Chapter 6   Problem 40 [†]

Given

$P_{hd} = 1.20\ kW = 1,200\ W$

$t_{hd} = 10.0\ min = 600\ s$

$P_{nl} = 7.00\ W$

$t_{nl} = 24.0\ h = 86,400\ s$

Solution

Find out which consumes the most energy.

First convert to SI units. This has been done and recorded above. The energy consumed by the hair dryer is

$$P = \frac{W}{t} \qquad \Rightarrow \qquad W = Pt$$

$$W_{hd} = P_{hd}t_{hd} = (1,200\ W)(600\ s) = 720,000\ J = 720\ kJ$$

The energy consumed by the night light is

$$W_{nl} = P_{nl}t_{nl} = (7.00\ W)(86,400\ s) = 604,800\ J = 605\ kJ$$

The night light uses slightly less power.

[†]Problem from Essential University Physics, Wolfson