NAME _____ DATE _____ CLASS _____

Holt Physics

Problem 19D

COST OF ELECTRICAL ENERGY

PROBLEM

Suppose you woke up one morning and realized that you had forgotten to turn off your front porch light the night before. If you had used .540 kW•h of energy over a period of 12 h, what is power emitted by the light bulb?

SOLUTION

Given: Energy = 0.540 kW•h Δt = 12 h

Unknown: P = ?

Choose the equation(s) or situation:

Use the equation relating energy and power on page 712.

Energy = $P\Delta t$

Rearrange the equation(s) to isolate the unknown(s):

Rearrange the equation to solve for the total power.

$$P = \frac{\text{Energy}}{\Delta t} = \frac{0.540 \text{ kW•h}}{12 \text{ h}} = 0.045 \text{ kW} = \boxed{45 \text{ W}}$$

ADDITIONAL PRACTICE

1. Suppose that you've just returned to work from your lunch hour. When you reach your desk, you realize that you had forgotten to turn off your computer. Fortunately, your computer was in its energy-conserving "sleep" mode. What is the power of a computer which consumed 2.7×10^8 J of energy?
2. Suppose you've just returned to the parking lot from a 3.0 h shopping spree at the mall and realized that you had forgotten to turn off the headlights to your car. If 4.86×10^8 J of energy was spent, what is the power of the headlights?
3. A bread machine requires 1200 W to bake bread. How much time is required for it to use 1.512×10^{10} J of energy?
4. Calculate how much time is required for a 600 W air conditioner to use 8.64×10^9 J of energy?
5. As an incentive to conserve electricity, some electric companies charge lower prices for electricity up to a certain number of kilowatt-hours, and then raise the cost of electricity for each kilowatt-hour you use over that number. Suppose your local electric company charges \$0.0650/kW•h for the first 200.0 kW•h, and then drastically raises the price for every kilowatt-hour more. What is the maximum your family would pay if they wanted to pay only the cheaper rate?

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6. Suppose you receive an electric bill which states the following:

Final Meter Reading	24422 kW•h
Previous Meter Reading	24204 kW•h
Cost of Electricity Used for 20 Days	\$0.078/kW•h

How much must you pay the electric company?

7. How much energy does a 125 W computer use in an 8.0 h workday?

8. Calculate how many joules of energy a 750 W refrigerator uses in 24 h.

9. Calculate how many joules of energy a 550.0 W hair dryer uses in 10.0 min.

10. Calculate how many joules of energy an 850 W toaster uses in 3.0 min.

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