1 Compared to its value elsewhere on the Sun, the magnetic field intensity over a sunspot is found to be about
   a. the same.
   b. 1000 times the value.
   c. 1/1000 the value.
   d. 1/10 the value.
   e. ten times the value.

2 The Asteroid Belt is thought to have originated when
   a. nearby stars exploded as supernovae.
   b. a planet failed to form near Jupiter.
   c. icy objects condensed out just beyond Neptune.
   d. icy objects condensed out in the inner Solar System.
   e. icy objects condensed out of the interstellar medium.

3 An asteroid whose impact generates an explosion similar to that of a typical nuclear weapon probably has a diameter of about
   a. 50 meters.
   b. 1 to 5 meters.
   c. 100,000 meters or larger.
   d. 1000 to 10,000 meters.

4 The Oort Cloud is
   a. distributed along the rotation axis of the solar system.
   b. a belt of objects mostly in the plane of the solar system.
   c. distributed in all directions.

5 The key argument against the Moon forming from the Earth alone, either by capture of another object or by breakup of a single object is that the Moon’s
   a. core lacks iron.
   b. orbit is tilted relative to the ecliptic.
   c. size is very large compared to Earth.
   d. orbit is tilted relative to Earth’s equator.

6 In a region of the atmosphere in which the temperature rises with increasing altitude
   a. you expect no changes.
   b. you expect rapid changes.

7 The term ‘Greenhouse effect’ refers to
   a. the absorption of ultraviolet light by gases in the atmosphere.
   b. a theory proposed by Charles T. Greenhouse.
   c. the absorption of infrared light by gases in the atmosphere.
   d. the fact that the atmosphere is transparent.
   e. the destruction of the ozone layer.
8 The time from one high tide to the next is lengthened by 24 minutes because of
   a. the presence of continents blocking the tidal flows.
   b. the rotation of the Moon on its axis.
   c. the motion of the Moon in its orbit.
   d. friction with the Earth.
   e. the effects of land tides.

9 The layer of the Earth’s interior that consists of dense, semiliquid material is the
   a. crust.
   b. mesosphere.
   c. outer core.
   d. mantle.
   e. inner core.

10 In the original Solar Nebula, rock, iron, and other metals were lost
   a. far from the center where it was cool.
   b. close to the center where it was hot.
   c. everywhere in the nebula.
   d. nowhere in the nebula.

11 The layer of the Moon’s interior that consists of a soft inner part and a solid outer part is
   a. none of these because it is soft everywhere.
   b. the crust.
   c. the mantle.
   d. none of these because it is solid everywhere.
   e. the core.

12 As seen from far above the Earth’s North Pole,
   a. no planet orbits the Sun clockwise.
   b. no planet orbits the Sun counterclockwise.
   c. only Uranus orbits the Sun clockwise.
   d. only Uranus orbits the Sun counterclockwise.

13 The large objects in our solar system come in
   a. in just four size categories, with the Sun as one of them.
   b. a continuous range of sizes.
   c. in just two size categories: the Sun and everything else.
   d. in just three size categories, with the Sun as one of them.

14 An asteroid whose impact generates a planet-wide catastrophe, changing the climate everywhere, probably has a diameter
   a. 1000 to 10,000 meters.
   b. 100,000 meters or larger.
   c. 50 meters.
   d. 1 to 5 meters.
15 Convection currents in the Earth’s Mantle
   a. do not happen because solid rock does not move.
   b. are responsible for moving the tectonic plates.
   c. happen but do not affect the crust.
   d. are responsible for land tides.
   e. cause mass extinctions.

16 Consider two sunspot pairs, one in the Sun’s northern hemisphere and one in the southern hemisphere. As the Sun rotates, one member of each pair leads.
   a. the leading sunspots are magnetic north poles while the trailing sunspots are magnetic south poles.
   b. the pair in the north are magnetic north poles while the pair in the south are south poles.
   c. the leading northern sunspot and the trailing southern sunspot are magnetic north poles.

17 The idea that neutrinos change from one type to another as they travel is now thought to be
   a. the answer to the cosmic ray problem.
   b. the answer to Ober’s Paradox.
   c. incorrect.
   d. unnecessary.
   e. the answer to the solar neutrino problem.

18 After a comet’s closest approach to the Sun, its tail points
   a. behind its direction of motion.
   b. in all directions at once.
   c. ahead of its direction of motion.
   d. nowhere.
   e. out of the plane of its orbit around the Sun.

19 The Asteroid Belt lies between the orbits of
   a. Venus and Earth.
   b. Earth and Mars.
   c. Jupiter and Saturn.
   d. Mars and Jupiter.
   e. Neptune and Pluto.

20 The gravitational influence of the planets mostly causes asteroids to
   a. move from the inner solar system to the asteroid belt.
   b. stay out of the inner solar system.
   c. move from the asteroid belt into the inner solar system.
   d. remain in the asteroid belt.

21 The Lunar Regolith is
   a. the soft part of the lunar core.
   b. another name for the lunar crust.
   c. the layer just above the core.
   d. a layer of dirt on the lunar surface.
   e. a rock layer just beneath the lunar surface.
22 The Oort Cloud is thought to have originated when
   a. icy objects condensed out of the interstellar medium.
   b. icy objects condensed out in the inner Solar System.
   c. a planet failed to form near Jupiter.
   d. icy objects condensed out just beyond Neptune.
   e. nearby stars exploded as supernovae.

23 A solar flare appears on the Sun’s surface as
   a. the expulsion of the entire solar atmosphere.
   b. a pair of dark spots.
   c. a rising arch of glowing gas.
   d. an explosion and jet of ejected material.
   e. a burst of neutrinos.

24 When the number of sunspots is greatest, the energy output of the Sun is
   a. increased because solar activity is greater.
   b. unaffected because the spots are small.
   c. decreased because the spots radiate less.

25 The epicenters of earthquakes are located
   a. mostly in the centers of oceans.
   b. mostly along continental boundaries.
   c. mostly near the Earth’s equator.
   d. at random places on the Earth’s surface.
   e. mostly along the edges of moving plates.

26 The current effort to defend the Earth against space impacts consists of
   a. re-directing Star-Wars anti-missile weapons.
   b. finding most dino-killer type asteroids.
   c. finding places to hide.
   d. building a space-patrol fleet of asteroid-killers.
   e. finding most near-Earth asteroids.

27 The important difference between matter in the radiation zone and matter in the convection zone is that
   a. the convection zone is farther from the center.
   b. the convection zone has no atoms with electrons.
   c. the convection zone is hotter.
   d. the convection zone is closer to the center.
   e. the convection zone has atoms with electrons.

28 The highest altitude layer of the atmosphere is the
   a. ozone layer.
   b. troposphere.
   c. stratosphere.
   d. ionosphere.
   e. mesosphere.
29 Pressure waves are transmitted through
   a. solids but not liquids.
   b. liquids but not solids.
   c. both solids and liquids.

30 The average energy of motion of an atom or molecule in a gas is called its
   a. entropy.
   b. density.
   c. temperature.
   d. speed.
   e. frequency.

31 Solar prominences are lifted out of the Sun’s surface by
   a. magnetic lines of force.
   b. convection currents.
   c. electric lines of force.
   d. gravity.
   e. centrifugal force.

32 The most likely candidate for a second star in our Solar system was
   a. the planet Mercury.
   b. the planet Jupiter.
   c. the planet Pluto.
   d. the planet Earth.
   e. the planet Mars.

33 When tectonic plates move past each other, they usually cause
   a. tornados.
   b. earthquakes.
   c. floods.
   d. forest fires.
   e. hurricanes.

34 The photosphere is a layer of the Sun that
   a. is visible only during eclipses.
   b. attracts photons.
   c. emits most sunlight.
   d. absorbs most photons.
   e. gives rise to the Solar Wind.

35 The Moon’s rotates on its axis
   a. once a day.
   b. once a year.
   c. not at all.
   d. once in 250 million years.
   e. once a month.
36. The mass of a carbon atom is 12.00 amu while the mass of a helium-4 atom is 4.003 amu. If three atoms of helium fuse to form carbon, how much mass is converted into energy?
   a. 0.012 amu
   b. 0.004 amu
   c. 0.009 amu
   d. 0.002 amu
   e. 0.006 amu

37. Which of the following particles has the smallest mass?
   a. deuteron.
   b. neutron.
   c. neutrino.
   d. proton.
   e. positron.

38. A neap tide can be expected when there is a
   a. waxing crescent moon.
   b. waning crescent moon.
   c. waxing gibbous moon
   d. new moon.
   e. first quarter moon.

39. The jovian planets typically have
   a. no moons.
   b. large systems of moons.
   c. only moons that they capture by accident.

40. When the Earth passes through the orbit of a broken-up comet, we see
   a. a lightning storm.
   b. a meteor shower.
   c. a display of Northern Lights.
   d. fire on the Moon.
   e. increased levels of ozone.

41. The side of the Moon that faces away from the Earth
   a. consists almost entirely of lunar maria.
   b. has only a few small lunar maria.
   c. looks exactly like the side that faces the Earth.

42. The first generally accepted example of Sea-floor spreading was under the
   a. Pacific Ocean.
   b. Indian Ocean.
   c. English Channel.
   d. Atlantic Ocean.
   e. Gulf of Mexico.
43. Current theory says that the Moon formed when
   a. the Earth captured another planet.
   b. a comet collided with the Earth.
   c. the Earth rotated fast enough to break up.
   d. another planet collided with the Earth.
   e. an asteroid collided with the Earth.

44. The density of water is $1000\text{kg/m}^3$ while the density of iron is $7800\text{kg/m}^3$. Which of the following values is a plausible value for the density of a terrestrial planet?
   a. $10,000\text{kg/m}^3$
   b. $500\text{kg/m}^3$
   c. $20,000\text{kg/m}^3$
   d. $1000\text{kg/m}^3$
   e. $5000\text{kg/m}^3$

45. In the reaction that powers our Sun, protons collide to make
   a. deuterons in one step.
   b. helium-4 in one step.
   c. tritium in one step.
   d. helium-3 in one step.
   e. carbon in one step.

46. The impacts of large objects on the surface of the Moon have caused
   a. jumbled terrain.
   b. highlands.
   c. craters.
   d. scarps.
   e. rift valleys.

47. High tide should occur
   a. when the Moon is rising.
   b. only when the Moon is over the opposite side of the Earth.
   c. when the Moon is setting.
   d. when the Moon is overhead and when the Moon is over the opposite side of the Earth.
   e. only when the Moon is overhead.

48. The objects of the Kuiper belt are mostly orbiting
   a. within the asteroid belt.
   b. among the Jovian planets.
   c. beyond all of the Jovian planets.
   d. between the orbits of Earth and Mars.
Answer Key: AHX2P2 Spring 2004

1 Choice b. (1000 times the value.)
2 Choice b. (a planet failed to form near Jupiter.)
3 Choice a. (50 meters.)
4 Choice c. (distributed in all directions.)
5 Choice d. (orbit is tilted relative to Earth’s equator.)
6 Choice a. (you expect no changes.)
7 Choice c. (the absorption of infrared light by gases in the atmosphere.)
8 Choice c. (the motion of the Moon in its orbit.)
9 Choice d. (mantle.)
10 Choice d. (nowhere in the nebula.)
11 Choice c. (the mantle.)
12 Choice a. (no planet orbits the Sun clockwise.)
13 Choice d. (in just three size categories, with the Sun as one of them.)
14 Choice a. (1000 to 10,000 meters.)
15 Choice b. (are responsible for moving the tectonic plates.)
16 Choice c. (the leading northern sunspot and the trailing southern sunspot are magnetic north poles.)
17 Choice e. (the answer to the solar neutrino problem.)
18 Choice c. (ahead of its direction of motion.)
19 Choice d. (Mars and Jupiter.)
20 Choice c. (move from the asteroid belt into the inner solar system.)
21 Choice d. (a layer of dirt on the lunar surface.)
22 Choice b. (icy objects condensed out in the inner Solar System.)
23 Choice d. (an explosion and jet of ejected material.)
24 Choice a. (increased because solar activity is greater.)
25 Choice e. (mostly along the edges of moving plates.)
26 Choice b. (finding most dino-killer type asteroids.)
27 Choice e. (the convection zone has atoms with electrons.)
28 Choice d. (ionosphere.)
29 Choice c. (both solids and liquids.)
30 Choice c. (temperature.)
31 Choice a. (magnetic lines of force.)
32 Choice b. (the planet Jupiter.)
33 Choice b. (earthquakes.)
34 Choice c. (emits most sunlight.)
35 Choice e. (once a month.)
36 Choice c. (0.009amu)
37 Choice c. (neutrino.)
38 Choice e. (first quarter moon.)
39 Choice b. (large systems of moons.)
40 Choice b. (a meteor shower.)
41 Choice b. (has only a few small lunar maria.)
42 Choice d. (Atlantic Ocean.)
43 Choice d. (another planet collided with the Earth.)
44 Choice e. (5000kg/m³)
45 Choice a. (deuterons in one step.)
46 Choice c. (craters.)
47 Choice d. (when the Moon is overhead and when the Moon is over the opposite side of the Earth.)
48 Choice c. (beyond all of the Jovian planets.)
Solutions

1. Module 041: Solar Magnetism and Activity Question 041.13
2. Module 017: Formation of the Solar System: Question 017.52
4. Module 015: Comets in Detail: Question 015.33
5. Module 022: The Earth’s Moon Question 022.44
6. Module 019: The Earth’s Atmosphere Question 019.13
7. Module 019: The Earth’s Atmosphere Question 019.31
8. Module 018: The Moon and the Tides: Question 018.32
10. Module 017: Formation of the Solar System: Question 017.21
11. Module 020: Earth and Moon Interiors Question 020.34
15. Module 021: Continental Drift Question 021.32
16. Module 041: Solar Magnetism and Activity Question 041.23
17. Module 042: Nuclear Fire Question 042.54
19. Module 014: Solar System Survey: Question 014.43
20. Module 016: Earth Impacts: Question 016.43
21. Module 022: The Earth’s Moon Question 022.32
22. Module 017: Formation of the Solar System: Question 017.42
23. Module 041: Solar Magnetism and Activity Question 041.43
24. Module 040: Survey of the Sun Question 040.35
25. Module 021: Continental Drift Question 021.12
26. Module 016: Earth Impacts: Question 016.41
27. Module 040: Survey of the Sun Question 040.13
28. Module 019: The Earth’s Atmosphere Question 019.27
29. Module 020: Earth and Moon Interiors Question 020.13
30. Module 042: Nuclear Fire Question 042.32
31. Module 041: Solar Magnetism and Activity Question 041.31
32. Module 017: Formation of the Solar System: Question 017.34
33. Module 021: Continental Drift Question 021.41
34. Module 040: Survey of the Sun Question 040.22
35. Module 018: The Moon and the Tides: Question 018.43
36. Module 042: Nuclear Fire Question 042.21
37 Module 042: Nuclear Fire Question 042.13
38 Module 018: The Moon and the Tides: Question 018.23
39 Module 014: Solar System Survey: Question 014.33
40 Module 015: Comets in Detail: Question 015.44
41 Module 022: The Earth’s Moon Question 022.15
42 Module 021: Continental Drift Question 021.22
43 Module 022: The Earth’s Moon Question 022.52
44 Module 014: Solar System Survey: Question 014.21
45 Module 042: Nuclear Fire Question 042.41
46 Module 022: The Earth’s Moon Question 022.22
47 Module 018: The Moon and the Tides: Question 018.11
48 Module 015: Comets in Detail: Question 015.22