Climate Change, Evidence and Indicators

Choose one answer per question. Circle A, B, C, or D.

1. Which observation describes weather rather than climate?
   A. It rained for an hour this afternoon.
   B. Summers are usually dry in this region.
   C. Winters here average several freezing weeks over many decades.
   D. The region’s typical spring rainfall was calculated from decades of records.

2. An analyst wants to use NOAA’s conventional U.S. climate normals for a station. How long is the standard period used for those normals?
   A. 5 years
   B. 1 year
   C. 30 years
   D. 100 years

3. Which of these is a common greenhouse gas that absorbs outgoing infrared radiation?
   A. Nitrogen gas
   B. Carbon dioxide
   C. Oxygen gas
   D. Argon

4. After Earth’s surface absorbs sunlight, it emits energy. Which step explains why greenhouse gases affect surface temperature?
   A. They cool Earth by preventing all incoming sunlight from reaching the surface.
   B. They permanently stop the surface from emitting any energy.
   C. They make the Sun emit more visible light.
   D. They absorb and re-emit some outgoing infrared energy.

5. Which record is best suited to comparing global sea level across a period of several decades?
   A. The height of a single wave during a storm
   B. Yearly estimates of global mean sea level across those decades
   C. One afternoon’s tide reading at one pier
   D. A map showing wind direction on one day

6. Which human activity directly adds carbon dioxide to the atmosphere and contributes to the long-term warming assessed by the IPCC?

A. Burning fossil fuels for transportation or energy
B. Measuring air temperature at weather stations
C. Mapping the length of daylight
D. Monitoring the direction of ocean currents

7. For a fictional station, the long-term July average is 12.0 degrees Celsius. One July averages 13.1 degrees. What is the temperature anomaly relative to that baseline?

A. 13.1 degrees Celsius above the baseline
B. 1.1 degrees Celsius below the baseline
C. 12.0 degrees Celsius above the baseline
D. 1.1 degrees Celsius above the baseline

8. A fictional town’s annual average rises from 16.0 to 16.6 degrees Celsius when comparing two 30-year periods. The town also records a very cold day during the later period. Which statement fits both observations?

A. A warmer average means each day must be warmer.
B. The cold day proves the two period averages are equal.
C. The cold day can occur while the multiyear average rises.
D. A cold day changes the meaning of the 30-year average to a daily reading.

9. In a simplified model, a parcel of seawater with typical ocean salinity warms while its mass stays the same. Which effect helps explain a contribution to sea-level rise?

A. The warmer parcel occupies more volume.
B. The warmer parcel gains mass from being heated.
C. The warmer parcel occupies less volume.
D. The warmer parcel turns completely into salt.

10. Which change transfers water previously stored on land into the ocean and directly contributes to rising global sea level?

A. A tide rises and then falls at a harbor.
B. An already floating ice floe breaks into smaller pieces.
C. Wind temporarily pushes water toward one beach.
D. Meltwater from a land glacier flows into the ocean.

11. A fictional record has three consecutive 10-year averages of 12.0, 12.1 and 12.2 degrees Celsius. The next three consecutive 10-year averages are 12.5, 12.6 and 12.7. By how much does the average rise between the two groups of three decades?

A. 0.7 degrees Celsius
B. 0.1 degrees Celsius
C. 0.5 degrees Celsius
D. 1.5 degrees Celsius

12. Over the same period, a fictional tide gauge shows a local rise of 40 millimeters while a fictional global mean series rises by 25 millimeters. What is the sound interpretation?

A. The global mean must rise by 40 millimeters because one coast did.
B. Local relative sea level can change by a different amount from the global mean.
C. The gauge must be wrong whenever it differs from the global mean.
D. The figures prove that all other coastlines fell by 15 millimeters.

13. In a simplified Arctic illustration, bright sea ice retreats and darker open water takes its place. With incoming sunlight unchanged, what happens to the share absorbed at the surface?

A. The absorbed share becomes zero once the sea ice is gone.
B. A smaller share is absorbed because open water reflects more sunlight.
C. The absorbed share cannot change while incoming sunlight stays the same.
D. A larger share is absorbed because open water reflects less sunlight.

14. A fictional local dataset shows that carbon dioxide and average temperature both rose during three periods. Which statement best distinguishes that dataset from a climate attribution study?

A. The two trends can be compared, while attribution also tests physical mechanisms and other influences.
B. The two rising trends prove carbon dioxide caused every local temperature change.
C. Three rising measurements are enough to identify the exact contribution of each influence.
D. The record proves that carbon dioxide has no effect unless temperature rises every year.

15. A fictional sea-level index reads 100 millimeters in 1980, 120 in 1990 and 180 in 2010. What are the average rises per year from 1980 to 1990 and from 1990 to 2010, in that order?

A. 3 and 2 millimeters per year
B. 20 and 60 millimeters per year
C. 2 and 3 millimeters per year
D. 2 and 6 millimeters per year