**IB Physics**

**FA IB8.1 – Energy Production**

Name

Favorite Analogy

**Show your work, and circle your answers and use sig figs to receive full credit.**

When you have finished this, go to the website and check your answers. If you got a problem wrong, cross it off on the front, and do it correctly on the back.

1. A 57.0% efficient gas water heater contains 175 liters of water at 18.0 oC. What is the temperature of the water (c = 4186 J kg-1 oC-1) after it has burned 0.784 kg of natural gas? (The specific energy of natural gas is 55 MJ kg-1)

2. A 42.0% efficient power plant burns coal and generates an average power output of 2.60 MW. How many kilograms of coal will it burn in a year? (The specific energy of the coal used is 47.0 MJ kg-1)

3. Air with a density of 1.28 kg m-3 enters a 24.0 m radius wind turbine at 7.30 m/s and exits at 6.10 m/s. It generates 160. kW of electrical power. What is the efficiency of the generator in turning the captured wind energy into electrical energy?

4. You are designing a pumped storage electrical generation site. It needs to generate 950. kW of electrical power with a flow rate of 860. kg s-1. What height above the generation site does the reservoir need to be if such systems are typically 65.0% efficient?

5. A solar panel measures 2.74 m by 1.35 m, and generates 547 W of power when the sunlight intensity is 800. W m-2. What is the efficiency of the panels?