

# Unit 3 Test Review: Energy

(For summative grade test on Friday, 11/6/09)

1. When the space shuttle returns to Earth from a space mission and reduces its speed in order to land, the kinetic energy is decreasing.
2. The distance an object is located above the earth's surface directly influences the object's gravitational potential energy.
3. A stone resting on a cliff has no kinetic energy.
4. In a roller coaster with three hills, one low, one medium and one high, in what order do the hills have to be for the roller coaster to have enough potential energy to complete the third hill? Start with the highest hill, and end up at the lowest hill.

5. Skateboarding on a ramp to the right is an example of the continuous transformations that can occur between

potential and kinetic energy.



6. The skateboarder(s) with the most potential energy is skateboarder A.

7. Give three examples of objects that are gaining potential elastic energy: stretched rubber band, compressed spring, and deformed rock before an earthquake.

8. Give three examples of objects that have kinetic energy: rolling tennis ball, falling rock, and ground shaking earthquake.

9. What kind of mechanical energy conversion occurs as a pendulum swings from the side to the bottom of its swing? potential to kinetic.

10. What kind of mechanical energy conversion occurs when a tennis ball hits the ground and compresses? kinetic to elastic potential.
11. What kind of mechanical energy conversion occurs when a roller coaster car travels from the top of the hill to the bottom? gravitational potential to kinetic.
12. In general, earthquakes and volcanoes are a result of the transformation of potential energy to kinetic energy.
13. What form of energy is stored in the nucleus of an atom, and released during fission or fusion? nuclear.
14. What form of energy is stored in the bonds between atoms in molecules, in substances such as sugar and gasoline? chemical.
15. What form of energy is either found in moving objects or stored in objects that are under stress or located at a height above the ground?  
mechanical.
16. What form of energy is found in vibrating atoms and molecules, and is commonly sensed by animals as heat? thermal.
17. What form of energy, such as visible light and microwaves, is transmitted by waves that can travel through a vacuum? radiant (also called light or electromagnetic waves).
18. What form of energy is stored in objects containing electrons, or transmitted in metals by the movement of electrons? electrical.
19. A new battery is a good example of potential energy.
20. What energy conversion takes place at the Sun, so that its energy can reach Earth? nuclear to radiant.
21. What energy conversion takes place when you light a match?  
chemical and mechanical to thermal and radiant.

22. What energy conversion takes place when a turbine spins a generator in an electric power plant? mechanical to electrical
23. What kind of energy conversion takes place in a fluorescent light bulb?  
electrical to radiant
24. Animals get energy from the food they eat. What is the original source of this energy? The Sun
25. The conversion of energy in photosynthesis is from radiant (light) energy to chemical energy.
26. What is the pigment that makes leaves green and captures energy from the Sun? chlorophyll
27. What is the organelle in plant cells where photosynthesis occurs?  
chloroplast
28. What are the reactants (ingredients) in the photosynthesis chemical reaction? carbon dioxide and water
29. What are the products (the end result) in the photosynthesis chemical reaction? sugar (glucose) and oxygen
30. What size of leaves and level of light on plants would most likely have the highest rate of photosynthesis? large surface area leaves with a high level of light.
31. Trees that grow in a forest tend to grow very tall with few branches. The same species of tree grown in an open area tends to grow shorter with many branches. The stimulus responsible for these different growth patterns is the amount of light reaching the tree.
32. The response of plants to the stimulus of light, in which they turn and grow towards a light source, is called: phototropism.
33. The response of plants to the stimulus of gravity, in which plant seedling roots grow down towards the center of the Earth, and stems grow up away from the center of the Earth, is called: gravitropism.

34. What kind of energy resources are geothermal, wind, and solar energy?

inexhaustible

35. What kind of energy resources are forests, crops and other biomass sources, such as wood or corn converted to alcohol?

renewable

36. What kind of energy resources are coal, uranium, natural gas and petroleum (oil)?

non-renewable

37. Write a short essay describing the energy conversions that occur in an automobile. Be specific in describing both the form of energy before and after each conversion, and the corresponding part and process in the automobile where each conversion occurs. (10 pts.) **When you turn the key of the car to start it, mechanical energy is being used. Turning the key completes a circuit of electrical energy which flows to the starter motor which turns (mechanical energy). As the motor turns, gasoline (chemical energy) is being pumped to the cylinders of the engine, where sparks (electrical or thermal energy) are used to ignite the gasoline and release thermal energy. That energy expands the gases in the cylinder and moves it, creating mechanical energy. That movement is transferred to the wheels of the car, which is also mechanical energy. If the lights of the car are turned on, electrical energy from the battery is used to create the radiant energy of the lights. As the tires turn on the pavement, they get hot, which is thermal energy. Water is circulated through the engine to cool it, thus transferring thermal energy to the radiator. A fan behind the radiator turns (mechanical energy) and pulls cool air over the radiator, helping the transfer of thermal energy. When the windshield wipers are turned on, electrical energy is used to run the motors of the windshield wipers. If the air conditioning is turned on, a belt connected to the engine turns the air conditioner compressor (mechanical energy) which pumps**

heat out of the car (thermal energy). Turning on the radio uses electrical energy to turn radio waves (radiant energy) into sound waves (mechanical energy).

38. Describe what changes in the use of energy resources that humans will have to make in the future, as the supply of fossil fuels drops. (10 pts.)  
Humans currently get about 91% of their energy from non-renewable resources, such as oil, coal, natural gas and uranium. All of these energy resources will eventually become scarce, and will have to be replaced by either renewable or inexhaustible energy resources. It is not likely that renewable energy resources such as hydroelectric and biomass (like converting algae to alcohol) can be increased enough by themselves to make up for the loss of fossil fuels. That means that inexhaustible energy resources such as solar, wind, geothermal or waves / tides will have to become our main energy resources. Of these, solar and wind will probably be the best sources, but we will have to find a way to store their energy for use when the Sun is not shining or the wind is not blowing.

#### District Questions from Past Units

39. Are the elements located on the upper, left side of the Period Table of Elements, in Group 1, metals or non-metals? Are they reactive or non-reactive? metals, reactive.
40. A scientist is working on an experiment and needs NaCl. The scientist found KCl but no NaCl. How does the scientist know the KCl will work the same as the NaCl in the experiment? Because potassium (K) is in the same group as sodium (Na), and has the same properties.
41. What laboratory items can safely be recycled? paper not contaminated with chemicals or bacteria.