C 8. Ultraviolet radiation has a shorter wavelength (higher frequency) than infrared radiation. The energy of a photon varies directly with the frequency ($E = hf$). Since infrared photons have a lower frequency, they have lower energy.

11. The energy of individual photons only depends on the frequency of the light (which corresponds to the color of the light). The intensity relates to the number of photons in the beam of light. Since the frequency does not change when the intensity changes, the energy of each photon stays the same.

25. No, you would not get an interference pattern if electrons behaved only like particles. Wave properties are needed to get an interference pattern. Particles would just move through the double slits one after another and would hit the screen in random locations.

27. The deBroglie wavelength depends on both the mass and velocity ($\lambda = \frac{h}{mv}$). Objects with a larger mass will have a shorter wavelength. To arrange these by shortest to longest wavelength, they should be arranged in order of most massive to least massive. Automobile, baseball, DNA molecule, helium atom, neutron, electron.

P4. $f = 1 Hz$ $E = hf = (6.626 \times 10^{-34} Js)(1 Hz) = 6.63 \times 10^{-34} J$

P12. $m = 1g = 10^{-3} kg$ $\lambda = \frac{h}{mv} = \frac{(6.626 \times 10^{-34} Js)}{(10^{-3} kg)(1000 m/s)} = \frac{6.626 \times 10^{-34} (kg m^2/s^2) s}{(10^{-3})(10^{3}) kg \cdot m/s}$
$v = 1000 m/s$

$\lambda = 6.626 \times 10^{-34} m$