

Review for Midterm Exam 2

1. Think-pair-share (sans -pair-share)
2. Questions

Think

~~Pair~~

~~Share!~~

A bright star is moving away from Earth. Which of the choices best completes the following statement describing the spectrum of this star?

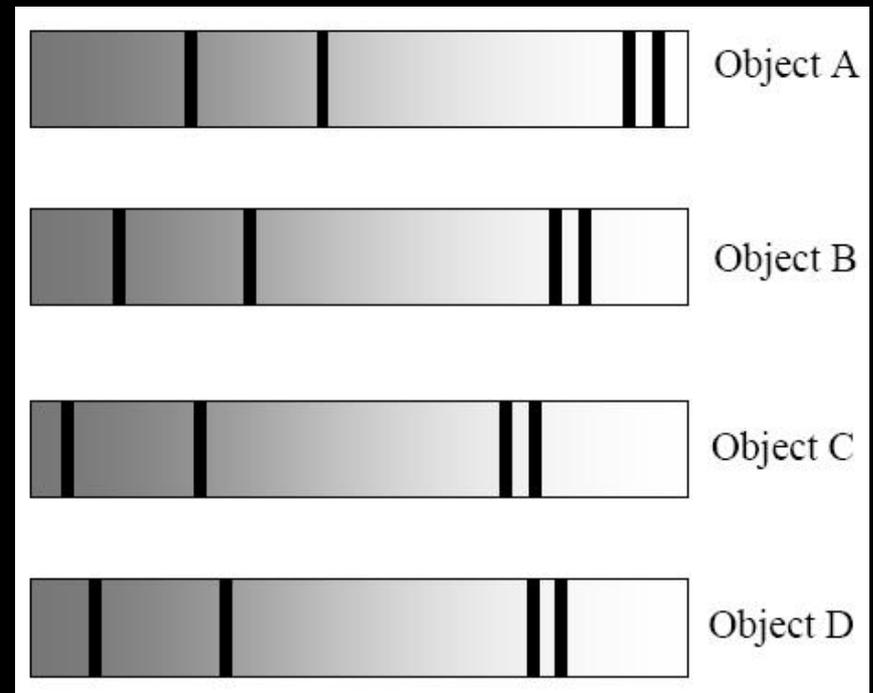
A(n) _____ spectrum that is _____ relative to an unmoving star.

- A. Absorption; blueshifted
- B. Emission; redshifted
- C. Continuous; blueshifted
- D. Absorption; redshifted
- E. Continuous; redshifted

Use the four spectra for Objects A-D, shown below, to answer the question. Note that one of the spectra is from an object at rest (not moving relative to Earth) and the remaining spectra come from objects that are all moving away from the observer. [Assume that the left end of the spectrum corresponds with short wavelengths and the right end corresponds with long wavelengths.]

Which object would be at rest?

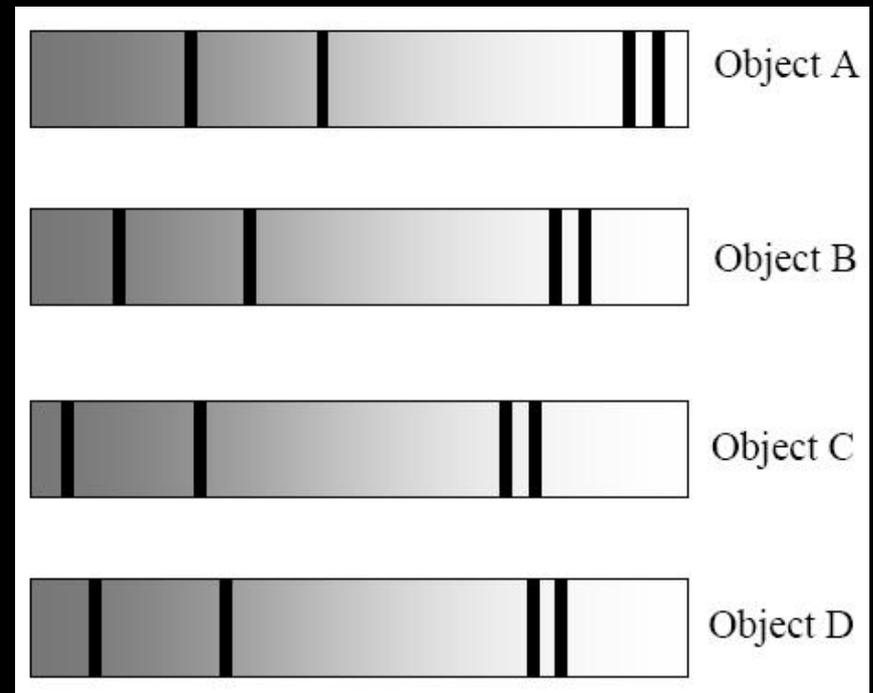
- A. Object A
- B. Object B
- C. Object C
- D. Object D
- E. They are moving the same speed.



Use the four spectra for Objects A-D, shown below, to answer the question. Note that one of the spectra is from an object at rest (not moving relative to Earth) and the remaining spectra come from objects that are all moving away from the observer. [Assume that the left end of the spectrum corresponds with short wavelengths and the right end corresponds with long wavelengths.]

Of the objects that are moving, which is moving with the fastest speed?

- A. Object A
- B. Object B
- C. Object C
- D. Object D
- E. They are moving the same speed.



An important line in the absorption spectrum of stars occurs at a wavelength of 656nm for stars at rest. Imagine that you observe five stars (A-E) from Earth and discover that this absorption line is at the wavelength shown in the table below for each of the five stars.

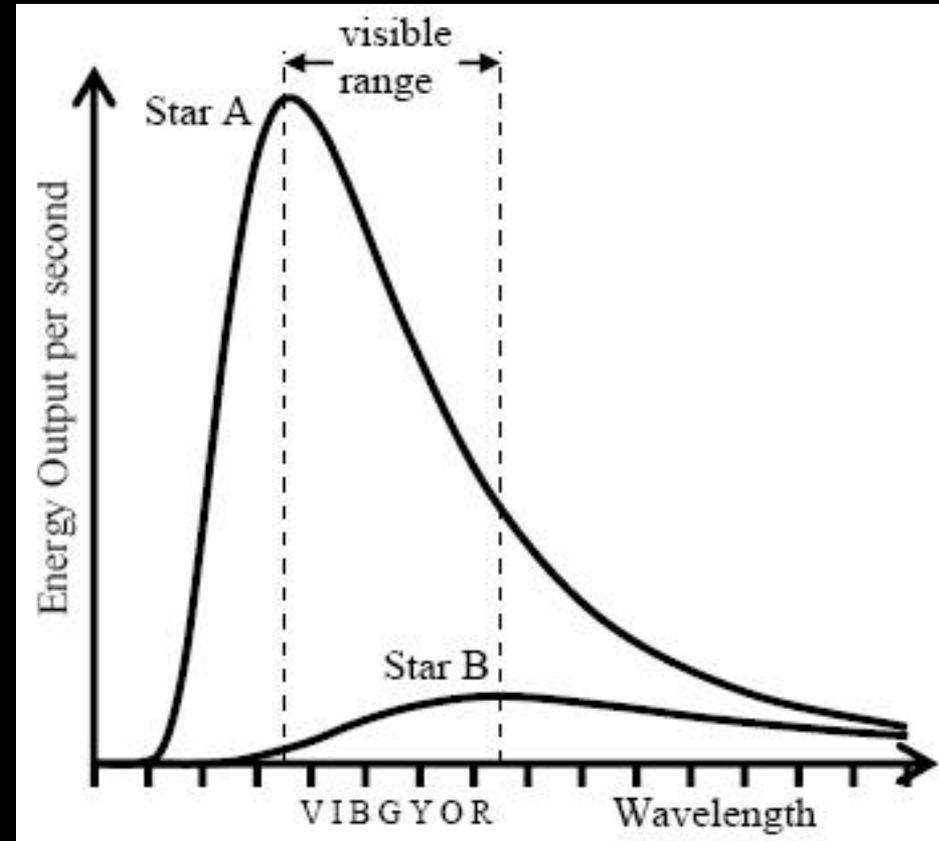
1. STAR	2. Wavelength of Absorption Line
Alpha	649 nm
Bravo	660 nm
Charlie	656 nm
Delta	658 nm
Echo	647 nm

Based on the information in the table above, which of the following is the most accurate ranking of the speed of the stars from moving fastest toward the Earth to moving fastest away from Earth.

- A. Bravo, Delta, Charlie, Alpha, Echo
- B. Echo, Delta, Charlie, Bravo, Alpha
- C. Charlie, Echo, Alpha, Delta, Bravo
- D. Alpha, Bravo, Charlie, Delta, Echo
- E. Echo, Alpha, Charlie, Delta, Bravo

Use the graph at the right to determine which of the following best describes how Star A would appear as compared with Star B.

- A. Star A would appear more red than Star B.
- B. Both stars would appear more red than blue.
- C. Both stars would appear more blue than red.
- D. Star A would appear more blue than Star B.
- E. None of the above.



Energy is released from atoms in the form of light when electrons

- A. Move from higher energy levels to lower energy levels.
- B. Move in their orbit around the nucleus.
- C. Move from lower energy levels to higher energy levels.
- D. Are emitted by the atom.
- E. Are absorbed by atoms.

How does the spectrum of the Sun change when observed from space above the Earth's atmosphere versus from the ground?

- A. The Sun doesn't change based on where the observer is, so the spectrum should be the same.
- B. The spectrum from the ground will have more absorption lines because the Earth's low-density atmosphere will absorb more light.
- C. The spectrum from the ground will have fewer absorption lines because the Earth's low-density atmosphere will emit light to "fill in" some of the absorption lines.

Which of the following forms of light travels the slowest?

A. Radio waves

B. Visible light

C. X-rays

D. Infrared light

E. They all travel at the same speed

Which of the following forms of light has the longest wavelength?

A. Radio waves

B. Visible light

C. X-rays

D. Infrared light

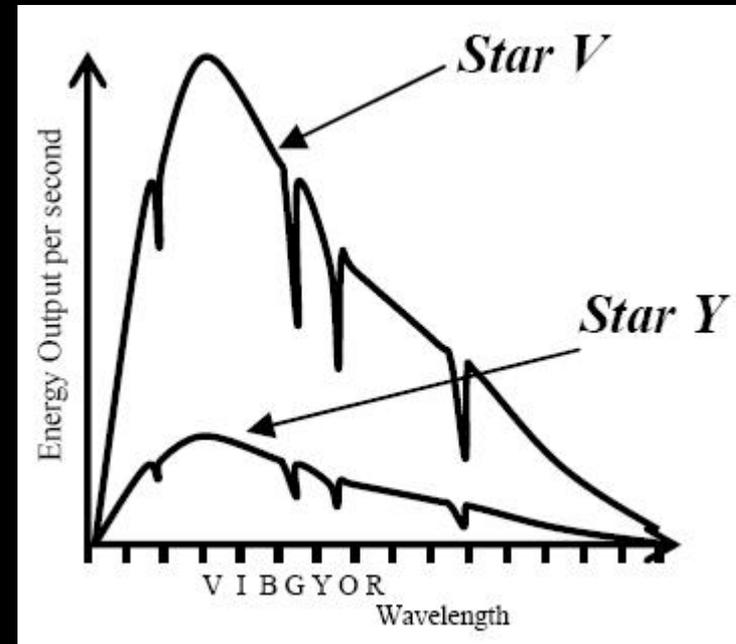
E. They all have the same wavelength.

A lump of lead is heated to a high temperature. Another lump of lead that is twice as large is heated to a lower temperature. Which lump of material appears bluer?

- A. The cooler lump appears bluer.
- B. The hotter lump appears bluer.
- C. Both lumps look the same color.
- D. Cannot tell which lump looks bluer.

Consider the two spectral curves for Star V and Star Y shown in the graph at the right. What can you determine about the relative temperatures of the two stars?

- A. Star V has a higher temperature.
- B. Star Y has a higher temperature.
- C. Both stars have the same temperature.
- D. The relative temperatures cannot be determined.



If you were going to design a pair of glasses for seeing people at night, you would want them to convert

- A. Infrared light to X-rays
- B. X-rays to visible light
- C. Infrared light to visible light
- D. Visible light to ultraviolet light

Which type of electromagnetic radiation has a wavelength adjacent to, but longer than, ultraviolet light?

A. Radio

B. Infrared

C. Visible

D. X-ray

E. Gamma ray

Spectra and spectral curves can be used to determine what properties of a star?

- A. Velocity
- B. Chemical composition
- C. Surface temperature
- D. All of the above
- E. None of the above.

When something is what we usually call “red hot,” it is hotter than something that is

- A. Yellow hot
- B. White hot
- C. Neither of these
- D. Both of these

Suppose two observers look at the spectrum of a cloud of gas in a laboratory; the first reports seeing emission lines and the second reports seeing absorption lines. How can this best be explained?

- A. The first observer sees the gas against a hot background.
- B. The second observer sees the gas against a hot background.
- C. One observer is moving rapidly relative to the other.
- D. The atoms in the gas are forming molecules.

Suppose the atoms in a receding gas cloud have two energy levels separated by an energy corresponding to a wavelength of 486.3 nm. The observer will see a spectrum with absorption at a wavelength

A. Less than 483.3 nm.

B. Equal to 486.3 nm.

C. Greater than 486.3 nm.

D. It depends on the temperature of the cloud.

An atom has energy levels with energies 1, 3, 9, and 10. The fourth energy level (with energy=10) is the outermost possible orbit for the electron.

Assuming this atom has a single electron in the second energy level, light with which of the following energies can the atom absorb?

A. 1

B. 2

C. 5

D. 6

E. Two of the above answers are possible.

Atom X had energy levels with energies 1 and 10. Atom Y has energy levels with energies 1 and 12. An electron in each atom moves from the upper energy level to the lower energy level. Light emitted from which atom has a longer wavelength?

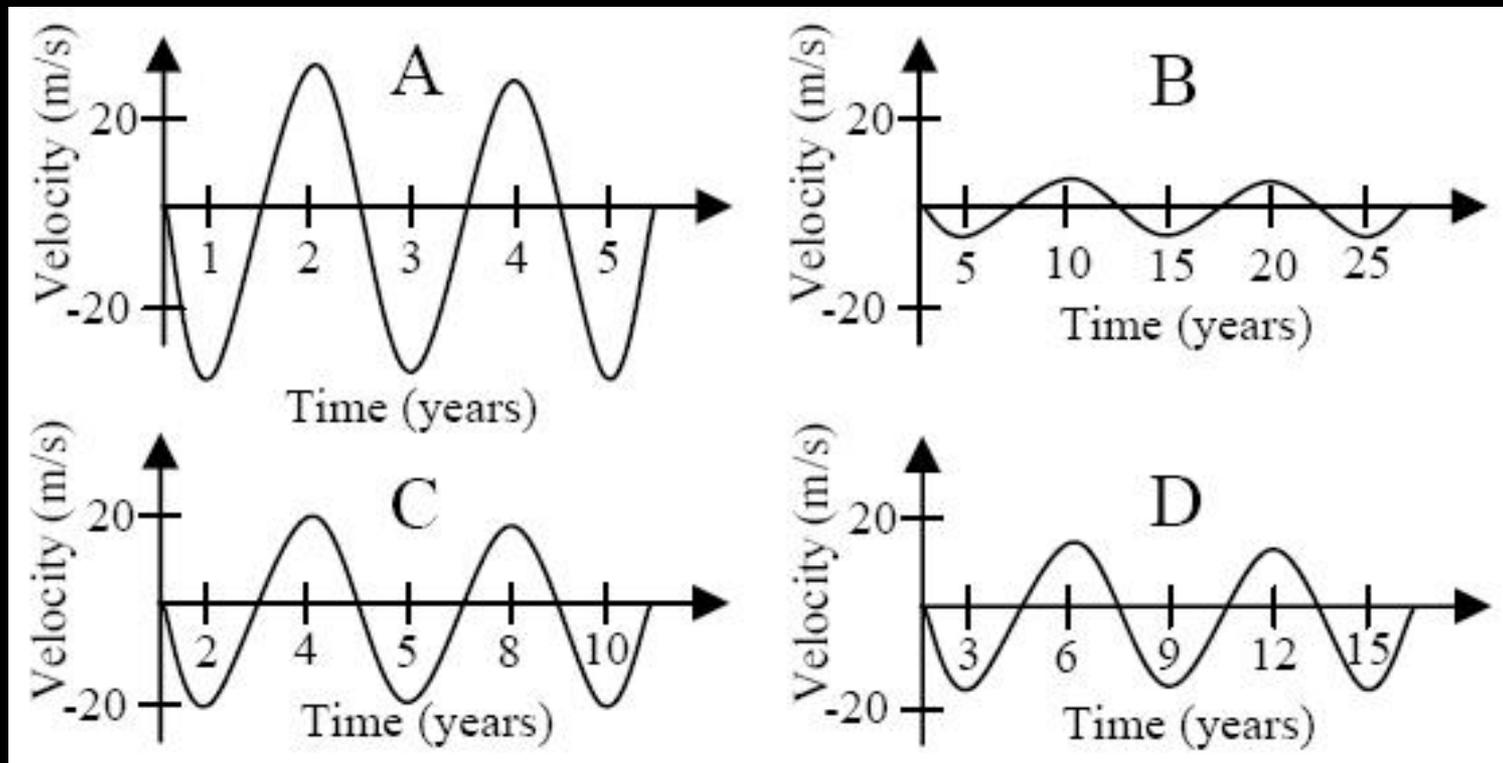
A. Atom X

B. Atom Y

C. The wavelength is independent of the energy.

D. It cannot be determined without more information.

The plot below show radial velocity curves for four different stars with extrasolar planets. From which star would be detected the greatest Doppler Shift in the light we would receive on Earth?



Comets tend to have very large orbital periods and are composed mostly of water ice and methane ice. Their spectacular tails are observed to be composed of water vapor. At which distance from the Sun would this tail probably form?

Water boils:
373 K

Water freezes:
273 K

- A. 0.5 AU
- B. 1 AU
- C. 2 AU
- D. 10 AU

