IQ

• Radio, x-ray and infrared radiation are all examples of:

• A. Magic
• B. Electromagnetic radiation
• C. Atoms and molecules
• D. Cartoon characters
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• 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.
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- A hot, blue star emits more energy at every wavelength than does a cool, red star.
- A. - True
- B. - False
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- 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.
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- 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.
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
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.
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- 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. $\left(\frac{10^3 \text{ km/s}}{3 \times 10^5 \text{ km/s}}\right) \times 100 = 3.33\%$
  - 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.