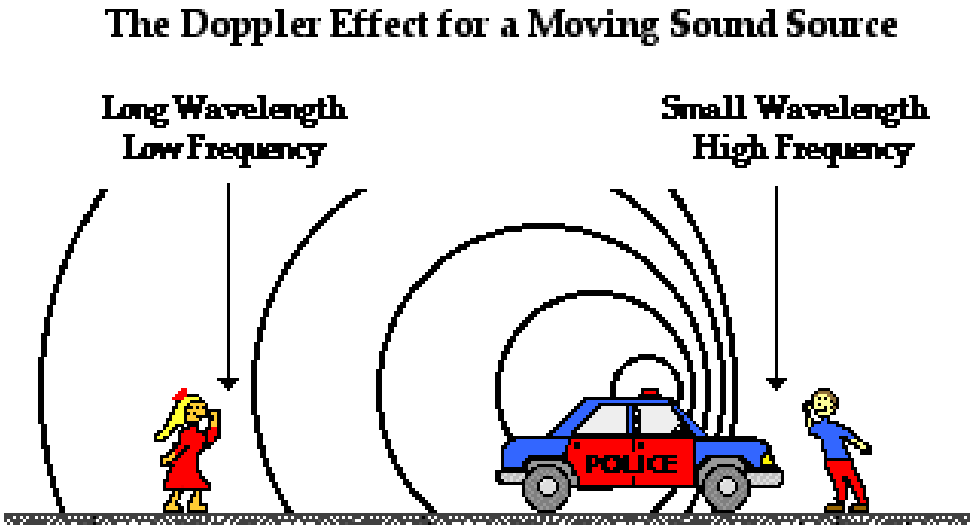
4.3 Evidence for Big Bang

Doppler Effect

A change in the frequency of a wave relative to an observer caused by moving the wave's source.



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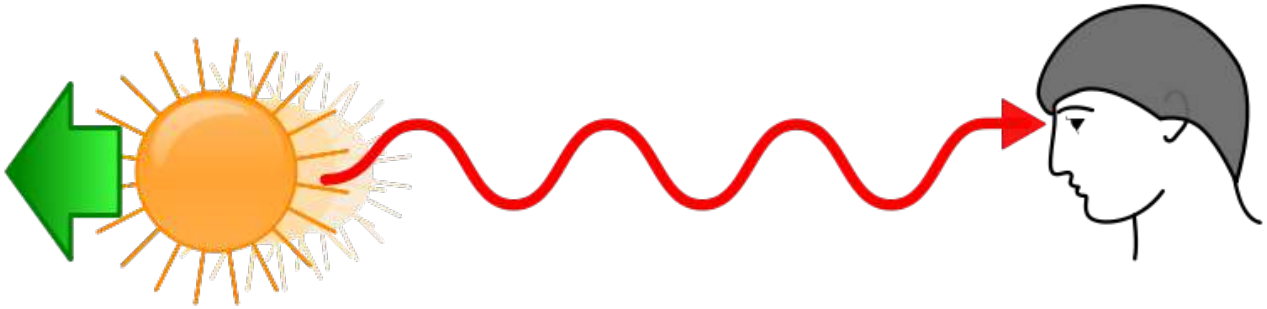
WOD

Red Shift

Shift of wavelengths of light towards the red end of the spectrum with longer wavelengths; happens as a light source moves away from us.



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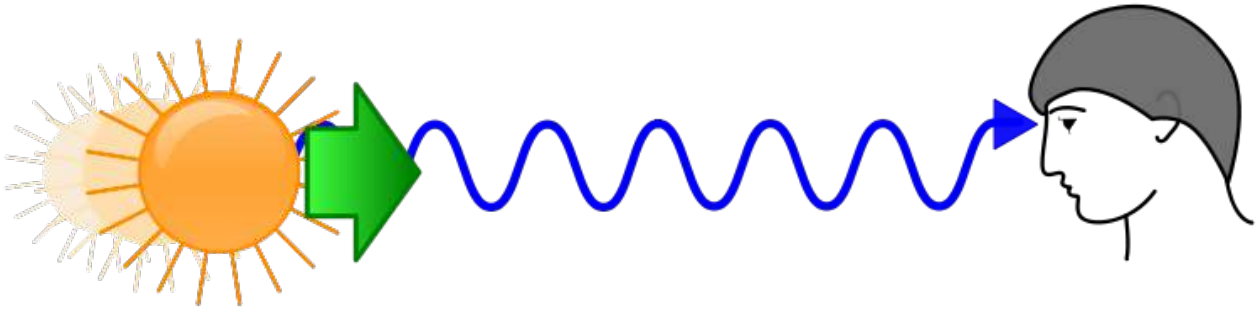
WOD

Blue Shift

Shift of wavelengths of light towards the blue end of the spectrum with shorter wavelengths; happens as a light source moves towards from us.



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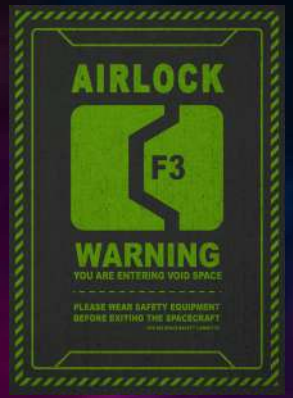
Warning!

- When the slides say turn and talk, do this.
- When the slides say check with a teacher, do that!
- Moving ahead without understanding what you are learning will cause a lot of confusion.



Work with at least 1 other person. Get team points

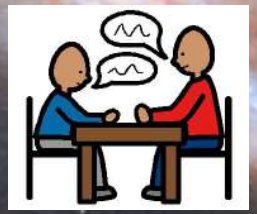
Symbols For This lesson

DO NOT need to write

SOMETHING to write in notebook

Read

Talk to a neighbor at your table, yes really do this!



Talk to the teacher!

Review Our Big Question

Where did matter in the universe come from?

What we know so far: What elements do we find in all stars?-

Tell the teacher your answer!

Notebook Set-up

4.3 Evidence for Big-Bang part

Guiding Question: What is the evidence for the origin of the universe?

Model #1 Doppler Effect

Model #2 Red Shift/Blue Shift

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4.3 Evidence for Big-Bang part 2

Model #2 Red Shift/Blue Shift cont.

Model #3 The Big Bang

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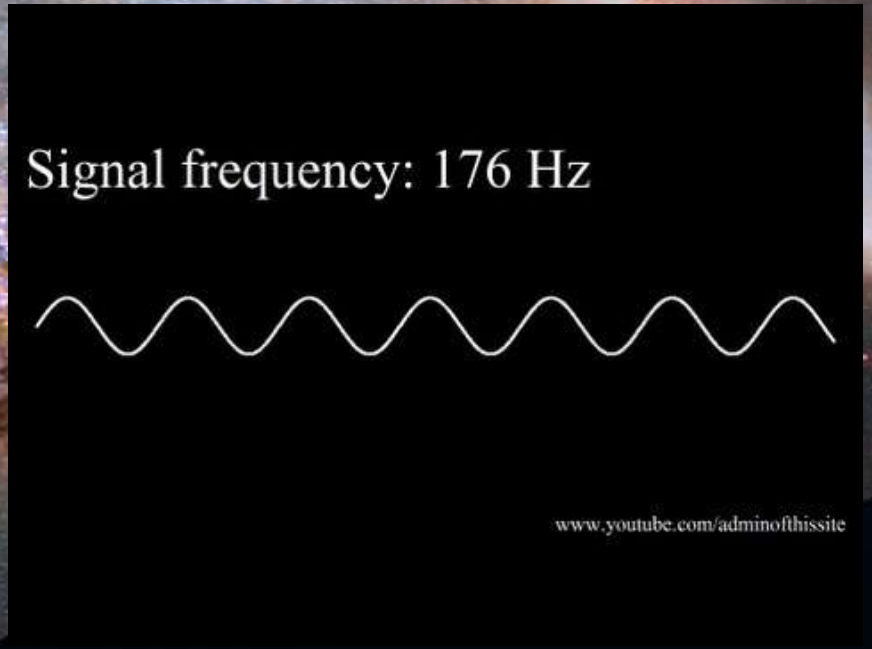
Listen to the sound of the car horn

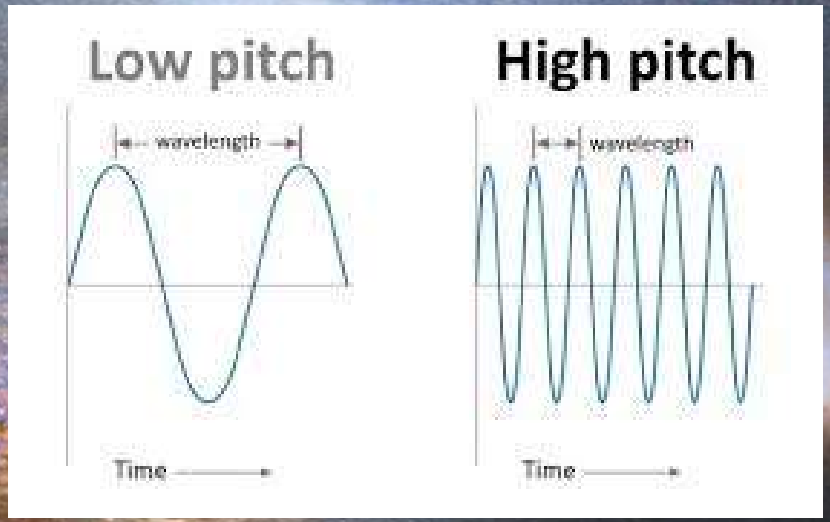
What changes in the SOUND of the horn did you observe as the car passes the camera, list 2-3

Observe: Pitch and Wavelength

- Watch the video below, feel free to fast forward
- What happens to the pitch of the sound when the wavelength gets longer?



Pitch and Wavelength



Long wavelengths have_____ pitch.
Short wavelength have_____ pitch.

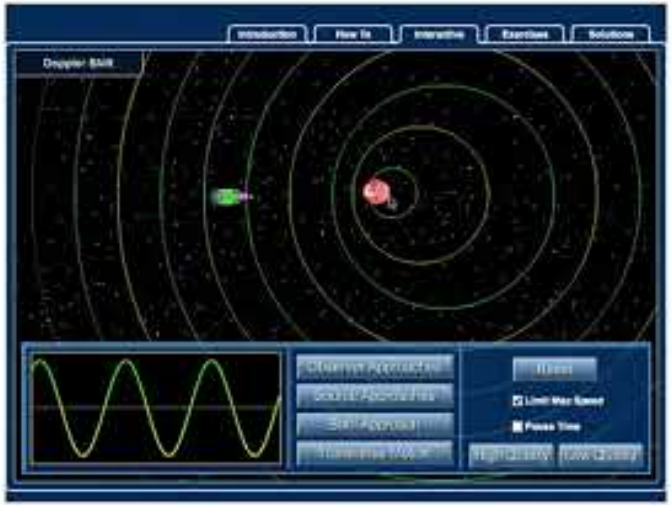
Return to the car horn

1. What is happening to the WAVELENGTH of the car as it gets closer to the camera
2. What is happening to the WAVELENGTH of the car as it gets further away from the camera?

Connection to Stars and the Universe

- BOTH sound and light travel in waves and behave the same way when the source is moving.
- Next, let's see what happens to star's light when it moves.
- Watch the next 2 video clips of a star's wave as it moves towards the space craft

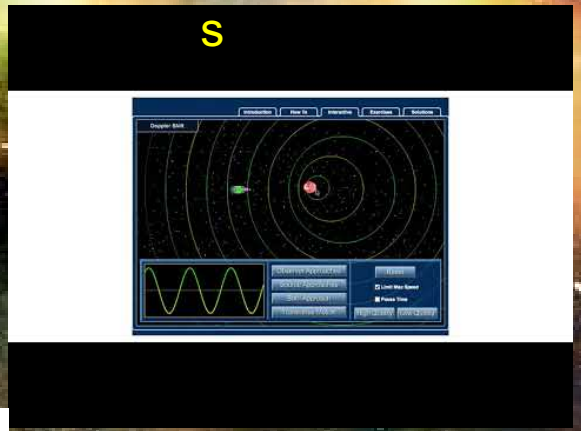
Star Moving Towards



Star Moving Away

What's Happening?

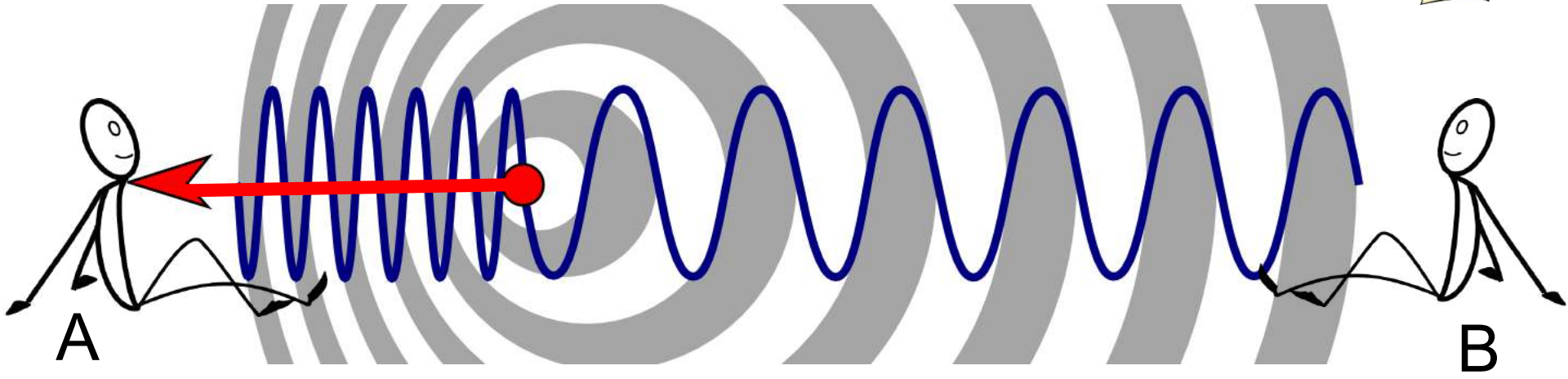
Toward
s



Away

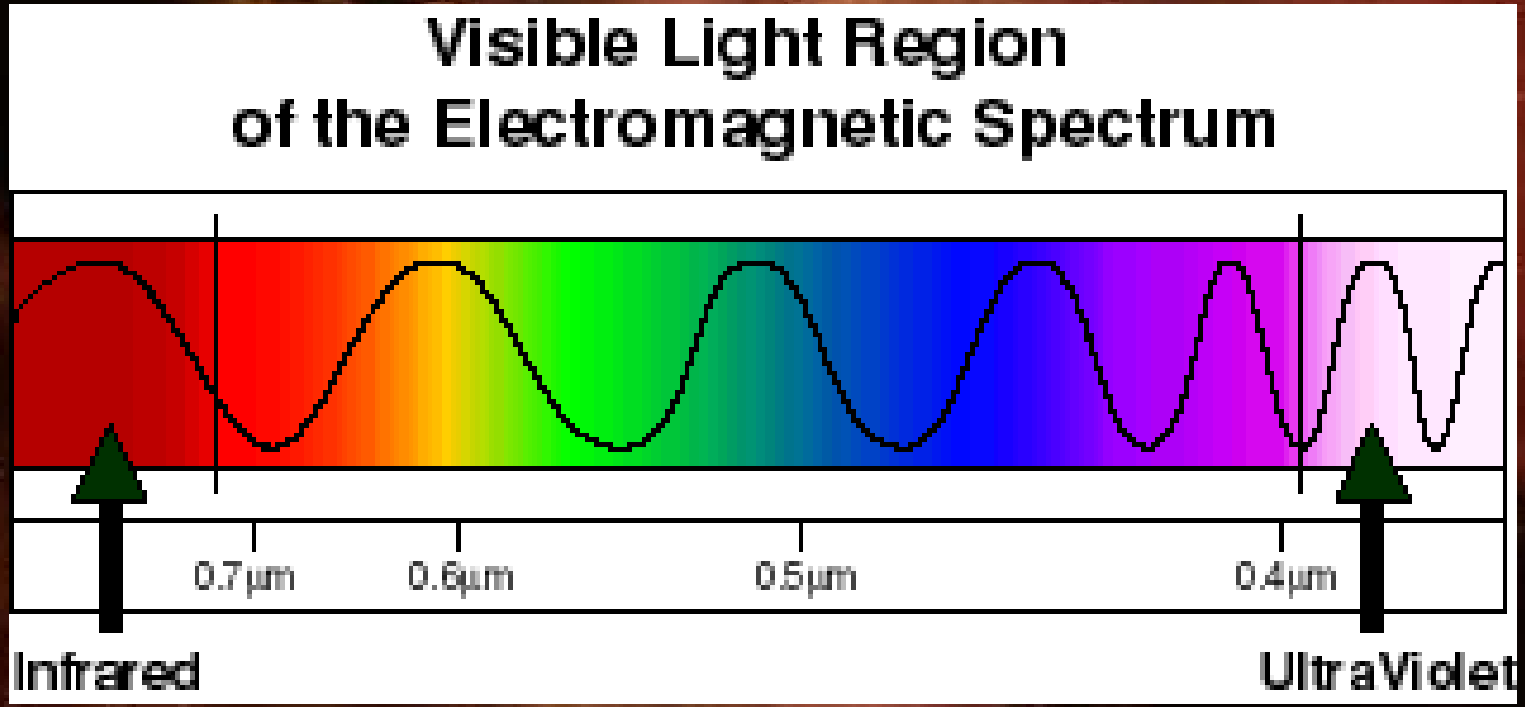
From the perspective of the spaceship, how does the wavelength change when the star is moving towards the spacecraft? Away?

Model #1 Doppler Effect



1. Draw the picture above in your notebook.
2. Write a caption for this diagram. Include what person A and person B would be seeing. (2 sentences) Makes sure you use these words: moving, towards, away, and wavelength.

Review: Which color has the Longest Wavelength? Shortest?



Prediction-What happens to the color?

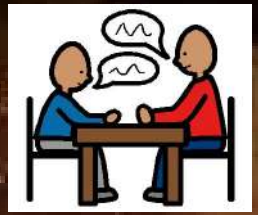
- If a star is moving towards us, what color will the the star shift to?
- If a star is moving away from us what color will the star shift to?

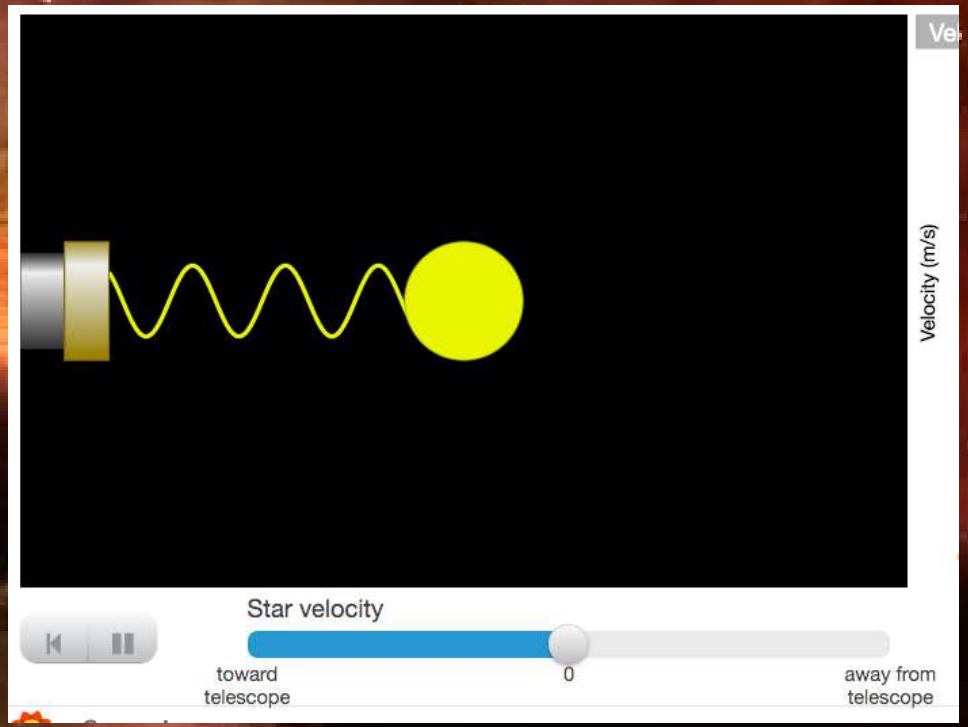
Test Your predictions

Open the link for the interactive lab

Press play to start the wave

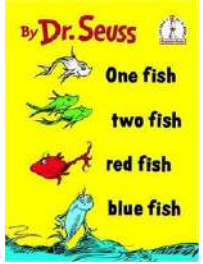
Move the star velocity away and towards to test your prediction.

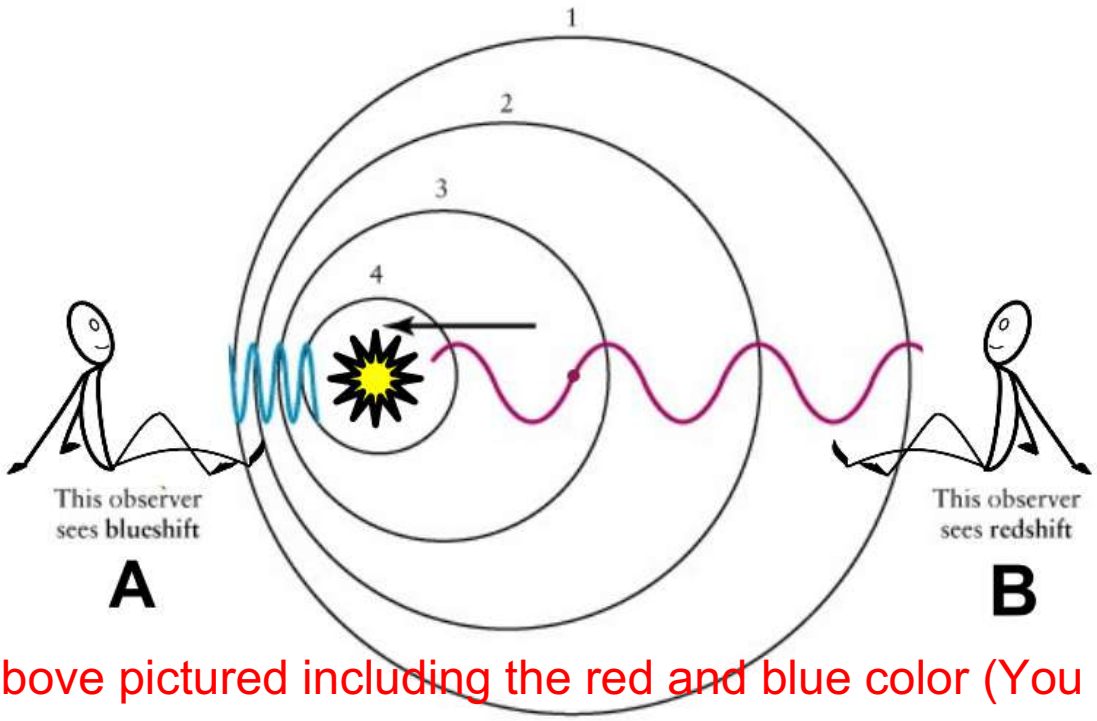




Sheldon Cooper and the Doppler Effect

Model #2 Red Shift/Blue Shift





+Colored Pencils

1. Draw the above pictured including the red and blue color (You can skip the circles)
2. Write a caption for this diagram from the perspective of observe A and Observer B. (2 sentences total) Use the words Red shift, blue shift, away, towards,and wavelength.