Grade: 6th

Topic: Human Body Systems

Title: *The Body as a System*

Objective:

Student will identify an example of a feedback mechanism within a system that serves to keep changes within specified limits.

Standards:

6.3.17 - Recognize and describe that energy is a property of many objects and is associated with heat, light, electricity, mechanical motion, and sound.
6.4.11 - Describe that human beings have body systems for obtaining and providing energy, defense, reproduction, and the coordination of body functions.
6.7.1 - Describe that a system, such as the human body, is composed of subsystems.
6.7.3 - Identify examples of feedback mechanisms within systems that serve to keep changes within specified limits.

Materials:

- Chalkboard or overhead

Activity: 1. Ask students: "Why is the human body considered a system?" Have students answer in their science notebooks.
2. Discuss with students how the human body has parts and processes that interact and are interrelated.
3. Ask students: "What is a healthy human's average body temperature?"
4. Discuss with students how the average human's body temperature is 37° Celsius (98.6° Fahrenheit). Have students write this in their science notebooks.
5. Ask students: "Do we always have a body temperature of 37° Celsius?"
6. Discuss with students how a person's body temperature can rise when he/she is sick and when he/she exercises.
7. Ask students what ideas they have on how humans get their body temperatures back to 37° Celsius after they have been sick or have exercised.
8. Instruct students to look around the room briefly to observe the physical condition of their classmates. Have students write their observations in their science notebooks.

9. Tell students that they are about to do 30 jumping jacks without stopping. Have students make predictions as to how they will be different after doing the jumping jacks. After they have written their predictions, have students complete the 30 jumping jacks.
10. When everyone has completed 30 jumping jacks, ask the students to look around and observe each other a second time. Have students record their observations in their science notebooks.
11. Ask students: "What do you notice about each other that is different from before you did the jumping jacks?" Students may want to make a Venn diagram comparing and contrasting this topic in their science notebooks.
12. Discuss with students how they might look flushed (red or pink skin) and/or be sweating. Have students draw a picture in their science notebooks of what someone would look like if they looked flushed.
13. Ask students to discuss why they might get flushed and sweaty during and after exercise. Students should write their responses in their science notebooks.
14. At the conclusion of the activity, ask questions such as the following:
    - What is one feedback mechanism that can occur in the human body when body temperature rises?
    - Why does this feedback mechanism take place when the body's temperature rises?

15. Discuss with students how exercise creates heat energy in the cells of the body, which raises the body temperature. Explain that the body has cooling mechanisms such as vasodilatation (the enlargement of blood vessels to release heat away from the body) and sweating (to release heat through evaporation). Explain that these two responses help bring the body temperature back to about 37° Celsius.

Follow-up Activity:

1. Write the term "feedback mechanism" on the chalkboard or the overhead.
2. Ask students what they think the term means. Students may write their response in their science notebooks.
3. Discuss with students how feedback mechanisms serve to keep systems within specified limits.
4. Write the following words/phrases on the board: "System," "Specified Limit," "Change of System," and "Feedback Mechanism or Response." Have students copy this as a chart in their science notebooks.
5. Divide students into small groups and direct them to use the example of maintaining a body temperature of 37° Celsius to identify examples of the phrases you listed on the board or overhead. Students should write these examples in their science notebooks.
6. Ask a group to write its responses on the chalkboard, under each listed word. Review the student responses and discuss with students that the system is the human body, the specified limit is a body temperature of 37° Celsius, the change in the system is the body temperature rising because of

exercise, and the feedback mechanism or response is vasodilation and/or sweating. Students should write responses in their science notebooks.
7. Ask students: "What is the purpose of this feedback mechanism?"
8. Discuss with students that the purpose is to maintain a body temperature within the proximity of 37° Celsius. Students should write this in their science notebooks.
9. Ask students if they can think of any other types of feedback mechanisms and write them in their science notebooks.

Additional Follow-up Activity**:**

Discuss with students how when an animal is cold, it shivers, generating heat energy to regulate its body temperature. Explain that this is another example of a feedback mechanism. Have students think of another feedback mechanism and think, draw, and write in their science notebooks.

Adapted from Indiana Standards Resources Grade 6.

Assessment: 0-4 Scale

4 – Exceptional
3 – Expected
2 – Developing
1 – Beginning
0 – Non-existent

Criteria:

1.) Student recorded reasonable predictions and observations in their science notebooks. _____

2.) Student participated in the activity by performing the 30 jumping jacks. _____

3.) Student produced proper drawings, diagrams, and charts in their science notebooks. _____

4.) Student cooperated with others within their group and stayed on task throughout the activity + _____

TOTAL _____

	÷ 4 =		
TOTAL		FINAL SCORE	