**Astronomy Assessment and TPS Questions:**

**HR Diagram**

1. A star a on the lower right-hand part of the main sequence will \_\_\_\_\_\_ than a star on the upper left-hand part of the main sequence.
   1. have a shorter lifetime.
   2. be hotter.
   3. be larger.
   4. be more luminous.
   5. be less massive
2. Which of the following sequences of spectral types represent the *coolest* to *hottest* stars?
3. OBAFGKM
4. ABFGKMO
5. OMKGFBA
6. MKGFABO
7. MFKGABO
8. Compared to stars on the lower right-hand part of the main sequence, stars on the upper left-hand part of the main sequence (choose all that apply)
   1. are redder.
   2. are cooler.
   3. have longer lifetimes.
   4. are more luminous.
   5. are smaller.

*The HR Diagram at right is provided to assist with answering the following two questions.*

1. Which is hotter, a main sequence star with an absolute magnitude of M= 8 or a white dwarf with a luminosity 100 times less than the Sun’s luminosity?
2. the main sequence star
3. the white dwarf
4. They have the same temperature.
5. There is insufficient information to determine this.
6. Which statement is the most correct about the comparison between a spectral type G5 main sequence star and a spectral type O5 main sequence star?
   1. The G5 star is cooler, dimmer, smaller, and will not live as long as the O5 main sequence star.
   2. The G5 star is hotter, brighter, smaller, and will live longer than the O5 main sequence star.
   3. The G5 star is smaller, hotter, brighter, and will not live as long as the O5 main sequence star.
   4. The G5 star is dimmer, cooler, smaller, and will live longer than the O5 main sequence star.
   5. The G5 star is hotter, dimmer, larger, and will live longer than the O5 main sequence star.
7. On an H-R diagram, stars at the same temperature are found
8. aligned horizontally (i.e., side-by-side).
9. aligned vertically (i.e., one above the other).
10. next to each other on the main sequence.
11. near the bottom of the diagram
12. near the top of the diagram
13. A star on the lower right-hand part of the main sequence will \_\_\_\_\_\_ than a star on the upper left-hand part of the main sequence.
14. have a shorter lifetime.
15. be hotter.
16. be larger.
17. be more luminous.
18. be less massive
19. Which of the following would most likely give off the most energy?
    1. a red star half the size (diameter) of the Sun
    2. a red star 10 times the size (diameter) of the Sun
    3. a blue star half the size (diameter) of the Sun
    4. a blue star 10 times the size (diameter) of the Sun

The figure below shows an H-R diagram with data points A – F that represent various stages in the “evolutionary path” for the lives of stars. Note that only stars B, D, and E are main sequence stars.

Luminosity

Temperature

A

B

D

C Black Dwarf

E

F

1. Which of the following would be the best ranking, (from earliest to latest) for the stages in the life of a low mass star without a companion?
2. B, D, F, A
3. E, F, A, C
4. B, E, A, C
5. E, B, D, F, A, C
6. C, E, B, D, F, A
7. Which statement is the most correct about the comparison between a K5 main sequence star and a B5 main sequence star?
8. The K5 star is cooler, dimmer, smaller, and will not live as long as the B5 main sequence star.
9. The K5 star is hotter, dimmer, larger, and will live longer than the B5 main sequence star.
10. The K5 star is smaller, hotter, brighter, and will not live as long as the B5 main sequence star.
11. The K5 star is hotter, brighter, smaller, and will live longer than the B5 main sequence star.
12. The K5 star is dimmer, cooler, smaller, and will live longer than the B5 main sequence star.
13. How does the size of a star near the top left of the H-R diagram compare with a star of the same luminosity near the top right of the H-R diagram?
    1. They are the same size.
    2. The star near the top left is larger.
    3. The star near the top right is larger.
    4. There is insufficient information to determine this.
14. If the temperature of a star increases without a change in the stars size, its point on the H-R diagram moves

a. horizontally to the left

b. up and to the left

c. down and to the left

d. down and to the right

Use the graph at right, to answer the following three questions. **Note that Stars A, B and C are Main Sequence stars.**

Spectral Type

Absolute Magnitude

O B A F G K M

***D***

***B***

-5

0

5

10

15

***E***

***C***

***A***

1. How many of the stars (A-D) are giving off the same amount of energy as Star E?
   1. Only one star
   2. Two stars
   3. Three stars
   4. All four stars
   5. None of the above
2. Which of the following is the correct ranking for the size of the Stars A-E, from largest to smallest?
   1. E=D=A>B>C
   2. A>D>E>B>C
   3. E>D>A>B>C
   4. A>D=B>E=C
   5. E>D=B>A>C
3. Which of the following is the correct ranking for the temperature of the Stars A-E, from hottest to coolest?
   1. A>D=B>E=C
   2. E>D>A>B>C
   3. E=C>B=D>A
   4. A=D=E>B>C
   5. None of the above
4. Which of the following properties are on the horizontal axis of the H-R diagram?
5. Temperature
6. Spectral type
7. Luminosity
8. Absolute magnitude
9. More than one of the above
10. Which pair of properties is on the vertical axis of the H-R diagram?
11. Luminosity & absolute magnitude
12. Temperature & luminosity
13. Spectral type & temperature
14. Spectral type & absolute magnitude
15. The vertical axis of the H-R diagram can be labeled either \_\_\_\_\_\_\_ or \_\_\_\_\_\_\_\_.
16. temperature, luminosity
17. spectral type, temperature
18. apparent magnitude, luminosity
19. absolute magnitude, luminosity
20. A star’s luminosity tells you its ­­\_\_\_\_\_\_\_\_\_\_\_\_\_.
    1. Apparent magnitude
    2. Absolute magnitude
    3. Spectral type
    4. Temperature
    5. Size
21. Which of the following sets of star properties can be determined from the H-R diagram?
22. apparent magnitude, absolute magnitude, temperature
23. luminosity, spectral type, temperature
24. temperature, spectral type, distance
25. spectral type, apparent magnitude, temperature
26. Which of the following is a valid acronym for the spectral types of stars?
27. One Boring Afternoon Frank Grew Mediocre Kiwis
28. Only Beginners Fail And Grow Killer Melons
29. Once Beautiful And Finally Grotesque King Midas
30. Only Believable As Franz Kafka’s Ghostly Monster
31. The correct order for the spectral types, from coolest to hottest, is
32. MKGFABO
33. BAFMGKO
34. OBAFGKM
35. None of the above
36. Which has a higher temperature, an A spectral type star or an F spectral type star?
37. A star
38. F star
39. They could have the same temperature.
40. It is not possible to tell from this information.
41. Which spectral types are Red Giants?
    1. O&B
    2. K&M
    3. B&A
    4. They can be any spectral type.
42. A red main sequence star would most likely be which spectral type?
43. O
44. M
45. F
46. B
47. G
48. What is the spectral type of the Sun?
49. O
50. M
51. K
52. A
53. G
54. White dwarf stars do not:
55. have high temperatures.
56. have high luminosities.
57. belong to O spectral type.
58. have large absolute magnitude numbers.



1. Using the HR diagram above, which of the stars has the same temperature as Star D?
   1. Star A
   2. Star E
   3. Star B
   4. Star F
   5. There is insufficient information to answer.
2. Using the HR diagram above, which of the stars has the same luminosity as Star A?
3. Star C
4. Star D
5. Star B
6. Star E
7. There is insufficient information to answer.
8. On an H-R diagram, where would you find a blue main sequence star?
   1. Upper right
   2. Lower left
   3. Upper left
   4. Lower right
   5. Right in the middle
9. Where on an HR diagram would you find a very big star?
   1. Lower right
   2. Lower left
   3. Upper right
   4. None of the above
10. Do two stars with the same temperature necessarily have the same luminosity?
11. No – but they could have the same luminosity.
12. No – it is impossible for them to have the same luminosity.
13. Yes, they must have the same luminosity.
14. Which star is hotter, a white dwarf or a spectral type O main sequence star?
15. O main sequence star
16. White dwarf
17. They could be the same temperature.
18. Which of the following pairs could **not** have the same luminosity?
19. A red giant and a main sequence star
20. A red giant and a white dwarf
21. A white dwarf and a main sequence star
22. Two main sequence stars
23. All of these pairs could have the same luminosity.
24. Which of the following can have the highest temperature?
25. Red giants
26. Main sequence stars
27. White dwarfs
28. Both a and b
29. Both b and c
30. If temperature was switched to the top horizontal axis and spectral type was placed on the lower horizontal axis, how would this change the arrangement of stars on the H-R diagram?
31. The diagram would be flipped upside down, with the main sequence going from O type stars on the bottom left to M type stars on the top right.
32. The diagram would be reversed, with the main sequence going from M type stars on the bottom left to O type stars on the top right.
33. Only the position of the red giants and white dwarfs would change.
34. The diagram would not change; all of the stars would remain where they are.



1. Using the HR diagram above, which of the following stars is the largest?
2. Star A
3. Star B
4. Star C
5. Star F
6. There is insufficient information to answer.
7. Using the stars shown in the diagram above, which is hotter, a star with an absolute magnitude of 5 or a type B5 main sequence star?
8. The star with the absolute magnitude of 5
9. The type B5 main sequence star
10. They have the same temperature.
11. There is not enough information to determine this.
12. Using the stars shown in the diagram above, which is a type B main sequence star, a star with a luminosity 100 times that of the Sun or a star with a temperature of 8000 K?
13. the star with 100x the Sun’s luminosity
14. the star with a temperature of 8000 K
15. They are both type B main sequence stars.
16. There is not enough information to determine this.
17. Using the stars shown in the H-R diagram above, which of the following could be describing a red giant star?
18. luminosity 1000 times greater than the Sun, spectral type A5, 5000 K
19. luminosity 1500 times greater than the Sun, spectral type K5, 10000 K
20. luminosity 5000 times greater than the Sun, spectral type O5, 5000 K
21. luminosity 10 times greater than the Sun, spectral type M5, 3000 K
22. None of the above could be red giants.

**Object D**

Wavelength

V I B G Y O R

visible range

Energy Output per second

**Object B**

Wavelength

V I B G Y O R

visible range

Energy Output per second

V I B G Y O R

Wavelength

**Object C**

visible range

Energy Output per second

**Object A**

Wavelength

visible range

Energy Output per second

V I B G Y O R

1. Using the images above, which object’s blackbody curve looks most like the blackbody curve of a white dwarf?
   1. Object A
   2. Object B
   3. Object C
   4. Object D
   5. None of the above look like the blackbody curve for a white dwarf.



1. Using the HR diagram above, how would the blackbody curve of Star D appear?
2. It would have a tall peak and peak at the right end of the horizontal axis.
3. It would have a tall peak and peak at the left end of the horizontal axis.
4. It would have a short peak and peak at the right end of the horizontal axis.
5. It would have a short peak and peak at the left end of the horizontal axis.
6. Using the information on the HR diagram above, how would the blackbody curve of a white dwarf appear compared to that of a red giant?
7. The white dwarf’s blackbody curve would have a shorter peak and peak at a shorter wavelength
8. The white dwarf’s blackbody curve would have a taller peak and peak at a shorter wavelength.
9. The white dwarf’s blackbody curve would have a shorter peak and peak at a longer wavelength.
10. The white dwarf’s blackbody curve would have a taller peak and peak at a longer wavelength.