

task_239xqp7zjr32bv4a_with_calculation

Student Group

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Exercise E5 Conversions: Speed, Energy, and Power

2. The energy of a 60.0-hertz light bulb (100-W) is \$1.6 \times 10^{-19}\$ J. The charge of about \$1.6 \times 10^{-19}\$ C is the charge of one electron. How many electrons are there in a 60.0-hertz light bulb?
1. A vehicle speed of 80.00 km/h is in m/s.

Solution

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\begin{align*} 80.00 \frac{\text{km}}{\text{h}} &= 80.00 \frac{1000 \text{ m}}{3600 \text{ s}} = 22.22 \frac{\text{m}}{\text{s}} \\ 100 \text{ W} &= 100 \frac{\text{J}}{\text{s}} = 100 \frac{\text{C} \cdot \text{V}}{\text{s}} = 100 \frac{\text{C}}{\text{s}} \cdot \text{V} \\ 1.6 \times 10^{-19} \text{ J} &= 1.6 \times 10^{-19} \text{ C} \cdot \text{V} \\ \frac{100 \text{ C}}{\text{s}} &= \frac{100 \text{ C}}{\text{s}} \cdot \frac{1.6 \times 10^{-19} \text{ J}}{1.6 \times 10^{-19} \text{ C} \cdot \text{V}} = 6.25 \times 10^{19} \frac{\text{J}}{\text{s}} \end{align*}
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