger a response from the immune system
- Antibodies: proteins produced by white blood cells that either attack invader cells or mark them for destruction

Types of Immunity:

- Genetic: have at birth, controlled by genetics
- Passive: get from mother's breast milk
- Active: get vaccine or get exposed to antigen and make your own antibodies

Vaccine: injection of a dead or weakened pathogen

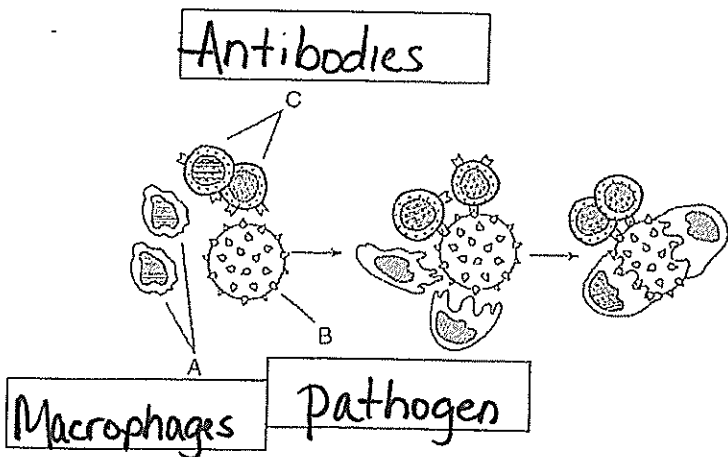
- Triggers the body to making antibodies against that pathogen
- Effective against both viruses and bacteria
- Can only prevent diseases, not cure them

Steps to making a vaccine:

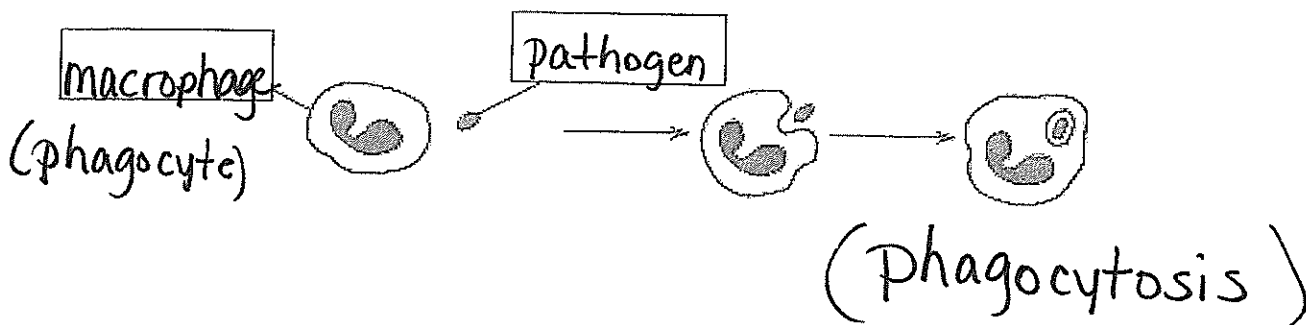
- 1) obtain pathogen
- 2) treat pathogen to kill or weaken it
- 3) inject altered pathogen (vaccine) into organism
- 4) body responds to antigens present by making antibodies and having white blood cells attack invader
- 5) some white blood cells specific for this pathogen remain in the body for a long time to continue the protection from future attacks by the pathogen

Antibiotics: drugs used to fight bacterial infections

Label the diagrams below:



Some white blood cells remember the antigen after a first encounter. That is why we don't get sick again from the same pathogen (microscopic organism). As soon as it enters your body, special memory cells quickly make antibodies to fight it. Other white blood cells, called macrophages, engulf and destroy pathogens.



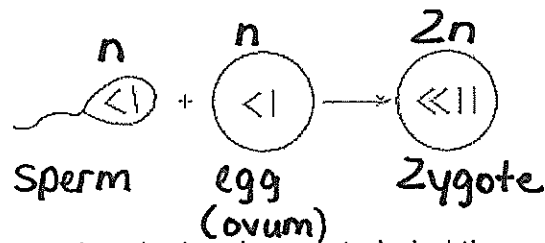
Directions: Fill in the charts below:

Cause of disease	Examples
1. Genetic	Down syndrome, cystic fibrosis,
2. Exposure to toxins	Toxic Shock Syndrome, Lead Poisoning Mercury poisoning
3. Malnutrition	Scurvy (vitamin C deficiency), goiter (iodine deficiency)
4. Organ malfunction	Heart Attack, Stroke
5. Life Style Choices	Lung cancer, drug addiction, skin cancer

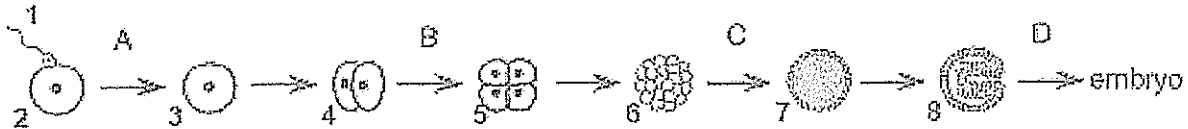
Pathogen	Description of pathogen	Examples of disease
1. Virus	Particles composed of nucleic acid and protein. They reproduce when they invade living cells.	Common cold, influenza, AIDS, and chicken pox
2. Bacterium	tiny prokaryotic Cells	Poisoning (from toxins given off by some bacteria), strep throat, syphilis, and food poisoning
3. Fungi	Organisms made of either one or many cells. They include yeasts and molds. They eat by absorbing organic substances.	Athlete's foot and ringworm.
4. Parasites	Organisms that obtain nutrients from another organism (Host)	Leeches and tapeworms. Malaria (a disease caused by a one-celled organism and transmitted to humans by mosquitoes) and heartworm (a parasitic worm that lives in dogs and cats)

Disease/disorder	Description
AIDS	<ul style="list-style-type: none"> <li>caused by the HIV virus</li> <li>weakens human immune system by attacking T-cells</li> <li>spread through bodily fluids</li> <li>can't be cured</li> </ul>
Allergies	<ul style="list-style-type: none"> <li>immune system reacts to a harmless substance like pollen</li> <li>leads to overproduction of histamines</li> <li>causes inflammation, watery eyes, runny nose...</li> </ul>
Asthma	<ul style="list-style-type: none"> <li>form of an allergy caused by a reaction to particles in the air</li> <li>causes airways to constrict, making breathing difficult</li> </ul>

Human Reproduction: Label the diagram below using the following terms: sperm, zygote, egg, fertilization,  $2n$ ,  $n$



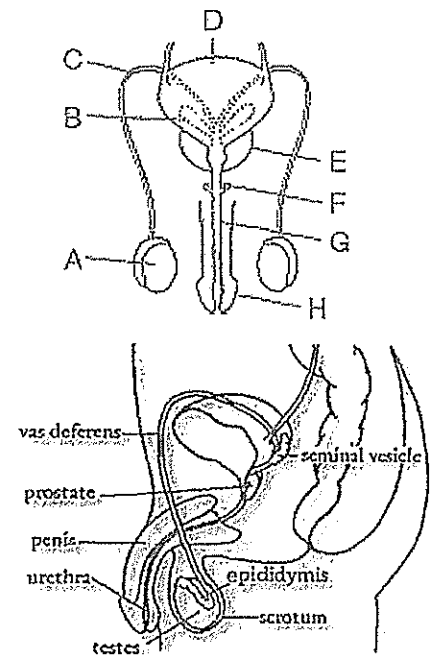
Fertilization, zygote formation and early development: Label the arrows below



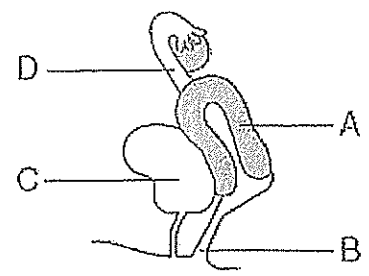
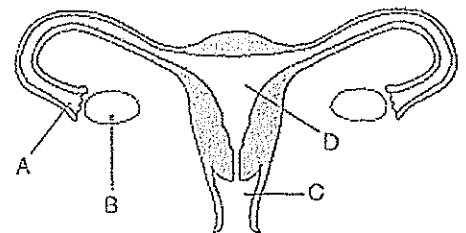
- The egg and sperm were made by the process of meiosis.
- A fertilized egg is called a zygote.
- A zygote undergoes cell division called mitosis.
- differentiation is when cells become different from one another and take on special functions.

Male Reproductive System:

Structure	Function
1. <b>Testes</b>	Produces sperm and testosterone
2. <b>Scrotum</b>	Keeps lower temperature for sperm production
3. <b>Seminal Vesicles</b> <b>Prostate, Cowper's gland</b>	Provides fluid for sperm
4. <b>Urethra</b>	Tube that carries urine or semen out of the body
5. <b>Penis</b>	Used for internal fertilization

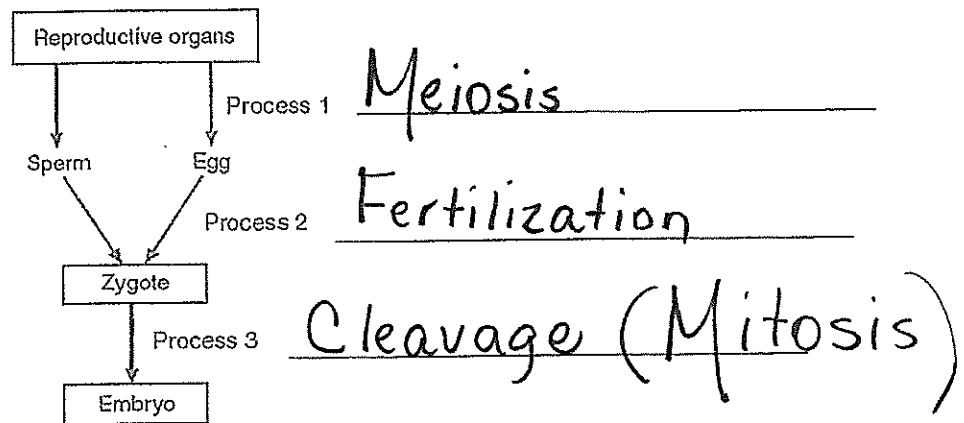
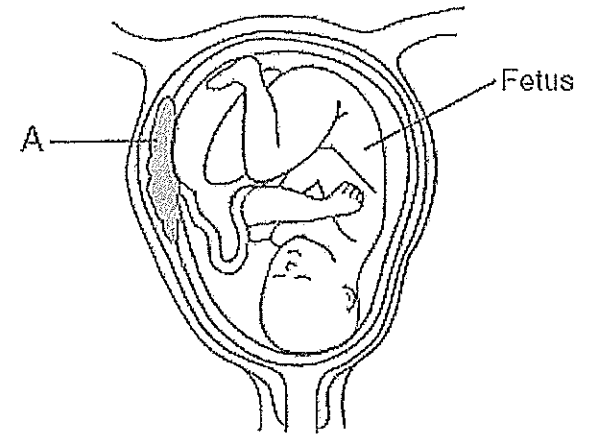


Structure	Function
1. Ovary	Produce ova and estrogen
2. Oviduct	Site where fertilization takes place
3. Uterus	Site for embryo development
4. Vagina (birth canal)	Semen deposited / passage for vaginal birth



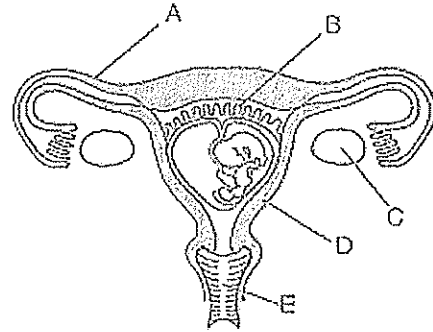
Human Development:

- After about two months, when all the major organs have begun to form, the embryo is now called a fetus.
- The placenta is an important organ that enables nutrients to pass from the mother's blood to the fetus, and waste products to pass from the fetus to the mother's blood. The blood from the fetus and mother do not mix.
- Harmful materials can cross the placenta and cause harm to the fetus (alcohol, viruses, drugs...)
- The Umbilical cord contains blood vessels that transfer nutrients to the fetus and wastes toward the mother.



Complete the boxes in the chart below using the information from the diagram of the human reproductive system.

Letter on diagram	Name of structure	Function of structure
A	Oviduct	site of fertilization
B	placenta	Transports oxygen directly to the embryo
C	Ovary	Ova production estrogen production
D	Uterus	site of development
E	Vagina	Site where semen is deposited birth canal



List 3 factors that can be harmful to the development of a fetus:

Malnutrition / Virus / Alcohol and or drugs

Reproductive Technology:

- Involves methods that assist organisms in producing offspring and methods that aid in the examination of developing offspring
- in vitro fertilization: sperm fertilized an egg outside of the female body and is placed into the uterus after several cell divisions
- Artificial insemination: sperm is inserted into the female reproductive system
- amniocentesis: amniotic fluid is withdrawn from a woman's uterus to test for certain problems in the fetus, such as genetic defects
- Karyotyping: a picture of chromosomes are taken to be analyzed for certain genetic disorders
- Sonogram: a picture of the fetus can be taken using sound and echo



- Three days after an organism eats some meat, many of the organic molecules originally contained in the meat would be found in newly formed molecules of
  - glucose
  - protein
  - starch
  - oxygen
- Salmonella* bacteria can cause humans to have stomach cramps, vomiting, diarrhea, and fever. The effect these bacteria have on humans indicates that *Salmonella* bacteria are
  - predators
  - pathogenic organisms
  - parasitic fungi
  - decomposers
- Which situation indicates a serious organ system malfunction?
  - The ovary releases estrogen, which quickly binds to cell receptors.
  - Blood flow throughout the entire body is suddenly reduced.
  - White blood cells release enzymes in response to the proteins on inhaled pollen.
  - Mitochondria stop functioning in a unicellular organism exposed to pollutants
- Which body system is correctly paired with its function?
  - excretory—produces antibodies to fight disease-causing organisms
  - digestive—produces hormones for storage and insulation
  - circulatory—transports materials for energy release in body cells
  - respiratory—collects waste material for digestion
- The failure to regulate the pH of the blood can affect the activity of
  - enzymes that clot blood
  - red blood cells that make antibodies
  - chlorophyll that carries oxygen in the blood
  - DNA that controls starch digestion in the blood
- Which activity is *not* a response of human white blood cells to pathogens?
  - engulfing and destroying bacteria
  - producing antibodies
  - identifying invaders for destruction
  - removing carbon dioxide

- In some people, substances such as peanuts, eggs, and milk cause an immune response. This response to usually harmless substances is most similar to the
  - action of the heart as the intensity of exercise increases
  - mechanism that regulates the activity of guard cells
  - action of white blood cells when certain bacteria enter the body
  - mechanism that maintains the proper level of antibiotics in the blood
- The diagram below represents an event that occurs in the blood.



Cell A

Which statement best describes this event?

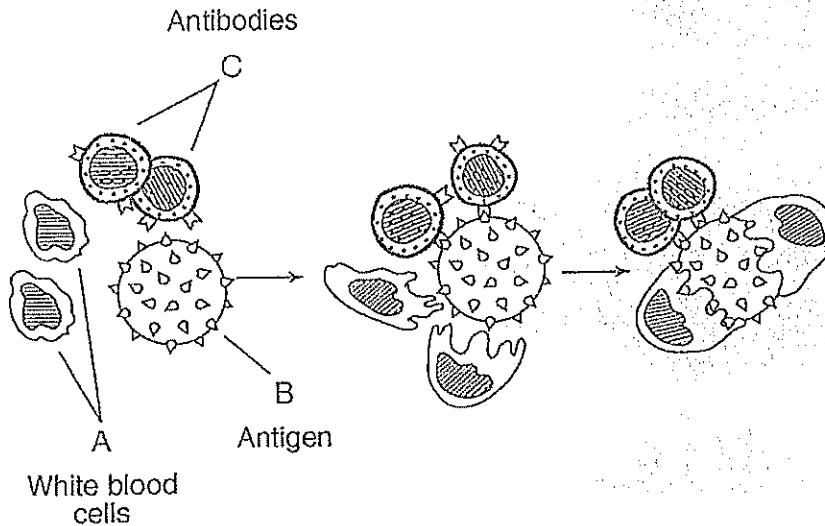
- Cell A is a white blood cell releasing antigens to destroy bacteria.
  - Cell A is a cancer cell produced by the immune system and it is helping to prevent disease.
  - Cell A is a white blood cell engulfing disease-causing organisms.
  - Cell A is protecting bacteria so they can reproduce without being destroyed by predators.
- Drugs to reduce the risk of rejection are given to organ transplant patients because the donated organ contains
 

<input checked="" type="radio"/> foreign antigens	B) foreign antibodies
C) DNA molecules	D) pathogenic microbe
  - The virus that causes AIDS is damaging to the body because it
    - targets cells that fight invading microbes
    - attacks specific red blood cells
    - causes an abnormally high insulin level
    - prevents the normal transmission of nerve impulses
  - How do vaccinations help prepare the body to fight invasions of a disease causing organisms?
    - inhibiting antigen production
    - stimulating antibody production
    - inhibiting white blood cell production
    - stimulating red blood cell production

12. Which row in the chart below contains an event that is paired with an appropriate response in the human body?

Row	Event	Response
(1)	a virus enters the bloodstream	increased production of antibodies
(2)	fertilization of an egg	increased levels of testosterone
(3)	dehydration due to increased sweating	increased urine output
(4)	a drop in the rate of digestion	increased respiration rate

- (A) (1)      B) (2)      C) (3)      D) (4)
13. The diagram below represents one possible immune response that can occur in the human body.

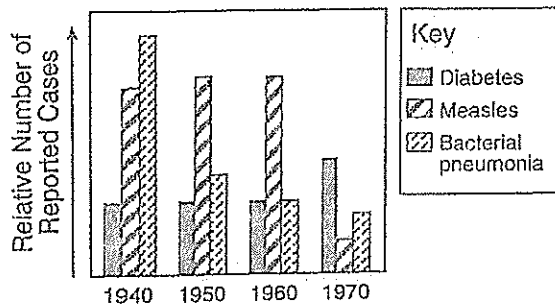


The structures that are part of the immune system are represented by

- A) A, only      (B) A and C, only      C) B and C, only      D) A, B, and C
14. When a new viral infection appears in a population, scientists usually try to develop a vaccine against the virus. Which substances would most likely be contained in the new vaccine?
- A) live bacteria that ingest viruses  
 B) white blood cells from an infected individual  
 (C) weakened viruses associated with the infection  
 D) a variety of microbes that will attack the virus
15. People with AIDS are unable to fight multiple infections because the virus that causes AIDS
- (A) weakens their immune systems  
 B) produces antibodies in their blood  
 C) attacks muscle tissue  
 D) kills pathogens
16. To replace burned skin, doctors can successfully transplant replacement skin taken from another part of the body of the burn victim. Which statement best explains why the transplanted skin is *not* rejected?
- A) The transplanted skin is damaged, making the immune system nonfunctional.  
 (B) The antigens of the replacement skin are the same as those of the damaged skin.  
 C) Burn victims lose so much blood that white blood cells cannot cause an immune response.  
 D) There is no blood supply to the skin, so mixing of antigens does not occur.
17. Certain microbes, foreign tissues, and some cancerous cells can cause immune responses in the human body because all three contain
- (A) antigens      B) enzymes  
 C) fats      D) cytoplasm

Base your answers to questions 18 and 19 on the graph below and on your knowledge of biology.

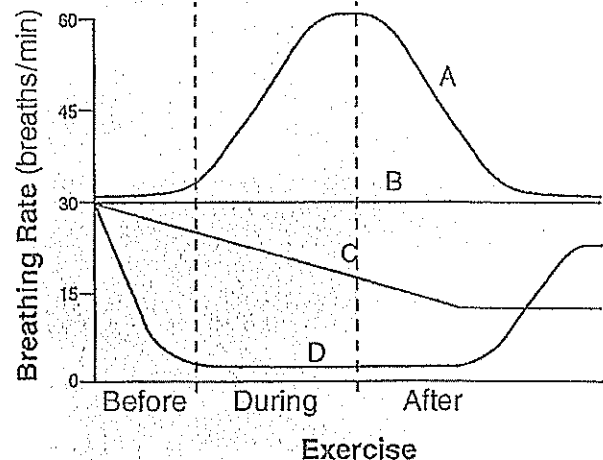
**Incidence of Three Human Diseases in Four Different Years**



18. Which statement best explains a change in the incidence of disease in 1970?
- A) Children were vaccinated against measles.
  - B) New drugs cured diabetes.
  - C) The bacteria that cause pneumonia developed a resistance to drugs.
  - D) New technology helped to reduce the incidence of all three diseases.
19. Which statement provides the best possible reason for the decrease in number of cases of bacterial pneumonia from 1940 to 1970?
- A) As a result of genetic engineering, humans became immune to the bacteria.
  - B) Antibiotics were made available for the treatment of bacterial infections.
  - C) The bacteria did not respond to medical treatments.
  - D) As a result of sexual reproduction, the bacteria evolved into a harmless form.
20. Which statement does *not* identify a characteristic of antibodies?
- A) They are produced by the body in response to the presence of foreign substances.
  - B) They may be produced in response to an antigen.
  - C) They are nonspecific, acting against any foreign substance in the body.
  - D) They may be produced by white blood cells.
21. Allergic reactions are most closely associated with
- A) the action of circulating hormones
  - B) a low blood sugar level
  - C) immune responses to usually harmless substances
  - D) the shape of red blood cells

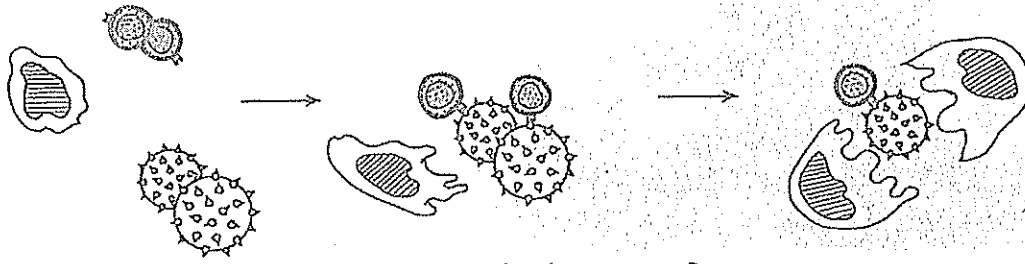
22. Meiosis and fertilization are important processes because they may most immediately result in
- A) many body cells
  - B) immune responses
  - C) genetic variation
  - D) natural selection
23. Scientific studies have indicated that there is a higher percentage of allergies in babies fed formula containing cow's milk than in breast-fed babies. Which statement represents a valid inference made from these studies?
- A) Milk from cows causes allergic reactions in all infants.
  - B) Breast feeding prevents all allergies from occurring.
  - C) There is no relationship between drinking cow's milk and having allergies.
  - D) Breast milk most likely contains fewer substances that trigger allergies.
24. Regulation of sexual reproductive cycles of human males is related most directly to the presence of the hormone
- A) estrogen
  - B) progesterone
  - C) testosterone
  - D) insulin

25. Which line in the graph below best illustrates an effect of the carbon dioxide level in the blood on breathing rate before, during, and after a period of exercise?



- A) A     B) B     C) C     D) D
26. The reproductive system of the human male produces gametes and
- A) transfers gametes to the female for internal fertilization
  - B) produces enzymes that prevent fertilization
  - C) releases hormones involved in external fertilization
  - D) provides an area for fertilization

27. The diagram below represents what can happen when homeostasis in an organism is threatened.



Which statement provides a possible explanation for these events?

- A) Antibiotics break down harmful substances by the process of digestion.
- B) Some specialized cells mark and other cells engulf microbes during immune reactions.
- C) Embryonic development of essential organs occurs during pregnancy.
- D) Cloning removes abnormal cells produced during differentiation.

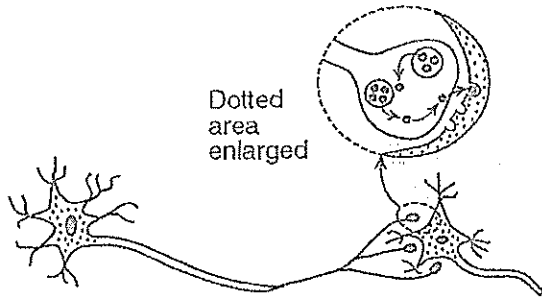
28. Base your answer to the following question on the table below and on your knowledge of biology.

Volunteer	Injected with Dead Chicken Pox Virus	Injected with Dead Mumps Virus	Injected with Distilled Water
A	X		
B		X	
C			X
D	X	X	

None of these volunteers ever had chicken pox. After the injection, there would most likely be antibodies to chicken pox in the bloodstream of

- A) volunteers A and D, only
- B) volunteers A, B, and D
- C) volunteer C
- D) volunteer D, only

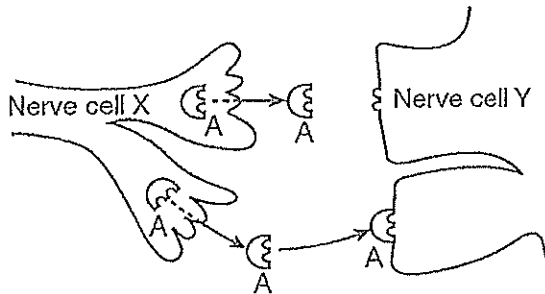
29. A process that occurs in the human body is represented in the diagram below.



Which statement is most closely associated with the diagram?

- A) Small molecules are obtained from large molecules during digestion.  
 B) Certain molecules are replicated by means of a template.  
 C) Receptor molecules play an important role in communication between cells.  
 D) Energy from nutrients is utilized for waste disposal.

Base your answers to questions 30 through 32 on the diagram below and on your knowledge of biology.



30. Which statement best describes the diagram?

- A) Nerve cell X is releasing receptor molecules.  
 B) Nerve cell Y is signaling nerve cell X.  
 C) Nerve cell X is attaching to nerve cell Y.  
 D) Nerve cell Y contains receptor molecules for substance A.

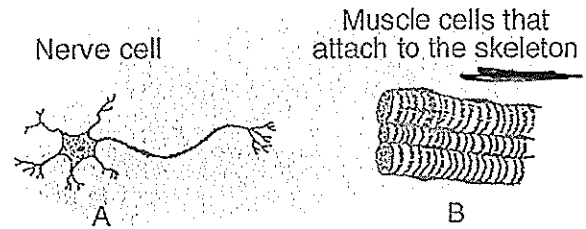
31. The process represented in the diagram best illustrates

- A) cellular communication  
 B) muscle contraction  
 C) extraction of energy from nutrients  
 D) waste disposal

32. A drug is developed that, due to its molecular shape, blocks the action of substance A. Which shape would the drug molecule most likely resemble?

- A)     B)    C)    D)

33. Two types of human cells are shown in the diagram below.



Cell A causes the cells at B to contract. This activity would be most useful for

- A) lifting a book from a bookshelf  
 B) coordinating the functions of organelles  
 C) digesting food in the small intestine  
 D) carrying out the process of protein synthesis

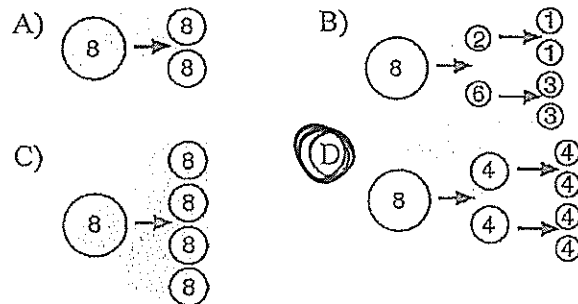
34. The human reproductive system is regulated by

- A) enzymes  
 B) sex cells  
 C) complex carbohydrates  
 D) hormones

35. Which statement accurately compares cells in the human circulatory system to cells in the human nervous system?

- A) Cells in the circulatory system carry out the same life function for the organism as cells in the nervous system.  
 B) Cells in the circulatory system are identical in structure to cells in the nervous system.  
 C) Cells in the nervous system are different in structure from cells in the circulatory system, and they carry out different specialized functions.  
 D) Cells in the nervous system act independently, but cells in the circulatory system function together.

36. Which diagram best represents part of the process of sperm formation in an organism that has a normal chromosome number of eight?



37. Base your answer to the following question on the passage below and on your knowledge of biology.

When humans perspire, water, urea, and salts containing sodium are removed from the blood. Drinking water during extended periods of physical exercise replenishes the water but not the sodium. This increase in water dilutes the blood and may result in the concentration of sodium dropping low enough to cause a condition known as hyponatremia.

Symptoms of hyponatremia include headache, nausea, and lack of coordination. Left untreated, it can lead to coma and even death. The body has a variety of feedback mechanisms that assist in regulating water and sodium concentrations in the blood. The kidneys play a major role in these mechanisms, as they filter the blood and produce urine.

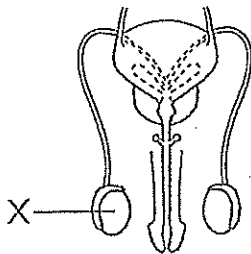
The best way to reduce the symptoms of hyponatremia would be to

- A) drink more water
- B) eat chocolate
- C) eat salty foods
- D) drink cranberry juice

38. In an investigation to determine the change in heart rate with increased activity, a biology teacher asked students to take their pulses immediately before and immediately after exercising for 2 minutes. The data showed an average heart rate of 72 beats per minute before exercising and 90 beats per minute after exercising. If a valid conclusion is to be made from the results of this investigation, which assumption must be made?

- A) In most students, the average heart rate is not affected by exercise.
- B) Exercise causes the heart rate to slow down.
- C) Each student exercised with the same intensity.
- D) The heart rate of each student goes up 18 beats after jogging for 2 minutes.

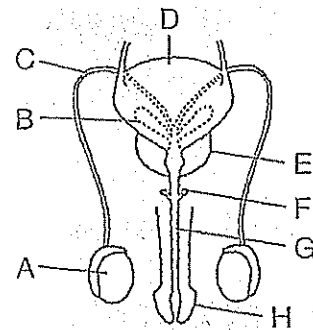
39. The diagram below represents a system in the human body.



The primary function of structure X is to

- A) produce energy needed for sperm to move
- B) provide food for the sperm to carry to the egg
- C) produce and store urine
- D) form gametes that may be involved in fertilization

Base your answers to questions 40 and 41 on the picture below which represents systems in a human male and on your knowledge of biology.



40. Which sequence represents the path of sperm leaving the body?

- A) A → C → G
- B) A → C → B
- C) E → F → H
- D) D → F → G

41. Which structure has both reproductive and excretory functions?

- A) A
- B) G
- C) C
- D) D

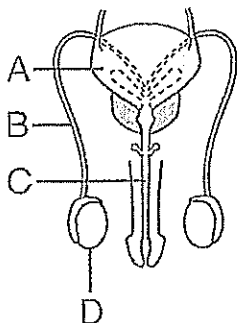
42. Essential materials needed for development are transported to a human fetus through the

- A) reproductive hormones
- B) egg cell
- C) placenta
- D) ovaries

43. Toxins can harm a developing fetus. They usually enter the fetus by the process of

- A) blood flow from the mother to the fetus
- B) active transport from the ovary
- C) diffusion across placental membranes
- D) recombination of genes from the fetus and mother

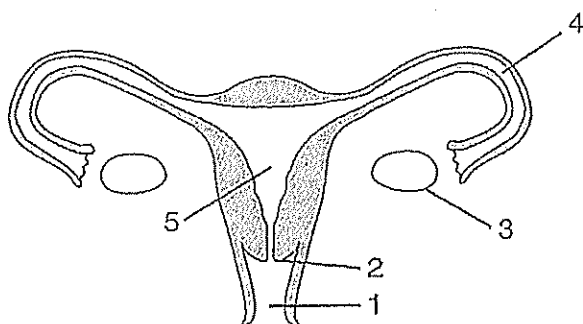
44. The diagram below represents a human reproductive system.



Meiosis occurs within structure

- A) A    B) B    C) C     D) D

45. The human female reproductive system is represented in the diagram below.

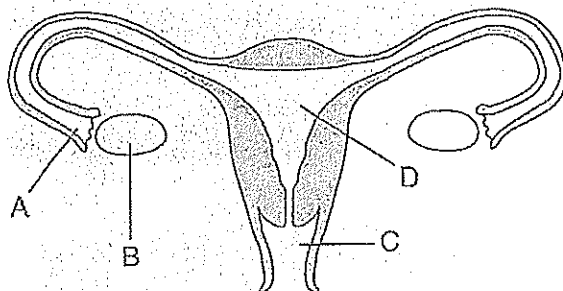


Production of gametes and support of the fetus normally occur in structures

- A) 1 and 2                      B) 2 and 4  
 C) 3 and 5                      D) 4 and 5

46. Which statement best describes the relationship between the blood of a human fetus and the blood of the mother?
- A) Their blood systems are separate only at certain times in development and connected at other times.  
 B) The blood flows directly from the mother into the fetus.  
 C) Their blood systems are separate and no materials are exchanged.  
 D) Their blood systems are separate, but certain materials pass from one to the other.

47. 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

- A) A     B) B    C) C    D) D

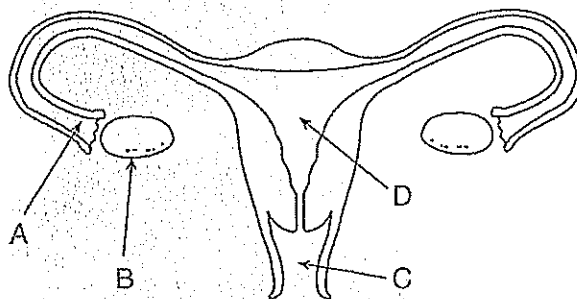
48. As women age, their reproductive cycles stop due to decreased

- A) digestive enzyme production  
 B) production of ATP  
 C) levels of specific hormones  
 D) heart rate

49. Human egg cells are most similar to human sperm cells in their

- A) method of movement  
 B) amount of stored food  
 C) chromosome number  
 D) shape and size

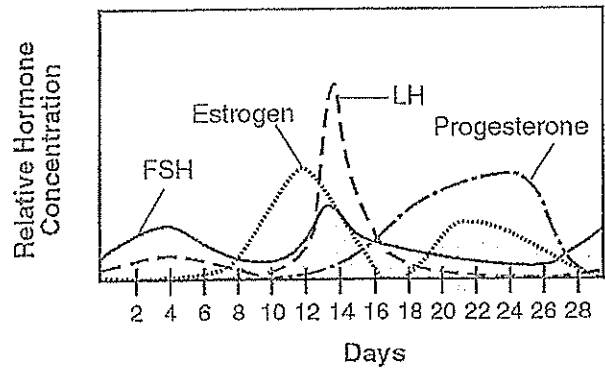
50. Base your answer to the following question on the diagram below, which represents the human female reproductive system.



New inherited characteristics may appear in offspring as a result of new combinations of existing genes or may result from mutations in genes contained in cells produced by structure

- A) A     B) B    C) C    D) D

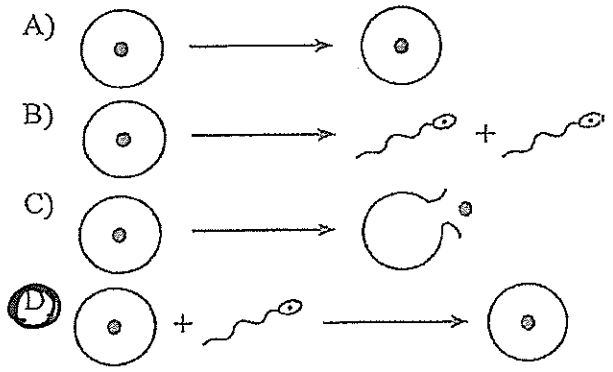
51. Some chemical interactions in a human are shown in the graph below.



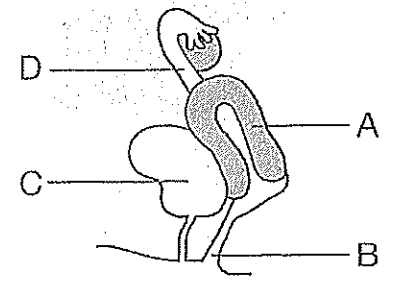
This graph represents hormones and events in the

- A) process of fetal growth and development
  - B) process of meiotic cell division during sperm development
  - C) reproductive cycle of males
  - D) reproductive cycle of females
52. A large number of sperm cells are produced by males every day. This large number of sperm cells increases the chance that
- A) at least one sperm cell will be reached when the eggs swim toward the sperm cells in the ovary
  - B) several sperm cells will unite with an egg so the fertilized egg will develop properly
  - C) some of the sperm cells will survive to reach the egg
  - D) enough sperm cells will be present to transport the egg from where it is produced to where it develops into a fetus

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



54. Which situation involves a risk to a fetus due to the mother smoking during pregnancy?
- A) decreased digestive activity in the stomach of the fetus
  - B) a decrease in the amount of oxygen in the ovary of the mother
  - C) inhalation of secondhand smoke by the fetus
  - D) toxins in the bloodstream of the mother
55. Which sequence represents the order of some events in human development?
- A) fertilized egg → sperm → tissues → egg
  - B) fetus → tissues → fertilized egg → egg
  - C) fertilized egg → tissues → organs → fetus
  - D) sperm → fertilized egg → organs → tissues
56. The letters in the diagram below represent structures in a human female.

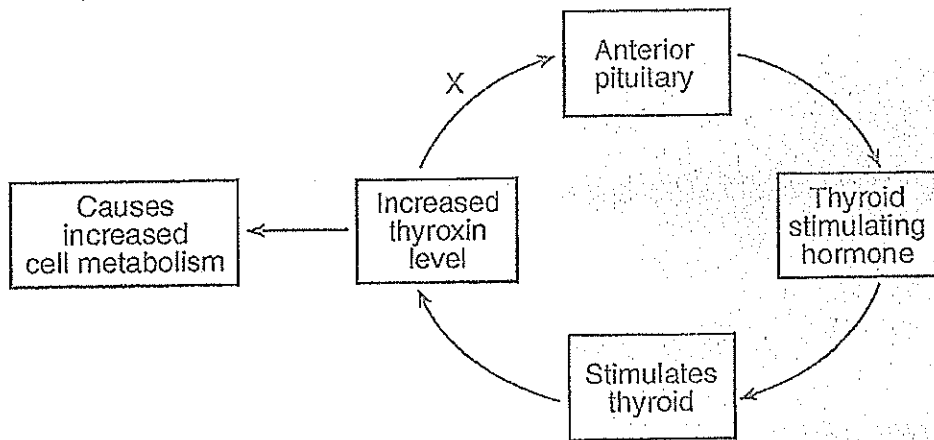


Estrogen and progesterone increase the chance for successful fetal development by regulating activities within structure

- A) A
  - B) B
  - C) C
  - D) D
57. Heavy cigarette smoking and the use of alcohol throughout pregnancy usually increase the likelihood of
- A) the birth of twins
  - B) the birth of a male baby
  - C) a baby being born with a viral infection
  - D) a baby being born with medical problems
58. Although all the body cells in an animal contain the same hereditary information, they do not all look and function the same way. The cause of this difference is that during differentiation
- A) embryonic cells use different portions of their genetic information
  - B) the number of genes increases as embryonic cells move to new locations
  - C) embryonic cells delete portions of chromosomes
  - D) genes in embryonic body cells mutate rapidly



Base your answers to questions 59 through 61 on the diagram below of activities in the human body.



59. Describe the action represented by the arrow labeled *X* in the diagram and state *one* reason that this action is important.

It signals the pituitary gland to release Thyroid stimulating hormone.

60. This diagram illustrates part of

- A) a feedback mechanism  
 B) an enzyme pathway  
 C) a digestive mechanism  
 D) a pattern of learned behavior

61. Identify *one* hormone involved in another biological relationship and an organ that is directly affected by the hormone you identified.

Insulin hormone targets the liver to absorb glucose from the bloodstream.

62. During the last months of pregnancy, the brain of a human embryo undergoes an essential "growth spurt." Which action by the mother would most likely pose the greatest threat to the normal development of the nervous system of the embryo at this time?

- A) spraying pesticides in the garden  
 B) taking prescribed vitamins on a daily basis  
 C) maintaining a diet high in fiber and low in fat  
 D) not exercising

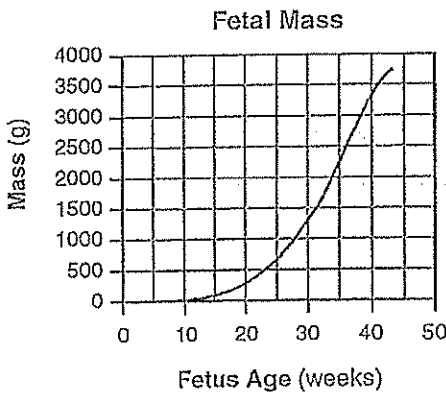
63. Research has shown that certain body cells, known as stem cells, can develop into a variety of specialized cells. Various factors can cause stem cells to develop into different types of mature cells. These different types of mature cells result from

- A) different antibodies and mitotic cell division  
 B) identical genetic codes and meiotic cell division  
 C) different environments of the cells and the functioning of different parts of the genetic code  
 D) similar steps in the development of the cells and a reduction in the number of chromosomes in each cell

64. Acetylcholine is a chemical secreted at the ends of nerve cells. This chemical helps to send nerve signals across synapses (spaces between nerve cells). After the signal passes across a synapse, an enzyme breaks down the acetylcholine. LSD is a drug that blocks the action of this enzyme. Describe *one* possible effect of LSD on the action of acetylcholine.

Acetylcholine will accumulate in the synapses.

Base your answers to questions 65 and 66 on the graph below and on your knowledge of biology. The graph represents changes in the mass of a fetus from week 8 to its birth at week 43.



65. Identify *one* factor that could cause a fetus to grow at a slower rate than that shown in the graph.

- Malnutrition
- Mother smokes
- Mother drinks alcohol

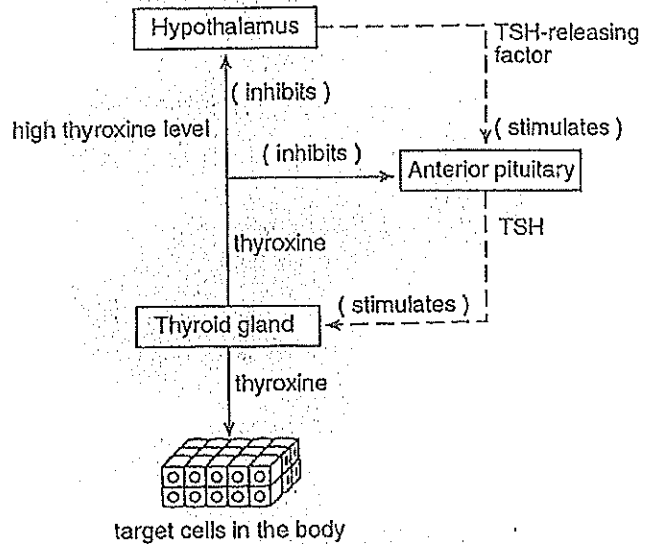
66. During which five-week period did the fetal mass increase at the greatest rate?

- A) weeks 10-15      B) weeks 15-20  
 C) weeks 25-30      **D) weeks 30-35**

67. State *one* specific way white blood cells help to protect the human body from pathogens.

- White blood cells engulf and destroy pathogens
- White blood cells produce antibodies

68. The diagram below represents a function of the thyroid gland.



State *one* effect of an increasing level of TSH-releasing factor.

Pituitary will release T.S.H.

69. Consuming large volumes of soft drinks containing sugar during the day can disrupt homeostasis. Describe how the human body responds to restore sugar balance. In your answer, be sure to:

- identify the hormone responsible for restoring homeostasis
  - identify the organ that releases this hormone
  - state *one* possible reason why sugar levels may remain high even though this hormone has been released
- Insulin lowers blood sugar levels  
 • Insulin is released from the pancreas  
 • Even though insulin levels are high, if the liver receptors are damaged, the blood sugar levels will remain high. Liver won't receive the message

Base your answers to questions 70 through 72 on the passage below and on your knowledge of biology.

### Avian (Bird) Flu

Avian flu virus H5N1 has been a major concern recently. Most humans have not been exposed to this strain of the virus, so they have not produced the necessary protective substances. A vaccine has been developed and is being made in large quantities. However, much more time is needed to manufacture enough vaccine to protect most of the human population of the world.

Most flu virus strains affect the upper respiratory tract, resulting in a runny nose and sore throat. However, the H5N1 virus seems to go deeper into the lungs and causes severe pneumonia, which may be fatal for people infected by this virus.

So far, this virus has not been known to spread directly from one human to another. As long as H5N1 does not change to another strain that can be transferred from one human to another, a worldwide epidemic of the virus probably will not occur.

70. State what is in a vaccine that makes the vaccine effective.

Vaccine contains dead or weakened form of the pathogen

71. Identify the type of substance produced by the human body that protects against antigens, such as the flu virus.

The body produces specific antibodies.

72. Identify *one* event that could result in the virus changing to a form able to spread from human to human.

Virus change due to **MUTATIONS**

73. 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.

Sexual reproduction results in variation in offspring. Offspring receive a combination of genes from 2 parents. Therefore the offspring are a mix of both parents and not identical to either one.

74. Base your answer to the following question on the information below and on your knowledge of biology.

Until the middle of the 20th century, transplanting complex organs, such as kidneys, was rarely successful. The first transplant recipients did not survive. It was not until 1954 that the first successful kidney transplant was performed. Success with transplants increased as research scientists developed techniques such as tissue typing and the use of immunosuppressant drugs. These are drugs that suppress the immune system to prevent the rejection of a transplanted organ. In 2002, there were nearly 15,000 kidney transplants performed in the United States with a greater than 95% success rate.

Describe the relationship of the immune system to organ transplants and the use of immunosuppressant drugs to prevent the rejection of a transplanted organ. In your answer be sure to:

- state *one* way the immune system is involved in the rejection of transplanted organs.
  - explain why the best source for a donated kidney would be the identical twin of the recipient.
  - explain why immunosuppressant drugs might be needed to prevent rejection of a kidney received from a donor other than an identical twin.
  - state *one* reason a person may get sick more easily when taking an immunosuppressant drug.
- Immunosuppressants weaken the immune system*
- *Immune system recognizes foreign antigens*
  - *Identical twins have identical DNA, therefore identical antigens*
  - *Immunosuppressant drugs are necessary to inhibit the body's immune system from attacking the antigen on the transplanted organ*

75. Base your answer to the following question on the information below and on your knowledge of biology.

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

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

*Hormones are specific to target cell receptors. Only certain organs have matching receptors for certain hormones*

76. Base your answer to this question on the list below and on your knowledge of biology.

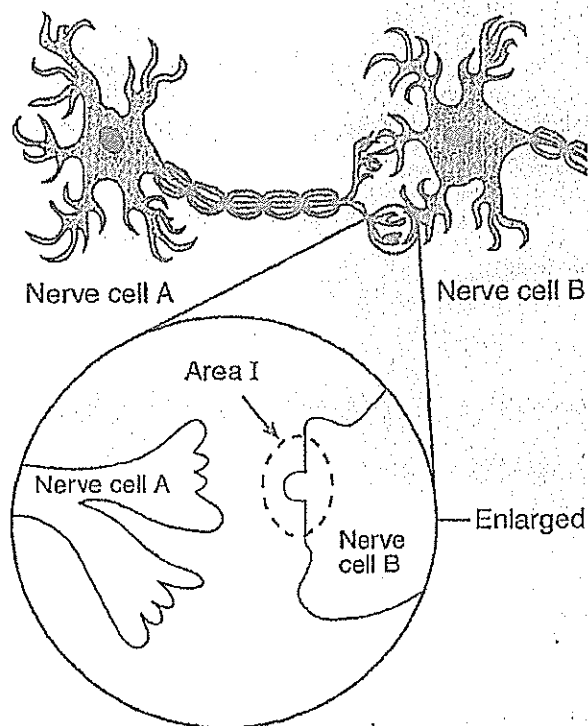
The list includes two processes involved in the development of a human fetus.

- Processes
- mitosis
  - differentiation

Select one process from the list and describe its role in the development of a human fetus. In your answer be sure to:

- identify the process you selected
  - state the role of this process in fetal development
  - identify the organ in the mother where this process occurs
- *Mitosis*
  - *Responsible for fetal growth*
  - *This occurs in the uterus*
- *Differentiation*
  - *Responsible for development of different, specialized organs*
  - *Occurs in the uterus*

77. Base your answer to the following question on the diagram of nerve cells below and on your knowledge of biology.



Identify *one* substance, other than the secretions from nerve cells, used in cell communication.

Hormones are used in cell communication

78. 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.

Fertilization is the union of a haploid sperm and a haploid ovum.

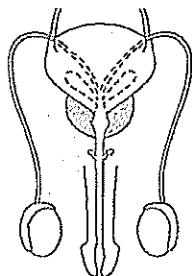
The result is a diploid Zygote which begins to grow into an embryo in the uterus

The ovary releases hormones that maintain the uterine lining during development

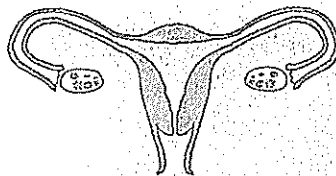
Materials are exchanged between the mother and fetus across the placenta

Base your answers to questions 79 and 80 on the following information.

The diagrams below represent organs of two individuals. The diagrams are followed by a list of sentences. For each phrase, select the sentence from the list below that best applies to that phrase. Then record its *number* in the space provided.



Individual A



Individual B

*Sentences*

1. The phrase is correct for both Individual A and Individual B.
2. The phrase is not correct for either Individual A or Individual B.
3. The phrase is correct for Individual A, only.
4. The phrase is correct for Individual B, only.

79. Contains organs involved in internal fertilization

1

80. Contains a structure in which a zygote divides by mitosis

4

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