ASTRONOMY

DESCRIPTION: Students will demonstrate an understanding of the basic concepts of mathematics and astrophysics relating to stellar evolution.

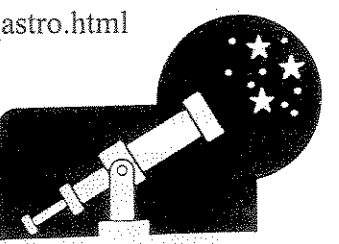
A TEAM OF UP TO: 2 **APPROXIMATE TIME:** 50 minutes

EVENT PARAMETERS: Students will provide a scientific calculator. All resources are permitted, including laptop computers and programmable calculators.

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 (gamma, X-ray, UV, optical, IR, radio), charts, graphs, animations and DS9 imaging analysis software, participants will be asked to complete activities which include the following:

1. Use all available information to determine answers relating to stellar evolution, including **stellar nurseries**, planetary nebulae, **main sequence** stars, red giants, red supergiants, **Wolf-Rayet Stars**, Type Ia supernovae, Type II supernovae, white dwarfs, neutron stars, **magnetars**, pulsars, black holes, Cepheids, and **Mira** variable stars.
2. Use all available information, including Kepler's laws, cosmological distance equations, rotation, and **circular motion** to determine answers relating to the orbital motions of stars and binary systems.
3. Students should be knowledgeable about calculating distances to stellar objects, including **parallax**, spectroscopic parallax, Cepheid variables, type Ia supernovae, and planetary nebulae.
4. Students will be asked to identify, know the location, be knowledgeable about, and/or answer questions relating to the three content areas outlined above for the following Objects: **Mira, WR124, RCW 38, NGC 2440, NGC 2266, Simeis 147, N49, IC 4406, Sagittarius A, Proxima Centauri, 3C58, W49B, Antares, Tycho's SNR, NGC 6888, M16**

RESOURCES: Science Olympiad Astronomy CD-see http://www.soinc.org
http://chandra.harvard.edu/edu/formal/stellar_ev/
http://www.tufts.edu/as/wright_center/fellows/sci_olympiad/sci_olympiad_astro.html
http://chandra.harvard.edu/photo/index.html
http://oposite.stsci.edu/pubinfo/pictures.html
http://antwrp.gsfc.nasa.gov/apod/astropix.html
http://www.seds.org/
http://skyserver.sdss.org/en/



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.

National Science Education Standards: Science as Inquiry, Content Standard A: Use Technology and Mathematics to Improve Investigations and Communications; Formulate and Revise Scientific Explanation and Models using Logic and Evidence; Earth and Space Science, Content Standard D: The Origin and Evolution of the Universe (Grades 9-12).