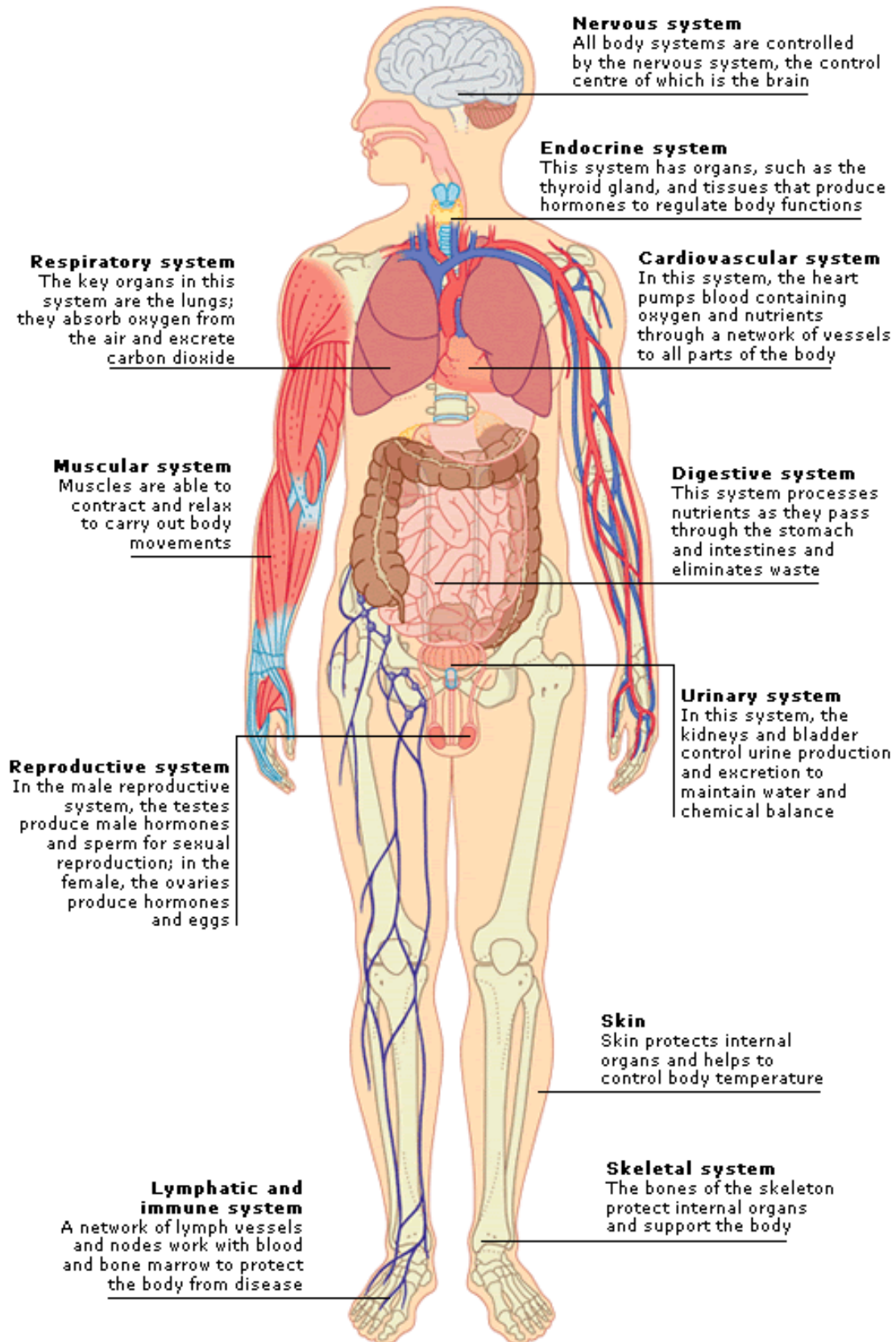


# TOPIC 5. HOMEOSTASIS & HUMAN PHYSIOLOGY

## 39. The Body Systems

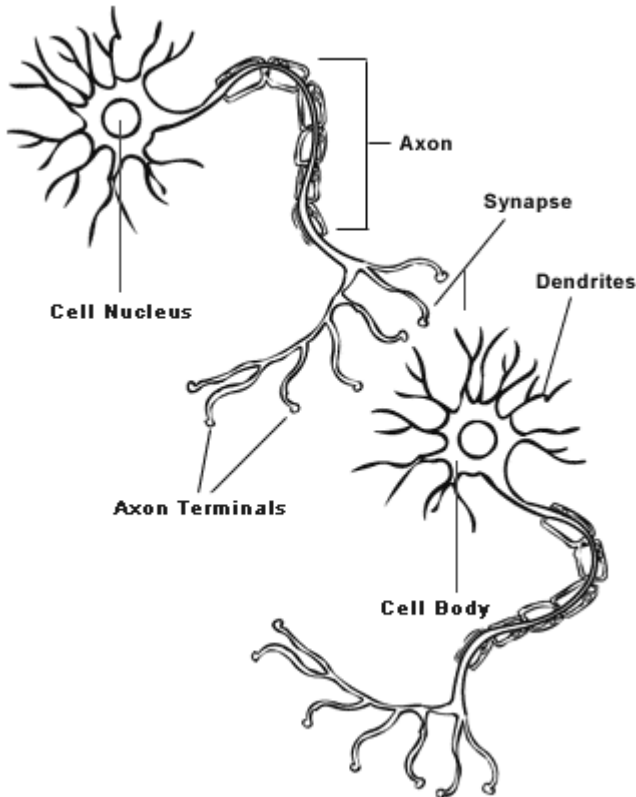


<b>System</b>	<b>Function</b>	<b>Organs</b>	<b>Malfunction(s)</b>
<b>Digestive</b>	To breakdown food ( <i>nutrients</i> ) and put them in the blood stream.	Mouth - Esophagus – Stomach - Small Intestine - Large Intestine - Rectum - Anus	<u><b>Ulcer</b></u> - a hole in the lining of the stomach.
<b>Circulatory</b>	Carry food and oxygen TO cells and wastes (CO <sub>2</sub> ) from cells.	Heart - Arteries - Veins - Capillaries	<u><b>Heart Attack</b></u> - when the blood supply to the heart is blocked. <b>(Stroke = Brain)</b>
<b>Respiratory</b>	Gas Exchange: Bring oxygen into the body and remove carbon dioxide from it.	Nose/Mouth - Trachea (windpipe) - Bronchi - Lungs (Alveoli) - Diaphragm	<u><b>Asthma</b></u> - blockage of the alveoli (air sacs) in the lungs.
<b>Excretory</b>	Removal of wastes from the blood and then from the body.	Kidneys - Ureter - Bladder - Urethra – Skin - Lungs	<u><b>Kidney Stones</b></u> - blockage of one part of the excretory system (painful).
<b>Immune</b>	Protect the body from pathogens (disease-causing microorganisms).	Skin - Lymph Nodes - Thymus - Bone Marrow	<u><b>Allergies</b></u> <u><b>AIDS</b></u> - weakening of the immune system due to the HIV virus.
<b>Endocrine</b>	Helps to regulate body functions.	Pituitary Gland - Ovaries - Testies - Pancreas	<u><b>Diabetes</b></u> - when the body cannot regulate the amount of glucose in the blood.
<b>Nervous</b>	Controls the functioning of the rest of the body.	Brain - Spinal Cord - Sense Organs	<u><b>Stroke</b></u> - when the blood supply to the brain is blocked.

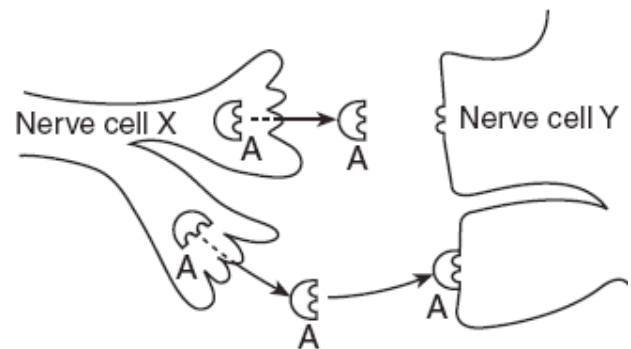
40. **Hormones** - “Chemical Messengers” produced by the endocrine glands.

41. **Neurotransmitters** - chemicals produced by nerve cells that allow for communication between 2 nerve cells.

### Diagram of a Neuron



### Diagram of a Synapse

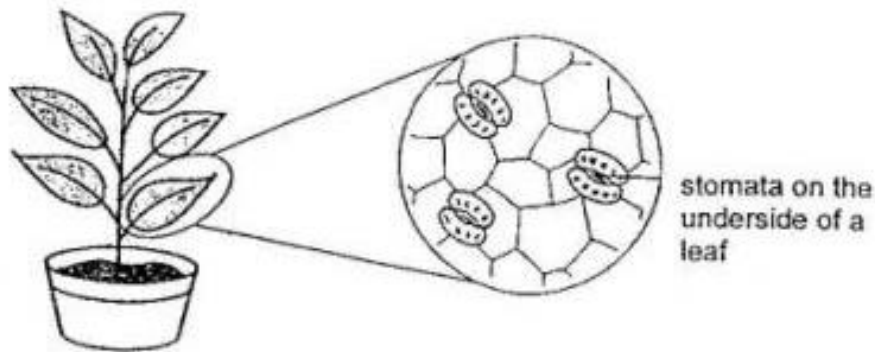


42. **Receptors** - protein molecules found on the outer surfaces of cells that recognizes **hormones**, **neurotransmitters**, **antibodies** or disease-causing microorganisms called **pathogens**.

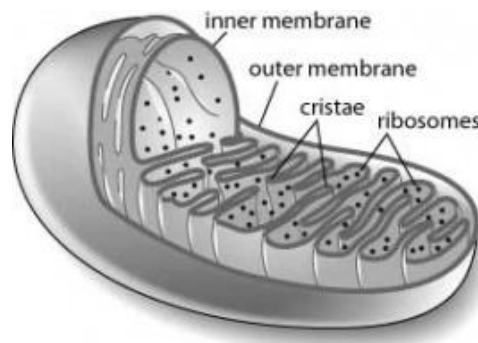
43. **Antibodies** - specifically shaped proteins produced by immune cells ( **B-cells** ) to help fight diseases.

44. **Mitochondria** - site of cellular **respiration** and uses oxygen to break down *food molecules* (glucose) to release energy or **ATP**.

45. **Circulation** - involves the movement of materials inside the cell as well as the movement between parts of a multicellular organism.
46. **Excretion** - the removal of wastes produced by the cells.
47. Failure to maintain homeostasis can result in **disease** or **death**.
48. Photosynthesis - stores energy in the chemical bonds of **glucose**.  
(sugar)
49. **Chloroplast** - site of photosynthesis in plant cells.
50. **Leaf** - major site of photosynthesis in a plant.
51. **Stomate** - tiny openings in the leaf where **CO<sub>2</sub>** enters.



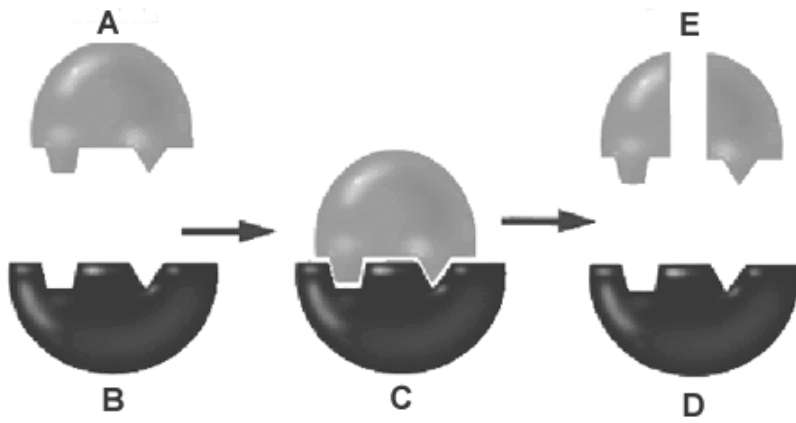
52. **Stomates** help maintain **HOMEOSTASIS** by controlling the gases that enter (*carbon dioxide*) and exit (*oxygen/water vapor*) the leaf.
53. **Respiration**- releases the energy or **ATP** stored in the sugar **glucose**.
54. **Mitochondria** - the site of **cellular** respiration in MOST organisms.



55. **Enzymes** - special proteins that affect the *rate* of chemical reactions.

56. **Substrate** - the molecule the enzyme reacts with.

57. **Active Site** - area ON THE ENZYME where the substrate fits.



A = \_\_\_\_\_

B = \_\_\_\_\_

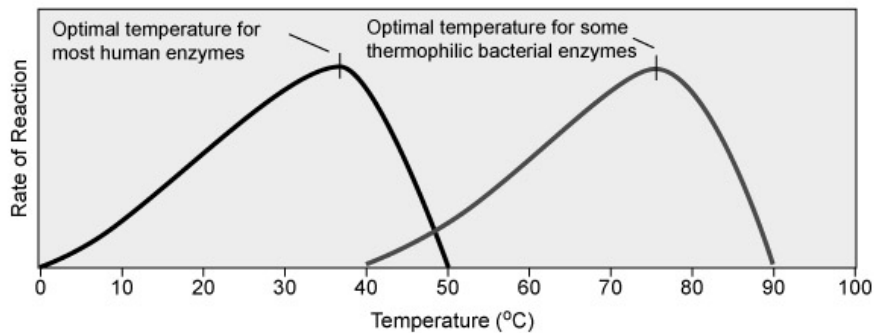
C = \_\_\_\_\_

D = \_\_\_\_\_

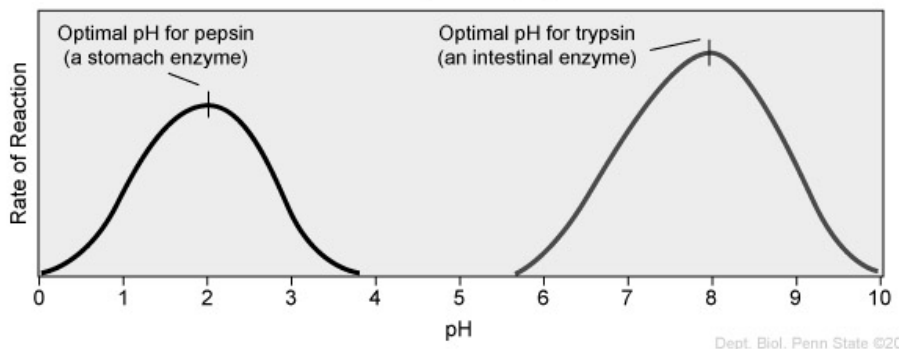
E = \_\_\_\_\_

58. Enzyme reaction rates are affected by each of the following:

(a) **Temperature** - each enzyme works best at a specific temp.  
(Increase Kinetic Energy = more collision between the molecules)



(b) **pH** - each enzyme works best at a specific pH



Dept. Biol. Penn State ©20

59. Most often enzymes are named by adding a suffix **-ASE** to the root word of the substrate.

For example: **Sucrase** breaks down sucrose.

**Protease** breaks down proteins.

**ATP Synthase** synthesizes ATP.

60. **Dynamic Equilibrium** - steady state or balance.  
*Another way of saying HOMEOSTASIS.*

61. **Positive Feedback** - a change prompts an **increase** response.

**Example** - As you punch me...I punch you harder.  
*(Both increase OR both decrease.)*

62. **Negative Feedback** - a change prompts a **decrease** response.  
*(more common)*

**Example**- As the temperature in your house goes up, the thermostat turns the heater off; as the temperature goes down, the thermostat turns the heater on. *(As one goes up the other goes down.)*

63. When glucose levels are above normal the pancreas secretes **insulin**. This hormone prompts glucose to move from the blood into body cells, resulting in a **decrease** glucose level in the **blood**.

64. Another hormone secreted by the pancreas called **glucagon** works in the opposite way. When the glucose level in the blood is too low, this hormone prompts the release of glucose stored in the **liver**.

65. The **immune** system is the body's primary defense against disease-causing microorganisms.

66. These disease-causing microorganisms are called **pathogens**.

## Diseases and Disorders:

*Be familiar with different diseases and disorders, what causes them, and how they may affect the body. Don't fret about memorizing all of them. Typically the exam asks you to name a disease and how it disrupts homeostasis.*

The most important diseases and disorders for you to know are:

### 67. Acquired ImmunoDeficiency Syndrome = AIDS

- (a) Caused by the HIV virus (a *pathogen*)
- (b) HIV stands for Human Immunodeficiency Virus
- (c) Weakens human immune system, leaving body vulnerable to other diseases.
- (d) Spread through bodily fluids, usually sexual contact, intravenous (IV) drug use (sharing needles), or blood transfusions.
- (e) Can't be cured yet, but spread may be prevented by sexual abstinence, "safe" sex (using condoms), not sharing needles, or testing blood before using it for a transfusion.

### 68. Cancer

- (a) Caused when a cell reproduces (*divides*) at an uncontrolled rate, forming a tumor.
- (b) Cancer cells do not **specialize** and take resources from healthy tissue.
- (c) May be caused by radiation, chemicals (*such as asbestos or cigarette smoke*), and viruses.
- (d) Treatments include surgery, radiation therapy, and chemotherapy.

### 69. Diabetes

- (a) Affects body's ability to control blood sugar or glucose (C<sub>6</sub>H<sub>12</sub>O<sub>6</sub>)
- (b) Some diabetics may be treated using injections of insulin made by genetically engineered bacteria.

### 70. Allergies

- (a) Occur when immune system reacts to a harmless substance (*pollen*) the same way it would a harmful one (*such as a cold virus*).
- (b) **Asthma** is a form of allergy caused by a reaction to dust particles in the air that causes the airway to constrict.