

**MULTIPLE CHOICE. (2 Point Each)**

- 1) A geostrophic wind:
  - A) flows perpendicular to the pressure gradient force.
  - B) is usually not affected by the Coriolis force.
  - C) follows the pressure gradient force.
- 2) The Coriolis effect is strongest at this latitude:
  - A) 90 degrees.
  - B) 45 degrees.
  - C) 15 degrees.
  - D) 0 degrees.
- 3) The maximum concentrations of ozone are found in the:
  - A) mesosphere.
  - B) troposphere.
  - C) ionosphere.
  - D) stratosphere.
- 4) The sky is blue because of:
  - A) rayleigh scattering.
  - B) reflection.
  - C) mie scattering.
  - D) absorption.
  - E) refraction.
- 5) Volcanic outgassing:
  - A) has had little effect on the earth's atmosphere.
  - B) created the earth's first atmosphere.
  - C) emits very little carbon dioxide.
  - D) emits large amounts of water vapor.
- 6) The temperature is lowest here:
  - A) stratosphere.
  - B) mesopause.
  - C) tropopause.
  - D) stratopause.

- 7) Choose the correct listing of radiation from the longest wavelengths to the shortest wavelengths:
  - A) x-rays, ultraviolet, infrared, gamma rays, visible, radio.
  - B) radio, infrared, visible, ultraviolet, x-rays, gamma rays.
  - C) gamma rays, radio, ultraviolet, infrared, visible, x-rays.
  - D) radio, gamma rays, ultraviolet, visible, infrared, x-rays.
- 8) The solar constant:
  - A) is higher for Earth than for Mars.
  - B) varies inversely with the fourth power of an object's distance from the Sun's surface.
  - C) is the same throughout the solar system.
- 9) The four factors that are totally responsible for wind are:
  - A) the pressure gradient force, the Coriolis force, the centripetal acceleration, moisture content.
  - B) the centripetal acceleration, moisture content, friction, Coriolis force.
  - C) friction, centripetal acceleration, pressure gradient force, moisture content.
  - D) the Coriolis force, friction, the centripetal acceleration, the pressure gradient force.
- 10) Horizontal pressure changes are \_\_\_\_\_ than vertical pressure changes.
  - A) about the same
  - B) greater
  - C) less than
  - D) None of the above. There are no horizontal pressure changes.
- 11) On average, the atmosphere absorbs roughly this percentage of the solar radiation that reaches the top of the atmosphere:
  - A) 50 percent.
  - B) 5 percent.
  - C) 25 percent.
  - D) 14 percent.

- 12) Relatively speaking, the earth's atmosphere is:
- A) very thin when compared to the earth's diameter.
  - B) very thick when compared to the earth's diameter.
  - C) stops when we reach "space".
  - D) stops at the top of the troposphere.
- 13) The atmosphere is a(n):
- A) blackbody absorber.
  - B) inferior absorber of x-rays.
  - C) absorber of all radiation equally.
  - D) selective absorber.
- 14) The mixing ratio has the most in common with this measure of water vapor:
- A) saturation vapor pressure.
  - B) absolute humidity.
  - C) specific humidity.
  - D) relative humidity.
- 15) In this atmospheric layer, the temperature is relatively constant for the first 10 kilometers, then it increases:
- A) stratosphere.
  - B) mesosphere.
  - C) troposphere.
  - D) thermosphere.
- 16) Most of the outgoing terrestrial radiation at the top of the atmosphere are emitted from:
- A) the atmosphere
  - B) Earth's surface
- 17) The atmospheric window:
- A) is a local phenomenon similar to the ozone hole that opens over Antarctica in winter.
  - B) is located at a band of wavelengths between 0.1 and 0.4 micrometers.
  - C) allows certain wavelengths of longwave radiation to pass through the atmosphere.
- 18) This occurs around a high-pressure system when the Coriolis effect exceeds the pressure gradient force, causing air to turn:
- A) subgeostrophic flow.
  - B) geostrophic flow.
  - C) supergeostrophic flow.
- 19) The average albedo of the Earth is about:
- A) 0.3.
  - B) 0.5.
  - C) 0.7.
  - D) 0.9.
- 20) In a typical troposphere, air temperature decreases with height at the following rate:
- A) 2.5 degree C per one kilometer
  - B) 6.5 degree C per one kilometer
  - C) 10.5 degree C per one kilometer
- 21) This is NOT a variable gas:
- A) ozone.
  - B) carbon dioxide.
  - C) argon.
  - D) water vapor.
- 22) Cyclones:
- A) experience Coriolis effects that deflect air to the right in the Southern Hemisphere.
  - B) are associated with supergeostrophic winds.
  - C) are typically regions of fair weather.
  - D) are associated with low-pressure systems.
- 23) Saturation vapor pressure is dependent upon this variable:
- A) temperature.
  - B) air composition.
  - C) air pressure.
- 24) As the air temperature increases, with no addition of water vapor to the air, the relative humidity will:
- A) remain the same.
  - B) increase.
  - C) decrease.
- 25) Most of the clouds are formed in the:
- A) troposphere.
  - B) mesosphere.
  - C) stratosphere.
  - D) thermosphere.

- 26) A "greenhouse" works because:
- A) of the difference in the solar constant.
  - B) all greenhouses face south and into the maximum angle of solar energy.
  - C) short wave lengths of energy pass through the glass but longer ones can't.
  - D) the windows of the greenhouse only allow green light wavelengths to pass through.
- 27) The pressure gradient force is proportional to:
- A) the slope of the isobars.
  - B) the change in temperature expressed in Kelvin degrees.
  - C) the change in air density.
  - D) the speed necessary to achieve hydrostatic equilibrium.
- 28) The "stratosphere" warms because of:
- A) the injection of moisture by meteors.
  - B) the injection of moisture by high-flying jet aircraft.
  - C) the interaction of ozone and ultraviolet light.
  - D) dust and dirt deposited by volcanoes.
- 29) The dew point temperature:
- A) tells us how cold the air is.
  - B) tells us how moist the air is.
  - C) can be larger or smaller than the air temperature.
- 30) Hydrostatic equilibrium occurs when:
- A) the force of gravity and the vertical pressure gradient both act to push air downward.
  - B) large air masses are moving either up or down.
  - C) the force of gravity and the vertical pressure gradient both act to push air upward.
  - D) the force of gravity and the vertical pressure gradient have equal value and oppose each other.
- 31) Of the following planets, which has the most massive atmosphere?
- A) Mars                      B) Earth                      C) Venus
- 32) Which of the following will increase in a rising parcel of air?
- A) saturation vapor pressure.
  - B) relative humidity.
  - C) air temperature.
- 33) Water vapor in the atmosphere is an important source of:
- A) ozone pollution.                      B) sunlight.
  - C) carbon dioxide.                      D) heat.
- 34) Anticyclones:
- A) have clockwise winds in the Northern Hemisphere.
  - B) have air spiraling into them near the surface.
  - C) are associated with subgeostrophic winds.
- 35) If the air temperature remains constant, evaporating water into the air will \_\_\_\_\_ the dew point and \_\_\_\_\_ the relative humidity.
- A) increase, increase.
  - B) increase, decrease.
  - C) decrease, decrease.
  - D) decrease, increase.
- 36) If object A is at 400 K, and object B is at 800 K, then the radiation intensity of object A will be this amount of that the radiation intensity of object B:
- A) one-fourth.                      B) one-sixteenth.
  - C) one-eighth.                      D) one-half.
- 37) The highest temperatures are typically found in the:
- A) stratosphere.                      B) troposphere.
  - C) mesosphere.                      D) thermosphere.

- 38) The Stefan–Boltzmann Law gives the relationship between:
- A) solar energy and distance.
  - B) moisture and long–wave radiation.
  - C) emissivity and wavelength.
  - D) the intensity of radiation and the temperature of an object.
- 39) The troposphere makes up what fraction of the atmosphere's mass?
- A) 30%.
  - B) 50%.
  - C) 60%.
  - D) 80%.
- 40) The four layers of the atmosphere from the top down are:
- A) thermosphere, stratosphere, mesosphere, troposphere.
  - B) thermosphere, mesosphere, stratosphere, troposphere.
  - C) stratosphere, mesosphere, thermosphere, troposphere.
  - D) troposphere, stratosphere, mesosphere, thermosphere.
- 41) Wind systems are generated by:
- A) the interaction of the atmosphere with the charged particles of the solar wind.
  - B) different pressures in different places.
  - C) the drag on the atmosphere caused by the earth's rotation.
  - D) the movements of ocean currents.
- 42) The greenhouse effect warms up Earth's surface temperature by:
- A) 13 degree C.
  - B) 33 degree C.
  - C) 53 degree C.
  - D) 73 degree C.
- 43) The Coriolis force:
- A) is caused by pressure gradient forces.
  - B) affects the speed of motion.
  - C) is constant.
  - D) affects the direction of motion.
- 44) The radiation emitted by Earth:
- A) had its origin in radioactive elements in the earth's interior.
  - B) is primarily absorbed by the atmosphere.
  - C) has little effect on the earth's energy budget.
  - D) is in the form of radio waves.
- 45) Sunsets are red for all of the following reasons except:
- A) red light has more energy than blue light.
  - B) Rayleigh & Mie scattering.
  - C) light has to travel through more atmosphere to reach the observer.
- 46) At the theoretical Absolute Zero (Zero degrees Kelvin),
- A) all molecular motion stops.
  - B) molecular motion is at a minimum.
  - C) atoms implode.
- 47) Geostrophic flow:
- A) occurs in atmospheric levels with substantial friction.
  - B) occurs when the pressure gradient force equals the Coriolis force.
  - C) can occur in all levels of the atmosphere.
- 48) A missile launched due south in the Northern Hemisphere will be deflected toward:
- A) east.
  - B) west.
- 49) Which of the following gases is not a greenhouse gas:
- A) carbon dioxide.
  - B) nitrous oxide.
  - C) water vapor.
  - D) methane.
  - E) oxygen.
- 50) Specific humidity:
- A) is a useful measure for comparing water vapor at two different locations.
  - B) is the same as the relative humidity.
  - C) changes as a given mass of air expands.

# Answer Key

Testname: MIDTERM.2008.VERSION\_A.TST

## MULTIPLE CHOICE. (2 Point Each)

- 1) A
- 2) A
- 3) D
- 4) A
- 5) D
- 6) B
- 7) B
- 8) A
- 9) D
- 10) C
- 11) C
- 12) A
- 13) D
- 14) C
- 15) A
- 16) A
- 17) C
- 18) C
- 19) A
- 20) B
- 21) C
- 22) D
- 23) A
- 24) C
- 25) A
- 26) C
- 27) A
- 28) C
- 29) B
- 30) D
- 31) C
- 32) B
- 33) D
- 34) A
- 35) A
- 36) B
- 37) D
- 38) D
- 39) D
- 40) B
- 41) B
- 42) B
- 43) D
- 44) B
- 45) A
- 46) A
- 47) B
- 48) B

- 49) E
- 50) A