STEM Sims™

Machines

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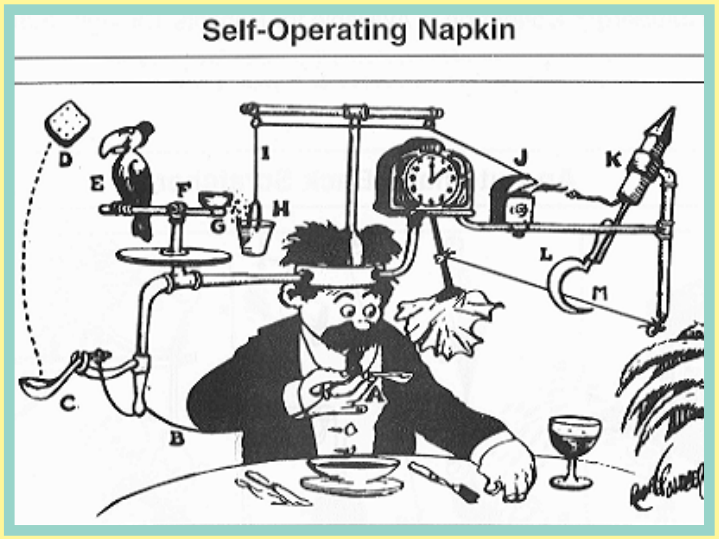
Do you need an idea for a scientific study?
Try out one of our ideas or make one of your own.

Start learning right now about how simple machines make complex tasks easier. Take the following brief quiz to see how much you already know about simple machines. See the bottom of page 4 to check your answers.

1. Which of the following common household items is considered a simple machine?
   a. fork
   b. paper towel
   c. table
   d. sink

2. What kind of levers are tweezers?
   a. first-class levers
   b. second-class levers
   c. compound second-class levers
   d. compound third-class levers

3. How many simple machines make up a can opener?
   a. 0
   b. 1
   c. 2
   d. 3



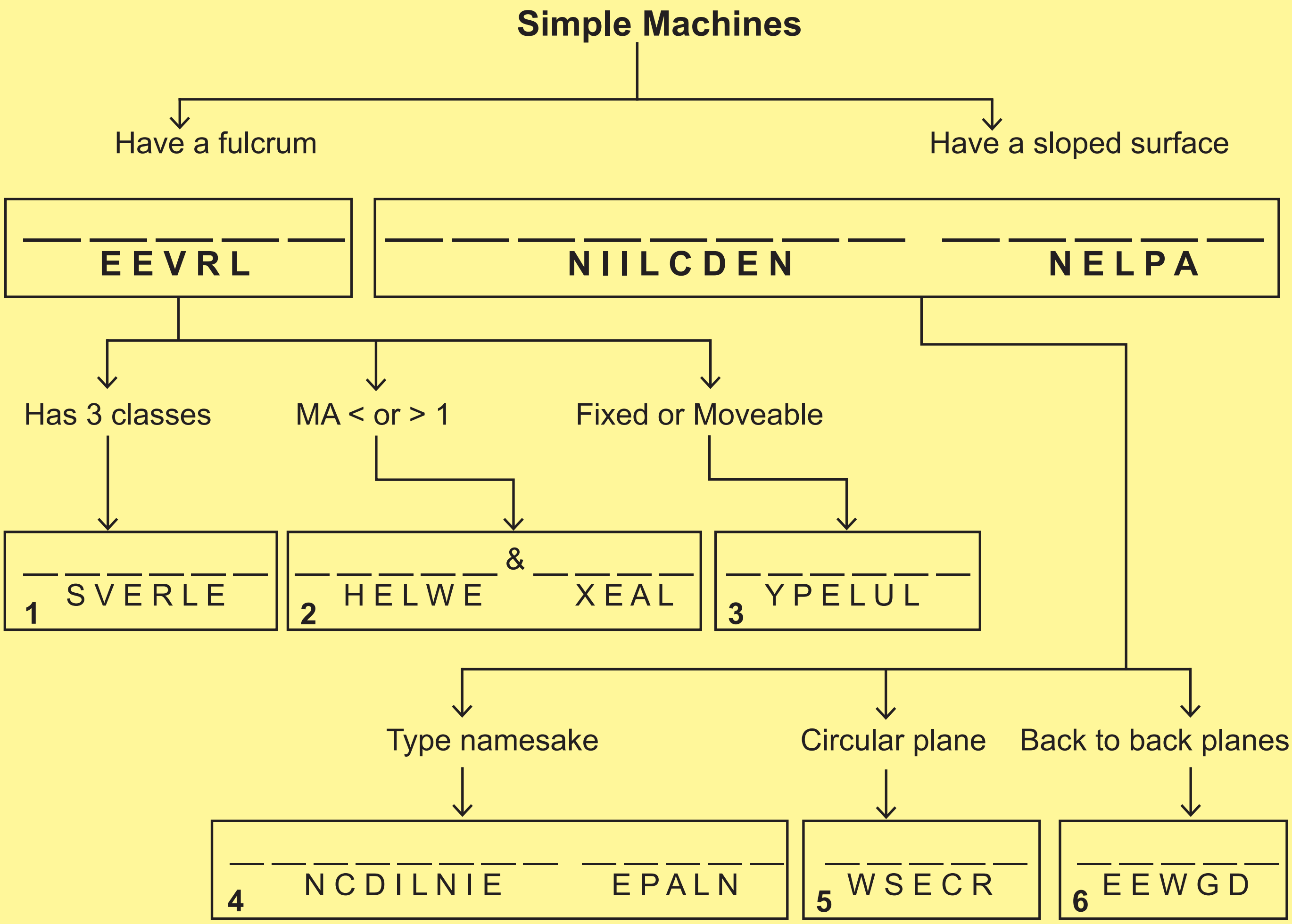
4. In 1608, Giacomo Torelli innovated set design at Teatro Novissimo in Venice, Italy by using which simple machine?
   a. inclined plane
   b. wheel and axle
   c. pulley
   d. lever

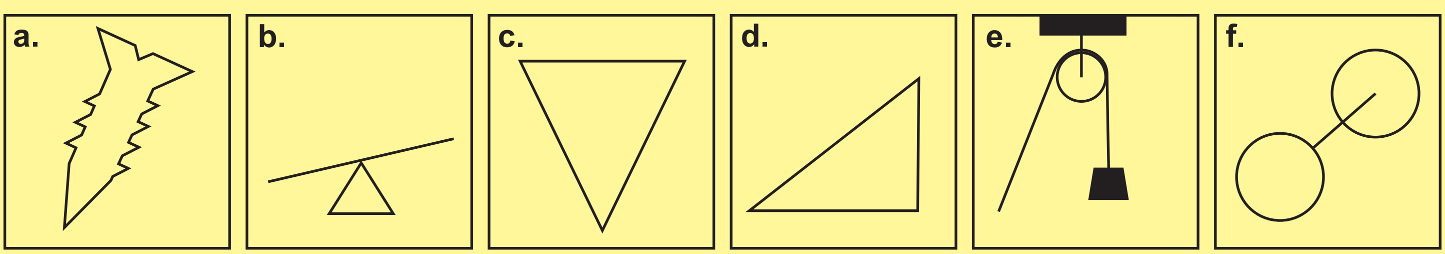
5. Which cartoonist is famously known for his complex works using a variety of simple machines?
   a. Theodor Seuss Geisel (Dr. Seuss)
   b. Rube Goldberg
   c. Walt Disney
   d. Maurice Sendak

Work Like a Machine!

Most machines have a number of interconnected parts that are collectively used to complete a task. The map below shows how simple machines can be broken down into six major types. Can you fill in the missing information to correctly identify and connect the types of simple machines?

Directions: Unscramble the letters and fill in the blanks below to complete the map for the different types of simple machines. Then match the images to the correct type of machine.





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Simple Machines

The classic list of simple machines are inclined planes, levers, wedges, wheels and axles, pulleys, and screws. All of these inventions help make work more efficient when movement is involved. The term work in this context means the force multiplied by the distance the object moved. Force is a push or pull that causes an object to move. Force is measured in newtons (N), which are named after Sir Isaac Newton, father of classical mechanics. Work is measured in a unit called joules (J), which is one newton multiplied by one meter. The joule was named after James Joule, an English physicist whose experiments in the relationship between heat, energy, and mechanical work played a key part in establishing the Law of conservation of energy.

The efficiency of any machine is a simple ratio of work output over work input. The higher the efficiency of a machine, the more effective the machine is in completing work. It is believed that the inclined plane (ramp) was used to build the ancient Egyptian pyramids. Each ramp was augmented to become higher and lengthier as the pyramid grew taller in order to keep the slope from becoming too steep. Wedges on the other hand are simply to push things apart or hold things in place, like an axe to chop wood or a doorstop wedge to hold open the door.

Levers, as we learned on page 3, create work using a back and forth motion. If force is applied at one end and the fulcrum is in between, as in first-class levers, an opposite reaction will happen at the other end. If the fulcrum is at either end, as in second-class and third-class levers, the force and load will move in the same direction.

Wheels and axles, pulleys, and screws all use circular motions to complete their tasks. Wheels can roll something across great distances, like bicycles. Pulleys can be used to move things up and down, like an elevator. Screws can be used to make holes, attach two objects together, or move objects. While we typically think of metal or plastic screws used in construction, a ceiling fan is also considered a screw, which moves air. All of these simple machines make our lives more convenient and comfortable.

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Answers: Page 2 Answers: 1) a, it is considered a wedge. 2) d. 3) d. 4) c. 5) b. **Page 3 Answers**: 1) LEVER II) INCLINED PLANE 1) Levers=b. 2) Wheel & Axle=f. 3) Pulley=e. 4) Inclined Plane=d. 5) Screw=a. 6) Wedge=c.

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