Communication, Regulation and Homeostasis  (20 pts) Watch and take notes

http://higheredbcs.wiley.com/legacy/college/sarafino/0470129166/animations/homeo1a/frameset.htm

Think Bank:  Homeostasis   (30 pts) Read and do the activities

http://www.think-bank.com/iwb/flash/homeostasis.swf

Homeostatic Control Mechanisms   (13 pts) Take the quiz

HOMEOSTASIS  (5 pts)  Watch


BioFlix: Homeostasis - Regulating Blood Sugar  (5 pts)  Watch

https://massasoit.instructure.com/courses/902777/pages/bioflix-homeostasis-regulating-blood-sugar

https://massasoit.instructure.com/courses/902777/pages/bioflix-homeostasis-regulating-blood-sugar

HOMEOSTASIS TUTORIAL  (19 pts)  Go through tutorial and take quiz

http://www.occc.edu/biologylabs/Documents/Homeostasis/homeostasis_tutorial.htm

http://www.occc.edu/biologylabs/Documents/Homeostasis/homeostasis_tutorial.htm
HOMEOSTASIS REVIEW


CONNECTING CONCEPTS: ANIMAL PHYSIOLOGY.HOMEOSTASIS

(25 pts) Do activity and answer questions

http://ats.doit.wisc.edu/biology/ap/ho/ho.htm

http://ats.doit.wisc.edu/biology/ap/ho/ho.htm
Prequiz

1. Which term describes a mechanism by which the internal conditions of an organism are kept at set values without regard to the external conditions?
   a. conformational homeostasis
   b. thermoregulation
   c. negative feedback
   d. regulatory homeostasis

2. True or false? Organism must maintain homeostasis because optimal enzyme activity is achieved within a very narrow range of conditions.
   a. True
   b. False

3. Which of the following actions is not a function of the epithelium?
   a. Controls the exchange of nutrients between the internal and external environments
   b. Allows the internal environment to alter its conditions to match those of the external environment
   c. Creates an internal environment that is different from the external environment
   d. Regulates the excretion of waste

Topic 1: Tutorial about Ben’s problems with homeostasis. The URL for the tutorial is listed at the top of this page.

As you go through the tutorial, answer the questions below.

1. At 8 am, Ben’s blood pressure plummets. List the two body parts that respond to the problem with blood pressure according to the tutorial in the order that they respond.

2. By 8:30 am, Ben falls victim to a jacket thief. Work through this section of the module and then use the information from pages 9-11 of your textbook to identify the control center and effectors used in the shivering response.

   Control center:

   Effector:
3a. What happens to Ben at 11:50 am? (Be specific)

b. Is this an example of positive or negative feedback?

4. Which two body parts are involved in the homeostasis challenge that occurs at 5 pm?

5. At 8:30 pm, Ben is dehydrated. What are the three steps in the process used to regulate his plasma osmolality?
   1.
   2.
   3.

6. At 12 am, Ben’s glucose levels increase.
   a. Which part of his body reacts first?
   b. List ALL of the organs that respond next.
NARRATION

Homeostasis
All animals must minimize variations in such internal conditions as body temperature, blood pressure, blood pH, level of hydration, and blood glucose concentration—even though the external environment is constantly changing. Some animals are more tolerant of fluctuations than others, but all must maintain a stable internal environment. Animals have evolved various mechanisms to achieve this homeostasis, but all homeostatic mechanisms operate in the same general way.

As an example of homeostatic control, we will use body temperature in an endotherm, an animal that uses heat from metabolism to regulate its body temperature.

The thermometer on the right shows a mammal’s actual body temperature. The thermometer on the left shows its preferred temperature, or set point. Each type of animal has its own set point—a normal or target value—for each regulated internal condition. The set point is like the target value on a thermostat.

Sensors are cells, organs, or structures located throughout the body that perceive changes in some parameter of the external or internal environment. An example is body temperature. In animals, sensors are nerve cells specialized to detect a specific type of stimulus. Sensors continuously transmit information from this stimulus to an integrator.

An integrator is a component of an animal’s nervous system that compares the incoming information with the set point. Most integrators are a part of the brain or central nervous system.

If the value of the stimulus being sensed is higher or lower than the set point, the integrator sends this information to an effector—a cell, organ, or structure that takes appropriate action to return the value to the set point.

The process of homeostatic control is continuous, so sensors also monitor changes made by the effector.

Consider what happens in a mammal when the sensor detects a body temperature that is lower than the set point.

Sensory information flows from the sensor to the integrator. The integrator then compares this information with the set point and detects that body temperature is too low.

Next, the integrator sends instructions to the effector. The effector responds by taking action—for example, inducing shivering to generate more metabolic heat or fluffing up fur to improve insulation—to move body temperature back toward the set point. The sensor measures the modified temperature and sends this information to the integrator.

This mechanism continues until the set point has been reached.

When the body temperature overshoots the set point, the integrator detects that the temperature is too high and sends instructions to the effector. The effector responds with actions to increase the removal of heat from the body. These actions might include inducing panting and dilating blood vessels. The sensor detects the new body temperature and sends the information to the integrator.

When body temperature is back to the set point, the integrator stops signaling the effector to take action.

In this way, any deviation from the set point initiates metabolic and behavioral changes to achieve homeostasis. Homeostatic systems are based on negative feedback—a corrective response in which effectors reduce or oppose the change in internal conditions.
KEY TERMS & CONCEPTS

**effector** A cell, organ, or structure that an animal uses to respond to external or internal stimuli. Effectors are usually under control of the nervous system.

**endotherm** An animal that produces adequate heat to warm its own tissues. Birds and mammals are endotherms; most other animals are ectotherms (animals that rely principally on heat gained from the environment).

**homoeostasis** The relatively constant chemical and physical conditions in the cells, tissues, and organs of an animal.

**integrator** A component of an animal nervous system that evaluates sensory information and triggers appropriate responses.

**negative feedback** In homeostatic mechanisms, a corrective response in which effectors reduce or oppose a change in internal conditions.

**sensor** A cell, organ, or structure that senses some aspect of the external or internal environment.

**set point** A normal or target value for a regulated internal parameter, such as body temperature or the level of hydration.

**Postquiz**

1. Which component of a homeostatic system sends instructions based on sensory information?
   a. Effector
   b. Set point
   c. Sensor
   d. Integrator

2. Which component of a homeostatic system perceives changes in some parameter of the environment?
   a. Effector
   b. Set point
   c. Sensor
   d. Integrator

3. Which action does not cool down the body?
   a. Panting
   b. Dilating blood vessels
   c. Shivering
   d. Sweating

4. Which action is an example of negative feedback?
   a. The arrival of platelets at a wound site stimulates the recruitment of more platelets to form a clot.
   b. A person who loses 3 pounds continues to diet to lose an additional 10 pounds.
   c. Glucagon is secreted after eating to raise blood sugar level.
   d. Insulin is secreted after eating to lower blood sugar level.
Homeostasis Quiz

1. Which of the following is recovered in the collecting duct of the nephron?
   A. NaCl
   B. Glucose
   C. Water
   D. Potassium

2. The _________ leads from the kidney, to the bladder.
   A. Urethra
   B. Collecting Duct
   C. Glomerulus
   D. Ureter
   E. Loop of Henle

3. _________ systems are more common in vertebrates.
   A. Negative Feedback
   B. Regulator
   C. Positive Feedback
   D. None of the above

4. The component of the body that relays information to the appropriate regulator is:
   A. Efferent nerve
   B. Coordinating Center
   C. Sensor
   D. Regulator
5. The hormone that is made from cholesterol, and is insoluble in water is a:
   A. Steroid Hormone
   B. Protein Hormone

6. The protective coating that covers the device that carries impulses towards the cell body are called:
   A. Axon
   B. Dendrites
   C. Myelin Sheath
   D. Schwann's Cells

Using the above image, answer the following 3 questions
7. #2, is the _________
   A. Glomerulus
   B. Bowman's Capsule
   C. Collecting duct

8. # 6 is the _________
   A. Renal Vein
   B. Loop of Henle
   C. Glomerulus
   D. Collecting duct

9. The _________ transport blood to the glomerulus
   A. Afferent arterioles
   B. Collecting Duct
   C. Efferent Arterioles
   D. Bowmans Capsule

10. Process that slows down or stops reactions reducing its effects or stimulus.
    A. Dynamic Equilibrium
    B. Positive Feedback
    C. Static Equilibrium
    D. Negative Feedback
11. The Autonomic Nervous System is made up of:
   
   A. Skeletal Muscles  
   B. Smooth Muscles  
   C. Skin  
   D. Cardiac muscles  
   E. a & c  
   F. c & d  
   G. b & d

12. Number 4 would be labelled as:
   
   A. Myelin Sheath  
   B. Axon  
   C. Dendrites  
   D. Node of Ranvier
13. #5 Would be labelled as:
   A. Neuron
   B. Axon
   C. Dendrite
   D. Body

14. #3 Would be labelled as:
   A. Nucleus
   B. Cell Body
   C. Node of Ranvier
   D. Schwann Cell

15. The area between the myelin sheath causes ____________ to occur
   A. Slowed action potential
   B. Saltatory Conduction
   C. Parasympathetic Reaction
   D. None of the Above

16. Neuron with short dendrites, and a long axon that carries messages away from the Central Nervous System:
   A. Afferent Neurons
   B. Association Neurons
   C. Efferent Neurons
17. ______ ADH causes the nephrons to become more permeable to water
   A. Decreased
   B. Glycine
   C. Increased
   D. Maintaining

18. During a simple reflex, the stimulus travels along the following pathway:
   A. Motor Neuron, Interneuron, Sensory Neuron, Sense Organ
   B. Interneuron, Motor Neuron, Sense Organ, Sensory Neuron
   C. Sensory Neuron, Motor Neuron, Interneuron, Sense Organ
   D. Sense Organ, Sensory Neuron, Interneuron, Motor Neuron

19. Gatekeeper of the brain:
   A. Cerebellum
   B. Thalamus
   C. Cerebrum
   D. None of the above
20. The __________ controls the flight or fight reaction.

   A. Cerebellum
   B. Sympathetic System
   C. Pituitary
   D. Parasympathetic

Refer to this diagram for the following 4 questions (21-24)

21. A Would be labelled as:

   A. Thyroid
   B. Pituitary
   C. Adrenal Gland
22. D would be labelled as:
   A. Hypothalamus
   B. Adrenal Gland
   C. Male Testes

23. C would be labelled as:
   A. Parathyroid
   B. Pancreas
   C. Thyroid

24. E would be labelled as:
   A. Pituitary
   B. Female Ovary
   C. Pancreas

25. These cells produce insulin
   A. Beta Cells
   B. Alpha Cells

26. When the action potential begins, and sodium ions cross over, the polarity changes to:
   A. Positive inside, Negative outside
   B. Negative inside, Positive inside
   C. No difference in charges
   D. None of the above
27. ______ is released when blood sugar is too high.
   A. Glucagon
   B. Glycogen
   C. Insulin
   D. None of the Above

28. This hormone is associated with thermoregulation:
   A. TSH
   B. Glucagon
   C. T3
   D. Insulin

29. Part of the nerve cell that carries messages away from the cell body:
   A. Dendrite
   B. Myelin Sheath
   C. Axon
   D. Node of Ranvier

30. A combined Endocrine and Exocrine gland:
   A. Adrenal Gland
   B. Thyroid
   C. Pancreas
   D. Hypothalamus