

DO NOT WRITE ON THIS TEST PACKET

**Solar System
Test Booklet**

**Science Olympiad
NSCD Invitational 2010**

Multiple Choice:

On the answer sheet, write the letter of the choice that best answers each question. No credit will be given for answers written on the test itself.

1. No greenhouse effect occurs on Mercury because of no
 - a. daily spin
 - b. atmosphere
 - c. relatively cool regions
 - d. plant life
 - e. terrestrial radiation
2. The planet with a mass most like Earth's is
 - a. Mercury
 - b. Venus
 - c. Mars
 - d. Saturn
 - e. Neptune
3. The parts of Saturn's rings with the greatest rotational speed are the
 - a. inner parts
 - b. outer parts
 - c. neither; all parts of Saturn's rings rotate equally
4. The planet most like the sun is
 - a. Mercury
 - b. Venus
 - c. Jupiter
 - d. Uranus
 - e. Neptune
5. Asteroids orbit the
 - a. sun
 - b. earth
 - c. moon
 - d. all of these
 - e. none of these
6. In a museum collection you could likely see a
 - a. meteoroid but not a meteorite
 - b. meteor but not a meteoroid
 - c. meteorite but not a meteoroid
7. Most "shooting stars" are actually about the size of
 - a. grains of sand
 - b. baseballs
 - c. small buildings
 - d. very large buildings
 - e. small continents
8. The general direction of a comet's tail is
 - a. toward the sun
 - b. away from the sun
 - c. neither of these
9. The consequences of a comet's tail sweeping across the earth would be
 - a. virtually negligible
 - b. catastrophic
 - c. like an enhanced Aurora Borealis worldwide
 - d. completely unpredictable
10. The core of the moon is
 - a. solid
 - b. liquid
 - c. gaseous
 - d. not enough information is known to answer

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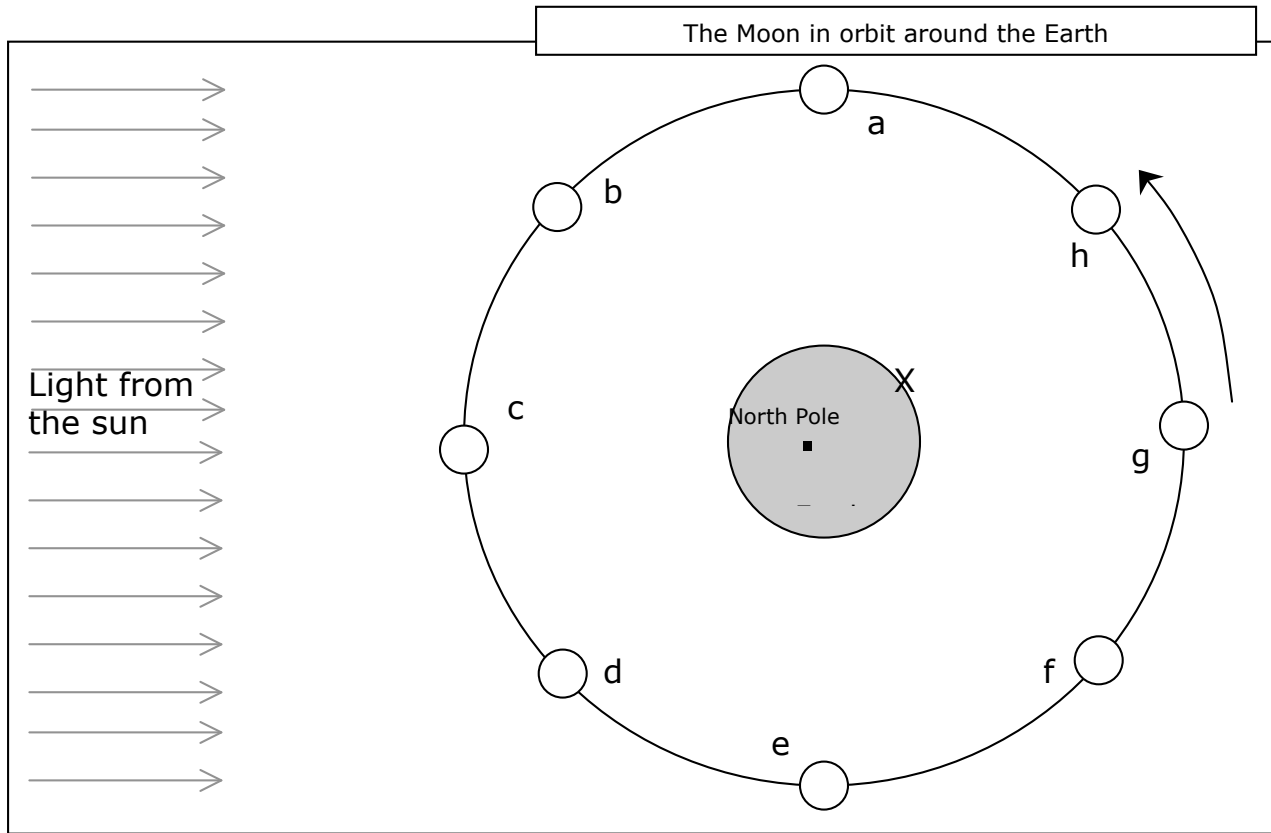
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11. The reason we don't have lunar eclipses monthly is because of the
- relatively close distance of the moon and the earth
 - relatively long distance to the sun
 - tapering of the sun's rays
 - different orbital planes for the earth and the moon
 - 23° tilt of the earth's axis
12. The age of our solar system is most nearly
- 1.3 billion years
 - 4.6 billion years
 - 5.5 billion years
 - 14 billion years
13. The planet that is most tipped on its orbital plane is
- Mars
 - Jupiter
 - Saturn
 - Uranus
 - Neptune
14. The most abundant gas in Earth's atmosphere is
- oxygen
 - nitrogen
 - water vapor
 - carbon dioxide
 - methane
15. The most abundant gas in Venus' atmosphere is
- oxygen
 - nitrogen
 - water vapor
 - carbon dioxide
 - methane
16. The most abundant gas in Mars' atmosphere is
- oxygen
 - nitrogen
 - water vapor
 - carbon dioxide
 - methane
17. Neptune was discovered by irregularities in the orbit of
- Jupiter
 - Saturn
 - Uranus
 - Pluto
 - Earth
18. Each second, the sun's mass
- Decreases
 - Increases
 - Remains unchanged
19. Pluto's status as a planet was removed because
- its orbital period is too long
 - it is gradually leaving the solar system
 - it has no atmosphere
 - other Kuiper Belt objects are even bigger than Pluto
20. On which of the following bodies would you NOT find a volcano?
- Earth
 - Callisto
 - Mars
 - Io

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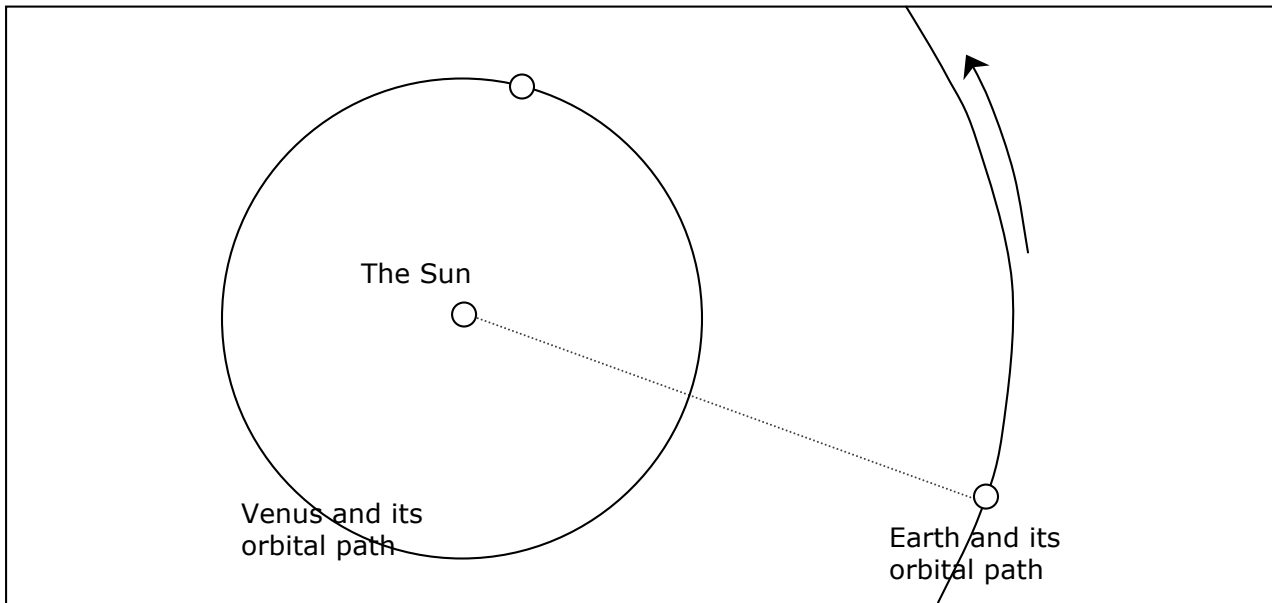
Given the following drawing of the Earth and moon, answer questions 21 to 26 on your answer sheet.



21. What is the phase of the moon at position b?
 - a. Waning gibbous
 - b. Full
 - c. Waning Crescent
 - d. Waxing Crescent
22. How many degrees is the moon's orbital plane inclined to the Earth's?
 - a. 0°
 - b. 5°
 - c. 9°
 - d. 10°
23. A waxing moon is going
 - a. from full to new
 - b. from quarter to full
 - c. from new to quarter
 - d. from new to full
24. On your answer sheet, draw the phase of the moon at position d
25. If you were standing at the equator, at position X, what would the time be?
 - a. 9am
 - b. 6pm
 - c. 3am
 - d. 9pm
26. On your answer sheet tell what season of the year this drawing represents and why.

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Given the Sun, Earth and Venus in the drawn positions below, answer questions 27 to 31 on your answer sheet.

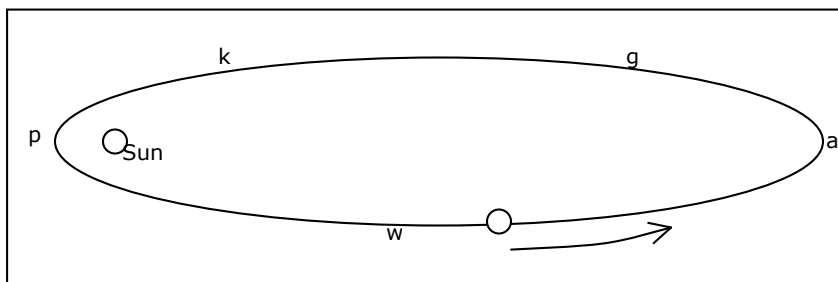


27. On your answer sheet, draw the phase of Venus as seen from Earth.
28. How much of Venus' surface is receiving sunlight?
- 0%
 - 50%
 - 72%
 - 100%
29. In one Earth month from the time of this drawing, will the phase of Venus
- Wax
 - Wane
 - Stay the same
 - Eclipse
30. Venus would best be seen from Earth
- At midnight
 - In the morning
 - In the evening
 - At noon
31. What distance does the straight line in the above drawing represent?
- 100 million miles
 - 1AU
 - 127 million km
 - 1.3×10^7 km
32. Which of the following is Kepler's Third Law of Planetary motion?
- $F = ma$
 - $Y = mX + b$
 - $P^2 = C R^3$
 - Equal sweeps in equal times

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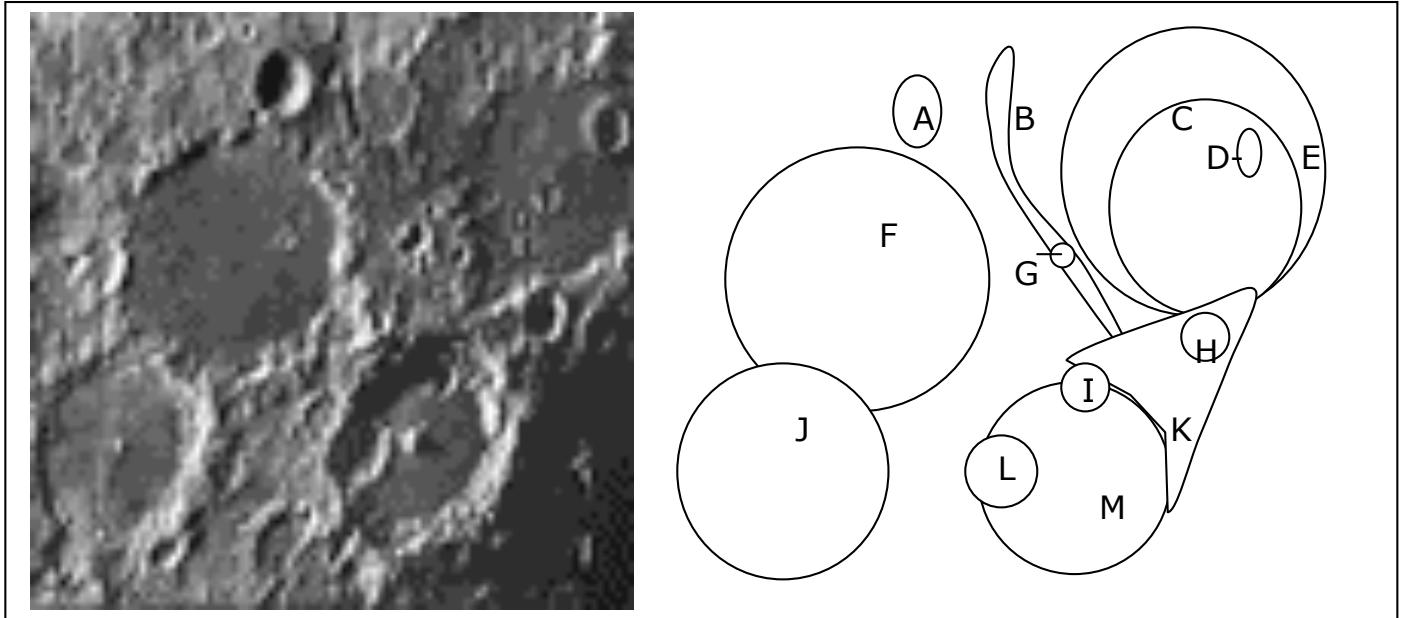
Using the drawing below, answer questions 33 through 35 on your answer sheet.



33. At which letter is the object moving with the greatest tangential speed?
- a. a
 - b. g
 - c. k
 - d. p
34. The object in orbit has a high
- a. Minor axis
 - b. Eccentricity
 - c. Orbital ratio
 - d. Perihelion distance
35. The object in orbit is probably
- a. A planet
 - b. A moon
 - c. A comet
 - d. A cow jumping over the moon

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Given the following picture and accompanying diagram representing the set of impact craters and lunological events in the picture, answer questions, using the multiple choice letter on your answer sheet.



36. Of the following, which is the youngest crater?

- a. C
- b. D
- c. E
- d. Unable to determine

39. Of the following, which is the oldest crater?

- a. C
- b. M
- c. Unable to determine

37. Of the following, which is the oldest event?

- a. B
- b. G
- c. H
- d. I
- e. Unable to determine

40. Of the following, which is the youngest event?

- a. M
- b. I
- c. K
- d. B
- e. Unable to determine

38. Of the following, which is the oldest crater?

- a. A
- b. F
- c. J
- d. Unable to determine

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Short Answer:

On your answer sheet, write the word or phrase that best answers each question.

41. What planet in our solar system ranks 4th in size?
42. Why is the Leonid Meteor Shower so named?
43. What was the first spacecraft to fly by Jupiter?
44. What are the names of the two rovers currently exploring the surface of Mars?
45. Which are older, the lunar Maria or the moon's rocky highlands?
46. List all the planets that have ring systems.
47. What planet has surface features most similar to Earth's moon?
48. Which moon in the solar system is actually larger than the planet Mercury?
49. For what reason does Venus have a hotter average surface temperature than Mercury, even though Mercury is closer to the sun?
50. What planet other than Jupiter was famous for a giant, swirling dark spot?

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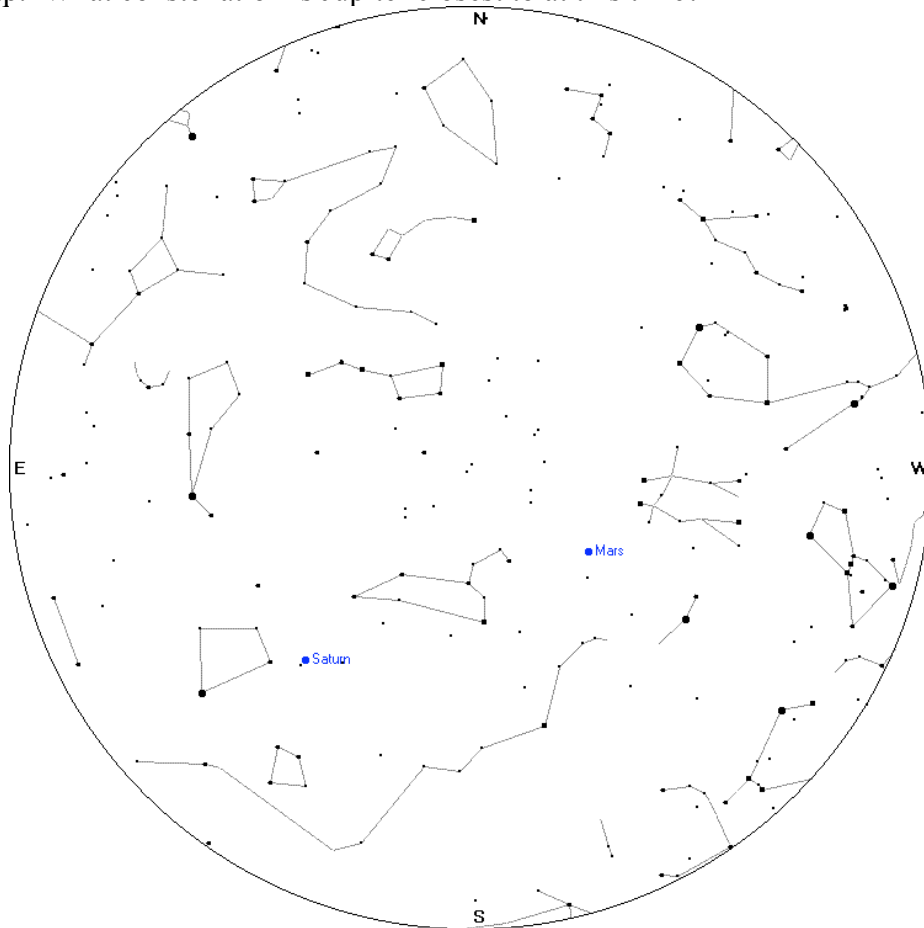
Planet Location / Star Charts:

On your answer sheet, write the word or phrase that best answers each question.

51. Today is February 6, 2010. If you looked in the constellation of Cancer tonight at 9:00 pm, what planet would you see?

For question 52, use the star chart shown below:

52. If you stayed up even later, until 4:00am, you would see the planet Jupiter as shown on this star map. What constellation is Jupiter closest to at this time?



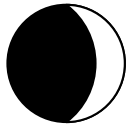
53. Finally, if you stayed up almost until sunrise, you would see a planet rise in the southeast very near the small constellation of Scutum. What planet is this?

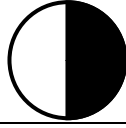
When you finish the test, double-check your answers and hand the answer sheet in to the proctor. Keep this test booklet and give it to your head coach.

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**Solar System
Answer Key**

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1.	B
2.	B
3.	A
4.	C
5.	A
6.	C
7.	A
8.	B
9.	A
10.	A
11.	D
12.	B
13.	D
14.	B
15.	D
16.	D
17.	C
18.	A
19.	D
20.	B
21.	C
22.	B
23.	D
24.	
25.	C

26.	summer, since the north pole is inclined towards the sun.
27.	
28.	B
29.	A
30.	B
31.	B
32.	C
33.	D
34.	B
35.	C
36.	B
37.	A
38.	B
39.	A
40.	B
41.	Neptune
42.	Meteors appear to originate from constellation of Leo
43.	Pioneer 10

44.	Spirit and Opportunity
45.	Rocky Highlands
46.	Jupiter, Saturn, Uranus, and Neptune (need all 4)
47.	Mercury
48.	Ganymede
49.	Greenhouse effect or Dense Atmosphere
50.	Neptune
51.	Mars
52.	Virgo
53.	Mercury