

- 3) In which of the situations shown (A–D) will the observer receive light that is not Doppler shifted at all? Explain your reasoning.
- 4) Imagine our solar system is moving in the Milky Way toward a group of three stars. Star A is a blue star that is slightly closer to us than the other two. Star B is a red star that is farthest away from us. Star C is a yellow star that is halfway between Stars A and B.
- Which of these three stars, if any, will give off light that appears to be blueshifted? Explain your reasoning.
  - Which of these three stars, if any, will give off light that appears to be redshifted? Explain your reasoning.
  - Which of these three stars, if any, will give off light that appears to have no shift? Explain your reasoning.
- 5) You overhear two students discussing the topic of Doppler shift.

**Student 1:** *Since Betelgeuse is a red star, it must be going away from us, and since Rigel is a blue star it must be coming toward us.*

**Student 2:** *I disagree, the color of the star does not tell you if it is moving. You have to look at the shift in wavelength of the lines in the star's absorption spectrum to determine whether it's moving toward or away from you.*

Do you agree or disagree with either or both of the students? Explain your reasoning.

## Part II: Shift in Absorption Spectra

When we study an astronomical object like a star or galaxy, we examine the spectrum of light it gives off. Since the lines of a spectrum occur at specific wavelengths, we can determine that an object is moving when we see that the lines have been shifted to either longer or shorter wavelengths. For the absorption line spectra shown on the next page, short-wavelength light (the blue end of the spectrum) is shown on the left-hand side, and long-wavelength light (the red end of the spectrum) is shown on the right-hand side.