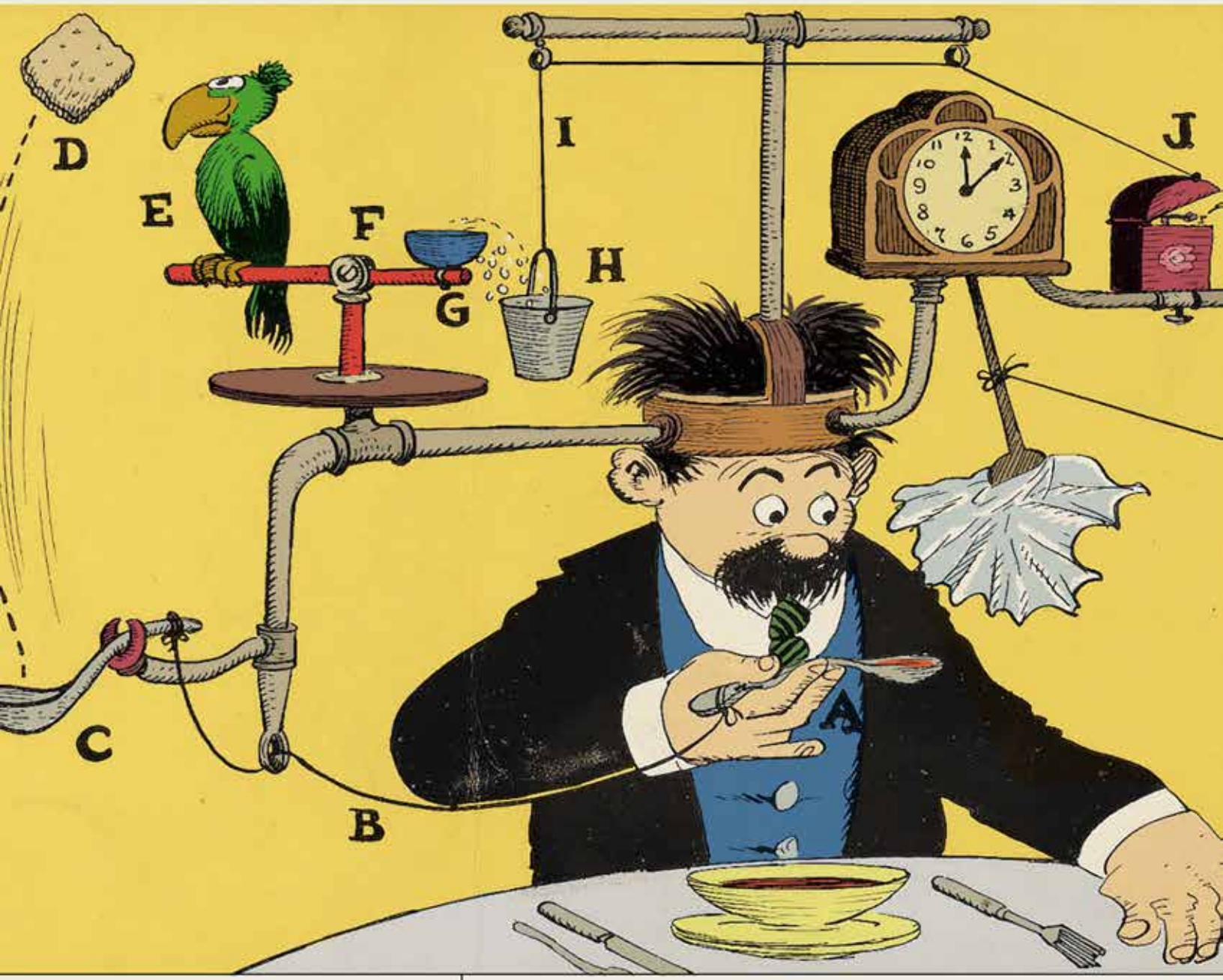
EDUCATION PACKET

The Art of RUBE GOLDBERG



INTERNATIONAL ARTS & ARTISTS | Traveling Exhibitions

Rube Goldberg, *Rube and Father Lighting Cigars*, date unknown. Photograph.

TABLE OF CONTENTS

COVER, Rube Goldberg, *Rube Goldberg Inventions United States Postal Service Stamp* (included on sheet of "Comic Classics" stamps), date unknown. Sheet of USPS stamps. Artwork Copyright © Rube Goldberg Inc. All Rights Reserved. RUBE GOLDBERG ® is a registered trademark of Rube Goldberg Inc. All materials used with permission. www.rubegoldberg.com

EXHIBITION OVERVIEW

Rube Goldberg (1883-1970) was a Pulitzer Prize-winning cartoonist best known for his zany invention cartoons. He was born in San Francisco in 1883 and graduated from the University of California, Berkeley, with a degree in engineering. His first job at the San Francisco Chronicle led to early success, but it was not until he moved to New York City that he became a household name.

Goldberg's crowning artistic achievement is undoubtedly his invention drawings. These overly-complicated chain reaction machines designed to perform simple tasks—from their first appearance in 1912 to the emergence of Goldberg's mature style in "The Inventions of Professor Lucifer G. Butts, A.K." — are a comment on modern life and, as Goldberg himself put it, a "symbol of man's capacity for exerting maximum effort to achieve minimal results." It's estimated that he created approximately 50,000 cartoons in his lifetime.

Rube Goldberg is the only person ever to be listed in a dictionary as an adjective. According to Webster's New World Dictionary, a Rube Goldberg Machine is "a comically involved, complicated invention, laboriously contrived to perform a simple operation." Humor and a narrative separate a Rube Goldberg machine from a chain-reaction machine. Each of Goldberg's cartoons tells a story, and he strove to amuse and delight his viewers through his work.

The Art of Rube Goldberg offers visitors an intimate look at the life and legacy of one of the keenest and wittiest observers of modern times, whose name has entered the cultural lexicon and whose influence continues to reverberate into the 21st century.

Rube Goldberg, *Concept Sketch of Boob McNutt,* c. 1920s. Ink and pencil on paper. Artwork Copyright © Rube Goldberg Inc. All Rights Reserved. RUBE GOLDBERG ® is a registered trademark of Rube Goldberg Inc. All materials used with permission. www.rubegoldberg.com

CURRICULUM GUIDE

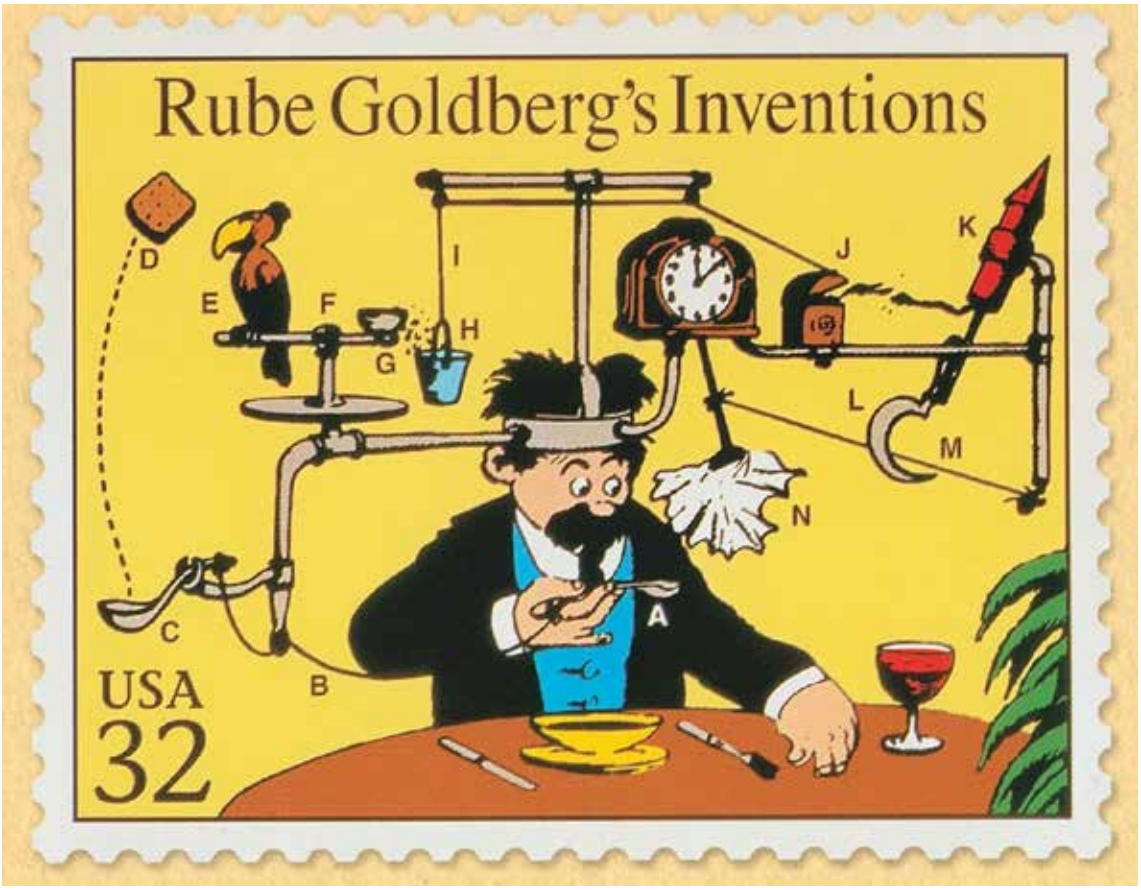
This curriculum guide will provide a framework for understanding simple machines and will provide the following learning outcomes:

1. Understanding of the basic simple machines
2. Evaluating the mechanical advantages of simple machines
3. Designing simple and compound machines

These lessons can be used in succession or separately. We estimate that Lessons 1 and 2 are approximately one class period long, while Lessons 3 through 8 could be two or more class periods long.

The standards used in the development of creating this curriculum are the Next Generation Science Standards, which can be found at the following link: www.nextgenscience.org

The materials for these activities can be found in the Rube Goldberg Machine Speed Trunk, available at: www.rubegoldberg.com/education/teaching-resources/. These materials may also be sourced elsewhere. Please see the additional information section for images of cartoons and links to videos.



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LESSON 1

Draw a Simple Machine Cartoon

MATERIALS/ RESOURCES:

1. An example of a Rube Goldberg cartoon
2. “Drawing Rube Goldberg Machines” worksheet or any size paper
3. Pencils, markers or crayons

PRE-ACTIVITIES:

Students will need to know the following:

- What is work?
- What are the six simple machines?
- How do machines multiply force without multiplying work?

ACTIVITIES:

1. Review cartoons by Rube Goldberg.
2. Show an example of Goldberg’s work and follow each segment to the completion of its designated task, highlighting each simple machine.
3. Explain that a team of students (ideally two students per team) decide on a simple chore or task and devise a “Rube Goldberg” way to accomplish this activity using at least five simple machines.
4. Have students draw a cartoon of their machine labeling each step and making sure to include humorous elements.
5. Have students present their cartoon to the class, explaining how it would work to accomplish their chosen task.

ASSESSMENT:

1. Observe team’s ideas and progress.
2. Check to see if the five simple machines are incorporated in the design.
3. Determine if the machines will accomplish the tasks they are designed to complete.
4. Creativity and imagination are also assessed.

VARIATIONS:

1. Students can work alone, or in larger groups, on their cartoon.
2. Students can collage pictures of objects into their cartoons instead of drawing them.

LESSON 2

Human Rube Goldberg Machine

MATERIALS/ RESOURCES:

1. An example of a Rube Goldberg cartoon
2. Space: open space such as a gym or hallway; or have the students use the perimeter of the classroom with desks pushed in to center
3. Video Examples: www.youtube.com/watch?v=4MiYtvbK4JY

PRE-ACTIVITIES:

Students will need to know the following:

- What is a Rube Goldberg Machine?
- What are the six simple machines?
- How do machines multiply force without multiplying work?

ACTIVITIES:

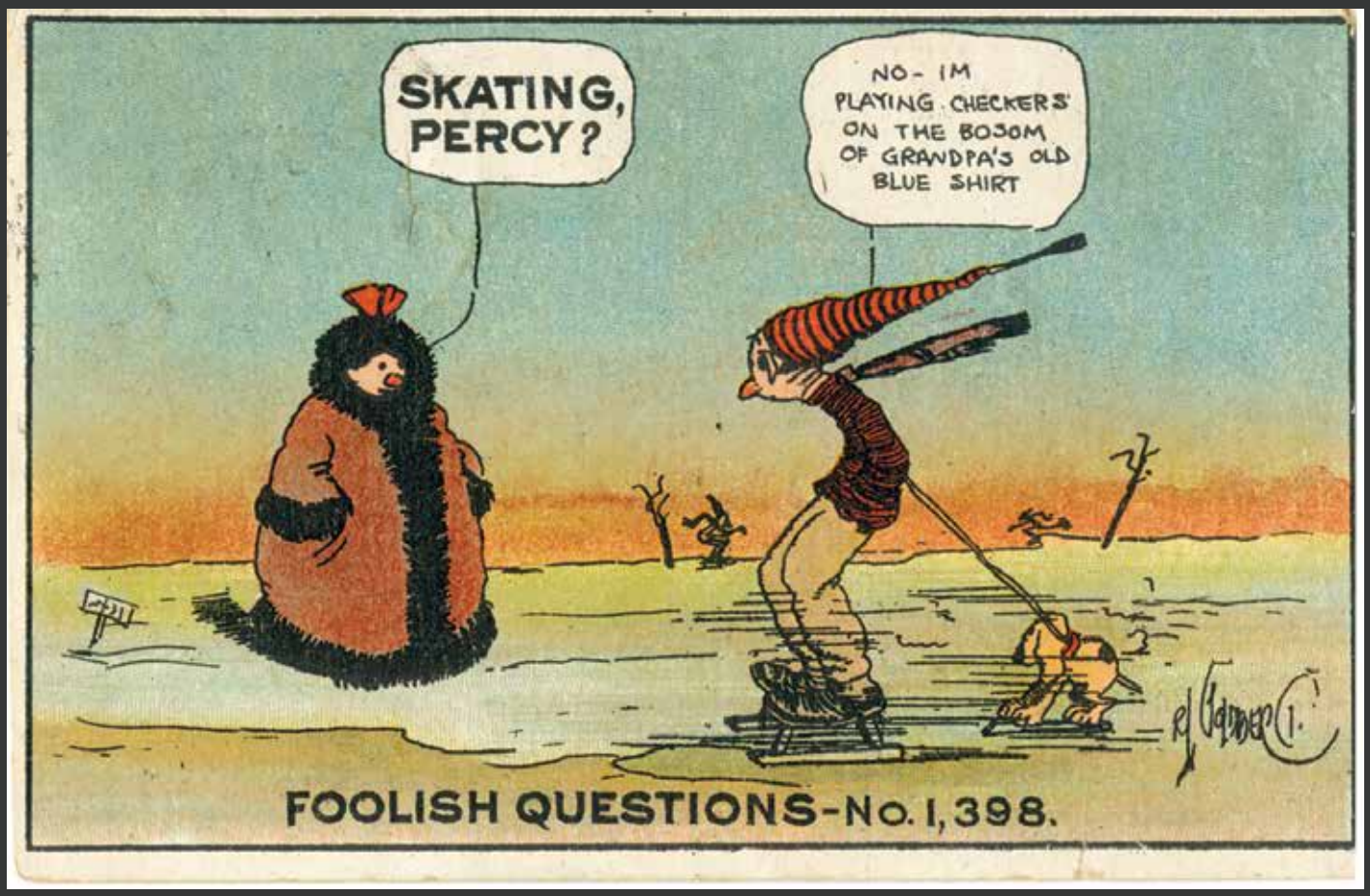
1. Review cartoons by Rube Goldberg, or review prior lesson ("Draw a Simple Machine Cartoon").
2. Show an example of Goldberg's work and follow each segment to the completion of its designated task, highlighting each simple machine.
3. Explain that a team of students (ideally five students per team) is to decide on a simple chore or task and devise a "Rube Goldberg" way to accomplish this activity, using at least five simple machines.
4. Have students act out their machine in a linear fashion like a skit, with each student taking on the role of an object.
5. Have students present their human Rube Goldberg Machine to the class, explaining as they go along how it would work to accomplish their chosen task.

ASSESSMENT:

1. Observe each team's ideas and progress.
2. Check to see if the five simple machines are incorporated in the design.
3. Determine if the machines will accomplish the tasks they are designed to complete.
4. Assess each machine for creativity and imagination.

VARIATIONS:

1. Students can mime their machine actions and have other students guess what they are portraying.
2. Students can incorporate props from the classroom into machine portrayals.
3. Record the students' machines on video and review with class which ones were most successful, funny, etc.
4. One student on the team can be the narrator of the actions; or each student "object" can explain their role and connection to next person.



Rube Goldberg, *Foolish Questions Postcards*, c. 1910. Color postcards. Artwork Copyright © Rube Goldberg Inc. All Rights Reserved. RUBE GOLDBERG ® is a registered trademark of Rube Goldberg Inc. All materials used with permission. www.rubegoldberg.com

LESSON 3

Experiment with Simple Machines

MATERIALS/ RESOURCES:

1. An example of a Rube Goldberg cartoon
2. See following "Simple Machine Station Guide" for each station's materials and worksheets

PRE-ACTIVITIES:

Students will need to know the following:

- What is a Rube Goldberg Machine?
- What are the six simple machines?
- How do machines multiply force without multiplying work?

ACTIVITIES:

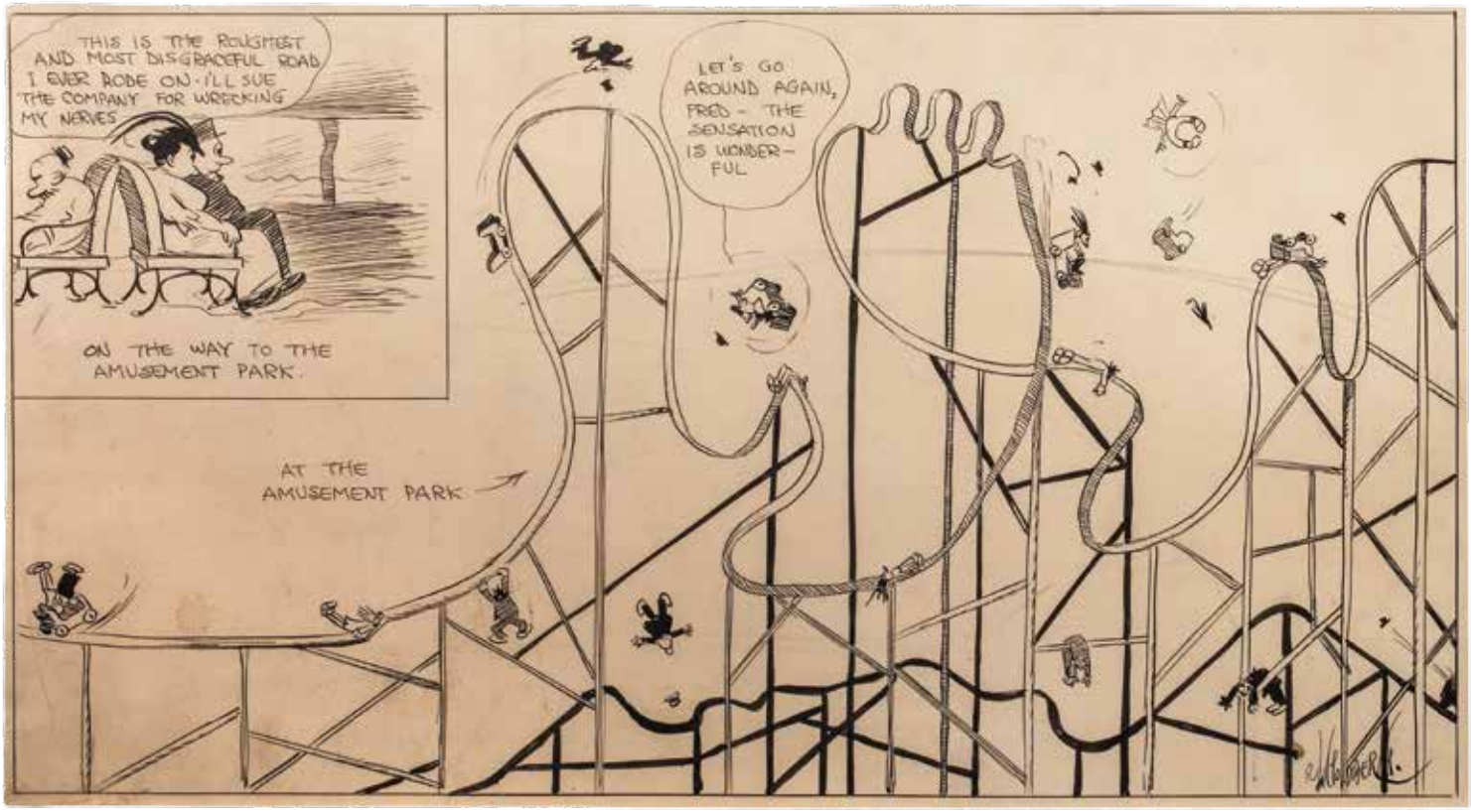
1. Review cartoons by Rube Goldberg, or review prior lesson ("Draw a Simple Machine Cartoon", "Human Rube Goldberg Machine").
2. Show an example of Goldberg's work and follow each segment to the completion of its designated task, highlighting each simple machine.
3. Assign students a Simple Machine Station to start at' and set a rotation schedule (students generally need at least 15 minutes at each station).
4. Review with students in a large group, or at each station, what the experiment is.
5. After the students have had a chance to visit all six stations, ask one student from each station to give a quick summary explanation of that simple machine to the class.

ASSESSMENT:

1. Observe each student's ideas, progress and teamwork.
2. Observe each student's understanding of the physical task of each simple machine.

VARIATION:

After students have rotated to all six simple machine stations, have them revise their cartoons from the first lesson ("Draw a Simple Machine Cartoon") to make edits to the simple machines from what they have learned.



Rube Goldberg, *Amusement Park*, c.1920. Ink on paper. Artwork Copyright © Rube Goldberg Inc. All Rights Reserved. RUBE GOLDBERG ® is a registered trademark of Rube Goldberg Inc. All materials used with permission. www.rubegoldberg.com

SIMPLE MACHINE STATION GUIDE

LEVER

The students will make a lever out of the given materials and explore the relationship of the fulcrum to the load. The students will discover that it is easier to move an object when the fulcrum is closer to the load.

Materials/ Resources:

1. Wooden ruler
2. Object to lift
3. Tape
4. Can or toilet paper roll
5. Lever

Hint:

Move the fulcrum closer to the load. Then move the fulcrum away from the load.

INCLINED PLANE

The students will make inclined planes with boards varying the slope of the board. There will be rubber bands around the book. The students will tie the string to the rubber bands and pull the books up the different inclined planes. They will also pull the books straight up without using the inclined planes. The students will find that the steeper the slope, the more work it takes to move an object up an inclined plane.

Materials/ Resources:

1. Two boards varying in length
2. String
3. Rubber bands
4. Ruler
5. Heavy book
6. “Inclined Plane” worksheet

Hint:

Look at the stretch of the rubber bands straight up compared to different inclined planes.

WHEEL AND AXLE

The students will push one car on its side and the other on its wheels. They will note the difference in distance traveled.

Materials/ Resources:

1. Two matchbox cars
2. Rulers
3. “Wheel and Axle” worksheet

Hint:

Try one of the cars on its side.

SCREW

The students will make a screw out of an inclined plane. Student will cut the square diagonally to make an inclined plane. Tape one of the short edges of the triangle to a pencil. Wrap the triangle around the pencil. They will actually see the inclined plane as part of the screw.

Materials/ Resources:

1. Nine inch paper square
2. Tape
3. Pencil
4. Scissors
5. Tabletop
6. Screw worksheet

Hint:

How are the cuts different?

WEDGE

The students will cut paper with both sharp scissor and dull scissors. They will observe that the sharp scissors will cut more effectively than the dull scissors.

Materials/ Resources:

1. Paper
2. Dull scissors
3. Sharp scissors
4. Wedge worksheet

Hint:

How are the cuts different?

PULLEYS

The students will make a pulley with a sewing spool, string, and a pencil. They will use this pulley to lift an object. They will compare lifting the object with the pulley to lifting it without the pulley. They will find that it is easier to lift an object with the use of a pulley.

Materials/ Resources:

1. Sewing spool
2. String
3. Pencil
4. Object to lift
5. “Pulley” worksheet

Hint:

Compare using the pulley to not using the pulley.

Rube Goldberg, *Jews and Arabs*, 1947. Charcoal and ink on paper.

LESSON 4

Machine Poetry

MATERIALS/ RESOURCES:

1. *Click, Rumble, Roar* edited by Lee Bennett Hopkins; *Machine Poems* edited by Jill Bennett; or other poetry books with machine references
2. Chart paper, marker/ white board
3. Clipboards with paper and pencils for every two students

PRE-ACTIVITIES:

Students will need to know the following:

- What is a Rube Goldberg Machine?
- What are the six simple machines?
- Types of poem structures and descriptive words.

ACTIVITIES:

1. The teacher will choose and read aloud a poem and ask the students to write a quick personal response to the poem.
2. Read 2-3 poems and have students verbally share responses, writing key terms on the board when appropriate. Discuss any terms that may be new to some students.
3. Divide the class into teams of 2. Give each team these directions:
    a. Each team has 20 minutes to take a machine walk.
    b. The teams should describe any machines they see around the school, using descriptive words and drawings.
    c. Each team should look for a different machine.
4. Send the teams on their mission with a designated time of return.
5. Regroup in the classroom at the designated time.
6. Allow groups to share the machines they wrote down while the teacher writes these on chart paper/ white board.
7. Each team of students can work together or separately to write a short poem about the machine they observed. Review descriptive words that could describe the machine's sounds, smells, appearance, and its purpose/task.
8. Have students share their machine poem with the class.

ASSESSMENT:

1. Observe student's ideas, progress, and teamwork.
2. Observe student's poetry composition and use of descriptive words to learn about machines.

VARIATION:

If it is not possible for students to leave the classroom, the teacher can gather examples of machines to display in the classroom and students can view them there. Or the teacher may ask students to bring in examples of machines.

Rube Goldberg, *I Never Thought of That (Portrait of Irma on Wedding Day)*, 1916. Ink on paper with photograph.

LESSON 5

Machine Stories

MATERIALS/ RESOURCES:

1. An example of a Rube Goldberg cartoon with the accompanying text covered or removed

PRE-ACTIVITIES:

Students will need to know the following:

- What is a Rube Goldberg Machine?
- What are the six simple machines?

ACTIVITIES:

1. Students will look at Rube Goldberg's cartoon machines without their accompanying text.
2. Students will use descriptive words to portray the machine's actions. This can be structured as a written assignment, an oral presentation, a small group activity, or a combination of these.

ASSESSMENT:

1. Observe each student's ideas, progress and teamwork.
2. Observe each student's understanding of each machine.
3. Observe each student's use of descriptive words to learn about machines.

VARIATION:

Have students write a short story about a machine they wish they had to accomplish an everyday task in their lives, such as feeding the family dog. The students should use descriptive words to "paint the image of the machine" and explain how such a machine would help them.

"THEY'RE REALLY NOT MACHINES. THEY'RE REALLY SATIRICAL REPRESENTATIONS OF PROGRESSIVE NOTHING."

–Rube Goldberg on his inventions

LESSON 6

Energy Transfers

MATERIALS/ RESOURCES:

1. An example(s) of a Rube Goldberg cartoon
2. Three marbles (different sizes and/or weights)
3. An inclined plane
4. A ruler
5. The bottom section of a milk carton
6. Water
7. Baking soda
8. Vinegar
9. Five plastic flasks with corks
10. Five measuring cups
11. Protective eye wear for each student
12. Balls that will bounce
13. Rubber bands
14. Coffee filters

PRE-ACTIVITIES:

Students will need to know the following:

- What is a Rube Goldberg Machine?
- What are the six simple machines?
- How do machines multiply force without multiplying work?
- What are the different types of energy?
- What is mechanical energy?

ACTIVITIES:

Marble Rolling Activity

1. Set up a demonstration of rolling three different-sized marbles down an inclined plane. Place the bottom section of the milk carton at the bottom of the ramp to catch the marble.
2. Ask students to predict how many centimeters each marble will move the milk carton, and which marble will move it the most.
3. Demonstrate with one marble and record the distance the milk carton was moved.
4. Repeat this step five times and calculate the average distance.
5. Demonstrate the second and third marbles using the same process.
6. Compare students' predictions with outcomes.
7. Which marble had the most energy? Why? Students will discover that the larger the mass, and the higher an object is raised, the more energy is stored.

Jumping Jack Activity

1. Have students assume a standing X ("jumping jack open") position, with their arms above their shoulders in a wide V and their legs apart in an inverted V. Tell them to hold the position, and explain that they are storing potential energy that has yet to be converted into kinetic energy.
2. Ask them to do a jumping jack. Explain that, as they move, they're creating kinetic energy; at each pause, their bodies are holding potential energy.

Chemical Potential Energy Activity

1. Set out the vinegar, baking soda, water, and coffee filters.
2. Explain that vinegar and baking soda are made of molecules that contain potential energy in their chemical bonds, or potential chemical energy.
3. Have students write a one sentence prediction of what will happen when baking soda, vinegar, and water are mixed together.

4. Break students into 5 groups of 4.
5. Instruct students to put their goggles on.
6. Have students mix half of a cup of water and half of a cup of vinegar in a plastic flask.
7. Put a teaspoon of baking soda in a coffee filter.
8. Insert it in the flask.
9. Place cork securely on flask. Quickly move away.
10. The energy created (kinetic energy created when chemical interaction converts potential energy) will cause the cork to pop off the flask.
11. After the cork pops off the flask, have students write a paragraph about the steps of the experiment and the results. They should write it on the same sheet of paper as the prediction.

VARIATIONS:

1. For a less messy, but also less dramatic, experiment, pour vinegar over a pile of baking soda and watch the energy conversion occur.
2. Online interactives can be found at the following links:
    a. www.pbslearningmedia.org/resource/hew06.sci.phys.maf.trebuchet/energy-transferin-a-trebuchet/
    b. www.pbslearningmedia.org/resource/hew06.sci.phys.maf.rollercoaster/energy-in-a-roller-coaster-ride/
    c. www.pbslearningmedia.org/resource/hew06.sci.phys.maf.springmass/masses-and-springs/
    d. www.pbslearningmedia.org/resource/hew06.sci.phys.maf.projmotion/projectile-motion/

Potential Energy and Gravity Activity

1. Allow students to hold a ball over their heads, let it bounce off the floor and allow it to continue bouncing.
2. Explain that gravity is the force that converts the ball's potential energy to kinetic energy; when it hits the pavement, it possesses potential energy for an instant, and then the force of the ground converts it to kinetic again as it bounces upward.

Potential and Kinetic Energy Activity

1. Give a rubber band to each student. Ask them to hold it tightly and stretch it almost as tightly as possible. Explain that the stretched rubber band embodies potential energy, which they can feel in the tension as the rubber band pulls against their hands.
2. Instruct them to let go of the rubber band while aiming at a wall. Explain that movement in the rubber band demonstrates potential energy being converted to kinetic energy.

ASSESSMENT:

1. Observe student's ideas, progress, and teamwork.
2. Observe student's understanding of kinetic versus potential energy.

LESSON 7

Build a Rube Goldberg Machine

MATERIALS/ RESOURCES:

1. An example(s) of a Rube Goldberg cartoon
2. Any specific materials your class desires or the Rube Goldberg Speed Build Trunk

PRE-ACTIVITIES:

Students will need to know the following:

- What is a Rube Goldberg Machine?
- What are the six simple machines?
- How do machines multiply force without multiplying work?
- What is an energy transfer?
- What are the different types of energy?
- What is mechanical energy?

ACTIVITIES:

1. Review cartoons by Rube Goldberg or review a prior lesson ("Draw a Simple Machine Cartoon", "Human Rube Goldberg Machine"). Review each simple machine with class. Have students brainstorm ways to connect simple machines to make compound machines.
2. Break students into groups of 2-4 each.
3. Assign a task, or let the students choose their task, and decide how long they will have to build their machine. "Pop a balloon," for example, is a simple but exciting task.
4. Set parameters for each step, what "counts" as a step, such as an energy transfer, plus size allotment for each machine (a table top or a few desks pushed together is recommended for each group of students).
5. Have students build a three, seven, or fifteen-step Rube Goldberg machine. The teacher may let students choose their materials or may assign materials from the Speed Build Trunk.
6. After the allotted period of time, each team of students will "run" their machine in front of the class to see if it works.

ASSESSMENT:

1. Observe each student's ideas, progress and teamwork.
2. Observe each student's understanding of the simple machines.

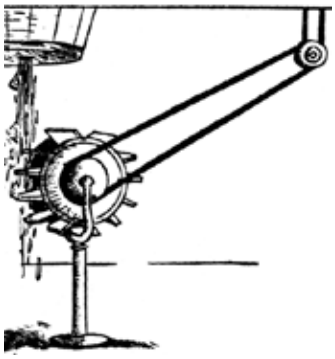
VARIATIONS:

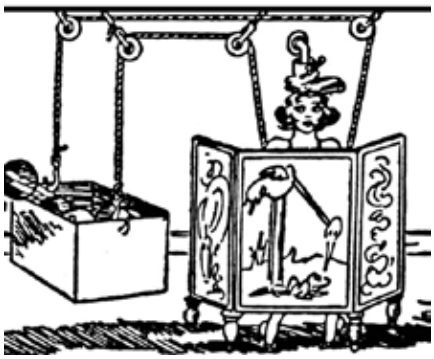
1. Have students write a machine task description like those of Rube Goldberg (For example, "A. The palm tree falls over, knocking into parrot B." etc.)
2. Have students present their machines to the rest of the class with the task description serving as a narrative.
3. Have students judge the machines on a rubric you create or for "funniest," "most creative," etc.
4. This activity may be repeated. Students may first build a machine with three steps, and then increase the number to seven or fifteen steps in subsequent attempts.

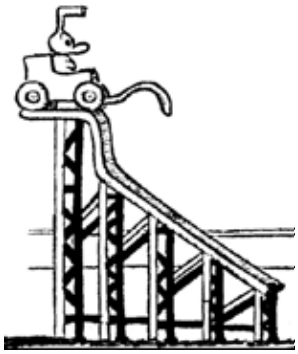
WORKSHEETS

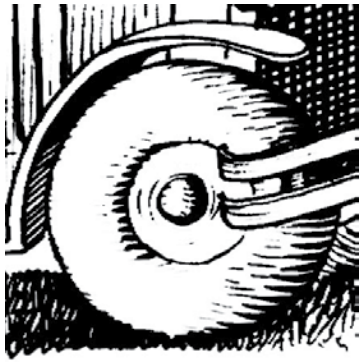
NAME:_____ DATE:_____

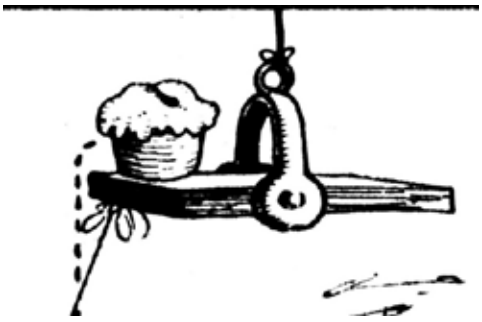
LABEL THE 6 SIMPLE MACHINES









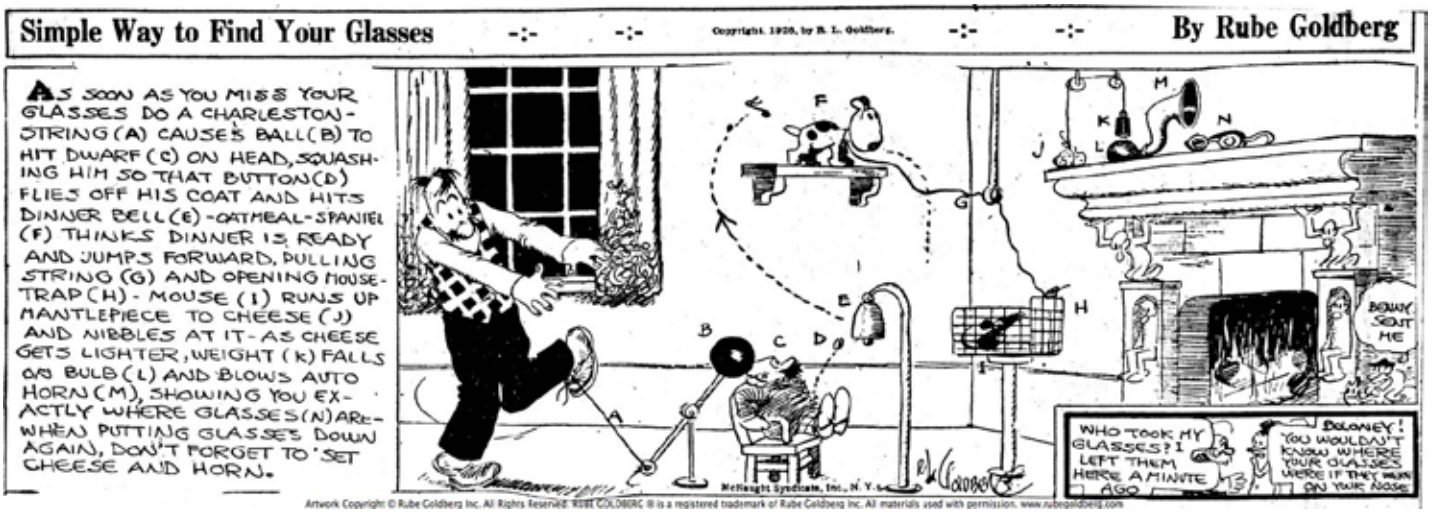


KEY WORDS:

Pulley, Lever, Inclined Plane, Screw, Wedge, Wheel and Axle

NAME:_____ DATE:_____

CIRCLE AND LABEL THE SIMPLE MACHINES IN RUBE GOLDBERG'S CARTOONS



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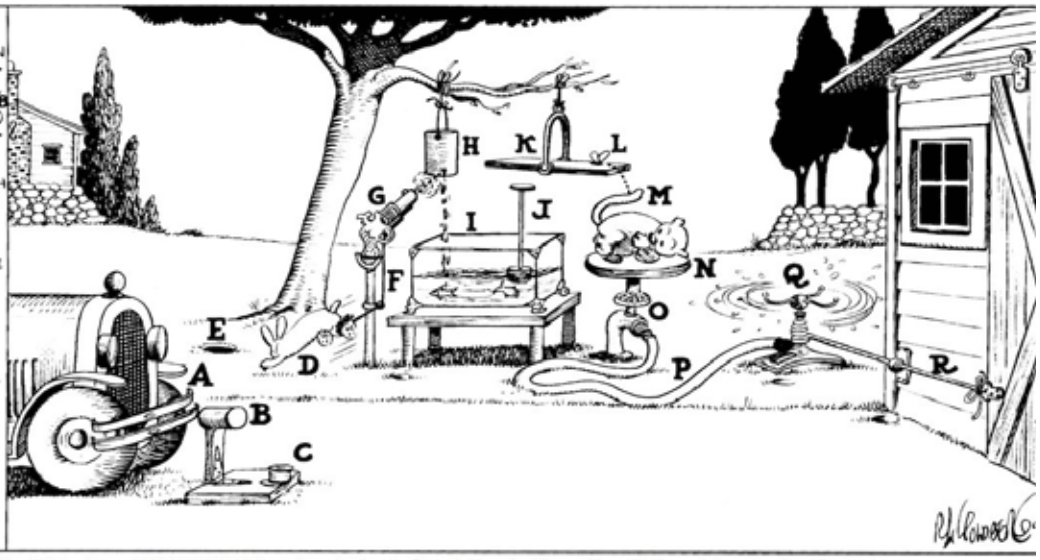
CIRCLE AND LABEL THE SIMPLE MACHINES IN RUBE GOLDBERG'S CARTOONS

Opening the Garage Door by Rube Goldberg

PROFESSOR BUTTS TAKES A DRINK OF STRANGE GIN AND EVOLVES AN INVENTION FOR OPENING THE GARAGE DOOR WITHOUT GETTING OUT OF THE CAR. DRIVE AUTO BUMPER (A) AGAINST MALLET (B) PUSHING IT DOWN AND EXPLODING CAP (C) FRIGHTENING RABBIT (D) WHO RUNS TOWARD HIS BURROW (E) PULLING STRING (F) WHICH DISCHARGES PISTOL (G). THE BULLET PENETRATES CAN (H) FROM WHICH THE WATER DRIPS INTO AQUARIUM (I). AS THE TIDE RISES IN THE AQUARIUM IT ELEVATES THE FLOATING CORK-UPRIGHT (J) WHICH PUSHES UP END OF SEE-SAW (K) CAUSING FLEA (L) TO LOSE IT'S BALANCE AND FALL ON GEDUNK HOUND'S TAIL (M) WHO WAKES UP AND CHASES HIS TAIL ROUND AND ROUND CAUSING PLATFORM (N) TO SPIN AND TURN ON FAUCET (O). WATER RUNS THROUGH HOSE (P) STARTING REVOLVING LAWN SPRINKLER (Q) ON WHICH ROPE (R) WINDS ITSELF OPENING GARAGE DOOR. OF COURSE, IF YOU WISH, YOU CAN DRIVE RIGHT THROUGH THE DOOR, AND THEN THERE WON'T BE ANY OBSTRUCTION LEFT TO BOTHER YOU IN THE FUTURE.



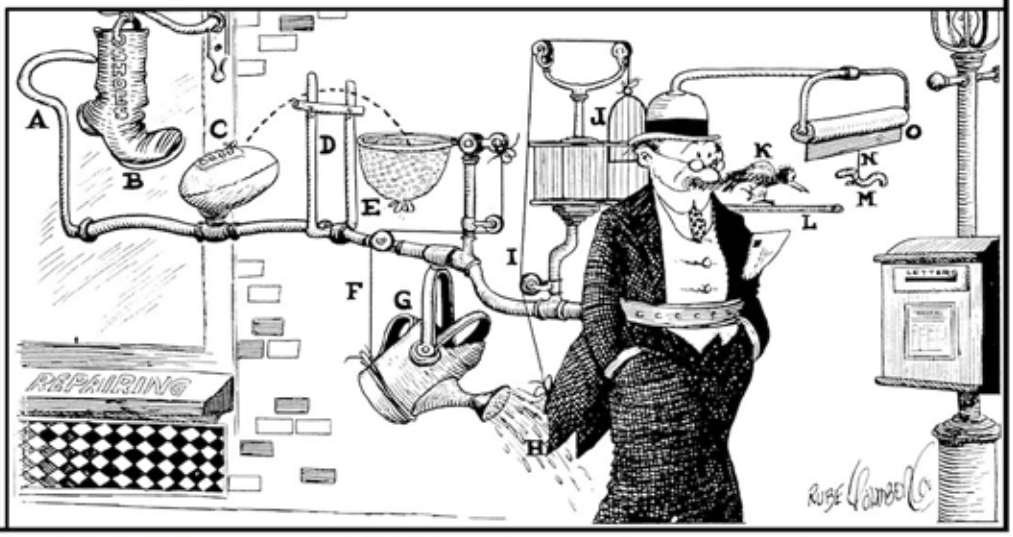
NAME:_____ DATE:_____

CIRCLE AND LABEL THE SIMPLE MACHINES IN RUBE GOLDBERG'S CARTOONS

Simple Idea to Keep You From Forgetting To Mail Your Wife's Letter — **By Rube Goldberg**

PROFESSOR BUTTS GETS CAUGHT IN A REVOLVING DOOR AND BECOMES DIZZY ENOUGH TO DOPE OUT AN IDEA TO KEEP YOU FROM FORGETTING TO MAIL YOUR WIFE'S LETTER.

AS YOU WALK PAST COBBLER SHOP, HOOK (A) STRIKES SUSPENDED BOOT (B) CAUSING IT TO KICK FOOTBALL (C) THROUGH GOAL POSTS (D). FOOTBALL DROPS INTO BASKET (E) AND STRING (F) TILTS SPRINKLING CAN (G) CAUSING WATER TO SOAK COAT TAILS (H). AS COAT SHRINKS CORD (I) OPENS DOOR (J) OF CAGE ALLOWING BIRD (K) TO WALK OUT ON PERCH (L) AND GRAB WORM (M) WHICH IS ATTACHED TO STRING (N). THIS PULLS DOWN WINDOW SHADE (O) ON WHICH IS WRITTEN, "**YOU SAP, MAIL THAT LETTER.**" A SIMPLE WAY TO AVOID ALL THIS TROUBLE IS TO MARRY A WIFE WHO CAN'T WRITE.



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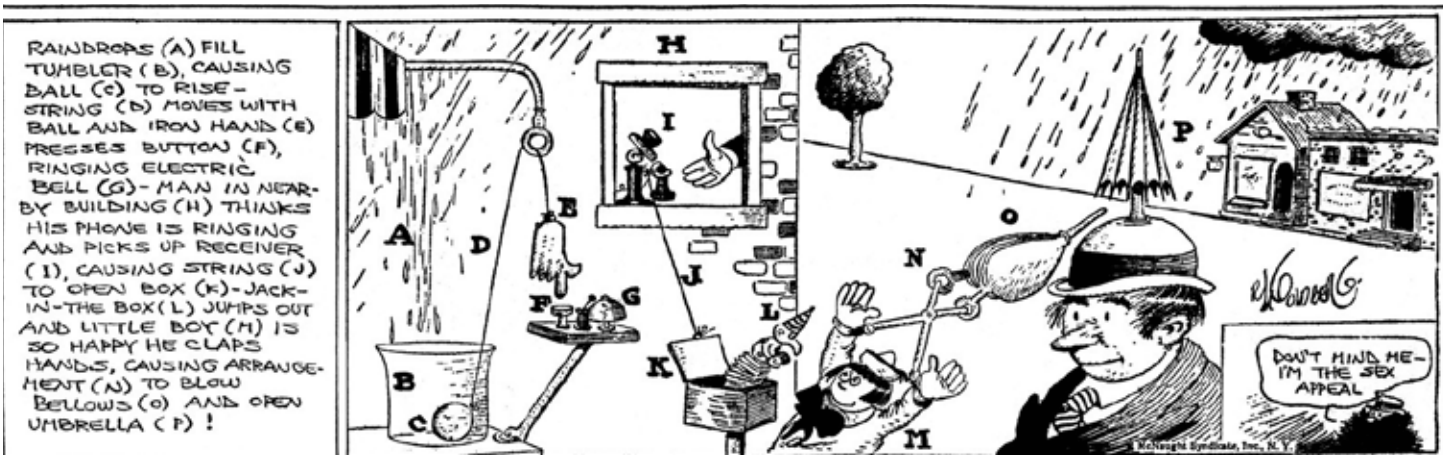
DRAW A RUBE GOLDBERG MACHINE



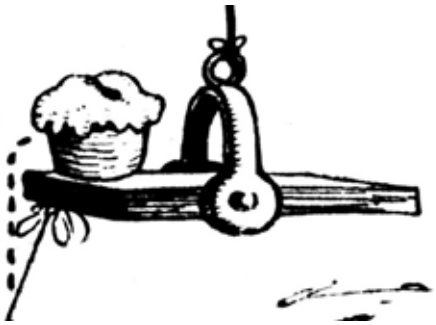
LEVER

lev·er, ˈlevər,ˈlēvər/, *noun*

1. a rigid bar resting on a pivot, used to help move a heavy or firmly fixed load with one end when pressure is applied to the other.
   Synonyms: Crowbar.

Materials: Wooden ruler, object to lift, tape, can or toilet paper roll.

Make a lever out of the given materials and explore the relationship of the fulcrum to the load.
Discover that it is easier to move an object when the fulcrum is closer to the load.



Does the lever make it easier to lift the load?

Move the fulcrum closer to, and then away from, the load. Which is easier to lift?

Draw an example of a lever in action.

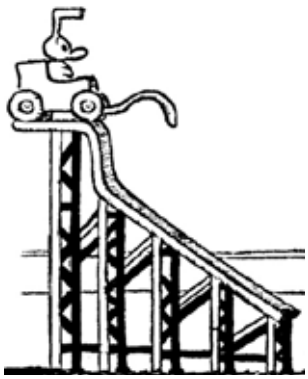
INCLINED PLANE

in·clined plane, *noun*

1. a plane inclined at an angle to the horizontal.
2. a sloping ramp up which heavy loads can be raised by ropes or chains.
   Synonyms: Ramp, slant, gradient.

Materials: Two boards varying in length, string, rubber bands, ruler, a heavy book.

Make inclined planes with boards, varying the slope of the board. Try leaning the board against objects of different heights. Tie rubber bands around the book. Tie the string to the rubber bands and pull the books up the different inclined planes. Also pull the books straight up without using the inclined planes.



Is it easier to pull the book straight up in the air, or up the inclined plane? Why?

Look at the stretch of the rubber bands during the straight-up pull compared to different inclined planes. During which is the rubber band longer?

What is an example of an inclined plane in your everyday life?

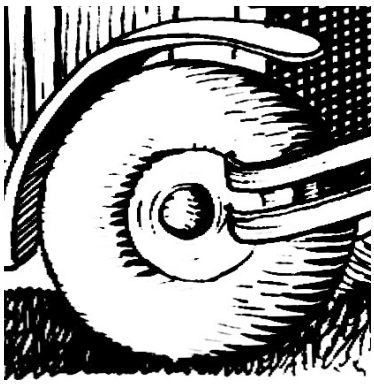
WHEEL AND AXLE

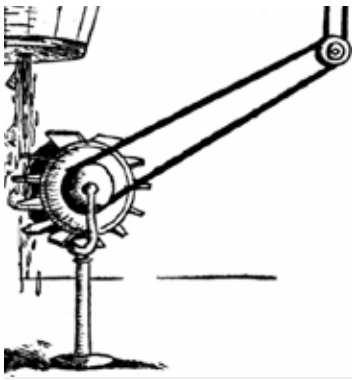
wheel and ax·el, *noun*

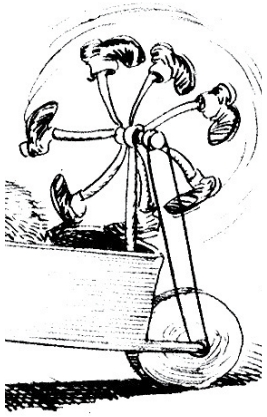
1. a simple lifting machine consisting of a rope that unwinds from a wheel onto a cylindrical drum or shaft joined to the wheel to provide mechanical advantage.
   Synonyms: Axis, shaft.

Materials: Two matchbox cars, rulers.

Push one car on its side and the other on its wheels. Note the difference in distance traveled.







Which car moved more easily, the one on its' wheels or the one on its' side?

If cars did not have wheels, how might they move? Would it be harder this way?

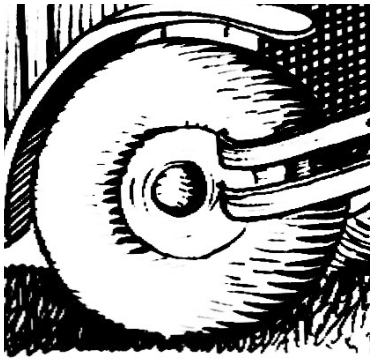
SCREW

skro͞o/, *noun*

1. a short, slender, sharp-pointed metal pin with a raised helical thread running around it and a slotted head, used to join things together by being rotated so that it pierces wood or other material and is held tightly in place.
   Synonyms: Bolt, fastener.

Materials: Nine inch paper square, tape, pencil, scissors.

Make a screw out of an inclined plane. Cut the paper square diagonally to make an inclined plane. Tape one of the short edges of the triangle to a pencil. Wrap the triangle around the pencil. An inclined plane is part of a screw.



What is a screw typically made out of?

What do we use screws for in everyday life?

What tool do we use to get a screw into a piece of wood? Why?

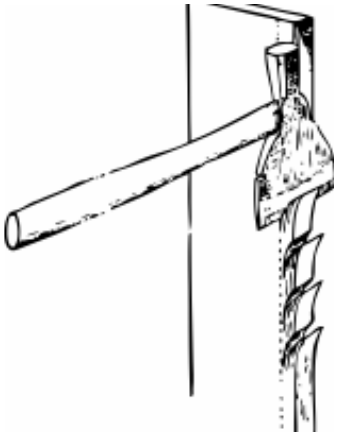
WEDGE

wej/, *noun*

1. a piece of wood, metal, or some other material having one thick end and tapering to a thin edge, that is driven between two objects or parts of an object to secure or separate them.
   Synonyms: Doorstop, chock.

Materials: Paper, dull scissors, sharp scissors.

Scissors are made up of two wedges (the blades) and fixed at an axis point. Cut paper with both sharp scissor and dull scissors. Observe that the sharp scissors cut better than the dull scissors as the wedge's point narrower and therefore slices more easily.



Which scissor is easier to cut with, the sharp or the dull? Why?

How are the cuts different?

Is a scissor a simple machine or a compound of two simple machines?

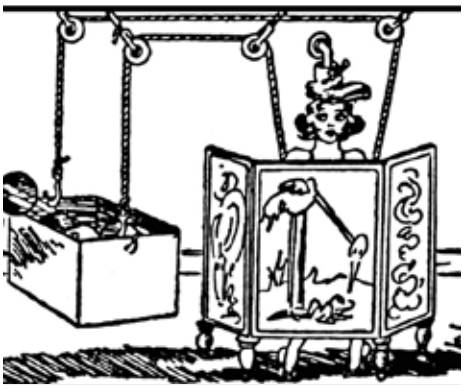
PULLEY

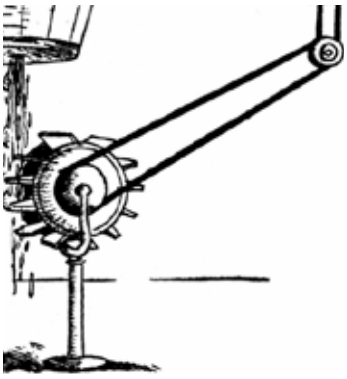
pul·ley, ˈpo͝olē/, *noun*

1. a wheel with a grooved rim around which a cord passes. It acts to change the direction of force applied to the cord and is chiefly used (typically in combination) to raise heavy weights.
   Synonyms: Sheave, drum.

Materials: Sewing spool, string, pencil, object to lift.

Make a pulley with a sewing spool, string, and a pencil. Use this pulley to lift an object. Compare lifting the object with the pulley and without the pulley.





Compare using the pulley and not using the pulley. Which is easier to lift the load?

Where do we use pulleys in our every-day life?

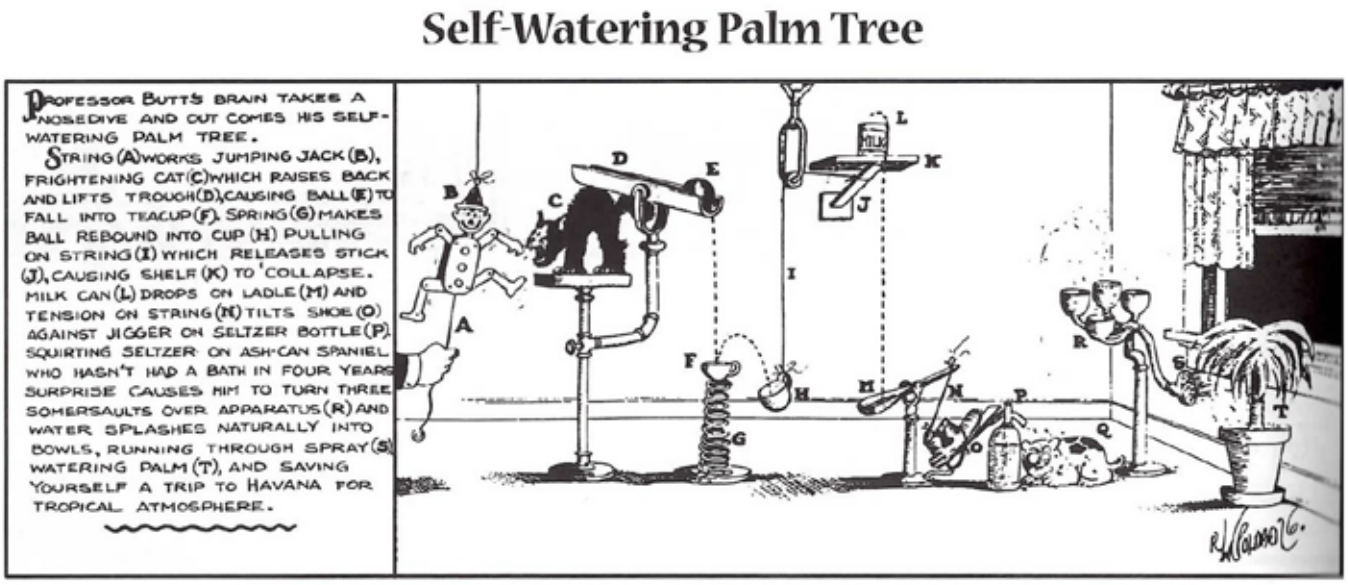
Draw an example of a pulley system using more than one pulley.

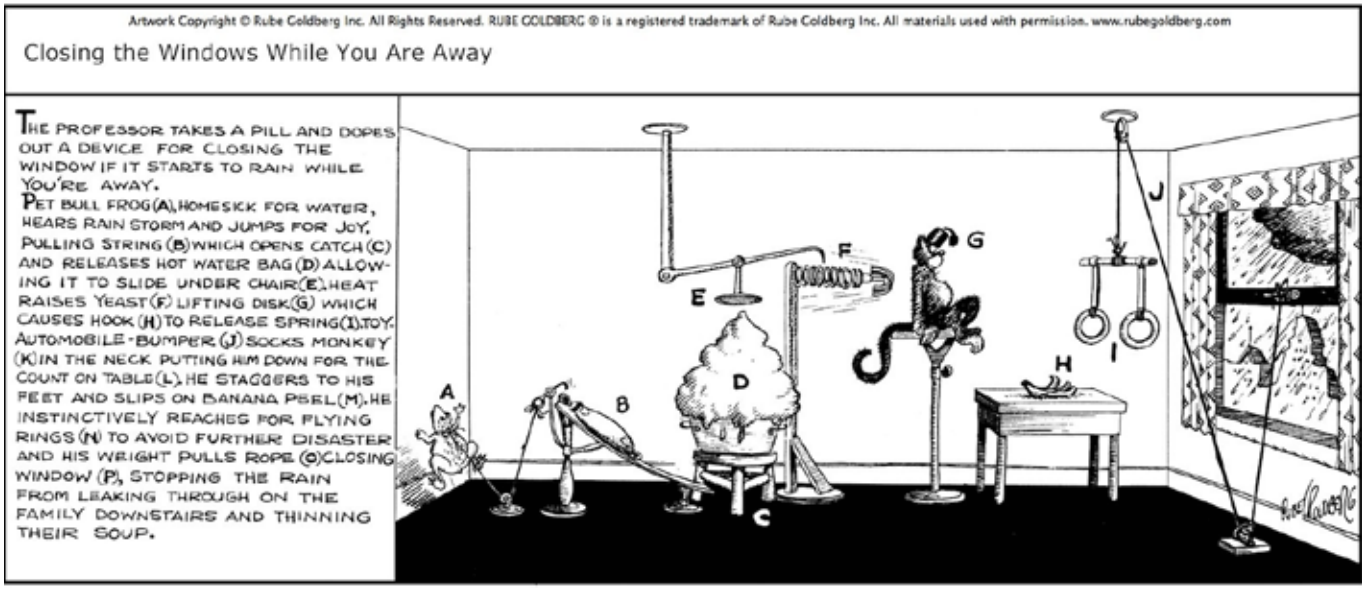
WHAT IS ALWAYS PRESENT BUT NEVER VISIBLE? ENERGY! LABEL POTENTIAL AND KINETIC ENERGY BELOW:

Energy is the ability to do work or cause change. Much like mass or volume, energy is a property of an object. Movement, sound, heat, and light provide evidence that energy is present and being used.

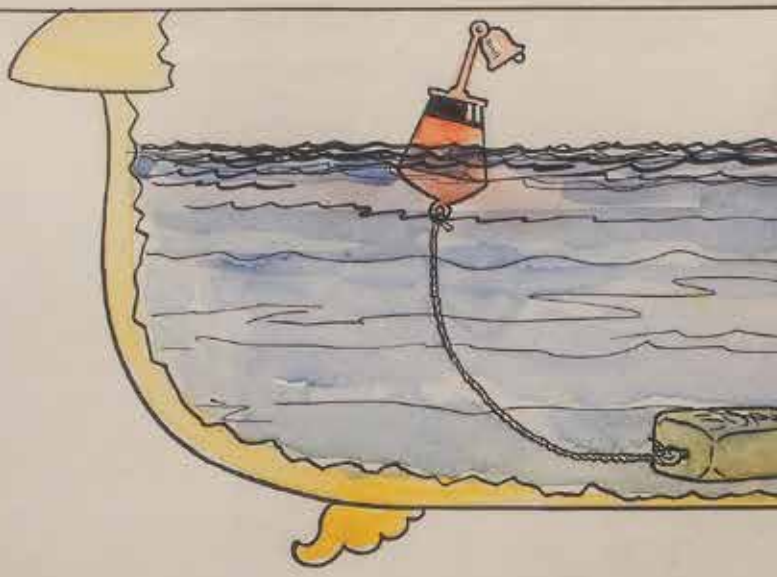
Potential energy (PE) appears in many different forms, and is defined as the energy in matter due to its position or the arrangement of its parts. The various forms of potential energy include gravitational potential energy, elastic potential energy, chemical potential energy, and electrical potential energy.

Kinetic energy (KE) is the energy of motion. Potential energy is converted into kinetic energy as soon as the object begins to move. A thrown football, a speeding automobile, a waterfall, or a rock falling from a cliff are examples of objects that have kinetic energy.

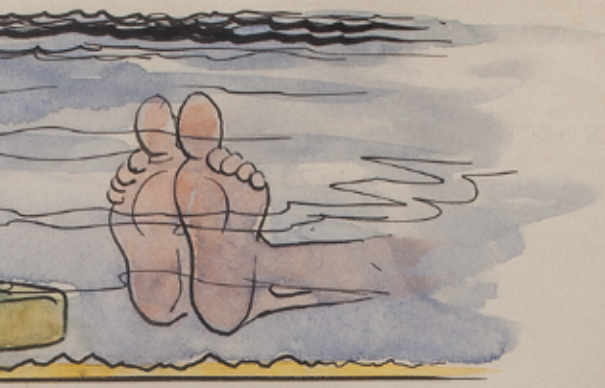




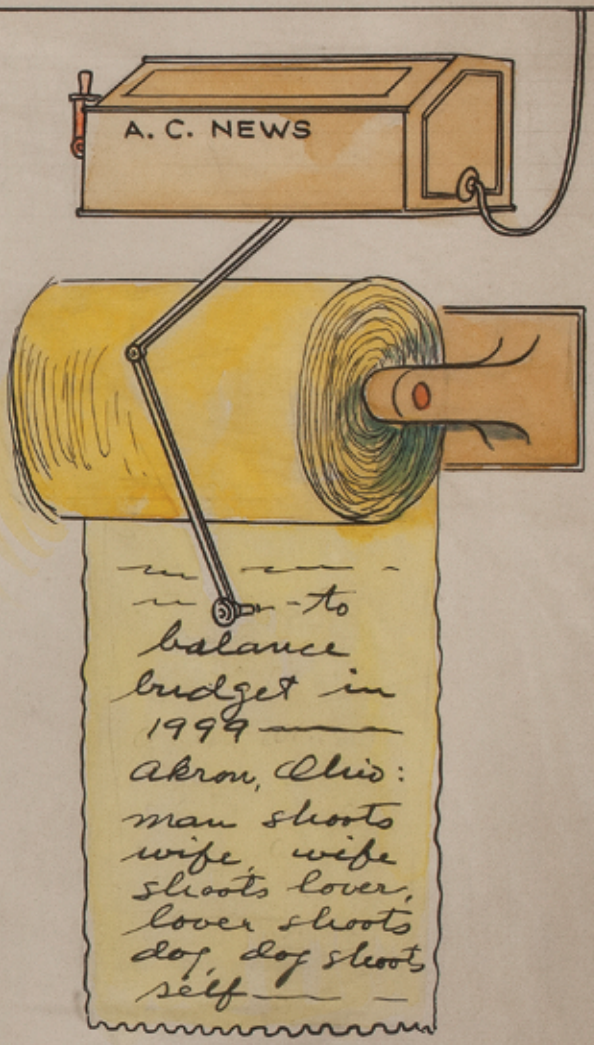
MINIATURE BELL-BUOY FOR LOCATING SOAP AT BOTTOM OF BATHTUB



SPECIAL SPOON FOR EATING SOUP THROUGH WHISKERS - WING-LIKE BRACKET PUSHES BACK MOUSTACHE AND GUARD, SUSPENDED BENEATH SPOON, KEEPS OVERFLOW FROM SOILING BEARD



SIMPLE DEVICE FOR KEEPING YOUR HEAD DOWN IN GOLF - UPON LIFTING HEAD CORD IS RELAXED AND FOOT GIVES YOU A WARNING KICK IN THE PANTS



ROLL OF TISSUE WITH TELETYPE NEWS SERVICE TO MAKE BATHROOM READING MORE EFFICIENT AND UP-TO-DATE

ROBE GOLDBERG

ADDITIONAL INFORMATION

1. Rube Goldberg videos online: www.rubegoldberg.com/rube-tube/
2. RubeWorks Building App game*: www.rubegoldberg.com/education/rube-works-game/
3. Rube Goldberg's original invention cartoons online: www.rubegoldberg.com/artwork/automatic-blotter/?c=45
4. Rube Goldberg in the news: www.rubegoldberg.com/rube-headlines/
5. Videos about Rube: www.rubegoldberg.com/about/
6. Mousetrap game information: en.wikipedia.org/wiki/Mouse_Trap_(game)

*for more information regarding RubeWorks, please email anns@artsandartists.org

Catalogue Information

Please contact Ann Scoggins at anns@artsandartists.org if you are interested in purchasing catalogues to sell in conjunction with *The Art of Rube Goldberg*.

Suggested Speaker List

For a "Skype in the Classroom" lesson with Jennifer George, the Legacy Director of Rube Goldberg, Inc., please email Ann Scoggins at anns@artsandartists.org.

Docent Tour Themes

The Industrial Revolution: Rube lived during a time of rapid change, and his cartoons of zany, over-complicated machines reflect the ideals of mechanization during the Industrial Revolution. Just as our society uses digital technology like smart phones to make our lives easier, contemporaries of Rube's were doing the same thing with heavy machinery, and Rube was poking fun at their audacity. How does technology shape your life? What would Rube think of smart phones and drones?

Suggested works: invention cartoons

Patents/ Patent Models: Rube holds numerous copyright patents for his cartoons, but he was also a trained engineer, and his invention cartoons satirize the methodical style used by inventors in their patent requests in the early 1900s. Again, he pokes fun at the complicated process of invention by creating ever more complicated, wasteful, nearly useless "machines"--as if the novelty of impressive-looking gears, dials, and chain reactions was now, for inventors, almost an end in itself. Imagine the frustration of trying to submit a patent of one of Rube's machines today!

Suggested works: invention cartoons

Vaudeville: Much of the popular entertainment of Rube's age was in the style of bawdy song-and- dance vaudeville acts, akin to today's slapstick. Vaudeville was famous for its elaborate physical comedy, sight gags, and flawless timing. Rube was friends with Groucho Marx, the Gershwin Brothers, Charlie Chaplin, the infamous Joe Cook, and many other entertainers, and he often hosted boisterous parties in his NYC apartment. Rube and his wife Irma enjoyed the theater and also wrote lyrics for sheet music. It is clear to see how his humorous cartoons were inspired by the comedic performances of his day!

Suggested works: invention cartoons

Pop-culture: Rube's stamp on contemporary pop culture is everywhere, so much so that its manifestations are not always obvious. The board game Mousetrap, for instance, was a blatant rip-off of his invention cartoon style, as were a few other games from the same company. (Mousetrap has gone on to sell over 60 million games, making much more money for its publishers than Goldberg ever did from his cartoons.) Popular brand names and idioms inspired by Rube's many cartoon series include Mike and Ike candies (from Mike and Ike: They Look Alike), the music festival Lollapalooza (from Rube's cartoon of the same name), and the word "boob" to mean a lazy, foolish person (from Rube's Boob McNutt cartoon series).

Suggested works: Mousetrap game, Mike and Ike candy, etc.

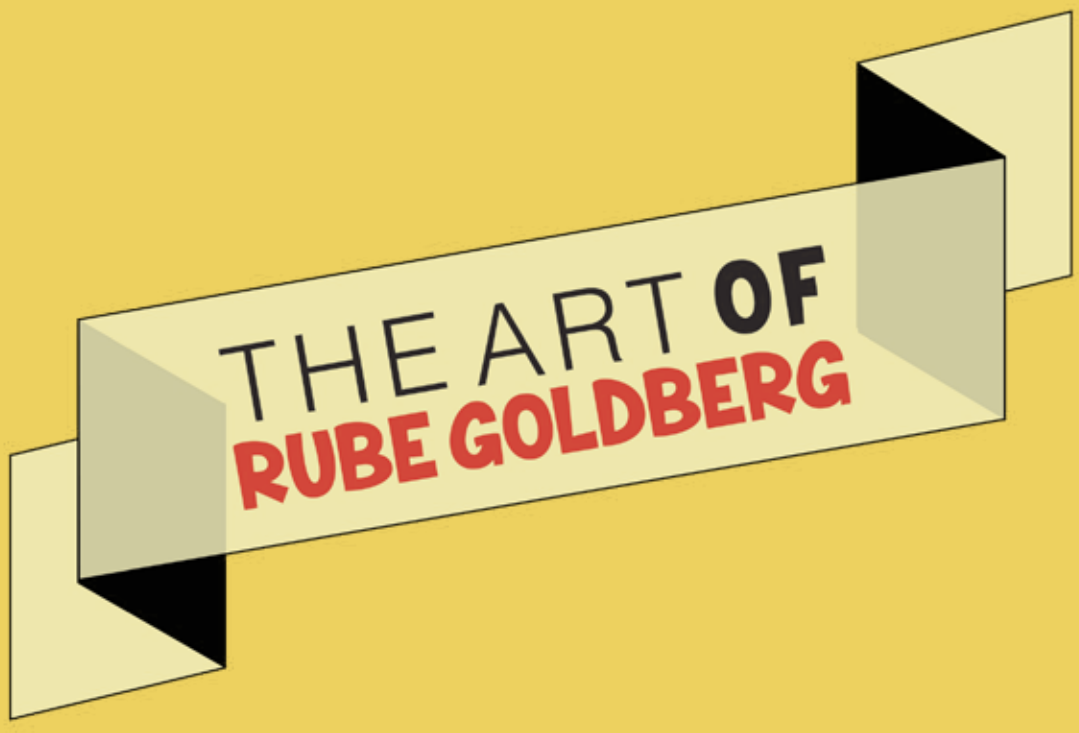
Simple Machines, chain reactions: Many students learn about simple machines and chain reactions in classmas part of a science or engineering curriculum. See the Rube Goldberg Lesson Plans and Resources formdescriptions and ideas.

Suggested works: invention cartoons

History of Editorial Cartoons, Satire: Rube was most proud of his editorial cartoons that commented on issues of his day, from politics to religion. He used satire to give his social criticisms a humorous edge, as many artists still do today. What parallels to our contemporary society can you see in Rube's editorial cartoons?

Suggested works: editorial cartoons

The Art of Rube Goldberg was conceived by Creighton Michael; developed in cooperation with Heirs of Rube Goldberg, LLC, New York, New York; and curated by Max Weintraub. The tour was organized by International Arts & Artists, Washington, DC.


THE ART OF
RUBE GOLDBERG