

Massachusetts State B Division Science Olympiad Reach for the Stars
March 25, 2000



INSTRUCTIONS:

Please DO NOT mark on these question pages. This section will be used by other teams participating in this event in other time slots. Place all of your answers on the answer pages.

Part 1 is the identification portion of the event. You are not allowed to have any resources during Part 1. You will answer the questions based on the 3 star charts provided. 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 in Part 1 will be used as a tie-breaker. You have 20 minutes for Part 1.

When you have finished with Part 1, you may turn in the answer section and start on Part 2. You have 30 minutes for Part 2. Place all answers on the answer pages. You may use any resources you have for Part 2.

May the Stars be With You!

PART 1: Celestial Objects Identification

A: Using the Sky Chart for Northern Hemisphere Centered on North Celestial Pole, answer the following questions:

1. The letter L marks a constellation which represents the chariot of a famous celestial hunter. What is the name of this constellation? (1a) The brightest star in this constellation is called (1b)
2. A double star system is marked by the letter G. What are the names of these two stars? (2a) These two stars are part of the asterism (2b) which is the predominant pattern in the constellation (2c)
3. An asterism known as the Great Square is part of the constellation (3a) and is represented by the letter (3b) . Attached to the Great Square is a constellation which contains the only deep sky object outside of the Milky Way Galaxy. The name of this object is (3c) .
4. The letter V marks the bright reddish star (4a) which is located in the constellation of (4b) the shepherd.
5. The letter O marks the most prominent star in a constellation sometimes called the Northern Cross. The actual name of this constellation is (5a) and the letter O represents the star named (5b) . This star, along with two others, make up a prominent asterism in the summer sky known as the (5c) . The other two stars are (5d) in the constellation (5e) and (5f) in the constellation (5g) .
6. The letter F marks a famous group of siblings which are often mistakenly referred to as a constellation. This object, known as (6a) is actually an (6b) . Two other stellar siblings are twins. These brothers are located in the constellation (6c) and their names and letters marking their location are (6d) and (6e)
7. Sirius is the brightest apparent magnitude star in the Northern Hemisphere winter sky. Sirius is called the Dog Star and is located in what constellation? (7a) On the star chart it is represented by the letter (7b) . Sirius has a companion star in a constellation called (7c) represented by the letter (7d) . The brightest star in this constellation, the companion of Sirius, is called (7e) .
8. Cancer the crab is one of the zodiacal constellations and contains a deep sky object known as (8a) . Another zodiacal constellation is low on the horizon in the fall. This constellation contains a bright red star (P on the chart); the name of the constellation is (8b) and the bright red star is called (8c) .
9. The letter B marks the location of a deep sky object called (9a) which is located in the constellation of (9b) . This constellation contains two bright stars. The red star is called (9c) and is represented by the letter (9d) ; the bluish-white star is called (9e) and is represented by the letter (9f) .
10. The constellation represented by the letter D is called (10a) . This constellation is the Queen of Ethiopia. There is another constellation which her Royal Highness could wear if only it was closer! This is the constellation called (10b) and is represented by the letter (10c) .
11. The letter H is the location of the orangish star (11a) in the constellation of (11b) . It appears to be located near the deep sky object called (11c) .

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B: Using the SC002 Constellation Chart, North Circumpolar Region Epoch 2000, Answer the following questions:

1. Vega is the brightest apparent magnitude star in the N. Hemisphere summer sky. What is the right ascension (RA) and declination (DEC) for Vega? __(1a)__
In approximately what year will it be the star nearest the North Celestial Pole? __(1b)__
2. At RA 18^h DEC $+52^0$ is located the brightest star in the constellation of __(2a)__.
3. How many hours does it take for the entire sky to rotate over your head? __(3a)__ How many degrees does the sky turn during each hour of rotation? __(3b)__ How many degrees does the sky turn during a 30-day month? __(3c)__
4. On February 5th at 8:00PM EST what bright star is almost directly overhead if you live at $+45^0$ latitude? __(4a)__ This star is in the constellation of __(4b)__.
5. The stars between which latitudes are on the Sky Chart for Northern Hemisphere Centered on North Celestial Pole and are not on the SC002 Constellation Chart North Circumpolar Region Epoch 2000 sky chart? __(5a)__

C: Using the SC001T Constellation Chart, Equatorial Region Epoch 2000, answer the following questions:

1. The straight line across the center of the chart is called the __(1a)__ and the curved line is called the __(1b)__. The curved line represents what motion? __(1c)__
2. What is the RA of the Vernal Equinox? __(2a)__
3. What is the RA __(3a)__ and the date __(3b)__ of the Winter Solstice in the Southern Hemisphere?
4. Between which latitudes can the Sun be directly over your head? __(4a)__
5. The stars between which latitudes are located on ALL THREE of the sky charts? __(5)__
6. What is the RA and date of the shortest day in the Northern Hemisphere? __(6)__
7. What is RA and DEC for Sirius? __(7a)__
8. What is the name of the reddish star located at $14^h +20^0$? __(8a)__ This star is part of the constellation __(8b)__.
9. The constellation which touches the curved line at heliocentric longitude 243^0 is called __(9a)__. What is the heliocentric longitude of Betelgeuse? __(9b)__
10. The planet Saturn is now located on $3^h30' +10^0$. What constellation is it in? __(10a)__
11. Is Venus an evening or a morning star this month? __(11a)__
12. Two planets are closer together in the sky than they have been for 20 years. Which two planets are they? __(12a)__. What other planet is very close to these two planets and form a rare grouping this month? __(12b)__
13. Where on the chart will planets always be found? __(13a)__
14. Why are planets found here? __(14a)__

15. On March 19th there was a full moon located at $12^h + 5^0$. How many days until the Moon returns to these same coordinates? (15a) To the same phase? (15b)

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PART 2: Comparative Planetology

A. Use the 6 images on the Planetary Surfaces page to answer the following:

1. In image 1, place the three events labeled with the letters J, K, and L in chronological sequence from oldest to youngest. (1) [J is the small crater to the left]
2. Which image shows features that resemble those found in Antarctica? (2)
3. In image 7, which of the two areas is youngest? (3)
4. In image 8, which of the four features is the youngest? (4)
5. In image 6, place the three events labeled with the letters O, P, and Q in chronological order from youngest to oldest. (5) [P is a very faint feature]
6. Four of the images are of Solar System planets and the other four are from moons. Name the planets/moons that the images are from:

Image 1 (6a)

Image 2 (6b)

Image 3 (6c)

Image 4 (6d)

Image 5 (6e)

Image 6 (6f)

Image 7 (6g)

Image 8 (6h)

B. The Celestial Objects page contains images of Solar System objects, stars, constellations, and/or deep sky objects. Identify each object. Please be SPECIFIC as to what the object is.

1.
 - A. _____
 - B. _____
 - C. _____
 - D. _____
 - E. _____
 - F. _____
 - G. _____
 - H. _____
 - I. _____
 - J. _____
 - K. _____
 - L. _____
 - M. _____
 - N. _____
 - O. _____
 - P. _____

Q. _____

R. _____

S. _____

2. Which of these objects is presently geologically active? __ (2a) __ Which show signs of past geologic activity? __ (2b) __
3. One of these objects is contained within one of the other images. Name them.
__ (3a) __ What other two objects are located within the same image? __ (3b) __

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