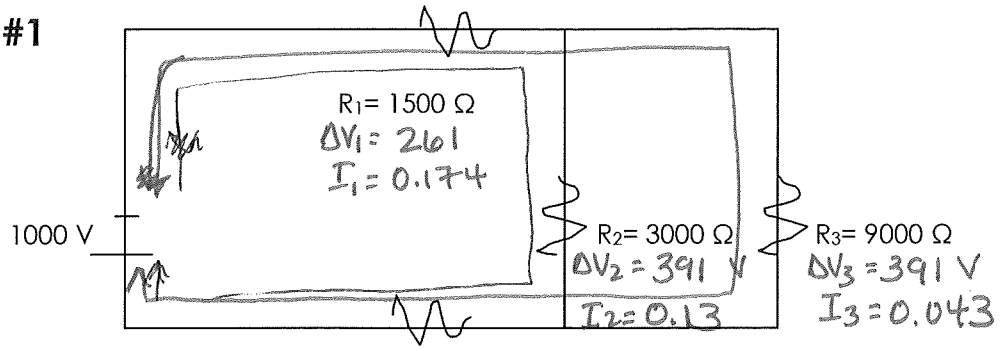
Name Key Hour _____

Complex Circuit Practice Worksheet

Circuit #1



1. Find the **total resistance**. (Do parallel resistors first-get an answer, then add the series ones) (5750 Ω)

$\frac{1}{R_{eq}} = \frac{1}{3000} + \frac{1}{9000}$ $R_{eq} = 2250 + 1500 + 2000 = \boxed{5750\ \Omega}$

2. Find the **total current**. (Round to 3 decimals!) (0.174 A)

$\Delta V = IR$
$1000 = I(5750)$ $\boxed{I = 0.174\ A}$

3. Find the voltage drop for any resistors in series. (There should be 2 series resistors) (ΔV_1= 261 V, ΔV_4= 348 V)

R_1: $\Delta V_1 = (.174)(1500) = 261\ V$ R_4: $\Delta V_4 = (.174)(2000) = 348\ V$

4. Find the voltage lost through resistor 2. (Remember- each circuit path adds up to the total voltage of the battery) ($\Delta V_1 + \Delta V_2 + \Delta V_4 = 1000$ V)

$\Delta V_1 + \Delta V_2 + \Delta V_4 = 1000\ V$
$261 + \Delta V_2 + 348 = 1000$ $\Delta V_2 = 391\ V$

5. Find the voltage lost at R_3. ($\Delta V_1 + \Delta V_3 + \Delta V_4 = 1000$ V)

same 391 V

6. Solve for the currents through the rest of the resistors and put your answers in the box.

R_2: $\Delta V_2 = I_2 R_2$
$391 = I_2(3000)$
$I_2 = .13$

R_3: $\Delta V_3 = I_3 R_3$
$391 = I_3(9000)$
$I_3 = 0.043$

7. What is $I_2 + I_3$? Does it equal the total current? It SHOULD!

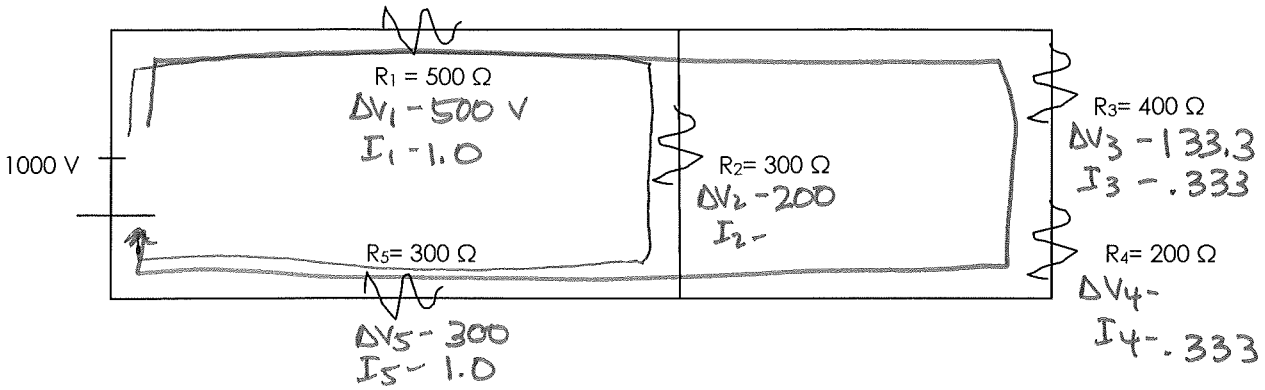
$.13 + .043 = .173$ ✓

I_1 =	.174 A	(0.174 A)
I_2 =	0.13 A	(0.130 A)
I_3 =	0.043 A	(0.043 A)
I_4 =	.174 A	(0.174 A)
ΔV_1 =	261 V	(261 V)
ΔV_2 =	391 V	(391 V)
ΔV_3 =	391 V	(391 V)
ΔV_4 =	348 V	(348 V)

Name _____ Hour _____

Complex Circuit Practice Worksheet

Circuit #2



1. Find the **total resistance**. (R_3 and R_4 are in series with each other but in parallel with R_2, so do $\frac{1}{300} + \frac{1}{(400+200)}$, get an answer and then add the two resistors that are in series.) *(1,000 Ω)*

$\frac{1}{R_{eq}} = \frac{1}{300} + \frac{1}{600} = 200\,\Omega + 500 + 800 = \boxed{1000\,\Omega}$

2. Find the total current. (Use the total voltage and total resistance) (1.0 A)

$\Delta V = IR$
$1000 = I(1000)$ $\quad \boxed{I = 1.0\ A}$

8. Find the voltage drop for any resistors that are in series.
(ΔV_1 =500 V, ΔV_5 = 300 V)

$\Delta V_1 = (1)(500) = 500\ V$

$\Delta V_5 = (1)(300) = 300\ V$

9. Find the voltage lost at R_2 and then the current through it.
($\Delta V_1 + \Delta V_2 + \Delta V_5$ = 1000 V)

$1000 = 500 + \Delta V_2 + 300$
$\boxed{\Delta V_2 = 200\ V}$

$200 = I_2(300)$
$I_2 = .667$

10. What is the voltage left to be lost through R_3 and R_4?

200 V

11. Use this voltage and their combined resistance to find the current through R_3 and R_4. (It's the same).

$\Delta V = IR$
$200 = I(400+200)$ $\quad \boxed{I = .333A}$

12. Find the voltage of R_3 using the current you just found.

$\Delta V_3 = IR$
$\Delta V_3 = (.333)400 = \boxed{133.3\ V}$

13. Find the voltage of R_4.

$\Delta V_4 = (.333)(200) = \boxed{66.6V}$

I_1 =	1.0 A	(1.0 A)
I_2 =	.667 A	(0.667 A)
I_3 =	.333 A	(0.333 A)
I_4 =	.333 A	(0.333 A)
I_5 =	1.0 A	(1.0 A)
ΔV_1 =	500 V	(500 V)
ΔV_2 =	200 V	(200 V)
ΔV_3 =	133.3 V	(133.2 V)
ΔV_4 =	66.6 V	(66.6 V)
ΔV_5 =	300 V	(300 V)

14. What is $\Delta V_1 + \Delta V_2 + \Delta V_5$? Does it equal $\Delta V_1 + \Delta V_3 + \Delta V_4 + \Delta V_5$? **Explain why it should!**

1000

$500 + 200 + 300 = 1000$

$500 + 133.3 + 66.6 + 300 = 999.9$ ✓