

Watt's Your Appliance?



Wisconsin's K-12 Energy Education Program (KEEP)
College of Natural Resources
University of Wisconsin-Stevens Point

Watt's Your Appliance?

Investigating and Comparing Wattages of Common Household Appliances

Estimated Time: 45 minutes

Age: 4th-12th grade

STUDENTS SHOULD GAIN AN UNDERSTANDING OF:

- The difference between power and energy
- Average wattages of common household appliances
- Actions they can take to reduce their energy consumption

SUPPLIES

- Power vs Energy Images
- Watt's Your Appliance Cards, cut in half and laminated
- If possible, watt meter (check out from KEEP)
- Answer Key

INTRODUCTION

- Background vocabulary for electricity:
 - Power - How fast energy is used or transmitted
 - Watt - Unit of power
 - Energy - How much electricity has been generated, stored, or used over time
 - Kilowatt-hour (kWh) - 1,000 watts consumed over one hour
- Hold up (or show pictures of) two electrical appliances from classroom or home and have students predict which one uses more energy in a day.
- Go over the power vs energy concept pages

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ACTIVITY

- Hand out appliance cards to each student. Explain that these represent an average size appliance, and that they should think about the power used, not the energy consumed over time.
- Instruct them to compare their appliance with others to predict which one uses more or less energy. The goal is to have them order themselves from least to greatest wattage.
- While they are working, set out the wattage cards on the floor, a table, or tape to a wall.
- Have students work as a whole class to match the appliances with their average wattage.
- Ask students how we could find out what the wattage is, besides looking at the answer key or asking Google. Options include using a watt meter (show if possible) or looking at the wattage on the appliance.
- If possible, demonstrate using watt meter on two appliances and then have students discuss changes that could be made to the order of the appliances.
- Have students discuss why they made any changes or why they think some are higher or lower wattages.
- Go over correct wattages for each appliance with discussion questions below.

DISCUSSION

- Which appliances have the greatest/least wattage? Why?
 - Electric production of heat needs a lot of power
 - Motors that spin do not need a lot of power
- How does heat correlate with the amount of electricity used?

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DISCUSSION (Continued)

- Compare the following appliances and discuss why each uses more/less:
 - Ceiling fan vs Air conditioning (motor spinning vs taking heat & humidity out of air)
 - Cold water wash vs Hot water wash (same washing machine, heat booster)
 - Space heater vs Blanket/warm clothing (no electricity required)
- Predict and then calculate which uses the most energy over one year (see table on next page).
- **Refrigerator > Aquarium Pump & Filter > Microwave**
- Discuss how time of use affects energy consumption
 - We may have an appliance with low wattage but if it is running all day, everyday, the energy use is going to be high
 - Low wattage appliances sometimes are “on” all the time. We call these “vampire appliances” because they constantly “suck” energy.

WRAP-UP & EXTENSIONS

- Use the average Wisconsin electric rate of \$0.17 per kWh to calculate how much each appliance would cost to run in a year.
- Have students discuss ways they can conserve energy at home and at school.
- Investigate “vampire appliances” and how they affect energy usage.
- Calculate energy usage for one appliance for a year, all appliances from one room in house, or appliances in the classroom.
- Brainstorm ways that kids can teach others how to take action to save energy. Examples include presentations, poster, quizlets, Kahoot, class book, infographic, debate, board game, or a classroom/at home scavenger hunt.
- KEEP Lesson: At Watt Rate
- KEEP Kit for checkout: Energy Audit Kit

ENERGY USE OF APPLIANCES IN ONE YEAR					
APPLIANCE	POWER USED	HOURS PER DAY	DAYS PER YEAR	CALCULATION	ENERGY PER YEAR
Aquarium Pump & Filter	24 W	24	365	$24\text{ W} \div 1000\text{ W/kW} = 0.024\text{ kW}$ $0.024\text{ kW} \times 24\text{ hrs/day} \times 365\text{ days/year} =$	210 kWh per year
Refrigerator	180 W	24	365	$180\text{ W} \div 1000\text{ W/kW} = .18\text{ kW}$ $0.18\text{ kW} \times 24\text{ hrs/day} \times 365\text{ days/year} =$	1,576.8 kWh per year
Microwave	1200 W	.25	365	$1200\text{ W} \div 1000\text{ W/kW} = 1.2\text{ kW}$ $1.2\text{ kW} \times .25\text{ hrs/day} \times 365\text{ days/year} =$	109.5 kWh per year
Your choice appliance				$\underline{\hspace{1cm}}\text{ W} \div 1000\text{ W/kW} = \underline{\hspace{1cm}}\text{ kW}$ $\underline{\hspace{1cm}}\text{ kW} \times \underline{\hspace{1cm}}\text{ hrs/day} \times \underline{\hspace{1cm}}\text{ days/year} =$	

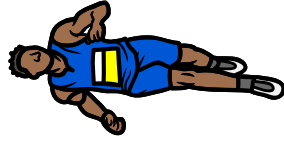
Power vs Energy

Power is how fast energy is used or transmitted.

Watts are a measure of power.



Sprinter uses a lot of power



Distance runner uses less power

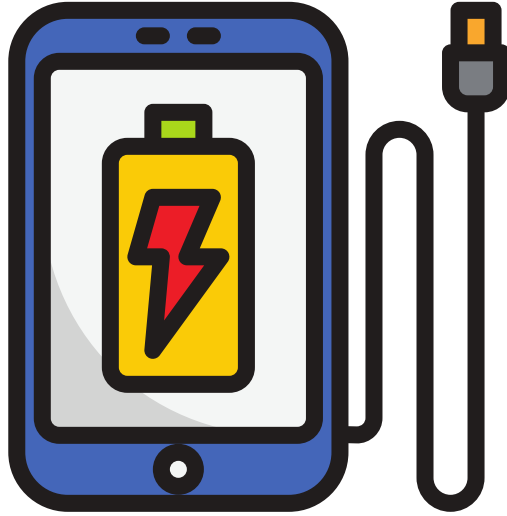
A **kilowatt-hour (kWh)** is a measure of energy (not power).

Energy is how much electricity has been generated, stored, or consumed over time.



They may use the same amount of energy over time

Phone Charger



5 watts

Alarm Clock



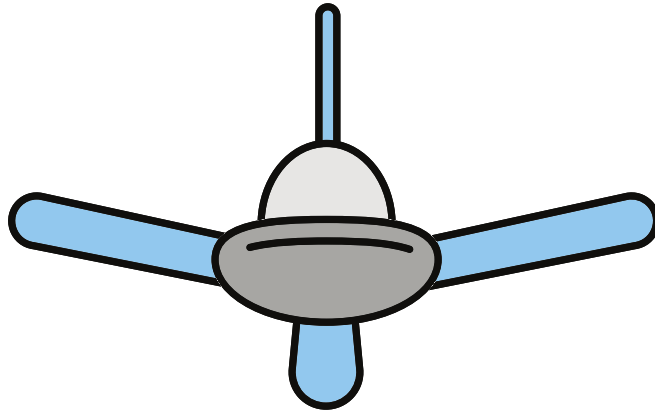
10 watts

Aquarium Pump and Filter



24 watts

Ceiling Fan



75 watts

Xbox



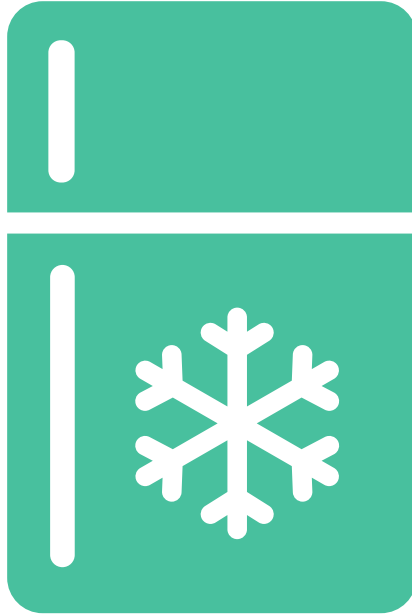
100 watts

LED Television



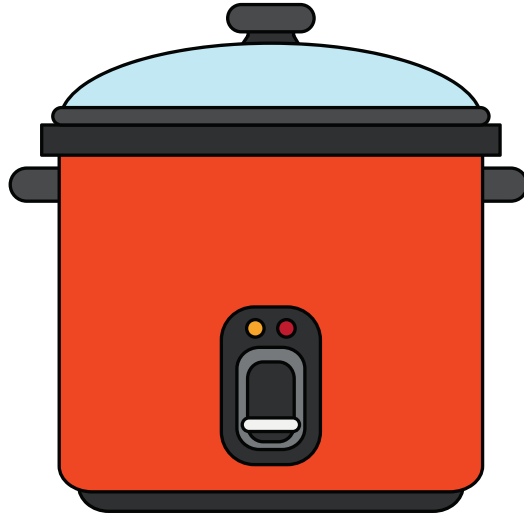
100 watts

Refrigerator



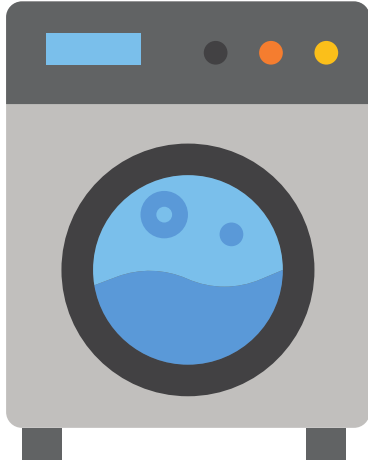
180 watts

Slow Cooker



200 watts

Washing Machine



Cold water wash

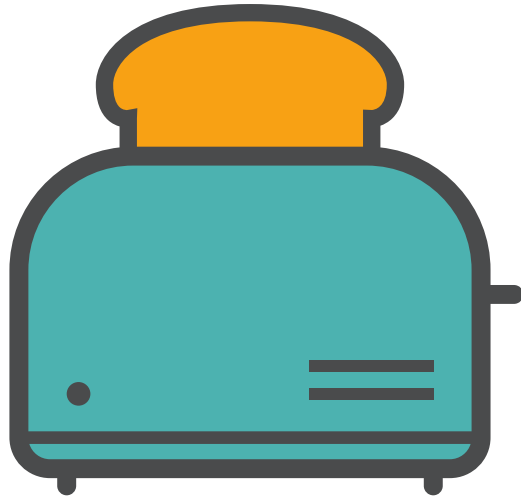
500 watts

Coffee Maker



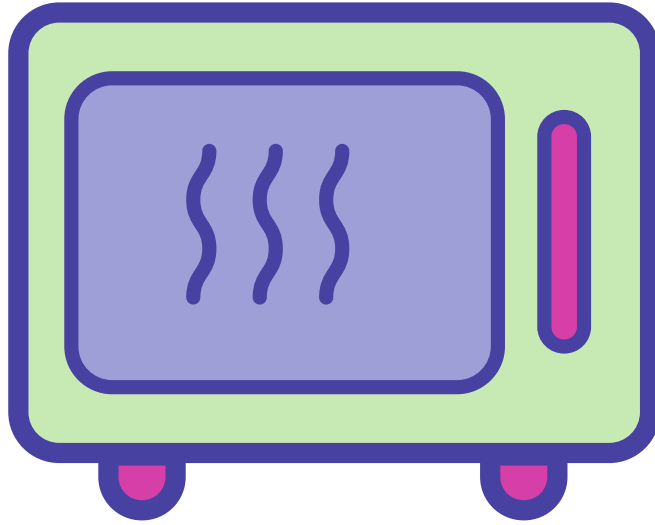
800 watts

Toaster



1,200 watts

Microwave



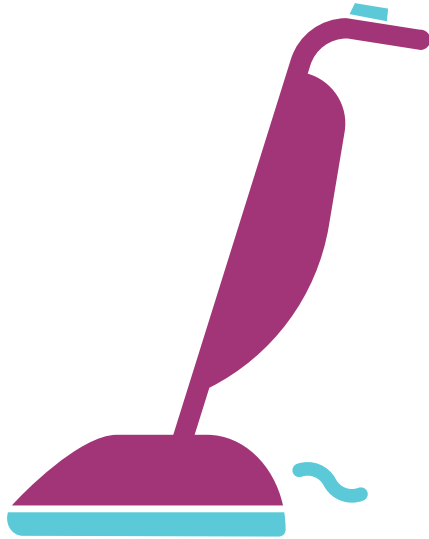
1,200 watts

Blow Dryer



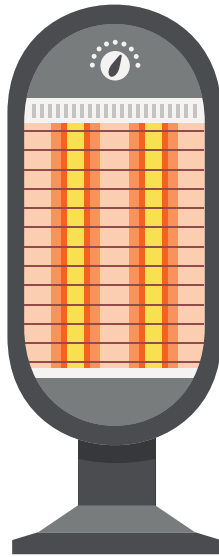
1,200 watts

Vacuum Cleaner



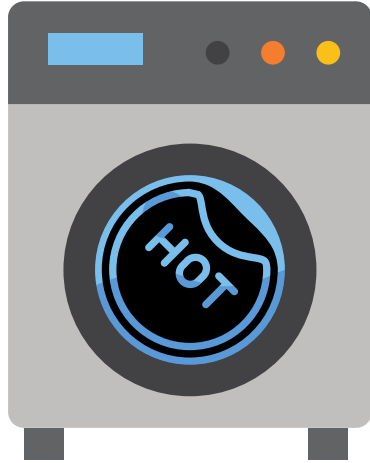
1,400 watts

Space Heater



1,500 watts

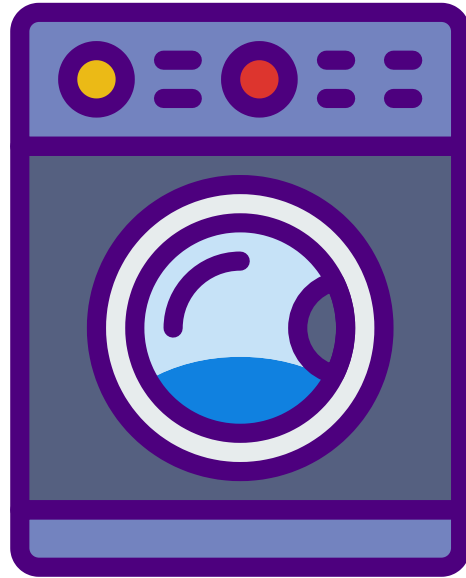
Washing Machine



Hot water wash

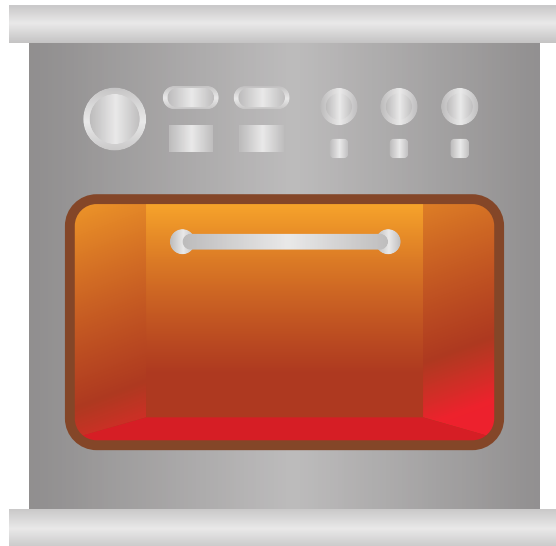
2,500 watts

Electric Clothes Dryer



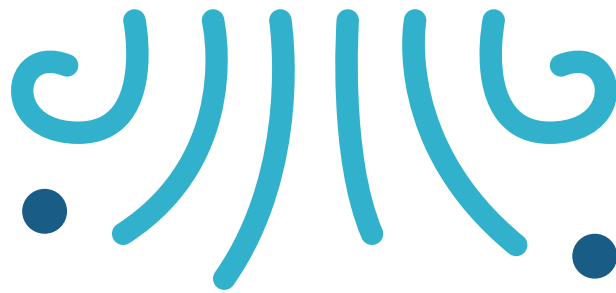
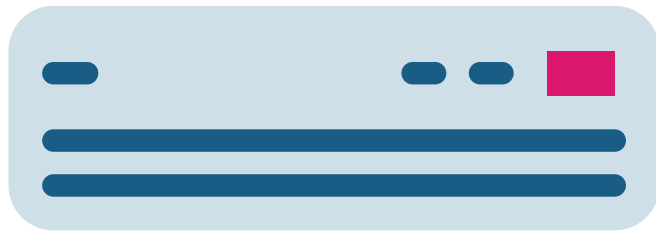
3,000 watts

Electric Oven



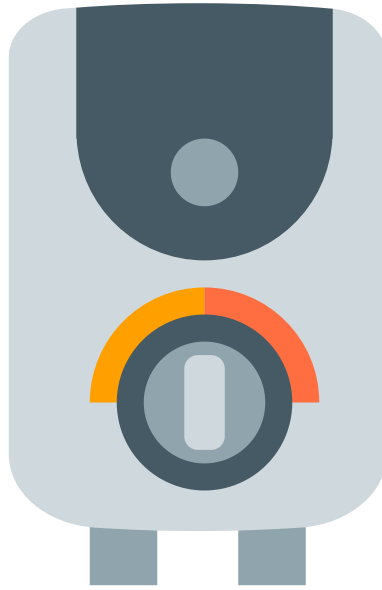
3,000 watts

Air Conditioner



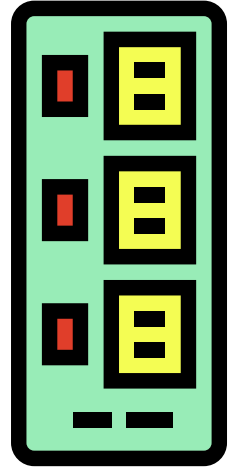
3,500 watts

Water Heater



4,000 watts

Watts Your Appliance – Answer Key



Phone Charger	5 watts
Alarm Clock	10 watts
Aquarium Pump and Filter	24 watts
Ceiling Fan	75 watts
Xbox	100 watts
LED Television	100 watts
Refrigerator	180 watts
Slow Cooker	200 watts
Washing Machine (cold water)	500 watts
Coffee Maker	800 watts
Toaster	1,200 watts
Microwave	1,200 watts
Blow Dryer	1,200 watts
Vacuum Cleaner.....	1,400 watts
Space Heater	1,500 watts
Washing Machine (hot water)	2,500 watts
Electric Clothes Dryer	3,000 watts
Electric Oven	3,000 watts
Air Conditioner	3,500 watts
Water Heater	4,000 watts