Physics 111 Exam 2
Spring 2026

Multiple Choice. Choose the one alternative that BEST completes the statement or answers the question, and mark your scan sheet. Only the scan sheet will be graded. Each question is equally weighted.

1) Compared to the distance between Earth and Mars, the distance between Jupiter and Saturn is _____.
A) just slightly less B) much larger C) much smaller D) about the same

Answer: B

2) What space travel technique, first used by the Voyager probes, has been widely used to get planetary probes to distant planets in the Solar System?
A) solar sail
B) matter/antimatter warp drive
C) gravity assisted trajectory
D) hydrogen/oxygen rocket engine
E) ion propulsion engine

Answer: C

3) Rank these planets in order of the strength of the greenhouse effect on the planet, from the weakest to the strongest greenhouse effect.
A) Mercury, Earth, Mars, Venus
B) Mars, Mercury, Earth, Venus
C) Mercury, Venus, Earth, Mars
D) Mars, Earth, Venus, Mercury
E) Mercury, Mars, Earth, Venus

Answer: E

4) The polar caps on Mars are composed of _____.
A) salt deposits
B) both frozen carbon dioxide and water ice
C) frozen carbon dioxide only
D) water ice only
E) frozen hydrogen

Answer: B

5) What do we mean when we say that the terrestrial worlds underwent *differentiation*?
A) They lost interior heat to outer space.
B) When their interiors were molten, denser materials sank toward their centers and lighter materials rose toward their surfaces.
C) Their surfaces show a variety of different geological features resulting from different geological processes.
D) The five terrestrial worlds all started similarly but ended up looking quite different.

Answer: B

6) In the Apollo missions to the Moon, three astronauts made the journey. How many of these astronauts actually went to the lunar surface?
A) 3 B) none C) 1 D) 2

Answer: D

7) Which of the following moons is considered likely to have a deep, subsurface ocean of liquid water?
A) Europa B) Io C) Triton D) Miranda

Answer: A

8) Which of the following is *not* a characteristic of *all* the terrestrial planets?
A) They are located closer to the Sun than the jovian planets.
B) They have substantial atmospheres.
C) They have higher densities than the jovian planets.
D) They have solid, rocky surfaces.
E) They are smaller than the jovian planets.

Answer: B

9) Which of the following planets has a ring system?
A) Jupiter
B) Saturn
C) Neptune
D) Uranus
E) All of the above

Answer: E

10) Which planet is most similar in size and mass to Earth?
A) Venus B) Mars C) Jupiter D) Neptune E) Mercury

Answer: A

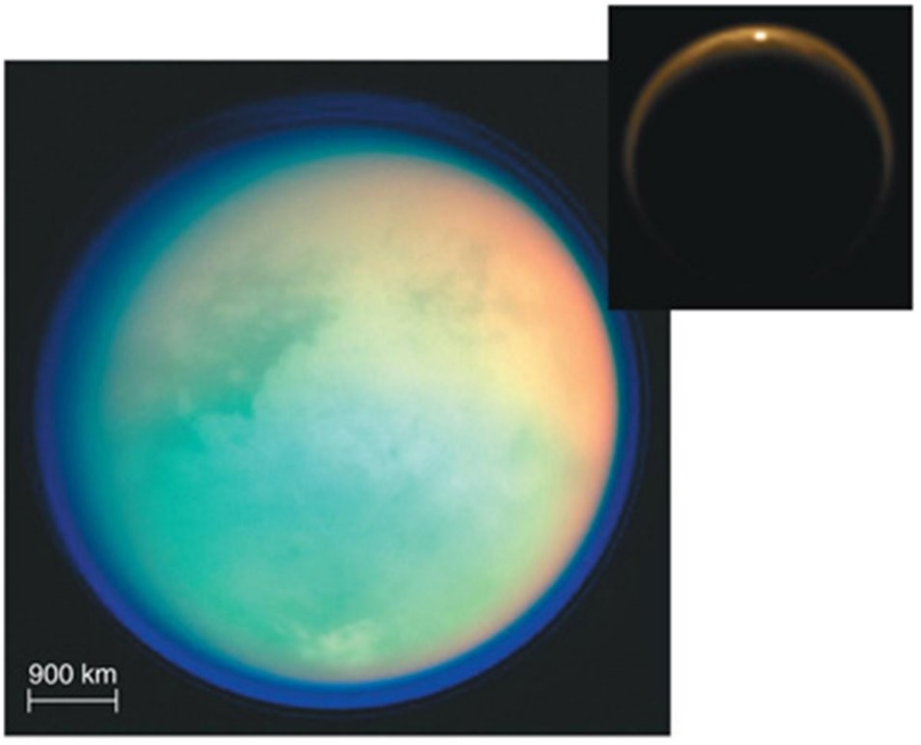
11) A crater of the correct age to be from the impact thought to have caused the extinction of the dinosaurs was found in _____.
A) Northern Africa
B) Chelyabinsk, Russia
C) Tunguska, Siberia
D) Arizona
E) the Yucatán Peninsula in Mexico

Answer: E

12) The U.S. manned spacecraft program that tested all of the techniques (except the actual landing) that were needed for a landing on the moon was
A) the Voyager program
B) the Mercury program
C) the Apollo program
D) the Space Shuttle program
E) the Gemini program

Answer: E

13) What is this object?



A) Neptune's moon Triton
B) Jupiter's moon Europa
C) Uranus's moon Miranda
D) Jupiter's moon Callisto
E) Saturn's moon Titan

Answer: E

14) Which of the following is a general characteristic of the four jovian planets in our solar system?
A) They are significantly lower in average density than are the terrestrial planets.
B) They have very high levels of volcanic and tectonic activity.
C) They rotate more slowly than the terrestrial planets.
D) They are made predominantly of elements heavier than hydrogen and helium.

Answer: A

15) All the following statements are true. Which one is most important in explaining the tremendous tidal heating that occurs on Io?
A) Io exhibits synchronous rotation, meaning that its rotation period and orbital period are the same.
B) Io orbits Jupiter in the Io torus, and therefore has a surface that is bombarded by many charged particles.
C) Io orbits Jupiter on an elliptical orbit as a result of orbital resonances with other moons.
D) Io is the closest to Jupiter of Jupiter's large moons.

Answer: C

16) Which of the four labeled arrows in this photo of the full moon points to one of the *lunar maria*?

A) Arrow 1 B) Arrow 2 C) Arrow 3 D) Arrow 4

Answer: A

17) A rock found on Earth that crashed down from space is called a(n) _____.

A) asteroid B) meteorite C) meteor D) impact

Answer: B

18) Which planet (besides Earth) has been visited by the largest number of robotic spacecraft?

A) Saturn B) Mars C) Jupiter D) Venus

Answer: B

19) If the hypothesis tracing the extinction of the dinosaurs to an impact is correct, the dinosaurs died off largely because _____.

A) the impact caused massive earthquakes worldwide
B) radiation from iridium in the asteroid caused the dinosaurs to die of cancer
C) of global climate effects initiated by dust and smoke that entered the atmosphere after the impact
D) of injuries suffered from direct hits of pieces of the asteroid or comet

Answer: C

20) In October 2022, the NASA mission, Double Asteroid Redirection Test (DART), successfully demonstrated

A) that the impact of a spacecraft could break an asteroid into several smaller pieces.
B) that the impact of a spacecraft could change the orbit of an asteroid.
C) that an asteroid could be towed to a new location by a spacecraft.
D) that the impact of a spacecraft could completly destroy an asteroid.

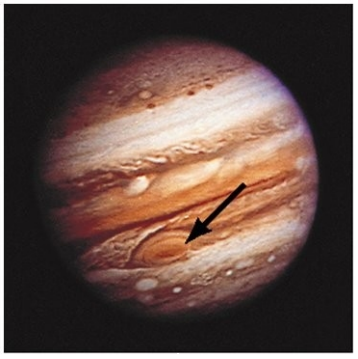
Answer: B

21) The asteroid belt is located _____.

A) beyond the orbit of Neptune B) between the orbits of Mars and Jupiter
C) between the orbits of Jupiter and Saturn D) between the orbits of Earth and Mars

Answer: B

22) What is the name of the feature indicated by the arrow in this photo?



A) The Cassini Division
B) The Great Dark spot
C) The Io torus
D) The Great Red Spot

Answer: D

23) According to the nebular theory of solar system formation, what are asteroids and comets?
A) Chunks of rock or ice that condensed after the planets and moons finished forming
B) The shattered remains of collisions between planets
C) Chunks of rock or ice that were expelled from planets by volcanoes
D) Leftover planetesimals that never accreted into planets

Answer: D

24) What is the *giant impact hypothesis* for the origin of the Moon?
A) The Moon formed from material blasted out of the Earth's mantle and crust by the impact of a Mars-size object.
B) The Moon formed just like the Earth, from accretion in the solar nebula.
C) The Moon formed when two gigantic asteroids collided with one another.
D) The Moon originally was about the same size as Earth, but a giant impact blasted most of it away so that it ended up much smaller than Earth.

Answer: A

25) Which of the following is farthest from the Sun?
A) Pluto
B) An asteroid in the asteroid belt
C) A comet in the Kuiper belt
D) A comet in the Oort cloud
E) Neptune

Answer: D

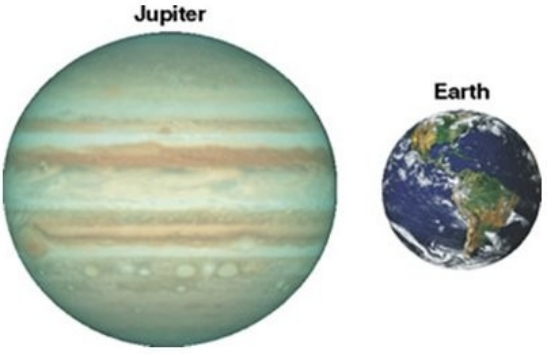
26) Why does Earth have so little carbon dioxide in its atmosphere compared to Venus?
A) Earth once had a lot of carbon dioxide, but it was lost to space during the heavy bombardment early in our solar system's history.
B) Earth has just as much carbon dioxide as Venus, but most of it is locked up in carbonate rocks rather than being free in the atmosphere.
C) Earth's volcanoes outgassed far less carbon dioxide than those on Venus.
D) Chemical reactions turned Earth's carbon dioxide into nitrogen.

Answer: B

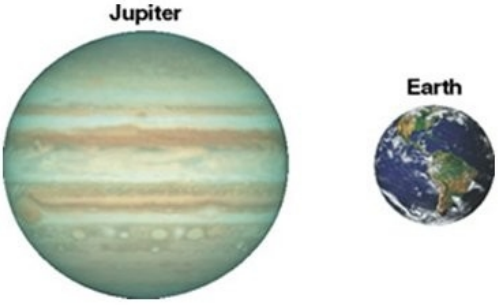
27) Which pair of photos below shows Earth correctly scaled in comparison to Jupiter?

A)

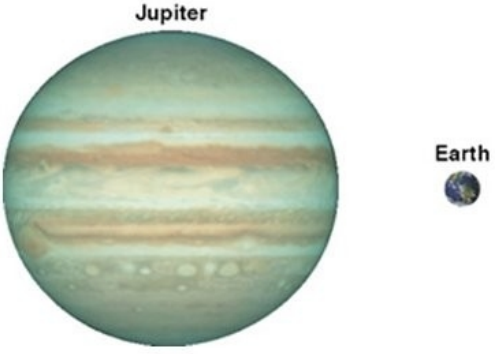
B)



C)



D)



Answer: D

28) The terrestrial planets in our solar system are _____.

A) Mars, Jupiter, Saturn, Uranus, and Neptune
B) Mercury, Venus, Earth, and Mars
C) Pluto and Eris
D) Jupiter, Saturn, Uranus, and Neptune

Answer: B

29) This famous photograph was taken by the Apollo 8 astronauts. It is called

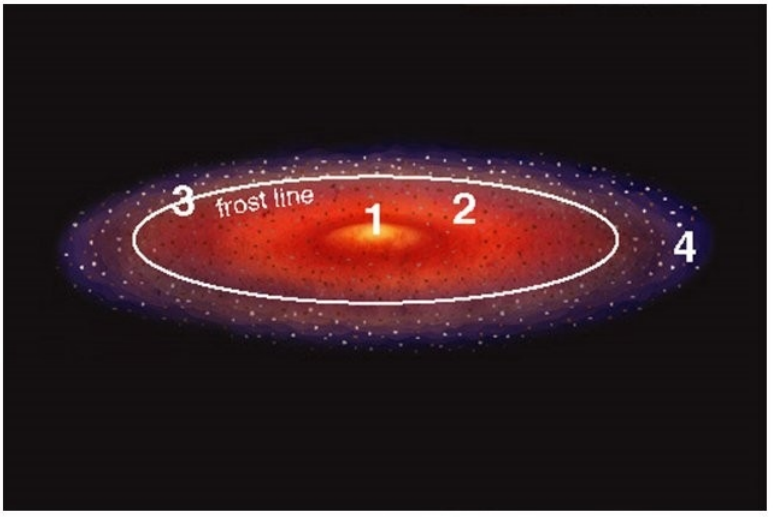
A) The Pale Blue Dot
B) Earthrise
C) Earth, Our Home
D) Earth Upside Down
E) Earth in a Sea of Darkness

Answer: B

30) When a comet is within the inner solar system, its visible tails point _____.
A) perpendicular to the ecliptic plane
B) always almost due north
C) opposite the direction the comet is moving in its orbit
D) away from the Sun
E) in the direction the comet is moving in its orbit

Answer: D

31) This diagram represents the solar nebula early in its history and shows the location of the *frost line*. Suppose you discover an object that is made of metal, rock, and ice. In which of the four regions shown in the diagram did it form?



A) Region 1 B) Region 2 C) Region 3 D) Region 4

Answer: D

32) Which of the following was the first strong evidence for an asteroid impact being the cause of the extinction of the dinosaurs 65 million years ago (as well as 75% of all species alive at the time)?

A) The discovery of asteroid fragments in dinosaur bones dating to that time
B) A worldwide layer rich in the element iridium that dates to that time
C) Careful studies of lunar craters suggesting an unusually large number of impact at that time
D) The fact that dinosaurs appear to have gone abruptly extinct at about that time

Answer: B

33) This photo shows Comet Hale-Bopp in the night sky. Suppose you had taken another photograph from the same spot 10 minutes after this photo was taken. How would the scene have appeared at that time?

A) We would see lots of smoke coming from the point where the comet crashed into the mountains.
B) It would have looked virtually the same.
C) We'd still see the same stars, but the comet would be out of sight, having passed below the horizon.
D) We'd still see the same stars, but the comet would have moved far enough so that we'd be able to see only its tails and not its coma above the horizon.

Answer: B

34) Which of the following best describes how the *greenhouse effect* works?
A) Greenhouse gases absorb X rays and ultraviolet light from the Sun, and this absorbed radiation then heats the atmosphere and the surface.
B) Greenhouse gases absorb infrared light coming from the Sun, and this absorbed sunlight heats the lower atmosphere and the surface.
C) A planet's surface absorbs visible sunlight and returns this absorbed energy to space as infrared light. Greenhouse gases slow the escape of this infrared radiation, which thereby heats the lower atmosphere.
D) The greenhouse effect is caused primarily by ozone, which absorbs ultraviolet light and thereby makes the atmosphere much hotter than it would be otherwise.

Answer: C

35) Comets with orbits that take them through the inner solar system shed sand- to pebble-size particles that then follow the comet around its orbit. How do these particles affect Earth?
A) They are the particles that produce meteor showers.
B) They have been implicated in mass extinctions, including the extinction of the dinosaurs.
C) They are the particles that produce the lights of auroras.
D) On rare occasions, they can blanket our entire atmosphere with dust.

Answer: A

36) Suppose that Earth's atmosphere had no greenhouse gases. Then Earth's average surface temperature would be _____.

A) about the same as it is now
B) well below the freezing point of water
C) slightly cooler, but still above freezing
D) slightly warmer, but still well below the boiling point of water

Answer: B

37) Why didn't a planet form where the asteroid belt is now located?

A) Gravitational tugs from Jupiter prevented material from collecting together to form a planet.
B) There was not enough material in this part of the solar nebula to form a planet.
C) There was too much rocky material to form a terrestrial planet, but not enough gaseous material to form a jovian planet.
D) The temperature in this portion of the solar nebula was just right to prevent rock from sticking together.

Answer: A

38) The jovian planets in our solar system are _____.

A) Jupiter, Saturn, Uranus, and Neptune
B) Pluto and Eris
C) Mercury, Venus, Earth, and Mars
D) Io, Europa, Ganymede, and Callisto

Answer: A

39) Why does the surface of the Earth have so few impact craters as compared to the Moon and Mars?

A) the Earth's strong magnetic field diverts most impacting bodies.
B) plate tectonics destroys the craters in a few hundred million years.
C) the Earth is in an orbit that minimizes the number of impacts.
D) the dense atmosphere of the Earth blocks objects from hitting the surface.

Answer: B

40) When we say that a moon has "synchronous rotation," we mean

A) that the moon's rotation is synchronized with the rising and setting of the Sun.
B) that the moon's rotation period is the same as the rotation period of the planet it orbits.
C) that the moon's rotation period is same as other moons in that system.
D) that the moon's rotation period is the same as its orbital period

Answer: D