• First Hour Test
  – Monday 15 February
  – Same time, same place
  – Bring something (clipboard, notebook, etc.) on which to write

• READ YOUR BOOK!
  – Concentrate on UNDERSTANDING the key concepts at the end of each chapter
IQ

- Radio, x-ray and infrared radiation are all examples of:
  - A. Magic
  - B. Electromagnetic radiation
  - C. Atoms and molecules
  - D. Cartoon characters
**IQ**

- That’s right! B. is the correct answer!
- Modern astronomical observations from ground and space acquire information from the entire electromagnetic spectrum, from short-wavelength gamma-rays to the longest wavelength radio waves.
IQ

• A hot, blue star emits more energy at every wavelength than does a cool, red star.

• A. - True

• B. - False
IQ

• A. True. The hotter an object, the bluer it appears.

• Blue stars are hotter than red stars and emit more energy at every wavelength.

• Cool stars appear red because their peak emission is in the red.
IQ

- The spectrum of a gas cloud illuminated by nearby hot, blue stars is:
  
  A. An absorption spectrum with many bright lines.
  B. A continuous spectrum with bright and dark lines.
  C. An emission spectrum with many bright lines.
  D. A spectrum analyzer with 3 dB rolloffs at each end.
IQ

- C. is the correct answer (See C., below). Atoms in the cool gas are excited by the blue light. When they excited atoms decay to a lower energy state, they emit light characteristic of the emitting atom.
The Doppler shift (Doppler Effect) makes rapidly receding objects appear redder.

A. - True
B. - False
IQ

• A. True. The wavelength of light emitted from a receding object appears to increase, that is, it appears to be redder.

• An approaching object will appear bluer because of the Doppler shift.
The speed of light, usually denoted by ‘c,’ is constant. The value of this constant velocity is very nearly $3 \times 10^5$ km/s. This means that the speed of light derived from a galaxy moving away from us at 1000 km/s will be slower by:

- A. 0%
- B. $(10^3 \text{ km/s} / 3 \times 10^5 \text{ km/s}) \times 100 = 3.33\%$
- C. 10%
- D. 52.5%
The answer is A! The speed of light is a **constant**, and it does **not** depend upon the speed of the source.

The **wavelength** (or **frequency**) of light **does** depend upon the speed of the source. This is the **Doppler Effect**.