

Team Number: _____

Score:

Team Name: _____

NSO Astronomy C Event 2012 – ANSWER KEY Section A

1. ___(A) **Type Ia Supernova Remnant** (B) **A, B** (3 possible points)
2. ___(A) **17** (B) **Rosette Nebula** (2 possible points)
3. ___(A) **C (KCEFB)** (B) **10, 17** (3 possible points)
4. ___(A) **C** (B) **1** (2 possible points)
5. ___(A) **Mira or Pulsating Variable** (B) **N, O** (3 possible points)
6. ___(A) **Globular Cluster** (B) **RR Lyrae** (2 possible points)
7. ___(A) **18** (B) **R** (2 possible points)
8. ___**2 white dwarfs, mass transfer red giant/white dwarf** (2 possible points)
9. ___**3,7,8,9,16** (5 possible points)
10. ___(A) **the giant branch** (B) **F** (2 possible points)
11. ___(A) **BP Piscium** (B) **6** (C) **planetary nebula, white dwarf** (4 possible points)
12. ___(A) **12** (B) **K** (2 possible points)
13. ___**Mira Instability Strip** (1 possible point)
14. ___**2,5,14** (3 possible points)
15. ___(A) **T-Tauri** (B) **13** (2 possible points)
16. ___**Stellar nursery, T-Tauri, Main Sequence, Mira variable, planetary nebula, white dwarf, mass transfer, Type Ia supernova** (8 possible points)
17. ___(A) **White dwarfs** (B) **neutron star, Type Ia supernova** (3 possible points)
18. ___(A) **R and/or G** (B) **RR Lyrae instability strip** (3 possible points)
19. ___(A) **A,B** (B) **Type Ia supernova, black dwarf** (4 possible points)
20. ___**Main Sequence star, white dwarf, black dwarf** (3 possible points)

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NSO Astronomy C Event 2012 – Answers Section B

1. (A) **F** (B) **70 – 80** (Years) (C) **7 – 9** (AU) (D) **30,000 – 35,000** (Kelvin)
(E) **They are broadened** (5 possible points)
2. (A) **AA** (B) **Rate of Decline** (C) **White Dwarf** (D) **2010** (E) **A** (4 possible points)
3. (A) **Helium** (B) **It is older and there were fewer heavy elements because of fewer supernovae/planetary nebulae** (C) **Shape or Amplitude** (3 possible points)
4. (A) **S** (B) **NGC 2440** (C) **$(1 - 3) \times 10^5$** (Kelvin) (3 possible points)
5. (A) **4** (B) **Shock waves are reflected up from the deep layers of the star, causing brightening** (2 possible points)
6. (A) **RX J0806.3 +1527** (B) **225 – 375** (Seconds) (C) **Gravitational Waves**
(D) **1 – 2.5** (M/M_{\odot}) (4 possible points)
7. (A) **O** (B) **Carbon** (C) **TiO** (D) **330 – 335** (Days) (E) **Symbiotic**
(F) **Helium Shell Flash** (6 possible points)
8. (A) **Symbiotic** (B) **Z** (C) **Radio** (D) **Jet (from accretion onto white dwarf)**
(4 possible points)
9. (A) **NGC 1555** (B) **Turbulent Accretion** (C) **Mass Loss (due to ejection)**
(D) **K, U** (E) **Presence of many young O and B stars** (6 possible points)
10. (A) **0.3 – 0.6** (B) **4** (C) **Yes, it would increase (more positive)** (3 possible points)
11. (A) **Jets from the star** (B) **Consumption of a star or large planet** (3 possible points)
(C) **Emission from supermassive black holes in the centers of galaxies**
12. (A) **NGC 3372** (B) **X-Ray** (C) **Supernovae, ‘Wind’ from massive stars** (D) **3**
(5 possible points)
13. (A) **DEM L238, Tycho’s SNR** (B) **W** (C) **Younger** (D) **Kepler’s SNR**
(8 possible points)
(E) **It is shorter (“Prompt” SNe)** (F) **2 – 2.5** (M/M_{\odot}) (G) **300 – 400** (Years)
14. **Rate of Decline- The faster it fades, the fainter the peak luminosity**
(1 possible point)

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NSO Astronomy C Event 2012 – Answers Section C.

Note: Use Scientific Notation Where appropriate.

1. (A) **570 – 600** (Light Years) (B) **10 - 11**(Apparent Mag.) (C) **0.5 - 1** (Absolute Mag.)
(D) **7 - 9** (Arcminutes) (E) **(3.5 – 4.5) x 10¹⁶** (Kilometers) (5 possible points)
2. **_70 - 100** (Megaparsecs) (1 possible point)
3. **_(1 – 1.5) x 10⁻⁴** (Arcseconds) (1 possible point)
4. **_1.8 – 2.2** (Parsecs) (1 possible point)
5. (A) **50** (Parsecs) (B) **2** (Times) (C) **3 - 5** (km/s) (3 possible points)
6. (A) **20** (M/M_{\odot}) (B) **0.9 – 1.1** (M/M_{\odot}) (C) **(2.8 – 3.2) x 10⁹** (kg/m^3)
(D) **White Dwarf** (4 possible points)
7. **_4000 - 5000** (Parsecs) (1 possible point)
8. **_+ 1.0 – 1.8** (B-V) (1 possible point)
9. **_(3 – 4) x 10⁻⁶** (Radians/Sec) (1 possible point)
10. (A) **14,000 – 15,000** (Kelvin) (B) **750 – 1250** (L/L_{\odot}) (2 possible points)