

Name _____

Section _____

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

- 1) This is version A of the exam. Please fill in (A). 1) _____
A) This is the CORRECT answer
B) This is WRONG
C) This is WRONG
D) This is WRONG
E) This is WRONG
- 2) Why is it thought that the climate on Mars changed when the planet lost its strong magnetic field? 2) _____
A) without a strong magnetic field, the ozone layer was destroyed by the solar wind, which stopped the greenhouse effect and cooled Mars down.
B) without a strong magnetic field, which enhances the greenhouse effect, Mars cooled down.
C) without a strong magnetic field, the solar wind stripped away most of the atmosphere, significantly reducing the greenhouse effect and cooling Mars down
D) without a strong magnetic field, the planet receives fewer charged particles from the solar wind, and therefore is not heated as much
E) without a strong magnetic field, the solar wind cannot melt the polar caps and release CO₂ to warm the planet
- 3) Mars has an atmosphere that is almost entirely carbon dioxide. Why isn't there a strong greenhouse effect keeping the planet warm? 3) _____
A) the atmosphere on Mars is too thin to trap a significant amount of heat
B) There actually is a strong greenhouse effect, and Mars would be 35°C colder than it is now without it.
C) Mars does not have enough internal heat to drive the greenhouse effect
D) the greenhouse effect requires an ozone layer, which Mars does not have
E) Mars is too far from the sun for the greenhouse effect to work
- 4) Why are the seasons in Mars' southern hemisphere so extreme? 4) _____
A) because Mars is farther from the sun than the Earth
B) because Mars has more carbon dioxide in its atmosphere than the Earth
C) because Mars has a more eccentric orbit than the Earth
D) because Mars' axis is more tilted than the Earth's
E) All of the above

- 5) Why do scientists think Mars was once warmer and wetter? 5) _____
- A) Mars shows evidence of significant volcanism, which implies that the climate was once warmer and therefore wetter
 - B) early observations showed what appeared to be changing vegetation patterns and canals, indicating the presence of water
 - C) there are many geologic features on Mars that are difficult to explain unless liquid water was once stable at the surface
 - D) all planets tend to begin with warm, wet climates and gradually become cold and dry, with smaller planets cooling faster than larger planets
 - E) It is very unlikely that Earth is the only habitable planet in the universe, so it is likely that Mars was once habitable as well
- 6) The reason that small planets tend to lose interior heat faster than larger planets is essentially the same as the reason that _____. 6) _____
- A) a large baked potato takes longer to cool than a small baked potato
 - B) Earth contains more metal than the Moon
 - C) thunderstorms tend to form on hot summer days
 - D) gas bubbles form and rise upward in boiling water
 - E) None of the above
- 7) Earth has been gradually warming over the past few decades. Based on a great deal of evidence, scientists conclude that this warming is caused by _____. 7) _____
- A) human activities that are increasing the concentration of greenhouse gases in Earth's atmosphere
 - B) the fact that our politicians spout a lot of hot air
 - C) the human release of chemicals called CFCs into the stratosphere
 - D) the increase in forest fires during recent years
 - E) None of the above
- 8) How does the greenhouse effect work? 8) _____
- A) Greenhouse gases absorb infrared light from the Sun, which then heats the atmosphere and the surface.
 - B) Ozone transmits visible light, allowing it to heat the surface, but then absorbs most of the infrared heat, trapping the heat near the surface.
 - C) Greenhouse gases transmit visible light, allowing it to heat the surface, but then absorb infrared light from Earth, trapping the heat near the surface.
 - D) The higher pressure of the thick atmosphere at lower altitudes traps heat in more effectively.
 - E) Greenhouse gases absorb X rays and ultraviolet light from the Sun, which then heat the atmosphere and the surface.
- 9) The terrestrial planet cores contain mostly metal because 9) _____
- A) the entire planets are made mostly of metal.
 - B) metals condensed first in the solar nebula and the rocks then accreted around them.
 - C) metals sank to the center during a time when the interiors were molten throughout.
 - D) radioactivity created metals in the core from the decay of uranium.
 - E) convection carried the metals to the core.

- 10) How have we been able to construct *detailed* maps of surface features on Venus? 10) _____
- A) by studying Venus from Earth with powerful optical telescopes
 - B) by landing spacecraft on the surface for close-up study
 - C) by studying Venus with powerful optical telescopes on spacecraft that were sent to orbit Venus
 - D) by using radar from spacecraft that were sent to orbit Venus
 - E) by making computer models of geological processes on Venus
- 11) Venus shows evidence of which of the following surface processes? 11) _____
- A) Impacts
 - B) Erosion
 - C) Volcanism
 - D) A and B
 - E) A, B and C
- 12) Approximately how old is the surface of Venus? 12) _____
- A) 750 million years.
 - B) 2 billion years.
 - C) 3 billion years.
 - D) 4.5 billion years.
 - E) 3.5 billion years.
- 13) Which of the following countries has sent landers to Venus? 13) _____
- A) The U.S.S.R.
 - B) The U.S.
 - C) France
 - D) A and B
 - E) None of the above
- 14) Which of these has NOT been one of the main hypotheses considered for the origin of the Moon? 14) _____
- A) The Moon split from the Earth due to tidal forces.
 - B) The Moon was captured into Earth orbit.
 - C) The Earth and Moon co-accreted in the solar nebula.
 - D) Earth was rotating so rapidly that the Moon split from it.
 - E) The Moon formed from the debris generated when a Mars-sized object impacted Earth.
- 15) Which of the following is/are common feature(s) of *all* fresh (i.e., not eroded) impact craters formed on solid surfaces: 15) _____
- A) ejecta
 - B) raised rims
 - C) central peaks
 - D) A and B only
 - E) A, B, and C

- 16) The lunar maria are: 16) _____
A) ancient, heavily cratered highlands
B) dark lavas inside volcanic calderas
C) dark lavas filling older impact basins
D) the bright regions on the Moon
E) permanently shadowed craters near the poles, where water ice may exist
- 17) All of the following have been cited as evidence for the Giant Impact Hypothesis, 17) _____
except:
A) The relative size of the Moon to the size of Earth is large compared to most planets and their moon.
B) Most rocks on the Moon's surface are older than those on the Earth's surface.
C) The Moon has a much smaller iron core than the Earth, even considering its size.
D) The Moon was once entirely molten.
E) The Moon has much lower volatile abundances than the Earth.
- 18) Spacecraft have landed on all the terrestrial worlds *except* 18) _____
A) Venus. B) Mars. C) Moon. D) Mercury.
- 19) The *lithosphere* of a planet is the layer that consists of 19) _____
A) the softer rocky material of the mantle.
B) the lava that comes out of volcanoes.
C) material between the crust and the mantle.
D) the rigid rocky material of the crust and uppermost portion of the mantle.
E) material above the crust.
- 20) Which factor s most important in determining the history of volanism and tectonism on a 20) _____
planet?
A) size of the planet
B) presence of an atmosphere
C) distance from the sun
D) rotation period
E) A, B, and C.
- 21) What are the conditions necessary for a terrestrial planet to have a strong magnetic field? 21) _____
A) fast rotation only
B) a rocky mantle only
C) a molten metallic core only
D) both a molten metallic core and reasonably fast rotation
E) both a metal core and a rocky mantle
- 22) Which mechanism can NOT explain Mercury's lack of a permanent atmosphere? 22) _____
A) Impact Heating
B) Volcanic Heating
C) Ablation by the solar wind
D) Thermal Escape
E) A and B

- 23) Why do we look for water-ice in craters at Mercury's pole? 23) _____
- A) Actually, water-ice is all over Mercury and not just at the poles.
 - B) The pole is the only place fortunate enough to have had comet impacts
 - C) Radar from the earth can only see Mercury's poles.
 - D) These craters contain the only permanently shadowed regions on Mercury
 - E) Water is boiling up through a spring at the poles. The craters provide a place for it to pool.
- 24) Calculate the ratio of the solar radiation flux on Mercury's surface for perihelion (0.304 AU) versus aphelion (0.456 AU). 24) _____
- A) 4:1 B) 1:2 C) 6:5 D) 4:5 E) 9:4
- 25) Why is Mars red? 25) _____
- A) Because the surface is covered with heavily oxidized ("rusted") minerals.
 - B) Because the atmosphere scatters more light at bluer wavelengths, transmitting mostly red light.
 - C) Because Mars is covered with ancient lava flows, which are red in color.
 - D) Because flowing water on Mars's surface altered the surface minerals several billion years ago.
 - E) A and C

Answer Key

Testname: PRELIM2_A

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