

Advanced Climatology Assessment

Climatology · Answer Key · 12 Questions

1. Which atmospheric layer contains approximately 80% of the total mass of the Earth's atmosphere and is the primary site of weather phenomena?

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

2. What is the primary driver of the thermohaline circulation, often referred to as the 'Global Ocean Conveyor Belt'?

- A) Tidal forces from the Moon
- B) Differences in density caused by temperature and salinity**
- C) Prevailing trade winds
- D) The Coriolis effect on surface currents

3. During a negative phase of the Arctic Oscillation, what is the most likely outcome for Northern Europe and the Eastern United States?

- A) Unusually mild and wet winters
- B) Increased hurricane activity
- C) Increased frequency of cold air outbreaks**
- D) Stabilization of the polar vortex

4. Which feedback mechanism occurs when warming leads to a decrease in surface albedo, thereby accelerating further warming?

- A) Water vapor feedback
- B) Ice-albedo feedback**
- C) Cloud-radiative feedback
- D) Lapse rate feedback

5. The 'Keeling Curve' is a graph that plots the ongoing change in the concentration of which gas in the Earth's atmosphere?

- A) Methane
- B) Nitrous oxide
- C) Carbon dioxide**
- D) Chlorofluorocarbons

6. What is the definition of a 'proxy' in the context of paleoclimatology?

- A) A computer simulation of past climates
- B) A physical, chemical, or biological imprint of past climate**
- C) A direct instrumental measurement taken before 1850
- D) A statistical correlation between solar cycles and rainfall

7. Which phenomenon is defined by the reversal of the Walker Circulation across the equatorial Pacific Ocean?

- A) La Niña
- B) The Pacific Decadal Oscillation
- C) El Niño**
- D) The Indian Ocean Dipole

8. What is the primary cause of the 'stratospheric cooling' trend observed while the troposphere is warming?

- A) Depletion of stratospheric ozone
- B) Increased greenhouse gas concentrations trapping heat in the troposphere**
- C) Changes in solar irradiance
- D) Increased volcanic aerosol loading

9. Which of the following is considered a 'short-lived climate forcer' that has a significant warming effect but remains in the atmosphere for only days to weeks?

- A) Carbon dioxide
- B) Nitrous oxide
- C) Black carbon**
- D) Sulfur hexafluoride

10. The 'Köppen climate classification system' primarily categorizes different climate types based on which two variables?

- A) Latitude and longitude
- B) Annual and monthly averages of temperature and precipitation**
- C) Wind speed and atmospheric pressure
- D) Soil moisture and vegetation type

11. What is the function of the 'Coriolis effect' in global wind patterns?

- A) It generates the heat required to create thermal convection
- B) It causes moving air to deflect to the right in the Northern Hemisphere**
- C) It creates the high-pressure systems found at the equator
- D) It reduces the speed of jet streams

12. In the study of climate, what does the term 'radiative forcing' measure?

A) The rate of ozone depletion in the upper atmosphere

B) The difference between incoming solar radiation and outgoing infrared radiation

C) The speed at which glaciers melt in polar regions

D) The percentage of solar energy reflected by cloud cover