

Exam 4 Review Sheet

Chapter 39 - Animal Cardiovascular and Respiratory Systems

1. How are gases exchanged?

- Gases are exchanged by Diffusion. Diffusion is efficient for moving gases over short distances. Adaptions for gas exchange: Large surface area, thin membranes, maximizing partial pressure differences.

2. Explain the concept of partial pressures of gases. How does this relate to the rates of diffusion of oxygen and carbon dioxide?

- Gases diffuse from areas of higher partial pressure to areas of lower partial pressure.
- 1. Ventilation by bulk flow: Breathing moves air containing oxygen into lungs and air containing carbon dioxide out of the lungs.
- 2. Diffusion across the respiratory surface: Oxygen diffuses from the lungs into the blood and carbon dioxide diffuses out of the blood into the lungs.
- 3. Circulation by bulk flow: Oxygen and carbon dioxide are transported by circulatory system to and from the cells.
- 4. Diffusion between blood and cells: Oxygen diffuses from the blood into cells and carbon dioxide diffuses out of the cell into the blood.

3. Explain some of the advantages of using air instead of water as a respiratory medium.

- The benefits of breathing air:
 - Oxygen content is 50 times higher than that of a similar volume of water
 - Oxygen diffuses out of the air faster
 - Air is less dense than water
 - Requires less energy for ventilation

4. What are three major adaptations of animals that increase the rate of respiratory gas exchange?

5. Explain 3 different ways the concentration gradient for gas exchange is maximized across fish gills.

- Pump water through mouth and over gills
- Protected by an operculum
- Gill filaments
 - Highly folded forming structures called lamellae
- Supplied by many blood vessels

6. Why are bird lungs so much more efficient than the lungs of mammals?

7. Explain tidal breathing. Define the terms tidal volume, vital capacity, inspiratory reserve volume, expiratory reserve volume and residual volume. Why does residual volume limit the efficiency of tidal breathing?

8. What roles do mucus and surfactant play in maintaining the function of the mammalian respiratory system?

9. How is oxygen carried in the blood? What is hemoglobin? How many molecules of oxygen can one molecule bind?

10. List all the things that affect the affinity of hemoglobin for oxygen?

11. Why does hemoglobin only release 25% of its oxygen to the tissues? Why is this important?

12. What is the difference between open and closed circulatory systems?

13. What are some of the advantages of a closed circulatory system?

14. What pumps the blood? What vessels carry blood away from the heart? What vessels carry blood back to the heart? Where are nutrients and gases exchanged?

15. What are the pulmonary and systemic circuits? Why is it advantageous to have them separate from one another?

16. What is the difference between oxygenated and deoxygenated blood?

- 17. Describe the pathway that blood follows through the human heart.
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- 18. What is the function of the heart valves? Explain the cardiac cycle. What is systole, diastole? What makes the “lub” - “dup” sounds?
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- 19. What are the pacemaker cells and where are they located? Do the ventricles and atria contract at the same time as each other?
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Chapter 40 - Animal Metabolism, Nutrition and Digestion

- 1. What are the 3 primary nutrients used by animals?
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- 2. What is the definition of metabolism? What is the definition of metabolic rate? What factors affect metabolic rate?
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- 3. How does body temperature affect an organism’s metabolic rate? What is the difference between an endotherm and an ectotherm? What types of processes does each use to regulate body temperature?
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- 4. What are essential amino acids, vitamins, minerals?
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- 5. What is the pathway for food through the human digestive system? What is the function of each of the following: mouth, stomach, small intestine, liver, pancreas, large intestine?
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Chapter 41 - Animal Renal Systems

- 1. What is osmosis? Understand which direction water moves in different situations.
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- 2. What is an osmoconformer? What is an osmoregulator?
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- 3. What are the nitrogenous waste products? How do they differ in toxicity? How do they differ in the amount of water required for excretion?
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- 4. What is the excretory system of the flat worms, the annelids and the insects?
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- 5. What is the excretory organ of vertebrates? What is the functional unit of the kidney?
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- 6. What are the parts of the nephron and what is the pathway of the filtrate?
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- 7. Where does filtration take place? What is the function of the proximal convoluted tubule? The loop of Henle? The collecting ducts? Know the details!!
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- 8. How efficient are the mammalian kidneys?
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- 9. What is the function of ADH? How does the renin-angiotensin system control blood pressure?
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Chapter 43 - Animal Immune Systems

1. What are the differences between innate immunity and adaptive immunity?
What is a pathogen?
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2. What are the components of the innate immune system and what role does each of them play? What are the cells?
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3. Describe the process of inflammation and how each of the symptoms can be explained.
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4. How does the complement system destroy pathogens?
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5. What are B cells? How are they involved in the adaptive immune response? What are antibodies? How are B cells activated?
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6. What are T cells? What are the two types of T cells and what makes them different? How are T cells activated? What are MHC proteins?
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7. What is clonal selection? What is clonal deletion?
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8. What is an autoimmune disease? What has gone wrong?
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9. Understand the information gone over about HIV infections.
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