



SCIENCE OLYMPIAD
— AT THE —
UNIVERSITY OF FLORIDA

Northern Regional: January 19th, 2019

Solar System B Test

Name(s): _____

Team Name: _____

School Name: _____

Team Number: _____

Rank: _____

Score: _____

Solar Systems B Test (105 points total)

Instructions: Write only on the answer sheet and NOT on the test. (points will be deducted).

Tiebreakers: question 15, if tie still needs to be broken then use questions 18, 7, 8, 9, 10, and 11 in that order)

Part I: Written Test (88 points)

Dwarf Planets (44 points)

1. What is a dwarf planet? (1pt)
2. List the five dwarf planets in our solar system from largest to smallest in size. (3 pts)
3. List the five dwarf planets in our solar system from closest to farthest from the sun. (3 pts)
4. What is a minor planet? (1pt)
5. Which dwarf planet(s) is/are located in the inner solar system? If none, state NOTA. (1pt)
6. Which image corresponds with the dwarf planet that has a presence of graphite, sulfur, and sulfur dioxide? (1pt)
7. Which dwarf planet is image A? How long is the rotational period? Name two of its moons. (4 pts)
8. Which dwarf planet is image B? How many moons does it have? Which asteroid belt is it located in? (3pt)
9. Which dwarf planet is image C? How long does it take to orbit the sun? How long is a day on this dwarf planet? (3pts)
10. Which dwarf planet is image D? What type of ice exists here? How many moons does it have? (3pts)
11. Which dwarf planet is image E? What does the surface primarily consist of? Name 2 notable geological features. (4 pts)
12. Which image corresponds with the dwarf planet that was primarily studied by the DAWN spacecraft? (1pt)
13. What is the bright spot in image F known as? What is it composed of? What dwarf planet is this found on? (3pts)
14. What are plutoids and roughly how many do scientists believe exist in our solar system? How many officially exist? (3pts)
15. Name five of Pluto's moons. (5pts) Place them in order of distance from Pluto for an extra 2pts. (7 total pts possible / tiebreaker)
16. What is hydrostatic equilibrium? Which dwarf planet has settled to this? (2pts)
17. Pluto is in a 2:3 orbital resonance with Neptune. What does this mean? (1pt)

Satellites (20 points)

18. Regarding Earth's moon: (13 points total)
 - a. What formation does Image G show? (1pt)
 - b. When and how did this form? (2pts)
 - c. What is the name for the dividing line between daylight and darkness on the moon? (1pt)
 - d. The moon is tidally locked with the Earth. What does this mean? (1pt)

- e. Name and describe the widely accepted theory of the formation of the moon. (4 points)
 - f. Explain where each of the following hypotheses failed to describe the formation of the moon:
 - i. The Fission Hypothesis: The moon broke from a rapidly spinning young Earth. (1pt)
 - ii. The Condensation Hypothesis: Earth and its moon condensed from the same cloud of matter in the solar nebula. (1pt)
 - iii. The Capture Hypothesis: The moon formed elsewhere in the solar nebula and was later captured by Earth. (1pt)
 - g. The moon contains a lot of breccias—large grained, angular fragments bound together by heat. What does this suggest? (1pt)
19. Mimas is the smallest astronomical body that is known to be rounded in shape because of its _____. (1pt)
 20. Mimas has a low density of only 1.15 g/cm³, what does this indicate? (1pt)
 21. Mimas has an irregular wobble, what does this indicate? (1pt)
 22. Thermal imaging has revealed irregular heating that is poorly understood. What does this indicate? (1pt)
 23. What is the name of the crater in image H? (1pt)
 24. In what way does Phoebe orbit Saturn? (1pt)
 25. Pluto and Charon are gravitationally locked, what does this mean? (1pt)

General Details of other Small Bodies (24 points)

26. What type of asteroid is represented in image I? (1pt)
27. What type of asteroid is represented in image J? (1pt)
28. What type of asteroid is represented in image K? (1pt)
29. When do “Kirkwood Gaps” occur? (1pt)
30. Name the most popular of Solar System formation theories. (1pt)
31. What is a Trans-Neptunian object? (1pt)
32. What is an extreme Trans-Neptunian object? (1pt)
33. What is L an image of? (1pt)
 - a. Where is it located? (1pt)
 - b. How many moons does it have? (1pt)
 - c. What is the resonance of this body and what other body does it have the resonance with? (2pts)
 - d. What type of gas exists in the atmosphere due to this body’s large size? (1pt)
 - e. The presence of water ice on the surface suggests a brief period of _____ in the distant past. (1pt)
34. What are centaurs? (1pt)
35. What is a Trojan? (1pt)
36. What are the two Trojan points of stability known as? (2pts)
37. What year was the discovery of the first Earth Trojan announced by NASA? What was its name? (2pts)
38. What year was ‘Oumuamua discovered? (1pt)
39. ‘Oumuamua became the first known _____ object to pass through the Solar System. (1pt)

40. What color is 'Oumuamua? What is a possible reason for the color? (2pt)

Part II: Hands-On/Interpretive Task (17 points)

41. What date was Voyager 2 launched? (1pt)
42. Voyager 2 made a successful flyby of which planet(s)? (2pts)
43. How many new moons did the Voyager 2 discover on Neptune? (1pt)
44. What mission is image M portraying? What date was it launched? (2pts)
45. What planet did image M's mission flyby for five months? What new observation did it make about this planet? (2pts)
46. Which mission is image N from? What date did it launch? (2pts)
47. What two things was image N's mission successful in? (2pts)
48. Which mission caught the north polar volcano, Tvashtar, in the middle of a spectacular eruption on Jupiter? (1pt)
49. What mission is currently orbiting Ceres? When was it launched? (2pts)
50. What year is Lucy planned to launch? What is the purpose of the mission? (2pts)