1. Which ocean current transports warm water away from Earth's equatorial region?

   A) Brazil Current B) Guinea Current
   C) Falkland Current D) California Current

2. The Gulf Stream and North Atlantic Current modify the climate of northwestern Europe by making the climate

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

3. At which latitudes do currents of dry, sinking air cause the dry conditions of Earth's major deserts?

   A) 0º and 30º N B) 60º N and 60º S
   C) 30º N and 30º S D) 60º S and 90º S

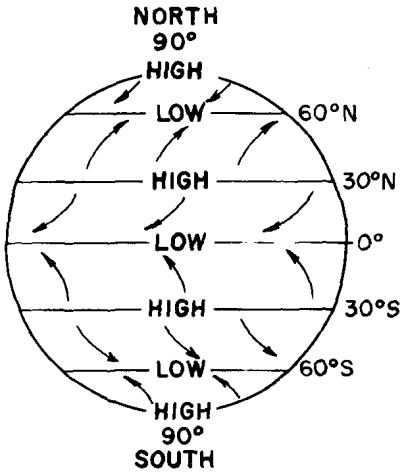
4. The California Ocean Current, which flows along the west coast of North America, is a

   A) cool current, flowing north
   B) cool current, flowing south
   C) warm current, flowing north
   D) warm current, flowing south

5. Most of Earth's weather events take place in the

   A) thermosphere B) mesosphere
   C) stratosphere **D) troposphere**

6. The diagram below shows the Earth's high and low air pressure belts and direction of prevailing winds for a particular time of the year. The winds do *not* appear to blow in a straight line from the high-pressure belts to the low-pressure belts. Which statement best explains this observation?



   A) Wind direction is modified by the Earth's rotation.
   B) Wind direction is modified by land forms.
   C) Wind direction is modified by water areas.
   D) Wind direction is modified by the Sun's motion.

7. London, England, is located at approximately 51° 30' north latitude and 0° longitude. Elmira, New York, is located at approximately 42° 10' north latitude and 76° 54' west longitude. What is one reason why London has a warmer average winter temperature than Elmira?

   A) London is located closer to the equator.
   B) London is located at a higher elevation.
   C) London's climate is modified by the North Atlantic Ocean Current.
   D) London's climate is modified by its longer duration of insolation.

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

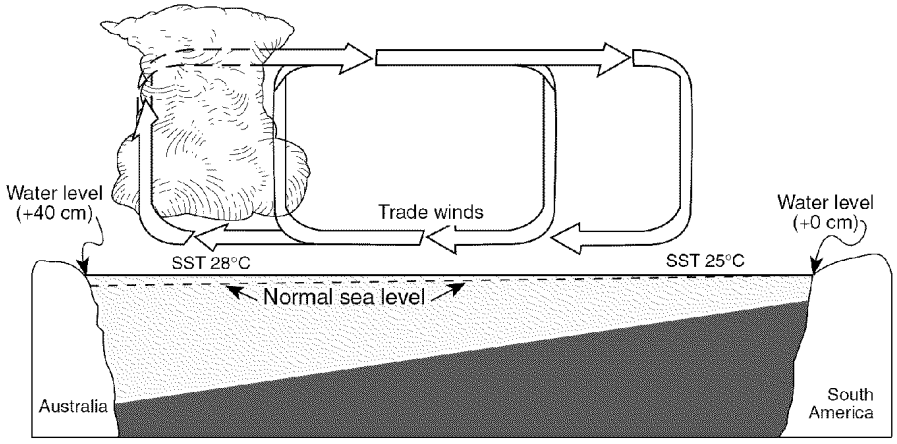
   A) low elevation and low latitude
   B) low elevation and high latitude
   C) high elevation and low latitude
   D) high elevation and high latitude

9. The Earth's planetary winds are deflected as a result of the Earth's

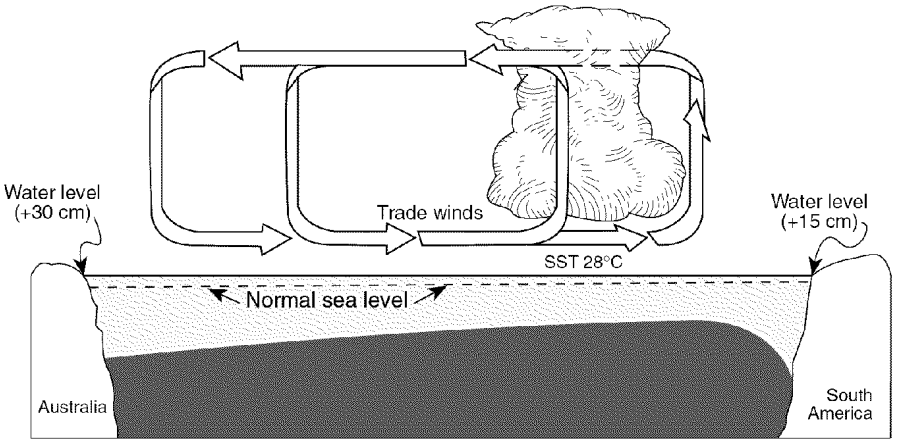
A) revolution around the Sun
B) seasonal changes
C) rotation on its axis
D) tilted axis

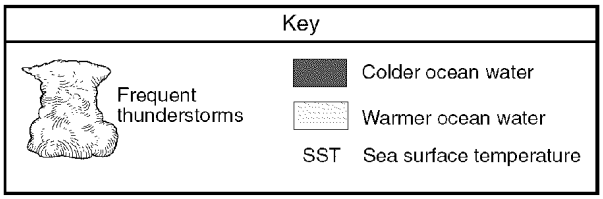
Base your answers to questions **10** through **14** on the two cross sections below, which represent the Pacific Ocean and the atmosphere near the Equator during normal weather (cross section *A*) and during El Niño conditions (cross section *B*). Sea surface temperatures (SST) are labeled and trade-wind directions are shown with arrows. Cloud buildup indicates regions of frequent thunderstorm activity. The change from normal sea level is shown at the side of each diagram.

Cross Section A: Normal Weather



Cross Section B: El Niño Conditions





10. During El Niño conditions, thunderstorms increase in the eastern Pacific Ocean region because the warm, moist air is

    A) less dense, sinking, compressing, and warming
    B) less dense, rising, expanding, and cooling
    C) more dense, sinking, compressing, and warming
    D) more dense, rising, expanding, and cooling

11. Earth's entire equatorial climate zone is generally a belt around Earth that has

    A) high air pressure and wet weather
    B) high air pressure and dry weather
    C) low air pressure and wet weather
    D) low air pressure and dry weather

12. Compared to normal weather conditions, the shift of the trade winds caused sea levels during El Niño conditions to

A) decrease at both Australia and South America
B) decrease at Australia and increase at South America
C) increase at Australia and decrease at South America
D) increase at both Australia and South America

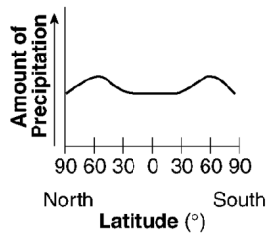
13. Which statement correctly describes sea surface temperatures along the South American coast and Pacific trade winds during El Niño conditions?

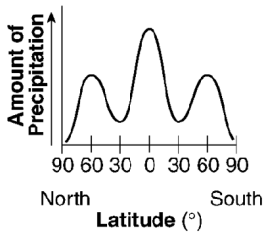
A) The sea surface temperatures are warmer than normal, and Pacific trade winds are from the west.
B) The sea surface temperatures are warmer than normal, and Pacific trade winds are from the east.
C) The sea surface temperatures are cooler than normal, and Pacific trade winds are from the west.
D) The sea surface temperatures are cooler than normal, and Pacific trade winds are from the east.

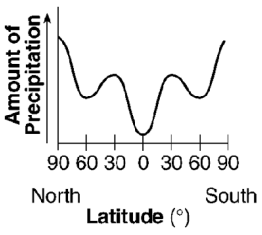
14. The development of El Niño conditions over this region of the Pacific Ocean has caused

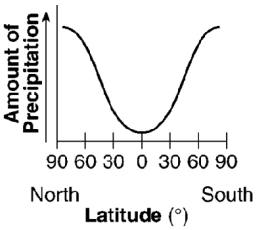
A) changes in worldwide precipitation patterns
B) the reversal of Earth's seasons
C) increased worldwide volcanic activity
D) decreased ozone levels in the atmosphere

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

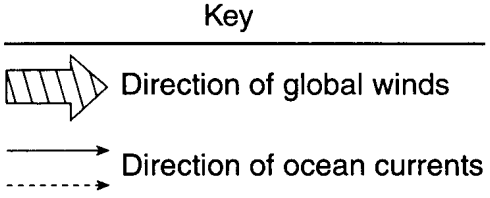
A)


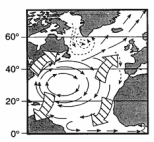
B)


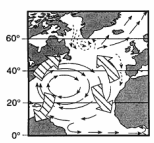
C)


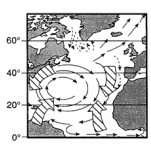
D)


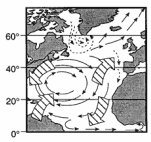
16. Which map best represents the global prevailing surface wind patterns responsible for generating Atlantic Ocean currents?



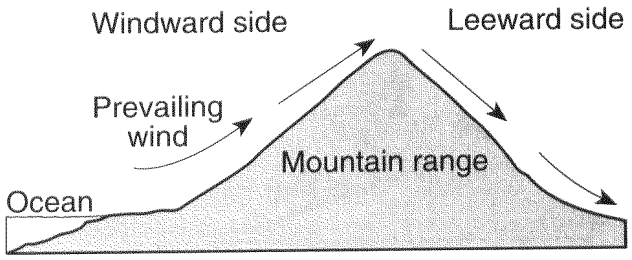
A)


B)


C)


D)


17. The cross section below shows the prevailing winds that cause different climates on the windward and leeward sides of this mountain range.



Compared to the climate conditions on the leeward side of this mountain range, the conditions on the windward side are usually

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

18. 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

19. Which ocean current directly warms Western Europe?

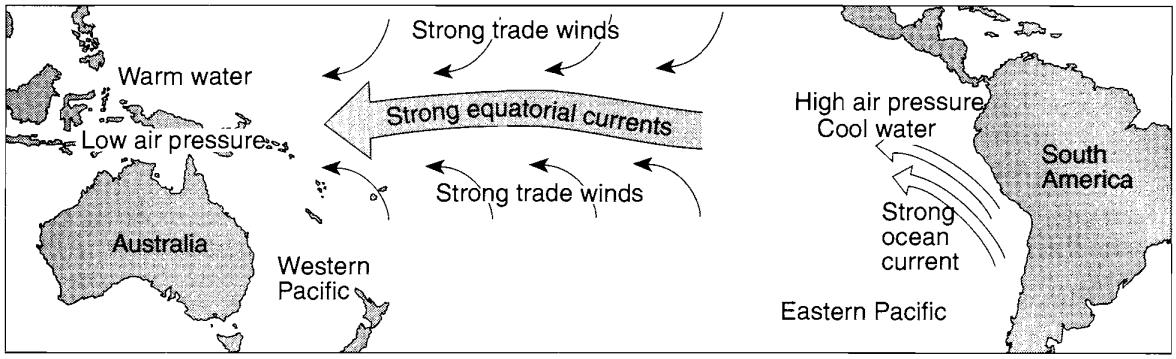
A) North Atlantic Current
B) South Equatorial Current
C) Canary Current
D) Labrador Current

Base your answers to questions **20** through **23** on the maps and the passage below. The maps show differences in trade wind strength, ocean current direction, and water temperature associated with air-pressure changes from normal climate conditions to EI Niño conditions.

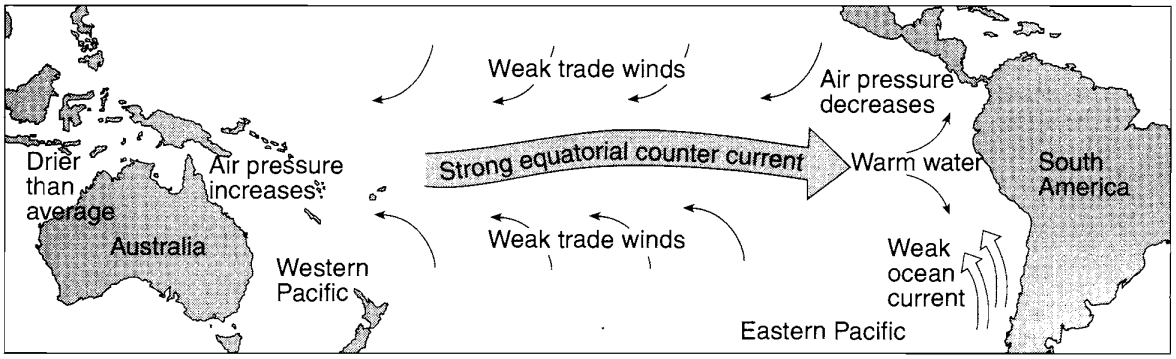
EI Niño Conditions

EI Niño conditions occur with a buildup of warm water in the equatorial Pacific Ocean off the coast of South America. The immediate cause of this buildup is a change in air pressure that weakens the southern trade winds. These are the planetary winds that move air from 30° S to the equator. Normally, these strong, steady winds, with the help of their counterparts in the Northern Hemisphere, push equatorial water westward away from South America. But, at intervals of two to seven years, these winds weaken, causing the westward water flow to reverse. This results in an accumulation of unusually warm water on the east side of the equatorial Pacific Ocean. This warm water not only changes the characteristics of the air above it, but also is thought to be the cause of weather changes around the world. EI Niño conditions may last only a few months, but often last a year or two.

Normal Climate Conditions



El Niño Conditions



20. The trade winds between 30° S and the equator usually blow from the

A) northeast **B) southeast** C) northwest D) southwest

21. Under normal climate conditions, what are the characteristics of the surface ocean current that flows along most of the west coast of South America?

A) cool water moving toward the equator
B) cool water moving away from the equator
C) warm water moving toward the equator
D) warm water moving away from the equator

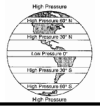
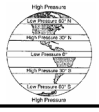
22. Equatorial Pacific trade winds weaken during EI Niño conditions when air pressure

A) falls in the western Pacific and rises in the eastern Pacific
B) falls in both the western and eastern Pacific
C) rises in the western Pacific and falls in the eastern Pacific
D) rises in both the western and eastern Pacific

23. During EI Niño conditions, air above the Pacific Ocean moving over the land on the equatorial west coast of South America is likely to be .

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

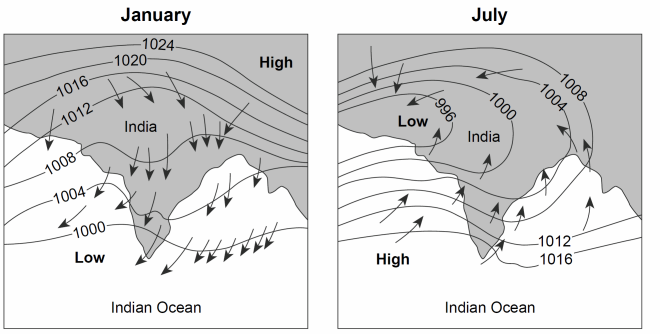
24. Which map represents the normal location of high and low air-pressure belts on the Earth?

A) 
B) 
C) 
D) 

25. Surface ocean currents located at 40º south latitude, 90º west longitude generally flow toward the

A) northeast
B) southeast
C) southwest
D) west

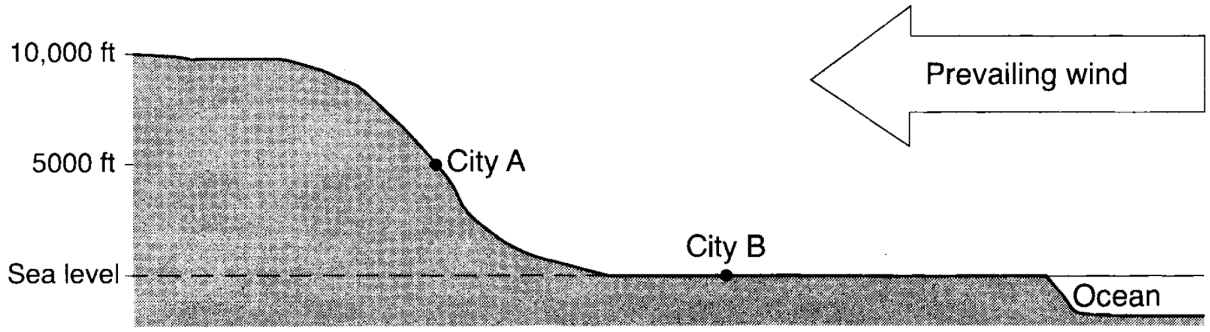
26. Arrows on the maps below show differences in the direction of winds in the region of India and the Indian Ocean during January and July. Isobar values are recorded in millibars.



Heavy monsoon rains usually occur in India during

A) January, when winds blow from the land
B) January, when winds blow toward high pressure
C) July, when winds blow from the ocean
D) July, when winds blow toward high pressure

27. The cross section below shows two cities, *A* and *B* at different elevations.



(Not drawn to scale)

Compared to the yearly temperature and precipitation at city *B,* city *A* most likely has

A) lower temperatures and less precipitation
B) lower temperatures and more precipitation
C) higher temperatures and less precipitation
D) higher temperatures and more precipitation

28. Two cities are located at the same latitude and elevation. One city, located in the center of the United States, has cooler winters and warmer summers than the other city, which is located near the coast. Which statement best explains these seasonal differences?

A) The air over continents is drier than the air over oceans.
B) Cold airmasses usually originate over continents.
C) A large body of water modifies coastal air temperatures.
D) Warm ocean currents flow along most coastlines.

29. Which event temporarily slows or reverses surface ocean currents in the equatorial region of the Pacific Ocean, causing a disruption of normal weather patterns?

A) tsunami
B) volcanic eruption
C) El Niño
D) deforestation

30. The Canaries Current along the west coast of Africa and the Peru Current along the west coast of South America are both

A) warm currents that flow away from the Equator
B) warm currents that flow toward the Equator
C) cool currents that flow away from the Equator
D) cool currents that flow toward the Equator

31. Which two ocean currents are both warm currents that primarily flow away from the equator?

A) Guinea Current and Labrador Current
B) Brazil Current and Agulhas Current
C) Alaska Current and Falkland Current
D) Canaries Current and Gulf Stream Current

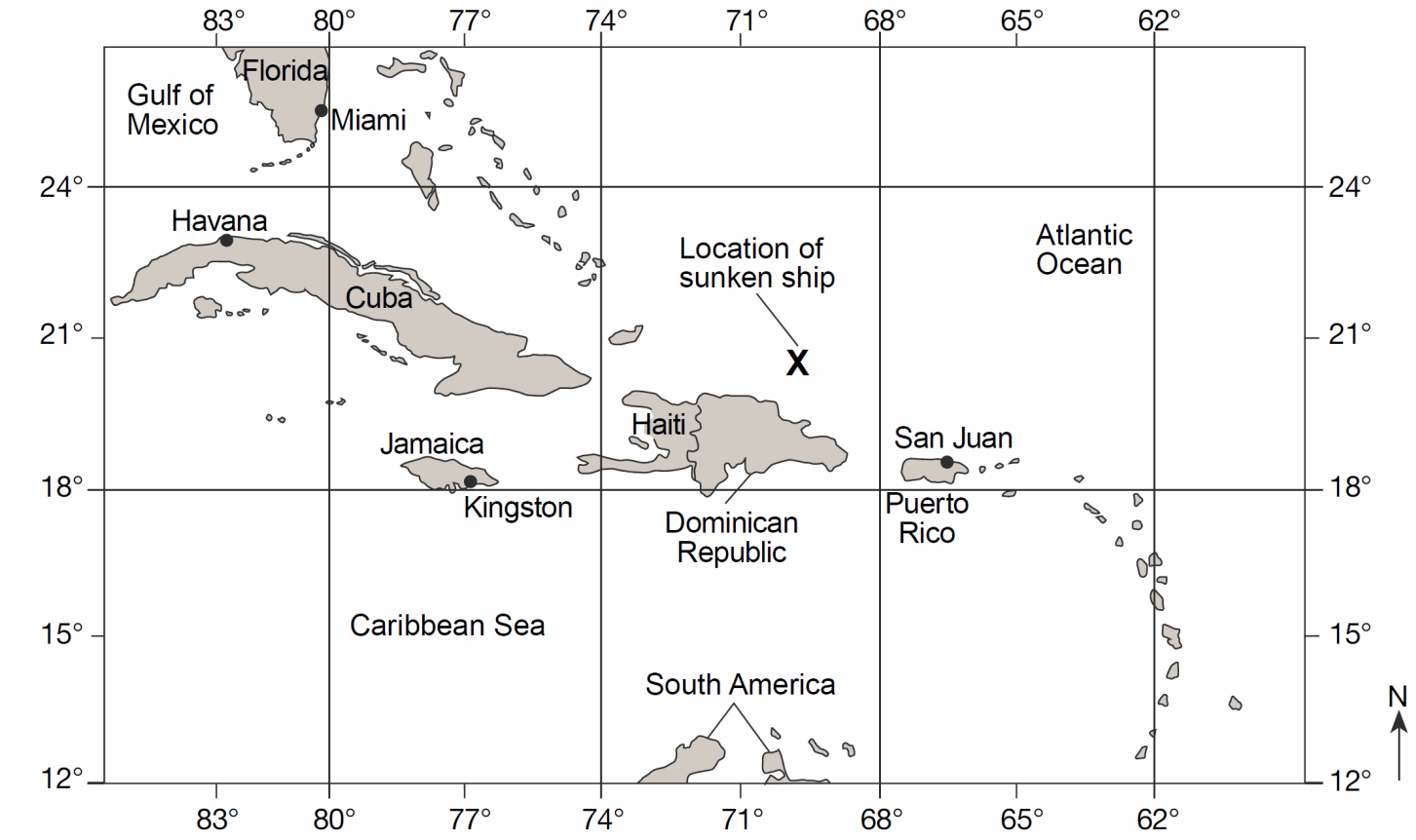
32. The planetary wind and moisture belts indicate that large amounts of rainfall occur at Earth's Equator because air is

A) converging and rising
B) converging and sinking
C) diverging and rising
D) diverging and sinking

33. Base your answer to the following question on the passage and map below. The map shows sections of the Atlantic Ocean, the Caribbean Sea, and the Gulf of Mexico.

Shipwreck

In 1641, the crew of the ship *Concepcion* used the Sun and stars for navigation. The crew thought that the ship was just north of Puerto Rico, but ocean currents had carried them off course. The ship hit a coral reef and sank off the coast of the Dominican Republic. The **X**on the map marks the location of the sunken ship.



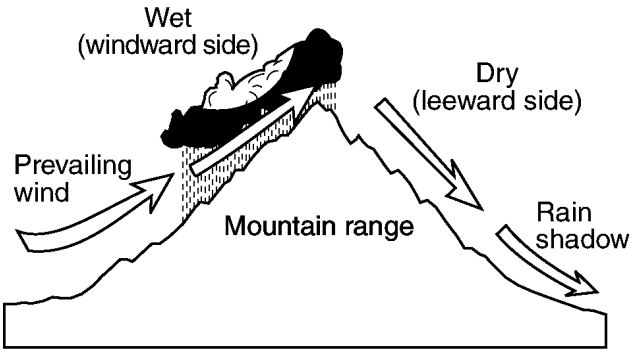
The *Concepcion* was carried off course to the northwest by an ocean current flowing from the

A) Florida Current
B) Gulf Stream Current
C) North Atlantic Current
D) North Equatorial Current

34. Which statement best summarizes the general effects of ocean currents at 20° S latitude on coastal regions of South America?

A) The east coast and west coast are both warmed.
B) The east coast and west coast are both cooled.
C) The east coast is warmed and the west coast is cooled.
D) The east coast is cooled and the west coast is warmed.

35. The cross section below shows how prevailing winds have caused different climates on the windward and leeward sides of a mountain range.



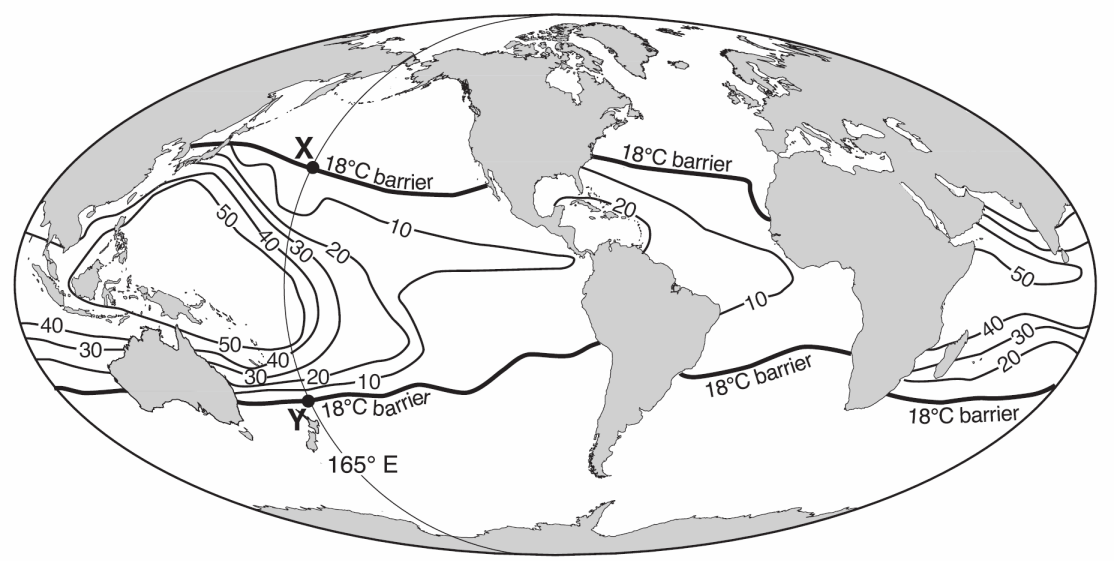
Why does the windward side of this mountain have a wet climate?

A) Rising air compresses and cools, causing the water droplets to evaporate.
B) Rising air compresses and warms, causing the water vapor to condense.
C) Rising air expands and cools, causing the water vapor to condense.
D) Rising air expands and warms, causing the water droplets to evaporate.

36. Waste produced by people in Delaware has been dumped into the Atlantic Ocean, where it is distributed by surface ocean currents. Which coastal area is most likely to become polluted by this waste?

A) western coast of Europe
B) southern coast of South America
C) western coast of Mexico
D) eastern coast of Africa

37. Base your answer to the following question on the map below, which shows coral reef distribution and diversity (number of different coral types) around the world. Isolines on the map represent the number of different types of coral. Coral reefs are found mostly in shallow tropical waters and do not grow when ocean temperatures fall below 18°C. The 18°C barrier represents the outer boundaries within which coral reefs normally grow. Points *X* and *Y* are locations on the map.



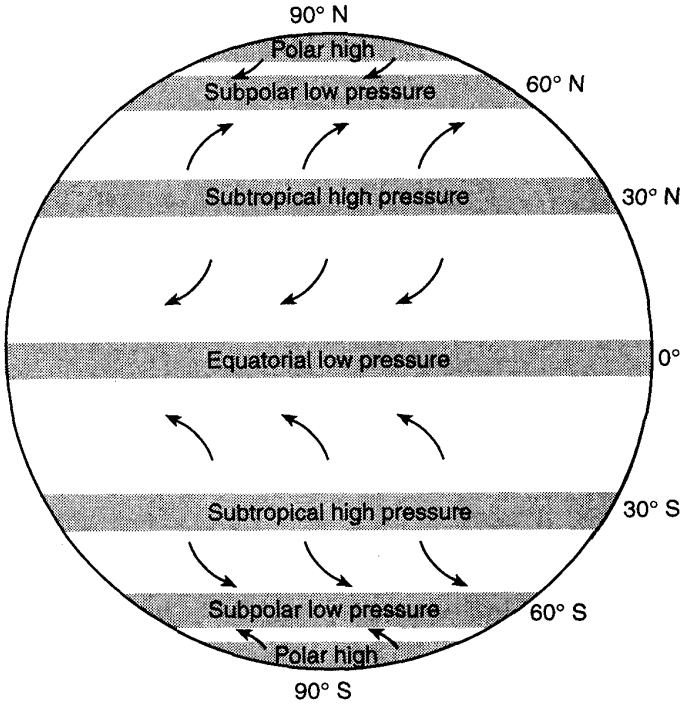
Which factor most likely determines why a greater number of coral types are found farther south along the east coast of southern Africa than along the west coast?

A) angle of the Sun's rays
B) temperature of the ocean currents
C) distance from the equator
D) seasonal air temperature range

38. A high air-pressure, dry-climate belt is located at which Earth latitude?

A) 0°
B) 15° N
C) 30° N
D) 60° N

Base your answers to questions **39** and **40** on the diagram below, which shows Earth's planetary wind belts and pressure belts.



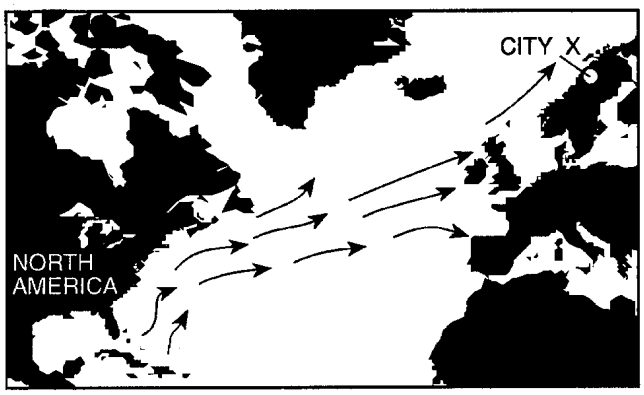
39. The best inference that can be made from this diagram is that winds blow from regions of

A) high latitude to regions of low latitude
B) high pressure to regions of low pressure
C) high elevation to regions of low elevation
D) high temperature to regions of low temperature

40. The surface winds shown in the diagram follow curving paths mainly due to Earth's

A) revolution **B) rotation**
C) gravitational field D) magnetic field

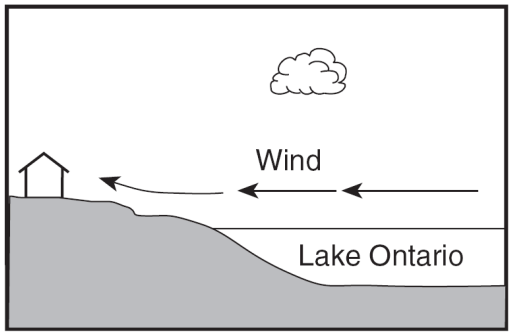
41. Arrows on the map represent ocean currents.



These ocean currents affect the climate pattern of city *X* by

A) decreasing the average annual cloud cover
B) decreasing the average annual evapotranspiration
C) increasing the average annual temperature
D) increasing the average annual air pressure

42. The cross section below shows a house on the shore of Lake Ontario in August.

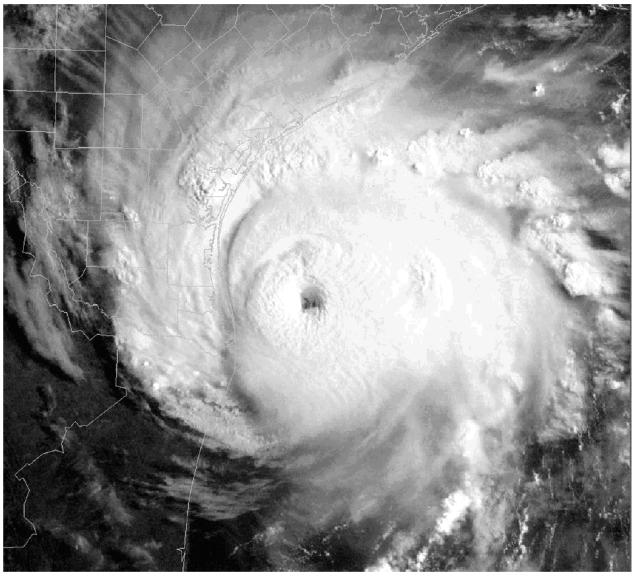


(Not drawn to scale)

Under which conditions would the wind shown in the cross section most likely occur?

A) at 2 a.m., when the air over land is 70°F and the air over the lake is 80°F
B) at 6 a.m., when the air over land is 70°F and the air over the lake is 70°F
C) at 2 p.m., when the air over land is 80°F and the air over the lake is 70°F
D) at 10 p.m., when the air over land is 70°F and the air over the lake is 72°F

Base your answers to questions **43** through **46** on the satellite image below, which shows a Northern Hemisphere hurricane.



43. When the eye of this hurricane reaches 43° N latitude, this hurricane will most likely be pushed by planetary winds toward the

A) northwest **B) northeast** C) southwest D) southeast

44. Which air mass is normally associated with the formation of hurricanes?

A) continental tropical **B) maritime tropical**
C) continental polar D) maritime polar

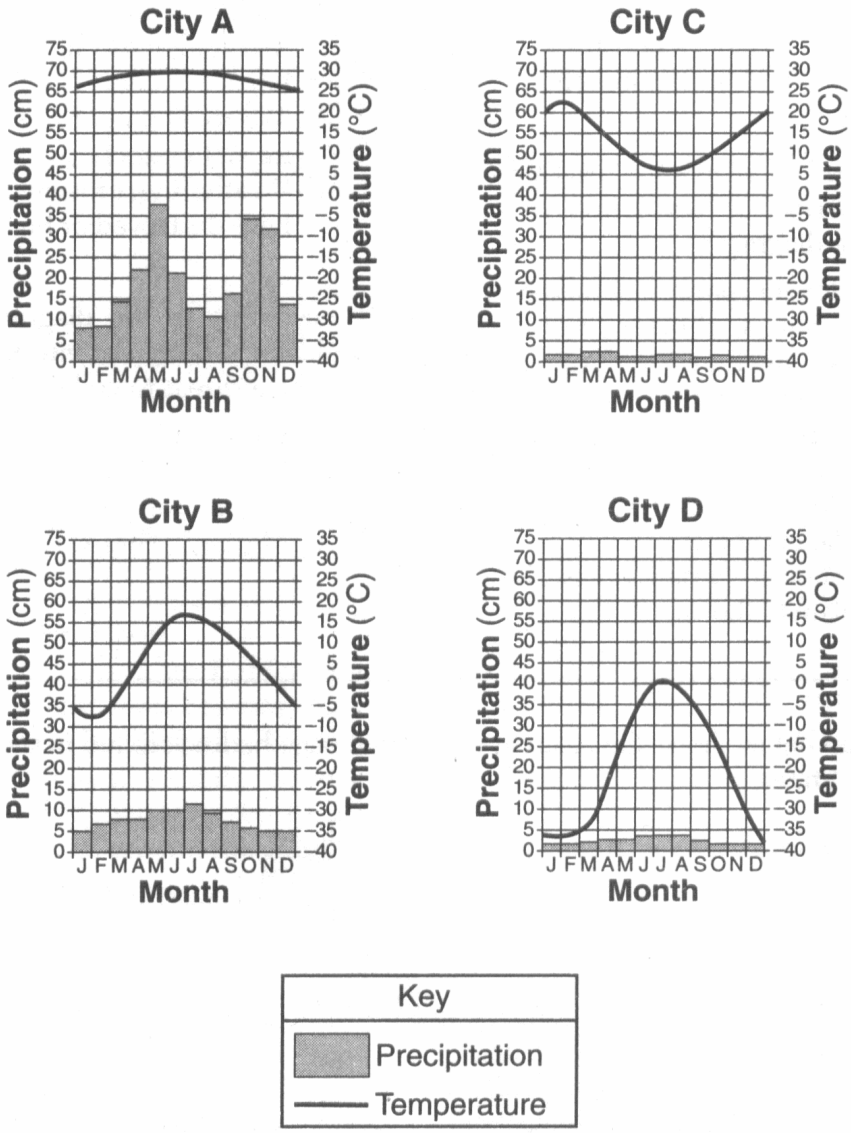
45. Clouds form in the hurricane because the air is

A) sinking, expanding, and cooling B) sinking, compressing, and warming
C) rising, expanding, and cooling D) rising, compressing, and warming

46. What is the usual surface wind pattern around the eye of Northern Hemisphere hurricanes?

A) clockwise and outward B) clockwise and inward
C) counterclockwise and outward **D) counterclockwise and inward**

Base your answers to questions **47** through **50** on the climate graphs below, which show average monthly precipitation and temperatures at four cities, *A, B, C,* and *D.*



47. Very little water will infiltrate the soil around city D because the region usually has

A) a frozen surface B) nearly flat surfaces
C) a small amount of runoff D) permeable soil

48. During which season does city *B* usually experience the month with the highest average precipitation?

A) spring **B) summer** C) fall D) winter

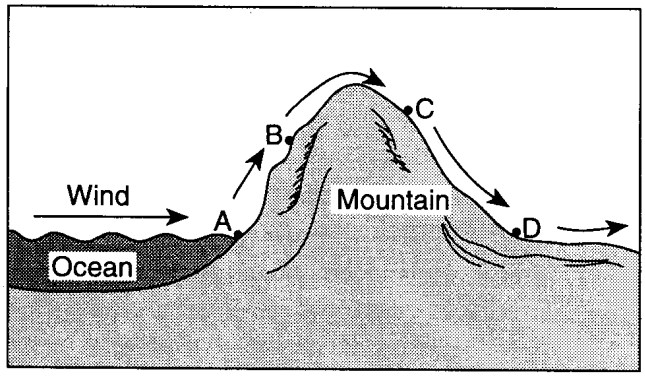
49. City *A* has very little variation in temperature during the year because city *A* is located

A) on the dry side of a mountain B) on the wet side of a mountain
C) near the center of a large landmass **D) near the equator**

50. It can be concluded that city *C* is located in the Southern Hemisphere because city *C* has

A) small amounts of precipitation throughout the year
B) large amounts of precipitation throughout the year
C) its warmest temperatures in January and February
D) its warmest temperatures in July and August

51. The cross section below shows the flow of prevailing winds over a mountain ridge.



Which location is most likely to receive precipitation?

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

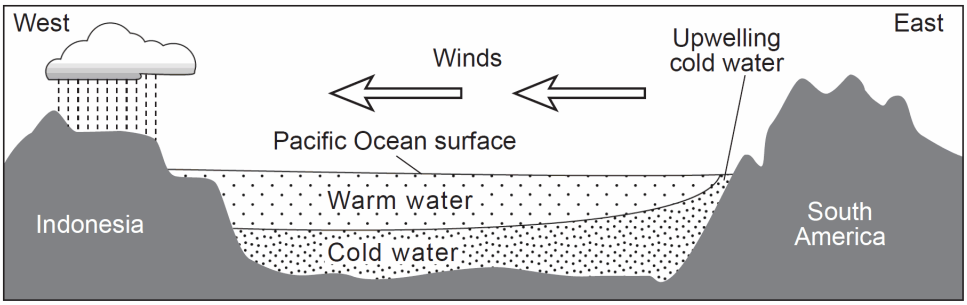
Base your answers to questions **52** through **55** on the passage and cross section below and on your knowledge of Earth science. The cross section represents a generalized region of the Pacific Ocean along the equator during normal (non-El Niño) conditions. The relative temperatures of the ocean water 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)

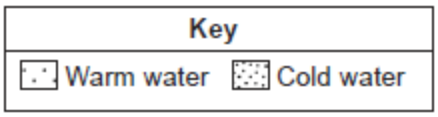
52. Compared to non-El Niño years, which climatic conditions exist near the equator on the western and eastern sides of the Pacific Ocean during an El Niño event?

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.

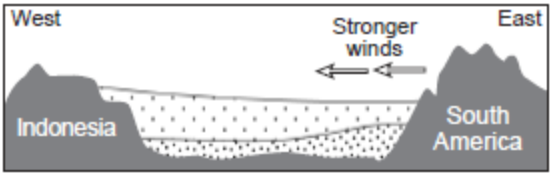
53. During an El Niño year, winter climatic conditions in New York State will most likely be

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

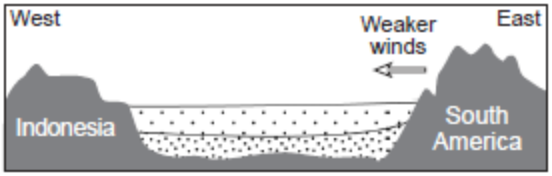
54. Which cross section best represents the changed wind conditions and Pacific Ocean temperatures during an El Nino event? [Diagrams are not drawn to scale.]



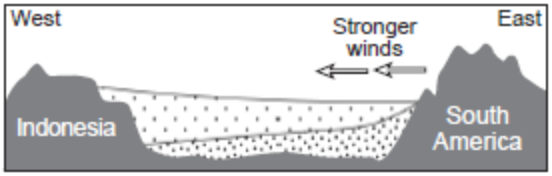
A)



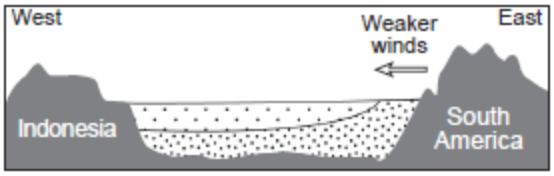
B)



C)



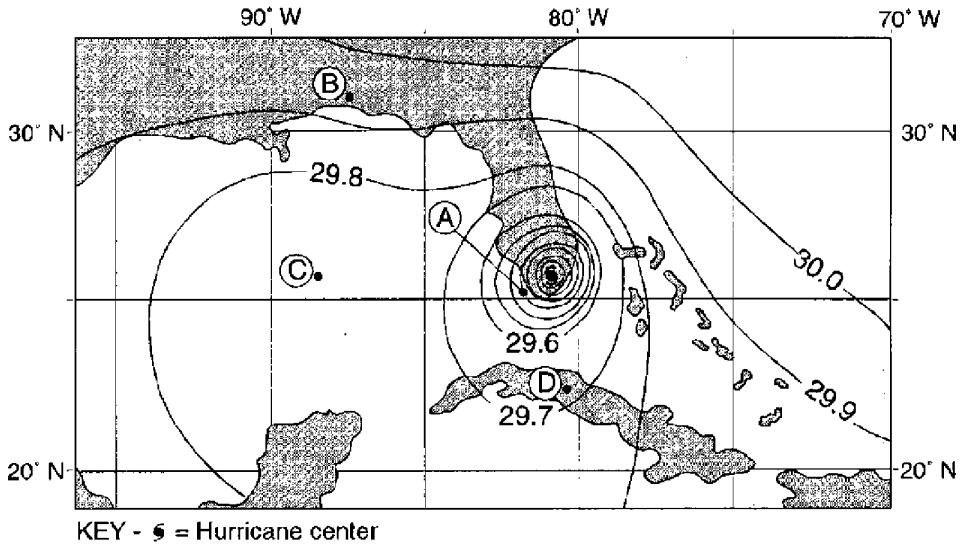
D)



55. 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.

Base your answers to questions **56** through **59** on the weather map below, which shows a hurricane that was located over southern Florida. The isobars show air pressure in inches of mercury. Letters *A* through *D* represent four widely separated locations.



56. What is the latitude and longitude at the center of the hurricane?

A) 26° N 81° W B) 26° N 89° W C) 34° N 81° W D) 34° N 89° W

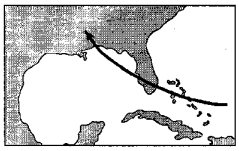
57. At which location were the winds of this hurricane the strongest?

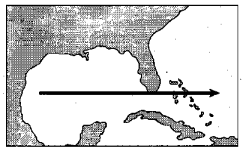
A) *A* B) *B* C) *C* D) *D*

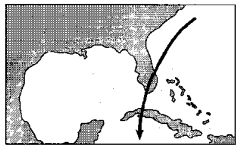
58. What was the direction of movement of surface winds associated with this hurricane?

A) counterclockwise and away from the center
B) counterclockwise and toward the center
C) clockwise and away from the center
D) clockwise and toward the center

59. Which map best shows the most likely track of this hurricane?

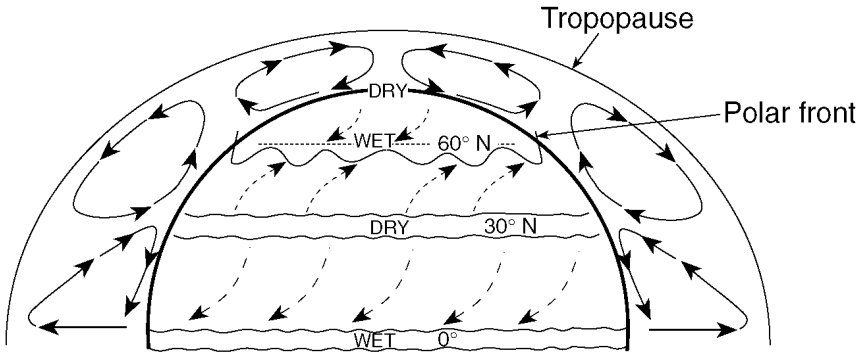
A)


B)


C)


D)


Base your answers to questions **60** and **61** on the diagram below, which represents the planetary wind and moisture belts in Earth's Northern Hemisphere.



(Not drawn to scale)

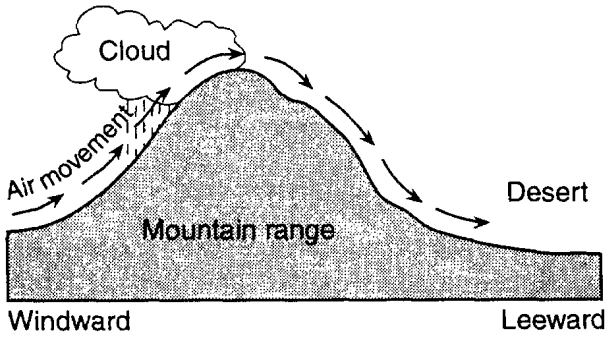
60. The paths of the surface planetary winds are curved due to Earth's

A) revolution **B) rotation** C) circumference D) size

61. The climate at 90° north latitude is dry because the air at that location is usually

A) warm and rising B) warm and sinking
C) cool and rising **D) cool and sinking**

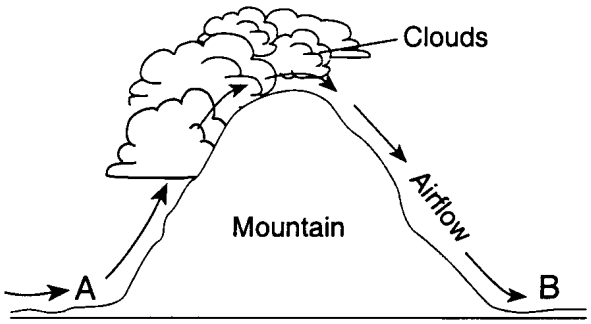
62. A desert often forms on the leeward side of a mountain range, as shown in the cross section below.



After most of the moisture is removed from the air on the windward side, deserts form on the leeward side because the sinking air

A) compresses and warms
B) compresses and cools
C) expands and warms
D) expands and cools

Base your answers to questions **63** and **64** on the diagram of a mountain shown below. The arrows represent the direction of airflow over the mountain.



63. Compared to the temperature and humidity conditions at location *A*, the conditions at location *B* are

A) warmer and less humid
B) warmer and more humid
C) cooler and less humid
D) cooler and more humid

64. As the air moves up the windward side of the mountain, the air

A) compresses and warms
B) compresses and cools
C) expands and warms
D) expands and cools

65. The map below shows an eastern portion of North America. Points *A* and *B* represent locations on the eastern shoreline.

Which factor is primarily responsible for location *A* having a lower average yearly temperature than location *B?*

A) nearness to a large body of water
B) elevation
C) latitude
D) prevailing winds

66. Which ocean current carries cool water toward Earth's equator?

A) Alaska Current
B) East Australia Current
C) Peru Current
D) North Atlantic Current

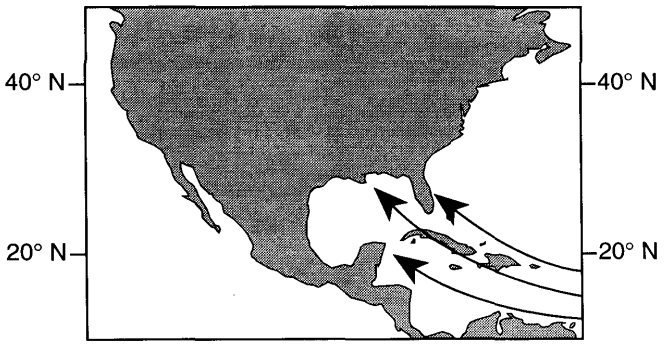
67. Which New York State location is most likely to experience the heaviest winter snowfall when the surface winds are blowing from the west or north-west?

A) New York City B) Binghamton
C) Oswego D) Plattsburgh

68. The Florida and Gulf Stream ocean currents along the east coast of North America are both

A) warm currents that flow northeastward
B) warm currents that flow southwestward
C) cool currents that flow northeastward
D) cool currents that flow southwestward

69. The map below shows part of North America.



The arrows shown on the map most likely represent the direction of movement of

A) Earth's rotation
B) the prevailing northeast winds
C) ocean conduction currents
D) Atlantic Ocean hurricanes

70. During winter, Lake Ontario is generally warmer than adjacent land areas. The primary reason for this temperature difference is that

A) water has a higher specific heat than land has
B) water reflects sunlight better than land does
C) land is more dense than water is
D) winds blow from land areas toward the water

71. Which natural event temporarily slows or reverses surface ocean currents in the equatorial region of the Pacific Ocean, causing a disruption of normal weather patterns?

A) monsoons B) volcanic eruptions
C) El Niño D) deforestation

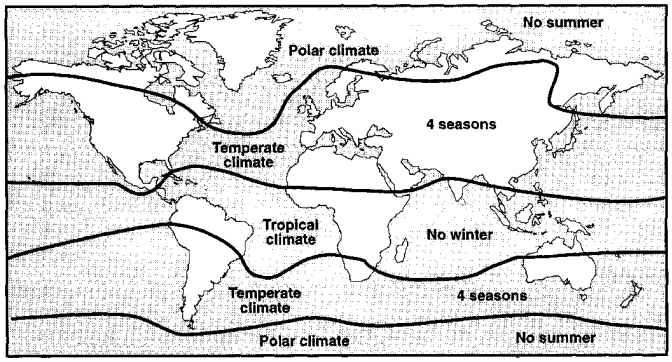
72. Precipitation often occurs along a frontal surface because the air along a frontal surface

A) has a high density
B) contains condensation nuclei
C) is rising
D) is low in humidity

73. During an El Niño event, surface water temperatures increase along the west coast of South America. Which weather changes are likely to occur in this region?

A) decreased air temperature and decreased precipitation
B) decreased air temperature and increased precipitation
C) increased air temperature and increased precipitation
D) increased air temperature and decreased precipitation

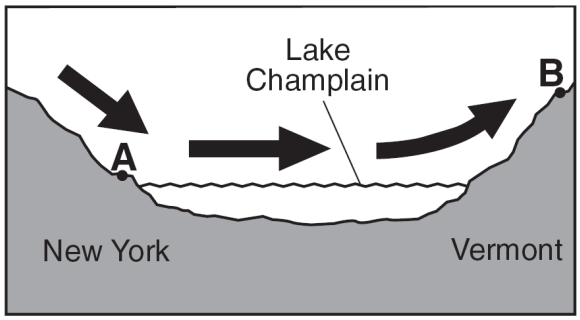
74. The map below shows the major climate zones on Earth.



The primary factor controlling these climate zones is

A) elevation B) solar time
C) latitude D) longitude

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

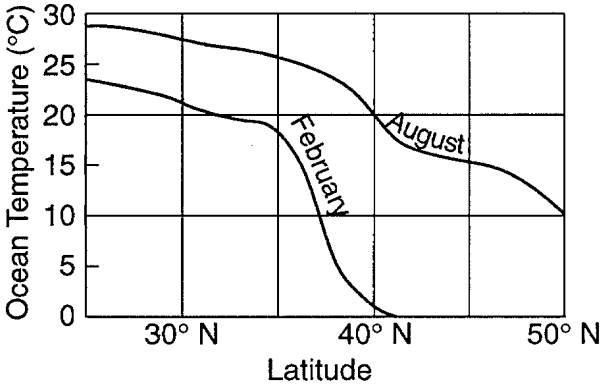


(Not drawn to scale)

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

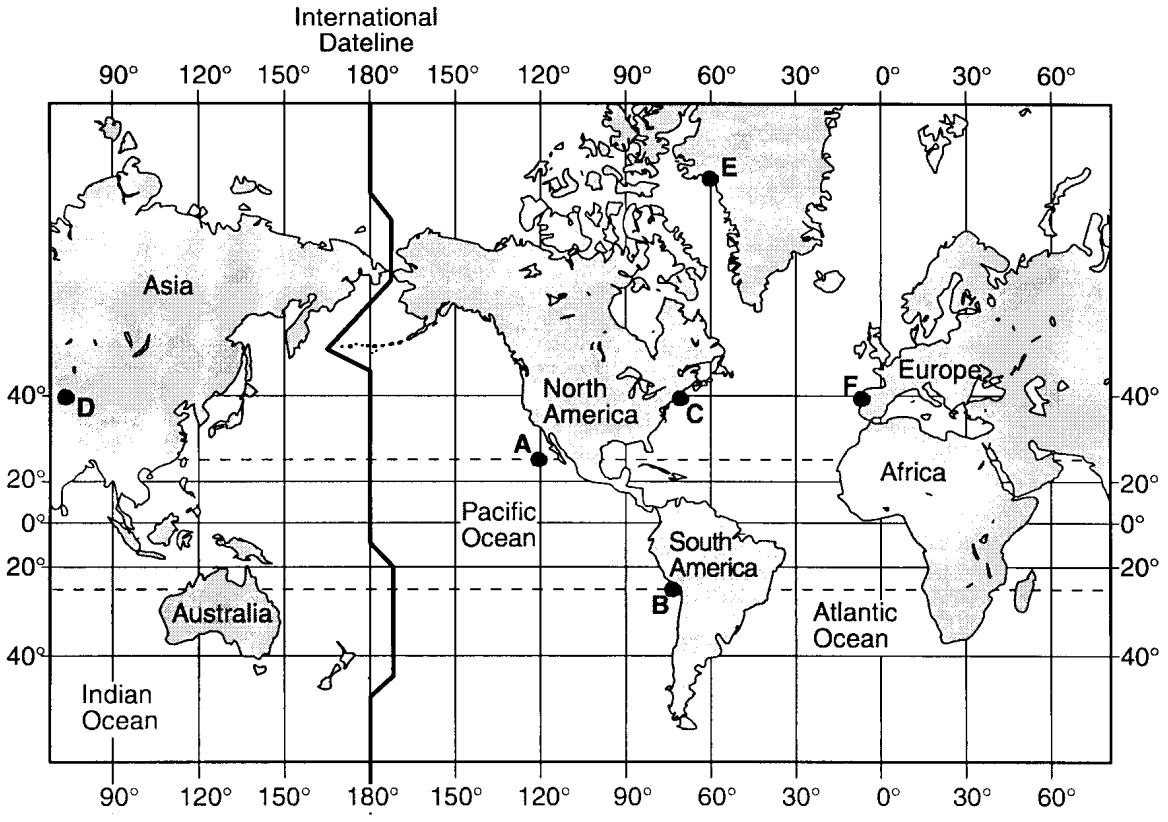
76. The graph below shows the ocean surface temperatures along part of the east coast of North America in February and in August.



Which inference about this region is supported by the data?

A) Tides are higher in August.
B) Insolation is greater in August.
C) The ocean is deeper in February.
D) Ocean currents flow faster in February.

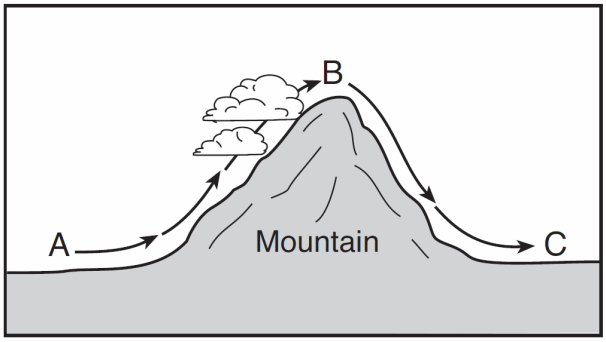
77. Base your answer to the following question on the map below. Letters *A* through *F* are locations on Earth's surface.



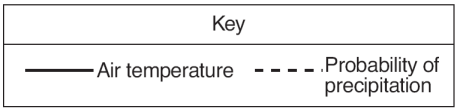
Ocean currents at location *A* move clockwise, and ocean currents at location *B* move counter-clockwise. These currents curve due to Earth's

A) internal structure
B) magnetic field
C) rotation
D) revolution

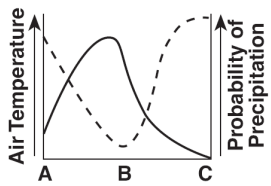
78. The diagram below shows the flow of air over a mountain, from location *A* to *B* to *C*.



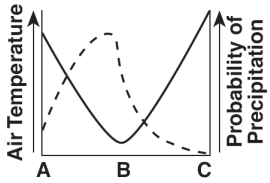
Which graph best shows how the air temperature and probability of precipitation change during this air movement?



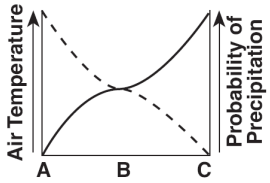
A)



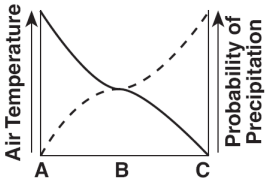
B)



C)



D)



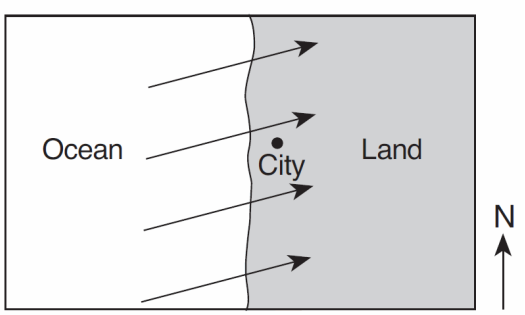
79. Most of the Earth's surface ocean currents are caused by

A) stream flow from continents
B) differences in ocean water density
C) the revolution of the Earth
D) the prevailing winds

80. The direction of movement of the major surface ocean currents is most affected by Earth's

A) tilted axis **B) prevailing winds**
C) rate of revolution D) tidal action

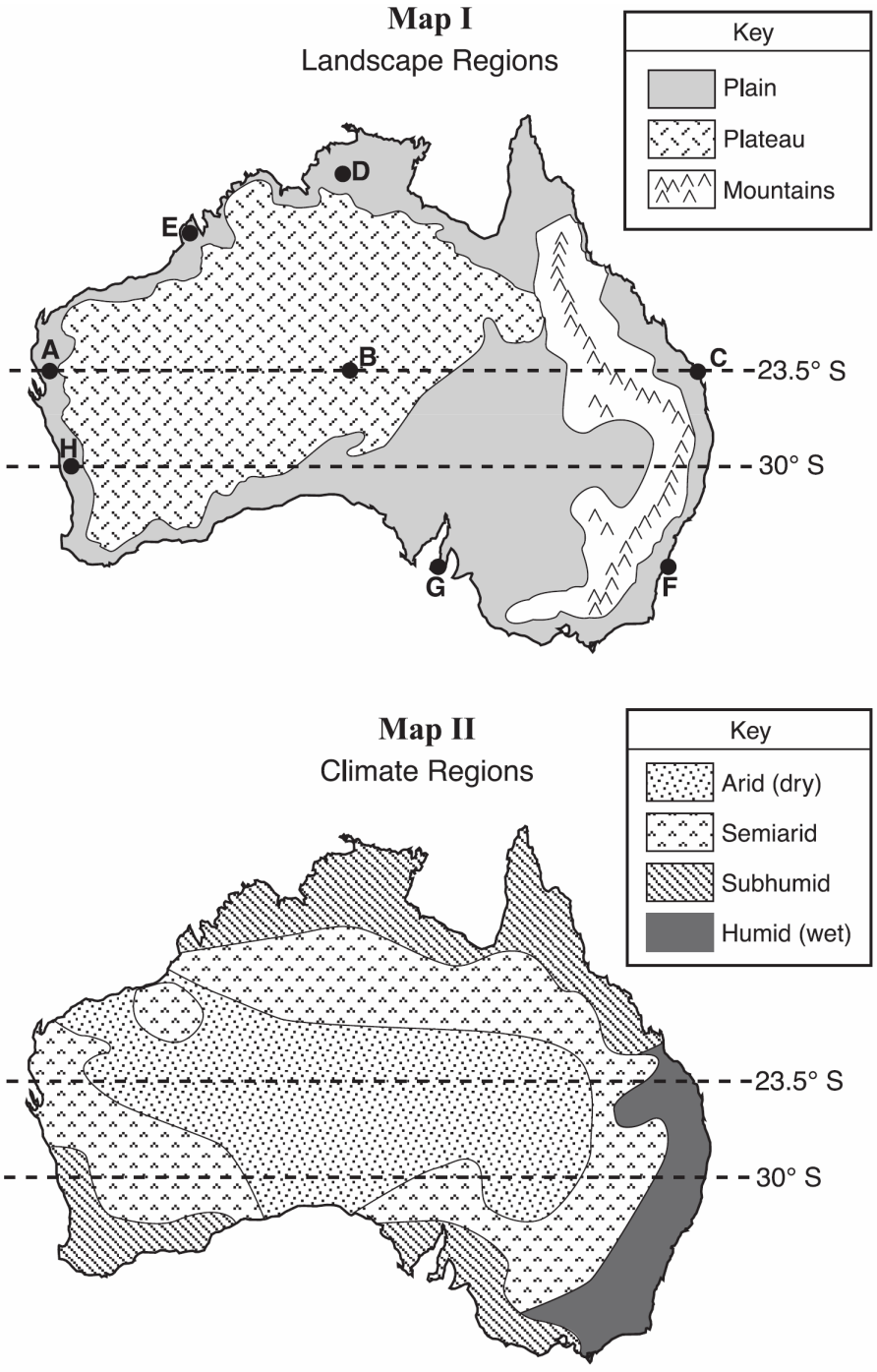
81. The arrows on the map below show the prevailing winds at a midlatitude coastal city.



This city most likely has a climate that is

A) arid, with a small difference between the highest and lowest yearly temperatures
B) arid, with a large difference between the highest and lowest yearly temperatures
C) humid, with a small difference between the highest and lowest yearly temperatures
D) humid, with a large difference between the highest and lowest yearly temperatures

Base your answers to questions **82** through **84** on the two maps for Australia below. Map I shows Australia's major landscape regions. Letters *A* through *H* represent locations in Australia. Map II shows Australia's general climate regions.



82. Which location's climate is most affected by the East Australia Current?

A) *E* **B) *F*** C) *G* D) *H*

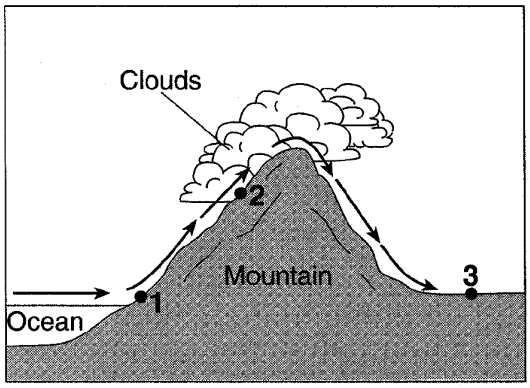
83. Which two locations have the driest climates?

A) *A* and *B* B) *G* and *H* C) *C* and *F* D) *D* and *E*

84. The greatest yearly temperature range was most likely recorded at location

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

Base your answers to questions **85** and **86** on the diagram below, which shows air movement over a mountain range. The arrows indicate the direction of airflow. Points 1 through 3 represent locations on Earth's surface.



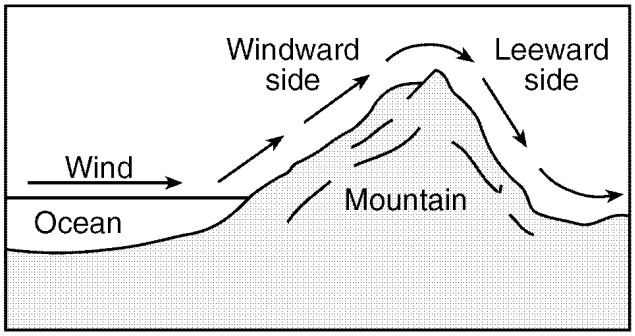
85. Cloud formation at location 2 is the direct result of air that is rising,

A) expanding, and cooling
B) expanding, and warming
C) compressing, and cooling
D) compressing, and warming

86. Compared to the climate at location 1, the climate at location 3 is

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

87. The cross section below shows the flow of winds over a mountain ridge.



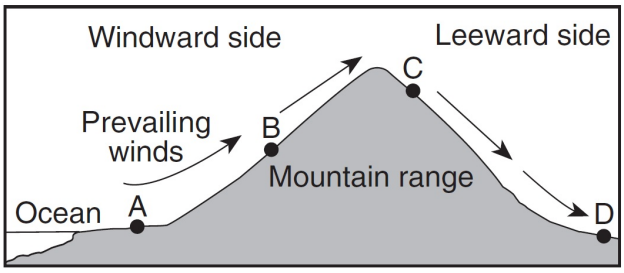
The heaviest rainfall would most likely occur on which side of this mountain and in which type of air mass?

A) on the leeward side, in a mP air mass
B) on the leeward side, in a cT air mass
C) on the windward side, in a mT air mass
D) on the windward side, in a cP air mass

88. According to the *Earth Science Reference* Tables, the prevailing winds at 45º S latitude are from the

A) southwest **B) northwest**
C) southeast D) northeast

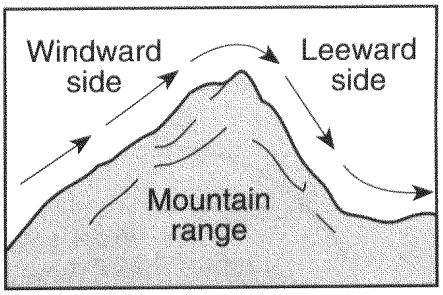
89. The cross section below represents prevailing winds moving over a coastal mountain range. Letters *A* through D represent locations on Earth's surface.



Which location will most likely have the least annual precipitation?

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

90. The diagram below shows wind flowing over a mountain range.



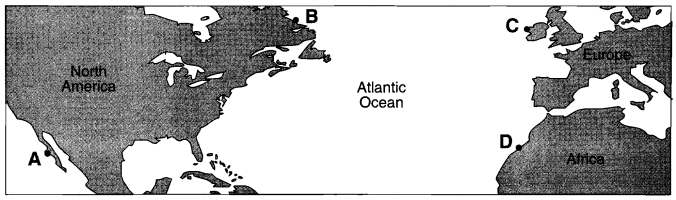
As the wind flows down the leeward side of the mountain range, the air becomes

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

91. Most of the Earth's surface ocean currents are caused by

A) stream flow from continents
B) differences in ocean water density
C) the revolution of the Earth
D) the prevailing winds

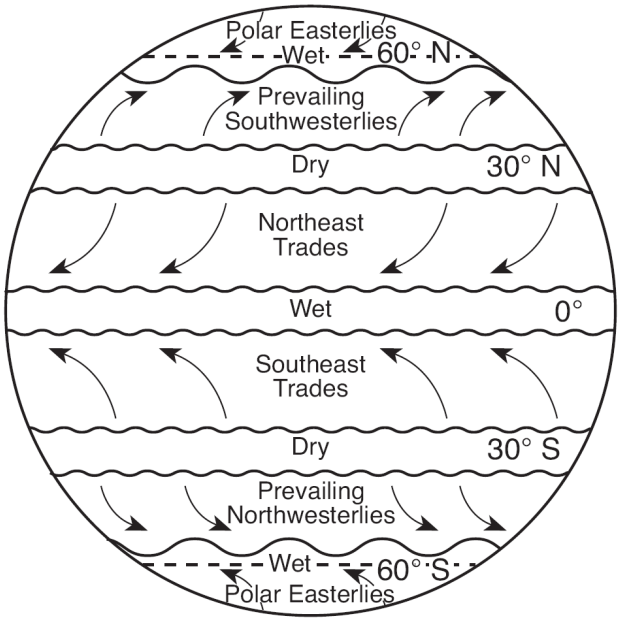
92. The map below shows four coastal locations labeled *A, B, C*, and *D*.



The climate of which location is warmed by a nearby major ocean current?

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

Base your answers to questions **93** through **95** on the map below, which shows Earth's planetary wind belts.



93. 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

94. The curving of these planetary winds is the result of

A) Earth's rotation on its axis
B) the unequal heating of Earth's atmosphere
C) the unequal heating of Earth's surface
D) Earth's gravitational pull on the Moon

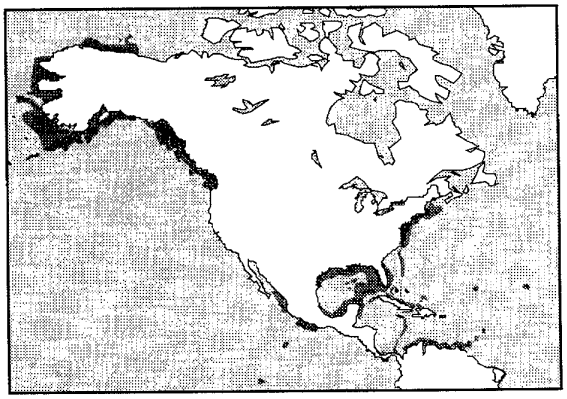
95. Which wind belt has the greatest effect on the climate of New York State?

A) prevailing northwesterlies
B) prevailing southwesterlies
C) northeast trades
D) southeast trades

96. As a sample of very moist air rises from sea level to a higher altitude, the probability of condensation occurring in that air sample will

A) decrease **B) increase**
C) remain the same

97. The shaded areas of the map below indicate concentrations of pollutants along the coastlines of North America.



Polluting material may have been carried to the Alaska area by the

A) California Current
B) North Pacific Current
C) Florida Current
D) Labrador Current

98. Most of Earth's surface ocean current patterns are primarily caused by

A) the force of gravity
B) the impact of precipitation
C) prevailing winds
D) river currents

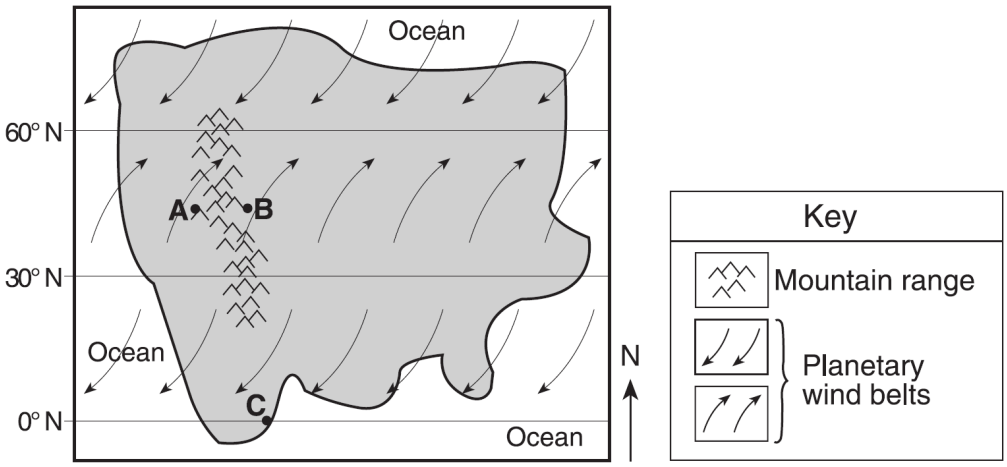
99. What is the name of the warm ocean current that flows along the east coast of the United States?

A) California Current
B) Florida Current
C) Labrador Current
D) North Pacific Current

100. What is the usual surface wind pattern within a Northern Hemisphere low-pressure system?

A) clockwise and outward
B) clockwise and inward
C) counterclockwise and outward
D) counterclockwise and inward

Base your answers to questions **101** and **102** 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.



101. 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

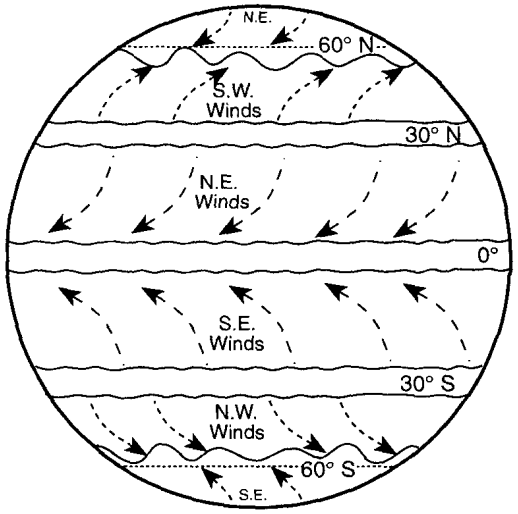
102. Compared to the climate at location *A*, the climate at location *B* would most likely be

A) warmer and more humid
B) warmer and less humid
C) cooler and more humid
D) cooler and less humid

103. Which interaction between the atmosphere and the hydrosphere causes most surface ocean currents?

A) cooling of rising air above the ocean surface
B) evaporation of water from the ocean surface
C) friction from planetary winds on the ocean surface
D) seismic waves on the ocean surface

104. The planetary winds on Earth are indicated by the curving arrows in the diagram below.



The curved paths of the planetary winds are a result of

A) changes in humidity
B) changes in temperature
C) Earth's rotation on its axis
D) Earth's gravitational force

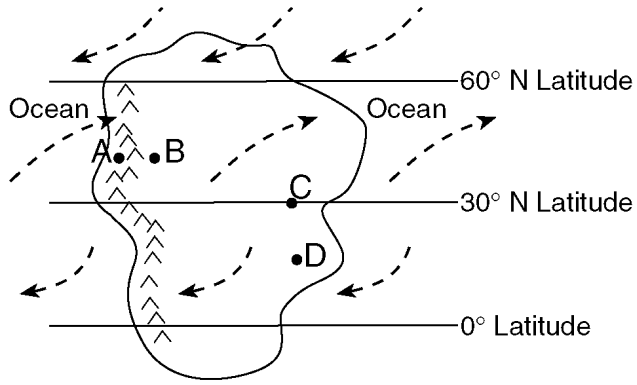
105. Warm water from tropical oceans is carried to northern Europe by the Gulf Stream and the

A) Alaska Current
B) Canaries Current
C) North Atlantic Current
D) Brazil Current

106. What is the general pattern of air movement on March 21 at Earth's Equator (0º)?

A) upward, due to low temperature and high pressure
B) upward, due to high temperature and low pressure
C) downward, due to low temperature and high pressure
D) downward, due to high temperature and low pressure

Base your answers to questions **107** and **108** 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.



107. Over the course of a year, compared to location *B*, location *A* will have

A) less precipitation and a smaller temperature range
B) less precipitation and a greater temperature range
C) more precipitation and a smaller temperature range
D) more precipitation and a greater temperature range

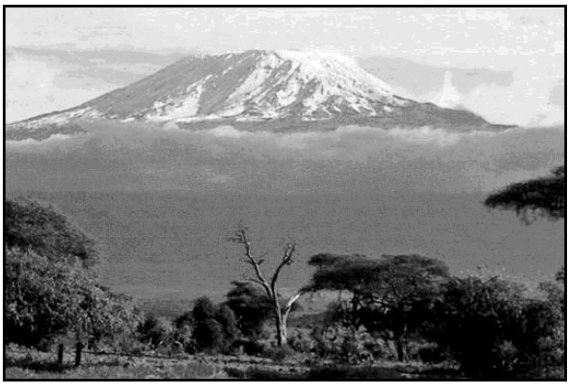
108. The climate at location *C* is much drier than at location *D.* This difference is best explained by the fact that location *C* is located

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

109. Which ocean current cools the climate of locations along the northeastern coastline of North America?

A) Florida Current
B) Labrador Current
C) Canaries Current
D) Guinea Current

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



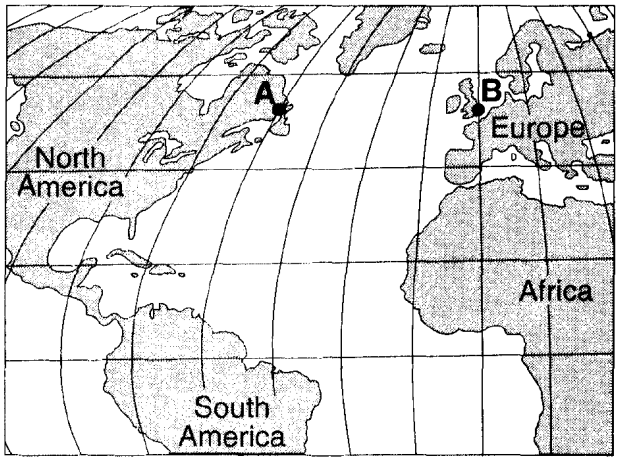
Which climate factor is responsible for the snow seen on Mt. Kilimanjaro?

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

111. Compared to land surface temperature changes, water surface temperature changes occur

A) more slowly because water has a lower specific heat
B) more slowly because water has a higher specific heat
C) faster because water has a lower specific heat
D) faster because water has a higher specific heat

112. Base your answer to the following question on the map below, which shows locations *A* and *B* on Earth's surface at the same distance from the ocean, at the same elevation above sea level, and at the same latitude.



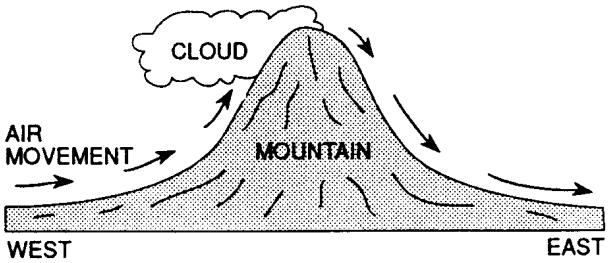
Which statement best explains why location *A* has a cooler climate than location *B*?

A) Location *A* has a longer duration of insolation each day.
B) Location *A* is influenced by a cold ocean current.
C) Location *B* is farther from the equator.
D) Location *B* has less intense insolation each day.

113. Compared to the climate conditions of dry inland locations, the climate conditions of locations influenced by a nearby ocean generally result in

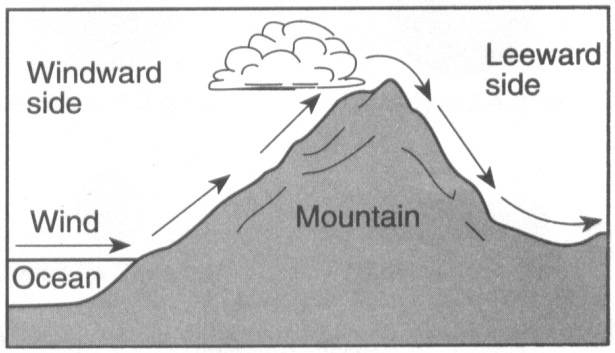
A) hotter summers and colder winters, with a larger annual range of temperatures
B) hotter summers and colder winters, with a smaller annual range of temperatures
C) cooler summers and warmer winters, with a larger annual range of temperatures
D) cooler summers and warmer winters, with a smaller annual range of temperatures

114. Which statement best explains why a cloud is forming as shown in the diagram below?



A) Water vapor is condensing.
B) Moisture is evaporating.
C) Cold air rises and compresses.
D) Warm air sinks and expands.

115. The diagram below shows how prevailing winds cause different weather conditions on the windward and leeward sides of a mountain range.



Clouds usually form on the windward sides of mountains because this is where air

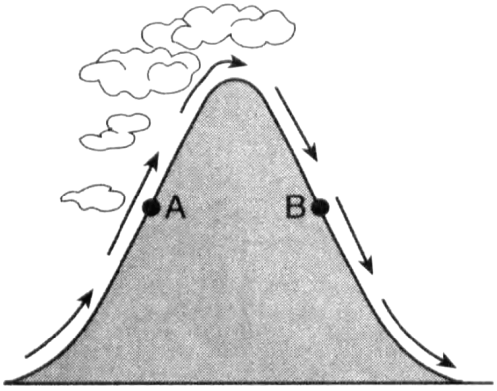
A) rises and cools
B) rises and warms
C) sinks and cools
D) sinks and warms

116. What is the best explanation for these two statements?

• Some mountains located near the Earth's Equator have snow-covered peaks.
• Icecaps exist at the Earth's poles.

A) High elevation and high latitude have a similar effect on climate.
B) Both mountain and polar regions have arid climates.
C) Mountain and polar regions receive more energy from the Sun than other regions do.
D) An increase in snowfall and an increase in temperature have a similar effect on climate.

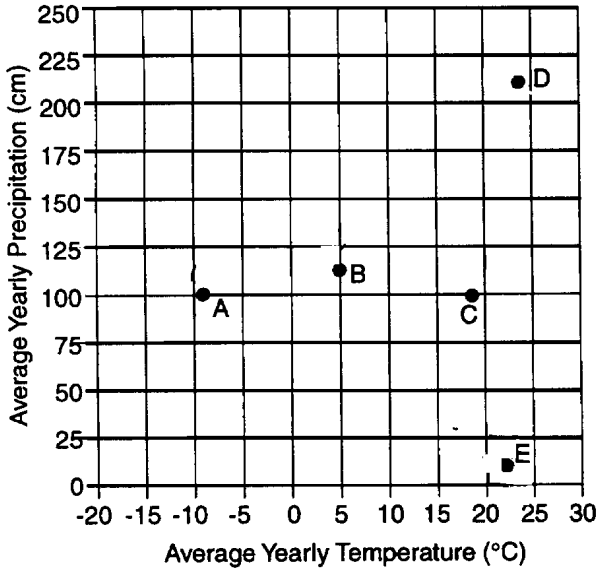
117. The cross section below shows the direction of air flowing over a mountain. Points *A* and *B* are at the same elevation on opposite sides of the mountain.



Compared to the air temperature and humidity at point *A*, the air temperature and humidity at point *B* are usually

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

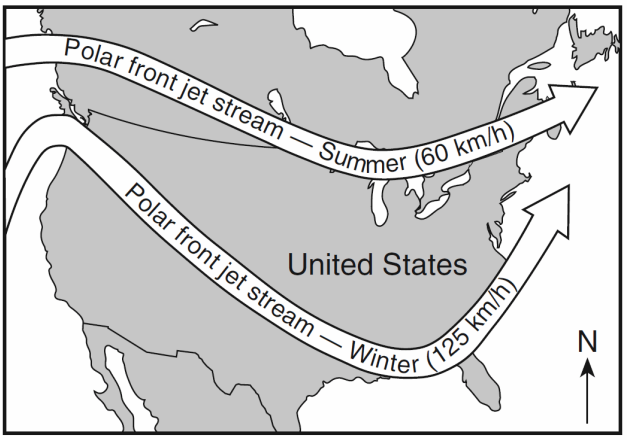
118. Base your answer to the following question on the graph below, which shows the average yearly temperature and average yearly precipitation for Earth locations *A* through *E*.



Locations *A* and *C* have different average yearly temperatures. This difference most likely is due to the fact that

A) *A* has a higher elevation
B) *A* is located nearer to the Equator
C) *C* has more precipitation
D) *C* has a greater longitude

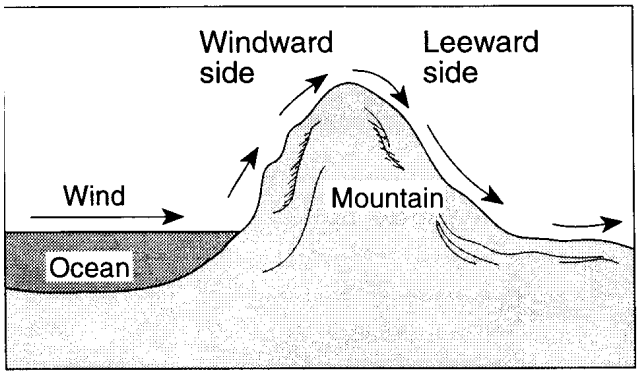
119. The map below shows a typical position and average velocity of the polar front jet stream during two different seasons.



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

120. The diagram below shows the flow of planetary winds over a mountain ridge.



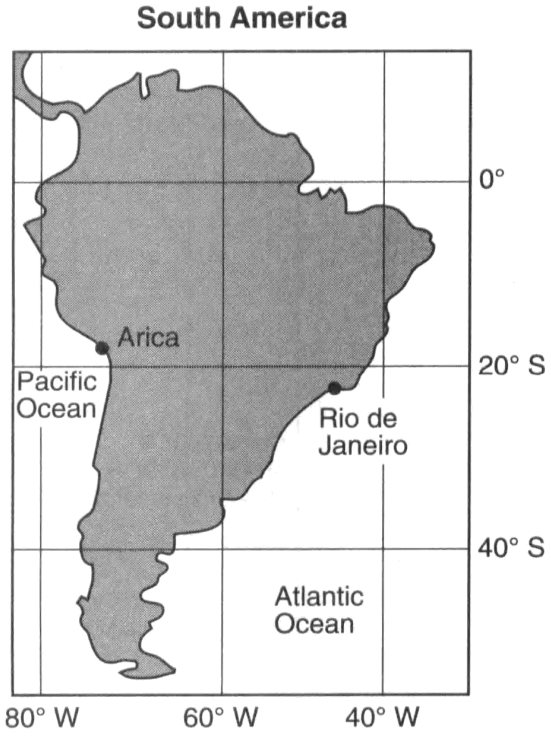
As air rises on the windward side of the mountain ridge, the air's temperature decreases. Which process usually causes this temperature decrease?

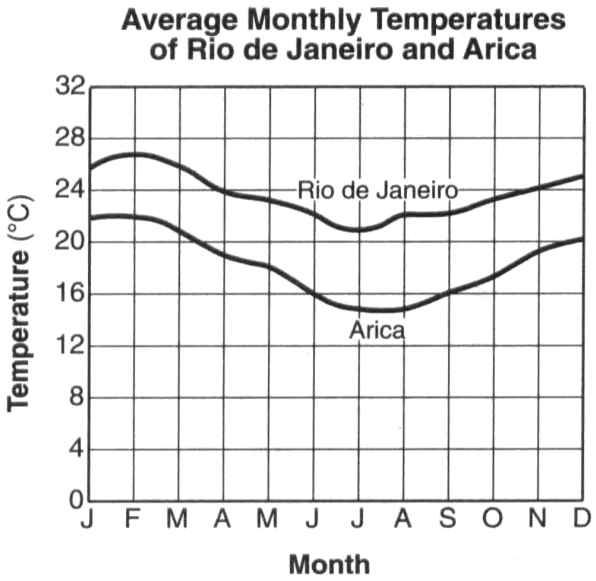
A) expansion of rising air
B) compression of rising air
C) precipitation from clouds
D) evaporation from clouds

121. Surface ocean currents resulting from the prevailing winds over the oceans illustrate a transfer of energy from

A) lithosphere to atmosphere
B) hydrosphere to lithosphere
C) atmosphere to hydrosphere
D) stratosphere to troposphere

122. Base your answer to the following question on the map and graph below. The map shows two cities, Arica and Rio de Janeiro, located on opposite coasts of South America. Both cities are near sea level. The graph shows the average monthly temperatures for the cities.

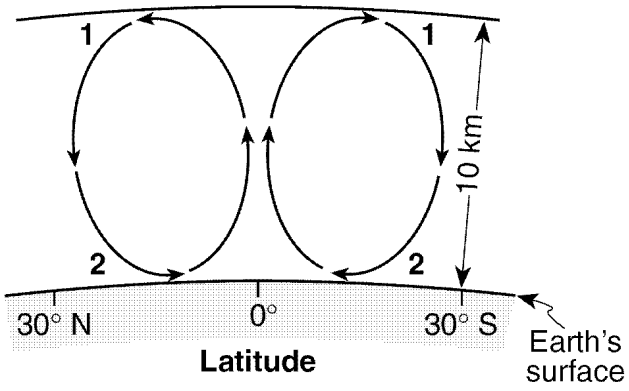




Why does Arica have cooler average monthly temperatures than Rio de Janeiro?

A) Rio de Janeiro receives insolation at a higher angle than Arica.
B) Rio de Janeiro is influenced by a warmer ocean current than Arica.
C) Arica is farther north than Rio de Janeiro.
D) Arica receives yearly insolation that is less intense than Rio de Janeiro.

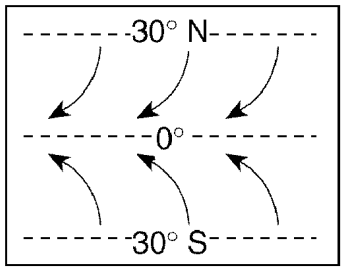
123. Base your answer to the following question on the cross section below and on your knowledge of Earth science. The cross section shows the general movement of air within a portion of Earth's atmosphere located between 30° N and 30° S latitude. Numbers 1 and 2 represent different locations in the atmosphere.



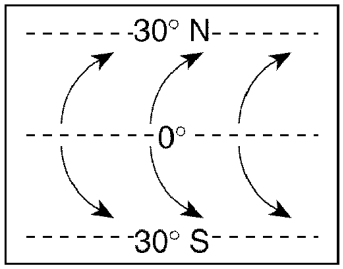
(Not drawn to scale)

Which map best shows the surface movement of winds between 30º N and 30° S latitude?

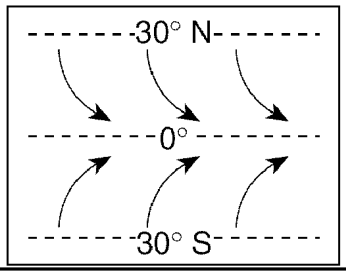
A)



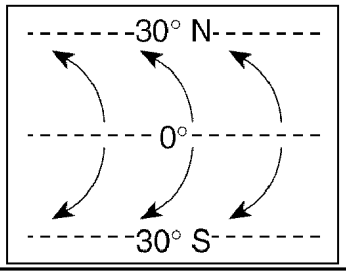
B)



C)



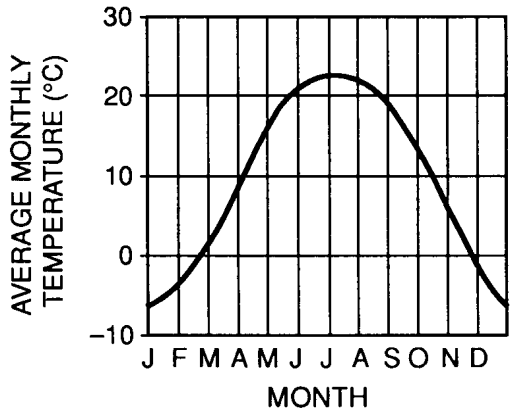
D)



124. Which coastal location experiences a cooler summer climate due to ocean currents?

A) southeast coast of North America
B) northeast coast of Australia
C) southwest coast of South America
D) northwest coast of Europe

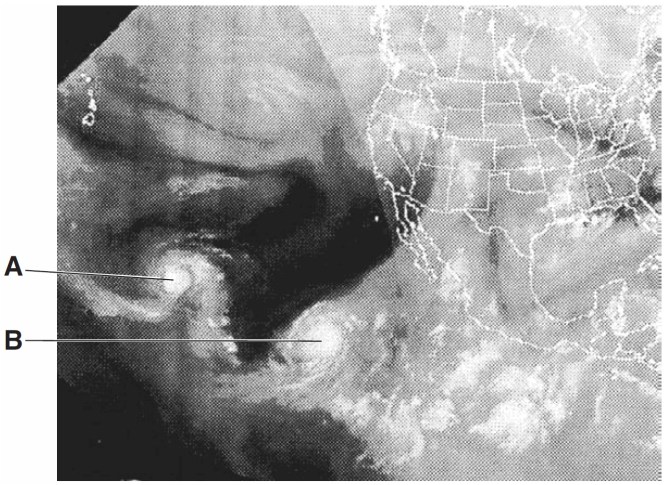
125. The graph below represents the average temperature of a city for each month of the year.



Where is this city most likely located?

A) inland in the Northern Hemisphere, in a middle latitude
B) inland in the Southern Hemisphere, in a middle latitude
C) on a coast near the Equator
D) on a coast in the Antarctic

126. The weather satellite image below shows two large swirl-shaped cloud formations, labeled *A* and *B*, over the Pacific Ocean.



These large swirl-shaped cloud formations most likely represent

A) polar air masses
B) warm fronts
C) tornadoes
D) hurricanes

127. Which planetary wind pattern is present in many areas of little rainfall?

A) Winds converge and air sinks.
B) Winds converge and air rises.
C) Winds diverge and air sinks.
D) Winds diverge and air rises.

128. Which ocean current warms the climate of northwestern Europe?

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

129. The data table below compares the climates of two United States cities located at approximately 43° north latitude. The data are based on a 30-year period.

Data Table

Location	Maximum Temperature (°F)	Minimum Temperature (°F)	Mean Annual Precipitation (in)	Mean Annual Snowfall (in)
city A	110	−36	23.8	31.9
city B	98	−19	38.2	92.9

Which statement best explains the climate variation between these two cities?

A) City *A* and city *B* are located at the same longitude.
B) City *A* is located at a high elevation, and city *B* is located at sea level.
C) City *A* is located far inland, and city *B* is located near a large body of water.
D) City *A* is located on the east coast, and city *B* is located on the west coast.

130. In which planetary wind belt do most storms move toward the northeast?

A) 30° N to 60° N
B) 0° to 30° N
C) 0° to 30° S
D) 30° S to 60° S

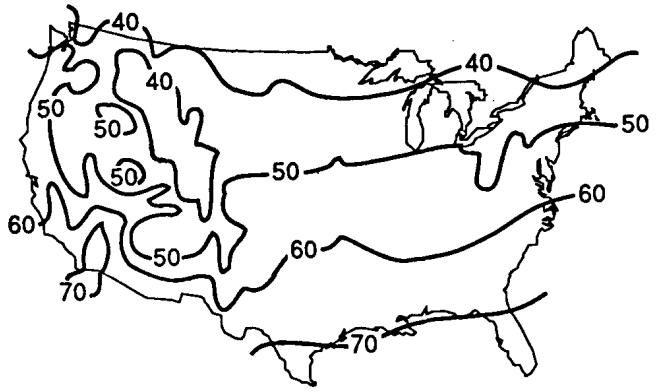
131. Most of the hurricanes that affect the east coast of the United States originally form over the

A) warm waters of the Atlantic Ocean in summer
B) warm land of the southeastern United States in summer
C) cool waters of the Atlantic Ocean in spring
D) cool land of the southeastern United States in spring

132. Most tornadoes in the Northern Hemisphere are best described as violently rotating columns of air surrounded by

A) clockwise surface winds moving toward the columns
B) clockwise surface winds moving away from the columns
C) counterclockwise surface winds moving toward the columns
D) counterclockwise surface winds moving away from the columns

133. 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

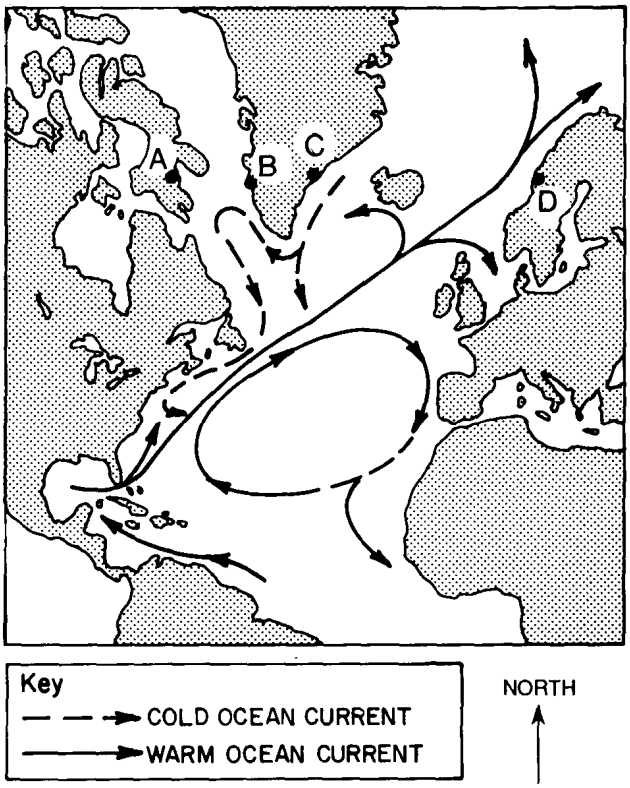
134. A city located near the center of a large continent has colder winters and warmer summers than a city at the same elevation and latitude located on the continent's coast. Which statement best explains the difference between the cities climates?

A) Windspeeds are greater over land than over oceans.
B) Air masses originate only over land.
C) Land has a lower specific heat than water.
D) Water changes temperature more rapidly than land.

135. During some winters in the Finger Lakes region of New York State, the lake water remains unfrozen even though the land around the lakes is frozen and covered with snow. The primary cause of this difference is that water

A) gains heat during evaporation
B) is at a lower elevation
C) has a higher specific heat
D) reflects more radiation

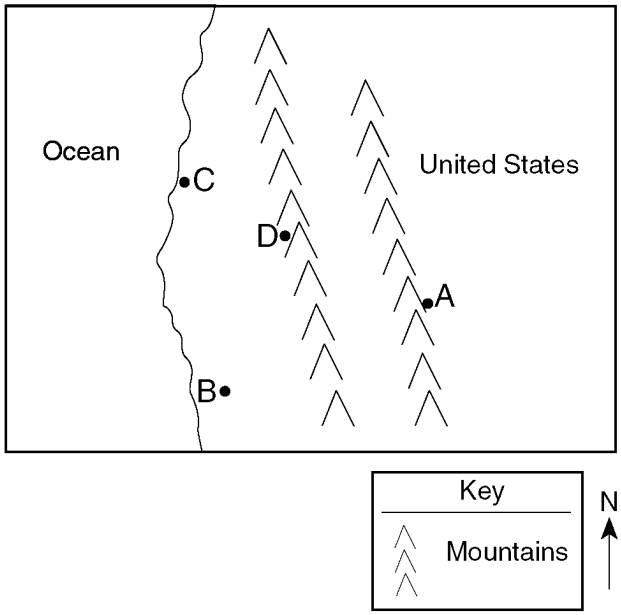
136. The map below shows the general path of ocean currents in a portion of the Northern Hemisphere. Locations *A*, *B*, *C,* and *D* are at the shoreline.



Which location most likely has the warmest climate?

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

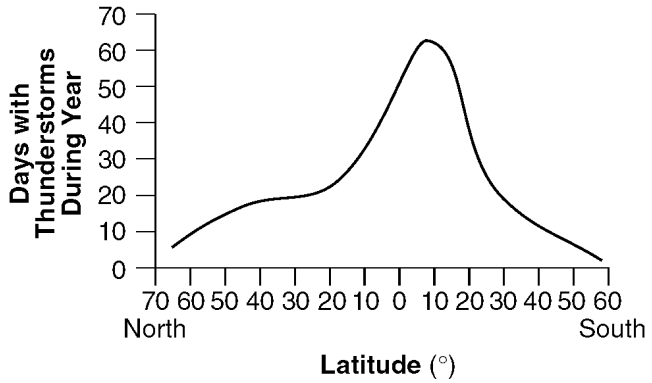
137. The map below shows the location of four cities, *A, B, C,* and *D,* in the western United States where prevailing winds are from the southwest.



Which city most likely receives the *least* amount of average yearly precipitation?

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

138. The graph below shows the average number of days each year that thunderstorms occur at different latitudes on Earth.



According to the graph, what is the approximate number of days each year that thunderstorms occur at locations along the 40°N parallel of latitude?

A) 8 days **B) 18 days**
C) 24 days D) 32 days

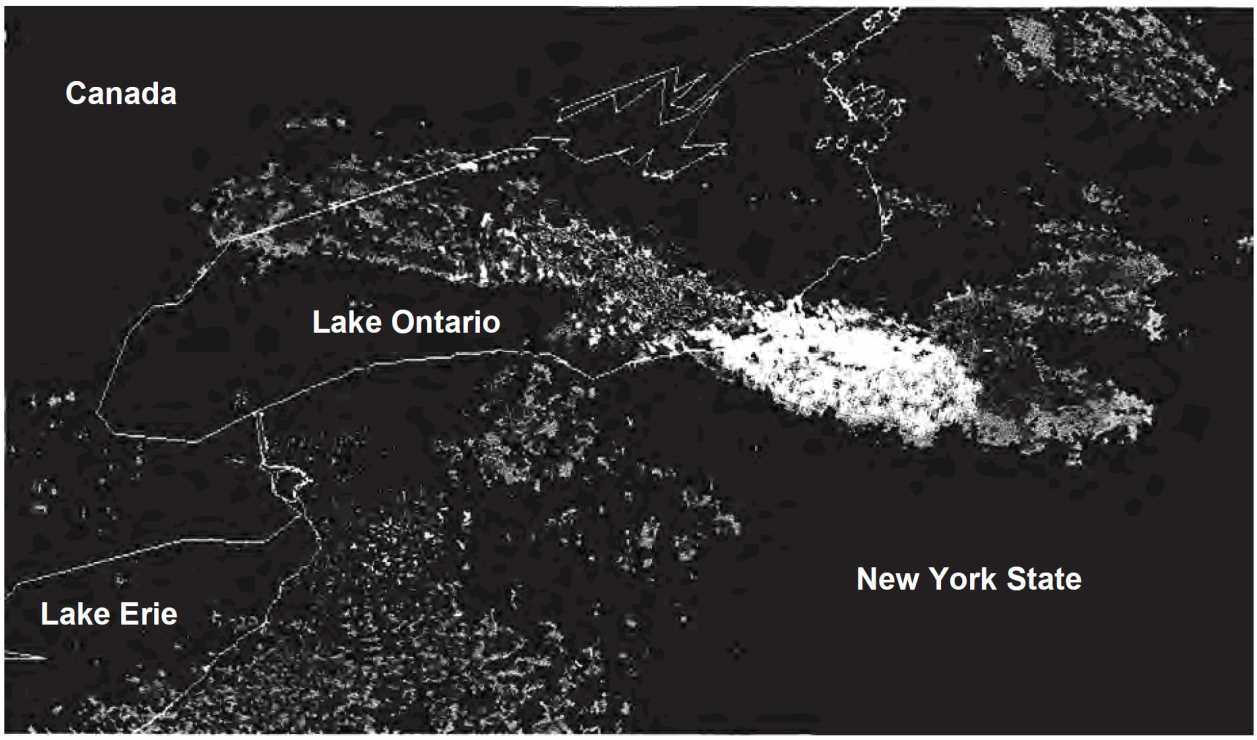
Base your answers to questions **139** and **140** on the reading passage about lake-effect snow and the radar image map below, and on your knowledge of Earth science. The radar map shows areas where snowfall was occurring. The whitest area indicates where snowfall was heaviest.

Lake-Effect Snow

In late fall, cold air originating in Canada and then moving over the Great Lakes often produces lake-effect snow in New York State.

When the cold air mass moves across large areas of warmer lake water, water vapor enters the cold air. When this moist air moves over the cooler land, the moisture comes out of the atmosphere as snow. The effect is enhanced when the air that flows off the lake is forced over higher land elevations. The areas affected by lake-effect snow can receive many inches of snow per hour. As the lakes gradually freeze, the ability to produce lake-effect snow decreases.

Radar Image Map



Adapted from: www.erh.noaa.gov

139. What is the most likely two-letter air mass symbol for an air mass from Canada that produces lake-effect snow in New York State?

A) mT B) mP C) cT **D) cP**

140. Which statement best explains why lake-effect snow *decreases* when lakes freeze gradually?

A) The ice prevents liquid water from evaporating into the atmosphere.
B) The lower temperature of ice makes liquid water condense at a slower rate.
C) More water is available to evaporate.
D) Ice speeds up the air moving above it, so less water can evaporate.

141. Which ocean current brings warm water to the western coast of Africa?

A) Agulhas Current
B) North Equatorial Current
C) Canaries Current
D) Guinea Current

142. Which ocean current provides warm water that moderates the climate of South America?

A) Benguela Current **B) Brazil Current**
C) Falkland Current D) Peru Current

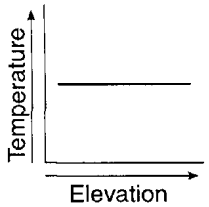
143. Which statement best explains why climates at continental shorelines generally have a smaller yearly temperature range than inland climates at the same latitude?

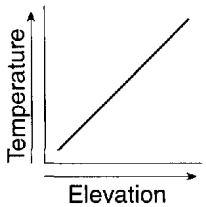
A) Land is a poor absorber and a poor conductor of heat energy.
B) Land changes temperature rapidly, due to the high specific heat and lack of transparency of land.
C) Ocean water is a good absorber and a good conductor of heat energy.
D) Ocean water changes temperature slowly, due to the high specific heat and transparency of water.

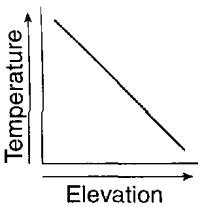
144. Which current is a cool ocean current that flows completely around Earth?

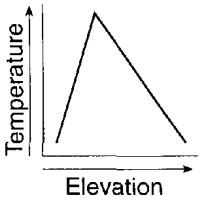
A) West Wind Drift
B) Gulf Stream
C) North Equatorial Current
D) California Current

145. Which graph best shows the general effect that differences in elevation above sea level have on the average annual temperature?

A)


B)


C)


D)


146. The table below shows the average January air temperature from 1901 to 2006 in two different cities in New York State.

Data Table

City	Average January Air Temperature (°F)
Albany	21.4
New York City	29.7

The most likely cause of this air temperature difference is that New York City is located

A) in a different prevailing wind belt
B) at a higher latitude
C) near a large body of water
D) at a higher elevation

147. As a parcel of air rises, its temperature will

A) decrease due to expansion
B) decrease due to compression
C) increase due to expansion
D) increase due to compression

148. The table below shows the latitude and the average yearly temperature for four different cities.

City	Singapore	Calcutta	Washington, D.C.	Moscow
Latitude	1° N	23° N	39° N	56° N
Average Yearly Temperature	81°F	79°F	57°F	39°F

It can be inferred from this table that the cities at higher latitudes have

A) lower average yearly temperatures because these cities receive insolation at a higher angle during the year
B) lower average yearly temperatures because these cities receive insolation at a lower angle during the year
C) higher average yearly temperatures because these cities receive insolation at a higher angle during the year
D) higher average yearly temperatures because these cities receive insolation at a lower angle during the year

149. The map below shows the locations of Virginia Beach, Virginia, and Springfield, Missouri.

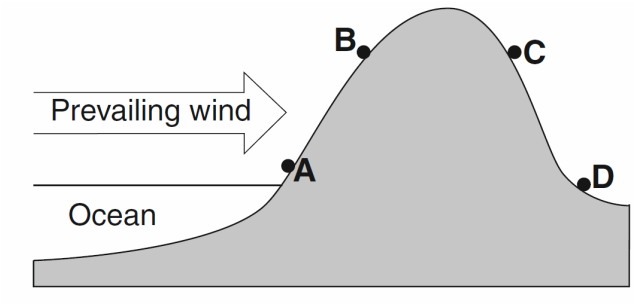
Virginia Beach experiences cooler summers and warmer winters than Springfield because Virginia Beach

A) is located closer to the Atlantic Ocean
B) is located closer to the equator
C) has a greater average yearly duration of insolation
D) has a greater average yearly intensity of insolation

150. Compared to a coastal location of the same elevation and latitude, an inland location is likely to have

A) warmer summers and cooler winters
B) warmer summers and warmer winters
C) cooler summers and cooler winters
D) cooler summers and warmer winters

151. The cross section below represents four locations on a mountain. The arrow indicates the prevailing wind direction.



Which location has the warmest and most arid climate?

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

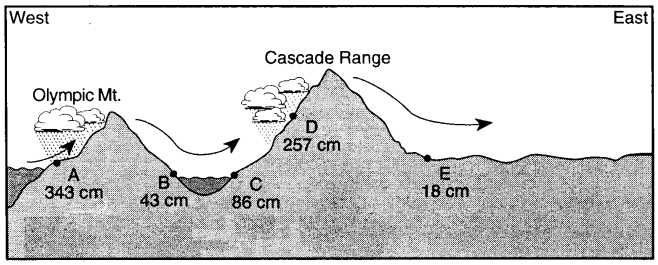
152. What is the name of the cool ocean current that flows along, the west coast of South America?

A) Brazil Current
B) Peru Current
C) South Equatorial Current
D) North Pacific Current

153. Two coastal cities have the same latitude and elevation, but are located near different oceans. Which statement best explains why the two cities have different climates?

A) They are at different longitudes.
B) They are near different ocean currents.
C) They have different angles of insolation.
D) They have different numbers of daylight hours.

154. The diagram below shows the average yearly precipitation, in centimeters, at locations *A* through *E* across the State of Washington. Arrows indicate the direction of prevailing winds.



(Not drawn to scale)

Which statement best explains why location *B* and location *E* receive relatively low average yearly precipitation?

A) These locations are on the leeward side of mountain ranges.
B) These locations are on the windward side of mountain ranges.
C) These locations receive more insolation than the other locations.
D) These locations receive less insolation than the other locations.

155. Which surface ocean current transports warm water to higher latitudes?

A) Labrador Current B) Falkland Current
C) Gulf Stream D) West Wind Drift

156. The northeastward flow of the Gulf Stream ocean current is caused primarily by

A) tides
B) precipitation
C) atmospheric winds
D) revolution of Earth

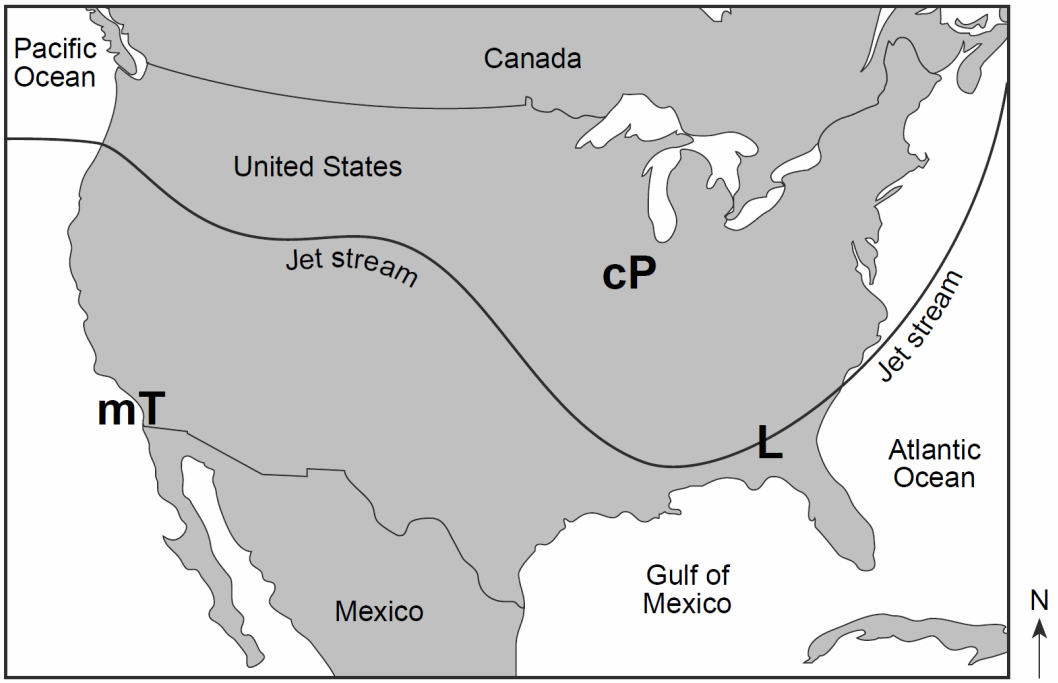
157. Which ocean current provides warm water that moderates the climate of South America?

A) Benguela Current **B) Brazil Current**
C) Falkland Current D) Peru Current

158. During an El Nino event, the South Equatorial Current reverses direction and flows over the top of northern portions of the Peru Current, causing

A) warmer surface ocean waters along the northeast coast of South America
B) warmer surface ocean waters along the northwest coast of South America
C) cooler surface ocean waters along the northeast coast of South America
D) cooler surface ocean waters along the northwest coast of South America

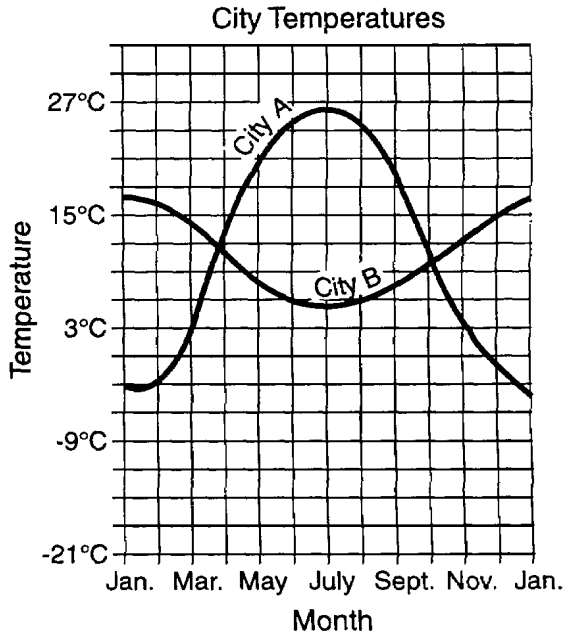
159. Base your answer to the following question on the map below, which shows the position of the jet stream relative to two air masses and a low-pressure center (**L**) over the United States.



What is the general movement of the surface winds around the center of this low-pressure area?

A) counterclockwise and outward
B) counterclockwise and inward
C) clockwise and outward
D) clockwise and inward

Base your answers to questions **160** and **161** on the graph below, which shows the average monthly temperature of two cities A and B.



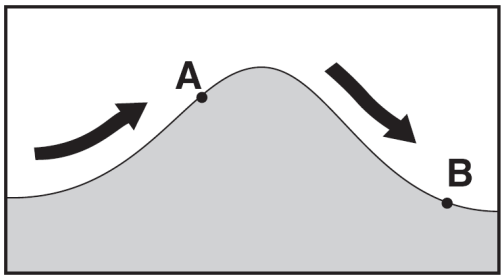
160. Both cities have an average yearly temperature of 11ºC, but city A has a much greater temperature range than city B has because city A most likely

A) is closer to the Equator
B) is farther from a large body of water
C) has more rainfall
D) has stronger prevailing winds

161. The temperature in city B is highest in January and lowest in July because city B is located

A) on the side of a mountain
B) on an island
C) in the Southern Hemisphere
D) at the North Pole

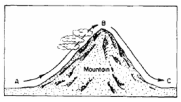
162. The arrows on the cross section below show the prevailing wind that flows over a mountain. Points *A* and *B* represent locations on opposite sides of the mountain.



Which statement correctly describes the differences in the climates of locations *A* and *B*?

A) Location *A* is warmer and drier than location *B*.
B) Location *A* is cooler and wetter than location *B*.
C) Location *B* is warmer and wetter than location *A*.
D) Location *B* is cooler and drier than location *A*.

163. The diagram below shows the flow of air over a mountain from point *A* to point *C*. Which graph best shows the approximate temperature change of the rising and descending air due to the adiabatic process?



A) 
B) 
C) 
D) 

164. Bodies of water have a moderating effect on climate primarily because

A) water gains heat more rapidly than land does
B) water surfaces are flatter than land surfaces
C) water temperatures are always lower than land temperatures
D) water temperatures change more slowly than land temperatures do

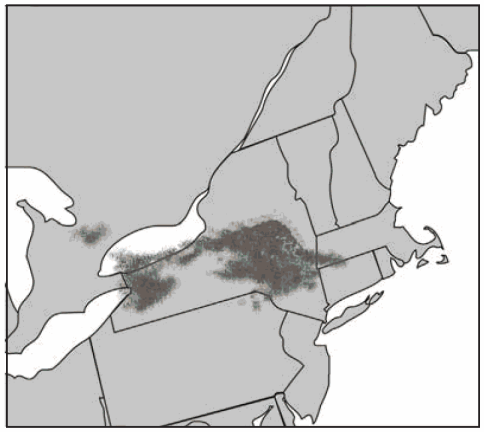
165. During the summer months, which change in location would most likely cause a decrease in the observed daytime air temperatures?

A) from 45º N latitude to 20º N latitude
B) from sea level to 5 km above sea level
C) from sea level on the windward side of a mountain to sea level on the leeward side
D) from the ocean coast to an inland location

166. Compared to an inland location of the same elevation and latitude, a coastal location is likely to have

A) warmer summers and cooler winters
B) warmer summers and warmer winters
C) cooler summers and cooler winters
D) cooler summers and warmer winters

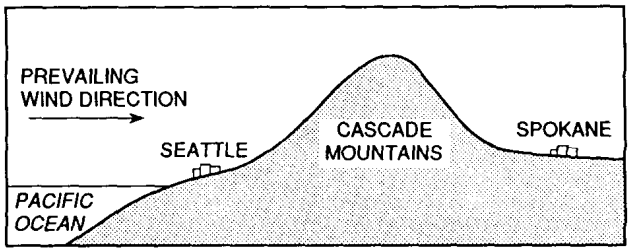
167. On the map below, dark-gray areas represent regions of lake-effect snow on a December day.



Which New York State location appears to be experiencing a lake-effect snowstorm?

A) New York City **B) Utica**
C) Plattsburgh D) Watertown

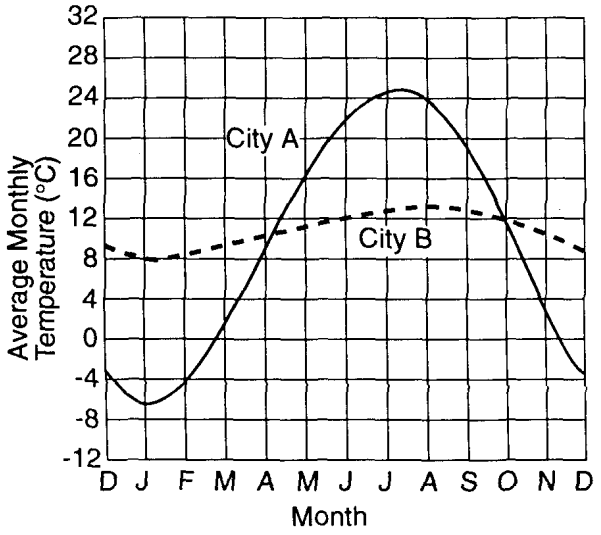
168. The diagram below shows the positions of the cities of Seattle and Spokane, Washington. Both cities are located at approximately 48 North latitude, and they are separated by the Cascade Mountains.



How does the climate of Seattle compare with the climate of Spokane?

A) Seattle – hot and dry
Spokane – cool and humid
B) Seattle – hot and humid
Spokane – cool and dry
C) Seattle – cool and humid
Spokane – warm and dry
D) Seattle – cool and dry
Spokane – warm and humid

169. The graph below shows the average monthly temperatures for two cities, *A* and *B*, which are both located at 41° north latitude.



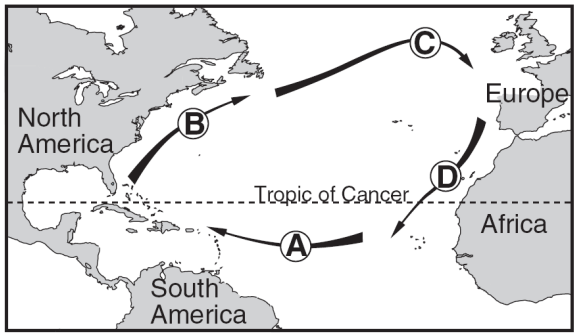
Which statement best explains the difference in the average yearly temperature range for the two cities?

A) City *B* is located in a different planetary wind belt.
B) City *B* receives less yearly precipitation
C) City *B* has a greater yearly duration of insolation.
D) City *B* is located near a large body of water.

170. Snowfall is rare at the South Pole because the air over the South Pole is usually

A) rising and moist B) rising and dry
C) sinking and moist **D) sinking and dry**

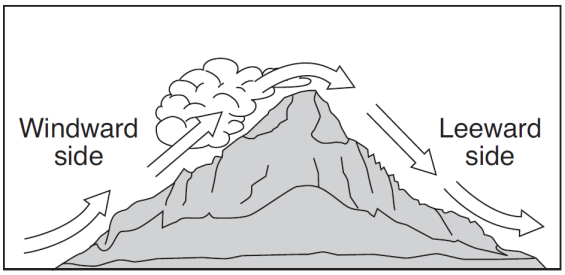
171. The arrows labeled *A* through *D* on the map below show the general paths of abandoned boats that have floated across the Atlantic Ocean.



Which sequence of ocean currents was responsible for the movement of these boats?

A) South Equatorial →Gulf Stream →Labrador →Benguela
B) South Equatorial →Australia →West Wind Drift → Peru
C) North Equatorial → Koroshio → North Pacific →California
D) North Equatorial → Gulf Stream → North Atlantic →Canaries

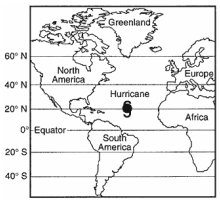
172. The diagram below shows air movement over a mountain.



Compared to the climate on the windward side of the mountain, the climate on the leeward side of the mountain is

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

173. 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

174. A city located on the coast of North America has warmer winters and cooler summers than a city at the same elevation and latitude located near the center of North America. Which statement best explains the difference between the climates of the two cities?

A) Ocean surfaces change temperature more slowly than land surfaces.
B) Warm, moist air rises when it meets cool, dry air.
C) Wind speeds are usually greater over land than over ocean water.
D) Water has a lower specific heat than land.

175. Which ocean current cools the climate of some locations along the western coastline of North America?

A) Florida Current
B) California Current
C) Canaries Current
D) Alaska Current

176. Which single factor generally has the greatest effect on the climate of an area on the Earth's surface?

A) the distance from the Equator
B) the extent of vegetative cover
C) the degrees of longitude
D) the month of the year

177. The prevailing southwesterlies wind belt causes most low-pressure weather systems to travel across the United States from the

A) southwest toward the northeast
B) northwest toward the southeast
C) northeast toward the southwest
D) southeast toward the northwest

178. Compared to an inland location, a location on an ocean shore at the same elevation and latitude is likely to have

A) cooler winters and cooler summers
B) cooler winters and warmer summers
C) warmer winters and cooler summers
D) warmer winters and warmer summers

179. Which cold ocean current affects the climate of the northeastern coast of North America?

A) Gulf Stream B) Canaries
C) Labrador D) North Atlantic

180. The planetary wind belts in the troposphere are primarily caused by the

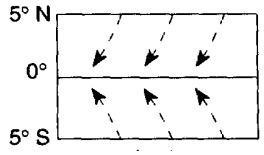
A) Earth's rotation and unequal heating of Earth's surface
B) Earth's revolution and unequal heating of Earth's surface
C) Earth's rotation and Sun's gravitational attraction on Earth's atmosphere
D) Earth's revolution and Sun's gravitational attraction on Earth's atmosphere

181. What controls the direction of movement of most surface ocean currents?

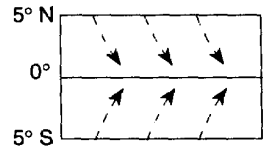
A) density differences at various ocean depths
B) varying salt content in the ocean
C) prevailing winds
D) seismic activity

182. Which map correctly shows the general pattern of flow of prevailing surface winds near the Equator on March 21?

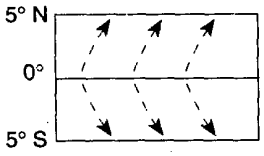
A)



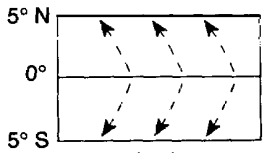
B)



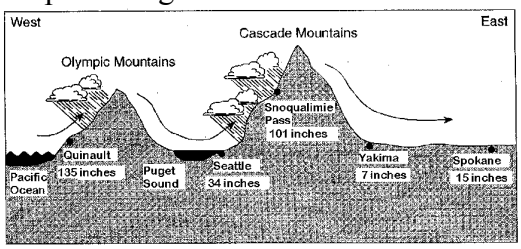
C)



D)

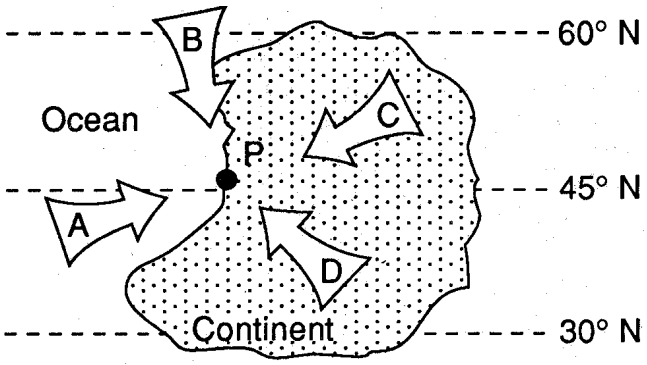


183. The cross section below shows several locations in the State of Washington and the annual precipitation at each location. The arrows represent the prevailing wind direction.



Why do the windward sides of these mountain ranges receive more precipitation than the leeward sides?

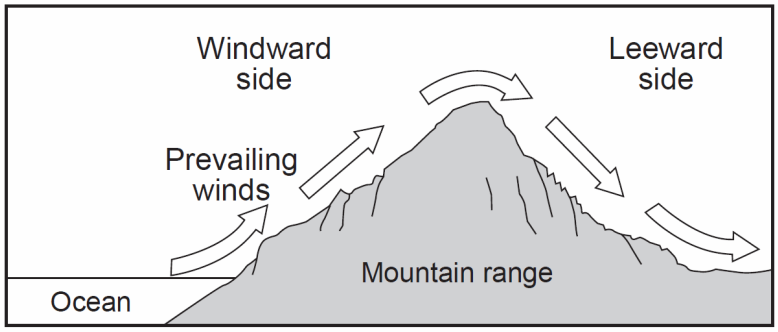
A) Sinking air compresses and cools.
B) Sinking air expands and cools.
C) Rising air compresses and cools.
D) Rising air expands and cools.



184. The map above shows an imaginary continent in the Earth's planetary wind belt between 30° and 60° North latitude. Location *P* is on the western edge of the continent. Location *P* has mild winters with much precipitation. Which arrow indicates the direction of the prevailing winds at this location?

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

185. 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

186. Which ocean current flows northeast along the eastern coast of North America?

A) Gulf Stream
B) North Equatorial
C) California
D) Labrador

187. Which factor most likely causes two cities at the same elevation and latitude to have different yearly average temperature ranges?

A) rotation of Earth
B) duration of insolation
C) distance from a large body of water
D) direction of prevailing winds

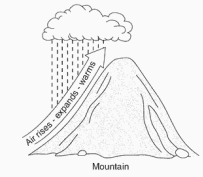
188. Most of the Gulf Stream Ocean Current is

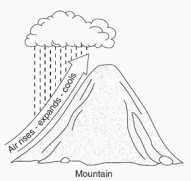
A) warm water that flows southwestward
B) warm water that flows northeastward
C) cool water that flows southwestward
D) cool water that flows northeastward

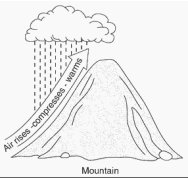
189. EI Cuy is a South American city located at 40° south latitude. The first day of winter at this location occurs on June 21. During which month would the coldest day of the year most likely occur at this location?

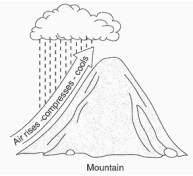
A) May
B) July
C) November
D) January

190. Which diagram best illustrates how air rising over a mountain produces precipitation?

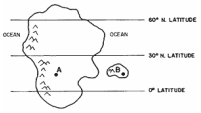
A) 

B) 

C) 

D) 

191. The diagram below represents an imaginary continent and a nearby island.



Which climatic variable causes location *A* to have cooler winters and warmer summers than location *B* ?

A) latitude
B) distance from a large body of water
C) direction of the planetary winds
D) location of mountain barriers