

STEM *Sims*™

# Battery to Glow



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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.**

Energy exists in two basic types: kinetic and potential. Each type has multiple different forms energy may take. Toppling dominoes is a great way to study energy changes. Take the following brief quiz to see how much you already know about energy and dominoes. See the bottom of page 4 to check your answers.

1. In November 2009 a group of 89 people set a world record for toppling dominoes. How many dominoes did this group topple over?
  - a. 44,981
  - b. 449,816
  - c. 4,491,863
  - d. 44,918,635
2. Tom Holmes set a record for the tallest free-standing tower built of dominoes. How tall was his tower?
  - a. 5.275 meters
  - b. 52.75 meters
  - c. 527.5 meters
  - d. 5,275 meters
3. In a typical set of 28 dominoes, how many dominoes have 6 dots on *both* ends of the domino?
  - a. 1
  - b. 2
  - c. 4
  - d. 6
4. Which energy storage type has the greatest energy density by mass?
  - a. nuclear fission of uranium-235
  - b. nuclear fusion of hydrogen
  - c. liquid hydrogen
  - d. mass-energy equivalence
5. Burning dry cow dung releases more energy per unit mass than burning wood.
  - a. true
  - b. false



# Energy Changes

Many people confuse the notions of energy transfer and energy transformation. Energy transfer means to move energy from one location to another location. Heat energy moved from a stove burner to the bottom of a pan is an example of energy transfer. Energy transformation means to change the form of energy. For example, a battery can change chemical energy into electrical energy. Are you ready to investigate energy? Get started now.

## Materials

3 – 5 boxes of dominoes  
open, stable flat surfaces

## Procedure

1. Make sure that you get permission before conducting this experiment.
2. Stand one domino up on its end on a flat, stable surface.
3. Knock over the domino.
4. Answer question #1 below.
5. Carefully stand up all the dominoes in a line so that when one falls over it will strike the adjoining domino.
6. Once all the dominoes are in place, knock over the first domino and observe the results.

## Questions

1. When the domino was standing upright, which type of energy did it have?
2. Which form of energy did the falling dominoes have?
3. Did the falling dominoes move matter or energy from one end of the line to the opposite end? Provide a reason to support your response.
4. Describe how this is or isn't a good model for how electrical charge is moved through a conductor.



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## Weird Energy

As the energy demands of the world increase, the search for new energy sources intensifies. Although energy derived from fossil fuels can supply most energy needs for years, the quest to find newer, cleaner sources is advancing at a rapid pace. Below are just a few of the new possible energy sources.

### Algae

Algae that photosynthesize take carbon dioxide from the air and use the energy from the sun to create sugars and other products. One such product is energy-rich oils that can serve as biofuels. Large farms of algae can supply huge amounts of energy with very limited resources required to support their growth. Space and water sources, both salt and fresh water is all these algae need to make biofuels.

### Body Heat

Even during cold times, places where people are crowded together in a small space can heat up rapidly. Many who have ridden on a packed subway car, train, bus, or elevator have experienced this phenomenon. Scientists in some colder climate countries created a system to trap and move the heat from people's bodies to nearby buildings to heat the offices.



### Waste Alcohol

When bad batches of alcohol are produced or alcohol is confiscated for some reason, most of this alcohol is poured out into a waste management system. Some scientists and officials created a plan to collect, modify, and use this waste material as a biofuel to power vehicles. Around the world over one million gallons of waste alcohol are tossed each year. With this new use, this alcohol is now turned into a cleaner burning vehicle fuel than gasoline.

### Walking

People are encouraged to take a minimum of 10,000 steps each day to maintain good fitness levels. With the world population approaching 8 billion people, that's a lot of energy going to waste. Scientists are working on sidewalk systems that can capture some of this kinetic energy due to walking and transforming it into other useful forms of energy.

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Answers: Page 2 Answers: 1) c, 2) a, 3) a, 4) d, 5) a. Page 3 Answers: Energy Changes 1) Gravitational potential energy, 2) Mechanical kinetic energy, 3) Energy, the matter did not move down the line. 4) Good model since energy is passed along the conductor and not matter.

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