Rustin Invitational - January 6, 2018

SOLAR SYSTEM

DO NOT WRITE ON TEST

DO NOT OPEN UNTIL INSTRUCTED

Tiebreakers:

1st: Checking from 1 – 75, first incorrect answer goes down one rank.

2nd : #69 correctness and thoroughness

3rd : #74 correctness and thoroughness

4th : 70 – 73 correct answer and work shown – will started with #70, if both correct then check #71 and will continue to #73

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SOLAR SYSTEM

- **DO NOT WRITE ON THE TEST**
- **PART 1 –Use Image Sheet 1 and put the LETTER of the Planet or Moon for answer (for questions 1 – 12)**

1. Which orbiting body has the greatest amount of nitrogen in its atmosphere?
2. Which planet has the most carbon dioxide in its atmosphere?
3. Which planet(s) have significant magnetic fields?
4. Images **B C F H** put in order of size from least to greatest.
5. Images **B C F H** put in order of mass from least to greatest.
6. Images **B C F H** put in order of density from least to greatest.
7. Identify the letter of Mars' largest moon.
8. Which planet will the sun rise in the west?
9. The most actively volcanic world in the solar system.
10. Has an average surface temperature of 471 °C ?
11. Which Image Letter has craters named Swift and Voltaire?
12. Image Letter of planet that is tilted 25° on its axis.

- **PART 2 –Identify the major parts of craters from the definitions given (for questions 13 -18)**

13. The bottom of a crater, either bowl-shaped or flat, usually below the level of the surrounding ground.
14. Formed in the middle of a crater by rock rebounding, by the strength of the underlying rock after the initial impact event.
15. The interior sides of a crater, usually steep.
16. The edge of the crater.
17. Rock material thrown out of a crater during an impact event.
18. Bright streaks extending away from the crater that is composed of material that was thrown out of the crater.

- **PART 3 –Knowledge questions (for questions 19 - 52)**

19. What is the name of the robotic spacecraft that was launched on December 4, 1996 that carried a lander and a rover?
20. How much of the surface of the moon can we see from Earth?
21. What phenomenon explains the amount of the moon's surface that we can see from Earth?

22. What Law was formulated in the late 1700's that led scientists to predict the existence of a planet between Mars and Jupiter?
23. In [Question 22] what is the largest object that is located at that distance between Mars and Jupiter?
24. The magma of volcanism on terrestrial planets is made up of what?
25. What is the name of the dividing line between daylight and darkness on the moon?
26. What is the latin word for sea used to describe features on the moon?
27. What is the name for a crater that is formed by the ejected material from the formation of a larger crater?
28. The locking of the rotation of a body to its revolution around another body through gravitational forcing is called _____.
29. The passage of a smaller celestial body or its shadow across the disk of a larger celestial body is called a _____.
30. What planet(s) will perform the task in [Question 29] when viewed from Earth?
31. What orbiter took the image of **A** on Image Sheet 1 in 1977?
32. What period did the tessera terrain form on the planet in image **H** on Image Sheet 1?
33. Describe the shape of the moons of Mars.
34. What explains the shape of the moons of Mars as compared to Earth's moon?
35. What is the name of the Danish astronomer whose observations allowed Johannes Kepler to derive his laws?
36. How did the astronomer in [Question 35] explain the strange movement of Mars across the sky? [It moved in epicycles or tiny circles in its orbit]
37. Which scientist is credited with the accurate explanation of Johannes Keplers data?
38. As a planet moves in its orbit, a line from the sun to the planet sweeps out equal areas in equal times. This is Keplers _____ law.
39. Who is credited with the discovery of Io?
40. What is the rotational period in hours of Io?
41. What is the revolution period in hours of Io?
42. What is the ring shaped cloud of ions and electrons surrounding Jupiter that come from its moon called?
43. On terrestrial planets what is the loose layer of heterogeneous superficial deposits covering solid rock called?
44. What do you know about the core of a planet or moon with a negligible magnetic field?
45. Say we discover two new planets--Junev and Condra. They are the same size but Junev has a mean density of 5 g/cm^3 and Condra 4 g/cm^3. Which has the larger core?
46. Which has a larger iron core, Mercury or the Moon?
47. How thick is the crust of rock wrapped around Mercury's core? A. 10% of the radius of Mercury B. 15% of the radius of Mercury C. 25% of the radius of Mercury D. 40% of the radius of Mercury
48. Which is likely to cool faster - a mantle of liquid rock or a mantle of solid rock?
49. During what phase(s) of the moon can a solar eclipse occur?
50. What is the darkest part of the shadow cast by an eclipse called?
51. Why doesn't a solar eclipse take place at least once every month

52. What is the name of a solar eclipse in which the sun is seen as a ring with the moon covering the center?

PART 4 –Use Image Sheet 2 to answer (for questions 53 – 69)

53. What is the name of the feature in image **Q** on Image Sheet 2?
54. When was the feature shown in image **Q** on Image Sheet 2 formed?
55. In image **Q**, what spacecraft captured these images?
56. On what planet or moon is image **N** taken?
57. What is the name of the feature in image **N**?
58. Image **O** was captured by Magellen. What is that name of this plateau?
59. In image **R** what is the name of the feature circled in red and where is it located?
60. In image **R** what is the surface around this object that is circled in red covered by?
61. In image **M**, what is the name of this feature?
62. In image **M**, what celestial body is it located on?
63. In image **S**, what is the feature the arrow is pointing to?
64. In image **S**, what body is this feature located on?
65. What is the age of the feature the arrow is pointing to in image **S**?
66. In image **S**, what features were used to determine its age?
67. In image **P**, what is the name of the large feature contained in this circle?
68. In image **P**, name the American spacecraft that landed within this circled area.
69. Refer to image **T** – Explain what is taking place and what features are in the series of 3 images that were taken over a period of time. What planet or moon is this surface?
70. The average mean distance of Earth to the Sun is 149.6×10^6 km and the period of Earth is 1.0 years. The average mean distance of Saturn from the Sun is 1427×10^6 km. Using one of Keplers laws what is the period of Saturn? **(Show ALL Work)**
71. How far from the center of Earth do synchronous satellites orbit? The moon is 60 ER (earth radii) away and has a period of 27.3217 days. Give answer in earth radii. **(Show ALL Work)**
72. A dwarf planet discovered out beyond the orbit of Pluto is known to have an orbital period of 619.36 years. What is its average distance from the Sun in astronomical units? **(Show ALL Work)**
73. You observe a binary system with a period of 24 years and an average separation of 12 AU. Star X is 10 AU away from the center of mass and Star Y is 2 AU away from the center of mass. What is the total mass of the system and what are the individual masses of Star X and Star Y? Give your answer in solar masses? **(Show All Work)**
74. Describe the characteristics of the northern and southern hemispheres of Mars?
75. Draw a diagram and label a solar eclipse showing the relative positions of the Earth, Moon and Sun.