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A few guidelines:

- You shouldn't need a calculator to do any of the math here.
- It will help for some questions to sketch out cartoons on scratch paper before picking answers.
- Fill out the scantron form clearly, these are being electronically graded.
- Remember to fill out your name (surname first)
- The exam ends at 12.30pm, if you finish early please leave as quietly as possible
- This is roughly divided up by lecture, but the number of questions on each topic varies.
- All questions are worth equal points, but some are harder than others.

Lecture 2: Days, Seasons and Lunar Phases

1. Earth's seasons are caused by:

   a) Earth is closer to the sun in summer than in the winter
   b) Earth's tilt makes summer locations get more direct sunshine
   c) Earth's rotation speeds up and slows down so that the length of day changes
   d) Warm air blows from the equator during the summer and cold air from the pole during the winter
   e) Vegetation changes cause the temperature to go up and down

2. If we look down on the Earth from above the north pole, does the planet spin?

   a) Earth doesn't spin, it's an optical illusion
   b) It spins clockwise
   c) It spins anti-clockwise
   d) It depends on the season
   e) It depends on the time of day

3. If the full Moon is at its highest point in the sky, what time is it?

   a) Midnight
   b) 6am
   c) Noon
   d) 6pm
   e) This could happen at any time of day

4. If you're at the north pole and it's spring equinox (March), the Sun is…

a) Directly overhead
b) On the horizon
c) 23½° above the horizon
d) It's permanently dark at the north pole
e) It depends on the time of day

Lecture 3: Orbits and Gravity

5. The Sun has about 1000 times more mass than Jupiter. Which of the following is true?

a) The gravitational force on Jupiter from the Sun is 1000 times that on the Sun from Jupiter
b) The gravitational force on the Sun from Jupiter is 1000 times that on Jupiter from the Sun
c) Jupiter and the Sun are too far apart to exert a gravitational force on each other
d) The force on the sun is zero, only Jupiter feels a gravitational force
e) The force on each object is the same

6. If it's high tide at 6pm, what is the phase of the Moon?

a) Full Moon
b) Half full and waxing
c) Half full and waning
d) Half full and either waxing or waning
e) New Moon

7. All planets are flattened somewhat, i.e. their radius at their equator is different than their radius at their north or south pole. Neptune and Uranus are flattened by about 2% (i.e. their polar radii are about 2% less than their equatorial radius) while Jupiter and Saturn are more flattened, by about 7-10%. This is because…

a) Jupiter and Saturn are composed of weaker materials
b) Jupiter and Saturn are closer to the Sun
c) Jupiter and Saturn are bigger
d) Jupiter and Saturn have more numerous and larger moons
e) Jupiter and Saturn spin faster

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Lecture 4: Light and Heat from Planets and Stars

8. The sky looks blue because…

a) Sunlight is naturally blue
b) The red light is absorbed at the top of the atmosphere
c) The Earth only reflects blue light, which lights up the sky
d) Air molecules scatter more blue light towards the surface
e) Small droplets of water in the atmosphere are colored blue

9. Arrange the following in order of decreasing wavelength x-rays, radio waves, visible light and infrared radiation.

a) Infrared, radio, visible and x-rays
b) Visible, x-rays, infrared and radio
c) Radio, x-rays, infrared, visible
d) Infrared, visible, radio, x-rays
e) Radio, infrared, visible, x-rays

10. Why are sunspots dark?

a) They're hotter and emitting all their light at ultraviolet wavelengths
b) They're holes in the solar atmosphere and show deeper levels that don't make light
c) They're high clouds over the Sun that block our view of the surface
d) They're cooler areas on the Sun's surface that don't emit as much light
e) They're floating solid islands of rock on the Sun's surface

Lecture 6: The Sun

11. How does the Sun produce its energy?

a) The Sun is cooling off and not producing any new energy
b) Burning of oil and gas
c) Radioactive decay of Uranium and Potassium
d) Tidal heating from Jupiter
e) Fusion of hydrogen atoms into helium

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Lecture 7: Craters

12. Impact craters differ from volcanic collapse craters in that…
    a) You'll never find rock that has melted in an impact crater
    b) Impact craters have raised rims
    c) Impact craters don't have raised rims
    d) Impact craters have flat floors
    e) Impact craters don't have flat floors

Lecture 8: Terrestrial planet interiors and surfaces

13. The core of the Earth is mostly…
    a) Iron
    b) Rock
    c) Ice
    d) Hydrogen and Helium
    e) Carbon

14. Energy is produced within the Earth mostly by…
    a) Burning of oil and gas
    b) Radioactive decay
    c) Nuclear fusion of Hydrogen into helium
    d) Tidal heating
    e) Solar heating

15. Why does Earth have a magnetic field and Mars does not?
    a) Mars has no magnetic rocks, whereas Earth does
    b) Earth has higher gravity
    c) Earth has a liquid core, whereas Mars does not
    d) Earth has volcanoes, whereas Mars does not
    e) Earth is nearer the Sun and so warmer than Mars

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Lecture 9: The Moon

16. What's the leading theory for the origin of the Moon?

a) A giant impact between the Earth and another planet created debris that formed the Moon.
b) The Early Earth was spinning so fast that it split into two pieces
c) The Moon formed elsewhere and was captured by the Earth
d) The Moon and the Earth formed together
e) The Moon used to be a small asteroid, but gained mass because many objects hit it

17. The dark patches on the lunar surface (Maria) are

a) Blast zones from giant impacts
b) Sheets of dark volcanic rock
c) Holes in the crust where we can see the underlying rocks in the mantle
d) Areas where liquid water has eroded the surface
e) Darker because they contain fewer impact craters

Lecture 10: Mercury

18. Mercury rotates three times every two orbits. If the zero longitude meridian faces the sun when Mercury is closest to the Sun (i.e. perihelion) then <u>when Mercury is at perihelion</u> in the future…

a) zero longitude will always face the sun
b) Either longitudes 0 or 180 will face the sun
c) All longitudes will get their turn at facing the sun
d) Only longitudes 0, 90, 180 and 270 can face the sun
e) Only longitudes 90 and 270 can face the sun

19. The lobate scarps that are found all across Mercury's surface indicate that…

a) The entire planet shrank in the past
b) The entire planet expanded in the past
c) Parts of the crust expanded and parts shrank
d) The planet expands and contracts periodically
e) Volcanoes don't exist on Mercury

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Lecture 11: Terrestrial planet atmospheres

20. Arrange the atmospheres of Earth, Mars, Titan and Venus in order of increasing pressure (Hint: Titan has a slightly larger pressure than the Earth).

a) Venus, Earth, Titan, Mars
b) Mars, Venus, Earth, Titan
c) Mars, Earth, Titan, Venus
d) Earth, Mars, Venus, Titan
e) Venus, Mars, Earth, Titan

21. The atmospheric scale height…

a) Measures what altitude clouds form at
b) Measures how fast pressure decreases with altitude
c) Measures how fast temperature decreases with altitude
d) Is the point where the atmosphere stops and empty-space begins
e) Is how much the thickness of the atmosphere varies between day and night

22. What size of particles is most easily moved by the wind?

a) Sand
b) Dust
c) Gravel
d) Cobbles
e) They're all equally easy to move, it depends on the wind-speed

23. Why do winds at the Earth's equator blow from east to west?

a) Because the planet spins west to east so it appears like the atmosphere moves east to west
b) Because the rotation of the Earth deflects rising air to flow to the west
c) Because the rotation of the Earth deflects air flowing towards the equator towards the west
d) Because of the ocean currents, which drag surface air along with them
e) Because east to west is the downhill direction at the equator

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Lecture 12: Venus

24. Venus has no magnetic field because

a) Venus has no iron core
b) Venus is too hot to generate a magnetic field
c) The iron core of Venus is completely solid
d) The magnetic field is there we just can't measure it
e) Venus spins too slowly to produce a magnetic field

25. The impact crater record on Venus is unusual because…

a) Venus is the only planet with no craters at all
b) The age of the surface seems larger than the age of the solar system
c) All the impact craters were erased half a billion years ago
d) Only craters smaller than a few kilometers in size can be found
e) No new craters have formed for 3.5 billion years

Lecture 13: Mars - Early History

26. Mars was once much warmer and wetter, why did the planet cool down?

a) The Sun has gotten fainter since that period
b) Mars is further away from the Sun than it used to be
c) Greenhouse gases were trapped in rocks
d) Heat from the interior decreased so the surface got cooler
e) Bright ice formed and reflected most of the solar energy back to space

27. How do we know that Mars once had a magnetic field?

a) Because all planets used to have magnetic fields
b) Because it spins fast, like the Earth
c) Because liquid water couldn't have existed otherwise
d) This result comes from computer models of early Mars
e) Because ancient rocks there are still magnetized

28. What is the crustal dichotomy on Mars?

a) The northern hemisphere is lower in elevation than the southern
b) The southern hemisphere is brighter than the northern
c) The eastern half of the planet is warmer than the western half
d) The bottom of the crust has a different composition than the top
e) Mars has both oceanic and continental crust

29. Mars has the largest volcanoes in the solar system. Olympus Mons is over 20km high; nothing on the Earth (volcanic or otherwise) even comes close to this. The main reason Mars can have such high mountains is…

a) Due to its weaker gravity which lowers the weight of the mountain
b) Due to its colder temperature which strengthens its surface rocks
c) Due to its thinner atmosphere, so the pressure on the mountains is less
d) Due to its different rock composition which happens to be stronger than Earth's
e) All of the above

Lecture 14: Mars - Recent History

30. Seasonal ice caps on Mars today…

a) Are composed of nitrogen ice
b) Are composed of CO_2 ice
c) Are composed of water frost
d) Are composed of clear slabs of water ice
e) Have different compositions in different hemispheres

Lecture 15: Processes unique to Earth

31. How do oceanic plates differ from continental plates?

a) The oceanic plates are denser
b) The oceanic plates are younger
c) The oceanic plates have a different composition
d) All of the above
e) None of the above

32. Continents currently cover less than one third of the surface of the Earth. The area of this continental crust is…

a) Shrinking with time
b) Expanding with time
c) Holding steady for the past few billion years
d) Can go up or down depending on the situation
e) It depends on sea-level

33. Earth didn't suffer a runaway greenhouse like Venus because…

a) The greenhouse effect didn't operate early in Earth's history
b) The Earth receives much less solar radiation than Venus
c) Earth reflects much more radiation back to space than Venus does
d) Rainfall removed the main greenhouse gas from the atmosphere
e) Venus had more volcanoes than the Earth

Lecture 16: Asteroids and Meteorites

34. The asteroid belt is…

a) The remains of a planet that was destroyed
b) A previous moon of Jupiter that was destroyed
c) Material from further out in the solar system captured by Jupiter's gravity
d) Debris thrown into space from impacts onto planets
e) Material that never formed a planet

35. The total amount of material in the asteroid belt is…

a) Amount the same as that in the planet Mars
b) About the same as that in the Earth
c) Less than what's in our Moon
d) More than what is in Mars, but less than what is in the Earth
e) Amount the same as what is in all the terrestrial planets combined

36. Iron meteorites formed…

a) In an iron-rich part of the asteroid belt
b) As a mixture of iron and rock, but the rock burned off when it passed through Earth's atmosphere
c) From breaking up a large asteroid that had an iron core
d) By iron getting concentrated in Jupiter's large magnetic field
e) By being blasted off the surface of Mercury (the most iron-rich planet) in large impacts

Lecture 17: Global Warming on the Earth

37. Our emissions of greenhouse gases have caused a temperature increase of only about 1° C. This is worse than it sounds because…

a) Even one degree is enough to kill many species on the planet
b) It sets off feedback effects that cause a runaway increase in temperature
c) It increases the size of the ozone hole
d) It makes people use air conditioners more and so use more power
e) It makes volcanoes more active which adds more CO_2 to the atmosphere

Lecture 18: Gas giants: Jupiter and Saturn

38. Metallic hydrogen makes up a big part of Jupiter and Saturn. This exotic sounding substance is made by…

a) Mixing iron and hydrogen under great pressure
b) Forcing iron to disintegrate into hydrogen atoms
c) Putting pure hydrogen under great pressure
d) Chemically combining iron and hydrogen
e) Putting pure hydrogen in a strong magnetic field

Lecture 19: Jupiter's Moons: Volcanoes and Oceans

39. Io's fantastic volcanic activity is driven by…

a) Heat left over from Io's formation
b) Heat produced by radioactive decay of elements in Io's core
c) Heat trapped by Io's large greenhouse effect
d) Heat Produced by tides raised by Jupiter
e) Heat created by the large number of asteroids that hit Io's surface

40. How do we know Europa has a liquid water ocean under its icy crust?
    a) We can detect it a spectrometer
    b) We know it's there from the gravitational effect on passing spacecraft
    c) We've drilled through the ice and detected this water
    d) We can measure its effect on Jupiter's magnetic field
    e) We know this from theoretical models

Lecture 20: Saturn's Rings and Moons

41. What are the particles in Saturn's rings composed of?
    a) Interstellar dust
    b) Rocks from the asteroid belt
    c) Water ice
    d) Nitrogen ice
    e) Carbon and organic compounds

42. Gaps in Saturn's rings are caused by…
    a) Gravitational interaction with Saturn's moons
    b) The rings grew up on each side of the gap
    c) Electrostatic forces pushing the ring particles apart
    d) Resonances with Saturn's magnetic field
    e) Ring particles collide with, and destroy, each other in these zones

43. The Roche limit is when
    a) A body spins so fast that it breaks apart
    b) Tidal heating creates volcanoes
    c) Drag forces from Saturn's atmosphere cause its moons to spiral inward
    d) Tidal forces overcome a moon's self-gravity and pull it apart
    e) The maximum number of allowed moons is exceeded and they start to collide with each other.

44. Half of the moon Iapetus is covered with very dark material and half with very bright material. The dark material…

a) makes up most of the moon and is buried by bright material erupted from volcanoes
b) is knocked off another moon of Saturn and collects on the leading side of Iapetus
c) is vegetation that covers half of Iapetus
d) is sheets of volcanic rock
e) only appears dark because it faces away from the Sun

Lecture 21: Titan

45. Titan's most unusual feature among all other moons is its atmosphere. Its atmosphere is…

a) mostly nitrogen with some methane
b) carbon dioxide with some methane
c) oxygen rich
d) mostly hydrogen and helium
e) carbon dioxide and water vapor

46. Liquid on Titan's surface rains, carves river channels and forms lakes like liquid water on the Earth. However, the liquid on Titan is…

a) metallic hydrogen
b) liquid helium
c) a blend of liquid nitrogen and oxygen
d) actually it's also liquid water on Titan
e) liquid methane

47. Titan is a moon of Saturn and is slightly smaller than Ganymede, a moon of Jupiter. Why does Titan have a big atmosphere whereas Ganymede is completely airless?

a) Ganymede is closer to the Sun and warmer so gases can escape
b) Tidal forces from Jupiter stripped off Ganymede's atmosphere
c) Titan was able to capture its atmosphere from Saturn
d) Titan's volcanoes continuously replenish its atmosphere
e) Jupiter's intense magnetic field doesn't allow its moons to have atmospheres

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Lecture 22: Ice giants: Uranus and Neptune

48. How was Neptune discovered?

a) It was known since ancient times along with Jupiter, Mars, Venus etc…
b) Discovered by accident with a telescope
c) Discovered by the Voyager spacecraft
d) Theoretically predicted from its effects on Uranus
e) It was discovered when it passed in front of the Sun

49. Neptune has atmospheric storms, clouds and weather patterns; in contrast Uranus is almost completely featureless with very little atmospheric activity. Why is this?

a) Neptune receives much more solar power than Uranus
b) Neptune has a significant internal heat source that Uranus lacks
c) Neptune spins much faster which provides energy to the atmosphere
d) Neptune's moons cause most of this activity through tidal effects
e) Neptune is much more massive than Uranus and its gravity powers this activity

50. The spin of Uranus is unusual because…

a) It's the slowest of all the planets
b) It's the fastest of all the planets
c) Its spin is retrograde like Venus.
d) Its axis is tilted at ~90° so that it rotates on its side.
e) Its rotation appears to be speeding up

51. The ring systems of Neptune and Uranus look different to the rings of Saturn in that…

a) They're highly inclined to the planet's equator
b) They're much larger
c) They're narrow rings rather than broad
d) They appear to have a metallic composition
e) They're composed of captured comets

52. Uranus and Neptune have hydrogen and helium upper atmospheres and probably have rocky cores. Most of the material between the core and upper atmosphere is…

a) liquid water and ammonia
b) liquid methane
c) metallic hydrogen
d) molten rock
e) carbon dioxide ice

Lecture 23: Moons of Uranus and Neptune

53. Neptune has few moons compared to the other giant planets and all its moons are also orbiting relatively close by. This is probably due to…

a) Neptune forming far from the sun where there was little solid material for moons
b) Most of Neptune's moons have already spiraled into the planet
c) Most of Neptune's moons have spiraled away from the planet and been lost
d) Most of the moons were destroyed by Neptune's tidal forces
e) Most of the Moons were destroyed when Neptune captured Triton

54. Neptune's largest moon Triton has a thin nitrogen atmosphere that partly freezes out into nitrogen ice in winter. This is similar to Mars' thin carbon dioxide atmosphere freezing into carbon dioxide frost during winter there. The frost on both bodies turns into transparent slabs of ice, what other common process do these bodies have that's connected to this frost?

a) They get covered with thick clouds while this is happening
b) Sunlight heats the transparent ice from below causing gas jets to erupt
c) This transparent ice shields the surface from impact craters
d) Liquid water can exist underneath these transparent slabs of ice
e) These ice sheets can flow like glaciers and carve valleys

55. The density of solid solar system bodies deceases between the Earth and Saturn. Asteroids are mostly rock, moons of Jupiter and rock/ice mixtures and moons of Saturn are even less dense and almost completely ice. The moons of Uranus and Neptune…

a) Have lower densities because they are composed of even lower density ices
b) Are pretty much the same density as Saturn's moons (mostly water ice)
c) Have higher densities because water ice becomes less common here
d) Have higher densities because they are captured asteroids
e) Have higher densities only because they are very compressed

Lecture 24: Pluto and the Kuiper Belt

56. Pluto crisscrosses Neptune's orbit, but never hits that planet. What's the special relationship that Pluto has with Neptune that allows this to occur?

a) Pluto can slow down and speed up in its orbit to avoid Neptune
b) Pluto can do a gravitational slingshot around Neptune whenever they come close
c) Pluto's orbital period is exactly 1.5 times that of Neptune, so Neptune is never around when Pluto crosses its orbit.
d) Pluto's orbital period is exactly half that of Neptune, so Neptune is never around when Pluto crosses its orbit.
e) It doesn't matter what the periods are, Pluto 's orbit is so highly inclined that it's far above Neptune when they cross over.

57. Why did people suspect the Kuiper Belt existed decades before we found any of the objects in it?

a) Its gravitational effects were affecting Neptune's orbit
b) We could see Kuiper Belts around other stars
c) The orbits of comets suggested a disk-like comet reservoir beyond Neptune
d) The Titus-Bode law predicts the Kuiper belt's location
e) Changes in Pluto's orbit suggested nearby objects

58. What is the bulk composition of Pluto and the other Kuiper Belt objects?

a) Rock, with an iron core
b) Mostly rock but with a big fraction of water ice
c) Pure water ice
d) Other ices like nitrogen, methane etc…
e) Hydrogen and Helium

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Lecture 25: Comets

59. A comet's tail appears only when a comet moves into the inner solar system. This is because…

a) they are too difficult to see when they are in the outer solar system.
b) the solar wind erodes the surface of the comet.
c) the Sun's gravity pulls material from the surface of the comet, leaving a trail of material behind the comet.
d) tidal forces from the Jovian planets disperse the tails.
e) heat from the Sun causes ices on the comet to vaporize.

60. Most short-period comets are thought to originate in the _____ whereas long-period comets are thought to come from the _____ .

a) Oort Cloud / Kuiper Belt
b) Kuiper Belt / Oort Cloud
c) Lagrange Points / Oort Cloud
d) Lagrange Points / Kuiper Belt
e) Kuiper Belt / Lagrange Points

61. The nucleus of a comet is…

a) about 10km in size and very bright.
b) about the size of the Earth and very bright.
c) about 10km in size and very dark.
d) about the size of the Earth and very dark.
e) usually bigger than the Earth with dark and bright patches.

62. The coma surrounding the comet's nucleus is…

a) much bigger than the Sun.
b) almost as big as the Sun.
c) almost as big as the Earth.
d) almost as big as our moon.
e) only a little bigger than the comet's nucleus.

63. A comet near the sun has two tails which are…

a) an ion tail that points away from the Sun and a dust tail pointing at the Sun.
b) an ion tail that points towards the Sun and a dust tail pointing away from the Sun.
c) an ion tail and dust tail both pointing mostly away from the sun.
d) an ion tail and dust tail both pointing mostly towards the sun.
e) randomly orientated.

Lecture 26: Formation of the Solar System

64. When giant molecular clouds collapse they form very energetic stars surrounded by spinning disks of gas and dust. These disks form because…

a) radiation pressure from the star pushes material out in to a disk.
b) the original clouds were also disk-shaped.
c) the magnetic field of the star guides the rest of the material into a disk.
d) the spin rate of the original cloud speeds up as it contracts.
e) the solar wind from the star pushes the disk and starts it spinning.

65. When the planets form from material in this disk all the planets close to the sun are rocky planets with iron cores. This is mostly because…

a) the Sun's magnetic field pulls all the iron into this zone.
b) the disk is so hot here that rock and iron are the only materials that are solid.
c) there's not enough material in this zone to form larger gas giant planets.
d) the hydrogen and helium used to form gas giant atmospheres only exists far from the Sun.
e) bigger planets would be disrupted by the Sun's tidal forces.

66. Giant planets form when large solid cores start capturing gas directly from the disk. Why are these large cores easier to form in the outer solar system?

a) The Sun's tidal forces are weaker so larger objects can form
b) It's cold enough for water ice to be solid so there's much more solid material to build planets
c) The disk is less turbulent here so particles can stick together more easily
d) The disk is denser further from the Sun
e) The disk spins faster further from the Sun so planets also grow faster

67. Neptune and Uranus ended up being much smaller than Jupiter and Saturn. Why is this?

a) Jupiter and Saturn grew more by absorbing many comets
b) Jupiter's gravitational effects kept Neptune and Uranus small
c) The solar wind added many more particles to Jupiter/Saturn than Uranus/Neptune
d) The magnetic fields of Jupiter and Saturn attracted more material
e) Uranus/Neptune formed more slowly and ran out of time before the disk dissipated

68. Let's say we monitor a protoplanetary disk about the same size as the one that became our solar system. If the disk just formed, how long would before the first planets appear?

a) About 10 years
b) About 1000 years
c) About 100,000 years
d) About 1,000,000 (1 million) years
e) Tens or hundreds of millions of years

Lecture 27: Extrasolar Planets

69. Why are very large stars not likely to have planetary systems?

a) They blow themselves apart before planets can form
b) Their extremely large tidal forces stop planets from forming
c) The large amount of energy they radiate stops solid material from forming
d) Very large stars tend to form without disks
e) Very large stars are usually in binary systems so planetary orbits are unstable

70. When a planet orbits its star then it causes the star to move as well. The astrometry technique tries to detect planets by looking for the star's wobble. Is the wobble largest when…

a) the planet is large and close to the star
b) the planet is small and close to the star
c) the planet is large and far from the star
d) the planet is small and far from the star
e) the planet is large and distance from the star doesn't matter

71. When we see planetary systems edge-on then the star appears to move toward and away from us. This causes the spectral features of the star to be blue- or red-shifted. The bigger the shift of these spectral features the easier it is to detect these planets. The radial velocity technique is most effective when…

a) the planet is large and close to the star
b) the planet is small and close to the star
c) the planet is large and far from the star
d) the planet is small and far from the star
e) the planet is large and distance from the star doesn't matter

72. Recently we started also measuring the diameter of some extrasolar planets. We do this by…

a) sending spacecraft to investigate these systems
b) using powerful telescopes to resolve these planets
c) using data on the planets' magnetic fields to guess their sizes.
d) recording how much of the star's light is masked when the planet passes in front of it
e) Bouncing radar waves off these planets and measuring how much energy comes back

Lecture 28: Origins of life

73. Life is based on molecules containing carbon. This is thought to be so because carbon

a) is a very versatile element in forming chemical bonds.
b) is the most abundant element in our solar system.
c) forms bonds that can only be destroyed at very high temperatures.
d) only bonds to oxygen.
e) is an element formed in the Sun.

74. The habitable zone is the range of orbit sizes of a planet that would allow a surface temperature suitable for liquid water. It's closer to the star for faint stars and further from the star for bright stars. Why is a planet very close to a faint star not suitable for life even though it's in the habitable zone?

a) If you get too close then the magnetic field of the star sterilizes the planet
b) Impacts of asteroids onto planets that are close to their stars are more energetic and destroy life
c) If you're too close to the star then solar flares will engulf the planet sooner or later
d) Tidal forces lock the planet so that the same face points toward the star all the time
e) Planets close to their stars don't have enough carbon for life

75. Neighboring giant planets can both help and hinder the development of life. The late heavy bombardment was a period of very high impact rates that likely destroyed any life already in existence on the Earth. This event was caused by…

a) outward migration of Neptune disrupting the Oort cloud
b) Jupiter and Saturn exchanging locations and disrupting the Kuiper belt
c) Uranus and Neptune exchanging locations and disrupting the Kuiper belt
d) Jupiter's tidal forces destroying a planet to form the asteroid belt.
e) inward migration of Jupiter destabilizing the asteroid belt

76. The earliest evidence for life on Earth has been dated at 3.85 billion years ago, immediately after the late heavy bombardment ceased. This evidence consists of…

a) Intact skeletal fossils
b) Fossilized dinosaur eggs
c) The first appearance of oxygen
d) Isotope ratios of carbon that are associated with living things
e) Meteorites from this period that contain bacteria