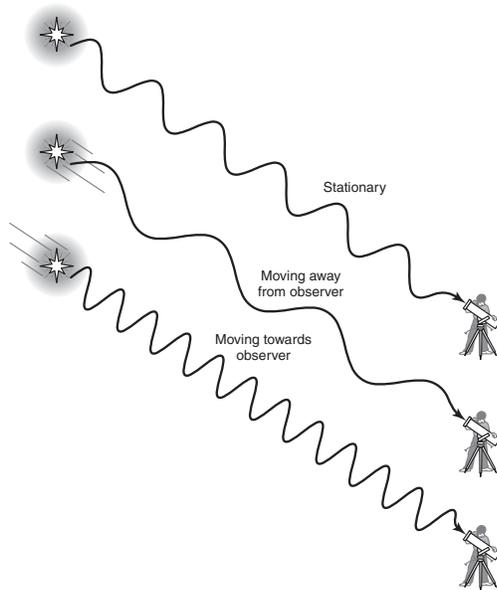


## THE DOPPLER SHIFT OF GALAXIES

The **Doppler shift** allows us to study the light emitted by an object to determine whether that object is sitting still (*stationary*), coming towards us (*approaching*) or moving away from us (*receding*). When the visible spectra of an object's light is shifted towards the red end of the visible spectrum, we know that object is moving away from us. Conversely, when the spectra is shifted towards the blue end of the visible spectrum, we know that object is moving towards us. If the spectrum is the same as the standard spectrum, the object is not moving.



On the right, you will find the standard spectrum for the element Hydrogen, which is the material that makes up the vast majority of galaxies in the Universe. Below that, you will find the spectra from a variety of galaxies. Use these diagrams to fill out the table on the next page. When you are down with the table, answer all questions in complete sentences.

Standard Hydrogen Spectrum	
VIOLET	RED
Virgo A	
VIOLET	RED
Andromeda	
VIOLET	RED
The Coma Pinwheel Galaxy	
VIOLET	RED
Cetus A	
VIOLET	RED
M58 Spiral Galaxy in Virgo	
VIOLET	RED
M109 Spiral Galaxy in Ursa Major	
VIOLET	RED
M65 Spiral Galaxy in Leo	
VIOLET	RED

<b>GALAXY NAME</b>	<b>SPECTRUM IS ____-SHIFTED (circle one)</b>	<b>THIS GALAXY IS... (circle one)</b>
Virgo A	RED or BLUE	RECEDING or APPROACHING
Andromeda	RED or BLUE	RECEDING or APPROACHING
The Coma Pinwheel Galaxy	RED or BLUE	RECEDING or APPROACHING
Cetus A	RED or BLUE	RECEDING or APPROACHING
M58 Spiral Galaxy in Virgo	RED or BLUE	RECEDING or APPROACHING
M109 Spiral Galaxy in Ursa Major	RED or BLUE	RECEDING or APPROACHING
M65 Spiral Galaxy in Leo	RED or BLUE	RECEDING or APPROACHING

1. Describe the motion of the majority of these galaxies.

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2. If this is the same motion of virtually all galaxies in the Universe, what can you say about the general movement and size of the Universe?

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3. Assuming your answer from question two is correct, what can you say about the size of the Universe as you go further and further back into the past?

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4. How is the movement of the Andromeda galaxy different from the movement of the other galaxies?

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5. What problem may this pose for our galaxy in the future?

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**Practice Regents Questions (Available on the blog)**

1. _____	2. _____	3. _____	4. _____	5. _____	6. _____
7. _____	8. _____	9. _____	10. _____	11. _____	12. _____