

### Worksheet answers

Energy can be transferred from one form to another. For example a torch turns chemical energy in a battery into light energy that you can see. However most energy transformations are not 100% efficient. Energy can't be lost, so where does the rest of the energy go?

A series of investigations will help you find what happens to wasted energy. Use all of your senses (sight, touch, sound) and write down your observations in the table below.

Heat energy is one type of energy produced in many of these reactions. If possible, record the temperature of the surface in each situation before and after each activity.

Activities may be done in any order.

	ACTIVITY	EQUIPMENT	OBSERVATIONS	TYPES OF ENERGY PRODUCED	TEMPERATURE CHANGE (°C)
A	Flatten a metal sheet with a hammer by hitting it several times in quick succession.	metal sheet hammer	<i>makes loud banging noise metal feels hot immediately after hammering</i>	<i>sound heat</i>	
B	Bounce a basketball as fast as you can.	basketball	<i>ball moves makes bounce sound when ball hits ground ball feels hot immediately after bouncing</i>	<i>kinetic sound heat</i>	
C	Make a 'guitar' by putting a few elastic bands around a shoebox without a lid. Pluck the elastic bands quickly.	bottom half of a shoebox 5 elastic bands	<i>strings move produces sound strings feel warm immediately after plucking</i>	<i>kinetic sound heat</i>	
D	Put on safety glasses. Add a few marble chips to 10 mL of dilute hydrochloric acid in a test tube.	marble chips 10 mL hydrochloric acid	<i>bubbles produced chips may move around test tube feels warm</i>	<i>chemical kinetic heat</i>	
E	Create an electrical circuit by joining a battery to a small globe with alligator leads for 10 seconds.	6 V battery 2 electrical leads with alligator clips small globe	<i>light turns on light feels warm</i>	<i>electrical light heat</i>	
F	Light a candle.	candle matches	<i>flame burns producing heat and light</i>	<i>chemical heat light</i>	

## Questions

1. Which of these activities involve production of heat energy?

*All of them involve production of heat energy.*

2. Give an example of a situation where useful heat energy is produced. Explain.

*Many examples are possible. These may include an oven, microwave, open fire, rubbing hands together for warmth, heating a car, electric or gas heater, kettle, toaster, hair-drier, hotplate or steam engine.*

3. Give an example of a situation where heat energy produced is not useful (it is waste). Explain.

*Many examples are possible. These may include car engine, lights, candle, computer, television and bouncing or hitting a ball.*

4. What happens to energy that has been transformed into heat? Energy can't be lost but eventually everything feels like it returns to room temperature. So where does the energy go?

*Heat energy spreads to the surrounding environment. Heat energy makes particles move faster, but as energy spreads further, between a greater number of particles, it has less effect on particle movement until it's not noticeable.*