



## CHAIN REACTION MACHINES

### LESSON 1: Who was Rube Goldberg?

| LESSON OVERVIEW                                                                                                                                                                                                                                                                                                           | GRADE LEVEL | BASE LESSON TIME                                                         |
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| In this lesson, students will be introduced to Chain Reaction Machines and how they combine a series of complicated steps to complete an ordinary, simple task. Students will learn about Rube Goldberg and his wacky inventions and cartoons and how he has come to be known for his examples of these complex machines. | K-8         | 30-50 minutes<br><i>More time used if playing Mouse Trap Board Game.</i> |

| TEACHER/LEADER TIPS                                                                                                                                                                                                                                                                                                                                                                                                            |
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| <p>Teachers may choose to play the Mousetrap Game in class as part of this lesson as an example of how a simple task can be made complicated in a chain reaction machine. Please allow more time for this lesson if playing the board game with students.</p> <p>Teachers may choose to show the accompanying Google Slides: YIP Chain Reaction Machine Lesson 1 with the class while guiding students through the lesson.</p> |

| GETTING YOURSELF READY                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                               |
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| <b>Materials:</b> <ul style="list-style-type: none"> <li>Google Slides: YIP Chain Reaction Machine Lesson 1: Who Was Rube Goldberg?</li> <li>Mouse Trap Board Game, (optional)</li> <li>Video Link (included in Google Slides): Goldie Blox Commercial, (2:05 minutes), <a href="https://www.youtube.com/watch?v=M0NoOtaFrEs&amp;feature=youtu.be">https://www.youtube.com/watch?v=M0NoOtaFrEs&amp;feature=youtu.be</a>)</li> <li>Video Link (included in Google Slides): CBS News, Jan. 26, 2014, (6:54 minutes)</li> </ul> | <b>Your Preparation:</b> <ul style="list-style-type: none"> <li>Set up Google Slides: Lesson 1; test internet and videos</li> <li>Set up MouseTrap Board Game (optional, game made by Hasbro and can be purchased at stores such as Khol's, Target or Amazon)</li> <li>Print Lunch Tray Labyrinth worksheet</li> </ul> | <b>Agenda:</b> <ul style="list-style-type: none"> <li>Warm-Up: MouseTrap Board Game and/or Chain Reaction Machine Video (10-40 minutes, depending on if you play game)</li> <li>Instruction: Who Was Rube Goldberg® (10 minutes)</li> <li>Activity: Lunch Tray Labyrinth (15 minutes)</li> <li>Closure (5 minutes)</li> </ul> |

| <p><a href="https://www.cbsnews.com/video/rube-goldberg-the-father-of-inventions/">https://www.cbsnews.com/video/rube-goldberg-the-father-of-inventions/</a></p> <ul style="list-style-type: none"> <li>• Lunch Tray Labyrinth worksheet</li> <li>• Pens/pencils</li> </ul>              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |  |
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| GETTING YOUR STUDENTS READY                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |  |
| <p><b>Objective:</b></p> <p>Students will be able to understand the concept of a Chain Reaction Machine and how it uses a complex approach to complete a simple task. Students will be able to create their own complex model to complete an ordinary task to apply their knowledge.</p> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |  |
| CONTENT                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |  |
| <p><b>Warm Up:</b></p> <p>Mousetrap Game and/or Chain Reaction Machine Video (5-40 minutes, depending on if you play game)</p>                                                                                                                                                           | <p>Ask students if anyone has ever played the board game Mouse Trap- a game in which players try to capture an opponents' mouse using the game's complicated mouse trap.</p> <p><i>(Note to teacher: If desired, you may choose to play Mouse Trap with your students. If you do not play the game, continue the lesson and share the video below.)</i></p> <p><b>Share Video:</b> Share the original GoldieBlox commercial which features a clever chain reaction and aired in 2014. GoldieBlox was a company started by a female student at Stanford University in 2012. Her vision was to create construction and engineering kits for girls. (Video is included in Google Slides: Lesson 1)</p> <p><b>Link:</b> <a href="https://www.youtube.com/watch?v=M0NoOtaFrEs&amp;feature=youtu.be">https://www.youtube.com/watch?v=M0NoOtaFrEs&amp;feature=youtu.be</a>, GoldiBlox, 2014, (2:05 minutes)</p> <p>Ask students if they have ever tried to make something simple, more complex- ask for examples (such as climbing out of the way back of the car rather than using the regular passenger door or eating peas with a knife.)</p> <p>Talk about this approach to problem solving. Ask students to think about the need for simplicity when creating inventions and solving problems, and also the pitfalls of complexity.</p> |  |
| <p><b>Instruction:</b></p> <p>Who Was Rube Goldberg? (10 minutes)</p>                                                                                                                                                                                                                    | <p><b>Share Video:</b> Share the CBS News video about the life of Rube Goldberg. (Video is included in Google Slides: Lesson 1)</p> <p><b>Video Link:</b> <a href="https://www.cbsnews.com/video/rube-goldberg-the-father-of-inventions/">https://www.cbsnews.com/video/rube-goldberg-the-father-of-inventions/</a>, CBS News, January 26, 2014, (6:54 minutes)</p> <p>Review Rube Goldberg's biography below:<br/> Reuben Lucius Goldberg (Rube Goldberg®) was born in San Francisco in 1883. His father, a practical man, insisted he go to college to become an engineer. After graduating from the University of California, Rube did a short stay with the City of San Francisco Water and Sewers Department. He continued drawing and soon got a job as a sports cartoonist</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |  |

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|                                                                                                                                                                                                                   | <p>for a San Francisco newspaper. An outstanding success, he soon moved to New York, drawing daily cartoons for the <i>Evening Mail</i>.</p> <p>Through his inventions, Rube Goldberg® discovered harder ways to achieve easy results. His cartoons compressed time and were as he said, symbols of man’s capacity for exerting maximum effort to accomplish minimal results. Rube believed that there are two ways to do things, the simple way and the hard way, and that a surprisingly large number of people preferred doing things the hard way.</p> <p>Rube Goldberg’s® work will endure because he gave priority to simple human needs and treasured basic human values. He was sometimes skeptical about advanced technology and big science. While most machines work to make difficult tasks simple, his inventions made simple tasks amazingly complex. Dozens of arms, wheels, gears, handles, cups, and rods were put in motion by balls, canary cages, pails, boots, bathtubs, and paddles.</p> <p>Goldberg’s drawings of absurdly-connected machines accomplishing a simple task in an extremely roundabout way, has meant that his name, Rube Goldberg®, has become associated with any convoluted solution to perform a simple task.</p> |
| <p><b>Activity:</b><br/>Lunch Tray Labyrinth<br/>(15 minutes)</p>                                                                                                                                                 | <p>Complete a “Lunch Tray Labyrinth” in small groups or individually.</p> <p>Distribute the Lunch Tray Labyrinth worksheet to students.</p> <p>Ask students to think of the most complicated way to get the cafeteria tray from Box 1 into the cafeteria window in Box 6. Students may draw an action picture of each device or gadget that moves the tray toward the window without leaving the lunch table. Describe the action on the lines under each box.</p> <p>Following the activity, have students share with the class.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <p style="text-align: center;"><b>CLOSURE</b><br/><i>(Check for Understanding)</i></p>                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <p><b>Closure: (5 minutes)</b><br/>In a Think-Pair-Share, ask students to think of another type of Chain Reaction Machine that they have observed before. They can share where they saw it and how it worked.</p> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |