Photoelectric Effect Simulation

The PHeT simulation (https://phet.colorado.edu/en/simulation/photoelectric) was used to examine the Photoelectric Effect. In the simulation, the wavelength of the incoming light that was incident on the sodium sample was the independent variable and the stopping voltage was the dependent variable.

Wavelength / nm	Stopping Voltage / V
150	6.00
200	4.00
250	2.65
300	1.80
350	1.20
400	0.75
450	0.40
500	0.20

1. Describe what *stopping voltage* means in this context.

2. Typically, the graph used to describe the photoelectric effect is *Kinetic Energy of Emitted Electron* vs. *Frequency of the Incoming Photon.*
    a. Describe how to determine the *Frequency of the Incoming Photon*. Also include the power of 10 when the value is written in scientific notation.

    b. Describe how to determine the *Kinetic Energy of Emitted Electron.* Also include the power of 10 when the value is written in scientific notation in Joules.

3. Complete the data table below. Include the proper powers of 10 in your unit labels.

Wavelength / nm	Stopping Voltage / V	f / 10— Hz	E_k / 10— J
150	6.00		
200	4.00		
250	2.65		
300	1.80		
350	1.20		
400	0.75		
450	0.40		
500	0.20		

4. Create a graph that represents your data. In order to complete the later portions of the activity, you are going to need both the 1st and 4th quadrants of your graph. Label the axes appropriately.

5. Draw a best-fit line and determine the equation for that line.

6. Describe what the slope of the line means. Compare the value you calculated to the expected value.

7. Use the graph to determine the x-intercept. Describe what it means. (Hint: Look at the units.)

8. Use the graph to determine the y-intercept. Describe what it means. (Hint: Look at the units.)

9. Write a general equation that would be applicable for any sample used.