

Grade 9 Technology Energy and Power

Unit 1 Topic 2 - Work, Energy & Power

Students will be expected to:

- 1.04 define the term work and state the unit of measurement for work.
- 1.05 define the term energy and state the unit of measurement for energy.
- 1.06 define kinetic energy and explore sources of kinetic energy.
- 1.07 define potential energy and explore sources of potential energy.
- 1.08 define the term power and state the unit of measurement for power.

Work

- Work is the transfer of energy.
- In order to do work, a force has to be applied to a mass and the mass has to be moved in the direction of the force over a distance.
- Work is not done on the mass if the mass doesn't move or if the force applied to the mass is in the opposite direction to its motion.
- Work is measured in Joules (a Joule is a Newton-metre).

Energy

- Energy is the ability to do work.
- Energy exists in several forms such as heat, kinetic or mechanical energy, light, potential energy, electrical, or other forms.
- According to the law of conservation of energy, the total energy of a system remains constant, though energy may transform into another form. Two billiard balls colliding, for example, may come to rest, with the resulting energy becoming sound and perhaps a bit of heat at the point of collision.
- Other examples include: A plane uses energy to carry passengers. When electricity turns a motor, the motor is using energy. When water is changed into steam it uses energy.

Since energy is the ability to do work, it is also measured in Joules.

Kinetic Energy

Kinetic energy is the energy of a mass in motion.

The more the object weights and the faster it is moving, the more kinetic energy it has.

If a car crashes into a wall at 5 mph, it shouldn't do too much damage to the car. But if it hits the wall at 40 mph, the car most likely will be totaled.

Kinetic energy would also be a loaded oil tanker coming up Placentia Bay. This vessel would need miles to stop simply because it has a tremendous amount of kinetic energy.

Potential Energy

Potential energy is stored energy or energy "waiting to be converted to power".

Examples of potential energy would be sunlight, coal, oil being pumped out of Hibernia, water in a dam above a power plant.



The yo-yo is an example of both kinetic and potential energy. Sitting in the yo-yoist's palm, the yo-yo has a certain amount of potential energy. This **potential energy** takes two different forms:

The yo-yo is held up in the air, giving it the potential to **fall** to the ground.

The yo-yo has string wound around it, giving it the potential to **spin** as it unwinds.

When the yo-yo is released, both forms of potential energy change to **kinetic energy**. The yo-yo spool falls straight to the ground, which builds

a certain amount of linear momentum. At the same time, the string unwinds, and the spool spins, which builds angular momentum.

Power

- ✚ Power is the amount of energy expended in a unit of time or the amount of work done in a unit of time.
- ✚ The unit of power is the Watt which is a Joule per second.
- ✚ An example of power would be people shovelling a mound of dirt by hand may take all day whereas a loader can come in and do that in a few minutes. The loader does the same amount of work in a shorter period of time and therefore has more power.

Assignment 2

Assignment

There are two spaces left blank at the bottom of the table. You are to fill in one example of kinetic energy and one example of potential energy.

Item	What is it? (kinetic or potential energy, source of energy)	Why?
gasoline in a fuel tank	potential energy	because the gasoline is waiting to be converted to power by the engine
rock resting on the top of a hill		
walking your body		
food in your stomach		
a compressing spring		
running your body		
sunlight		
rubber band flying through the air		
weight hanging from a tree		
wind		
pendulum clock		
water falling in a waterfall		
plants		

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