

Chapter 5 Energy and Energy Resources Homework Sheet

Hw#1

1. What is energy?
 - a. The ability to cause a change.
2. What is the origin of the word energy in Greek?
 - a. *energeia*: meaning activity
3. What is Kinetic energy?
 - a. energy due to motion. All moving objects have KE.
4. What does an object's kinetic energy depend on?
 - a. speed and mass
5. Which object has more kinetic energy? A blue car with a mass of 1,500 kg and a speed of 25 m/s OR a green car with a mass of 1,500 kg and a speed of 15 m/s.
 - a. The blue car because it has a greater speed.
6. Which object has more kinetic energy? The green car from question #5 or a truck moving at the same speed of 15 m/s with a mass of 8,000kg?
 - a. The truck because it has more mass.
7. Can energy be present even if the object is not moving? if yes, how?
 - a. Yes. Example: if you hold a ball in your hand and then let it go, the gravitational attraction between the ball and Earth causes a CHANGE to occur. Before you dropped the ball it had a form of energy called potential energy.
8. What is potential energy?
 - a. stored energy due to the interactions between objects or particles.
9. What are 3 forms of potential energy?
 - a. gravitational, elastic and chemical
10. What factors determine the gravitational potential energy stored between an object and Earth?
 - a. an object's mass and its height above Earth.
11. If Mary is holding a bag at waist level or if she is holding it above her head a different gravitational potential energy is present in both situations. In which situation is there more gravitational potential energy?
 - a. when the bag is above Mary's head
12. If Mary is holding a 20kg bag above her head or a 30 kg bag above her head a different gravitational potential energy is present in both situations. In which situation is there more gravitational potential energy?
 - a. when Mary is holding the 30kg bag above her head
13. What is elastic potential energy?
 - a. energy stored in objects that are compressed or stretched (such as a spring or rubberband)
14. What happens to the stored elastic potential energy in a stretched rubberband when it is released?
 - a. The elastic potential energy is transformed into kinetic energy
15. Name some materials that might store a lot of elastic potential energy. How are all of these materials similar?
 - a. rubber band, basketball, metal spring....any object that can be deformed and then return to its original shape. These objects must be able to withstand a change in shape--flexibility--and also quickly return to its original shape.
16. What is chemical potential energy? When is chemical potential energy released?

- a. energy stored in the chemical bonds between atoms. It is released when chemical reactions occur. Example: your body uses the chemical potential energy in foods for all its activities. It is also used in gasoline to drive cars and buses.
17. In what way are all forms of potential energy the same?
- a. All forms of potential energy are stored energy.
18. REVIEW question: What is WORK?
- a. the transfer of energy that occurs when a force is applied over a distance. You transfer energy by doing work.
19. Review question: What does work on?
- a. force and distance. You only do work on an object when the object moves. If there is no transfer of energy if an object doesn't move..therefore no work has been done.
20. How is energy related to work?
- a. work is the transfer of energy that occurs when a force causes and object to move.
21. When work is done on an object, does the object's energy increase or decrease?
- a. increase
22. When work is done by an object, does the energy increase or decrease?
- a. decrease
23. What is energy measured in?
- a. joules
24. Define the additional types of energy and give an example of each.
1. Mechanical energy-
 - a. Sound energy-
 - b. Thermal energy-
 - c. Electric energy-
 - d. Radiant energy-
 - e. Nuclear energy-
1. Mechanical energy- the total energy of an object or group of objects due to large-scale motions and interactions. Ex: mechanical energy of a basketball increases when a player shoots the basketball
 2. Sound energy- the energy that sound carries. Ex: plucking a guitar string
 3. Thermal energy- energy due to the motion of particles that make up an object. Ex: when you heat objects, you transfer thermal energy to those objects from their surroundings.
 4. Electric energy- the energy that an electric current carries. Ex: electric appliances change electric energy into other forms of energy.
 5. Radiant energy- energy that electromagnetic waves carry. sometimes called light energy. Ex: suns light
 6. Nuclear energy- is energy that is stored in the nucleus of an atom. Ex: nuclear power plant: nuclear energy is released when the nuclei of uranium atoms are split.

Lesson 2 and 3 homework sheet

Lesson 2

- 1) What is the law of conservation of energy?
 - a. Energy is not created or destroyed
- 2) Explain the energy transformation in a rollercoaster. Use KE and GPE.
 - a. MAX GPE at the top, MAX KE at the bottom, as it moves up KE decreases GPE increases, as it moves down KE increases GPE decreases
- 3) When you use a bicycle, mechanical energy gets transformed into what type of energy? Does the total amount of energy change?
 - a. ME transforms into TE. Total amount of energy does not change
- 4) What produces thermal energy?

- a. Friction
- 5) How can you reduce friction? Give an example.
 - a. Using a lubricant. Oil, grease, lotion, etc.
- 6) Which energy do we run off of? Why?
 - a. Electric- because it is inexpensive, safe, and can travel long distances
- 7) All forms of energy transform into which type of energy?
 - a. Thermal
- 8) Give an example of different types of radiant energy?
 - a. Visible: Sun
 - b. Invisible: microwaves and radio waves
- 9) A flashlight converts CPE-EE-RE. However, TE is also transformed. A jet engine transforms CPE-ME/KE. However, SE is also created. In these examples, what type of energy are these (TE&SE)? Why?
 - a. Waste energy because there is no purpose to TE or SE in either example
- 10) Most of the time WE is in the form of which type of energy?
 - a. TE
- 11) Discuss the energy transformations of the following:

a. Television	b. Toaster	c. Car	d. Mixer	e. Iron	f. Sun
g. Hot-air balloon	h. Photosynthesis	i. glowstick	j. tanning bed		

Lesson 3

- 1) Where do the sources of energy come from?
 - a. The Sun
- 2) What is a nonrenewable resource? List the four nonrenewable resources and their specific name (if they have).
 - a. It can be used up
 - b. Fossil fuels: coal, natural gas, petroleum & nuclear
- 3) What is a renewable resource? List the five renewable resources and their specific names (if they have).
 - a. Cannot be used up
 - b. Hydroelectric, Geothermal, biomass, & solar and wind (inexhaustible)
- 4) How are these fossil fuels formed?
 - a. Over millions years and under increasing temperature and pressure.
- 5) What is petroleum and natural gas created from and where?
 - a. Microscopic ocean organisms on the ocean floor
- 6) What is coal created from and where?
 - a. Plants that are buried under sediment rock/ on land
- 7) What will happen in time with these burning of the fossil fuels? What gas gets released? What does this gas do?
 - a. Global warming- carbon dioxide- warms the Earth's surface
- 8) Discuss the energy transformation of the electric power plant.
 - a. CPE-TE-ME-EE
- 9) How much of these fossil fuels are being used (in percentage) and for what purposes?
 - a. Petroleum: power cars, trucks, planes and heat buildings
 - b. Coal: 90 %: heat buildings and produce steel and concrete
 - c. Natural gas: half of homes use it & 30% in EPP: heating
- 10) Discuss the energy transformation of the nuclear power plant. Why is it so harmful?
 - a. Ne-TE-ME-EE
 - b. Produces nuclear waste for thousands of years
- 11) Discuss the energy transformation of a hydroelectric power plant. What does it use to produce electricity?
 - a. PE-KE-ME-EE
 - b. Running water
- 12) Discuss the energy transformation of solar panels. What are the advantages and disadvantages of solar energy or using a solar panel?
 - a. Solar energy-electric energy
 - b. It is exhaustible resource- never can be used up
 - c. expensive
- 13) What is the energy transformation of a wind turbine? Where are they most practical?
 - a. ME-EE
 - b. Flat plain land where the average wind speed is 5 m/s
- 14) What is biomass? What is biofuels? Why are they both helpful?

- a. Biomass- burn wood, dried peat moss, and manure to stay warm
 - b. Biomass converted into fuels that can be burned in the engines of cars and vehicles
 - c. Can reduce the use of gasoline and make petroleum last longer
- 15) What is geothermal energy? How can it produce electricity?
- a. Thermal energy from inside Earth
 - b. Drill into the reservoir, the hot water and steam in the reservoir spin a turbine at the surface to the electric generator
- 16) In a percent, how much energy is provided using fossil fuels? Using nonrenewable energy resources?
- a. 85% fossil fuels
 - b. 93% nonrenewable resources
- 17) Give one way to conserve energy.
- a. Turn off water while brushing teeth
 - b. Turn off lights