

Answer on Question #65355 – Physics – Electric Circuits

In The Friendship Contraction episode¹ of “The Big Bang Theory,” Penny confirms with Sheldon and Leonard that the power has gone out. She had been concerned because last month she “sent the electric company a Starbucks gift card, an apology note,” and a few pictures. If the cost of electricity was \$0.17 per kWh and the Starbucks gift card had a value of \$10 (and we don’t consider the value of the pictures), for how many hours could Penny have left her TV on if the TV requires 50.0 watts of power?

Solution

The amount of electric energy that will be covered by the gift card is:

$$E = \frac{\$10}{\$0.17 \text{ kWh}^{-1}} \approx 58.824 \text{ kWh}$$

As electric energy can be calculated as:

$$E = \text{Power} \times \text{Time} = P \times t$$

The time is:

$$t = \frac{E}{P} = \frac{58.824 \text{ kWh}}{50 \text{ W}} = \frac{58824 \text{ Wh}}{50 \text{ W}} \approx 1176.5 \text{ hours}$$

Answer: 1176.5 hours