Q1e

A 12 V battery supplies 130 mA (milli A) to a portable music system.

a) Determine the power delivered/absorbed by the music system

P_{music_system} = 1.56 ✔ W

b) Determine how much energy the battery delivers/absorbs in 5 minutes?

Energy w = -468 ✔ Joules

"+" = absorbed "-" = delivered

$V = 12\,V$

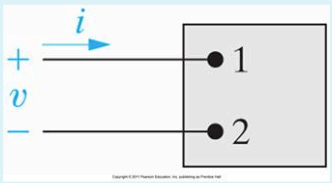
$i = 130\,mA = 0.13\,A$

$P = vi$

$= (12)(0.13) = 1.56$

$P = w/t$

$w = Pt = 468\,J$



Q2e

The voltage and current at the terminals of this circuit are zero for t < 0.

For $t \geq 0$ $v = 40\,e^{-1,750t}$ Volts $i = 8\,e^{-1,750t}$ Amps

a) Find the power absorbed/delivered by the circuit element at t = 500 μs (micro seconds).

$P_{500\mu s}$ = 55.6 ✔ Watts

b) How much energy is absorbed/delivered by the circuit element between zero and 500 μs (micro seconds)?

w = 75.54 ✔ mJ (milli J)

$P = vi$

$= 320\,e^{-3500t}$

$= 320\,e^{-1.75}$

$t = 500 \times 10^{-6}$

$w = \int_0^{500\mu s} P(t)\,dt = \int_0^{500\mu s} 320\,e^{-3500t}\,dt$

$= -\frac{16}{175} e^{-3500t} \Big|_0^{500\mu s} = -\frac{16}{175}(e^{-1.75} - 1)$

$w = 0.07554\,J \approx 75.54$

Q3c

Given:

A student measured the voltage and current for the resistor as shown in the figure.

v = 44.3 Volts i = -6.7 Amps

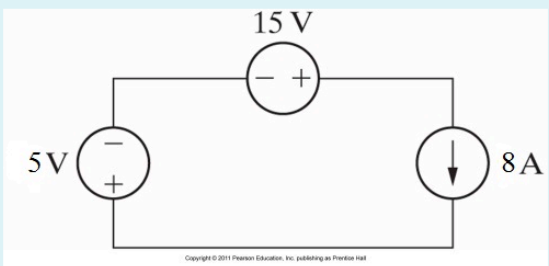
The instructor verified that the voltage was measured correctly.

a) Was the current measured correctly?

Correct? = No ✔

b) Find the power absorbed/delivered by the resistor. If needed, correct any measuring mistake (sign not magnitude). "+" = absorbed and "-" = delivered

P_R = 296.81 ✔ Watts



Q4b

Calculate the power in each circuit element.

"+" = absorbed and "-" = delivered

P_{5V} = 40 ✔ Watts

P_{15V} = -120 ✔ Watts

P_{8A} = 80 ✔ Watts

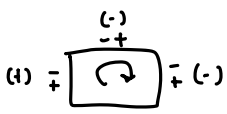
KVL : $5V - 15V - v = 0$

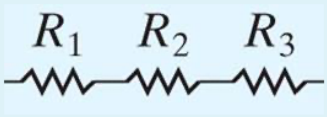
$v = -10V$

$P_{5V} = (5)(8) = 40$ (ABS)

$P_{15V} = -(15)(8) = 120$ (DELIVER)

$P_{8A} = (10)(8) = 80$ (ABS)





Q5

Given:

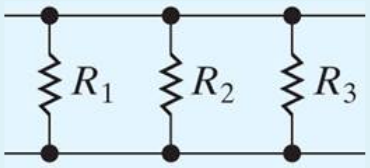
R_1 = 239 Ω (Ohm) R_2 = 139 Ω (Ohm) R_3 = 1553 Ω (Ohm)

Find the equivalent resistance R_{Eq}.

R_{Eq} = ??? Ω (Ohm)

Answer: 1931 ✔

$R = 239 + 139 + 1553 = 1931$



Q6

Given:

R_1 = 149 Ω (Ohm) R_2 = 280 Ω (Ohm) R_3 = 1699 Ω (Ohm)

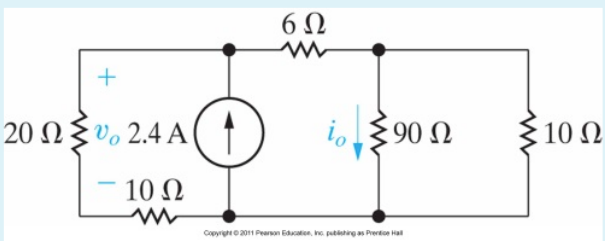
Find the equivalent resistance R_{Eq}.

R_{Eq} = ?? Ω (Ohm)

Answer:

$\frac{1}{R} = \frac{1}{149} + \frac{1}{280} + \frac{1}{1699}$

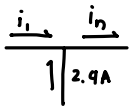
$R = 91.98$



Q7b

Find the current through the 10 Ω (Ohm) resistor on the far right side of the circuit.

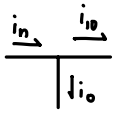
$i_{10\Omega}$ = 1.44 ✔ A



$V = iR$

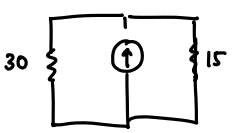
$i_1 = \frac{V_1}{20+10} =$

$i_n = \frac{V_n}{15}$



$i_1 - 2.4 + i_n = 0$

$i_n = 2.4 - i_1$



$V_{30} = V_{2.4} = V_{15}$