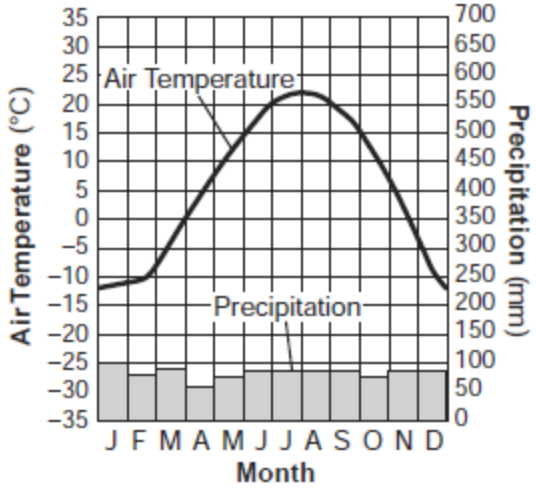
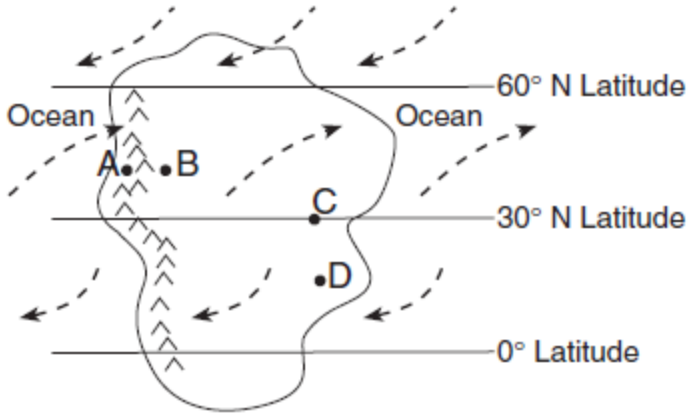
1. The graph below shows the yearly air temperature and precipitation of a location on Earth.



This location would be most likely at a latitude of

A) 0° B) 35° S **C) 50° N** D) 90° N

2. Base your answer to the following question on the map below, which shows an imaginary continent on Earth. Arrows represent prevailing wind directions. Letters *A* through *D* represent locations on the continent. Locations *A* and *B* are at the same latitude and at the same elevation at the base of the mountains.



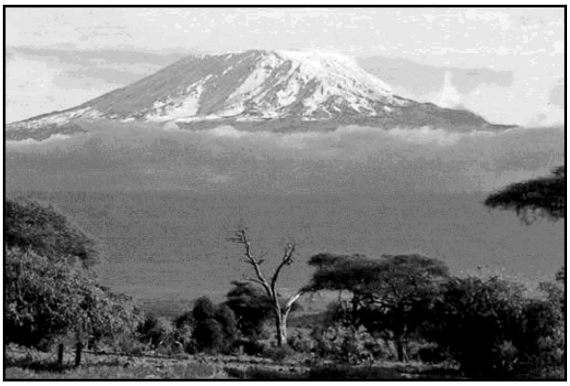
The climate at location *C* is much drier than at location *D*. This difference is best explained by the fact that location *C* is located

A) farther from any mountain range
B) closer to a large body of water
C) at a latitude that experiences longer average annual daylight
D) at a latitude where air is sinking and surface winds diverge

3. Mt. Marcy often has the coldest nighttime temperatures in New York State because of its

A) latitude and planetary winds
B) latitude and elevation
C) longitude and planetary winds
D) longitude and elevation

4. The photograph below shows Mt. Kilimanjaro, a volcano in Africa, located near the equator.



Which climate factor is responsible for the snow seen on Mt. Kilimanjaro?

A) high latitude
B) high elevation
C) nearness to a cold ocean current
D) nearness to a high-pressure weather center

5. Which combination of climate factors generally results in the coldest temperatures?

A) low elevation and low latitude
B) low elevation and high latitude
C) high elevation and low latitude
D) high elevation and high latitude

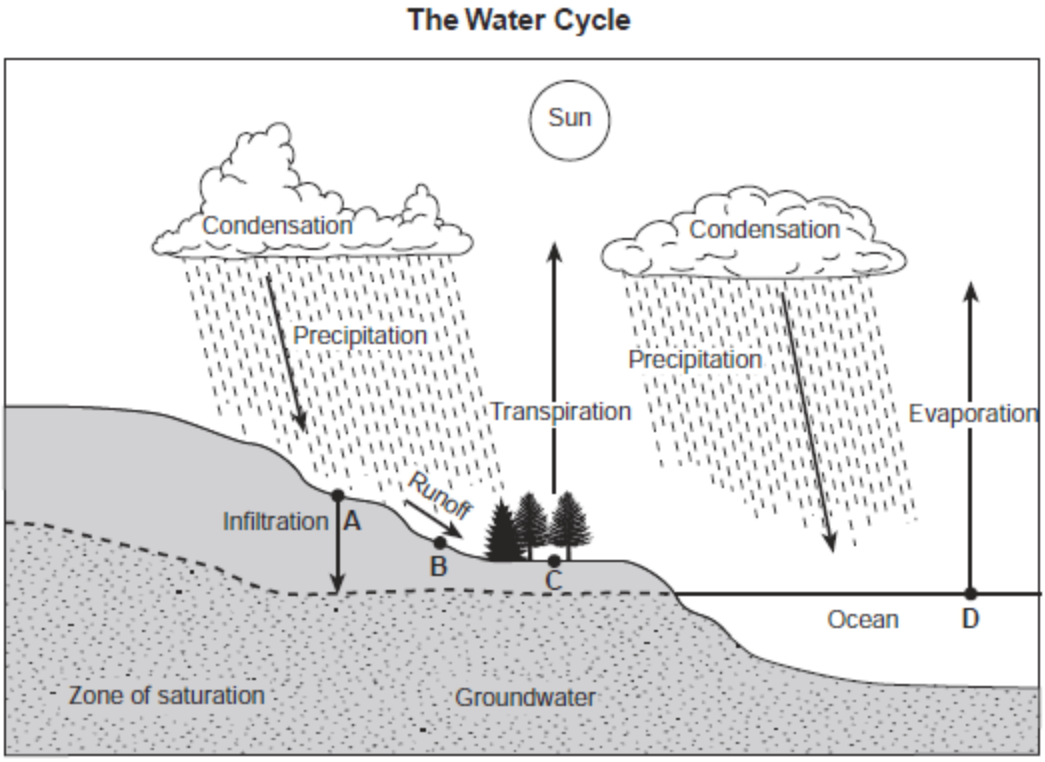
6. Soil composed of which particle size usually has the greatest capillarity?

A) silt B) fine sand
C) coarse sand D) pebbles

7. Which ocean current directly warms Western Europe?

A) North Atlantic Current
B) South Equatorial Current
C) Canary Current
D) Labrador Current

Base your answers to questions **8** through **10** on the cross section below and on your knowledge of Earth science. The cross section represents processes in the water cycle. Arrows represent the movement of water. Letters *A*, *B*, *C*, and *D* represent locations on Earth's surface.



8. What would most likely reduce the amount of runoff at location *B*?

A) infiltration occurring faster than precipitation
B) greater condensation than evaporation
C) saturated soil below the land surface
D) a frozen land surface

9. The greatest amount of transpiration and evaporation will occur most likely when the air temperature is

A) low and the humidity is low
B) low and the humidity is high
C) high and the humidity is low
D) high and the humidity is high

10. The downward movement of water from location *A* will usually be greatest when the soil is

A) nonporous and the particles are uniformly small in size
B) nonporous and the particles are uniformly large in size
C) porous and the particles are uniformly small in size
D) porous and the particles are uniformly large in size

11. When rainfall occurs, the rainwater will most likely become surface runoff if the land surface is

A) sandy
B) impermeable
C) covered with grass
D) nearly flat

Page 2

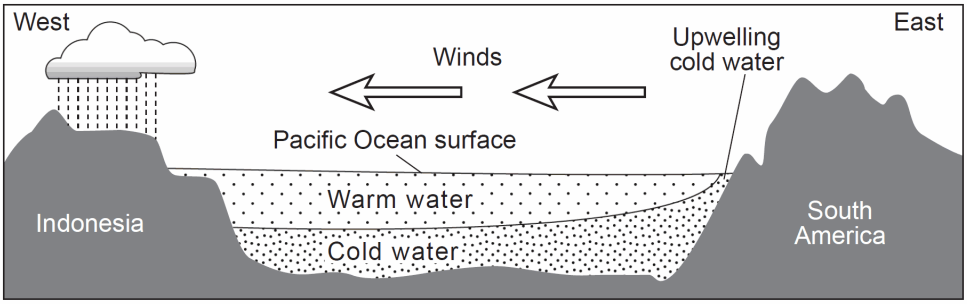
Base your answers to questions **12** through **15** on the passage and cross section below and on your knowledge of Earth science. The cross section represents a generalized region of the Pacific Ocean along the equator during normal (non-El Niño) conditions. The relative temperatures of the ocean water and the prevailing wind direction are indicated.

El Niño

Under normal Pacific Ocean conditions, strong winds blow from east to west along the equator. Surface ocean water piles up on the western part of the Pacific due to these winds. This allows deeper, colder ocean water on the eastern rim of the Pacific to be pulled up (upwelling) to replace the warmer surface water that was pushed westward.

During an El Niño event, these westward-blowing winds get weaker. As a result, warmer water does not get pushed westward as much, and colder water in the east is not pulled toward the surface. This creates warmer surface ocean water temperatures in the east, allowing the thunderstorms that normally occur at the equator in the western Pacific to move eastward. A strong El Niño is often associated with wet winters along the northwestern coast of South America and in the southeastern United States, and drier weather patterns in Southeast Asia (Indonesia) and Australia. The northeastern United States usually has warmer and drier winters in an El Niño year.

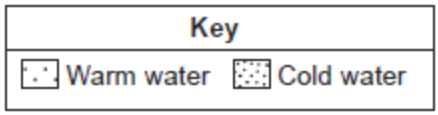
Normal Pacific Ocean Conditions (non-El Niño years)

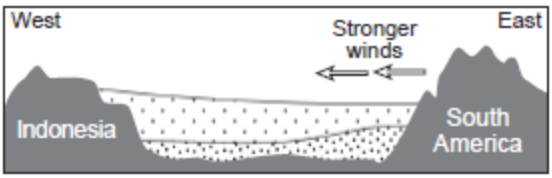


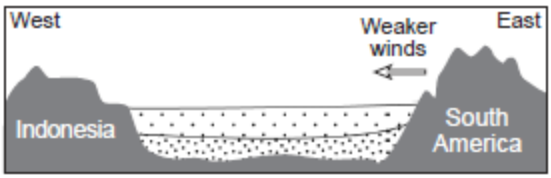
(Not drawn to scale)

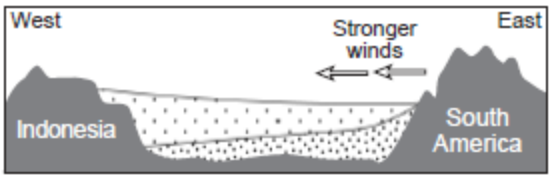
Page 3

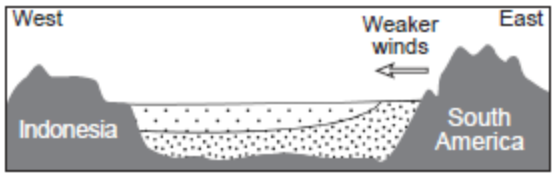
6. Which cross section best represents the changed wind conditions and Pacific Ocean temperatures during an El Nino event? [Diagrams are not drawn to scale.]



A) 

B) 

C) 

D) 

13. Compared to non-El Niño years, which climatic conditions exist near the equator on the western and eastern sides of the Pacific Ocean during an El Niño event?

A) The western Pacific is drier and the eastern Pacific is wetter.
B) The western Pacific is wetter and the eastern Pacific is drier.
C) The western and the eastern Pacific are both wetter.
D) The western and the eastern Pacific are both drier.

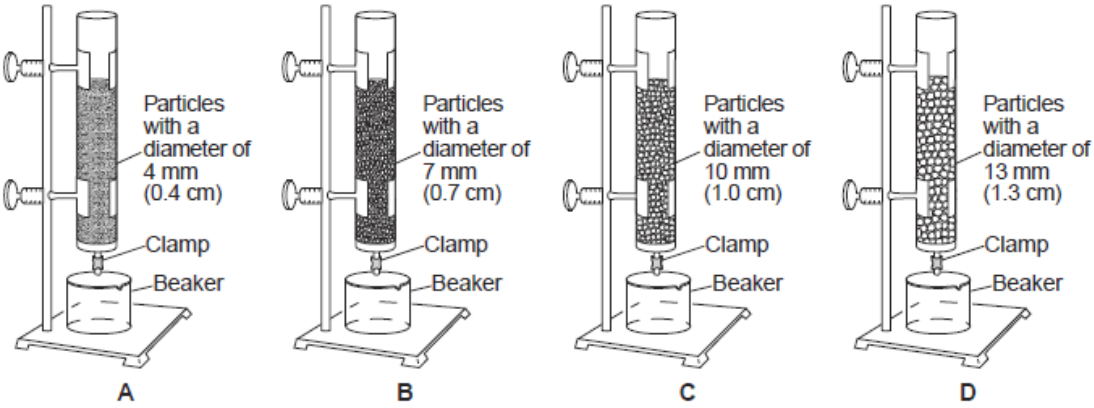
14. During an El Niño year, winter climatic conditions in New York State will most likely be

A) colder and wetter
B) colder and drier
C) warmer and wetter
D) warmer and drier

15. Which statement best describes the planetary wind belts that produce the winds represented in the cross section above?

A) Southwest and northwest winds diverge at the equator and blow toward the west.
B) Southwest and northwest winds diverge at the equator and blow toward the east.
C) Northeast and southeast winds converge at the equator and blow toward the west.
D) Northeast and southeast winds converge at the equator and blow toward the east.

16. Base your answer to the following question on the diagram below and on your knowledge of Earth science. The diagram represents setups of laboratory equipment, labeled *A, B, C*, and *D*. This equipment was used to test the infiltration rate and water retention of four different particle sizes. Each column was filled to the same level with uniform-sized dry, spherical particles. Water was poured into each column until the water level rose to the top of the particles. Then, the clamp was opened to allow the water to drain into the beaker beneath each column.

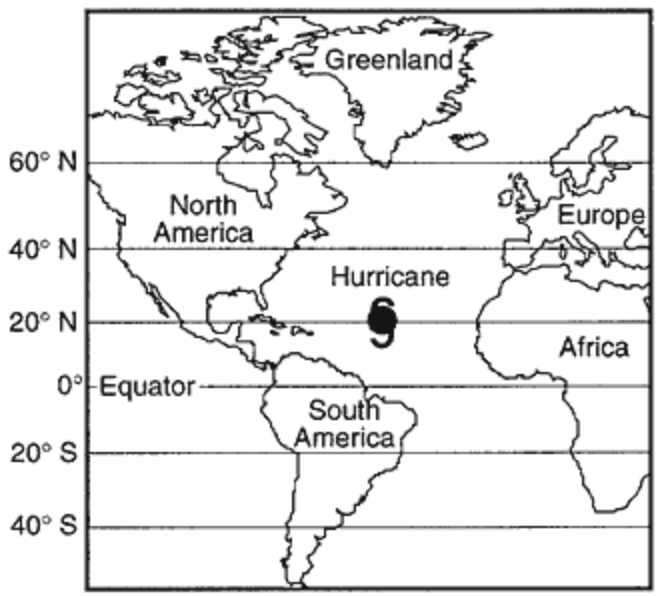


(Not drawn to scale)

Which column of particles retained the most water after the clamps were opened and the water was drained into the beakers?

A) *A* B) *B* C) *C* D) *D*

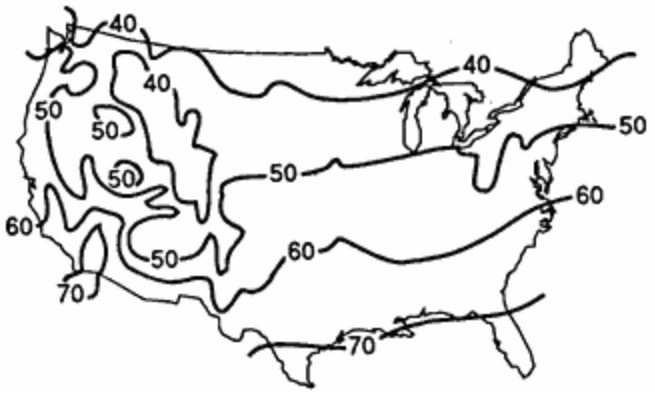
17. The hurricane shown on the map below is following a normal storm track for the month of September.



From the position shown on the map, toward which landmass is the hurricane most likely traveling?

A) North America B) South America
C) Europe D) Africa

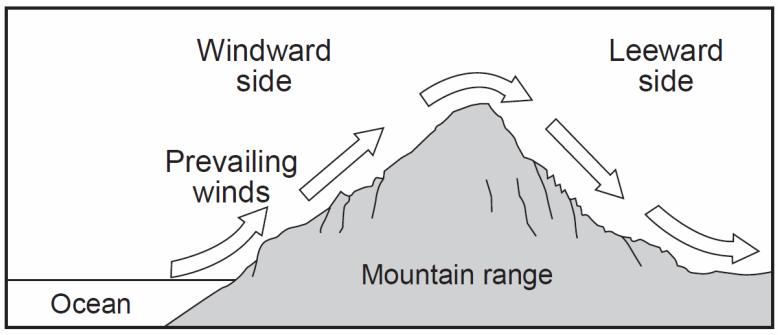
18. The map below shows average annual temperatures in degrees Fahrenheit across the United States.



Which climatic factor is most important in determining the pattern shown in the eastern half of the United States?

A) ocean currents
B) mountain barriers
C) elevation above sea level
D) latitude

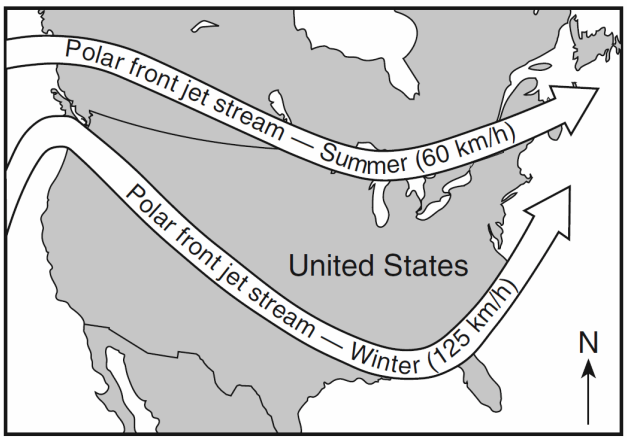
19. The cross section below represents a prevailing wind flow that causes different climates on the windward and leeward sides of a mountain range.



Compared to the temperature and moisture of the air rising on the windward side, the temperature and moisture of the air descending at the same altitude on the leeward side will be

A) warmer and drier
B) warmer and more moist
C) cooler and drier
D) cooler and more moist

20. The map below shows a typical position and average velocity of the polar front jet stream during two different seasons.



For the eastern United States, the change of the polar front jet stream from this summer position to this winter position causes

A) warmer temperatures farther north and causes storms to move more slowly
B) warmer temperatures farther north and causes storms to move more rapidly
C) cooler temperatures farther south and causes storms to move more slowly
D) cooler temperatures farther south and causes storms to move more rapidly

21. Which ocean current brings warm water to the southeastern coast of Africa?

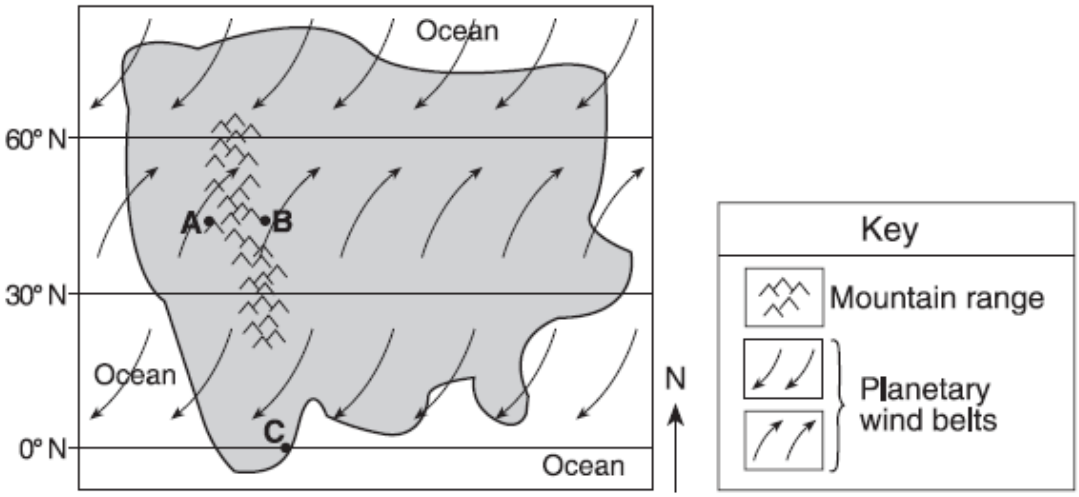
A) Agulhas Current
B) Benguela Current
C) West Australian Current
D) Equatorial Countercurrent

22. Flash flooding is most likely to occur when heavy rain falls on

A) deforested landscapes with clay soils
B) deforested landscapes with sandy soils
C) forested landscapes with clay soils
D) forested landscapes with sandy soils

Page 6

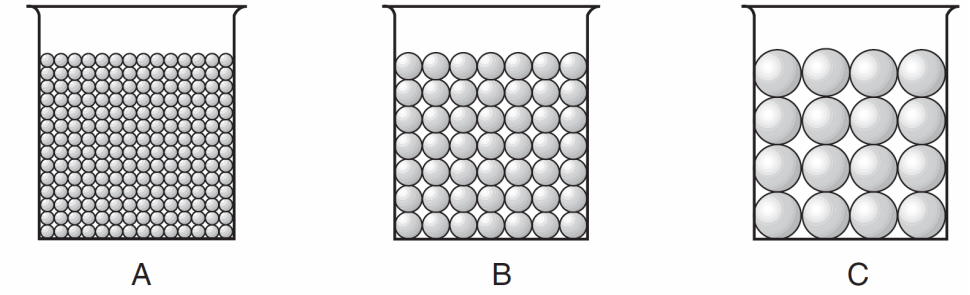
23. Base your answer to the following question on map below, which represents an imaginary continent. Locations *A* and *B* are on opposite sides of a mountain range on a planet similar to Earth. Location *C* is on the planet's equator.



Location *C* most likely experiences

A) low air pressure and low precipitation
B) low air pressure and high precipitation
C) high air pressure and low precipitation
D) high air pressure and high precipitation

24. The cross sections below represent three beakers that were used to test porosity. Beakers *A, B,* and *C* each contain a different size of bead. Each beaker holds an equal volume of beads. The amount of water needed to fill the total pore space between the beads in each beaker was measured.

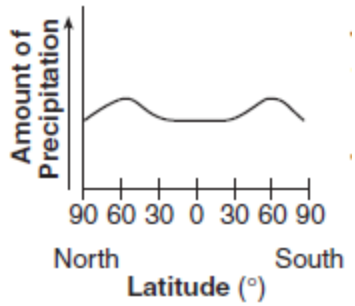


Which statement best describes the porosity that was found for these three samples?

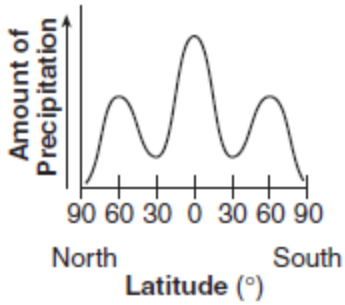
A) *A* had a greater porosity than *B* and *C*.
B) *B* had a greater porosity than *A* and *C*.
C) *C* had a greater porosity than *A* and *B*.
D) All three samples had the same porosity.

25. Which graph best shows the average annual amounts of precipitation received at different latitudes on Earth?

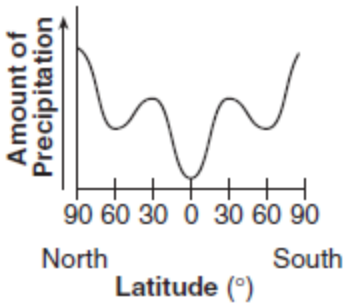
A)



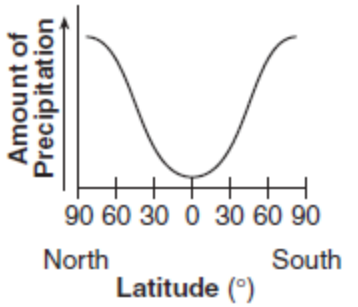
B)



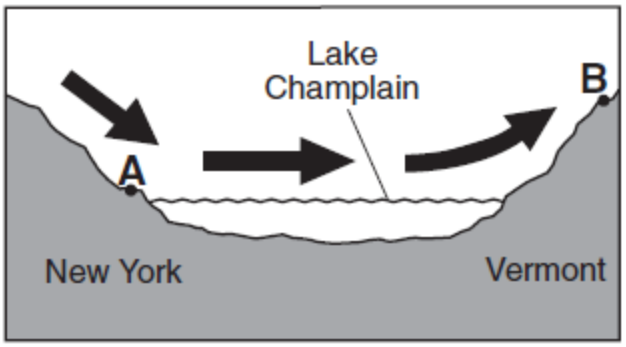
C)



D)



26. The arrows in the cross section below show the prevailing winds moving across northern New York State into Vermont during the summer.

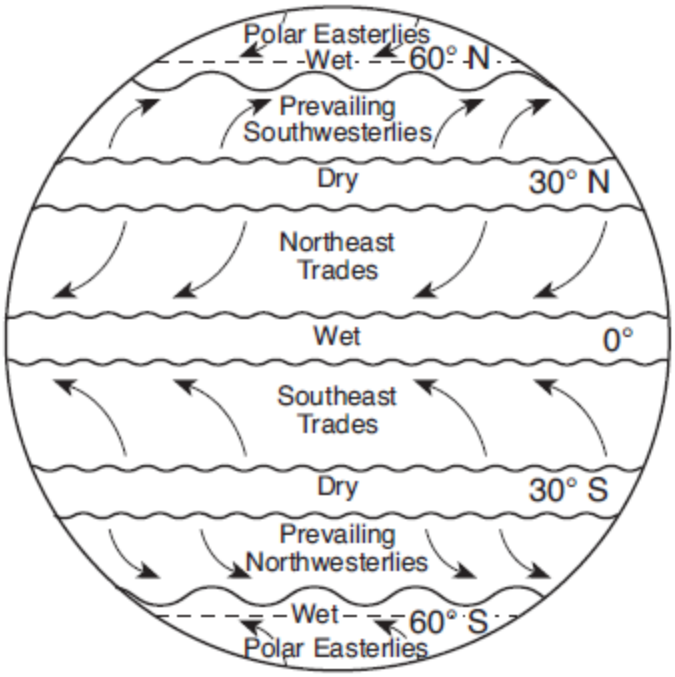


(Not drawn to scale)

Compared to the climate of location *A*, the climate of location *B* is

A) warmer and wetter B) warmer and drier
C) cooler and wetter D) cooler and drier

27. Base your answer to the following question on the map below, which shows Earth's planetary wind belts.



Which climatic conditions exist where the trade winds converge?

A) cool and wet B) cool and dry **C) warm and wet** D) warm and dry

Answer Key
Topic 8 - Climates and Water

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