2004 PA State Science Olympiad: Reach for the Stars, Part 2 Answer Key

[Tie-Breakers: (**1**) Total for ID, Part 1; (**2**) Question 7; (**3**) Question 14; (**4**) Question 16.]

MISSION TO MARS

A. Do not bend or write on the maps!
B. Always include units (m, °, N, S, E, or W) with number value responses.
C. Reference only the East longitude coordinates … those printed in **black type**.
D. During Part 2 of the Reach for the Stars Event, you will be working with two large-sized maps of Mars. Sheet 1 displays a Topographic Map; sheet 2 displays a Color Coded Contour Map. The specific sheet(s) to use in answering the questions under each topic has been identified after each topic heading.
E. You need not spend time reading the text at the top center of each map.

MAP SURVEY (Map Sheet 1)

1. (1 Pt.) For whom are a majority of Martian craters named? Be specific. **Astronomers (or Scientists)**
2. (1 Pt) Which surface features rise to the highest elevations? **Volcanoes (or Mons)**
3. (1 Pt) Which surface features have the lowest elevations? **Planitia (or Plains)**
4. (1 Pt) What type of projection was used to create the circular-shaped maps? **Polar Stereographic**
5. (2 Pts) Does the region surrounding the **North** or **South Polar Region** have the youngest surface? **North**
6. (3 Pts) State an observation or hypothesis supporting your reasoning for Question 5. **There are fewer craters in the North Polar Region.**
7. (3 Pts) The large rectangular map was drawn using the Mercator Projection. On the Mercator Projection, is distortion greatest at 0°, +30°, or – 57°? **– 57°**

MAP RELIEF (Map Sheets 1 and 2)

8. (1 Pt) Name the specific feature that rises to the highest elevation. **Olympus Mons**
9. (1 Pt) What is the elevation of the feature, identified in number 8, at its highest point? **21,229 Meters**
10. (2 Pts) Name the specific feature having the lowest elevation. **Hellas Planitia (or Coronae Scopulus)**
11. (2 Pt) What is the elevation of the feature, identified in number 10, at its lowest point? **– 8200 Meters**
12. (3 Pts) A map's relief is defined as the difference between its highest and lowest points in elevation. Calculate the relief of the large rectangular map. **29,429 Meters**

RELATIVE AGING OF CRATERS (Map Sheet 1)

13. (3 Pts) Locate the craters **Luzin**, **Cassini**, and **Tikhonravov** between 10˚ N 30˚ E and 30˚ N 40˚ E. Which of these three craters is oldest? **Tikhonravov**
14. State two observations to support your response to question 13.
    A. (3 Pts) **Tikhonravov is more heavily cratered.**
    B. (3 Pts) **Tikhonravov's walls appear more eroded.**
15. (3 Pts) Which of these three craters is youngest? **Luzin**
16. State two observations to support your response to question 15.
    A. (3 Pts) **This small crater overlaps Cassini, a crater which is more recent than Tikhonravov as indicated by its lesser eroded walls.**
    B. (3 Pts) **Luzin's crater walls are less eroded than are those for the other two.**

ROBOTIC EXPLORATION OF THE MARTIAN SURFACE (Map Sheet 1)

17. (2 Pts) Which earlier Martian mission landed at 19˚N 326.5˚E? **Pathfinder**
18. (2 Pts) Which earlier Martian mission landed at 47.5˚N 134˚E? **Viking 2**
19. (2 Pts) The Spirit rover landed at 15˚S 175˚E. What Martian feature is at this location? **Gusev Crater**
20. (2 Pts) The Opportunity rover landed at 2˚S 355˚E. What Martian feature is at this location? **Meridiani Planum**
21. (3 Pts) Both the Spirit and the Opportunity rovers were solar-powered. While one was active, the other was inactive. Explain why. **The rovers landed on opposite sides of Mars. Mars rotates on its axis, bringing sunlight for half a day and darkness during the remaining part of the day.**

Top Pennsylvania participant scores:
(to compare your participants' performance)

- 1st Place: 48
- 2nd Place: 46
- 3rd Place: 45
- 4th Place: 44 (2)
- 6th Place: 43 (2)

Average Score: 31.9 points out of 50

To obtain a set of the two accompanying Martian maps, send a check, money order, or School Purchase Order for $15.00 plus $4.95 USPS Priority shipping charges to:

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