NAME:_________________________________DATE:___________BLOCK:_____

BEER'S LAW PHET COMPUTER ACTIVITY
DUE DATE: END OF THE DAY ON 12/7/18

Open the Beer's Law Lab simulation on your laptop or tablet and **select Beer's Law**
http://phet.colorado.edu/en/simulation/beers-law-lab

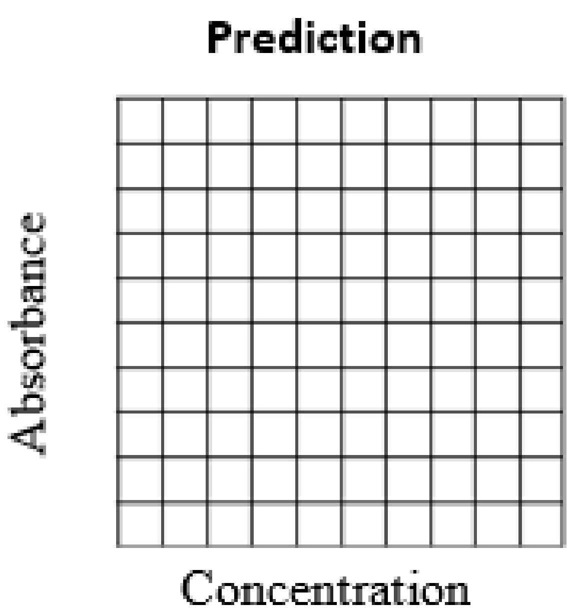
PART 1: INTRODUCTION

1. **Explore** the *Beer's Law* screen for a few minutes. Try to figure out what all of the controls show and do.

2. How does concentration affect how much light is **absorbed** and **transmitted** through the solution?

PART 2: INVESTIGATING ABSORPTION AND CONCENTRATION

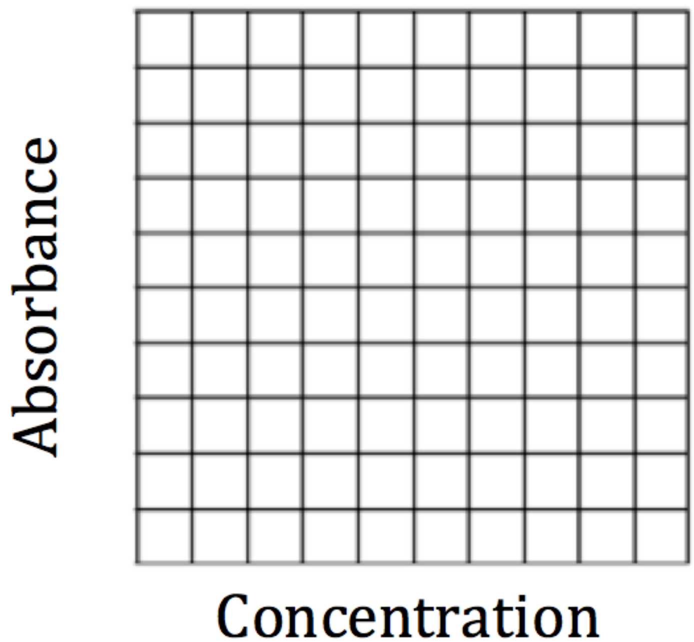
3. **Predict** what a graph of absorbance versus concentration would look like. Sketch your prediction.



4. Choose a solution from the simulation and **measure** the absorbance for different concentrations on the <u>preset</u> wavelength setting.

Data from the Simulation

Concentration (M)	Absorbance



5. How does your second graph compare to your prediction?

6. Based on Beer's Law (A = *abc* A = absorbance, *a* = molar absorptivity, *b* = pathlength and *c* = concentration), do you expect using different wavelengths of light would change the way your previous graph looks? Why or why not?

PART 3: INVESTIGATING ABSORPTION AND WAVELENGTH

7. a. Compare three solutions of different colors with the **same pathlength** (width of container).

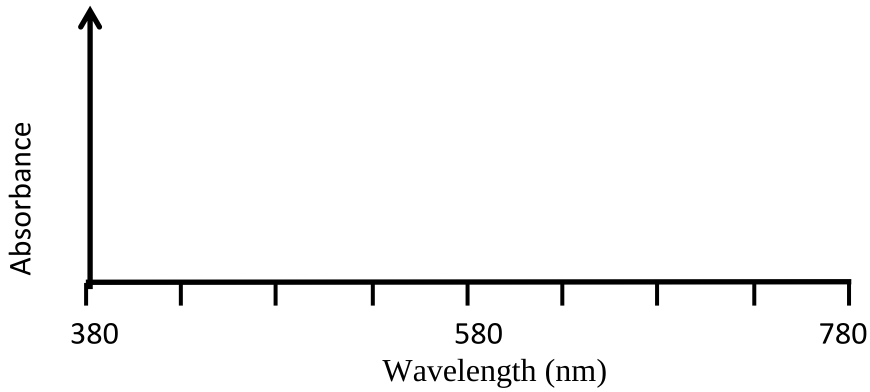
		Preset Wavelength: Simulation default setting			Variable Wavelength: Set to same color as solution		
Solution	Solution Color	Beam Color	Value (nm)	Abs	Beam Color	Value (nm)	Abs

b. What combinations give the most absorbance? Why?

c. How are beam color, solution color, and absorbance related?

8. a. Choose a solution and **keep concentration and pathlength constant** as you graph the absorbance for different wavelengths.

Solution: ________________________________



λ(nm)	Abs

b. What is the value for the "preset" wavelength for your solution? Mark this point on your graph.

c. Why do you think the "preset" wavelength is the best wavelength to use for this solution?

9. Compare your absorbance spectrum sketch with a group that chose a different solution. Would you use the same wavelength of light to do spectroscopy experiments with different colored solutions? Why or why not?

10. In a lab experiment monitoring the change in concentration of a reddish-brown substance, $FeNCS^{2+}$, a wavelength of 455 nm is used.

a. Does this wavelength agree with your conclusions about beam color, solution color, and absorbance above? Why or why not?

b. What other wavelengths might you consider using for $FeNCS^{2+}$ spectroscopy?