Station 1: Rubbing Hands

Press your hands together. Rub one palm vigorously against the other.

a. What happens to your hands?

b. What happens to the energy in your muscles?

Station 2: Beating Water

a. i. Fill a plastic bowl with tap water and use a thermometer to measure the temperature of the water.

ii. Using an egg beater, take turns to beat the water as hard as you can for about 1 minute each and then immediately measure the temperature of the water.

b. i. What happens to the temperature of the water?

ii. What happens to the energy you used to beat the water?

Station 3: Rolling a Can

Gently push the can so that it rolls away from you.

a. How did the can move?

b. i. What happens to the rubber band inside the can as the can rolls forward?

ii. What happens to the energy in the rubber band after the can reaches the farthest point away from you?

Station 4: Bending a Paper Clip

Pick up a paper clip and feel how cool it is. Open the clip and bend it back and forth several times (try not to break it).

What happens to the temperature of the paper clip where you bend it?

Station 5: Lifting a Weight

Lift the weight at this station.

a. What happens to the energy of the weight when you lift it?

b. What would happen to your energy if you were to keep lifting the weight as many times as you can?

Station 6: Playing a Guitar

Gillian is experimenting with different ways of playing her guitar.

Using the instrument at this station, determine what will happen to the sound of Gillian's guitar if she strums more energetically.

Mathematics questions for energy stations

Station 1: Rubbing Hands

The thermal energy needed to heat a cup of tea by 1°C is approximately 1 000 joules (J). When you press your palms together firmly and rub them back and forth, the work you do against the force of friction is about 0.8 J per rub (1 movement up and down). How many times will you need to rub your hands to make enough heat to warm your cup of tea by 1°?

Answer: ....

Station 2: Beating Water

The thermal energy needed to heat a 1 litre (1 kg) bowl of water by 1°C is approximately equal to the work of lifting the litre of water a distance of 400 m. If the egg beater lifts the water about 8 cm every turn, how many turns do you need to heat the water by 5°?

Answer: ....

Station 3: Rolling a Can

Each twist of the rubber band inside the can stores energy. If the rubber band twists $\frac{2}{3}$ of a full turn for every 10 cm the can travels, how far will the can roll back when the rubber band is twisted 6 full turns?

Answer: ....

Station 4: Bending a Paper Clip

The energy you use to bend the paper clip is equal to the weight of your arms multiplied by the height you lift them. 1 joule is about 1 kg x 10 cm. If your arms weigh about 10 kg and you lift them 1 cm each time you bend the clip, estimate how many joules of energy you put into the paper clip.

Answer: ....

Station 5: Lifting a Weight

When you lift a weight, its energy increases by its weight multiplied by the height you lift it. 1 joule is about 1 kg x 10 cm. How many joules of energy do you put into the weight?

Answer: ....

Station 6: Playing a Guitar

Gillian is playing an electric guitar. The louder she sets the volume on the amplifier, the greater the distance the membrane in the speaker moves and the greater the energy the speaker has to draw from the batteries or wall outlet.

Complete the pattern of volume settings and energy use for Gillian's guitar amplifier:

Volume setting	Low	2	3	4	5	6	7	8	9	Max
Energy used per hour in joules		3.4 J	3.8 J	4.2 J						6.6 J

How much energy does Gillian's amplifier use at the lowest setting?

Answer: ....