Quizbank/Test

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Astronomy midterm Test 3 Study Guide

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At the end of this document

- Attribution for the quizzes identifies where the questions were obtained
- Study guide links reading materials and/or relevant equations.
Astronomy midterm Test 3 Study Guide-v1s1

1. The incomplete rims seen in the figure are caused by:
   ___ a) vulcanism
   ___ b) low surface gravity
   ___ c) micrometeorite erosion
   ___ d) meteorite erosion
   ___ e) rilles

2. Rilles are caused by
   ___ a) impacts
   ___ b) meteorites
   ___ c) meteors
   ___ d) water
   ___ e) lava

3. In the Wikipedia excerpt on "Planetary Astronomy" the mechanism by which a meander grows over time was discussed. Which of the the following is best describes why meanders grow? (Pick only one best answer)
   ___ a) wind erosion
   ___ b) a combination of deposition and erosion
   ___ c) combination of erosion and underlying bedrock strength
   ___ d) occasional periods of intense flooding
   ___ e) combination of deposition and underlying bedrock strength
4. When imaged in visible light Venus appears like ______ rather than ______.
   ___ a) Venus ... Mars
   ___ b) an asteroid ... a terrestrial planet
   ___ c) a gas dwarf ... a rocky planet
   ___ d) Mars ... Venus

5. The clouds on Venus are made of
   ___ a) carbon dioxide
   ___ b) water
   ___ c) steam
   ___ d) nitrogen
   ___ e) sulfuric acid

6. The geology of Venus is predominantly
   ___ a) Picrite
   ___ b) Andesite
   ___ c) Basalt

7. Basalt is what type of rock?
   ___ a) Sedimentary
   ___ b) Metamorphic
   ___ c) Igneous

8. The rocks on Venus are mostly
   ___ a) associated with plate tectonics
   ___ b) from the seabed of a now non-existent ocean
   ___ c) from volcanoes
9. The rocky surface of the planet Venus can be detected when Venus is observed using infrared astronomy.
   ___ a) TRUE
   ___ b) FALSE

10. When Venus is viewed in the ultraviolet, its color appears brownish.
    ___ a) TRUE
    ___ b) FALSE

11. Moldavite is a mineral that may be associated with what radiation astronomy phenomenon?
    ___ a) evidence that Venus was once a comet
    ___ b) lightening strikes
    ___ c) predicting when currently dormant volcanoes will erupt
    ___ d) meteorite impacts and fireballs

12. According to Wikipedia, a "mineral" is a naturally occurring solid that
    ___ a) is heterogeneous
    ___ b) does not contain carbon
    ___ c) is by a chemical formula
    ___ d) contains carbon
    ___ e) has useful value
13. Which types of radiation astronomy directly observe the rocky-object surface of Venus?
   ___ a) X-ray astronomy
   ___ b) visual astronomy
   ___ c) radio astronomy
   ___ d) ultraviolet astronomy
   ___ e) infrared astronomy

14. One reason that Venus's atmosphere has more carbon dioxide than Earth's is that
   ___ a) Venus was too hot for oceans that could absorb the carbon dioxide
   ___ b) the mass of Venus is slightly higher
   ___ c) Venus has a lower magnetic field that disassociates carbon dioxide
   ___ d) Venus is exposed to a stronger solar wind strips away the other gasses

15. The surface temperature of Venus is about
   ___ a) 850 Fahrenheit (730 Kelvin or 230 Celsius)
   ___ b) 450 Fahrenheit (500 Kelvin or 66 Celsius)
   ___ c) 150 Fahrenheit (340 Kelvin or 66 Celsius)

16. The Venetian atmosphere consists of mostly carbon dioxide and
   ___ a) oxygen
   ___ b) helium
   ___ c) nitrogen
   ___ d) sulfuric acid
   ___ e) hydrogen
17. These drawings by Schiaparelli and Lowell were ultimately shown to be:

___ a) rift valleys
___ b) optical illusions
___ c) slip faults
___ d) subduction zones
___ e) rilles

18. Antipodal to the Tharsis bulge is

___ a) What Wikipedia contends IS an active volcano
___ b) the northern lowlands
___ c) What Wikipedia contends MIGHT BE an impact basin
___ d) What Wikipedia contends IS an impact basin
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19. The lobate feature shown in the figure is evidence of

___ a) wind erosion
___ b) plate tectonics
___ c) water flow
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___ e) lava flow
20. The Martian dichotomy separates
   ___ a) the crust from the mantle
   ___ b) the rift valley from the volcanoes
   ___ c) the highlands from the lowlands
   ___ d) the Tharsus buldge from Hellas basin
   ___ e) Valles Marineris from Olympus Mons

21. According to Wikipedia, ______ was formed due to swelling of the Tharsis bulge which caused the crust to collapse
   ___ a) Hellas basin
   ___ b) the northern lowlands
   ___ c) the southern lowlands
   ___ d) Valles Marineris
   ___ e) Elysium

22. What is this hematite?

   ___ a) irrefutable evidence that Mars once had life
   ___ b) evidence that Mars once had active volcanoes
   ___ c) evidence that Mars once had oceans
   ___ d) controversial evidence that Mars once had life
   ___ e) evidence that Mars now has active volcanoes
23. The polar ice caps on Mars are __
   __ a) actually clouds above the surface of Mars
   __ b) a nearly equal mix of water and carbon dioxide
   __ c) caused by geysers
   __ d) mostly water
   __ e) mostly carbon dioxide

24. Liquid water cannot exist on Mars due to __
   __ a) the solar wind
   __ b) high pressure
   __ c) low pressure
   __ d) high temperature
   __ e) low temperature

25. What is at the center of this magnified image of a Martian meteorite? fragment?
   __ a) controversial evidence that Mars once had life
   __ b) evidence that Mars now has active volcanoes
   __ c) evidence that Mars once had active volcanoes
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26. It is important to distinguish between molecules (collectively) in a gas and one individual molecule. This question is about an individual molecule. For a planet with a given mass, size, and density, which has the greater escape velocity?

   ___ a) the heavier molecule has the greater escape velocity
   ___ b) no molecules have escape velocity
   ___ c) the lighter molecule has the greater escape velocity
   ___ d) all molecules move at the escape velocity
   ___ e) all molecules have the same escape velocity

27. It is important to distinguish between molecules (collectively) in a gas and one individual molecule. This question is about a typical molecule in the gas. For a planet with a given mass, size, and density, which type of gas is more likely to escape?

   ___ a) all types of gas are equally likely to escape
   ___ b) atoms in a denser gas are more likely to escape
   ___ c) atoms in a hotter gas is more likely to escape
   ___ d) atoms in a colder gas are more likely to escape
   ___ e) atoms in a gas with more atomic mass are more likely to escape

28. Which type of gas is likely to have the faster particles?

   ___ a) a hot gas with high mass atoms
   ___ b) a cold gas with low mass atoms
   ___ c) all gasses on a given planet have the same speed
   ___ d) a cold gas with high mass atoms
   ___ e) a hot gas with low mass atoms
29. What is it about the isotopes of Argon-36 and Argon-38 that causes their relative abundance to be so unusual on Mars?

___ a) different speed
___ b) different half-life
___ c) identical abundance
___ d) different chemical properties
___ e) identical mass

30. In the formula, \( \frac{1}{2} m_{\text{atom}} v_{\text{escape}}^2 = G_{\text{Newton}} \frac{M_{\text{planet}} m_{\text{atom}}}{r_{\text{planet}}} \), which of the following is FALSE?

___ a) the formula is valid for all launch angles
___ b) the formula can be used to estimate how fast an atom must move before exiting the planet
___ c) \( v_{\text{escape}} \) is independent of \( m_{\text{atom}} \)
___ d) the formula is valid only if the particle is launched from the surface of planet of radius \( r_{\text{planet}} \)
___ e) the particle is assumed to have been launched vertically

31. What statement is FALSE about \( \frac{1}{2} m_{\text{atom}} \langle v_{\text{atom}}^2 \rangle_{\text{ave}} = \frac{1}{2} k_B T \)?

___ a) This equation does not involve the size or mass of the planet.
___ b) The average speed of a low mass particle is higher than the average speed of a high mass particle
___ c) Temperature is measured in Centigrades
___ d) The kinetic energy is directly proportional to temperature.
___ e) Temperature is measured in Kelvins
32. \( \frac{1}{2} m_{\text{atom}} \langle v_{\text{atom}}^2 \rangle_{\text{ave}} = \frac{1}{2} k_B T \), where \( T \) is temperature on the Kelvin scale. This formula describes:

___ a) The speed of a typical atom, where \( m \) is the mass of the atom.
___ b) The speed an atom needs to escape the planet, where \( m \) is the mass planet.
___ c) The speed an atom needs to orbit the planet, where \( m \) is the mass of the atom.
___ d) The speed an atom needs to escape the planet, where \( m \) is the mass of the atom.
___ e) The speed of a typical atom, where \( m \) is the mass of the planet.

33. How does the density of a Galilean moon depend on its distance from Jupiter?

___ a) the density of the moons is unknown
___ b) all the moons have nearly the same density
___ c) the more dense moon is closer to Jupiter (always)
___ d) the less dense moon is closer to Jupiter (always)
___ e) the most dense moon is neither the closest nor the most distant

34. How does the mass of a Galilean moon depend on its distance from the central body?

___ a) all the moons have nearly the same mass
___ b) the most massive moon is neither the closest nor the most distant
___ c) the less massive moon is closer to Jupiter (always)
___ d) the mass of the moons is unknown
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35. Does Jupiter's moon Io have craters?
   ___ a) yes, from impacts
   ___ b) yes, from volcanoes
   ___ c) yes, about half from impacts and the others from volcanoes
   ___ d) no, the surface is too old
   ___ e) no, the surface is too new

36. The mechanism that heats the cores of the Galilean moons is
   ___ a) radioactive decay of heavy elements
   ___ b) tides from the other moons and Jupiter
   ___ c) radiation from the Sun
   ___ d) tides from Jupiter
   ___ e) radiation from the Sun and from Jupiter

37. Immediately after publication of Newton's laws of physics (Principia), it was possible to "calculate" the mass of Jupiter. What important caveat applied to this calculation?
   ___ a) tides from the other moons and Jupiter.
   ___ b) Only the mass of Jupiter relative to that of the Sun could be determined.
   ___ c) They needed to wait over a decade for Jupiter to make approximately one revolution around the Sun.
   ___ d) The different moons yielded slightly different values for the mass of Jupiter.
   ___ e) The different moons yielded vastly different values for the mass of Jupiter.
38. Ganymede, Europa, and Io have ratios in __________ that are 1:2:4.
   ___ a) orbital period
   ___ b) density
   ___ c) Two other answers are correct (making this the only true answer).
   ___ d) rotational period
   ___ e) Argon isotope abundance

39. Which of Jupiter's moons has an anhydrous core?
   ___ a) Two other answers are correct (making this the only true answer).
   ___ b) Ganymede
   ___ c) Io
   ___ d) Europa
   ___ e) Ganymede

40. The 1982 Voyager flyby of Miranda (a moon of Uranus) established that _____
   ___ a) Miranda has the largest active volcano in the solar system
   ___ b) Miranda probably has an iron core
   ___ c) Two other answers are correct (making this the only true answer).
   ___ d) inspired a theory a previous incarnation was destroyed by a collision
   ___ e) Miranda has geysers.

41. It has been suggested that Miranda's "racetrack"
   ___ a) is antipodal to an impact crater
   ___ b) Two other answers are correct (making this the only true answer).
   ___ c) is an impact crater
   ___ d) is associated with tidal heating
   ___ e) is a series of rifts created by an upwelling of warm ice
42. According to Wikipedia, the largest lakes on Titan are probably fed by
___ a) rivers from the highlands
___ b) geysers
___ c) underground aquifers
___ d) methane rain
___ e) liquid water rain

43. The bright spot on Saturn's moon Titan is
___ a) a lake
___ b) a volcano
___ c) aurora borealis (northern lights)
___ d) solar wind particles striking the atmosphere
___ e) lightening

44. One "year" on Saturn's largest moon Titan lasts
___ a) 3 hours
___ b) 30 hours
___ c) 30 years
___ d) 300 days
___ e) 3 years
45. The photographs compare
   ___ a) wet and dry seasons
   ___ b) winter windstorms and summer doldrums
   ___ c) summer windstorms and winter doldrums
   ___ d) Titan and Earth
   ___ e) northern and southern hemispheres

46. The liquid water ocean of Saturn's largest moon Titan,
   ___ a) is known to contain life
   ___ b) explains how the elevation of a smooth planet seems to rise and fall
   ___ c) Two other answers are correct
   ___ d) is postulated to cover 15-30% of its surface
   ___ e) is less than one meter in depth

47. The black spot in this image of Jupiter is
   ___ a) a solar eclipse
   ___ b) an electric storm
   ___ c) the shadow of a moon
   ___ d) Two other answers are correct (making this the only true answer).
   ___ e) a magnetic storm
48. Which of the following statements is FALSE?

___ a) Jupiter emits more energy than it receives from the Sun
___ b) Jupiter has four large moons and many smaller ones
___ c) The Great Red Spot is a storm that has raged for over 300 years
___ d) Jupiter has a system of rings
___ e) Jupiter is the largest known planet

49. What is the mechanism that heats the interior of Jupiter?

___ a) rain
___ b) radioactivity
___ c) magnetism
___ d) tides
___ e) electricity

50. Why is Jupiter an oblate spheroid?

___ a) rotation about axis
___ b) tides from the Jupiter's moons
___ c) tides from the Sun
___ d) revolution around Sun
___ e) tides from other gas planets
51. What statement best describes the Wikipedia's explanation of the helium (He) content of Jupiter's upper atmosphere (relative to the hydrogen (H) content)?

   ___ a) Jupiter and the Sun have nearly the same ratio of He to H.
   ___ b) Jupiter's atmosphere has 80% more He because Jupiter's hydrogen fell to the core.
   ___ c) Jupiter's atmosphere has 80% more He because Jupiter's hydrogen escaped into space.
   ___ d) Jupiter's atmosphere has only 80% as much helium because the He escaped into space.
   ___ e) Jupiter's atmosphere has only 80% as much helium because the He fell to the core.

52. Where is the Sun-Jupiter barycenter?

   ___ a) At the center of Jupiter
   ___ b) The question remains unresolved
   ___ c) Just above the Sun's surface
   ___ d) Just above Jupiter's surface
   ___ e) At the center of the Sun

53. The barycenter of two otherwise isolated celestial bodies is?

   ___ a) both of these are true
   ___ b) the focal point of two elliptical orbital paths
   ___ c) a place where two bodies exert equal and opposite gravitational forces

54. Knowing the barycenter of two stars is useful because it tells us the total mass

   ___ a) TRUE
   ___ b) FALSE

55. Knowing the barycenter of two stars is useful because it tells us the ratio of the two masses

   ___ a) TRUE
   ___ b) FALSE
56. Although there is some doubt as to who discovered Jupiter's great red spot, it is generally credited to
   __ a) Galileo in 1605
   __ b) Messier in 1771
   __ c) Newton in 1668
   __ d) Cassini in 1665
   __ e) Tycho in

57. The bands in the atmosphere of Jupiter are associated with a pattern of alternating wind velocities that are
   __ a) easterly and westerly
   __ b) updrafts and downdrafts
   __ c) both of these

58. As one descends down to Jupiter's core, the temperature
   __ a) stays about the same
   __ b) decreases
   __ c) increases

59. Which of the following is NOT used to measure the mass of a planet
   __ a) the motion of an artificial satellite
   __ b) the motion of a moon
   __ c) the rotation of the planet about its axis
   __ d) the motion of a neighboring planet
   __ e) all of these have been used
60. What is unusual about calculations of the mass of Pluto made in the early part of the 20th century?
   ___ a) It was the first time a planet's period of orbit around the sun was used to calculate the planet's mass
   ___ b) The estimates were too low. Pluto was actually more massive than they thought.
   ___ c) The estimates were high. Pluto was less massive than they calculated
   ___ d) It was the first time a moon was used to calculate the mass of a planet
   ___ e) The estimates were correct to within less than 10%

61. Why was the discovery of Pluto peculiar?
   ___ a) It was discovered during a survey looking for stars
   ___ b) It was the first time a planet's period of orbit around the sun was used to calculate the planet's mass
   ___ c) It was seen by Galileo, who thought it was a star
   ___ d) It was seen by Halley, who was looking for comets
   ___ e) It was discovered by a calculation based on flawed assumptions

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63. Which statement describes the relation between Pluto and Neptune
   ___ a) Pluto's orbit intersects Neptune's orbit an the two bodies will eventually collide
   ___ b) Pluto's orbit intersects Neptune's orbit but they don't collide because of an orbital resonance between the two
   ___ c) Pluto's orbit intersects Neptune's orbit but they avoid each other because Pluto's mass is too small
   ___ d) Pluto's orbit lies outside Neptune's orbit
Key to Astronomy midterm Test 3 Study Guide-v1s1

1. The incomplete rims seen in the figure are caused by:

   + a) vulcanism
   - b) low surface gravity
   - c) micrometeorite erosion
   - d) meteorite erosion
   - e) rilles

2. Rilles are caused by

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3. In the Wikipedia excerpt on "Planetary Astronomy" the mechanism by which a meander grows over time was discussed. Which of the the following is best describes why meanders grow? (Pick only one best answer)

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   - a) all types of gas are equally likely to escape
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40. The 1982 Voyager flyby of Miranda (a moon of Uranus) established that ______
   - a) Miranda has the largest active volcano in the solar system
   - b) Miranda probably has an iron core
   - c) Two other answers are correct (making this the only true answer).
   + d) inspired a theory a previous incarnation was destroyed by a collision
   - e) Miranda has geysers.

41. It has been suggested that Miranda's "racetrack"
   - a) is antipodal to an impact crater
   + b) Two other answers are correct (making this the only true answer).
   - c) is an impact crater
   - d) is associated with tidal heating
   - e) is a series of rifts created by an upwelling of warm ice
42. According to Wikipedia, the largest lakes on Titan are probably fed by
   - a) rivers from the highlands
   - b) geysers
   + c) underground aquifers
   - d) methane rain
   - e) liquid water rain

43.

The bright spot on Saturn's moon Titan is
   + a) a lake
   - b) a volcano
   - c) aurora borealis (northern lights)
   - d) solar wind particles striking the atmosphere
   - e) lightening

44. One "year" on Saturn's largest moon Titan lasts
   - a) 3 hours
   - b) 30 hours
   + c) 30 years
   - d) 300 days
   - e) 3 years
45. The photographs compare

- a) wet and dry seasons
- b) winter windstorms and summer doldrums
- c) summer windstorms and winter doldrums
- d) Titan and Earth
- e) northern and southern hemispheres

46. The liquid water ocean of Saturn's largest moon Titan,

- a) is known to contain life
- b) explains how the elevation of a smooth planet seems to rise and fall
- c) Two other answers are correct
- d) is postulated to cover 15-30% of its surface
- e) is less than one meter in depth

47. The black spot in this image of Jupiter is

- a) a solar eclipse
- b) an electric storm
- c) the shadow of a moon
- d) Two other answers are correct (making this the only true answer).
- e) a magnetic storm
48. Which of the following statements is FALSE?

- a) Jupiter emits more energy than it receives from the Sun
- b) Jupiter has four large moons and many smaller ones
- c) The Great Red Spot is a storm that has raged for over 300 years
- d) Jupiter has a system of rings
+ e) Jupiter is the largest known planet

49. What is the mechanism that heats the interior of Jupiter?

+ a) rain
- b) radioactivity
- c) magnetism
- d) tides
- e) electricity

50. Why is Jupiter an oblate spheroid?

+ a) rotation about axis
- b) tides from the Jupiter's moons
- c) tides from the Sun
- d) revolution around Sun
- e) tides from other gas planets
51. What statement best describes the Wikipedia's explanation of the helium (He) content of Jupiter's upper atmosphere (relative to the hydrogen (H) content)?

- a) Jupiter and the Sun have nearly the same ratio of He to H.
- b) Jupiter's atmosphere has 80% more He because Jupiter's hydrogen fell to the core.
- c) Jupiter's atmosphere has 80% more He because Jupiter's hydrogen escaped into space.
- d) Jupiter's atmosphere has only 80% as much helium because the He escaped into space.
+ e) Jupiter's atmosphere has only 80% as much helium because the He fell to the core.

52. Where is the Sun-Jupiter barycenter?

- a) At the center of Jupiter
- b) The question remains unresolved
+ c) Just above the Sun's surface
- d) Just above Jupiter's surface
- e) At the center of the Sun

53. The barycenter of two otherwise isolated celestial bodies is?

- a) both of these are true
+ b) the focal point of two elliptical orbital paths
- c) a place where two bodies exert equal and opposite gravitational forces

54. Knowing the barycenter of two stars is useful because it tells us the total mass

- a) TRUE
+ b) FALSE

55. Knowing the barycenter of two stars is useful because it tells us the ratio of the two masses

+ a) TRUE
- b) FALSE
56. Although there is some doubt as to who discovered Jupiter's great red spot, it is generally credited to
   - a) Galileo in 1605
   - b) Messier in 1771
   - c) Newton in 1668
   + d) Cassini in 1665
   - e) Tycho in

57. The bands in the atmosphere of Jupiter are associated with a pattern of alternating wind velocities that are
   - a) easterly and westerly
   - b) updrafts and downdrafts
   + c) both of these

58. As one descends down to Jupiter's core, the temperature
   - a) stays about the same
   - b) decreases
   + c) increases

59. Which of the following is NOT used to measure the mass of a planet
   - a) the motion of an artificial satellite
   - b) the motion of a moon
   + c) the rotation of the planet about its axis
   - d) the motion of a neighboring planet
   - e) all of these have been used
60. What is unusual about calculations of the mass of Pluto made in the early part of the 20th century?
   - a) It was the first time a planet's period of orbit around the sun was used to calculate the planet's mass
   - b) The estimates were too low. Pluto was actually more massive than they thought.
   + c) The estimates were high. Pluto was less massive than they calculated
   - d) It was the first time a moon was used to calculate the mass of a planet
   - e) The estimates were correct to within less than 10%

61. Why was the discovery of Pluto peculiar?
   - a) It was discovered during a survey looking for stars
   - b) It was the first time a planet's period of orbit around the sun was used to calculate the planet's mass
   - c) It was seen by Galileo, who thought it was a star
   - d) It was seen by Halley, who was looking for comets
   + e) It was discovered by a calculation based on flawed assumptions

62. Which of the following is NOT used to measure the mass of a planet
   - a) the motion of an artificial satellite
   - b) the motion of a moon
   - c) the motion of a neighboring planet
   + d) all of these have been used

63. Which statement describes the relation between Pluto and Neptune
   - a) Pluto's orbit intersects Neptune's orbit an the two bodies will eventually collide
   + b) Pluto's orbit intersects Neptune's orbit but they don't collide because of an orbital resonance between the two
   - c) Pluto's orbit intersects Neptune's orbit but they avoid each other because Pluto's mass is too small
   - d) Pluto's orbit lies outside Neptune's orbit
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