QUESTION 1

Planetary-scale air circulation sets the stage for smaller-scale weather systems.First four questions deal with the idealized circulation patterns of Figure 9.2 that shows in step-wise fashion how surface winds and pressure patterns would develop on an idealized smooth solid Earth shown in panel A that on the sunlit side of such a non-rotating Earth, surface winds in the Northern Hemisphere would always blow from the north. This occurs because cold, dense air at polar locations displaces warm, less dense air at lower pressure extending the Earth in the tropics. In other words, a _____ is acting directly from high latitudes towards low latitudes.

- (•) pressure gradient force
- ( ) Coriolis Effectth.

QUESTION 2

Panel B shows that once the Earth begins to rotate, air moving southward from the North Pole turns westward well before reaching the equator. This is because rotation of the Earth produces the _____ that acts to the right of the direction of air motion in the Northern Hemisphere.

- ( ) friction force
- (•) Coriolis Effect

QUESTION 3

Panels C and D show that with continued rotation of an idealized Earth at the current rate of the real Earth, surface winds eventually assume a three zone pattern in each hemisphere separated by alternating belts of high and low air pressure. At middle latitudes (30 to 60 degrees) of the Northern Hemisphere, surface winds blow from the

- ( ) northeast
- (•) southwest

QUESTION 4

Because of continents and oceans, the real Earth exhibits a planetary scale circulation that is more complex than that presented in the figure. However, there are identifiable wind belts and pressure systems that more or less resemble the idealized pattern. For example, Northern Hemispheric mid-latitude surface winds are directed on average from the

- ( ) northeast
- (•) southwest

QUESTION 5

As shown in Figure 9.4 depicting the actual surface circulation wind belts and anticyclones in the Northern and Southern Hemispheres, surface westerlies and the polar easterlies converge along the

- ( ) equatorial trough
- (•) polar front

QUESTION 6

The low pressure belts are regions of converging surface winds, ascending air, cloudiness, and precipitation. The most active of these belts parallels the equator and is called the ITCZ or

- (•) equatorial trough
- ( ) polar front

QUESTION 7

As shown in Figure 5.6 of the Northern Hemisphere's middle and upper tropospheric circulation, the upper-air circulation of middle latitudes is characterized by a wave-like pattern in which horizontal winds blow mostly from

- ◉ west-to-east.
- ○ east-to-west.

QUESTION 8

When midlatitude upper-air long waves in the westerlies exhibit relatively small north-south amplitudes, the flow pattern is described as zonal. A meridional flow pattern occurs when long waves in the westerlies exhibit large north-south swings. Greater poleward heat transport accompanies a _____ flow pattern.

- ○ zonal
- ◉ meridional

QUESTION 9

The highest wind speeds in the upper-air long waves occur in association with the polar front, the semidiscontinuous boundary between the cold polar easterlies and the relatively warm prevailing westerlies. This "river" of high-speed winds is known as the polar front

- ○ velocity maximum.
- ◉ jet stream.

QUESTION 10

These relatively narrow corridors of high-speed winds tend to be most organized in winter and on average occur at lower latitudes in

- ○ summer.
- ◉ winter.

QUESTION 11

For the development of surface cyclones, conditions aloft must supply

- ○ jet stream convergence.
- ○ uniform zonal flow.
- ◉ upper air support.

QUESTION 12

In the Northern Hemisphere, Ekman transport causes surface winds to drive surface waters to the _____ of the wind direction.

- ○ left
- ◉ right

QUESTION 13

Long-term average conditions in the eastern tropical Pacific Ocean are associated with relatively cool waters off Peru and oceanic
- (●) upwelling.
- ( ) downwelling.

QUESTION 14

During El Niño episodes, the Southeastern U.S. often experiences conditions that are _____ than normal with more than average precipitation.
- ( ) warmer
- (●) cooler

QUESTION 15

Relatively long-term variations in the planetary circulation are termed oscillations. In addition to ENSO, there exist _____ oscillations.
- ( ) North Atlantic
- ( ) Arctic
- ( ) Pacific Decadal
- (●) all of these

QUESTION 16

Which of the following is a prime number?
- ( ) 4
- (●) 5
- ( ) 6

QUESTION 17

Which of the following is a prime number?
- ( ) 4
- (●) 5
- ( ) 6