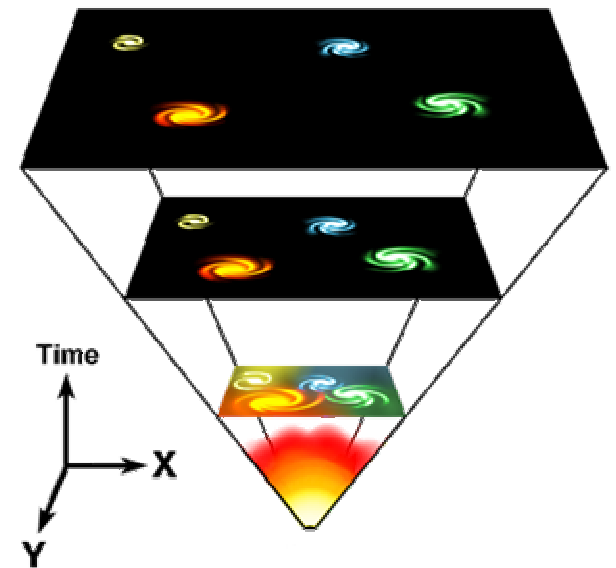
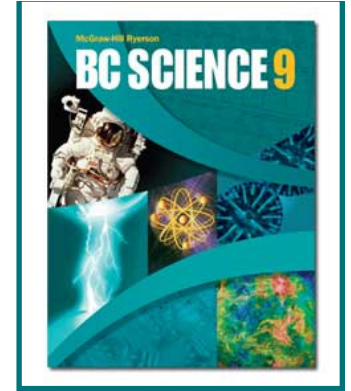


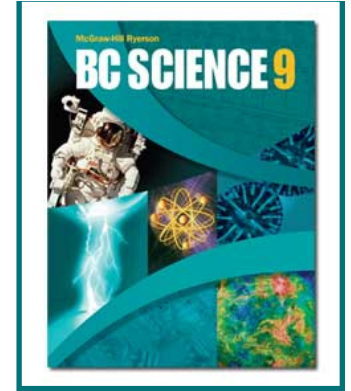
10.1 The Early Universe

- Until 100 years ago, scientists believed nothing ever changed in outer space.
- Using powerful telescopes, astronomers like Edwin Hubble discovered many new celestial bodies, and observed that everything in the universe was moving further apart.
- The universe expands like baking bread; galaxies and other celestial objects are like raisins in the dough, moving apart as the bread bakes.



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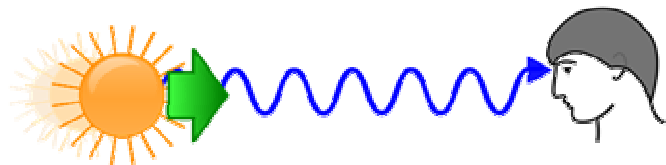
Red Shift Analysis



- By examining the light from distant stars, astronomers
- can estimate the speed and directions the star is traveling.
- Light, like all forms of electromagnetic radiation, travels in waves. Objects in space give off many different forms of radiation.
- Like the sound of a ambulance siren changes as it passes you, light from stars exhibits red-shift, indicating speed and direction of motion.
- A spectroscope analyzes the unique spectrum of a star, which astronomers can analyze to discover the direction and amount the light has shifted



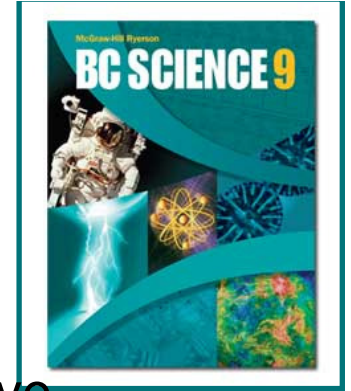
- A red shift means the wavelength is getting longer, and the star is moving away from us.



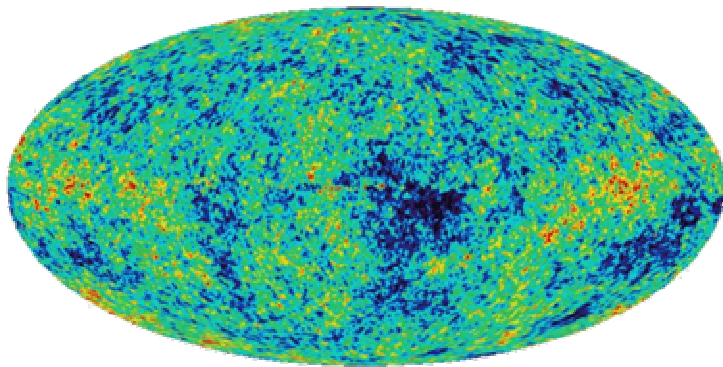
- Blue shift is the opposite; the star is getting closer.

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The Big Bang Theory



- Once astronomers realized everything was moving away
- from everything else, they realized the universe might have originated from a single point.
 - The Big Bang theory suggests that everything in the universe came from a single starting point, approximately 13.7 billion years ago.



- Although there are other theories about the beginning of the universe, much scientific evidence supports the Big Bang theory.
- The Big Bang is also supported by the presence of cosmic background radiation, which is the energy left over from the Big Bang.
- This radiation was mapped by the COBE and WMAP explorations.

Take the Section 10.1 Quiz

See pages 350 - 352