Circuits Worksheet #8

1. A $16\ \Omega$ and a $8\ \Omega$ resistor are connected in parallel. Find the equivalent resistance. ($5.33\ \Omega$)

2. A $5\ \Omega$, $10\ \Omega$, and $15\ \Omega$ resistor are connected in parallel.

   a) Find the equivalent resistance. ($2.73\ \Omega$)

   b) Find the current drawn by each resistor when they are connected in parallel to a $6\ V$ battery. ($1.2\ A$, $0.6\ A$, $0.4\ A$)

   c) Find the total current dawn by the three resistors by adding the currents in part b. Show that a single resistor of resistance equal to the value in part a draws the same amount of current from the $6\ V$ battery. ($2.2\ A$)

3. The following three appliances are connected in parallel to a $120\ V$ house circuit; a $1600\ W$ toaster; a $1250\ W$ microwave; and a $600\ W$ coffee pot. If all three were operated at the same time, what total current would they draw? ($28.75\ A$)

4. Three resistors connected in parallel have individual resistances of $450\ \Omega$, $1350\ \Omega$, and $2700\ \Omega$. If the circuit is connected to a $40\ V$ source, find

   a) the current through each resistor. ($0.0889\ A$, $0.0296\ A$, $0.0148\ A$)

   b) the total current delivered by the source. ($0.133\ A$)

   c) the equivalent resistance of the circuit. ($300\ \Omega$)

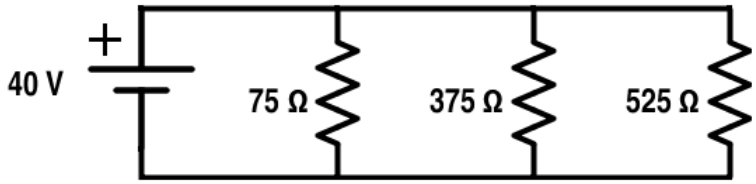
   d) the rate at which the source delivers energy. ($5.33\ W$)

   e) the rate of heat dissipation in each resistor. ($3.56\ W$, $1.19\ W$, $0.593\ W$)

5. Given that the resistors R_1, R_2, and R_3 are wired in parallel to a voltage source, complete the table:

Component	Current	Voltage	Resistance	Power
Source		$75\ V$		
R_1				$37.5\ W$
R_2				$12.5\ W$
R_3				$4.69\ W$

6. For the circuit shown below,



determine:

a) the equivalent resistance of the circuit. ($55.9\ \Omega$)

b) the current through each resistor. ($0.533\ A$, $0.106\ A$, $0.0762\ A$)

c) the total current delivered by the source. ($0.716\ A$)

d) the power delivered by the source. ($28.6\ W$)

e) the power dissipated in each resistor. ($21.33\ W$, $4.27\ W$, $3.05\ W$)

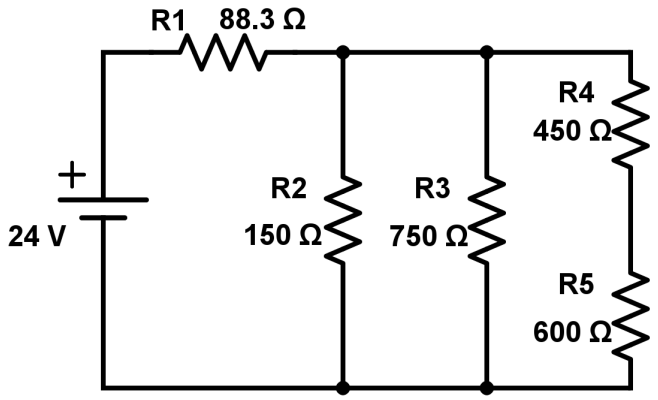
7. Given that the resistors R_1, R_2, and R_3 are wired in parallel to a voltage source, complete the table:

Component	Current	Voltage	Resistance	Power
Source		$120\ V$		
R_1			$1250\ \Omega$	
R_2	$0.032\ A$			
R_3				$1.28\ W$

8. Given that the resistors R_1, R_2, and R_3 are wired in parallel to a voltage source, complete the table:

Component	Current	Voltage	Resistance	Power
Source				$0.3715\ W$
R_1		$0.16\ V$		
R_2			$0.275\ \Omega$	
R_3	$0.286\ A$			

9. For the circuit shown below,



determine:

a) the equivalent resistance of the circuit. ($200\ \Omega$)

b) the total current drawn by the resistors. ($0.12\ A$)

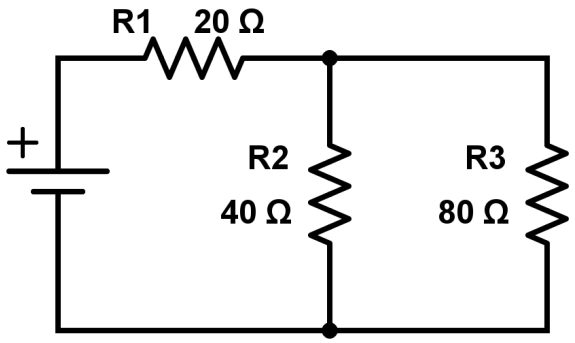
c) the potential drop across the parallel combination. ($13.4\ V$)

d) the current through resistors R_2, R_3, and R_4. ($0.0894\ A$, $0.0179\ A$, $0.0128\ A$)

e) the power delivered by the source. ($2.88\ W$)

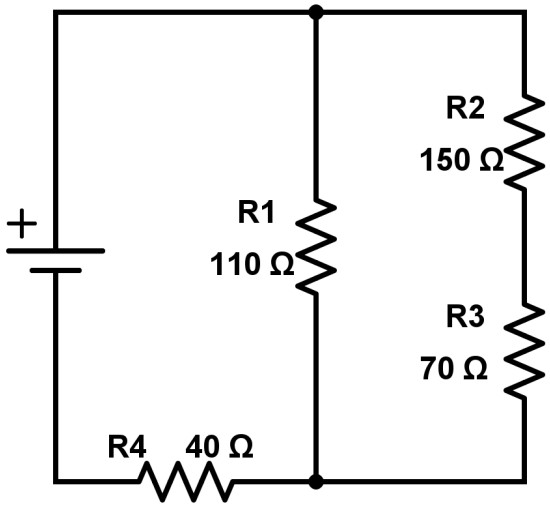
10. Determine the equivalent resistance of each of the following combinations of resistors.

a)



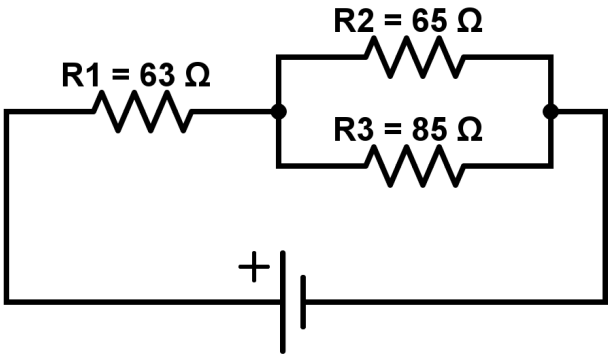
Answer : $46.7\ \Omega$

b)



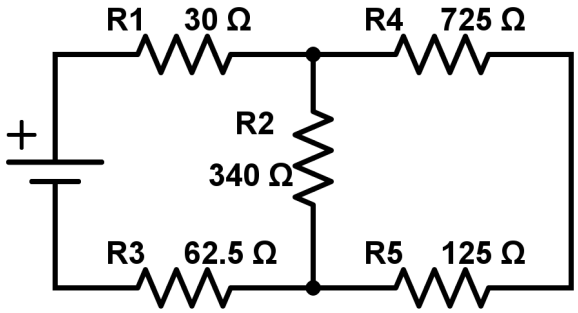
Answer : 113 Ω

c)



Answer : 99.8 Ω

d)



Answer : 335 Ω

Answers for problems 5, 7, and 8:

Component	Current	Voltage	Resistance	Power
Source	$0.729\ A$	$75\ V$		$54.7\ W$
R_1	$0.500\ A$	$75\ V$	$150\ \Omega$	$37.5\ W$
R_2	$0.167\ A$	$75\ V$	$450\ \Omega$	$12.5\ W$
R_3	$0.0625\ A$	$75\ V$	$1200\ \Omega$	$4.69\ W$

Component	Current	Voltage	Resistance	Power
Source	$0.139\ A$	$120\ V$		$16.64\ W$
R_1	$0.096\ A$	$120\ V$	$1250\ \Omega$	$11.52\ W$
R_2	$0.032\ A$	$120\ V$	$3750\ \Omega$	$3.84\ W$
R_3	$0.0107\ A$	$120\ V$	$11250\ \Omega$	$1.28\ W$

Component	Current	Voltage	Resistance	Power
Source	$2.32\ A$	$0.16\ V$		$0.3715\ W$
R_1	$1.45\ A$	$0.16\ V$	$0.110\ \Omega$	$0.2327\ W$
R_2	$0.582\ A$	$0.16\ V$	$0.275\ \Omega$	$0.0931\ W$
R_3	$0.286\ A$	$0.16\ V$	$0.560\ \Omega$	$0.0457\ W$