

Name \_\_\_\_\_ Period \_\_\_\_\_

## Chapter 25: Control of Body Temperature and Water Balance

*Guided Reading Activities***Big idea:** Thermoregulation

Answer the following questions as you read modules 25.1–25.3:

- Humans are to endothermic as reptiles are to exothermic.
- Complete the following table, which describes the four methods of heat exchange.

	Conduction	Evaporation	Convection	Radiation
<b>Description</b>	Involves the direct transfer of heat between two objects that are in direct contact with each other	The loss of heat from the surface of a liquid	The transfer of heat by the movement of air or a liquid over a surface	The transfer of heat through the release of electromagnetic waves between objects not in direct contact

- True or false: Animals maintain an internal temperature within a set range through thermoregulation. If false, make it a correct statement.  
True
- Which of the following involves warm and cold blood flowing in opposite directions?
  - Evaporative cooling
  - Metabolic heat production
  - Insulation
  - Countercurrent heat exchange

5. Complete the following table, which compares the different adaptations that organisms have to aid in thermoregulation.

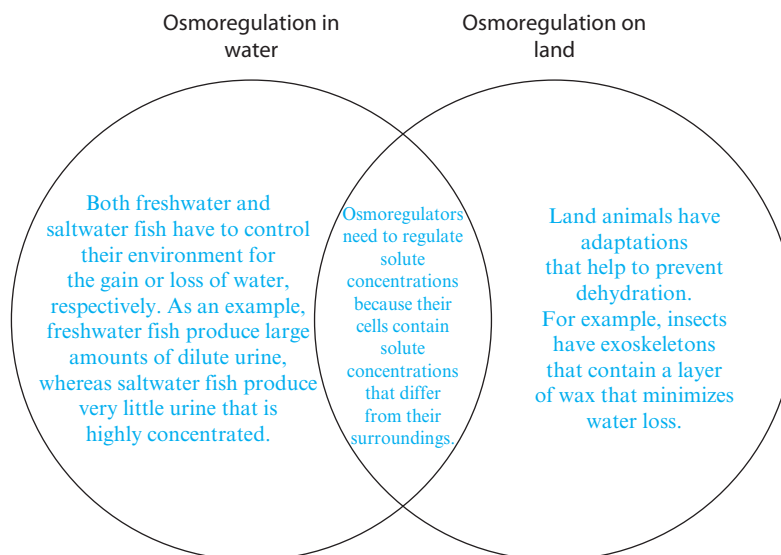
	Metabolic heat production	Insulation	Circulatory adaptations	Evaporative cooling	Behavioral responses
<b>Description</b>	The production of heat can be increased through an increase in metabolism, as indicated by the second law of thermodynamics.	Animals can reduce heat loss through insulation using fur, feathers, or fat.	Large thin body surfaces with a large amount of blood vessels can be used to maximize the radiation of heat. Blood vessels can also change diameter due to signals from the brain.	Occurs when water absorbs heat from the body surface and evaporates, taking heat with it.	Many organisms have evolved behaviors that help them to maximize or minimize heat loss. Elephants spraying themselves with water is one example.

6. Penguins huddle to reduce heat loss due to what type of heat exchange?  
Convection

**Big idea: Osmoregulation and excretion**

Answer the following questions as you read modules 25.4–25.9:

- Animals regulate the fluids of their bodies to make sure their cells are in a(n) isotonic environment.
- Complete the Venn diagram that compares osmoregulation in water to osmoregulation on land.



3. Briefly explain why the disposal of wastes is an important factor in osmoregulation.  
The disposal of wastes is an important factor in osmoregulation because metabolic wastes typically are dissolved in water.
4. True or false: It saves energy for terrestrial animals to convert ammonia to urea. If false, make it a correct statement.  
False, it takes energy to convert ammonia to urea.
5. It takes a lot of energy for birds to convert ammonia to uric acid. What is the benefit?  
Although it is true that this process takes a lot of energy, the birds gain the benefit of not losing water in the storage of the uric acid because it is relatively insoluble in water.
6. Briefly explain the relationship between filtrate and urine.  
The relationship is that your kidneys refine and concentrate the filtrate to produce urine.
7. Reabsorption in the tubules put(s) important solutes back into blood circulation and secretion put(s) substances from the blood into the tubules.
8. What components of the nephron make up the blood-filtering portion?  
The glomerulus and Bowman's capsule
9. You should not think of the kidney so much as a urine-producing structure as a structure that reabsorbs water.
10. List the five steps of filtrate processing in the nephron.
  - 1) Reabsorption of most valuable solutes from the proximal tubules as well as the uptake of toxins into the proximal tubule
  - 2) Reabsorption of water across the loop of Henle
  - 3) The transport of NaCl into the interstitial fluid of the medulla
  - 4) Regulation of pH in the distal tubule by secreting  $H^+$  ions into the tubule and reabsorbing bicarbonate ions. Water and NaCl are also reabsorbed across the distal tubule.
  - 5) More water and NaCl are reabsorbed into the interstitial fluid of the medulla.
11. What factors contribute to the solute gradient in the renal medulla?  
The presence of NaCl and urea in the interstitial fluid of the renal medulla contributes to the solute concentration gradient.
12. ADH leads to which of the following?
  - a. Decreased water excretion in the urine
  - b. Increased water reabsorption across the collecting ducts
  - c. Darker colored urine
  - d. All of the above

13. The filtering of blood using a machine that mimics the action of the nephron is known as dialysis.
14. What characteristic of the dialyzing solution allows for urea to flow from the patient's blood into the collection container of used dialyzing solution?  
*It mimics the solute concentration of the interstitial fluid of the renal medulla.*

### CONNECTING THE BIG IDEAS

Use your knowledge of the information contained within this chapter's "Big Ideas" to answer this question.

Some people recommend that, if you are trying to lose weight, you should drink several ice-cold glasses of water per day. What is the reasoning for doing so? In other words, is there any scientific basis for doing this?