



Studybeesofficial

Where Minds Pollinate

Class 12
Physics

Chapter 24

Exercise Solution

Follow Our Socials



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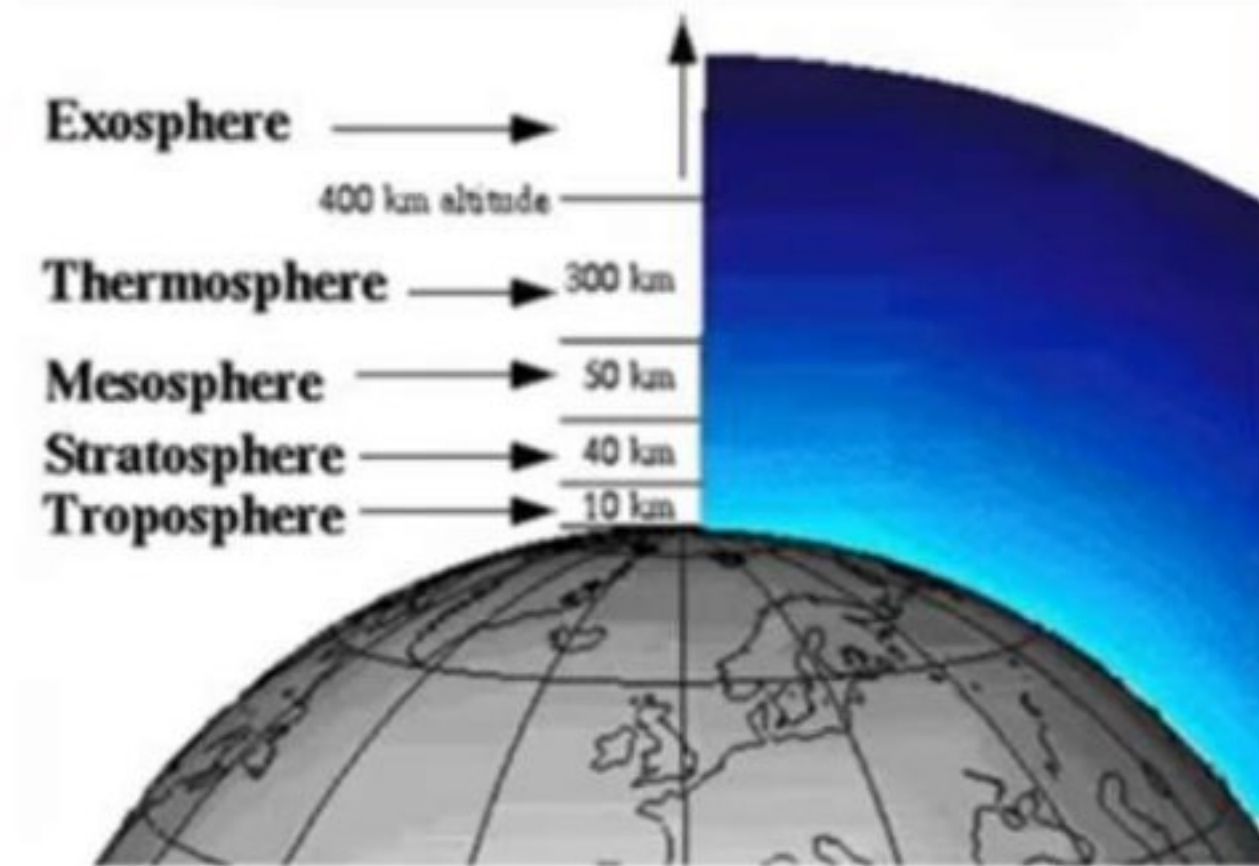
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1) Where in the atmosphere is water vapor most concentrated and why?

Water vapor is most concentrated in the **troposphere**, which is the lowest layer of the atmosphere. This layer is close to Earth's surface where oceans, rivers, and plants are present. Heat from the Sun causes water to evaporate into this layer. Weather activities like clouds and rain also occur here. That is why most water vapor is found in the troposphere.

**2) What is the difference between weather and climate?**

Weather is the **day-to-day condition** of the atmosphere, such as temperature, rain, or wind. It can change within hours or days. Climate is the **average weather of a place over a long time**, usually many years. For example, today's rain is weather, but a hot desert climate lasts for years.

3) Warm air has a greater capacity to hold water vapors. Why?

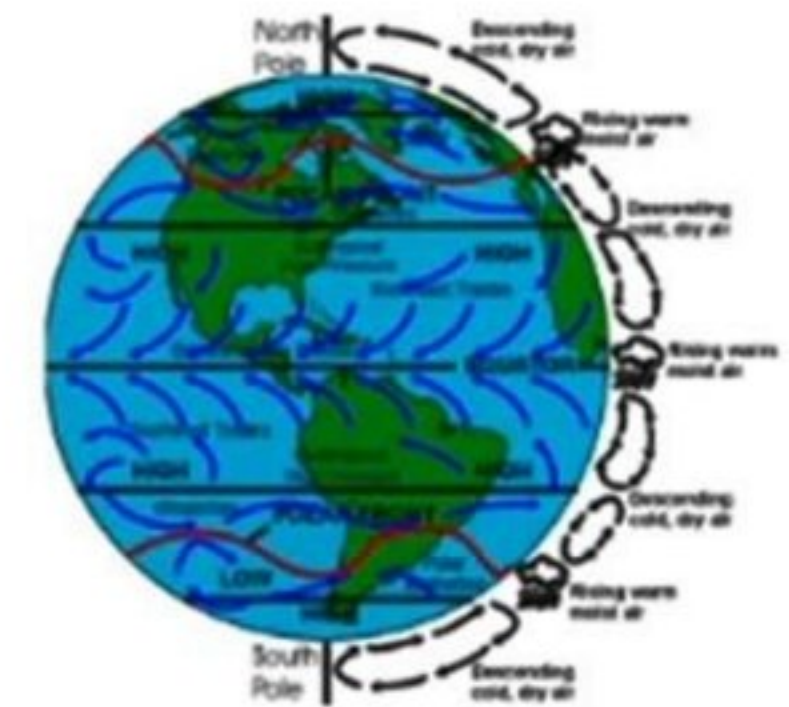
Warm air has more energy, so water molecules move faster in it. Because of this, warm air can hold more water vapor than cold air. Cold air cannot keep much water vapor and causes condensation. This is why rain often happens when warm air cools down. Hence, warm air holds more water vapor.

4) How does the atmosphere retain heat?

The atmosphere retains heat by the **greenhouse effect**. Gases like carbon dioxide and water vapor trap heat from the Sun. This heat is not allowed to escape easily into space. As a result, Earth stays warm enough for life. Without this effect, Earth would be very cold.

5) Describe global latitudinal air movements due to uneven heating at different latitudes.

The Sun heats the equator more than the poles. Warm air at the equator rises and moves toward the poles. Cold air at the poles sinks and moves toward the equator. This movement of air creates global wind patterns. These air movements help distribute heat around the Earth.

**6) What would be the consequences if all the polar ice melts?**

If all polar ice melts, sea level will rise greatly. Many coastal areas and cities may get flooded. Climate patterns will change, and weather may become extreme. Animals living in polar regions will lose their homes. Ocean currents will also be disturbed.

7) Is the lithosphere a part of metal? Justify your answer.

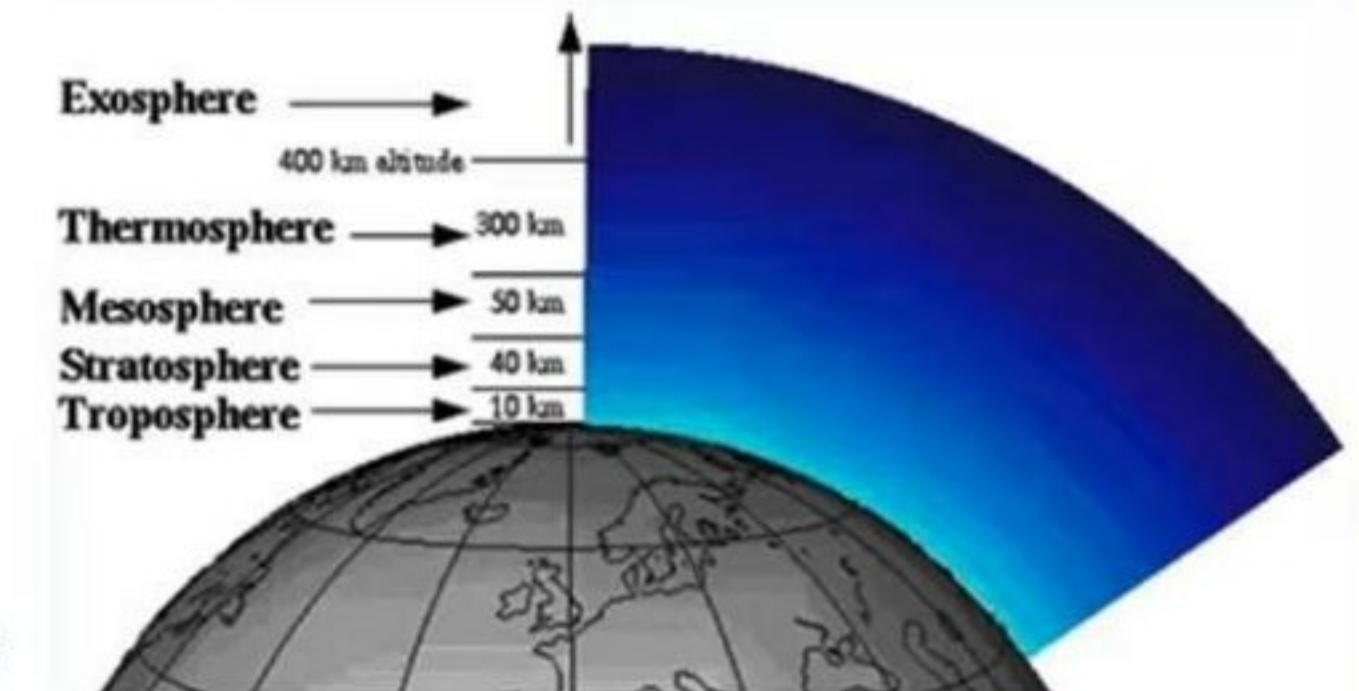
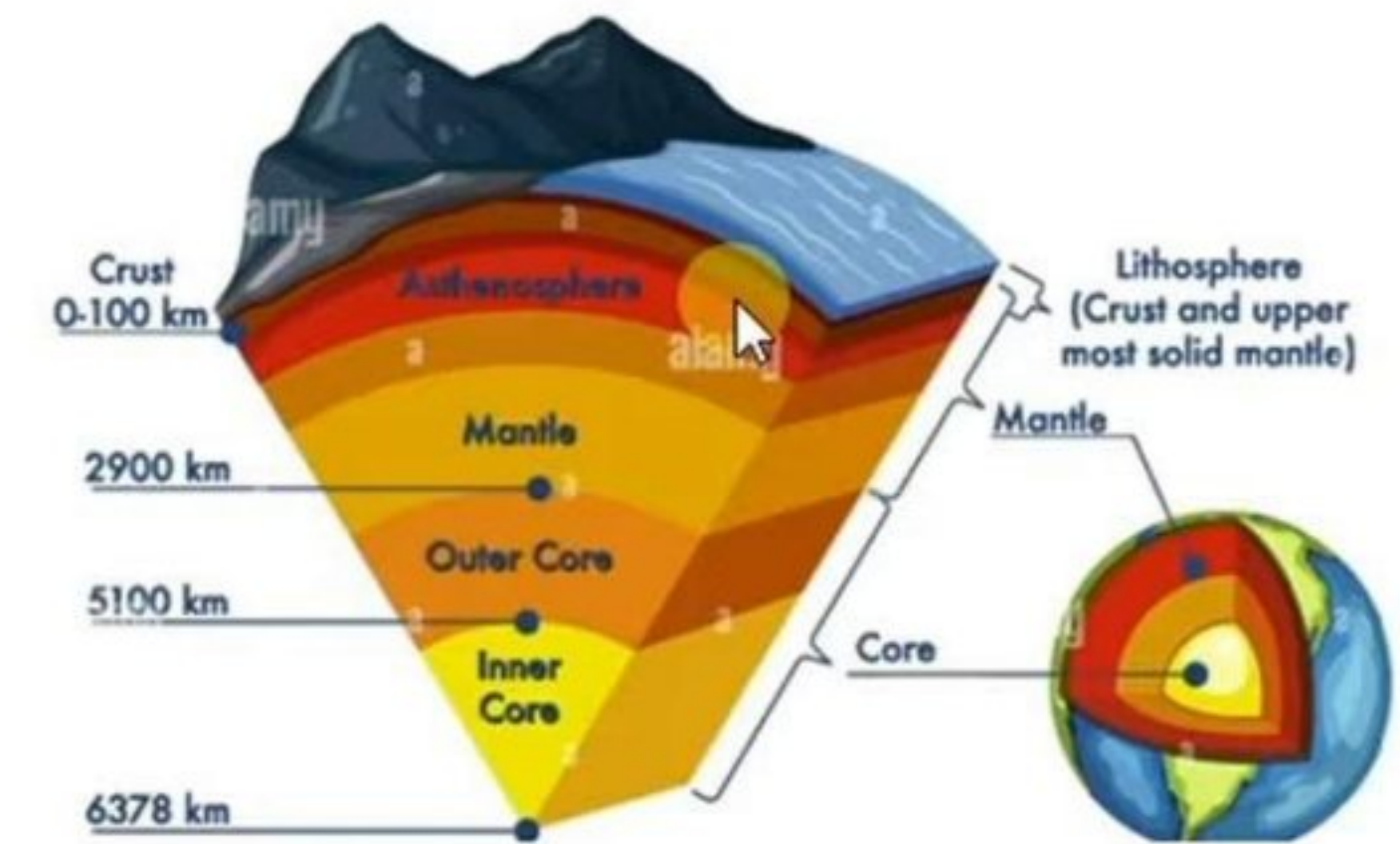
No, the lithosphere is not a part of metal. It is made of rocks and minerals. The lithosphere includes Earth's crust and the upper part of the mantle. It contains soil, rocks, and mountains. Metals are only found in small amounts inside rocks.

8) What are the four components of the biosphere?

The biosphere includes all living things on Earth. Its four main components are **plants, animals, fungi, and microorganisms**. These living things interact with air, water, and land. They play an important role in climate and environment. Together, they form the biosphere.

9) Why is the stratosphere called a calm and stable layer?

The stratosphere is called calm and stable because there is very little weather in it. Air movement is slow and smooth in this layer. It does not have clouds or storms. Temperature also changes very slowly. That is why it is a stable layer of the atmosphere.



Find the precipitation in mm if the change in storage of water is 20 mm, evapotranspiration is 50 mm, and runoff is 30 mm.

Given Data

Change in storage, $\Delta S = 20$ mm

Evapotranspiration, $E = 50$ mm

Runoff, $Q = 30$ mm

To Find

Precipitation, $P = ?$

Formula

$$\Delta S = P - E - Q$$

Solution

$$\Delta S = P - E - Q$$

$$20 = P - 50 - 30$$

$$20 = P - 80$$

$$P = 20 + 80$$

$$P = 100 \text{ mm}$$

Find the angle through which a Coriolis force of 200 N will deflect an air mass of 100,000 kg moving at a speed of 60 km h⁻¹.

Given Data

Coriolis force, $F = 200 \text{ N}$

Mass, $m = 100,000 \text{ kg}$

Speed, $v = 60 \text{ km h}^{-1} = 16.7 \text{ m s}^{-1}$

To Find

Angle of deflection, $\theta = ?$

Formula

$$F = 2m\omega v \sin \theta$$

Solution

$$F = 2m\omega v \sin \theta$$

$$200 = 2(100000)(7.3 \times 10^{-5})(16.7) \sin \theta$$

$$\sin \theta = \frac{200}{243.8}$$

$$\sin \theta = 0.82$$

$$\theta \approx 55^\circ$$

If the volume change in storage of the hydrosphere whose area is 30 km^2 is $600,000 \text{ m}^3$, find the precipitation if the volume of evapotranspiration is $1,500,000 \text{ m}^3$ and runoff volume is $600,000 \text{ m}^3$.

Given Data

$$\text{Area, } A = 30 \text{ km}^2 = 30 \times 10^6 \text{ m}^2$$

$$\text{Change in storage volume, } \Delta S = 600,000 \text{ m}^3$$

$$\text{Evapotranspiration volume, } E = 1,500,000 \text{ m}^3$$

$$\text{Runoff volume, } Q = 600,000 \text{ m}^3$$

To Find

$$\text{Precipitation, } P = ?$$

Formula

$$\Delta S = P - E - Q$$

Solution

$$P = \Delta S + E + Q$$

$$P = 600000 + 1500000 + 600000$$

$$P = 2700000 \text{ m}^3$$

Convert to mm:

$$P = \frac{2700000}{30 \times 10^6}$$

$$P = 0.09 \text{ m} = 90 \text{ mm}$$

If a Coriolis force of 30 N deflects a mass of air at 30° moving with speed of 40 km h^{-1} , find the mass of this air packet.

(Given: $\omega = 7.3 \times 10^{-5} \text{ rad s}^{-1}$)

Given Data

Coriolis force, $F = 30 \text{ N}$

Angle, $\theta = 30^\circ$

Speed, $v = 40 \text{ km h}^{-1} = 11.1 \text{ m s}^{-1}$

Angular velocity, $\omega = 7.3 \times 10^{-5} \text{ rad s}^{-1}$

To Find

Mass of air packet, $m = ?$

Formula

$$F = 2m\omega v \sin \theta$$

Solution

$$F = 2m\omega v \sin \theta$$

$$30 = 2(m)(7.3 \times 10^{-5})(11.1)(\sin 30^\circ)$$

$$30 = 0.00081m$$

$$m = \frac{30}{0.000081}$$

$$m \approx 369900 \text{ kg}$$