Energy Efficiency

When energy is changed some of it is always wasted. We can measure the amount of useful energy we get by the efficiency.

The examples below show energy changes in engines. The **work** that they do is their useful energy output.

$$\text{Efficiency} = \frac{\text{useful energy output}}{\text{total energy input}} \times 100$$

Calculate the efficiency of each engine.

1. A petrol engine takes 1000J of chemical energy and does 250J of work.

2. A diesel engine uses 6000J of chemical energy and does 2100J of work.

3. An electric motor uses 50J of electrical energy and does 40J of work.

4. A cyclist (a human engine) has 200J of energy and does 30J of work.

For the following questions, you will need to decide what form the useful energy is in.

5. A TV takes in 600J of electrical energy and gives out 300J of light, 240J of sound and 60J of heat energy.

6. A windup toy uses 50J of potential energy and gives out 24J of kinetic energy, 20J of heat energy and 6J of sound energy.

7. 100J of electrical energy is put into a light bulb. 20J of light energy and 90J of heat energy are produced.

8. A hairdryer uses 750J of electrical energy and converts it into 400J of heat energy and 350J of sound energy.

9. 2000J of electrical energy is used by a microwave to produce 100J of sound energy, 400J of light energy and 1500J of heat energy.

10. An iPod uses 400J of energy which is transformed into 100J of light energy, sound energy and 75J of heat energy.
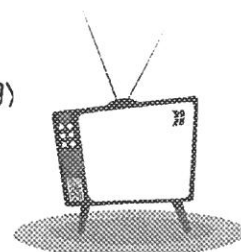
Efficiency Calculation Worksheet   Name: _____

1. Wile E. Coyote sets up a pulley to lift a gigantic boulder over a valley highway in an attempt to squish the Roadrunner. Wile E. Coyote puts 3402 J of energy into the pulley while the pulley does 2938 J of work. Calculate the efficiency of the pulley.

2. Wile E. Coyote's previous attempt of killing the Roadrunner failed so he decided to use an inclined plane to push a boulder down onto the Roadrunner. The output work done by the inclined plane is 875 J and the input work is 1285 J. Calculate the efficiency of the inclined plane.

3. After another failed attempt, Wile E. Coyote grabs a stick to create first class lever. He inputs 445 J of work and the output work of the lever is 430 J. Calculate the efficiency.

4. Wile E. Coyote tries chasing after the Roadrunner with his Acme 200 Cyclone bicycle. The output of bike is 2890 J of work while the input was 4122 J. Calculate the efficiency of the Acme 200 Cyclone.

5. Wile E. Coyote wants to poison the Roadrunner by putting arsenic in some bird feed. The arsenic comes in a can so he must use a can opener. If Wile E. Coyote applies 34 J of work and the can opener does 27 J work then what is the efficiency of the can opener?

6. In his last attempt Wile E. Coyote creates a catapult to launch a boulder. After construction, Wile E. Coyote sets up the catapult and waits for the Roadrunner. When the Roadrunner appears he puts 793 J of work into the catapult while it does 720 J of work. What is the efficiency this catapult?