## **Practice Exercise: Power on the Space Station**

Imagine you have the items below. It is your choice which of the items to build into your personalized Space Station. You may put in up to five solar arrays to generate power (Just remember they are very expensive and occasionally block your views out the window!). You may add as many power loads as you wish, as long as they do not exceed the power generation

## **Power Generation**



# of Solar Panels \_\_\_\_\_ X 5 kW/hr = \_\_\_\_\_ kW/hr power being generated

## **Power Loads**

	ltem	Description	Power Load	Write the kW/hr for your choices here
	Thermal control systems	Systems for heating and cooling	8.5 kW/hr	
	Environmental control and life support systems	Monitors all life support systems to keep them in proper balance.	7 kW/hr	
	Command and data computers	Controls many of the essential support functions.	3.5 kW/hr	
•	Flight Crew system	Housekeeping and trash management systems on-orbit maintenance	3 kW/hr	

	system, & inventory management			
	Tracking systems	Guidance, Navigation and Control.	1.75 kW/ hr	
$\bigcirc$	Communication systems	Links with ground control to exchange information	1.75 kW/hr	
	Food system	Includes microwave and oven, refrigeration system, and waste control system	2 kW/hr	
	Lighting system	Provides lighting to all parts of the station	2 kW/hr	
	Hair Dryer		1.5 kW/hr	
	250 Christmas Lights		1.25 kW/hr	
	Curling Iron		1.2 kW/hr	
	Coffee maker		1 kW/hr	
	Television		0.16 kW/hr	
	Electric guitar		0.6 kW/hr	
Ĩ	Personal hygiene system	Restroom facilities	0.5 kW/hr	
	Personal laptop		0.5 kW/hr	
	Stereo with CD player		0.03kW/hr	

	Nintendo Game Cube	0.03kW/hr	
	DVD player	0.03kW/hr	
	Satellite Receiver	0.03kW/hr	
00	Electric Razor	0.03kW/hr	
	Electric Toothbrush	0.03kW/hr	
		Total kW/hr	

## **Follow-Up Questions**

- 1. How many kW/hr did your space station generate?
- 2. How many kilowatts per hour was the power load?
- **3.** For the top three power consumers on your list, calculate the percent of the total load. [For example, if you chose the hair dryer, it is 1.5 kW/hr of my 15 kW/hr power configuration. This is 10% of the total energy usage.]
- **4.** Suppose you had a power load (an electric blanket) which consumed 3.5 % of the total power being generated every hour. If the power being generated was 55 kW/hr, how many kW/hr is the blanket consuming?

**Going further:** In your home, your appliances also run on electricity. You can calculate how much that electricity costs you by doing a little research:

- 1. Look at your electric bill. You are searching for a cost per kW/hr of electricity used.(For example, it may cost \$0.07 per kWh (kilowatt-hour)
- Examine your appliance. On the label, on the cord, or on the underside or back, there is information about the appliance's energy usage (it may be listed under "input"). It will be given in watts (W), amps (A), or volts (V), or sometimes volt-amps (VA)
- Use the following conversion factors to convert to watts.
  Watts = Volts X Amps Volt-Amps = Watts
- 4. Multiply the cost per kWh times the kW of the appliance and you'll get a cost per hour for using the appliance.

Appliance	Wattage	W ÷ 1000 = kW	Rate	Cost per Hour= kW x Rate
Hair Dryer	1500 W	1500 W ÷ 1000 = 1.5 kW	\$0.08 per kWh	1.5 kW x \$0.08 per kWh= \$0.12 per hour