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| **Teachers: Ms. Pedrazine, Ms. De la Garza, Mr. Hastey, Mr. Shuyler, Dr. Jeffery** |
| **Date:** March 24, 2016 (STEM Thursday) |
| **Subject / grade level:** 7th Grade Science – ***Digestive System*** |
| **Materials:**    **Per Student:**   1. liver lab student hand-out 2. Safety goggles 3. Non-latex gloves 4. candy   **Per Group:**  1. liver  2. Scissors  3. Beaker  4. Hydrogen peroxide  5. Thermometer  6. Stopwatch |
| **TEKS:**  **7**.(6) Matter and energy. The student knows that matter has physical and chemical properties and can undergo physical and chemical changes. The student is expected to:  ((B) distinguish between physical and chemical changes in matter in the digestive system; and  7.(7) Force, motion, and energy. The student knows that there is a relationship among force, motion, and energy. The student is expected to:  (B) illustrate the transformation of energy within an organism such as the transfer from chemical energy to heat and thermal energy in digestion. |
| **ENGAGE**    Video of human digestive system and the digestion process    **Probing/Eliciting Questions:**   1. What is the name of the (clear) substance that helps to break down your food as soon as you place food in your mouth? (saliva) 2. What is the name of the organ that begins the digestive process? (mouth) 3. What organ is responsible for chemically and mechanically breaking down/digesting the food you eat? (stomach) |
| **EXPLORE**  Card sort w/digestive system terminology   1. Review physical and chemical changes with class.    1. Ask students if they are aware of the differences between a physical and chemical change    2. Explain the differences between chemical and physical changes    3. Give students examples of physical and chemical changes and have them identify if the change is physical or chemical THINK PAIR SHARE    4. Examples to give:       1. Beaker of boiling water on a hot plate boiling (P)       2. Pieces of paper being cut into smaller pieces (P)       3. Mix baking soda and vinegar in a beaker (C)       4. An ice cube melting (P)       5. Burning a sugar cube (C)       6. A rusting nail (C) 2. Just as there are physical and chemical changes in the world around us, there are physical and chemical changes within the digestive system. 3. You will be manipulating a card sort with terms we will be using during this lesson. 4. You are to match the term with the correct definition and picture. 5. 5-7 minutes   **Academic Terms-**   * Digestion: the process by which food is broken down into substances that can be used by the cells of the body * Mechanical digestion: this occurs as the food is broken down into smaller pieces * Chemical digestion: the process by which foods are chemically changed into simpler substances * Enzyme: a protein substance that speeds up chemical reactions and breaks down large molecules into small molecules * Peristalsis: the squeezing motion that pushes food through the digestive system * Thermal energy: chemical reactions that break down food create this * Digestive system: all of the parts of the body needed to mechanically and chemically break down food * Chemical change: change in the identity of a substances that results in creating a new substance * Physical change: change in the properties of a substance * Mouth: breaks down food into small pieces and mixes food with saliva to start the digestive process * Stomach: chemically and mechanically digests food * Esophagus: pushes food from the throat down to the stomach * Small intestine: absorbs nutrients and helps digest food * Large intestine: absorbs water and passes useless waste from the body   **Probing/Eliciting Questions:**   1. Explain why peristalsis is important to the digestive system. 2. Differentiate between chemical and physical digestion. 3. Can you name some enzymes that are part of the digestion process? Saliva (salivary amylase), pepsin & hydrochloric acid (stomach), intestinal juices |
| **EXPLAIN**   * **Students discuss the card sort & refer back to the video**     **Probing/Eliciting Questions:**   1. What is the name of the organ that connects the mouth to the stomach? 2. What is the function of the small intestine? Large intestine? 3. What is mechanical digestion? Can you provide an example? 4. What is chemical digestion? Can you provide an example? 5. What is thermal energy? |
| **ELABORATE**  Liver Lab: Mechanical and Chemical Digestion **(Valeria - Data table handout w/ space for students to illustrate and jot down their observations)**  **Procedure:**   1. Utilize the data table provided to you to record the initial temperature and five temperatures taken at 2 minute intervals (total of 10 minutes). Your instructor will provide more details before you begin. 2. Put on your safety goggles. 3. If you are handling the liver, put on gloves. 4. Cut the liver into smaller pieces with the scissors (size of thumbnail). 5. Pour 100 mL of hydrogen peroxide into the beaker. 6. Place the thermometer in the beaker of hydrogen peroxide. Record the initial temperature. 7. Place the liver pieces in the beaker of hydrogen peroxide. Record your observations. 8. Record the temperature of the thermometers at intervals of 2 minutes for 10 minutes. 9. Clean up - Pour off the hydrogen peroxide, and dispose of it according to your teacher’s instructions. Remove the liver from the hydrogen peroxide, and properly dispose of the liver. 10. Answer the questions on your data table handout using complete sentences.   ·  **Probing/Eliciting Questions** *(Included in lab packet)***:**   1. How did cutting the liver into smaller pieces represent digestion? 2. How did placing the liver in the hydrogen peroxide represent digestion? 3. Use your data to explain what happened to the energy during the investigation. 4. What type of energy is being released? 5. Illustrate the energy transformation. 6. Summarize how this investigation models digestion. |
| **EVALUATE (Valeria)**   * Students eat a piece of candy and explicitly describe digestion process/physical and chemical breakdown in their own words. * Students are to eat a piece of candy and keep in mind while eating this candy what are their thoughts as to what is going on in their digestive system. * Students should be able to explain     **Probing/Eliciting Questions:**  1. What are some terms you remember using earlier?  2. How will you describe the digestive process as you ate your piece of candy? Describe this process utilizing the science terminology we’ve used today in calss.  3. Do you think both animals and human beings have the same digestive system? Why or why not? |

**Closure Statement:**

Today’s lesson objectives were to:

* distinguish between physical and chemical changes in matter in the digestive system; and
* illustrate the transformation of energy within an organism such as the transfer from chemical energy to heat and thermal energy in digestion

Can you tell us one thing you’ve learned today about the digestive system, using the terminology we’ve used in today’s lesson? (Teacher will call on at least one student from each lab group).

Thank you for allowing us to teach you and learn with you today! :)