

Work, Energy, and Machines

- Energy is the ability to do work. In which of these examples does using energy cause work to be done?
 - A girl kicks a ball across a field.
 - A boy holds a suitcase by his side.
 - A pitcher holds a ball in his glove.
 - A woman reads instructions for assembling her bicycle.
- How is the energy in the food we eat an example of chemical potential energy?
 - It isn't; food stores kinetic energy.
 - It isn't; chemical potential energy is only found in fossil fuels.
 - Food is broken down and then moves through the digestive system.
 - The chemical bonds in the food store energy that is released when we eat it.
- A child has a mass of 35 kg. The child is running across a field and has a speed of 3 m/s^2 . What is the kinetic energy of the child?
 - 315 J
 - 157.5 J
 - 52.5 J
 - There is not enough information to determine the kinetic energy.
- The following table shows information about three different objects sitting on a bookshelf. Some data are missing from the table.

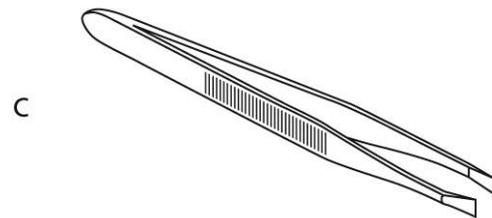
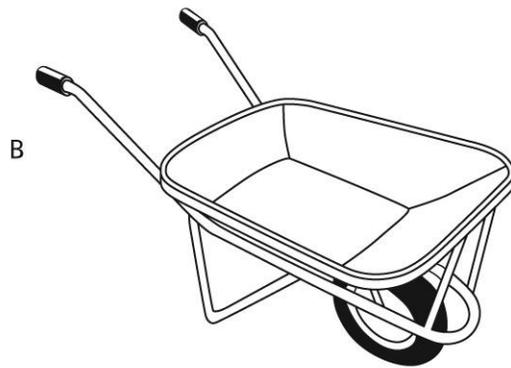
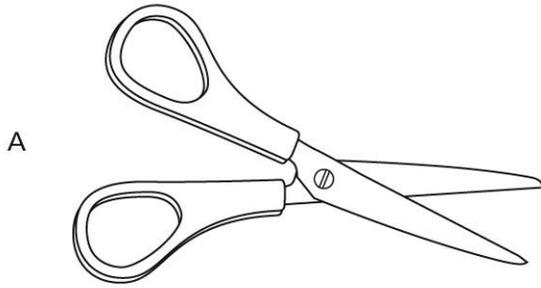
	Mass	Height	Acceleration due to Gravity
Object 1	4 kg	3 m	9.8 m/s^2
Object 2	6 kg		9.8 m/s^2
Object 3		2 m	9.8 m/s^2

If object 2 has a height of 3 m, what is its gravitational potential energy?

- 176.4 J
- 117.6 J
- 58.8 J
- 29.4 J

Name _____ Date _____

5. The images below show three common devices that are examples of simple machines.



Why are scissors considered a first class lever?

- A. They aren't. Scissors are a third class lever.
- B. They aren't. Scissors are a second class lever.
- C. The fulcrum is between the input force (applied at the handles) and output force (applied to the blades).
- D. The input force (applied at the handles) is between the fulcrum and the output force (applied to the blades).

Name _____ Date _____

6. What is the difference between input force and output force?
- Input force is the force a machine exerts on an object, and output force is the force exerted on a machine.
 - Input force is the force exerted on a machine, and output force is the force a machine exerts on an object.
 - Input force is a measure of the machine's efficiency, and output force is a measure of the mechanical advantage of the machine.
 - Input force is a measure of the mechanical advantage of the machine, and output force is a measure of the machine's efficiency.
7. As you pull down on a pulley, the load attached to the pulley is lifted. How has the pulley changed the way work is done?
- It made the load lighter.
 - It made the load heavier.
 - It lifted the load more quickly.
 - It changed the direction of force.
8. A child pushes a toy car down a hill. After 5 seconds, the car has a kinetic energy of 115 J and a gravitational potential energy of 30 J. What is the car's mechanical energy at that time?
- 3.9 J
 - 85 J
 - 115 J
 - 145 J
9. Four movers pushed different boxes across a floor for the same distance. The table shows how much force each mover used, the time it took to move the box, and the mass of the box.

Mover	Force (N)	Time (s)	Mass of Box (kg)
Akira	155	5	15
Maddie	120	10	15
Jayden	90	3	18
Hamid	160	10	22

Which mover did the most work moving a box?

- Akira
- Hamid
- Jayden
- Maddie

Name _____ Date _____

10. The motion of a fish swimming in a fish tank is an example of which type of energy?
- A. kinetic energy
 - B. chemical energy
 - C. potential energy
 - D. gravitational energy
11. A worker moves a heavy load into a house with the aid of an inclined plane. If the plane has a length of 6.2 meters and a height of 1.7 meters, what is its ideal mechanical advantage?
- A. 3.65
 - B. 7.9
 - C. 10.54
 - D. 0.27
12. A girl uses 60 J of energy to move a box from the floor to a shelf. How much power does she use if it takes her 3 s to move the box?
- A. 15 W
 - B. 20 W
 - C. 90 W
 - D. 180 W

Name _____ Date _____

Critical Thinking**Answer the following questions in the space provided.**

13. Discuss three different simple machines. Identify the machine by name, then give an example of how that machine is used in real life.

Name _____ Date _____

Extended Response**Answer the following questions in the space provided.**

14. Energy can be used to do work using many processes. Complete the chart by identifying the energy conversion or conversions that take place for each example given. The first example is done for you.

Example	Energy conversion(s)
You get energy when you eat and digest food.	Chemical energy from food is converted to mechanical energy you can use to do work.
Energy from a battery runs a CD player.	
Energy from a windmill lights a lamp.	
Differences in temperatures cause wind.	
A loud noise makes the windows rattle.	