Review Questions

- Ch. 15 Special Senses
  - Name the types of transducers found in the body. Which senses do they correspond to?
  - Eye
    - What are the functions/actions and innervations of the extrinsic eye muscles?
    - Name the glands associated with the eye. What is/are the function(s) of each? What does each secrete? Describe the pathway of tears.
    - What are the tunics of the eye? Which structures of the eyeball are derived from each?
    - How does the eye **accomodate** for near and far vision? What structures are necessary for accomodation?
    - Name the layers of the retina. What is the function of each layer? What kinds of cells are found in each layer? What is the function of each?
    - Describe the special regions at the back of the retina
    - Describe the fluids inside the eyeball. Where is each one found?
    - Describe the pathway that aqueous humour follows as it is created and drained.
    - (Ignore the chemistry of phototransduction)
    - Describe the pathway that neural signals from the eye follow as they travel to the occipital lobes.
  - Smell & Taste
    - Compare and contrast the sense of smell and the sense of taste
  - Hearing & Balance/Equilibrium
    - What are the three segments or regions of the ear? Describe each.
    - What is the function of the ear ossicles? What is the name and function of the muscles that attach to them?
    - What are the bony and membranous labyrinths? What does each contain?
    - How does the cochlea transduce sound into nervous signals? How do we distinguish different pitches?
    - What are the semicircular canals? What do they detect? How?
    - What are the macula and the utricle? What do they detect? How?
    - Compare and contrast the cochlea, utricle and macule, and semicircular canals.
- Ch. 16 Endocrine System
  - What is the general function of the endocrine system? How is it similar to and different from the nervous system?
  - What are the two major mechanisms of hormone action? How do they correspond to the chemical properties of the individual hormones?
  - What are up-regulation and down-regulation?
  - How are hormones transported in the blood?
  - Name the three general mechanisms that can stimulate the release of hormones.
  - Describe the structure and function of the pituitary gland. What hormones does each part of it secrete ? What is the function of each?
  - Describe the relationship between the pituitary and the hypothalamus.
  - Describe the structure and function of the thyroid gland. What two hormones does it secrete? What are their functions? Where is each synthesized within the gland?
  - What does the parathyroid gland secrete? What is the function of its hormone?
  - Describe the structure of the adrenal gland. Which parts secrete which hormones? What is

the function of each?
    - What hormones does the pineal gland secrete? What is its function?
    - Describe the structure of the pancreas. What does the pancreas secrete? What is the function of each pancreatic hormone? Which cells produce which hormones?
- Ch. 17 Blood
    - What are the components of blood?
    - What is hematocrit? What is a normal hematocrit for adult males and females?
    - Describe the structure and function of erythrocytes.
    - Describe the structure and function of hemoglobin.
    - Describe each of the leukocytes. How are they grouped? What is the function of each?
    - Describe the structure and function of platelets. What is hemostasis?
    - Describe the components of plasma. What is the function of each.
    - What are the major human blood groups? How do they interact? Which ones can we give to which people? How do we determine a person's blood group?
- Ch. 18 Heart
    - Describe the anatomy, structure and function of the heart and its coverings.
    - Where is the heart located?
    - Describe and name the valves of the heart.
    - Name and describe the vessels that enter and exit the heart. How do we define the terms artery and vein? What are the systemic and pulmonary circulatory systems?
    - Describe the other internal structures of the heart. What is the function of each?
    - Describe the flow of blood through the heart. Be able to list the structures that a drop of blood passes, in order, as it passes through the heart, body and lungs.
    - What is the coronary circulation?
    - Describe the mechanism of muscle excitation and contraction in the heart.
    - Describe the sequence of excitation in the heart. Describe the structure and function of the SA node, AV node and all other pathways.
    - Describe the EKG waves and how they correspond to events in the heart.
    - Describe the heart sounds and how they correspond to events in the heart.
    - Describe the cardiac cycle. phase by phase.
    - What is cardiac output? How do we calculate it from the activities of the heart?
    - How are stroke volume and heart rate regulated/determined?
- Ch. 19. Blood Vessels
    - Describe the structure and function of the arteries, arterioles, capillaries, venules, and veins.
    - Name and describe the different kinds of capillaries.
    - Describe how blood flows through capillary beds, vascular shunts and metarteioles
    - Describe how nutrients and fluids are driven out of the capillaries and wastes and fluid are driven back in.
    - Describe the mechanisms of venous return.
    - Describe how blood flow is related to pressure and resistance
    - Describe how resistance is related to the radius of a vessel
    - Describe how blood pressure changes as you travel from the aorta to the venae cavae
    - What are diastolic pressure, systolic pressure, pulse pressure and mean arterial pressure? What is the significance of each?
    - What is the relationship between cardiac output and venous return? What is Starling's Law? How is cardiac output controlled?

- How is blood pressure controlled/regulated? Describe the short-term and long-term mechanisms
- How do we measure blood pressure
- Describe autoregulation of blood flow through the organs.
- How is blood flow related to temperature regulation?
- How is blood drained from the brain?
- Describe the hepatic portal system in terms of structure and function.

- Ch. 20 Lymphatic System
  - What is lymph? How does it travel in the body?
  - What are the functions of the lymphatic system?
  - Describe lymph vessels. How are they like or different from blood vessels?
  - What are lymph nodes? What is their function?
  - What are lacteals?
  - How is lymph drained from different parts of the body? Which blood vessels does it drain into?
  - What are the major functions of the lymphocytes?
  - Describe the structure and function of the spleen, thymus, tonsils and MALT
- Ch. 21 The Immune System
  - Describe the functions of the Adaptive and Innate Immune Systems (compare and contrast)
  - What are the innate defenses?
  - Describe the function of the phagocytes and NK cells
  - Describe the mechanism and function of inflammation and fever
  - What is the function of interferons and complement proteins. Which cells secrete each? What are their effects?
  - Describe the structure and functions of antibodies
  - Describe the maturation and function of B-lymphocytes and T-lymphocytes.
  - What is immunological memory? How do we get it?
- Ch. 22 Respiration
  - What is the difference between the respiratory zone and the conducting zone of the respiratory system? Which structures or organs are found in each?
  - What is the function of the respiratory turbinates?
  - How do we produce sound for speech? How do we change the pitch of that sound?
  - Describe the trachea and main bronchi
  - Describe the anatomy of the lungs. How are the two lungs different from each other?
  - How are bronchi different from bronchioles? How are the different kinds of bronchioles different from each other?
  - What are alveoli, alveolar sacs and alveolar ducts? What is their function?
  - Describe an alveoli. What kinds of cells does it contain? What is the function of each?
  - How does oxygen get into the bloodstream?
  - Describe the structure and function of the pleurae.
  - Describe the mechanics of breathing (ventilation). Which muscles are necessary? How are forces transmitted to the lungs? What is the role of the pleurae? Describe the pressure changes that occur during ventilation.
  - If you change the volume of a gas, what happens to its pressure?
  - What is the significance of surface tension in the lungs? What is the function of a surfactant?

- Describe the respiratory volumes and capacities. How are they related to each other? What is the definition of each? What is special about Functional Residual Capacity?
- What is dead space?
- What is Dalton's Law of Partial Pressures? What does it mean?
- What are the approximate percentages and partial pressures of gases in the atmosphere? In the alveolus?
- How do gases dissolve in liquid? What is Henry's Law?
- What are the partial pressures of oxygen and CO_2 in the alveolus, arterial blood and venous blood?
- What is ventilation-perfusion coupling?
- How are oxygen and CO_2 carried in the blood?
- What is the oxygen-hemogloibin dissociation curve? What factors can change this curve? What happens when it moves?
- How is CO_2 related to blood pH?

- Ch. 23 Digestion
  - What are the six essential activities of the digestive system? Which organs are specialized for each of these processes?
  - What are the layers of alimentary canal? What is the function of each?
  - What is the enteric nervous system? What are the two plexuses in the digestive system, and what are their functions?
  - What is the function of saliva? What does it contain? Name the salivary glands.
  - Describe the structure and function of the esophagus
  - Describe the structure and function of the stomach.
  - Name the cells of the gastric glands. What is the function of each?
  - What does the stomach specialized for digesting? How does it do this?
  - What are the subdivisions of the small intestine?
  - What are the major functions of the small intestine?
  - What features does the small intestine contain to maximize chemical digestion and assimilation?
  - How are nutrients absorbed from the small intestine into the blood stream?
  - Describe the structure and function of the liver and gall bladder.
  - Describe the structure and function of the liver lobules
  - Describe the blood flow to and from the liver
  - Describe the structure and function of bile. What is the function of the gall bladder?
  - Describe the enterohepatic circulation
  - Describe the structure and function of the pancreas
  - What are the functions of Cholecyctokinin, Gastrin and Secretin?
  - Describe the structure and functions of the colon.
  - How do we control defecation?
- Ch. 24 Nutrition and Metabolism
  - What are vitamins and minerals?
  - What is metabolism?
  - What is the chemical equation that describes the over-all metabolism of glucose?
  - What is glycolysis? What compounds are needed for glycolysis? What are the products?
  - What happens to pyruvate?

- What is the Krebs Cycle (Citric Acid Cycle)? Where does it occur?
- What are the reactants and products of the Krebs cycle? In what way is it a cycle?
- How much ATP is produced by the Krebs Cycle?
- What is NADH? What is $FADH_2$?
- What is the electron transport chain? How does it make ATP?
- Why do we need oxygen in the body?
- How do we break down fatty acids for energy?
- How do we break down amino acids for energy?

- Ch. 25 Urinary System
  - What are the functions of the urinary system (especially the kidneys)?
  - What does retroperitoneal mean?
  - Describe the circulation of blood in the kidneys
  - What are the parts of the nephron? What is the function of each?
  - What are the three basic processes of the kidney?
  - What mechanisms are involved in micturation?
  - What is a counter-current mechanism?
  - How does the kidney make concentrated urine?
  - Describe glomerular filtration
  - What is the function of the juxtaglomerular aparatus?
  - What is the difference between cortical nephrons and juxtaglomerular nephrons?
  - What is the function of the peritubular capillaries and the vasa recta?
  - What substances are reabsorbed in the PCT?
  - What substances are secreted in the DCT?
  - How does water-reabsorption occur in the collecting duct?
  - How is urine volume and concentration regulated?
  - What is the function of urea in the kidney?
  - What are the components of urine?
  - Describe the renin-angiotensin mechanism. What initiates it? What is its function or effect?
  - What are the functions or effects of the urinary "hormones" and what triggers their release?
- Ch. 26 Fluid, Electrolyte and Acid-Base Balance
  - What are the fluid compartments of the human body?
  - How are the extracellular fluids different from the intracellular fluids?
  - What are the sources of water in the human body? List them in order from greatest to least.
  - What are the avenues of water-loss in the human body? List them from greatest to least.
  - What are the effects of over-hydration and dehydration?
  - How does the body regulate sodium and potassium ion balance?
  - How does the body regulate blood volume and pressure?
  - How does the body regulate calcium levels?
  - How does the body regulate pH?
  - What is a buffer? How do the bicarbonate and phosphate buffer systems work?
  - What are respiratory acidosis and alkalosis? What are metabolic acidosis and alkalosis?
- Ch. 27 Reproductive System
  - Describe meiosis. What happens in each phase? What do the words haploid and diploid mean?
  - Describe the structure of the testes. Where do sperm develop? Where do they complete their

maturation?
    - Describe spermatogenesis and spermiogenesis
    - How do sperm travel from the testis to the external world? Describe the pathway and the means of propulsion.
    - Describe the erectile tissues of the penis. Describe the mechanism of an erection.
    - Describe the accessory glands of the male reproductive system, and the function of each.
    - Describe the composition of semen.
    - Describe oogenesis, the development of the follicle, and ovulation. What happens to the follicle after ovulation?
    - Describe the uterus, both in gross anatomy and in terms of its histological layers.
    - Describe the uterine tubes
    - Describe the vagina
    - Describe the female external genitalia, including vaginal orifice, urethra orifice, hymen, labia minora, labia majora, clitoris (and prepuce), and greater vestibular glands.
    - Describe the similarities between the clitoris and the penis.
- Ch. 28 Pregnancy and human development
    - How does a sperm penetrate an oocyte?
    - What prevents multiple sperm from fertilizing one egg?
    - Explain the terms conceptus, zygote, morula, blastocyst, embryo, and fetus
    - What is implantation? Describe the process
    - What is placentation?
    - How do the three germ layers develop from an embryonic disk? What is gastrulation?
    - What does each of the three germ layers (ectoderm, mesoderm, endoderm) develop into?
    - How does the neural tube form?
    - What are somites?
    - How does the embryo get its tube-within-a-tube structure?
    - What are the contents of breast milk? What are the advantages of feeding a baby breast milk?