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 O_2 & CO_2
      - 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 CO_2 & O_2 levels in blood

4. Circulatory System
   a. function:
      - transport of O_2, CO_2, 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