Maine State C Division Science Olympiad

Reach for the Stars
March 25, 2000

Team Name _____

Team Member Names: _____

_____

Instructions: Please DO NOT mark on these question pages. Place all of your answers in the answer section.

You may <u>use any resources you have</u> for this event. There are questions that use information you are expected to have with you. Since the description for this event states exactly which stars, constellations, and deep sky objects you are required to know, the correct number of responses to these questions will be used to break any ties that might occur.

At the end of the event, you must turn in BOTH the question and answer sections.

GOOD LUCK and have a STELLAR time!

PART 1: Celestial Object Identification

A. Use <u>Sky Chart for Northern Hemisphere Centered on North Celestial Pole</u> and <u>SC002T Constellation Chart</u> to answer the following:

1. **The letter P is the bright star __(1a)__ which is located in the constellation of __1b)__.**
2. **At 17^h $30'$ RA $+39^0$ Dec is one of the stars marking a familiar asterism in the summer sky. The star is named __(2a)__ and it is in the constellation __(2b)__. This constellation contains the deep sky object __(2c)__ which is a __(2d)__. The other two bright stars in the asterism called the __(2e)__ are named __(2f)__.**
3. **The letters AA represent the constellation of __(3a)__. The second-brightest star in this constellation is called __(3b)__. What type of star is it? __(3c)__**
4. **The letter V represents the constellation of __(4a)__ and contains the bright star called__(4b)__. The coordinates for this star are __(4c)__.**
5. **The letter H marks the location of the constellation of __(5a)__. The bright star is called __(5b)__. This constellation contains two deep sky objects. What are their names and what types of objects are they? __(5c)__**
6. **What are the names and letters for the two brightest stars in the constellation of Orion? __(6a)__ Orion's hunting dog is named __(6b)__ and contains the bright star__(6c)__.**

B. Using the information on the <u>Celestial Objects</u> page, answer the following:

1. **Identify the stars/deep sky objects using the clues provided. The clues may include spectra, orbital motions, prominent seasonal appearance of planets, other objects within the constellation or object, or any other relevant clues.**
2. **Place the objects that have spectra and their names on the H-R diagram.**

PART 2: Stellar Evolution:

A. Using the information on the <u>Graphs, Star Charts, Stellar Information, and H-R Diagram</u> pages, answer the following:

1. **The main sequence lifetime of a star (T) is equal to its solar mass (M) x 10^{10} divided by its solar luminosity. At the end of the main sequence lifetime, stars reach their "turn off point" and leave the main sequence to the giant branch of the H-R Diagram. Determine the main sequence lifetimes for the following stars:**
   (a) Vega
   (b) Capella
   (c) Procyon
   (d) Altair
   (e) Spica
   (f) What is the relationship between main sequence age and mass?
2. **(a) Use the information in the Absolute Magnitude-Spectral Type table to construct a zero-age main sequence on the H-R Diagram graph paper.**
   (b) Plot the data for the three star clusters (Pleiades, Hyades, M67) on the H-R Diagram.
   (c) For each cluster determine the absolute magnitude of the star at the cluster "turn off point."
   (d) What are the ages of the three clusters?

Sky Chart for Northern Hemisphere Centered on North Celestial Pole