Period 3 Multiple Choice Exercises

E.1 On a cold morning, your car starter motor cranks for 10 seconds, drawing 60 amps of current from your 12 volt battery. How much charge flowed through the starter motor?

a) 6 coul
b) 10 coul
c) 120 coul
d) 600 coul
e) 720 coul

E.2 How much electric power was drawn by the starter motor in the previous question?

a) 1.2 watts
b) 6 watts
c) 120 watts
d) 720 watts
e) 1,000 watts

E.3 How much energy did the battery in Exercise E.1 supply?

a) 1,200 joules
b) 6,000 joules
c) 7,200 joules
d) 144,000 joules
e) 198,000 joules

E.4 The joule heating in a wire with resistance of 5 ohms amounts to 500 watts. How much current flows through this wire?

a) 10 amps
b) 15 amps
c) 45 amps
d) 75 amps
e) 100 amps

E.5 If your electric company charges 12 cents per kilowatt-hour for electricity, how much would you pay to operate a 20 watt bulb for 4 hours per day for one year?

a) $3.50
b) $4.40
c) $16.50
d) $35.00
e) None of the above is correct.
Solutions to Period 3 Multiple Choice Exercises

E.1 On a cold morning, your car starter motor cranks for 10 seconds, drawing 60 amps of current from your 12 volt battery. How much charge flowed through the starter motor?

a) 6 coul
b) 10 coul
c) 120 coul
d) 600 coul
e) 720 coul

\[ I = \frac{Q}{t} \] so \[ Q = I \times t = 60 \text{ amps} \times 10 \text{ sec} = 600 \text{ coul} \]

E.2 How much electric power was drawn by the starter motor in the previous question?

a) 1.2 watts
b) 6 watts
c) 120 watts
d) 720 watts
e) 1,000 watts

\[ P = I \times V = 60 \text{ amps} \times 12 \text{ volts} = 720 \text{ watts} \]

E.3 How much energy did the battery in Exercise E.1 supply?

a) 1,200 joules
b) 6,000 joules
c) 7,200 joules
d) 144,000 joules
e) 198,000 joules

\[ E_{\text{pot}} = Q \times V = 600 \text{ coul} \times 12 \text{ volts} = 7,200 \text{ joules} \]

E.4 The joule heating in a wire with resistance of 5 ohms amounts to 500 watts. How much current flows through this wire?

a) 10 amps
b) 15 amps
c) 45 amps
d) 75 amps
e) 100 amps

\[ P_{\text{joule}} = I^2 R \] so \[ I^2 = \frac{P_{\text{joule}}}{R} \] and \[ I = \sqrt{\frac{P_{\text{joule}}}{R}} = \sqrt{\frac{500 \text{ watts}}{5 \text{ ohms}}} \]

\[ = \sqrt{\frac{500}{5}} \text{ amps} = 10 \text{ amps} \]
If your electric company charges 12 cents per kilowatt-hour for electricity, how much would you pay to operate a 20 watt bulb for 4 hours per day for one year?

a) $3.50  
b) $4.40  
c) $16.50  
d) $35.00  
e) None of the above is correct.

\[
P = E \quad \text{or} \quad E = P \times t = 20 \text{ watts} \times \frac{4 \text{ hrs}}{\text{day}} \times 365 \text{ days} = 29,200 \text{ watt-hrs} \\
\]

\[
29,200 \text{ watt-hrs} \times \frac{1 \text{ kW}}{1,000 \text{ watt}} = 29.2 \text{ kilowatt-hrs} = 29.2 \text{ kWh} \\
\]

\[
29.2 \text{ kWh} \times \frac{$0.12}{\text{kWh}} = $3.50 \\
\]