

Exam

Name _____

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

- 1) Which of the following health problems is most closely associated with the thinning of Earth's ozone layer? 1) _____

A) Skin irritations B) Skin cancer C) Heart disease D) Blindness

Answer: B

Explanation: A)
 B)
 C)
 D)

- 2) The Montreal Protocol _____. 2) _____

A) resulted in significant reduction in the production of CFCs by signatory nations
B) addressed transnational movement of acid-forming pollutants
C) developed the framework for reduction of carbon dioxide in the United States and Canada
D) is an example of a failed attempt to reduce international air pollution

Answer: A

Explanation: A)
 B)
 C)
 D)

- 3) The ozone layer is in what layer of the atmosphere? 3) _____

A) Mesosphere B) Thermosphere C) Troposphere D) Stratosphere

Answer: D

Explanation: A)
 B)
 C)
 D)

- 4) The Coriolis effect _____. 4) _____

A) results in seasonal temperature fluctuations across the globe
B) results in the formation of stratospheric ozone
C) is caused by the gravitational pull of the sun and the Moon
D) is caused by Earth's rotational forces

Answer: D

Explanation: A)
 B)
 C)
 D)

5) Which of the following is a secondary pollutant in the troposphere but a beneficial component of the stratosphere? 5) _____

- A) Carbon monoxide
- B) Ozone
- C) Nitrogen oxides
- D) Carbon dioxide

Answer: B

Explanation: A)
B)
C)
D)

6) Within a Hadley cell, _____. 6) _____

- A) warm air rises and cool air falls
- B) cool water rises and warm water falls
- C) warm water rises and cool water falls
- D) cool air rises and warm air falls

Answer: A

Explanation: A)
B)
C)
D)

7) Atmospheric nitrogen is converted to nitrogen oxides _____. 7) _____

- A) when fertilizers containing nitrogen are applied to farm fields
- B) when fuels are burned at high combustion temperatures
- C) in a photochemical reaction with ozone
- D) by using catalytic converters on automobiles

Answer: B

Explanation: A)
B)
C)
D)

8) Catalytic converters are used to control emissions of _____. 8) _____

- A) carbon monoxide and nitrogen oxides
- B) carbon monoxide and sulfur dioxide
- C) carbon dioxide and nitrogen gas
- D) carbon dioxide and nitrogen oxides

Answer: A

Explanation: A)
B)
C)
D)

9) Which one of the following would contribute most to acid precipitation falling in the northeastern United States? 9) _____

- A) Ozone forming during morning rush hour in Buffalo, New York
- B) Coal-fired power plants in northeastern Canada
- C) Nuclear power plants in the region
- D) Coal-fired power plants in the Midwest

Answer: D

Explanation: A)
B)
C)
D)

- 10) During the 1990s, damaging acid precipitation in the United States occurred predominantly _____ 10) _____
- A) in western states such as Nevada and California
 - B) in the Northeast
 - C) in southern states such as Texas and Louisiana
 - D) in the Midwest
- Answer: B
- Explanation: A)
B)
C)
D)
- 11) What two pollutants are the primary causes of acid precipitation? 11) _____
- A) Ozone and lead B) SO₂ and NO_x C) NO_x and N₂O D) Ozone and SO₂
- Answer: B
- Explanation: A)
B)
C)
D)
- 12) Tropospheric ozone forms from reactions involving _____. 12) _____
- A) volatile organic compounds (VOCs) and nitrogen oxides
 - B) stratospheric ozone and jet stream winds
 - C) tropospheric CFCs and stratospheric ozone
 - D) atmospheric nitrogen and atmospheric oxygen
- Answer: A
- Explanation: A)
B)
C)
D)
- 13) Coal mines and coal processing facilities are required to minimize the amount of coal dust emitted during mining, processing, and transporting the coal. The regulations controlling coal dust emissions would mainly prevent _____. 13) _____
- A) lung damage to those working at the plant and living nearby
 - B) wasting coal that can be reclaimed and burned to produce electricity
 - C) coal "fog" that can cause traffic fatalities
 - D) acid precipitation in the region
- Answer: A
- Explanation: A)
B)
C)
D)

14) Which of the following symptoms most closely matches the known physiological effects of carbon monoxide? 14) _____

- A) Inflammation of the eyes, nasal passages, and skin
- B) Lung irritation and bronchitis
- C) Feeling tired
- D) Skin cancer

Answer: C

Explanation: A)
B)
C)
D)

15) Winds carry air from _____. 15) _____

- A) areas of low pressure toward areas of high pressure
- B) areas of high temperature toward areas of low temperature
- C) areas of low temperature toward areas of high temperature
- D) areas of high pressure toward areas of low pressure

Answer: D

Explanation: A)
B)
C)
D)

16) Inhaling PM 2.5 is most likely to cause _____. 16) _____

- A) damage to alveoli in the lungs
- B) hallucinations
- C) brain damage
- D) depletion of the ozone layer

Answer: A

Explanation: A)
B)
C)
D)

17) The air you breathe is 78% _____. 17) _____

- A) oxygen
- B) nitrogen
- C) hydrogen
- D) carbon dioxide

Answer: B

Explanation: A)
B)
C)
D)

18) The Coriolis effect contributes to _____. 18) _____

- A) the destruction of the ozone layer
- B) global wind patterns
- C) increased acidic deposition
- D) global warming

Answer: B

Explanation: A)
B)
C)
D)

- 19) Near the equator, the atmospheric circulation patterns are called _____. 19) _____
A) high-pressure cells B) Ferrel cells
C) Hadley cells D) Coriolis cells
Answer: C
Explanation: A)
B)
C)
D)
- 20) Temperature increases with altitude through most of the stratosphere because _____. 20) _____
A) sunlight is more intense in the stratosphere
B) of the interaction between ozone and the sun's UV radiation
C) jet stream winds produce frictional heat
D) greenhouse gases in the stratosphere warm the air
Answer: B
Explanation: A)
B)
C)
D)
- 21) In the United States, air quality has _____ in the past 40 years. In China, air quality has _____ 21) _____
over the same time period.
A) improved; gotten worse B) gotten worse; improved
C) gotten worse; also gotten worse D) improved; improved even more
Answer: A
Explanation: A)
B)
C)
D)
- 22) Stratospheric ozone destruction involves a complex series of reactions. The first significant reaction 22) _____
involves _____.
A) UV radiation from sunlight breaking apart O₃ molecules
B) ultraviolet (UV) radiation from sunlight causing Cl atoms to break free from CFCs
C) O₃ reacting with industrial sulfuric acid
D) O₃ reacting directly with CFCs
Answer: B
Explanation: A)
B)
C)
D)

- 23) Atmospheric pressure is the pressure exerted on an area from the weight of the atmosphere above it. Pressure is often measured in pounds per square inch (psi) and in units called millibars (mb). Normal air pressure at sea level is approximately 14.7 psi or 1,013 mb. At the top of Mount Everest, the air is only 33% as dense as it is at sea level, and the air pressure is approximately 333 mb. Denver, Colorado, at an elevation of 5,280 feet, has an average air pressure of 834 mb. The air in Denver is _____ as dense as it is at sea level. 23) _____

A) 121% B) 16% C) 82% D) 67%

Answer: C

Explanation: A)
B)
C)
D)

- 24) Jet streams are strong _____ that flow from _____. 24) _____
- A) ocean currents; the equator toward higher latitudes
B) air currents; the equator toward higher latitudes
C) ocean currents; continent to continent
D) air currents; west to east

Answer: D

Explanation: A)
B)
C)
D)

- 25) The huge dust storms that took place in the southern plains of the United States in the 1930s _____ 25) _____
- A) were the result of ozone depletion and acid precipitation killing off vegetation
B) were caused by abnormally warm waters in the central Pacific Ocean
C) were the result of a prolonged drought and poor farming techniques
D) were triggered by tornados and were worsened by global climate change

Answer: C

Explanation: A)
B)
C)
D)

- 26) The main pollutants that cause acid precipitation are _____. 26) _____
- A) carbon monoxide and carbon dioxide B) lead and sulfur dioxide
C) sulfur dioxide and nitrogen oxides D) tropospheric ozone and carbon monoxide

Answer: C

Explanation: A)
B)
C)
D)

- 27) Lead pollution is a problem because lead _____. 27) _____
- A) will cause the ozone hole to increase
 - B) causes central nervous system damage in humans
 - C) is a precious metal, and it is being lost to the atmosphere
 - D) forms an acid in the atmosphere, resulting in acid precipitation

Answer: B

Explanation: A)
B)
C)
D)

- 28) Which of the following is a secondary pollutant? 28) _____
- A) Sulfuric acid
 - B) Carbon monoxide
 - C) Lead
 - D) Sulfur dioxide

Answer: A

Explanation: A)
B)
C)
D)

- 29) _____ are used to remove sulfur oxides from the emissions from coal-fired power plants. 29) _____
- A) Scrubbers
 - B) Catalytic converters
 - C) Desulfurators
 - D) CFCs

Answer: A

Explanation: A)
B)
C)
D)

- 30) Atmospheric pressure is the pressure exerted on an area from the weight of the atmosphere above it. Pressure is often measured in pounds per square inch (psi) and in units called millibars (mb). Normal air pressure at sea level is approximately 14.7 psi or 1013 mb. At the top of Mount Everest, the air is only 33% as dense as it is at sea level, and the air pressure is approximately 333 mb. Denver, Colorado, at an elevation of 5,280 feet, has an average air pressure of 834 mb. What would Denver's air pressure be in psi? 30) _____
- A) 17.9 psi
 - B) 12.1 psi
 - C) 8.34 psi
 - D) 14.7 psi

Answer: B

Explanation: A)
B)
C)
D)

- 31) The greatest loss of stratospheric ozone _____. 31) _____
A) occurred after the Montreal Protocol failed to be ratified
B) is expected to occur in the mid-21st century
C) occurs in urban areas where automobile use is most prevalent
D) has occurred over Antarctica

Answer: D

Explanation: A)
B)
C)
D)

- 32) Much progress in reducing atmospheric levels of lead pollution has resulted from _____. 32) _____
A) the elimination of leaded gasoline
B) the switch from lead to graphite in pencils
C) new types of lead scrubbers on smokestacks that removed lead from the power plant emissions
D) the development of new types of batteries that use lithium instead of lead

Answer: A

Explanation: A)
B)
C)
D)

- 33) Which of the following statements is most logical? 33) _____
A) "I like the weather in Iowa. I just don't like the climate."
B) "I just shoveled 12 inches of climate off my driveway."
C) "Climate happens all the time. Weather just happens when you're paying attention."
D) "We can pretty well predict climate ourselves. We need professionals to predict weather."

Answer: D

Explanation: A)
B)
C)
D)

- 34) As air descends in a circulation cell, the air _____, and a _____ -pressure region occurs where the air reaches Earth's surface. 34) _____
A) cools; high B) cools; low C) warms; low D) warms; high

Answer: D

Explanation: A)
B)
C)
D)

- 35) Several members of a family die of carbon monoxide poisoning. Which of the following is the most likely source of the carbon monoxide? 35) _____
- A) A faulty furnace
B) A nearby coal-fired power plant
C) A backyard bonfire
D) A faulty electric space heater
- Answer: A
Explanation: A)
B)
C)
D)
- 36) Air at the equator is much warmer than air at the North and South Poles. Which of the following scenarios is most likely to decrease the difference in temperature between the equator and poles? 36) _____
- A) Earth being completely covered with water
B) Earth spinning without a seasonal tilt to its axis
C) Earth being completely covered by land
D) Earth rotating in the opposite direction
- Answer: A
Explanation: A)
B)
C)
D)
- 37) Which of the following is a primary pollutant? 37) _____
- A) Lead
B) Ozone
C) Sulfuric acid
D) Nitric acid
- Answer: A
Explanation: A)
B)
C)
D)
- 38) Carbon monoxide _____. 38) _____
- A) is consumed by plants for photosynthesis
B) is produced by plants during photosynthesis
C) is a major component of the atmosphere
D) causes ozone depletion
E) blocks oxygen transport in human blood
- Answer: E
Explanation: A)
B)
C)
D)
E)
- 39) In the 1970s and 1980s, CFCs were widely used in _____. 39) _____
- A) refrigerators and aerosol cans
B) snowmobiles and motorcycles
C) light bulbs and electronics
D) coal-fired power plants
- Answer: A
Explanation: A)
B)
C)
D)

ESSAY. Write your answer in the space provided or on a separate sheet of paper.

40) Explain how acid precipitation forms, and describe the impacts of acid precipitation on the environment.

Answer: Acid precipitation is a secondary pollutant formed in the atmosphere when sulfur and nitrogen oxides dissolve in water to produce sulfuric acid and nitric acid. Acid precipitation can affect both aquatic and terrestrial ecosystems, in addition to human-made structures. Acid precipitation can acidify streams and lakes, leading to the death of fish and other aquatic species. Trees are negatively impacted by acid precipitation when acidic rainwater causes harmful changes to soils. Acid precipitation is particularly damaging to stone structures, gradually dissolving away buildings, gravestones, and historic architecture.

41) Describe the distinction between a primary pollutant and a secondary pollutant. Give an example of a primary pollutant and an example of a secondary pollutant. Explain the source(s) and effect(s) of each of these pollutants, and describe recent U.S. trends in atmospheric concentrations of each.

Answer: A primary pollutant is a chemical contaminant that is directly released from its source, while a secondary pollutant is formed via reactions between primary pollutants and other gases in the atmosphere. Lead is one example of a primary pollutant. Until its use was eliminated in 1996, lead was added to gasoline as a way to improve engine performance. Although its concentrations in the United States have been declining, lead is still released from fossil fuel combustion in power plants and from industrial processes such as lead smelters, solid waste incineration facilities, and lead-acid battery producers. Lead interferes with nervous system function and can cause brain damage. Tropospheric ozone (O_3) is one example of a secondary pollutant. Tropospheric ozone forms from a series of reactions that involve VOCs and NO_x . Ozone irritates respiratory tissue and can cause breathing difficulty. Ozone can also cause damage to leaf tissue. Ozone concentrations have been declining in the United States, but not as rapidly as the decline in other pollutants.

42) Discuss the objective and success of the 1987 Montreal Protocol.

Answer: The objective of the Montreal Protocol was to reduce the use of CFCs, which were contributing to the depletion of the ozone layer, the loss of which would increase the global prevalence of skin cancer. The world community came together in 1987 to craft the Montreal Protocol, which has been ratified by most countries. As a result of the protocol, CFC production has been phased out and replaced by more ozone-friendly compounds. The Montreal Protocol is viewed as one of the most successful international environmental treaties ever signed.

Answer Key

Testname: CHAPTER A

- 1) B
- 2) A
- 3) D
- 4) D
- 5) B
- 6) A
- 7) B
- 8) A
- 9) D
- 10) B
- 11) B
- 12) A
- 13) A
- 14) C
- 15) D
- 16) A
- 17) B
- 18) B
- 19) C
- 20) B
- 21) A
- 22) B
- 23) C
- 24) D
- 25) C
- 26) C
- 27) B
- 28) A
- 29) A
- 30) B
- 31) D
- 32) A
- 33) D
- 34) D
- 35) A
- 36) A
- 37) A
- 38) E
- 39) A
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Answer Key

Testname: CHAPTER A

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