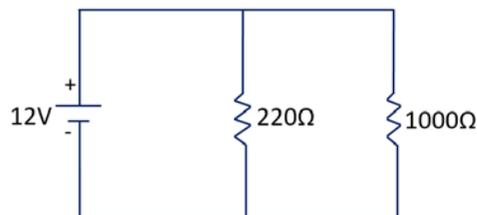


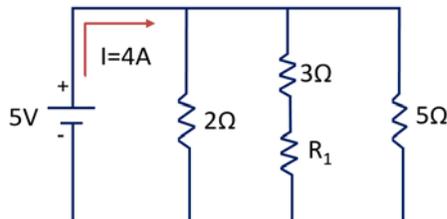
NOTE: Use engineering format for problems 1 through 5 and non-engineering format for problems 6 through 8. This is an individual assignment.

NOTE: Some circuits problems require many steps to arrive at the final answer. In past homework assignments, problems were often broken down into many steps to guide you to the answer. For example, to find the power consumed by a resistor deep in the circuit, you may have been asked to find the equivalent resistance of a circuit, then the total current leaving the power source, then the voltage drop across a leading resistor, etc. For the problems below, you will need to fill in the intermediate steps yourself! You may need to refer back to earlier homework assignments to see the steps taken to arrive at various answers.

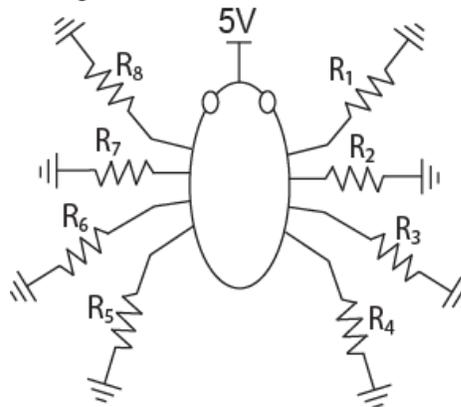
1. For the circuit provided, find the power dissipated by the 220Ω resistor. $P=0.65W$



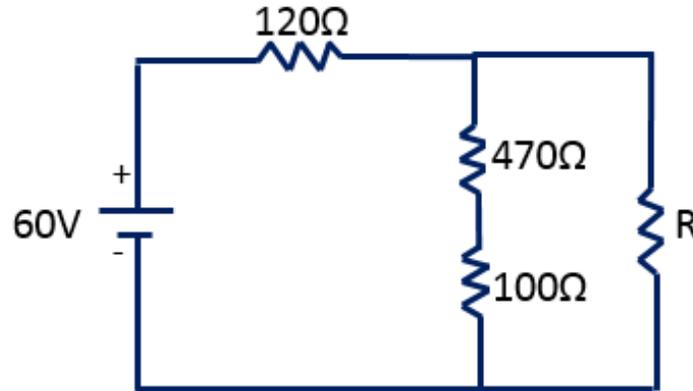
2. For the circuit given, if the current leaving the power source is 4A find the value of R_1 . $R_1=7\Omega$



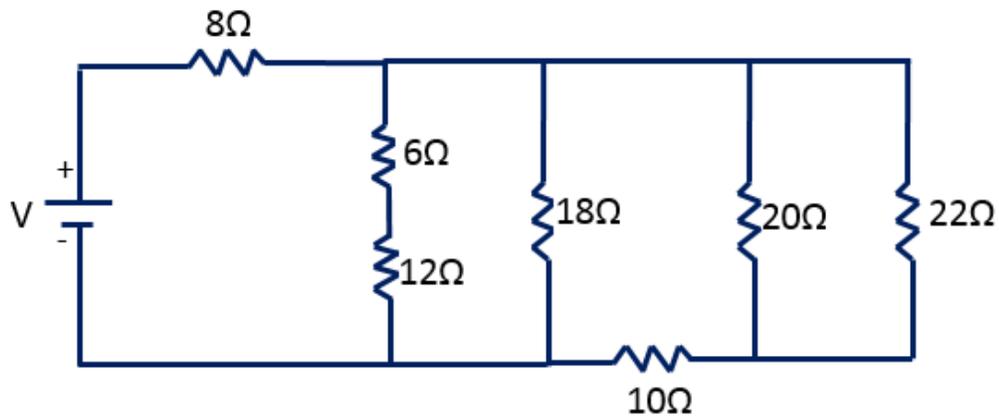
3. For the circuit given, find the current through R_3 if $R_1 = 220\Omega$, $R_2=1k\Omega$, $R_3=470\Omega$, $R_4=220\Omega$, $R_5=4.7k\Omega$, $R_6=10k\Omega$, $R_7=470\Omega$, $R_8=1k\Omega$. (Remember that you can redraw the circuit with straight lines as in previous homework assignments to make the circuit easier to interpret). $I=10.6mA$



4. For the circuit given, if the power dissipated by the 120Ω resistor is 12.5W , then what is the value of R ? $R=74.53\Omega$



5. For circuit given, if the power dissipated by the 18Ω resistor is 6.2W , then find
- The current through the 10Ω resistor. $I_{10\Omega}=0.516\text{A}$
 - The voltage drop across the 6Ω resistor. $\Delta V_{6\Omega}=3.521\text{V}$
 - The voltage provided by the voltage source. $V_s=24.082\text{V}$



6. If you did not complete the "Around the Pencil" challenge in class, complete it for this homework assignment and add the functionality of starting the challenge by pressing a whisker.
- Bring your Arduino to class with the sketch uploaded to show your professor.
 - Include a screenshot of your sketch with your homework.

NOTE: If you did complete the "Around the Pencil" challenge in class and want to play around with your bot, write a sketch that makes your Arduino move in a "figure 8" pattern after a whisker is pressed. This is not required, but if you get it to work, then leave this sketch in your bot to show in class!

Note: Have your Arduino ready to complete the Around the Pencil or Figure 8 Challenge at the beginning of class. Do not turn your homework in at the front; have it ready so that the instructor / assistant can grade Arduino motion activity.

7. Below you will find a list of most of the Arduino language elements that we have utilized so far. Provide a few words describing what each command does. A few examples are provided.

<code>setup() { }</code>	called when a sketch starts. Initialize variables, pin modes, . . . runs only once
<code>loop() { }</code>	
<code>if (whisker1==HIGH) { }</code> <code>else if (whisker2==HIGH)</code> <code>{ }</code> <code>else { }</code>	
<code>for (int i=0; i<400;i++)</code> <code>{ }</code>	executes a sequence of commands 400 times
<code>;</code>	semicolon is used to end a statement
<code>{ }</code>	
<code>//</code>	
<code>=</code>	
<code>==</code>	use in <code>if</code> statements to see if two quantities are equal to each other
<code><</code>	
<code>></code>	
<code><=</code>	
<code>>=</code>	
<code>++</code>	
<code>HIGH</code>	if pin is digital input (voltage at pin > 3V); if a digital output (write 5V to pin)
<code>LOW</code>	
<code>INPUT</code>	
<code>OUTPUT</code>	make pin an output
<code>int whisker1=0;</code>	declares <code>whisker1</code> as an integer variable with an initial value of zero
<code>pinMode(0, OUTPUT);</code>	
<code>digitalWrite(0, HIGH);</code>	
<code>whisker1=digitalRead(7);</code>	
<code>delay(20);</code>	
<code>delayMicroseconds(1300);</code>	
<code>Serial.begin(9600);</code>	set up the ability to send information to the Serial Monitor (9600 = baud rate)
<code>Serial.println(val);</code>	print the variable " <code>val</code> " on the Serial Monitor ... the " <code>ln</code> " stands for "line" and causes any additional printing to show up on the next line
<code>Serial.print(val);</code>	

8. Draw a simple shape of your choosing in SolidWorks. Be sure to use at least two different commands to create features, such as "Extruded Boss/Base" and "Extruded Cut."