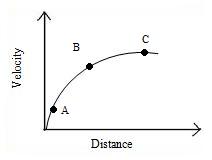
**Astronomy Assessment and TPS Questions:**

**Hubble’s Law**

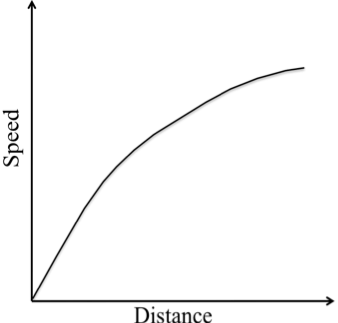
1. How would you best describe the relationship between a galaxy’s distance from our galaxy and the speed at which that galaxy appears to be moving away from our galaxy?
   1. Nearby galaxies appear to move away faster than farther galaxies
   2. Farther galaxies appear to move away faster than nearby galaxies
   3. All galaxies appear to move away at the same speed
2. We know galaxies are moving away from us because their light is \_\_\_\_\_\_\_\_\_\_\_.
3. redshifted
4. blueshifted
5. not experiencing any Doppler Shift
6. How would you best describe the relationship between a galaxy’s distance to our galaxy and the shift in the spectrum of light from the galaxy?
   1. The further a galaxy is, the greater its blueshift
   2. The further a galaxy is, the lesser its blueshift
   3. All galaxies appear to have the same blueshift
   4. The further a galaxy is, the greater is redshift
   5. The further a galaxy is, the lesser its redshift
   6. All galaxies appear to have the same redshift
7. Your friend Bob’s house is 2 miles from your house. Your friend Kanye’s house is 5 miles from your house. Bob and Kanye both decide that they want to double their distance from you. Who has to move the farthest to accomplish that goal?
8. Bob
9. Kanye
10. They have to move the same amount
11. Your friend Bob’s is house 2 miles from your house. Your friend Kanye’s house is 5 miles from your house. Bob and Kanye both decide that they want to double their distance from you. If they both drive from their old houses to their new houses, leaving and arriving at the same time, who had to drive faster?
12. Bob
13. Kanye
14. They drove the same speed.
15. If we observe three different galaxies, which one appears to be moving the fastest?
    1. Galaxy A 1 billion light years away
    2. Galaxy B 2 billion light years away
    3. Galaxy C 3 billion light years away
    4. All of them appear to move the same speed
16. Which of the following best represent the center of the Universe?
    1. The Milky Way galaxy
    2. The Andromeda Galaxy
    3. Our Local Group of galaxies
    4. None of the above
17. A steeper slope in a Hubble plot tells you ­\_\_\_\_\_\_\_\_\_.
    1. The Universe is younger
    2. The Universe is older
    3. The Universe is Larger
    4. The Universe is Smaller
18. A Hubble plot with a flat slope represents a universe with an expansion rate that \_\_\_\_\_\_\_\_ over time.
    1. increases
    2. decreases
    3. remains constant
19. Galaxy X is located 400 light years away from the Milky Way and Galaxy V is located 830 light years away from the Milky Way. As the universe doubles in size, what will occur?
    1. Galaxy X will appear to move away from the Milky Way faster than Galaxy V does
    2. Galaxy V will appear to move away from the Milky Way faster than Galaxy X does
    3. Both Galaxy X and Galaxy V will appear to move away from the Milky Way at the same speed
20. In a Hubble plot, the x-axis is labeled “distance” and the y-axis is labeled “velocity”. A more detailed label for the x-axis would be \_\_\_\_\_\_ and for the y-axis would be \_\_\_\_\_\_.
21. distance from the center of the universe, speed away from the center of the universe
22. distance from the center of the universe, orbital speed around center of universe
23. distance from the observer, radial velocity
24. distance from the observer, orbital speed
25. A Universe having a Hubble plot with a steep slope means that:
26. if you look at galaxies 1000 light-years away and 2000 light-years away, the galaxies 2000 ly away will be moving much faster than the galaxies 1000 ly away.
27. if you look at galaxies 1000 ly away and 2000 ly away, the galaxies 2000 ly away will be moving only a tiny bit faster than the galaxies 1000 ly away.
28. if you look at galaxies 1000 ly away and 2000 ly away, the galaxies 2000 ly away will be moving a tiny bit slower than the galaxies 1000 ly away.
29. if you look at galaxies 1000 ly and 2000 ly, the galaxies 2000 ly away will be moving much slower than the galaxies 1000 ly away.
30. The galaxies 1000 ly away and 2000 ly away will be going the same speed.
31. The important thing to remember when deciding whether the Hubble plot of our universe shows accelerating or decelerating expansion is:
32. Because the plot has a changing slope, it must be accelerating expansion.
33. Because the plot gets flatter as time progresses, it must be accelerating expansion.
34. Because the plot gets steeper as time progresses, it must be accelerating expansion.
35. When looking at a Hubble plot what is the correct relationship between slope, age of the universe and expansion rate?
    1. A steeper slope indicates an older universe with a slower expansion rate
    2. A steeper slope indicates an a younger universe with a slower expansion rate
    3. A shallower slope indicates a younger universe with a faster expansion rate
    4. A shallower slope indicates an older universe with a slower expansion rate



1. Use the graphs above to answer this question. If the three universes (A-C) are the same size, rank the ages of the universes represented by each of the three Hubble plots, from oldest to youngest.
   1. A>B>C
   2. C>B>A
   3. B>A>C
   4. B>C>A
   5. None of the above
2. Use the graphs above to answer this question. Rank the expansion rates of the three universes (A-C) represented by each of the three Hubble plots, from fastest expansion rate to slowest expansion rate.
   1. C>B>A
   2. A>B>C
   3. B>C>A
   4. None of the above
3. Use the graphs above to answer this question. If all three universes (A-C) represented in graphs are the same age, rank the sizes of the universes from largest to smallest.
   1. A>B>C
   2. B>A>C
   3. C>A>B
   4. C>B>A
   5. None of the above
4. Use the Hubble plots shown on the previous page to answer this question. Universe A and Universe B are the same size. We know that Universe A must be younger because:
5. To reach the same size as Universe A, Universe B would have needed more time.
6. To reach the same size as Universe B, Universe A would have needed more time.
7. Only young universes can have fast expansion rates.
8. The slope of Universe A’s Hubble plot shows that it has a faster expansion rate than Universe B.
9. More than one of the above.



1. Using the graph above, which location represents a time where the universe is expanding the fastest?
   1. A
   2. B
   3. C
   4. The Universe is expanding at a constant rate
2. Using the graph above, which location represents a time when expansion of the Universe is slowest?
   1. A
   2. B
   3. C
   4. The galaxies are all moving at the same speed
3. Using the graph shown on the previous page, which location represents the oldest location in time?
   1. A
   2. B
   3. C



A

B

C

1. Use the graph above to answer this question. Which point on the graph, A, B or C, corresponds with a time when the universe was younger?
2. Use the graph above to answer this question. Which point on the graph, A, B, or C, corresponds with the fastest expansion rate?
3. Use the graph above to answer this question. Which point on the graph, A, B or C, corresponds with galaxies that are moving away from us at the fastest velocities?
4. Universe A has a slope twice as steep in its Hubble plot as Universe B. If both of them are 11 billion years old, which one is smaller?
   1. Universe A
   2. Universe B
   3. They are the same size
   4. You cannot determine from this information
5. Imagine we were in a universe (universe A) that has a slope for its Hubble plot that is slightly less steep than our current slope. If you look 11 billion light years away in universe A, how would the speed of those galaxies compare to the speed of galaxies in our universe, 11 billion light years away?
   1. They would be moving faster
   2. They would be moving slower
   3. They would be moving the same speed
   4. You cannot determine