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(Compilations of the Multiple Choice Questions)

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Geography

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Climatology

1. Consider the following pairs:

Atmosphere Layer :: Feature

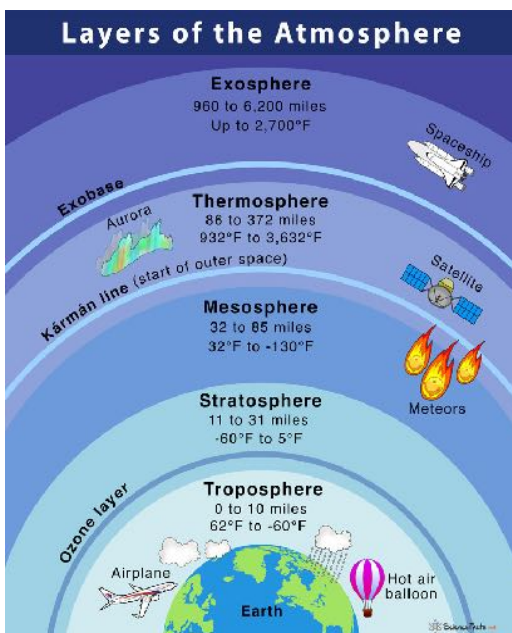
1. Troposphere :: This layer is marked by temperature inversion.
2. Stratosphere :: This layer is almost free from clouds.
3. Exosphere :: Kármán line is located within this layer

Which of the above pairs are correct?

- A. 1 and 2 only
- B. 2 and 3 only
- C. 1 and 3 only
- D. 1, 2 and 3

Answer: A

Explanation



2. Consider the following statements:

1. Albedo of a surface is the proportion of sunlight that the surface can reflect back into space.
2. The difference between the mean temperature of a place and the mean temperature of its parallel (latitude) is called thermal anomaly.
3. Poles would have been much colder if it is not for the moderating effect by the atmospheric circulation.

Which of the above statements are correct?

- A. 1 and 2 only
- B. 2 and 3 only
- C. 1 and 3 only
- D. 1, 2 and 3

Answer: D

Explanation

- Albedo is the amount of sunlight (solar radiation) reflected by a surface, and is usually expressed as a percentage or a decimal value, with 1 being a perfect reflector and 0 absorbing all incoming light.
- When talking about albedo, the surface is almost always the surface of a planet like Earth.

- White objects, such as a snowy hill have a high albedo. Conversely, dark objects, like pavement, have a low albedo.
- The difference between the mean temperature of a place and the mean temperature of its parallel (latitude) is called the temperature anomaly or thermal anomaly.
- The largest anomalies occur in the northern hemisphere and the smallest in the southern hemisphere.
- Winds transfer heat from one latitude to another. E.g. Poles would have been much colder if it is not for the moderating effect by the atmospheric circulation.
- Winds also help in exchange of heat between land and water bodies. E.g. Land breeze and sea breeze.

3. Consider the following statements with respect to Lapse Rate.

- 1. Lapse rate is the rate of change in temperature of the atmosphere with altitude.**
- 2. The lapse rate is considered positive if the temperature increases with elevation.**
- 3. The lapse rate of tropopause is zero.**
- 4. Atmosphere absorbing the outgoing terrestrial (longwave) radiation is the main reason for fall in temperature with altitude.**

Which of the above statements are correct?

- A. 1, 2 and 4 only

- B. 2 and 3 only
C. 1, 3 and 4 only
D. 1, 2, 3 and 4

Answer: C

Explanation

- Lapse rate (Temperature Lapse or Temperature Lapse Rate) is the rate of change in temperature of the atmosphere with altitude (elevation).
- The lapse rate is considered:
 - ✓ Positive: Temperature decreases with elevation,
 - ✓ Zero: Temperature is constant with elevation !Negative:
 - ✓ Temperature increases with elevation
- Hence, the lapse rate of troposphere below tropopause is positive, the lapse rate of tropopause is zero, and the lapse rate of stratosphere is negative.
- The fall in temperature with altitude is primarily due to the following reason:
 - ✓ Atmosphere is mostly transparent to in the incoming shortwave radiation but actively absorbs the outgoing terrestrial (longwave) radiation.
 - ✓ Greenhouse house gases like CO₂, water vapor, are the primary absorbers of the terrestrial radiation and their concentration is highest at the earth's surface and goes on decreasing with altitude. Hence, temperature falls with altitude.

4. Which of the following are the factors that affect wind movement?

1. Coriolis Force
2. Gravitational Force
3. Centripetal Acceleration
4. Buoyant Force
5. Transparency of Atmosphere

Select the correct code.

- A. 1, 2, 4 and 5 only
- B. 1, 2, 3 and 4 only
- C. 1, 3, 4 and 5 only
- D. 1, 2, 3, 4 and 5

Answer: B

Explanation

- The factors that affect wind movement are pressure gradient force, buoyant force, friction, Coriolis force, gravitational force and centripetal acceleration.
- The pressure gradient (difference in pressure) between atmospheric pressure cells and the surroundings causes the movement of air from relatively high-pressure centres to relatively low-pressure centres.
- The atmospheric pressure cells also determine whether the air sinks or rises at a place.
 - ✓ The surrounding atmosphere exerts buoyant force on low- pressure cells and hence the air within a low pressure cell rises.
 - ✓ The air within a high-pressure cell sinks as it is denser than the surrounding atmosphere.

- The irregularities of the earth's surface resist the wind movement in the form of friction.
- Due to the earth's rotation, winds do not cross the isobars at right angles as the pressure gradient force directs but get deflected from their original path.
 - ✓ This deviation is the result of the earth's rotation and is called the Coriolis effect.
- Centripetal acceleration creates a force directed at right angles to the wind movement and inwards towards the centres of rotation.

5. Consider the following statements:

1. The trade winds are those blowing from the sub-tropical high-pressure areas towards the equatorial low-pressure belt.
2. The westerlies of the southern hemisphere are weaker than those of northern hemisphere due to the vast expanse of water.
3. Sirocco are foehn like winds in USA and Canada move down the west slopes of the Rockies.
4. Mistral is one of the local names given to such winds that blow from the Alps over France towards the Mediterranean Sea.

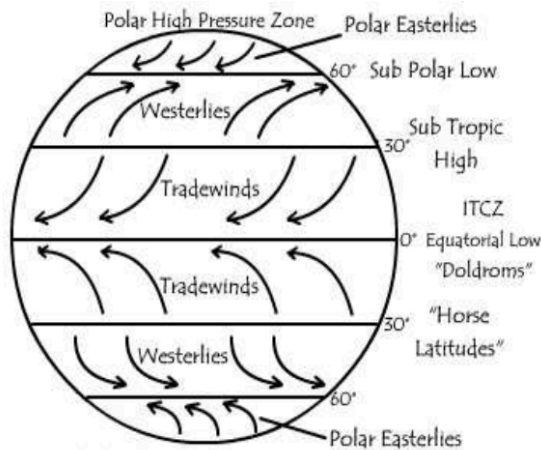
Which of the above statements are correct?

- A. 1, 3 and 4 only
- B. 1 and 4 only
- C. 2 and 3 only
- D. 1, 2, 3 and 4

Answer: B

Explanation

- The trade winds are those blowing from the sub-tropical high-pressure areas towards the equatorial low-pressure belt.



- The westerlies of the southern hemisphere are stronger and persistent due to the vast expanse of water, while those of the northern hemisphere are irregular because of uneven relief of vast land-masses.

Name	Type	Location
Loo	Hot	Plains of northern India and Pakistan
Mistral	Cold	Rhine valley - Southern France
Sirocco	Hot	Mediterranean wind that comes from the Sahara
Fohn	Hot	Leeward side of Alps
Chinook	Hot	Leeward side of Rockies