Energy Review Problems Worksheet

show all calculations with units

$1/R = \dfrac{\text{Energy (BTUs)}}{\text{area (ft}^2\text{)time (hr)}\Delta T(°F)}$ Power(watts) = current(amps) x voltage(volts)

BTU = energy needed to raise the temp. of 1 pound of water 1°F

1 gallon weights 8 pounds	1 cubic foot of gas contains 1031 BTUs
1 kWh = 3413 BTU	1 ton of coal contains 2.5×10^7 BTUs

1. How many kWhs of energy could be generated by a coal burning power plant that burned 250 tons of coal and was 40% efficient?

2. How much natural gas must be burned in order to produce 5.2×10^4 kWhs of electricity if the power plant was 65% efficient?

3. How many pounds of water could raise in temperature 20°F by the 90% efficient burning of 30 cubic feet of natural gas?

4. a. The R-value of a hot water heater insulation blanket is 6.7 and covers an area of 25 square feet. How many BTUs will it save for every hour that it prevents 1°F of temperature change?_____

   b. How many cubic feet of gas will that save in one year?

5. What is the efficiency of a gas-burning furnace that heats 5,000 lbs of water 25°F by burning 210 cubic feet of natural gas?

6. 7.0 tons of coal are burned to generate 3.6 x 10^4 kWh of electricity. What is the efficiency of the generator?

7. If you replace one 75-watt incandescent light bulb with fluorescent light bulb that give the same amount of light by drawing only 20 watts. You use the light bulb for an average of 4 hours a day.
a. How many kWhs of energy would you save in one day?

b. How many kWhs of energy would you save in one year?

c. The cost of one kWh is $0.10. How much money does the fluorescent light bulb save in one year?

8.   a.   How much power is produced by a solar cell that produces 0.06 amps of current and has a voltage of 0.75 volts?

 b. if the solar cell had an area of 20 cm^2 and collected sunlight when the solar constant (the amount of energy available per cubic centimeter) was 0.08 watts/cm^2, what was the efficiency of the solar cell?

 c. How many solar cells would it take to run a 60-watt bulb?

9. If the efficiency of a coal-burning power plant is 65% and the efficiency of energy transmission is 95%, and the efficiency of an electric stove is 85%, how many BTUs of heat could be produced by an electric stove after 0.50 tons of coal have been burned?

10. How many cubic feet of gas must be burned in a 80% efficient pool heater in order to increase the temperature of a 200,000 gallon pool from 60°F to 75°F?