POTENTIAL AND KINETIC ENERGY

Name _____

Potential energy is stored energy due to position. Kinetic energy is energy that depends on mass and velocity (movement).

Potential Energy = Weight x Height (P.E. = w x h)

Kinetic Energy = $^1/_2$ Mass x Velocity^2 (K.E. = $^1/_2mv^2$)

The units used are:
- Energy = joules
- Weight = newtons
- Height = meters
- Mass = kilograms
- Velocity = m/s

For a closed system, the sum of the potential energy and the kinetic energy is a constant. As the potential energy decreases, the kinetic energy increases.

Solve the following problems.

1. What is the potential energy of a rock that weighs 100 newtons that is sitting on top of a hill 300 meters high?

   Answer: _____

2. What is the kinetic energy of a bicycle with a mass of 14 kg traveling at a velocity of 3 m/s?

   Answer: _____

3. A flower pot weighing 3 newtons is sitting on a windowsill 30 meters from the ground. Is the energy of the flower pot potential or kinetic? How many joules is this?

   Answers: _____ _____

4. When the flower pot in Problem 3 is only 10 meters from the ground, what is its potential energy?

   Answer: _____

5. How much of the total energy in Problems 3 and 4 has been transformed to kinetic energy?

   Answer: _____

6. A 1200 kg automobile is traveling at a velocity of 100 m/s. Is its energy potential or kinetic? How much energy does it possess?

   Answers: _____ _____

Name _____ Period _____ Date _____

Energy & Work – Ch. 5

PART A – WORK

1. A game show contestant won a prize by pushing a bowling ball 20 m using her nose. The amount of work done was 1470 J. How much force did the contestant exert on the ball?

GIVEN	WORK	ANSWER

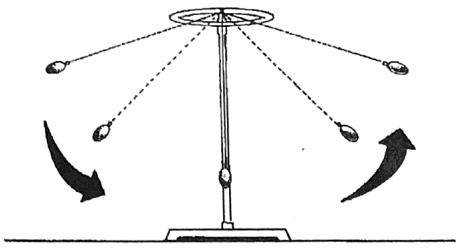
2. Carlos does a chin-up in gym class and raises himself 0.8 m. If Carlos has a mass of 62 kg, how much work does he accomplish? (Remember, mass is not a force!)

GIVEN	WORK	ANSWER

3. A football player picks up the football, runs with it, and throws it to a teammate. During which of these actions is work being done on the football? Explain.

PART B – CONSERVATION OF ENERGY

4. On the diagram of the pendulum, identify the position of maximum potential energy with the letter "P". Identify the position of maximum kinetic energy with the letter "K". Identify the position where kinetic energy is increasing with the letter "I". Identify the position where the kinetic energy is decreasing with the letter "D".



5. Imagine dropping a soccer ball. The first bounce will be highest, and each bounce after that will be lower until the ball stops bouncing. Describe the energy changes that take place and explain how energy is conserved.

CALCULATING POWER

Name _____

Power is the amount of work done per unit of time. The unit for power, joules/second, is the watt.

$$\text{Power} = \frac{\text{work}}{\text{time}}$$

work = joules
time = seconds

Solve the following problems.

1. A set of pulleys is used to lift a piano weighing 1,000 newtons. The piano is lifted 3 meters in 60 seconds. How much power is used?

   Answer: _____

2. How much power is used if a force of 35 newtons is used to push a box a distance of 10 meters in 5 seconds?

   Answer: _____

3. What is the power of a kitchen blender if it can perform 3,750 joules of work in 15 seconds?

   Answer: _____

4. How much work is done using a 500-watt microwave oven for 5 minutes?

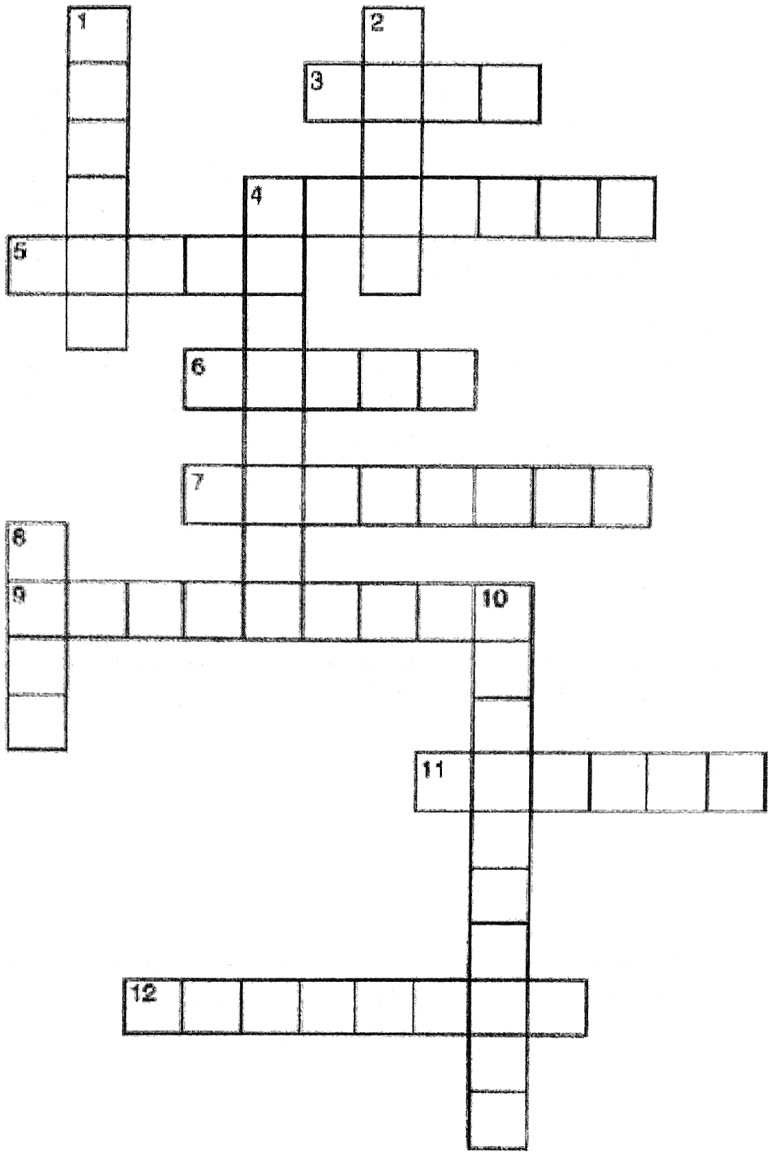
   Answer: _____

5. How much work is done using a 60-watt light bulb for 1 hour?

   Answer: _____

FORCE AND WORK CROSSWORD

Name _____



Across

3. Force times distance
4. Point around which a lever rotates
5. Amount of work done per unit of time
6. Can be considered a type of inclined plane wrapped around a cylinder
7. A machine makes work easier by reducing force and increasing _____ .
9. How many times a force is multiplied by a machine is the mechanical _____ .
11. An inclined plane is an example of a _____ machine.

Down

1. Unit of force
2. Unit for work (newton-meter)
4. Force that reduces the efficiency of a machine
8. Joule per second
10. Work output divided by work input.
12. An automobile is an example of a _____ machine.