Energy Scene Teacher Notes

Students may identify different or additional interactions than those described here. Use the notes provided as a guide. Also note that while students are not making observations first hand or directly collecting evidence of the interactions represented here they will make claims and offer evidence based on their prior experiences.

Skateboarder

Claim (C): The skateboarder interacts with the skateboard.

Evidence (E): The skateboarder's foot pushes against the ground, causing the skateboard to move forward.

Energy source (ES): skateboarder's foot (chemical and mechanical/motion energy) → Energy receiver (ER): skateboard (mechanical/motion, thermal – heat/friction)

Students may also say that the skateboarder and/or skateboard (ES/ER) has gravitational potential energy when airborne. They may also cite the food the person ate or the sun as the energy source.

Guitar

Claim (C): The person's fingers interact with the guitar strings.

Evidence (E): When the person's fingers strums the guitar strings, the strings move causing air molecules (and eventually a person's ear drum) to vibrate.

Energy source (ES): person's fingers (chemical and mechanical/motion) → Energy receiver (ER): guitar strings (mechanical/motion, thermal - heat – heat/friction)

Students may also identify the food the person ate or the sun as the energy source.

Frisbee fetching dog

Claim (C): The dog interacts with the frisbee.

Evidence (E): The dog jumps in the air (change in dog's motion) and catches the frisbee in it's mouth, stopping the motion of the frisbee.

Energy source (ES): dog's muscles (chemical and mechanical/motion energy) → Energy receiver (ER): frisbee (mechanical/motion, thermal – heat/friction)

Students may also say that the dog and/or frisbee (ES/ER) has gravitational potential energy as they are airborne. Students may also identify the food the dog ate or the sun as the energy source.

Melting icicles

Claim (C): The icicles interact with the sun.

Evidence (E): Heat from the sun warms the icicles, making them melt.

Energy source (ES): sun (thermal and radiant - light) → Energy receiver (ER): frozen water (thermal)

Tap dance

Claim (C): The tap shoes interact with the floor.

Evidence (E): The tap shoes strike the dance floor causing the air molecules (and eventually a person's ear drum) to vibrate.

Energy source (ES): dancer's body/feet/tap shoe (chemical and mechanical/motion) → Energy receiver (ER): floor (mechanical/motion, thermal – heat/friction))

Students may also identify the food the person ate or the sun as the energy source.

Hot air balloon

Claim (C): Warm air inside the balloon interacts with the cooler air outside the balloon.

Evidence (E): As warmer air fills the balloon, it rises.

Energy source (ES): propane (chemical and thermal) → Energy receiver (ER): air in the balloon (thermal)

Students may also say that the balloon has gravitational potential energy as it is suspended above the Earth. Students familiar with the science of fire may offer the claim that propane is interacting with an igniter and oxygen and, as evidence of an energy interaction, the fire that results. Fire comes from a chemical reaction between oxygen and a fuel. The fuel has to be heated to its ignition temperature before it will burn. Propane (fuel) is burned in the balloon's burner, the air in the balloon warms up and the balloon rises. The balloon is kept afloat due to density differences between the warmer air in balloon and the cooler surrounding air in the atmosphere.

Juggling

Claim (C): The juggler interacts with the balls.

Evidence (E): The juggler tosses the balls into the air, causing them to rise.

Energy source (ES): juggler's hands/arms (chemical, mechanical/motion, gravitational potential) → Energy receiver (ER): balls (mechanical/motion and gravitational potential)

Students may also identify the food the person ate or the sun as the energy source.

Wind turbine

Claim (C): Air interacts with the wind turbine.

Evidence (E): As the wind blows, there is a change in the motion of the wind turbine blades.

Energy source (ES): wind/sun (thermal, radiant, mechanical/motion) → Energy receiver (ER): wind turbine blades (mechanical/motion)

Depending on students' familiarity with wind, students may or may not include the sun as an energy source. Students may also extend the interaction to include the generation of electricity: Energy source (ES): Wind turbine blades turn (mechanical/motion) → Energy receiver (ER): a shaft inside the turbine that turns a generator (mechanical/motion) / Energy source (ES): generator (movement of magnets over wires inside generator (mechanical/motion) → Energy receiver (ER): wires (electrical and thermal).

Campfire

Claim (C): Match or lighter (fire) interacts with wood.

Evidence (E): The wood changes; it burns, it is hot, and it glows.

Energy source (ES): Match or lighter (chemical energy) → Energy receiver (ER): wood (thermal, radiant, chemical energy)

This may be a difficult interaction for students to discern. Refer to the notes under Hot Air Balloon for more information about fire.

Lava lamp

Claim (C): Heat from the lamp interacts with the "lava."

Evidence (E): When the lava (a waxy substance) in the lamp warms up, blobs of lava rise and cool, then fall.

Energy source (ES): Lamp/bulb (electrical and thermal) → Energy receiver (ER): "lava" (thermal)

Students may also note that the "lava" has gravitational potential energy.

Solar calculator

Claim (C): Light interacts with the solar panel on the calculator.

Evidence (E): The calculator is operable in the presence of light. (Numbers are displayed on the calculator's screen and the device will make calculations.)

Energy source (ES): light (radiant energy) → Energy receiver (ER): solar cells of the calculator (electrical)

Baby Bungee

Claim (C): The baby interacts with the bouncy baby seat.

Evidence (E): As the baby pushes off the floor (jumps), the baby seat (and the baby) moves up and falls back down.

Energy source (ES): baby's legs (chemical, mechanical/motion) and elastic harness on baby seat (elastic) → Energy receiver (ER): baby seat and baby (elastic, mechanical/motion)

Students may also say that the baby and baby seat have gravitational potential energy as they are suspended.

Washing dishes

Claim (C): The person's hand and warm water are interacting with the glass.

Evidence (E): The glass is cleaner and warmer.

Energy source (ES): hands (mechanical/motion) and water (mechanical/motion and thermal) → Energy receiver (ER): glass (thermal)

Students may also say that chemical energy is involved in moving the person's hands and thermal energy is involved to heat up the hot water used to wash the dishes.

Fireworks

Claim (C): Match/lighter/fuse interacts with the chemicals making up fireworks.

Evidence (E): After the fuse is ignited, the fireworks chemicals explode. Sound, heat, and light are given off.

Energy source (ES): match/lighter (chemical) → Energy receiver (ER)/Energy source (ES): fuse (chemical) → Energy receiver (ER): fireworks chemicals (chemical, radiant, and thermal energy)

Students may say that gravitational potential energy is involved before the firework shell (pieces) fall(s) to the ground. Additional information about fire can be found under the notes for the Hot Air Balloon scene.

Slinky

Claim (C): The boy's hands interact with the slinky.

Evidence (E): As the boy pulls and pushes on each end of the slinky, the slinky droops and vibrates back and forth.

Energy source (ES): boy's hands (mechanical/motion), position of the slinky (gravitational potential), make up of slinky (stored mechanical - elastic) → Energy resource (ER): slinky (elastic, mechanical/motion)

Eating a sandwich

Claim (C): A person is interacting with a sandwich.

Evidence (E): Eating the sandwich provides fuel and building material for a person's body.

Energy source (ES): sandwich/food (chemical) → Energy receiver (ER): person's body (chemical, mechanical/motion, thermal)