ASTRONOMY

Read the General Rules in the manuals and on www.soinc.org as they apply to every event.

1. **DESCRIPTION:** Students will demonstrate an understanding of the basic concepts of mathematics and physics relating to stellar evolution and **variable stars**.

   A TEAM OF UP TO: 2 **APPROXIMATE TIME:** 50 minutes

2. **EVENT PARAMETERS:** Each team may bring either two laptop computers or two 3-ring binders (any size) containing information in any form from any source, or one binder and one laptop. The materials must be 3-hole punched and inserted into the rings (notebook sleeves are allowable). Each team member is permitted to bring a programmable calculator. No Internet access is allowed.

3. **THE COMPETITION:** Using information which may include Hertzsprung-Russell diagrams, spectra, light curves, motions, cosmological distance equations and relationships, stellar magnitudes and classification, multi-wavelength images (X-ray, UV, optical, IR, radio), charts, graphs, animations and DS9 imaging analysis software, participants will complete activities and answer questions related to:

   a. Stellar evolution, including spectral features and chemical composition, luminosity, blackbody radiation, color index (B-V), and H-R diagram transitions, proto-stars, **T Tauri variables**, Cepheid variables, semiregular variables, red supergiants, **Mira variables**, **RR Lyrae variables**, neutron stars, magnetars, pulsars, x-ray binary systems, **dwarf & recurrent novas, S Doradus variables,** Type II and **Type Ia supernovas**.

   b. Use Kepler's laws, rotation and circular motion to determine answers relating to the orbital motions of binary and multiple star systems; use parallax, spectroscopic parallax, and the distance modulus to calculate distances to Cepheids, **RR Lyraes** and **Type Ia supernovas**.

   c. Identify, know the location and answer questions relating to the content areas outlined above for the following Objects: **Mira**, **W49B**, **Tycho's SNR**, **Vela SNR**, **G1.9+0.3**, **Eta Carinae**, **SS Cygni**, **T Tauri**, **GRS 1915+105**, **47 Tucanae**, **The Trapezium**, **T Pyxidis**, **Abell 30**, **RX J0806.3+1527**, **V1647 Ori**, **V1**, **NGC 1846**, **NGC 3132**

4. **SCORING:** All questions will have been assigned a predetermined number of points. The highest score wins. Selected questions having differentiated weights will be used to break ties.

Recommended Resources: All reference and training resources including the **Astronomy CD** are available on the Official Science Olympiad Store or Website at http://www.soinc.org Also: http://www.aavso.org/ ; http://chandra.harvard.edu/photo/index.html ; http://antwrp.gsfc.nasa.gov/apod/astropix.html

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