

2008 Astronomy Answer Sheet

School Name _____ Team Number _____

Student Names _____

Please make sure that you print legibly on this sheet. You may tear this sheet off of the rest of the test to use as your answer sheet. All of your answers are to be recorded on this sheet of paper. If the question is multiple choices, circle the letter of your choice. At the end of the event, please turn in the Answer Sheet and the test. Good Luck!!!!!!!!!!

- | | | |
|------------------|-------------|-------------|
| 1. _____ | 11. A B C D | 21. A B C |
| 2. _____ | 12. A B C D | 22. A B C D |
| 3. A B C D | 13. A B C D | 23. A B C D |
| 4. A B C D E | 14. _____ | 24. A B C D |
| 5. A B C D E F G | 15. _____ | 25. A B C D |
| 6. A B C D | 16. A B C D | 26. A B C D |
| 7. A B C D | 17. A B C D | 27. A B C D |
| 8. A B C | 18. A B C D | 28. A B C D |
| 9. A B C | 19. A B C D | 29. A B C D |
| 10. A B C D | 20. A B C D | 30. A B C D |

Number of answers correct: _____ Number of tiebreakers correct _____

FINAL RANK: _____

2008 Astronomy Event

- 1) Two classes of regular variable stars are Cepheid Variable and RR Lyrae Variable stars. Which type of star is a low-mass stars?

- 2) Two classes of regular variable stars are Cepheid Variable and RR Lyrae Variable stars. Which type of stars is generally found in globular clusters?

- 3) Variable stars are stars in which the _____ changes over time.
 - a) size
 - b) color
 - c) shape
 - d) brightness

- 4) The current approximation of the number of variable stars within the Milky Way region is:
 - a) < 1,000
 - b) 1,001 – 5,000
 - c) 5,001 - 15,000
 - d) 15,001 – 30,000
 - e) > 30,000

- 5) The causes of stellar variability is/are
 - I. Physical changes within the star
 - II. Earth's atmospheric interference
 - III. Geometrical alignment
 - A) I only
 - B) II only
 - C) III only
 - D) I and II only
 - E) II and III only
 - F) I and III only
 - G) I, II and III

- 6) In a Cepheid star:
- A) as the radius decreases, the temperature decreases and the opacity increases.
 - B) as the radius decreases, the temperature and opacity increase.
 - C) as the radius decreases, the temperature increases and the opacity decreases.
 - D) As the radius decreases, the temperature and opacity decrease.
- 7) In a Cepheid star:
- A) as the radius increases, Helium recombines and pressure drops.
 - B) as the radius increases, Helium ionizes and the pressure drops.
 - C) as the radius increases, Helium recombines and the pressure increases.
 - D) as the radius increases, Helium ionizes and the pressure increases.
- 8) Cepheid stars have a period of variability that is _____ RR Lyrae variable stars.
- A) greater than
 - B) less than
 - C) equal to
- 9) Classical Cepheid have light curves that
- a) increase and decrease in brightness at regular rates.
 - b) increase in brightness slowly and then decrease in brightness rapidly.
 - c) increase in brightness rapidly and then decrease in brightness slowly.
- 10) Approximately what percentage of all stars are binary or multiple versus a solo star like our own.
- a) 20%
 - b) 40%
 - c) 60%
 - d) 80%
- 11) Cepheid stars give off ____ times as much light as RR Lyraes
- a) 0.1
 - b) 10
 - c) 100
 - d) 1,000

Use the following table to answer question 12. The data was recorded after observing a variable star every other night for a period of time:

| Date | Star Brightness |
|--------|-----------------|
| 1-Apr | 9.1 |
| 3-Apr | 9.3 |
| 5-Apr | 9.8 |
| 7-Apr | 9.9 |
| 9-Apr | 9.7 |
| 11-Apr | 9.9 |
| 13-Apr | 9.9 |
| 15-Apr | 9.7 |
| 17-Apr | 9.1 |
| 19-Apr | 8.8 |
| 21-Apr | 8.8 |
| 23-Apr | 8.3 |
| 25-Apr | 8.6 |
| 27-Apr | 9.0 |
| 29-Apr | 9.1 |
| 1-May | 9.2 |
| 3-May | 9.6 |
| 5-May | 9.9 |
| 7-May | 9.6 |
| 9-May | 9.7 |

12) What is the period of the variable star?

- A) 8 Days
- B) 14 days
- C) 17 days
- D) 29 days

13) The smaller the magnitude, the

- a) brighter the star
- b) dimmer the star
- c) closer the star
- d) farther the star

14) A star has an apparent magnitude 3.0 and distance 100pc. What is its absolute magnitude?

15) A star has an apparent magnitude 9.0 and absolute magnitude 2.0. How far away is it rounded to the nearest whole pc? (Do not use the unit in your answer)

Use the following two figures to answer questions 16 through 19.

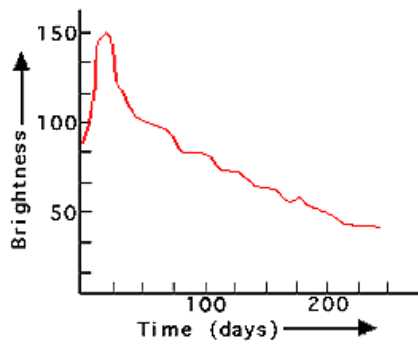


FIGURE 1

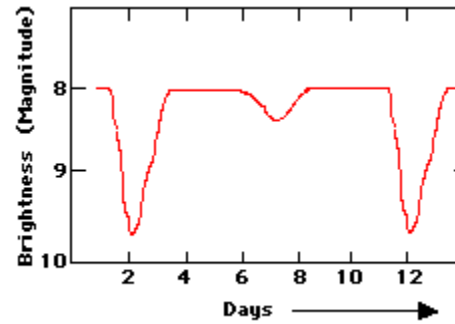
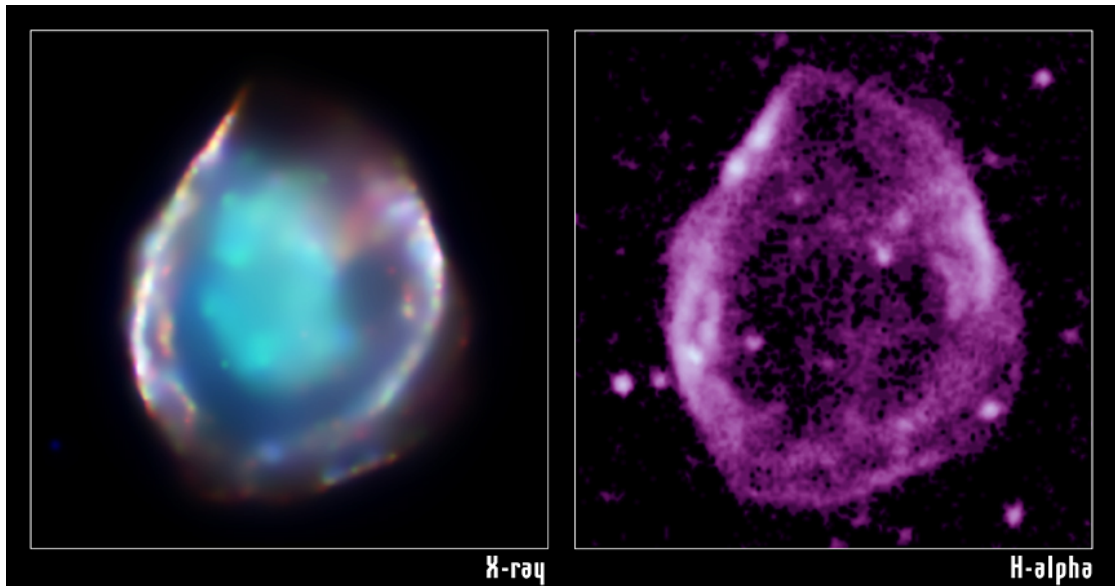


FIGURE 2

Images from: http://imagine.gsfc.nasa.gov/docs/science/how_11/light_curves.html

- 16) Figure 1 shows the light curve of
- a supernova
 - an Cepheid star
 - an RR Lyrae Variable star
 - a long period variable star
- 17) Figure 2 shows the light curve of a star with a period of about
- 2 days
 - 5 days
 - 10 days
 - 12 days
- 18) Figure 2 shows a distinctive light curve for an eclipsing binary with stars of
- unequal diameter/brightness
 - equal diameter/brightness
 - equal diameter but unequal brightness
 - equal brightness but unequal diameter
- 19) Figure 2 is characteristic of a light curve produced by two stars with
- the same surface temperature and same brightness.
 - different surface temperatures but the same brightness.
 - different surface temperatures and different brightness.
 - the same surface temperatures but different brightness.

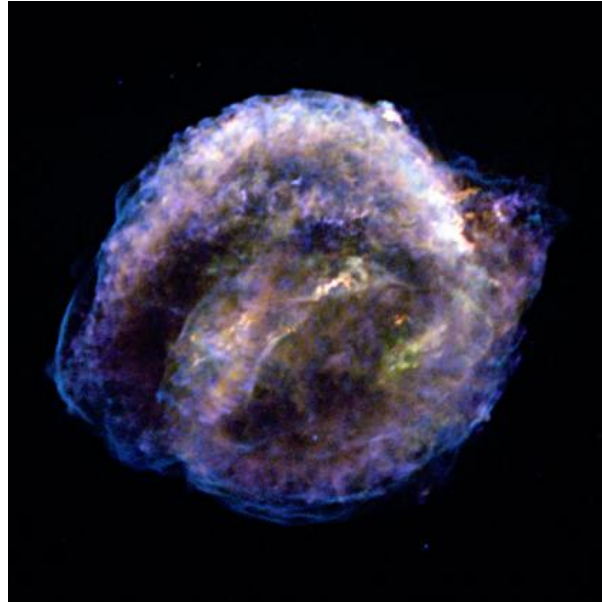
Use the following two figures to answer questions 20 through 23.



Credit: X-ray: NASA/CXC/Rutgers/J.Hughes et al; Optical: Rutgers Fabry-Perot

- 20) The above picture is of
- a) DEM L71
 - b) R Cygni
 - c) GRO J1655-40
 - d) Kepler's Super Nova Remnant
- 21) The image above is a classic picture of the results due to a white dwarf pulling in too much material from a nearby star causing it to explode. This is an example of a
- a) Type Ia Supernova
 - b) Type II Supernova
 - c) Black Hole
- 22) The Estimated Distance from Earth to this star is
- a) 80,000 Light Years
 - b) 160,000 Light Years
 - c) 240,000 Light Years
 - d) 320,000 Light Years
- 23) This star can be found in the constellation _____.
- a) Andromeda
 - b) Dorado
 - c) Orion
 - d) Pisces

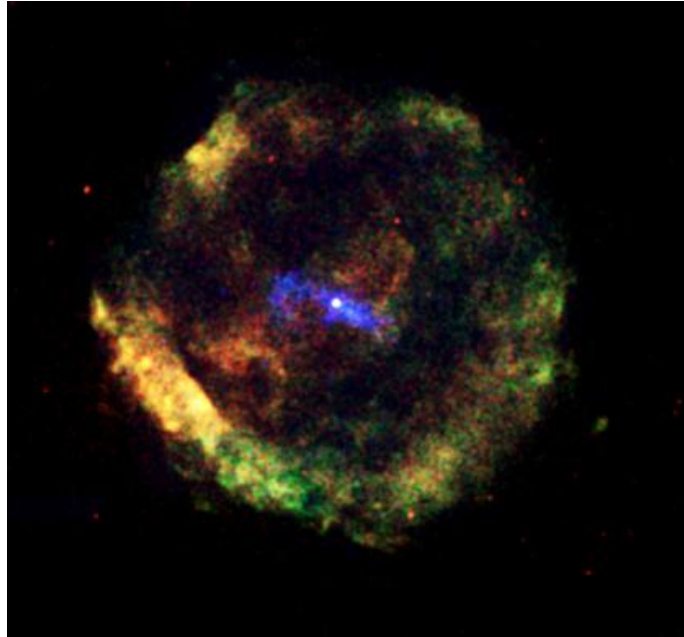
Use the following two figures to answer questions 24 through 27.



Credit: NASA/CXC/NCSU/S.Reynolds et al.

- 24) The above picture is of
- a) DEM L71
 - b) R Cygni
 - c) GRO J1655-40
 - d) Kepler's SNR
- 25) This image is of
- a) one of the brightest supernovas recorded in the galaxy.
 - b) one of the biggest flares captured on film.
 - c) one of the oldest stars in the galaxy.
 - d) a newly forming star.
- 26) Controversy existed on the original classification of this star. It has been determined that it is, in fact, a
- a) Cepheid
 - b) RR Lyrae variable
 - c) type Ia supernova
 - d) flare
- 27) This star can be found in the constellation _____.
- a) Andromeda
 - b) Dorado
 - c) Orion
 - d) Ophiuchus

Use the following two figures to answer questions 28 through 30.



Credit: NASA/CXC/Eureka Scientific/M.Roberts et al.

- 28) The above picture is of
- a) G11.2-0.3
 - b) AH Leo
 - c) GRO J1655-40
 - d) Kepler's SNR
- 29) At the center of this supernova, a _____ can be found.
- a) dwarf star
 - b) pulsar
 - c) flare
 - d) red giant
- 30) This star can be found in the constellation _____.
- a) Libra
 - b) Pisces
 - c) Orion
 - d) Sagittarius

2008 Astronomy Answer Key

DO NOT PRINT OR COPY WITH EVENT

Questions 3, 8, 11, 12, 14, 16, 19, 20, 24 will be used as tie-breaker questions. First tiebreaker is highest number correct out of these 8 questions. Second tiebreaker is highest number correct out of numbers 3, 14, 19, 24. Third tiebreaker is highest number correct in first column. Fourth tiebreaker is highest number correct in second column. Fifth tiebreaker is highest number correct in third column. Hopefully you won't need all these tiebreakers, but just in case. Make extra copies of this so if you have extra graders you can use them!

| | | |
|----------------------|----------|-------|
| 1. RR Lyrae Variable | 11. C | 21. A |
| 2. RR Lyrae Variable | 12. D | 22. B |
| 3. D | 13. A | 23. B |
| 4. E | 14. -2.0 | 24. D |
| 5. F | 15. 251 | 25. A |
| 6. B | 16. A | 26. C |
| 7. A | 17. C | 27. D |
| 8. A | 18. A | 28. A |
| 9. C | 19. C | 29. B |
| 10. D | 20. A | 30. D |