Unit Test #1 – Electricity and Magnetism

C1.4	/13
C2.2	/10
C1.1	/13
C2.3	/13

Name: _____

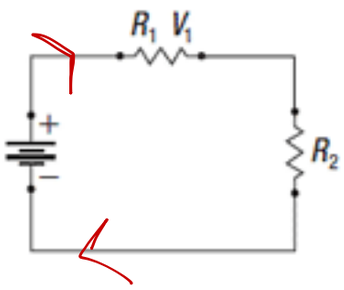
Instructions:

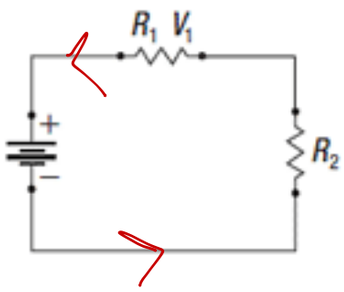
1. **Read each question carefully before answering.**
2. **Express all final answers with the correct number of significant digits.**
3. **Calculators may not be shared. No iPod or Smartphone calculators.**
4. **Good Luck !!**

/ 13	**C1.4**	**I can construct, or deconstruct, and explain the components of a basic electric device.**

1. What 3 basic parts are required in any electric circuit? Use correct terminology. Not examples. **(3 marks)**

2. In the circuit below left show the direction of conventional current flow, and on the circuit below right show the direction of electron flow. **(2 marks)**





3. Draw a circuit including a power source with 3 light bulbs connected in series. **(4 marks)**

4. Draw a circuit including a power source with 3 light bulbs connected in parallel. **(4 marks)**

/ 10	C2.2	**I can compare and contrast the behaviour and functions of series, parallel, and mixed DC circuits.**

5. Calculate the total electric potential difference across three 6.0 V batteries:
   a) connected in series **(2 marks)**

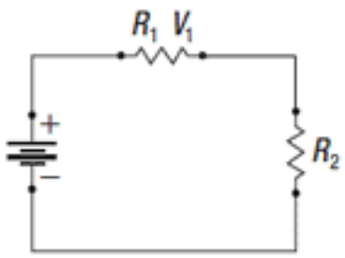
   b) connected in parallel **(2 marks)**

6. Determine the equivalent resistance when a 4.0Ω light bulb and a 8.0 Ω are:
   a) connected in series **(3 marks)**

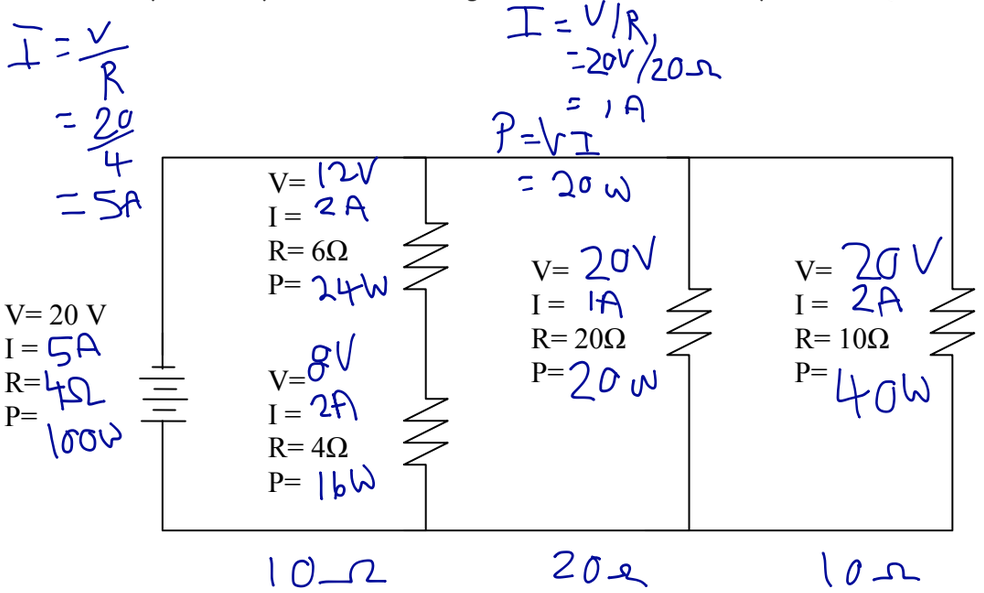
   b) connected in parallel **(3 marks)**

/ 13	C1.1	**I can construct DC circuits and analyse them using Ohm's law and Kirchoff's laws.**

7. The circuit below carries a current of 0.2A. V_1= 6.2V and V_{source}= 15V. Determine the resistance of R_2. ***(3 marks)***



8. Complete the parallel circuit diagram shown below. Show your work. **(10 marks)**



$\frac{1}{R_{eq}} = \frac{1}{10} + \frac{1}{20} + \frac{1}{10}$

$= 2/20 + 1/20 + 2/20$

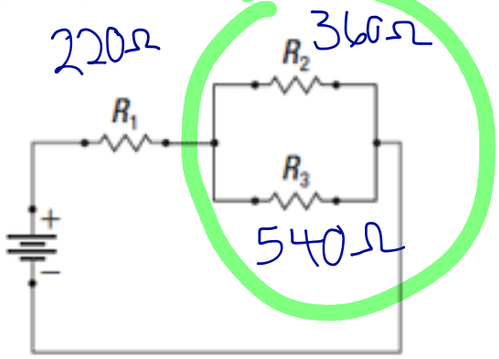
$\frac{1}{R_{eq}} = \frac{5}{20}$

$\therefore R_{eq} = 20/5$

$R_{eq} = 4\Omega$

/ 13	C2.3	**I can state Kirchoff's laws and Ohm's law, and use them to explain direct current, potential difference, and resistance in mixed circuit diagrams.**

9. Calculate the total resistance for the circuit pictured below. R_1=220Ω, R_2=360Ω, and R_3=540Ω. **(3 marks)**



$\frac{1}{R_{eq}} = \frac{1}{360} + \frac{1}{540}$

$= \frac{3}{1080} + \frac{2}{1080}$

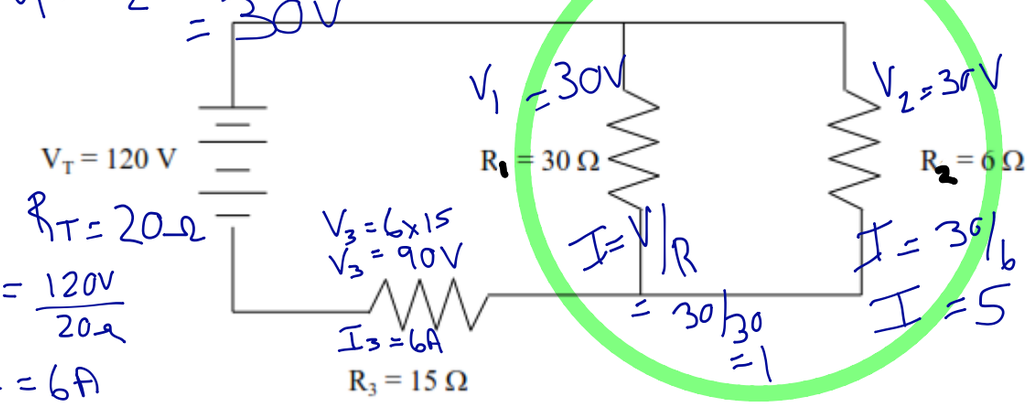
$\frac{1}{R_{eq}} = \frac{5}{1080}$

$R_{eq} = 1080/5 = 216\Omega$

360 720 1080
540 1080

$R_T = 220\Omega + 216\Omega$
$= 436\Omega$
$= 440\Omega$ (2 sig digs)

10. Analyze the following circuit. Determine R_T, I_T, V_1, V_2, V_3, I_1, I_2, and I_3. **(10 marks)**



$V_1 = V_2 = 120V - 90V$
$= 30V$

$I_T = \frac{120V}{20\Omega}$

$I_T = 6A$

$I = V/R$
$= 30/30$
$= 1$

$I = 30/6$
$I = 5$

	V	I	R
Total	120	6	20
1	30	1	30Ω
2	30	5	6Ω
3	90	6	15Ω

$R_T = 15\Omega + 5\Omega$

$R_T = 20\Omega$

$\frac{1}{R_{eq}} = \frac{1}{30} + \frac{1}{6}$

$= \frac{1}{30} + \frac{5}{30}$

$\frac{1}{R_{eq}} = 6/30$

$R_{eq} = 30/6$

$R_{eq} = 5\Omega$