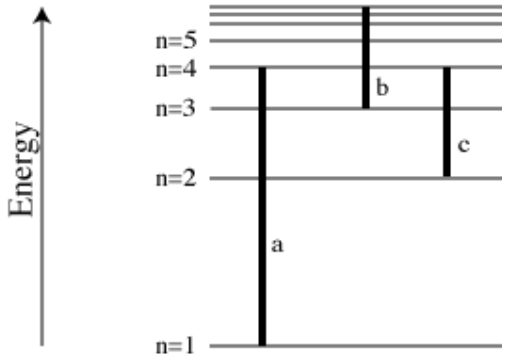
# LECTURE 5

1. What is the energy of the light absorbed when an electron in a hydrogen atom makes the following transitions: (a) n = 1 to n = 4; (b) n = 3 to n = 8; (c) n = 2 to n = 4. Give your answers to 3 significant figures. (d) Draw an energy level diagram for hydrogen, and draw vertical arrows to indicate each of these three electron transitions on the diagram. Label your lines "a", "b", and "c". *Refer to lecture 5 notes for examples of energy level diagrams*.

**(a) $E = 2.04 \times 10^{-18}$ J**
**(b) $E = 2.08 \times 10^{-19}$ J**
**(c) $E = 4.09 \times 10^{-19}$ J**

**(d)**




2. (a) Calculate the minimum energy photon that must be absorbed by a ground-state $He^{+1}$ ion to ionize the remaining electron? Report your answer with three significant figures. (b) Calculate the wavelength of this photon.

**(a) $8.72 \times 10^{-18}$ J**
**(b) ✦= 22.8 nm**

3. Consider a quantum dot that emits yellow light with a wavelength of 537 nm.
(a) What is the energy difference between the initial and final energy levels resulting in this yellow light emission.
(b) If 2.00 mol of photons are emitted at 537 nm, what is the total energy emitted?

**(a) $3.699 \times 10^{-19}$ J photon$^{-1}$**
**(b) $4.46 \times 10^{5}$ J or 446 kJ**

4. Briefly explain the meaning of the Schrodinger equation using language appropriate for readers of The New York Times Science Section. Limit your explanation to one or two sentences, which means you will need to select an aspect you feel is most important or exiting to share.

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**(One of many possible answers) The Schrodinger equation is an equation of motion for electrons (or other submicroscopic particles) that accounts for both particle-like and wave-like behaviors. Solutions to the Schrodinger equation for an electron tell us how strongly the electron is bound to the nucleus and tell us probable locations (orbitals) for that electron.**

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