TRANSFORMERS

TEACHER GUIDE

LAUNCH

PLANNING

Here's a suggested schedule for this kit! The activities should be completed in order, but you can choose when the lessons take place over time.

ACTIVITY INFORMATION	SECTION (S)	TIME REQUIRED	DAY/ LESSON
ACTIVITY 1: A "WOW!" WITH WOOL Spark your excitement about energy transfer. Total time: 45 min	☐ An Unusual Fire Starter	45 minutes	Day 1
ACTIVITY 2: SPINNING IN CIRCLES A simple design to understand large concepts. Total time: 2 h	☐ Spinning Around ☐ The Way it Works ☐ Types and Forms	60 minutes 60 minutes	Day 2 Day 3
ACTIVITY 3: SPINNING FASTER Build a wind turbine and make it spin! Total time: 3 h	☐		

PREPARATION AND SUPERVISION

- Your student will be performing an experiment where they hold a cardstock spiral above boiling water, making it spin.
- It can be helpful to have your student draw their spiral first and then cut it out.
- If your student struggles with tying the rubber band to the skewer, they can also glue or tape it on.

4

WARNING! Boiled water can cause burns to skin.
Be careful not to touch boiling water or hot appliances.
Avoid spills by using a stable container and surface.

REFLECT

Question 1: Where does the energy come from in each experiment?
Answer:
• In the experiment from Activity 1, the energy comes from the battery.
• In the experiment from Activity 2, the energy comes from the heat source causing the water to boil.
How to Help:
• Fun Fact: All energy on earth originated from the sun. There is more explanation to this in Activity 5.
• For Activity 2, your student may say that the energy comes from the steam. If this is what your student concludes, encourage them to think back further in the experiment to a more original source of energy, the type of energy that was used to heat the water.

Question 2: Where does the energy go in each experiment?
Answer:
• In Activity 1, the energy goes to the steel wool as heat, a flame or spark that burns out. The heat from the spark or flame dissipates into the environment around it.
• In Activity 2, the energy goes up to move the spiral. Again, the heat will dissipate into the environment.

5

THE WAY IT WORKS

CONTENT

• In this section, your student will learn the following vocabulary terms: combustion reaction, energy, energy transfer, law of conservation of energy, and oxidation.
• This section explains the reactions and processes that took place during the experiments in Activity 1 and 2.
• Because your student won't learn about the types and forms of energy until the next section, the explanations do not label the forms of energy.

6

TYPES AND FORMS

Types of Energy
• In this sub-section, your student will learn the following vocabulary terms: kinetic energy and potential energy.

Question: Try out an example for yourself! Your parent is driving the family car home from work when it breaks down on the side of the rode 9 m from the driveway. It takes your parent 100 N to push the car. How much work will your parent have to perform to get the car all the way home?
Answer: *900 J*
How to Help:

$$work = force \times distance$$
$$work = 100\ N \times 9\ m$$
$$work = 900\ N \cdot m$$
$$work = 900\ J$$

Power
In this sub-section, your student will learn the vocabulary term power, and use the power equation power = work/time.

Question: If you performed 10 J of work to push a swing for 2 minutes, how much power did you deliver?
Answer: *0.008 watts*
How to Help:

$$power = \frac{work}{time}$$

$$power = \frac{10\ J}{2\ minutes}$$

$$power = \frac{10\ J}{120\ seconds}$$

$$power = \frac{0.008\ J}{seconds}$$

$$power = 0.008\ watts$$

SHOW WHAT YOU KNOW

10

Question 1: Make a flow chart showing the energy conversions for each of the experiments in Activities 1, 2, and 3.
Answer:
• Activity 1: Chemical ➔ Electrical ➔ Thermal
• Activity 2: Electrical ➔ Thermal ➔ Mechanical
• Activity 3: Electrical ➔ Mechanical (if using a fan) OR Chemical ➔ Mechanical
How to Help:
• If your student uses potential and kinetic energy, encourage them to identify the forms of energy converted.
• If your student used their own breath to blow on the fan, they might be confused as to what form of energy this is. It is chemical energy because their body break chemical bonds when they move, which was required to push breath from their mouth.

Question 2: In the following scenarios, indicate the potential energy, kinetic energy, and the energy conversions.
a. Turning on a battery-powered flashlight.
Answer:
• The potential energy is the chemical energy in the batteries. The kinetic energy is the electrical energy and radiant energy when the light in the flashlight is on.
• Chemical energy ➔ Electrical energy ➔ Radiant energy

LAUNCH

Science Unlocked

Contact us at: www.homesciencetools.com/customer-service/

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Kit	SU-ENTRAN
Instructions	IN-ENTRANT
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