**Unit 7 Study Guide**

**Concepts:**

1. What is mass?
2. What are the units for mass?
3. What is weight?
4. What are the units for weight?
5. What is the equation for weight?
6. What is the acceleration due to gravity on earth?
7. What is work?
8. What are the units for work?
9. What must be true of the force in order for work to occur?
10. Draw me a situation where work IS being done. Use arrows to indicate the forces and the motion. Label the arrows.
11. Draw me a situation where work IS NOT being done. Use arrows to indicate the forces and the motion. Label the arrows.
12. What is power?
13. What are the units for power?

**Energy:**

1. What is energy?
2. What are the units for energy?
3. What is mechanical energy?
4. What is chemical energy?
5. What is electrical energy?
6. What is light energy?
7. What is thermal energy?
8. What happens to the motion of atoms as the temperature decreases?
9. What type of energy does our body use?
10. What is elastic potential energy?
11. What is gravitational potential energy?
12. What is the equation for GPE?
13. Which of the following, mass, height, or velocity, DOES NOT affect GPE?
14. What is kinetic energy?
15. What is the equation for kinetic energy?
16. Which of the following, mass, height, or velocity, DOES NOT affect Kinetic Energy?
17. What is the law of conservation of energy?
18. Draw me a picture of the first hill of a roller coaster. Explain the roller coaster car’s energy on the top of the ramp, midway down the ramp, and at the bottom of the ramp. *You should be using numbers, and the words potential and kinetic energy.*
19. Was there a perfect conservation of energy from potential to kinetic? If not, where did the extra energy go?
20. On this rollercoaster, when do I have a positive acceleration?
21. On this rollercoaster, when do I have a negative acceleration?
22. When am I going to have the highest speed throughout my rollercoaster ride?
23. Explain energy transfers. For example, what is the “energy start” and “energy end” for:
	1. A lightbulb
	2. A battery
	3. A solar cell

**Nuclear Energy:**

1. What is nuclear energy?
2. What is fission?
3. What does fission start with?
4. What does fission end with?
5. Where does fission occur?
6. What is fusion?
7. What does fusion start with?
8. What does fusion end with?
9. Where does fusion occur?
10. Does fission or fusion use a chain reaction process in order to work?
11. Briefly explain, in 3-4 steps, how a nuclear power plant generates electricity.
12. List 3 BENEIFTS of nuclear energy.
13. List 3 DISADVANTAGES of nuclear energy.

**Math:**

1. If a car has a mass of 3200kg on Earth, what is the weight of the car?
2. What would be the weight of the same car on Mars (1/3 of the gravity of Earth)?
3. If I lift an 800N bear (ya, I said bear) .5 meters and carry him across an interstate for a distance of 60 meters in the most awesome game of Frogger ever, how much work did I perform?
4. 380 J of work are performed on a soccer ball as it is kicked 190 meters. What was the force applied to the soccer ball?
5. What is the kinetic energy of an 18kg ball that is traveling at 3.5m/s, 9m above the ground?
6. What is the gravitational potential energy of that same ball from the previous question?
7. What is the magnitude of velocity of a 22kg dog that is running with 450J of kinetic energy?
8. An 8kg soccer ball starts at rest and is kicked 31.5 meters until it reaches a final velocity of 21m/s in 3 seconds. What is the power with which the soccer ball was kicked, assuming we ignore any friction or wind resistance?
9. If I were to pushing a cart for 8 seconds, with a force is 240N, over a distance of 11 meters, how much power did I exert?
10. If I pushed the same cart for 15 seconds, would I have done more or less work?