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|  | **12 ATAR Physics**  **Quantum Physics & Light**  **Eval & Analysis 2016 (5%)**   |  |  | | --- | --- | | Student name: |  | |

**Student research guide**

* Student research – one day in class
* Student notes to written into their Physics lab book

**Part One - The Photoelectric Effect**

* Research the key parts of the photoelectric effect
* Theory of the photoelectric effect
* How does it show divergence from the classical view of physics?
* What theory explains the photoelectric effect more completely?
* Apparatus and experimental set-up
* Forward and reverse bias configurations
* Explanation of data collected
* Analysis of data collected
  + Relevant equations
  + Graphical analysis
  + Key data from data analysis
  + Error considerations and explanations

**Part Two – Line Emission Spectra**

* Equipment
  + Various elemental samples
  + Hand spectrometer
  + Power source to produce potential difference
* Review the line emission spectra produced from the elemental samples demonstrated in the laboratory
* Draw the samples shown into your lab book as carefully as possible
* Identify each sample shown
* Note key information from each sample to allow future identification

**Part Three – The Photoelectric Effect and the Gold Leaf Electroscope**

* Review the video link shown below:

<https://www.youtube.com/watch?v=v-1zjdUTu0o>

* Identify the materials and equipment being used
* Consider each individual part of the video
  + Preparing the materials
  + Charging the rod
  + Charging the electroscope
  + Demonstrating the breakdown of classical physics
  + Demonstrating the photoelectric effect
* Comment on how this demonstrates the need for a new theory

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