

Stephanie Evans

EDPS 5442

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Machines Get Hot Lesson Plan

Unit: Temperature

Lesson: *Machines Get Hot*

Grade Level: 3rd Grade

Aspects of Science

The lesson is intended for a third grade science class and is part of a temperature unit. There are four lessons in the unit and each lesson was created by a different teacher. The lesson will take 1½ hours to complete. There are five sections (the warm-up, lesson, activity, evaluation, and application) to this lesson and each will take 15 to 20 minutes to complete.

The aspect of science that will be explored in the lesson is the motion of rubbing objects together. The discovery will be that rubbing any objects together produces heat, and sometimes light. Students will find that this heat, and sometimes light, can be produced in mechanical and electrical machines (Utah Core Standard 5, Objective 2).

References

Utah Education Network Website

The lesson is adapted from *Things are Heating Up* lesson plan found on the Utah Education Network Website under Third Grade Science, Standard 5, Objective 2 (<http://www.uen.org/Lessonplan/preview?LPid=11071>).

Book

The book, *Hands-on Physical Science Activities*, by Marvin N. Tolman is used to help the teacher gain background knowledge for the lesson. The specific pages the teacher will read are p.188 “What Happens When You Rub Your Hands Together?” and pp. 189-193 “Friction.” Book is published by: Parker Publishing Co. (ISBN 0-13-230178-4).

Technology Support Tool

The lesson will be supported by a SMART Board, PowerPoint presentation, and Pdf worksheet. The SMART Board will be the technology used to display the PowerPoint presentation. The PowerPoint presentation will be the technology used to introduce the students to the concept of friction through its displays (i.e., directions of what to do throughout the warm-up activity, the lesson, and the lesson activity). The Pdf worksheet is the technology designed to carry out the lesson activity (i.e., the scavenger hunt).

Lesson

Performance Objective: Students will be able to categorize the heat of electrical and mechanical objects by going on a scavenger hunt in small groups.

Lesson Materials:

- ❖ SMART Board
- ❖ PowerPoint Presentation
- ❖ 28 Student science journals
- ❖ 28 Pennies
- ❖ 28 Pieces of wool
- ❖ 28 Half sheets of paper
- ❖ *Rubbing Other Objects Together* instruction sheet
- ❖ 1 Mechanical Pencil Sharpener
- ❖ 1 Blender
- ❖ 1 Thermometer
- ❖ Water
- ❖ Pre-numbered *Things Are Heating Up* handout (Pdf worksheet)
- ❖ Parent Supervisors

Technology:

The SMART Board will be the technology used to display the PowerPoint presentation. The PowerPoint presentation will be the technology used to introduce the students to the concept of friction through its displays (i.e., directions of what to do throughout the warm-up activity, the lesson, and the lesson activity). The Pdf worksheet is the technology designed to carry out the lesson activity (i.e., the scavenger hunt).

Warm-up:

Introduce the Concept of Friction with activity *Producing Heat*

- Students will be asked to hold their hands together, palms touching. The teacher will ask: Do they feel cold, warm, damp, or sticky? (This question will be displayed on the SMART Board in a PowerPoint Presentation). Students will record the question and their observations in their science journals.

- Students will be asked to make a hypothesis by answering: What will happen if hands are rubbed together? (Question displayed). They write and answer this question in their science journals.
- Students are instructed to rub their hands together very fast for ten seconds (the teacher will time her class with a kitchen timer). When the timer goes off, students will be told to place their hands on their cheeks, and they will do so.
- The Teacher asks: What happened? (Question displayed). The teacher will call on a few students, who raise their hands, to answer this question. After a few students have answered this question, the teacher will display “The observation: The movement of your hands caused heat!” on the Board. Students will be asked to write this observation in their science journals.
- Students will be asked to rub their hands together again, but this time faster, and place their hands on their cheeks. The teacher asks: Do you feel more heat? (Question displayed). Students will write the question and their observations in their science journals.
- The teacher will show an example of how to determine whether or not a hypothesis is true. The teacher will display a previously made chart on the screen (the chart has two columns; column one says Hypothesis and column two says Actual Result). Students will be asked to draw a similar chart in their science journals.
- After the students have drawn the chart, the teacher will compare her hypothesis to what really happened, by displaying her hypothesis to the rubbing hands question in the hypothesis column and the actual result of the rubbing hands question in the actual result column. The teacher will ask her students to talk with a partner to determine whether or not her hypothesis is true. After her students converse, she will call on a few students to tell her if her hypothesis is correct or incorrect. Once a few students have shared their opinions, the teacher will display the way to tell if a hypothesis is correct (i.e., A hypothesis is correct if it is the same as the actual result). The teacher will then display a smiley face under her hypothesis if it is correct or a frowny face if it is incorrect. The teacher will ask her students to perform the same process with their hypothesis and actual result.
- After students have figured out if their hypothesis is correct or incorrect, the teacher will display the Results page on the Board and ask her students to write the word Results on the top of a new page in their science journal. The teacher will display her results (i.e., “My hypothesis was correct (or incorrect) because...” on the results page. She will ask her students to write the same prompt and give reasons why their hypothesis was correct or incorrect; making sure they account for their first observations (i.e., hands are cold, warm, damp, or sticky?).
- Once a student finishes writing, the teacher instructs students to get an instruction sheet, a penny, a half sheet of paper, and a piece of wool from the front of the room and take it back to their desk. Students read the instruction sheet and try rubbing the objects they got to see if they produce heat.
 - For about ten seconds, students rub a penny with wool and a penny with a half sheet of paper. Students touch the penny, touch the wool, and touch the paper. On the instruction sheet, the students are asked to write the question: “What happened to the penny, wool, and paper?” and their answer to the question in their science journals.
- Even if students have not completed the writing of their results from their rubbing hands hypothesis or the rubbing other objects activity, the teacher will address the class with this final question: What happens when two objects are rubbed against one another? (Question displayed) Students will be asked to write the question and their answer in their science journal. The teacher

will call on a few students to share their answers. Then she will display on the board: “One possible answer is: Heat is produced when two objects are rubbed together.”

Lesson:

Transition→Just like your hands and other objects produce heat when you rub them together or with other things, electrical and mechanical machines produce heat as their different parts rub together.

Introduction→Today we are going to explore how heat is produced in mechanical and electrical machines.

- The teacher asks students: What machines produce heat? (Question displayed). Students will write the answer to this question in their science journals.
- The teacher displays the types of machines that produce heat (i.e., mechanical and electrical machines) and their definitions of mechanical and electrical machines on the SMART Board.
 - Electrical machines are those that have moving parts, but work by the use of a motor.
 - Mechanical machines are machines that have moving parts, and the parts can be put into motion by a person.
- The teacher brings out two different machines; one mechanical and electrical. The mechanical machine is a mechanical pencil sharpener and the electrical machine is a blender. (The teacher will use these machines to demonstrate some machines conducting heat). The teacher will ask her students to make two columns on a new page in their science journals. The first column will be labeled mechanical machines and the second column will be labeled electrical machines. Students will draw the examples of each machine and write the definition of each example under the labels of the kind of machine they are in their science journals. (The final look of the columns will be displayed in PowerPoint).
- Students will bring their science journals and gather in a semi-circle at the front of the room (this way they can be near the machines when they produce heat). The teacher will take the mechanical pencil sharpener and crank the handle for five seconds. The teacher will take the cover off and let the class come up, a few students at a time, and feel the grinding gears. Once all the students have felt the heat of the gears, the teacher asks: What happened when the grinding gears rubbed together? (Question displayed). Students will write the question and their answer in their science journals. The teacher calls on a few students to share their answers. The teacher asks: On a scale of 1 to 5, how hot were the grinding gears of the pencil sharpener when you touched them? (Question displayed). Students will write this question and their answer in their science journal. The teacher calls on a few students and writes down their answers using the SMART Board. The teacher then asks the students she called on to share why they think their rating is correct (there is no right or wrong answer. Students just need to explain why they think what they do).
- The teacher fills up the blender with water and measures the temperature of the water before it is turned on. The teacher writes the temperature on the SMART Board, and then turns on the blender for five seconds. The temperature of the water is taken again and written on the SMART Board under the first temperature reading. The teacher asks: What happened to the temperature

of the water after the blender was turned on? (Question displayed). Students are instructed to write the question and their answer in their science journal. The teacher calls on a few students to share their answers.

- Students are dismissed to from the semi-circle and return to their seats with their science journals.

Activity:

Transition→As a class we are going to explore the school to see what other machines produce heat by going on a “Heat Scavenger Hunt.” (The school will know about the scavenger hunt, so they will be prepared for the students).

- Students are given a piece of a picture of a mechanical or electrical machine. It is placed face down on their desks. The teacher tells the students to flip over their piece and instructs them to find the students who will help them complete the picture. Before they are dismissed to find their group, students are told that once they have a complete picture, to sit together with their group on the floor in the front of the room (the students will make four groups of seven).
- Once the students are on the floor, the teacher asks each group to stand up and tell the class what their picture is of. Then teacher then asks: What kind of machine is the picture—mechanical or electrical? If the group does not know, the teacher will ask for the class to come up with the answer.
- Once each group has presented their picture, the teacher hands each of her students a Pdf handout called *Things Are Heating Up* (Displayed on SMART Board).
- The teacher explains the roles of each student in the group (the assignments are displayed in PowerPoint):
 - If you have the number 1 on the top of your page, you will make the final decision of what the machine is—mechanical or electrical. Put the name of the machine in the first or second column, depending on what your group’s answer is. However, before you write down the name of your machine in its proper column, make sure you have talked with your entire group first and have come up with the answer together.
 - If you have the number 2 on the top of your page, you will make the final decision on whether the machine produces heat or light. Put a check mark in the third or fourth column of the handout, depending on your group’s answer. However, before you write the check mark, make sure you have talked with your group and come up with the answer together.
 - If you have the number 3 on the top of your page, you will make the final decision of how hot your group thinks the machine is on a scale of 1 to 5. Also, make sure that you have talked with your group before you circle the final answer.
 - If you have the number 4 on the top of your page, your job is to make sure that everyone in your group, including yourself, have completed their worksheet by putting the information talked about in the group in the proper columns. Also, make sure your group, including yourself, glues the completed *Things are Hating Up* handout into your science journal.

- Student groups are dismissed to go on their scavenger hunt with their parent supervisor (Students will have fifteen minutes to find as many machines as they can. The parents are there to supervise that the students do what they need to do without disrupting other classes or mishandling machines. Also, they will help students complete their assignment in the allotted time).
- After fifteen minutes, students will be instructed by the teacher, as they come in, to sit on the floor with their group in the front of the room.

Evaluation:

Student groups are asked to explain their findings to the class.

- The teacher will ask a group to come up to the front of the class and read their findings:
- Student with role number 1 will read the answer the group came up with, and the class will raise their hands to agree or disagree with the type of the machine. If the class disagrees, the group presenting will explain the reason for their answer.
- This process will be repeated through every student role and group, until all student groups have presented.

Application:

At the end of the lesson, the teacher will ask students to write down the following questions in their journals (Displayed in PowerPoint):

- ❖ What kind of machines do you use in your home?
- ❖ Are the machines you use mechanical or electrical?

Then, the teacher will ask students to:

- ❖ Explore the machines in your home, write your observations in your science journals, and share your findings with your family.

Expectation of Technology

The technology used (i.e., the SMART Board, PowerPoint presentation, and Pdf worksheet) will enhance the learning of the students because it will allow them to visual what the intent of the lesson is and how to perform the needed objectives within the lesson and its activities.