STEM Sims™

Torque

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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.

Forces allow us to walk, run, sit, and stand. But what are forces called that cause an object to rotate or spin? Take the following brief quiz to see how much you already know about torque. See the bottom of page 4 to check your answers.

1. Who is credited for “discovering” the concept of torque?
   a. Aristotle
   b. Newton
   c. Galileo
   d. Archimedes

2. Who is credited with discovering the term “torque?”
   a. James Watts
   b. James Thomson
   c. Lord Kelvin
   d. Ernest Rutherford

3. What is the Latin meaning of the term “torque?”
   a. sharp
   b. dull
   c. twist
   d. pull

4. What is another way that scientists describe the quantity called torque?
   a. moment of a force
   b. time of a force
   c. segment of a force
   d. strength of a force

5. About how much torque in newtons times meters does a typical monster truck’s engine create?
   a. 18
   b. 180
   c. 1,800
   d. 18,000

Balancing the Impossible

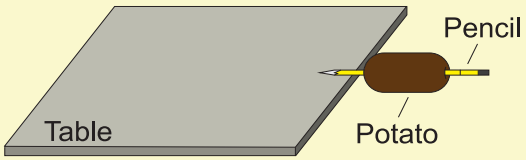
Many times, people view scientific events as magic. However, most of the time basic science is the reason for amazement. Get started now attempting to balance the magic potato.

Materials Required

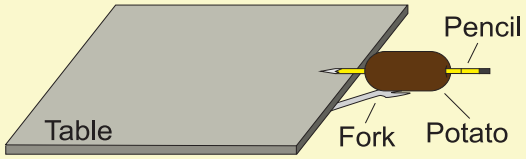
1 – small potato	1 – sharpened pencil
1- dinner fork	1 – flat surface like a tabletop

Procedure

1. Carefully spear the potato with the pencil, pushing the pencil all the way through the middle of the potato so about 3-centimeters of the pencil comes out the other side of the potato.
2. Attempt to balance the pencil and potato on the edge of the table as shown in Figure 1 below.



3. Describe in Table 1 why you were or were not successful in attempting to balance the pencil and potato on the table's edge.
4. Carefully stick the fork into the potato as shown in Figure 2 below.



5. Describe in Table 1 why you were or were not successful in attempting to balance the pencil, fork, and potato on the table's edge.
6. You might need to change the angle and/or placement of the fork to succeed in balancing the three things.

Table 1. Materials and Balancing Observations

Materials	Observations
Pencil/Potato only	
Pencil/Fork/Potato	

Questions

1. Construct an explanation as to why the pencil and potato were not able to balance on the edge of the table.

2. Construct an explanation as to why the pencil, fork, and potato were able to balance on the edge of the table.

Torque

The Disappearing Playground Device

One of the most common pieces of equipment found on the playgrounds of yesterday was a wooden plank balanced on a fulcrum. The seesaw or teeter totter used the principles of balanced and unbalanced forces to move children up and down. Since their first appearance on playgrounds around the turn of the 20th Century, hundreds of seesaws have been used as a wonderful play device, but also as a scientific tool without the children being aware that they were learning about the core physics property of force.

A likely first goal of two children playing on a seesaw was to sit in a specific place on the wooden plank that allowed the two children to both be suspended off the ground. This balancing point was based on the weight of each child and their position on the plank. One child might move closer to the fulcrum, while the other farther away to balance their differences in weight. Without being aware of the scientific terms they were experiencing, the two children would be investigating balanced and unbalanced forces, torque, lever arms, angular acceleration, and several other physics concepts that might be studied much later in their lives.

But as the children become more adept at manipulating their up and down motion of the seesaw, a major problem arose. If one child moved in a position on the wooden plank to lift the other child to the high point of the seesaw and then jumped off, the raised child would suddenly crash down and collide with the ground due to the unbalanced forces acting on the child and seesaw. This led to several back and spinal injuries. And these injuries gave rise to many lawsuits filed against cities that had seesaws in their parks and playground. In fact, there are now federal guidelines that state how seesaws can be safely installed and used in playgrounds. However, the number of cities and schools that still have seesaws as part of their playground equipment has declined over the past 20 years to a point where seesaws can now be found in less than 5% of these facilities. A sad exit to a wonderful tool for experiencing and studying balanced and unbalanced forces.

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Answers: Page 2 Answers: 1) d, 2) b, 3) a, 4) c, 5) c. **Page 3 Answers: Balancing the Impossible.** 1) Unbalanced forces. 2) The forces were balanced.