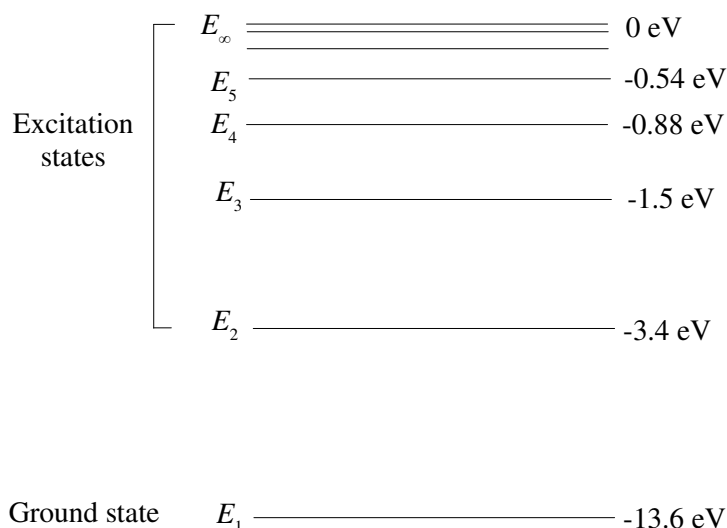


## Year 11 Physics Worksheet

### The Atom and Quantum

1. Explain how the buildup of an image by low intensity light implies the existence of photons
2. Calculate the energy of a photon of frequency  $6.00 \times 10^{14}$  Hz
3. Explain why (for some metal) high frequency light is able to eject electrons but low frequency light is not.
4. Explain why increasing the intensity of light will increase the current in the metal (assuming the frequency of light is high enough to produce the photoelectric effect).
5. Explain the effect of increasing the speed of a particle on its wavelength.
6. Calculate the de Broglie wavelength of an electron (mass  $9.11 \times 10^{-31}$  kg) travelling at a speed of  $2.65 \times 10^7$  ms<sup>-1</sup>.
7. Explain why electron microscopes are able to see so much greater detail than visible light microscopes.
8. Explain how an atom can have different energy levels and describe what happens when an atom drops from a higher energy level to a lower one.
9. An atom at the -1.51 eV potential energy level releases energy and drops to the -3.40 eV level. Calculate the frequency of the light emitted.
10. Draw the transition in question 9 on the energy level diagram for hydrogen shown below and on a line emission spectrum from  $4 \times 10^{14}$  to  $7 \times 10^{14}$  Hz.



11. Explain what the ionisation energy of an atom is and state what its value is for the hydrogen atom above.