



FLUENCY,  
ORIGINALITY,  
FLEXIBILITY &  
ELABORATION

*Thinking  
strategies  
to enhance skills  
of analysis,  
creativity,  
and problem  
solving.*

## CREATIVE CONTRAPTIONS

**Brief Description of the Lesson:** Students design complex chain-reaction style contraptions (in Rube Goldberg style) to accomplish a simple everyday task in a humorous way. The components of the chain reaction will show students' understanding of concepts related to force, motion and energy and recall their prior knowledge of simple machines.

**SOL:POS Objective:** *(List number and specific objective.)*

### Science 6.2

The student will investigate and understand basic sources of energy, their origins, transformations, and uses.

### Instructional Strategy:

Generating and Testing Hypotheses- Students use their knowledge of energy to develop a contraption to complete and everyday task.

**Materials:** Pencil, lined paper, drawing paper, Rube Goldberg cartoons (see web site to download examples and biographical information etc.) [www.rube-goldberg.com](http://www.rube-goldberg.com)  
*Mechanical Harry* by Bob Kerr, dominoes or several rectangular blocks

### Enduring Understanding:

- Fluency, flexibility, originality and elaboration are creative thinking processes.
- Inventors combine scientific principles and creative thinking to achieve desired results.
- Understanding cause and effect relationships is important in problem solving.

**Introduction/Essential Questions:** *(What influences your reaction to an issue or a problem?)*

- Why is it important for inventors to be creative thinkers?
- How can a chain reaction be used to accomplish a simple task?
- Why is it important for inventors to be original thinkers?
- When an invention doesn't work as planned, why is being a flexible thinker important?

**Teach and Explore Strategy:** *(Steps in teaching the process and exploring applications)*

Prior to teaching this lesson, be sure to have taught or reviewed the introductory thinking process lesson for fluency, flexibility, originality and elaboration. Help focus students' thinking by reminding them of the metacognitive component of this lesson.

- Ask the class if they have ever seen a wacky, multi step invention that does a simple job such as wake up a sleeping person, turn the page in a book, or turn the TV on.
- Tell the class about Rube Goldberg, the cartoonist, who entertained people with his

**FLUENCY,  
ORIGINALITY,  
FLEXIBILITY &  
ELABORATION**

*Thinking  
strategies  
to enhance skills  
of analysis,  
creativity,  
and problem  
solving.*

cartoons that showed humorous, complex, chain reaction contraptions doing simple everyday jobs or chores. (Show examples from website or other resources)

- Students should notice that each step in the process is part of a chain reaction.
- Ask the students what they know about chain reactions. Use the dominoes or blocks and create to create a line- demonstrate a chain reaction. Ask, What if I had been holding a bell in front of the last domino that fell?
- Brainstorm energy sources, types of energy transformations and students' prior learning of simple machines. How might knowing these science facts help someone create a cause and effect or chain reaction based contraption like Rube Goldberg's?
- Have students identify simple machines or science facts used in Goldberg's contraptions.
- Brainstorm every day simple jobs or chores and list them on the board or chart paper. Examples could include- making toast, washing dishes or a pet, washing a window, putting trash in a trashcan, turning on a lamp, buttoning a coat, blowing out a candle, catching a mouse, planting a bulb, trimming someone's hair, opening a door, etc.
- Students select one of these jobs or their own idea and create a chain-reaction based contraption. The design must include at least six steps and science facts. Should include at least one step related to an energy source or energy transformation **or** one step related to electricity or magnets **or** simple machines.
- Each step should either be numbered 1, 2, 3, etc or lettered A, B, C etc. Students should draw each step in the progression and label the parts.
- Written directions should also accompany the design as in the Rube Goldberg examples. The operation of each step should be described and referred to by number or letter in sequence. Humor can be added at the end as in the Goldberg cartoons.
- Students should also name their invention.

**Assessment Evidence:** (Discussion, teacher observation, completed product, student reflection...)

- Student responses in discussion
- Completed chain-reaction contraption (Consider accuracy of each step, evidence of force, motion or energy concepts, detail and originality)

**Metacognition:**

- What kind of thinking did you use to create your invention?
- What part of the contraption project was easy for you? What was difficult or challenging?
- Compared to other students' ideas, how original was your design?

**Extensions:**

- Students can think of another simple task and create another creative contraption.
- Students can create a 3-D model of their design using construction paper, cardboard, string, rubber bands, recycled junk etc.