**Astronomy Assessment and TPS Questions:**

**Apparent and Absolute Magnitude of Stars**

1. How does the luminosity of a stadium light compare when you observe it from inside the stadium near the light, versus when you observe it from your car in a distant parking lot.
2. The luminosity is greater when you observe it from inside the stadium.
3. The luminosity is greater when you observe it from outside in the parking lot.
4. The luminosity is the same when you observe it from either of these locations.

Jelly Star has an apparent magnitude of +1.1 and an absolute magnitude of +1.1. Pooh Bear Star has an apparent magnitude of +3.72 and an absolute magnitude of +6.1. Answer the following four questions using this information.

1. Which of the stars described above gives off more light?
   1. Jelly Star
   2. Pooh Bear Stard
   3. They give off the same amount of light.
   4. There is insufficient information to determine this.
2. Which of these stars is closer to Earth?
   * 1. Jelly Star
     2. Pooh Bear Star
     3. They are the same distance from Earth.
     4. There is insufficient information to determine this.
3. Which of these stars appears brighter to us here on Earth?
4. Jelly Star
5. Pooh Bear Star
6. They would appear equally bright form Earth.
7. There is insufficient information to determine this.
8. If both of these stars are main sequence stars, which star is hotter?
9. Jelly Star
10. Pooh Bear Star
11. They would be the same temperature.
12. There is insufficient information to determine this.

Jelly Star has an apparent magnitude of +2.1 and an absolute magnitude of +2.1. Pooh Bear Star has an apparent magnitude of +3.72 and an absolute magnitude of +1.1. Answer the following four questions using this information.

1. Which of the stars described above gives off more light?
   1. Jelly Star
   2. Pooh Bear Star
   3. They give off the same amount of light.
   4. There is insufficient information to determine this.
2. Which of these stars is closer to Earth?
3. Jelly Star
4. Pooh Bear Star
5. They are the same distance from Earth.
6. There is insufficient information to determine this.
7. Which of these stars appears brighter to us here on Earth?
8. Jelly Star
9. Pooh Bear Star
10. They would appear equally bright form Earth.
11. There is insufficient information to determine this.
12. If both of these stars are main sequence stars, which star is hotter?
13. Jelly Star
14. Pooh Bear Star
15. They would be the same temperature.
16. There is insufficient information to determine this.

Morrison Cutter is a star with an apparent magnitude of +2.3 and an absolute magnitude of -1.1. Casper is a star with an apparent magnitude of -3.7 and an absolute magnitude of -2.3. Answer the following four questions using this information.

1. Which of the stars described above gives off more light?
   1. Casper
   2. Cutter
   3. They give off the same amount of light.
   4. There is insufficient information to determine this.
2. If both of these stars are main sequence stars, which star is hotter?
3. Casper
4. Cutter
5. They would be the same temperature.
6. There is insufficient information to determine this.
7. Which of these stars is closer to Earth?
8. Casper
9. Cutter
10. They are the same distance from Earth.
11. There is insufficient information to determine this.
12. Which of these stars would look brighter in the night sky?
13. Casper
14. Cutter
15. They would appear equally bright form Earth.
16. There is insufficient information to determine this.
17. If both of these stars are main sequence stars, which star is hotter?
    1. Casper
    2. Cutter
    3. They would be the same temperature.
    4. There is insufficient information to determine this.

Star Y has an absolute magnitude of +3.0 and belongs to spectral class A. Star Z has an absolute magnitude of +13.2 and belongs to spectral class M. Use this information to answer the following two questions.

1. Which star would appear red?
2. Star Y
3. Star Z
4. They would appear the same color.
5. There is not enough information to determine this.
6. Which star has the largest surface area?
7. Star Y
8. Star Z
9. They have the same surface area.
10. There is not enough information to determine this.
11. Which of the following statements is always true of two stars that have the same absolute magnitude? Choose all that apply.
12. They have the same temperature.
13. They have the same luminosity.
14. They have the same spectral class.
15. They have the same surface area.
16. None the above.

Star J has an absolute magnitude of +8.0 and belongs to spectral type K. Star H has an absolute magnitude of -2.0 and belongs to spectral type K. Use this information to answer the following two questions.

1. Which of the following is true about the color of the two stars?
2. Star J would appear blue.
3. Star H would appear blue.
4. They would both appear the same color.
5. There is not enough information to determine this.
6. Which star has the largest surface area?
7. Star J
8. Star H
9. They have the same surface area.
10. There is not enough information to determine this.

Star A has an absolute magnitude of +2.0 and belongs to spectral class B. Star B has an absolute magnitude of +11.2 and also belongs to spectral class M. Use this information to answer the following two questions.

1. Which star is actually brighter?
   1. Star A
   2. Star B
   3. They have the same brightness.
   4. There is not enough information to determine this.
2. Which star has the greater surface temperature?
   1. Star A
   2. Star B
   3. They have the same temperature.
   4. There is not enough information to determine this.
3. Minardi star has an apparent magnitude of +2.30 and an absolute magnitude of – 5.50. The distance to Minardi is
4. less than 10 parsecs.
5. 10 parsecs.
6. more than 10 parsecs.
7. Which of the following statements correctly compares an O spectral type star and a K spectral type star?
   1. they are both main sequence stars
   2. the O spectral type star has the higher temperature
   3. the K spectral type star has the shorter main sequence lifetime
   4. all of the above statements are true
8. Rigel has an apparent magnitude of +0.18 and an absolute magnitude of -6.69. The distance to Rigel is
   1. less than 10 parsecs.
   2. 10 parsecs.
   3. more than 10 parsecs.
9. The star Aprilia is 10 pc away. It's apparent magnitude is +3.1. What is most likely its absolute magnitude?
   1. +6.2
   2. +3.1
   3. +0.31
   4. -3.1
   5. -6.2
10. The star Aprilia is 3 parsecs away. It's apparent magnitude is +3.0. What is most likely its absolute magnitude?
    1. +6.0
    2. +3.0
    3. +0.30
    4. -3.0
    5. -6.0
11. The star Trist has an apparent magnitude of +0.03 and an absolute magnitude of +3.0. If it were moved twice as far from Earth as it is now, which one of the following would occur?
    1. absolute magnitude number would decrease (gets smaller)
    2. apparent magnitude number would decrease (gets smaller)
    3. apparent magnitude number would stay the same
    4. absolute magnitude number would increase (gets bigger)
    5. apparent magnitude number would increase (gets bigger)
12. The star Moto has an apparent magnitude of -1.0 and an absolute magnitude of +3.0. If it were moved 10 times farther from Earth as it is now, which one of the following would occur?
    1. absolute magnitude number would decrease (gets smaller)
    2. apparent magnitude number would decrease (gets smaller)
    3. apparent magnitude number would stay the same
    4. absolute magnitude number would increase (gets bigger)
    5. apparent magnitude number would increase (gets bigger)
13. Vega has an apparent magnitude of +0.03 and an absolute magnitude of +0.58. If it were moved twice as far from Earth as it is now, which one of the following would occur?
    1. apparent magnitude number would increase
    2. apparent magnitude number would decrease
    3. apparent magnitude number would stay the same
    4. absolute magnitude number would increase
    5. absolute magnitude number would decrease
14. The star Moto has an apparent magnitude of -1.0 and an absolute magnitude of +3.0. If it were moved 10 times farther from Earth as it is now, which one of the following would occur?
    1. absolute magnitude number would decrease (gets smaller)
    2. apparent magnitude number would decrease (gets smaller)
    3. apparent magnitude number would stay the same
    4. absolute magnitude number would increase (gets bigger)
    5. apparent magnitude number would increase (gets bigger)
15. For a star which has m < M, which of the following statements best describes the relationship between the star’s apparent brightness, actual brightness and its distance form Earth?
16. The star appears brighter than it actually is and it would be located farther than 10 parsecs from Earth.
17. The star appears dimmer than it actually is and it would be located closer than 10 parsecs from Earth.
18. The star appears dimmer than it actually is and it would be located farther than 10 parsecs from Earth.
19. The star appears brighter than it actually is and it would be located closer than 10 parsecs from Earth.
20. Star G has an apparent magnitude of +5.0 and an absolute magnitude of +4.0. Star H has an apparent magnitude of +4.0 and an absolute magnitude of +5.0. Which of the following statements is true about viewing these two stars from Earth?
    1. Star G will appear brighter than Star H.
    2. The two stars will appear to have the same brightness.
    3. Star H will appear brighter than Star G.
    4. Star G would appear closer than Star H.
21. The star Antares is located approximately 185 parsecs away from Earth. Its apparent magnitude is +1.1. Which of the following is most likely its absolute magnitude?
    1. +4.9
    2. +1.8
    3. +0.5
    4. –5.4
22. The inverse-square law can be used to explain that
    1. a star’s apparent brightness decreases as the square of its distance from Earth.
    2. a star’s distance decreases as the square of its apparent brightness as seen from Earth.
    3. the more distant of two identical stars has a larger apparent brightness than the other.
    4. A star’s apparent brightness increases as the square of its distance from Earth.
23. Vega has an apparent magnitude of +0.03 and an absolute magnitude of +0.58. If it were moved twice as far from Earth as it is now, which following would occur?
    1. apparent magnitude number would increase
    2. apparent magnitude number would decrease
    3. apparent magnitude number would stay the same
    4. absolute magnitude number would increase
    5. absolute magnitude number would decrease
24. Rigel has an apparent magnitude of +0.18 and an absolute magnitude of -6.69. The distance to Rigel is
    1. Less than 10 parsecs.
    2. About 10 parsecs
    3. more than 10 parsecs
    4. the distance cannot be determined from this information.
25. Which of the following statements is always true of two stars that have the same absolute magnitude?
    1. They have the same temperature.
    2. They have the same luminosity.
    3. They have the same spectral class.
    4. They have the same surface area.
    5. None the above.

Haas is a star with an apparent magnitude of -2.3 and an absolute magnitude of +1.1. Sahara is a star with an apparent magnitude of +3.7 and an absolute magnitude of -2.3. Answer the following two questions using this information.

1. From which star does Earth receive the greatest amount of light?
   1. Haas
   2. Sahara
   3. Earth receives the same amount of light from both stars .
   4. There is insufficient information to determine this.
2. Which of these stars is closer to Earth?
3. Haas
4. Sahara
5. They are the same distance from Earth.
6. There is insufficient information to determine this.
7. Star A is a red main sequence star and Star B is a blue main sequence star.  If both stars appear to be the same brightness, which one is closer to Earth?
   1. Star A
   2. Star B
   3. They are the same distance from Earth.
   4. There is insufficient information to determine this.
8. A parsec is a unit of \_\_\_\_\_\_\_\_\_.
9. energy
10. speed
11. time
12. distance
13. A star’s absolute magnitude number corresponds to its \_\_\_\_\_\_\_\_\_.
    1. temperature
    2. luminosity
    3. apparent luminosity
    4. distance
14. What information do you need to determine how bright a star actually is?
    1. its apparent magnitude number
    2. its absolute magnitude number
    3. the wavelength of its blackbody peak
    4. its temperature
15. If Star 1 **is** brighter than Star 2, Star 1’s absolute magnitude number \_\_\_\_\_\_\_\_ than/as Star 2’s absolute magnitude number.
    1. will be smaller
    2. will be bigger
    3. could be the same
16. If a light bulb has a very low absolute magnitude number, you know that the light bulb:
    1. is very close to you.
    2. is very far away from you.
    3. is very bright.
    4. is very dim.
17. Star A has an absolute magnitude of 1, while Star B has an absolute magnitude of -1. Which star is brighter?
    1. Star A
    2. Star B
    3. There is insufficient information to answer the question.
18. **Absolute magnitude** refers to:
19. how bright a star appears from Earth.
20. how bright a star would appear from 10 parsecs away.
21. a way we can compare the actual luminosities of stars.
22. both b and c.
23. **Apparent magnitude** refers to:
24. how bright a star appears from Earth.
25. how bright a star would appear from 10 pc away.
26. a way we can compare the actual luminosities of stars.
27. both a and c.
28. How does the luminosity of a ten-watt light bulb placed two inches from your face compare to the luminosity of the same bulb when you view it from across the room?
    1. The luminosity is greater when you view it from two inches away.
    2. The luminosity is greater when you view it from across the room.
    3. The luminosity is the same when you view it from either location.
29. Which of the following has the lowest apparent magnitude number?
30. the Moon
31. the Sun
32. the star Sirius
33. a nearby star in the Milky Way with 100x the luminosity of the Sun
34. The Sun is not an extremely bright Main Sequence star. However, it is the brightest object in Earth’s sky. What can you assume about the apparent and absolute magnitude of the Sun?
35. The Sun’s apparent magnitude number must be very large and greater than its absolute magnitude number.
36. The Sun’s apparent magnitude number must be very small and less than its absolute magnitude number.
37. The Sun’s apparent magnitude number must be very large and less than its absolute magnitude number.
38. The Sun’s apparent magnitude number must be very small and greater than its absolute magnitude number.
39. Star X appears much brighter than Star Y, but they have the same actual brightness. If both Star X and Star Y are Main Sequence stars, how is this possible?
    1. Star X is closer than Star Y
    2. Star X is much bigger than Star Y
    3. Star X is further than Star Y
    4. Star X is a different spectral type than Star Y
40. Star A’s apparent magnitude number is equal to its absolute magnitude number. How far away from Earth is Star A?
41. Closer than 10 Parsecs
42. Farther than 10 Parsecs
43. Exactly 10 Parsecs
44. There is insufficient information to answer the question.
45. If a star appears brighter than its absolute magnitude number indicates it is, then which of the following is true?
46. The absolute magnitude of the star was measured incorrectly.
47. The apparent magnitude of the star was measured incorrectly.
48. The star is more than 10 parsecs away from Earth.
49. The star is less than 10 parsecs away from Earth.
50. The Sun is less than ten parsecs away and has an absolute magnitude number of approximately 5. Star Q is further than ten parsecs away and has an absolute magnitude number of 10. What can you assume about their apparent magnitudes?
51. The apparent magnitude number of the Sun must be greater than that of Star Q.
52. The apparent magnitude number of Star Q must be greater than that of the Sun.
53. It is possible that the two stars would have the same apparent magnitude value.
54. The apparent magnitude of Star A is 6 and the absolute magnitude of Star A is 0. Why is there a difference between the two magnitudes?
55. Star A is less than 10 parsecs away from Earth.
56. Star A is more than 10 parsecs away from Earth.
57. Star A is 10 parsecs away from Earth.
58. None of the above.
59. Star A has an apparent magnitude of 3, and Star B has an apparent magnitude of 1. Which star is closer to you?
60. Star A
61. Star B
62. They are the same distance away from you.
63. You cannot tell from this information.
64. Star A is 28 parsecs away and has an absolute magnitude of 7. Which of the following numbers could be Star A’s apparent magnitude?
65. -7
66. -0.7
67. 0.7
68. 7
69. 9

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| --- | --- | --- |
| Object | M (absolute magnitude) | m (apparent magnitude) |
| Planet Farquad | -8 | 2 |
| Planet Nulo | 1 | 4 |
| Planet Clipper | 2 | -8 |
| Planet Zeno | 3 | 3 |

1. Using the table above, which object appears brightest from Earth?
   1. Planet Farquad
   2. Planet Nulo
   3. Planet Clipper
   4. Planet Zeno
2. Using the table above, how many of the objects are less than 10 parsecs from Earth?
3. 1
4. 2
5. 3
6. 4
7. None
8. Using the table above, which object is closest to Earth?
9. Planet Farquad
10. Planet Nulo
11. Planet Clipper
12. Planet Zeno
13. Using the table above, which object is farthest away from Earth?
14. Planet Farquad
15. Planet Nulo
16. Plannet Clipper
17. Planet Zeno
18. There is insufficient information to answer.

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|  | Star A | Star B |
| Apparent Magnitude | 4 | -6 |
| Absolute Magnitude | 4 | 1 |

1. Using the table above, compared to Star B, what can you say about Star A?
   1. Star A is further from Earth than Star B.
   2. Star A is more luminous than Star B.
   3. Star A appears brighter than Star B.
   4. Star A is the same distance from Earth as Star B.
2. If the apparent magnitude of Star X is -2, and the apparent magnitude of Star Y is 0, which of the following must be true about the stars?
3. Star Y is closer to Earth.
4. Star X is closer to Earth.
5. Star Y is actually brighter than Star X.
6. Star X is actually brighter than Star Y.
7. None of the above
8. If the absolute magnitude of Star C is -7 and the apparent magnitude of Star D is 7, which of the following is true about the stars?
9. Star C is closer to Earth.
10. Star D is closer to Earth.
11. Star C is actually brighter than Star D.
12. Star D is actually brighter than Star C.
13. None of the above
14. If you took a shuttle to the Moon, as you approached the Moon what would you notice?
    1. Its apparent magnitude number would increase and its absolute magnitude number would decrease.
    2. Its apparent magnitude number would decrease and its absolute magnitude number would increase.
    3. Its apparent magnitude number would decrease and its absolute magnitude number would stay the same.
    4. Its absolute magnitude number would decrease and its apparent magnitude number would stay the same.
    5. Its apparent and absolute magnitude numbers would both stay the same.
15. Star A has an absolute magnitude of 8 and an apparent magnitude of 8. If you moved Star A 2 parsecs closer, what would happen to its absolute and apparent magnitudes?
16. Its apparent magnitude number would decrease while its absolute magnitude would stay the same.
17. Its apparent and absolute magnitudes would change by the same amount.
18. Its apparent and absolute magnitudes would stay the same.
19. Its apparent magnitude number would decrease while its absolute magnitude number would increase.
20. Its apparent magnitude number would increase while its absolute magnitude would stay the same.
21. Star A has an apparent magnitude of 1 and an absolute magnitude of 3. Star B has an apparent magnitude of 4 and an absolute magnitude of 2. Which star is farther from Earth?
22. Star A
23. Star B
24. They are both the same distance.
25. You cannot determine from this information.
26. Star A has an absolute magnitude of -3 and an apparent magnitude of 7. Star B has an absolute magnitude of -3 and an apparent magnitude of 3. Which star is closer to Earth?
27. Star A
28. Star B
29. They are the same distance away.
30. You cannot determine from this information.
31. Viewed from Earth, Yoma Star has an absolute magnitude of -12.4 and an apparent magnitude of -3.2. If Yoma star moved 100 times further away from Earth, what might its absolute magnitude number be?
    1. +3.2
    2. -3.2
    3. 5.0
    4. +12.4
    5. None of the above
32. Star A has an apparent magnitude of 1 and an absolute magnitude of 3. Star B has an apparent magnitude of 4 and an absolute magnitude of 2. If both of the stars are main sequence stars, which one is bigger?
    1. Star A
    2. Star B
    3. They are both the same size.
    4. You cannot determine from this information.
33. How many of the following statements are always true?

* Two stars with the same temperature have the same luminosity.
* Two stars with the same luminosity have the same absolute magnitude.
* Two stars with the same absolute magnitude have the same spectral class.
* Two stars of the same spectral type have about the same temperature.
* Two stars with the same absolute magnitude have the same apparent magnitude.

1. 1
2. 2
3. 3
4. 4
5. 5
6. None of the statements are always true.
7. Star H appears much dimmer than Star G when viewed from Earth, but is actually found to give off much more light. Which of the following could be the apparent and absolute magnitudes of Stars H and G?
8. Apparent H= 3, G= -1; Absolute H= -1, G= -3
9. Apparent H= -1, G= 3; Absolute H= -3, G=-1
10. Apparent H= 8, G= 1; Absolute H= 2, G= 5
11. Apparent H= 1, G= 8; Absolute H= 5, G= 2
12. None of the above

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| **Main Sequence Star** | **Absolute Magnitude** | **Apparent Magnitude** |
| A | 2 | -5 |
| B | -1 | 4 |
| C | 6 | 2 |
| D | 3 | 3 |

1. Using the table above, which star would appear the most blue?
   1. Star A
   2. Star B
   3. Star C
   4. Star D
   5. You cannot determine from this information
2. Using the table above, rank the stars in terms of distance away from Earth, from farthest to closest.
   1. A,C,D,B
   2. B,D,A,C
   3. B,D,C,A
   4. C,A,D,B