Sample Test and Quiz Questions

# Task 04: Students can apply appropriate measurement units to energy system parameters and convert between different units of measurement.

* What type of units would a solar array system have?
* What units would be used to measure energy consumption of an LED light?
* An air conditioner is rated for 6000 BTU/h, what is the kW rating?
* In your home, what are common units you would see?
  + BTU – gas/diesel
  + kW – electricity
  + watts – lights
  + water – liters/gallons

# Task 05: Students can calculate forces, mass, velocity, and flows acting in energy systems.

* Mass flow rate
  + Such as water at a rate used to fill a bucket
* Volume flow rate
  + Such as air velocity in a duct
* Solar PV systems
  + Wind force
  + Weather
  + Atmospheric pressure

# Task 06: Students can describe, convert, and use the physical properties pressure, temperature, and density.

* Describe pressure
  + A force exerted over a unit area
  + Pressure is normally a gas or liquid
  + Pressure is measured in pascals
* Describe temperature
  + Measurement of molecular kinetic energy
  + Usually in degrees Celsius or degrees Kelvin
* Describe density
  + Mass per unit volume
  + The reciprocal is specific volume
  + Density can change with temperature

# Task 07: Students can describe the concepts of heat and temperature.

* What is heat?
  + Heat is the thermal energy transfer between molecules.
  + Heat can be transferred by conduction, convection, or radiation
* What is temperature?
  + Temperature is a measurement of molecular kinetic energy

# Task 08: Students can compute the energy and work available from kinetic energy and potential energy sources.

* A river is used to drive a hydro turbine. The river flows at 3m/s and a flow rate of 500m3/s at a location 90 meters above the turbine. List the energy source. What is the power generation of the turbine?
* A wind turbine farm is generating power. When the turbine has excess power, it uses it to drive a pump. The pump deliveries water from a lake below to a reservoir above it to be used later. What are the energy sources here?

# Task 09: Students can compute energy flows for a system by applying the First Law of Thermodynamics (Conservation of Energy).

* Conservation of energy
  + Energy can neither be created or destroyed, only transformed from one form to another.
* A light bulb is turned on. What is happening to the energy?
* The stove was turned on to cook supper, describe the energy conservation.

# Task 10: Students can summarize the Second Law of Thermodynamics and apply the concept of efficiency.

* The second law of thermodynamics states that high quality energy can be converted to low quality energy, but the reverse cannot happen
* Low quality energy cannot be converted to high quality energy without added work
* An air conditioner uses 500 watts and produces 6000 btu/h of cooling. What is the efficiency of the system?