

# Measuring Potential

## You need

- ★ pendulum swings and energy values tables (see copymasters)
- ★ weights such as metal washers
- ★ a measuring tape
- ★ string
- ★ a ruler
- ★ wooden block(s)
- ★ sticky tape
- ★ classmates

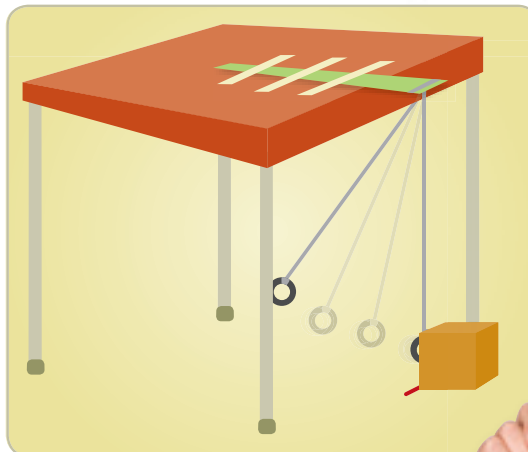
## Activity

Sefo knows that when he lifts a weight, he gives it more potential energy. When he lets go, the potential energy of the weight converts to kinetic energy.

Which has more potential energy, a heavy weight held over my head or a light weight on the roof?

How do you measure potential energy?

1.
  - i. In a group, make a pendulum by tying a weight (bob) to one end of a piece of string. Attach the other end to a ruler secured to a desk so that the bob swings freely and almost reaches the ground.
  - ii. Place a wooden block next to the pendulum at the lowest point of the arc. Use tape to mark the position of the block on the floor.
  - iii. Pull the bob back to a measured height and let go.



- iv. Measure how far the block moved after it was hit by the bob. (If it didn't move, increase the weight of the bob or use a smaller block.)



2. Repeat the experiment, using different starting heights and weights. Record your data in your copy of the table below.

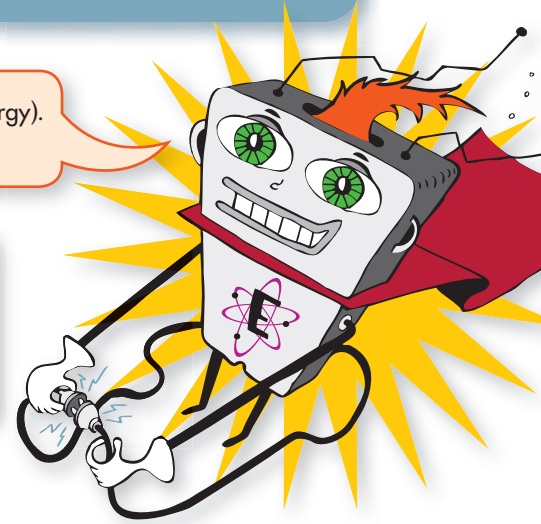
Pendulum Swings				
Weight	Height of bob at start			
	Height 1: ____	Height 2: ____	Height 3: ____	Height 4: ____
Number of weights (washers)	Distance the block moved			

3.

Potential energy is motion waiting to happen (stored energy).  
Kinetic energy is energy at work (moving energy).

Variables are things that might cause a change. Variables can be:

- independent (what you change)
- controlled (what you keep the same)
- dependent (what changes as a result of a change you have made).



Based on your experiment, discuss with a classmate:

- What sort of pendulum would transfer the most energy (hit the wooden block the hardest)?
- What sort of pendulum would move the block the least distance?
- What happens to the distance that the block moves if you:
  - double the weight of the bob?
  - double the height that the bob swings back from?

4.

- Using what you've learnt, predict which will go further: a light pendulum released high or a heavy pendulum released low.
- Test your prediction.

5.

- If potential energy is proportional to weight and height, then weight  $\times$  height should give a rough measure of energy.
- On your copy of the energy values table, copy your weight and height values from question 2. Then, to find the energy value, multiply the number of weights by the height for each pendulum–height combination.
  - How well does the energy value predict the distance the block actually moves?
  - Why might some of the energy have been lost?