Your name: _____

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AST 10: Homework 7

1. If two waves (Wave A and Wave B) have the same speed, but Wave A has three times the wavelength of Wave B, how are their frequencies related? $\nu_A = \frac{1}{3}\nu_B$

2. What is the Doppler effect? Shift in wavelength when source is moving: moving away, redshift. Move toward, blueshift.

3. Is light a wave or a particle? Both

4. What is a photon? Particle (quantum) of light.

5. The frequency of a light wave can be measured as the number of waves that go past in a time unit. The speed of light is approximately 300 million meters/sec and the wavelength of orange light is roughly 6×10^{-7} meters. How many waves of orange light will go past you in one second? (Use the relationship between speed of a wave, wavelength and frequency.) $c = \lambda\nu$. So $3 \times 10^8 = 6 \times 10^{-7}\nu$, or $\nu = \dfrac{3 \times 10^8}{6 \times 10^{-7}} = 0.5 \times 10^{15}$.

6. Is it possible to identify an element by the radiation it emits? How? What aspect of atomic structure is related to this phenomenon? Yes. From its signature spectral lines, which occur because of the energy levels of electrons.

7. If the frequency of an electromagnetic wave doubles, how does its energy change? Doubles.