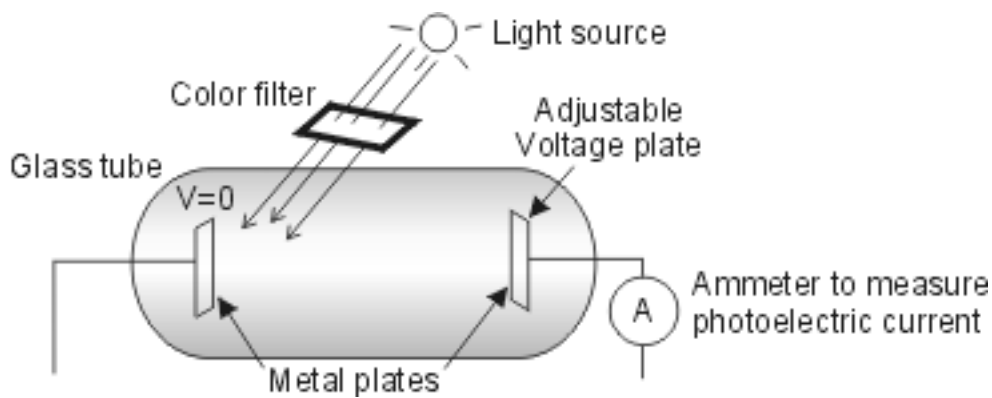


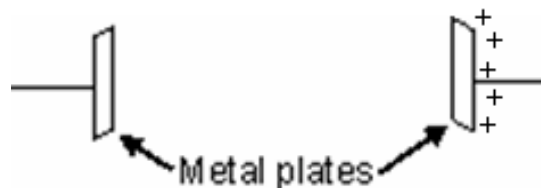
## Worksheet 1a: Qualitative Photoelectric Effect

A simplified version of Lenard's photoelectric effect apparatus:



It is observed that light striking the metal plate releases electrons that may travel to the other metal plate and be detected as a current by the ammeter.

1. Sketch the trajectories of electrons ejected from the left plate when the variable voltage plate is **positively charged**.

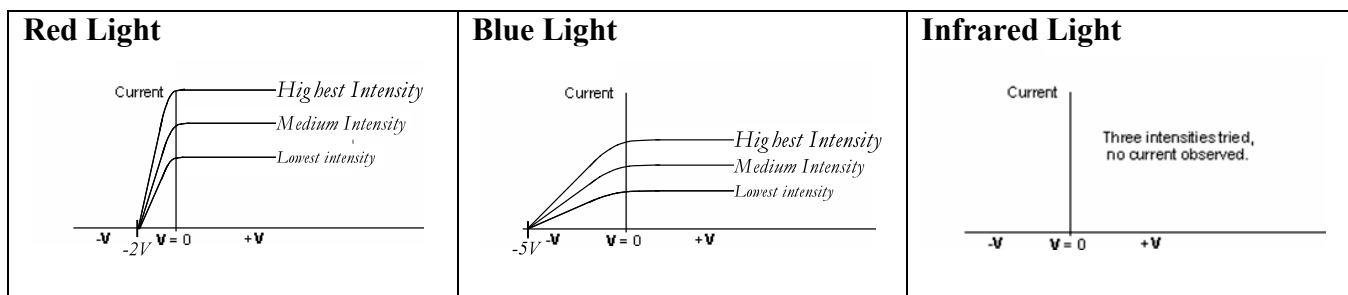


2. Sketch the trajectories of electrons ejected from the left plate when the adjustable voltage (right) plate is **negatively charged**.



3. In which of the above situations will the ejected electrons require more kinetic energy to reach the adjustable voltage (right) plate? Explain.

4. The three graphs below show the current observed as a function of the intensity of the light

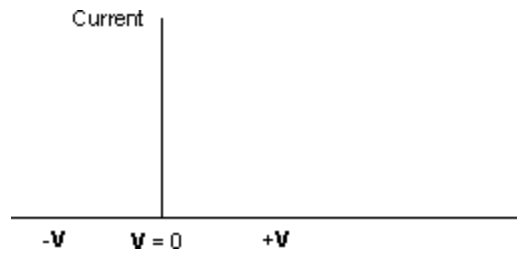


Do electrons ejected by red light or blue light have more energy?  
*Justify your answer based on the graphs*

5. What effect does increasing the intensity of the light have on the energy of the ejected electrons?  
*Justify your answer based on the graphs.*

6. What effect does increasing the intensity of the light have on the number of the ejected electrons?  
*Justify your answer based on the graphs*

7. The wave model of light predicts that the intensity of light would affect the maximum kinetic energy of the ejected electrons. Redraw the curves for different intensities of red light that would be expected by wave model and explain how they are different from what is actually observed.



*How is this graph different from what is actually observed (see graph on previous page)?*

8. What is the single effect of incident light brightness in the photoelectric effect?

9. Albert Einstein devised an alternative to the wave model: think of light as discrete little bundles of energy and not as a continuous wave.

*What determines the energy of the bundle, **frequency** or **intensity**?*

10. Propose an explanation for why was there no electron current under infrared light.