

Name _____

Period _____

AP Biology

Date _____

REVIEW UNIT 9: ANIMAL FORM & FUNCTION — “TOP TEN”

A. Top “10” — If you learned anything from this unit, you should have learned:

1. Regulation

- a. Homeostasis is maintained through hormones & nervous system control
 - hormone releasing gland, target cells, cell membrane receptors, secondary messengers, cellular response (produce enzyme or turn gene on)

2. Digestive system

- a. function:
 - enzymatic breakdown of food, absorption, elimination
 - supports cellular respiration (fuel) & biosynthesis (raw materials)
- b. structure:
 - mouth, esophagus, stomach, pancreas, liver, gall bladder, small intestines, large intestines
- c. adaptations / evolutionary trends:
 - villi & microvilli = increase surface area for absorption
 - zymogens = protection from self-digestion
 - tooth structure, length of digestive system, number & size of stomachs
 - symbiotic bacteria (*E. coli*) in intestines to breakdown cellulose
- d. regulation:
 - insulin / glucagon control of blood sugar
 - gastrin, GIP, CCK, secretin

3. Respiratory System

- a. function
 - exchange of O₂ & CO₂
 - supports cellular respiration
- b. structure:
 - trachea, bronchi, lungs, diaphragm, gills, hemoglobin
- c. adaptations / evolutionary trends:
 - alveoli & gills = need moist membranes & increase surface area gas exchange
 - counter current gas exchange in gills
- d. regulation:
 - chemoreceptors in medulla monitor pH of cerebrospinal fluid
 - chemoreceptors in aorta & carotid arteries monitor CO₂ & O₂ levels in blood

4. Circulatory System

a. function:

- transport of O₂, CO₂, nutrients, cellular wastes, regulatory molecules, immune cells
- supports cellular respiration & immune response

b. structure:

- heart, atria, ventricles, valves, arteries, veins, capillaries, RBC, hemoglobin

c. adaptations / evolutionary trends:

- open vs. closed system
- 2 → 3 → 4 chambers of heart = supports high metabolic output, endothermy (heat production), flight, increased body size
- 4-chambered heart = double circulation (pulmonary & systemic)
- countercurrent heat exchange
- structure of arteries vs. veins (thickness of wall, elasticity, valves in veins)

d. regulation:

- “pacemaker” (SA node)
- baroreceptors in aorta & carotid arteries monitor blood pressure

5. Excretory system

a. function:

- water balance, filtration of blood, excretion of cellular nitrogenous waste (protein digestion)

b. structure:

- kidney, glomerulus, nephron, Bowman’s capsule, Loop of Henle, collecting duct

c. adaptations / evolutionary trends:

- based on osmosis, diffusion & active transport
- reclaim water & solutes as needed, excrete urea
- ammonia vs. urea vs. uric acid = type of waste product vs. habitat & type of organism

d. regulation:

- ADH = reduces blood osmolarity (high solutes); osmoreceptors in hypothalamus
- aldosterone = increases low blood pressure; monitored by JGA (near kidney)

6. Muscles

a. function: locomotion

b. structure:

- muscle cells, sarcomere, actin (thin) & myosin (thick) fibers, tropomyosin regulatory protein

- c. adaptations / evolutionary trends:
 - sliding filament system of muscle contraction
 - acetylcholine trigger, ATP, release & uptake of Ca^{+2} from sarcoplasmic reticulum
 - d. regulation: mostly voluntary; acetylcholinesterase
7. Immune
- a. function: protects body from attack by pathogens
 - b. structure:
 - lymph system, leukocytes, lymphocytes, macrophages, B cells, antibodies, T cells
 - c. adaptations / evolutionary trends:
 - innate, non-specific immunity = barrier defense, leukocytes, macrophages
 - acquired immunity = lymphocytes, antibodies, memory B & T cells
 - MHC proteins = antigen production
 - d. regulation:
 - histamines, prostaglandins, interleukins
 - e. miscellaneous:
 - vaccinations trigger immune response
 - HIV outwits immune system
8. Nervous System
- a. function: sensory input, motor function, regulation
 - b. structure: neuron, axon, dendrites, synapse
 - c. adaptations / evolutionary trends:
 - voltage gated channels & ion-gated channels
 - Na & K channels, Na/K pump, neurotransmitters
 - d. regulation:
9. Reproduction
- a. function: produce & deliver gametes, nurture fetus
 - b. structure:
 - testicles, penis, glands, sperm, ovaries, eggs, Fallopian tubes, uterus
 - c. adaptations / evolutionary trends:
 - aquatic egg vs. amniotic egg
 - external vs. internal fertilization; external vs. internal development (placenta)
 - sperm production vs. egg production (polar bodies)
 - d. regulation: FSH & LH, testosterone, estrogen, progesterone, female monthly cycle

10. Development

a. function:

- going from one-celled zygote to a multi-celled organism with differentiated tissues & organs

b. adaptations / evolutionary trends:

- cleavage, gastrulation, neurulation, organogenesis
- 3 tissues layers: body plan
 - ectoderm: skin, teeth, nails, nerves
 - mesoderm: bone, blood, muscle
 - endoderm: digestive system
- differentiation: turning off some genes turning on others

B. Labs

1. Physiology of Circulatory System

Be sure to review the procedures and the conclusions, and understand:

- a. Factors that affect heart rate
- b. How to set up a similar experiment
- c. Controls vs. Experimental