GEOLOGY **NAME** _____
UNIT 1 **PER** _____ **DATE** _____

Analyzing Redshifts Worksheet

Directions: Use the information in the passage below and your notes to complete the worksheet.

When a star is moving toward Earth very fast, the wavelength of its light shortens, causing it to appear slightly more blue than usual. If a star is moving away from Earth very fast, the wavelength of its light lengthens, causing it to appear slightly more red. By measuring this **redshift** or **blueshift** of light, astronomers can determine whether the star is moving toward or away from Earth, and how fast. To do this, astronomers use the shift of spectral lines produced by chemicals in the star's atmosphere. Astronomers can also use the spectrum of a galaxy to tell how fast the galaxy is moving toward or away from Earth.

Using the principle of redshift, Edwin Hubble studied the relationship between a galaxy's distance and the speed at which it moves away from Earth. He found that the farther away a galaxy is, the faster it moves away from Earth. This relationship is called **Hubble's Law**.

1. During his research, Edwin Hubble made two observations, which are listed in the table below. Hubble made conclusions from these observations, which led to the creation of Hubble's Law. In the table, fill in the conclusions that were made from the two pieces of evidence.

Observations / Evidence	**Conclusion** (So…What does it mean? What's happening?)
Most stars and galaxies show a Redshift.	
Stars and galaxies that are further away from us show a greater red-shift.	

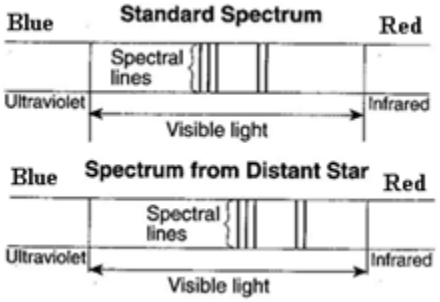
2. A) If a star or galaxy is moving away from us, what should happen to the wavelength of light emitted from it?

_____

B) If a star or galaxy is moving closer to us, what should happen to the wavelength of light emitted from it?

_____

3. The diagram to the right shows a standard spectrum (reference spectrum) compared to a spectrum produced from a distant star.



A) Compared to the standard reference spectrum, what has happened to the light coming from the distant star? (circle) REDSHIFT / BLUESHIFT

B) How did you come to that conclusion in letter A?

_____

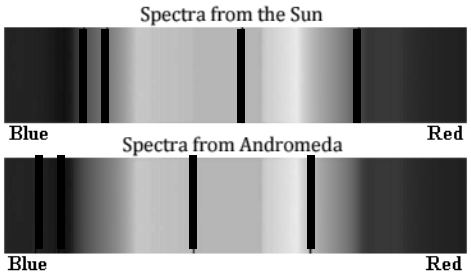
_____

C) How is this distant star moving compared to reference? (circle) TOWARDS US / AWAY FROM US

D) How did you come to that conclusion in letter A? _____

_____

4. The diagram to the right shows light spectra from the Sun and the Andromeda galaxy. Explain what the spectra tell us about the Andromeda galaxy AND explain how/why you came to this conclusion.



_____

_____

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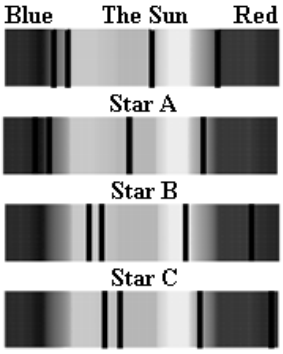
_____

5. The diagram to the left shows light spectra from the Sun (reference) and three other stars in distant galaxies.



A) Which star(s) show a redshift? _____

B) Which star(s) show a blueshift? _____

C) Which star(s) is moving away from us? _____

D) Which star(s) is moving towards us? _____

E) Which star is moving the slowest? _____

F) Which star is moving the fastest? _____

6. The diagram to the right shows light spectra from the Milky Way galaxy and four other distant galaxies.

A) Which galaxies show a redshift?

_____

B) Which galaxies show a blueshift?

_____

C) Which galaxies are moving away from us?

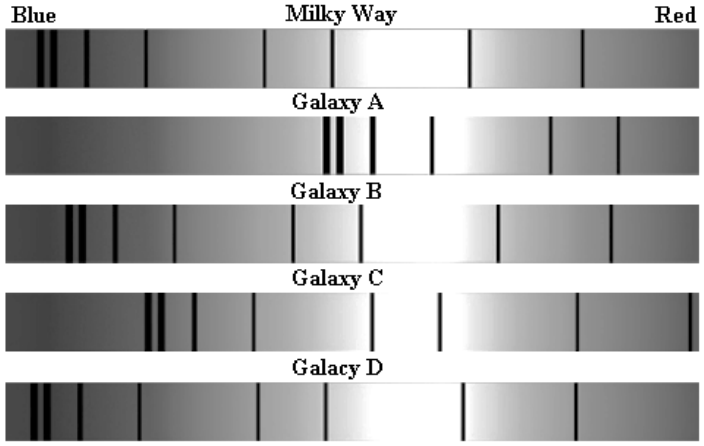
_____

D) Which galaxies are moving towards us?

_____

E) List the galaxies from slowest to fastest moving.

_____



F) Which galaxy is the closest to the Milky Way? _____ Explain how you determined this: _____

_____

_____

G) Which galaxy is the farthest to the Milky Way? _____ Explain how you determined this: _____

_____

_____

6. The diagram to the right shows light spectra from the Milky Way galaxy and four other distant galaxies.

A) Are any galaxies moving towards us? _____ If so, which? _____

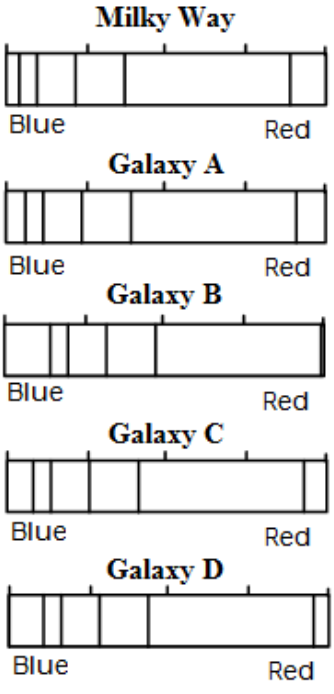
B) Explain how you can prove your answer is correct for question A.

_____

_____

_____

_____



C) Examine the light spectrum to fill out the table below.

Galaxy	**Distance from Milky Way** 1 = nearest & 4 = farthest	**Speed** 1 = slowest & 4 = fastest
A		
B		
C		
D		