

Exercises for Unit #4: Energy

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Let's see how much you've picked up with these experiments and the reading - answer as best as you can. *(No peeking at the answers until you're done!)* Just relax and see what jumps to mind when you read the question. You can also print these out and jot down your answers in your science notebook.

Energy Exercises

1. Everything in the universe can be categorized as what two things?
2. What is energy?
3. What is work?
4. If someone carries a lawn chair to their roof to watch the meteor showers, is work done on the chair?
5. What if the chair falls off the roof? Is work done on the chair then?
6. If someone pushes a train with all their might, but the train doesn't move, is work done?
7. What are two units used to measure work?
8. What is power?
9. What are two units to measure power?
10. Where does all the energy you get from food originate from?

Simple Machines/Levers Exercises

1. Can you name the six simple machines?

5. Describe a third-class lever. Can you give an example?

2. It is easier to move things using a lever but what has to happen to lessen the force needed to move the load?

3. Describe a first-class lever. Can you give an example?

4. Describe a second-class lever. Can you give an example?

Pulley Exercises

1. If I'm talking about simple machines, what does load mean?

2. So what does effort mean when it comes to simple machines?

3. With the pulleys, as your effort got less and less, what happened to the amount of string you had to pull?

4. What is mechanical advantage?

Answers to Energy Exercises

1. Matter and energy.
2. The ability of an object or system to do work on another object or system. Energy is defined in the physics books as the ability to do work.
3. Work is moving an object against a force over a distance. $\text{Work} = \text{force} \times \text{distance}$
4. Yes. The chair has been moved a distance, against the force of gravity.
5. Nope, the chair moves a distance, but it moves with the force of gravity. Work is moving something a distance against a force. In this case, the chair does not move against a force. No work is done.
6. Nope again! There's no distance moved so...no work done.
7. Joules and calories.
8. The amount of work done in a given amount of time. $\text{Power} = \text{work} \div \text{time}$
9. Watts and horsepower.
10. The sun. You are powered by the sun!

examples are see-saw, a hammer (when it's used to pull nails), scissors, and pliers.

4. In a second-class lever, the load is between the fulcrum and the effort. Some examples are a wheelbarrow, a door, a stapler, and a nut-cracker.

5. The third-class lever has the effort between the load and the fulcrum. A few examples of this are tweezers, fishing rods, your jaw, and your arm

Answers to Pulley Exercises

1. The load is what you are lifting or moving.
2. Effort is the force needed to lift the load.
3. As the effort got less, the amount of string (distance) got greater and greater.
4. Mechanical advantage is the factor by which a mechanism multiplies the force put into it.

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Answers to Simple Machines/Levers Exercises

1. The six machines are the inclined plane, the wheel and axle, the lever, the pulley, the wedge, and the screw.
2. The distance that the effort moves is much greater than the distance the load moves.
3. A first-class lever is a lever in which the fulcrum is located in between the effort and the load. Some