



SECTION - 1

Q. No. 3.

(a) Explain the causes of global warming.

ANSWER.

1. Introduction:

Global warming is the gradual increase in the long-term average temperature of the Earth's lowest atmosphere (troposphere) and oceans. Since the industrial revolution, the Earth's average temperature has risen by approximately 1.1°C to 1.2°C , primarily driven by "Enhanced Green House Effect."

2. The Core Mechanism: The Greenhouse effect

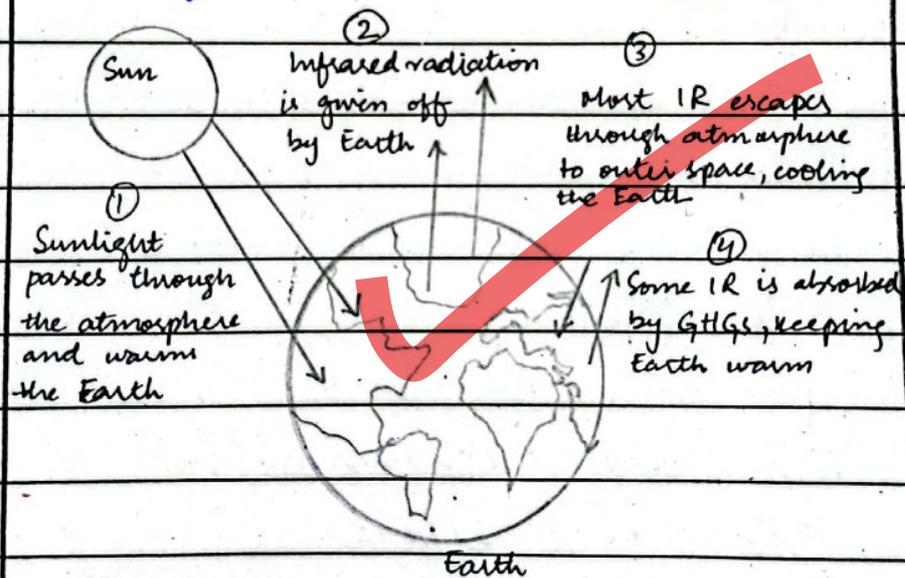
The Earth's temperature is maintained by a natural balance of incoming solar radiation and outgoing infrared radiation. Certain gases trap heat within atmosphere,

acting like a thermal blanket.

2.1. The Mechanism: How it works

Short-wave solar radiation passes through the atmosphere, but long-wave infrared radiation (heat) reflected from Earth's surface is absorbed by Greenhouse Gases (GHGs) and reflected back to Earth.

3. Diagram: Greenhouse Effect



⑤ Enhance Green House Effect: More levels of CO_2 increase amount of heat retained, causing Earth's surface to heat up.

4. Causes of Global Warming

4.1. Primary Anthropogenic (Man-Made) Causes:

Human activities are the primary drivers of global warming.

The most notable ones are:

(i) Burning of Fossil Fuels:

The combustion of coal, oil, and natural gas for electricity, industry, and transportation is the largest source of CO_2 .

(ii) Deforestation:

Forests act as "Carbon Sinks".

When trees are cut down or burned, the stored carbon is released as CO_2 .

Deforestation accounts for roughly 10-15% of GHG emissions globally according to IPCC (the UN's body on climate change research).

(iii) Agricultural Practices:

Methane (CH_4) releases from livestock and rice paddies are major sources, a gas 25 times more potent than CO_2 in trapping heat. Nitrous Oxide (NO_2) from nitrogenous fertilizers use is 300 times more potent than CO_2 in trapping heat.

(iv) Industrial Emissions:

The use of chlorofluorocarbons (CFCs) and Hydrofluorocarbons (HFCs) in refrigeration and air-conditioning contributes significantly to Global Warming.

4.2. Natural Causes

Natural factors also play a minor role in global warming, such as:

(i) Volcanic Eruptions:

These release large amounts of CO_2 and aerosols, though their net effect is slightly cooling down temporarily followed by slight warming.

(ii) Solar variations:

Fluctuations in solar intensity (Solar cycles) can effect the Earth's temperature.

(iii) Water Vapor:

As the Earth warms, more water evaporates. Water vapor is a potent greenhouse gas, creating a positive feedback loop, that further increases global warming.

(b) Explain the solar and lunar eclipses.

ANSWER.

1. **Definition:**

An eclipse is an astronomical event that occurs when one celestial body (like moon or a planet) moves into the shadow of another celestial body, obscuring its light temporarily.



2. Solar Eclipse (Sun-Moon-Earth)

2.1. Definition:

A solar eclipse occurs when the Moon passes between the Sun and the Earth, casting its shadow on the Earth's surface. This can only happen during New Moon Phase.

2.2. Mechanism:

The Moon blocks Sun light, creating a path of darkness on Earth.

2.3. Types of Solar Eclipse:

(i) Total Solar Eclipse: The Moon completely covers the Sun. The Sun's outer atmosphere (corona) becomes visible, causing a "Ring of Fire" effect.

(ii) Partial Solar Eclipse: The Moon covers only a portion of the Sun.

(B22) Annual Solar Eclipse: Occurs when Moon is at its farthest point from Earth. It appears smaller and doesn't fully cover the Sun, leaving a "Ring of Fire".

3. Diagram: Solar & Lunar Eclipse

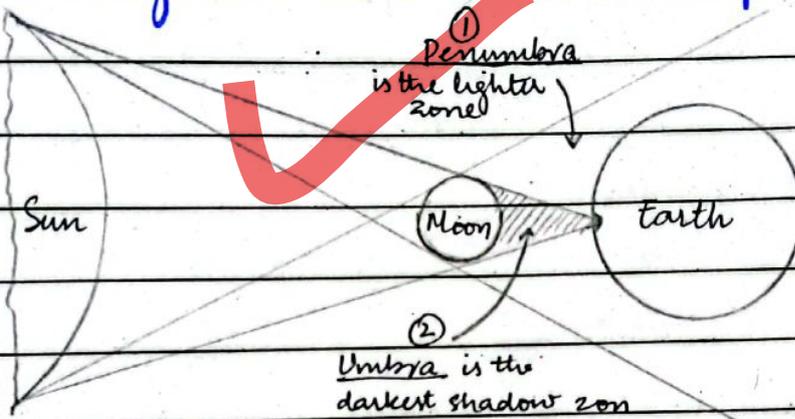


Fig. 1. Solar Eclipse

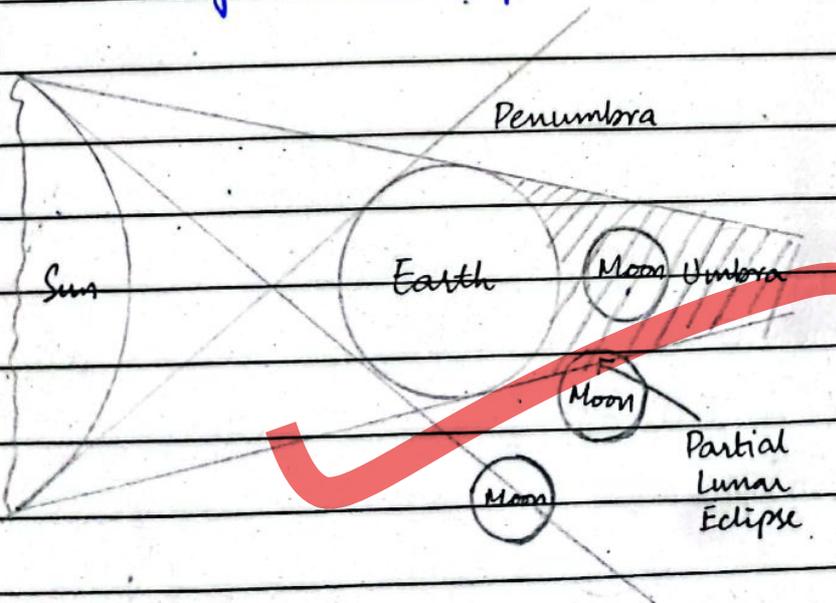


Fig 2: Lunar Eclipses

3. Lunar Eclipse (Sun-Earth-Moon)

3.1. Definition:

A lunar eclipse occurs when the Earth passes between the Sun and Moon, casting its shadow on the Moon. This only happens during a full Moon phase.

3.2. Mechanism:

The Earth blocks the sunlight from reaching the Moon.

3.3. Types of Lunar Eclipse:

(i) Total Lunar Eclipse:

The entire Moon enters Earth's darkest shadow (Umbra). The Moon appears reddish (The Blood Moon) due to Rayleigh Scattering in Earth's atmosphere.

(ii) Partial Lunar Eclipse:

Only a portion of Moon enters

the Earth's Umbra.

(iii) Penumbral Lunar Eclipse :

The Moon passes through the Earth's faint outer shadow (Penumbra)

The dimming is often too subtle to notice with naked eye.

(c) Give a brief about tsunamis and cyclones.

ANSWER.

1. Tsunami - Geological Hazard

The word "Tsunami" has been derived from Japanese words "Tsu" meaning harbor and "Nami" meaning wave. It is a series of massive ocean waves generated by a sudden, large scale displacement of the ocean floor.

1.1. Causes of Tsunami :



i. Undersea Earthquakes:

About 80% of tsunamis are caused by tectonic shifts in subduction zones where seabeds sea floor moves vertically.

ii. Volcanic Eruptions:

It can be caused by under-water explosions or the collapse of volcanic islands.

iii. Landslides:

Another cause is submarine landslides displacing vast amounts of water.

1.2. Mechanisms:

In the deep ocean, tsunamis have smaller amplitudes (less than 1 m) but travel at jet-like speeds (up to 800 km/hr). As they approach shallow coastal waters, their speed decreases, but their height amplifies, often reaching 30 meters.

1.3. Key Feature:

It is a massive sea wave, not a tidal wave.

2. Cyclones - Atmospheric Hazard

A cyclone is a large-scale system of air rotating inward around a low-pressure center in the atmosphere. In the Northern Hemisphere, they rotate counter-clockwise; in the Southern Hemisphere, they rotate clockwise.

2.1. Causes:

i. Warm Sea Surface Temperature:

Requires temperature above 26.5°C to provide energy via evaporation.

ii. Coriolis Force:

The Earth's rotation provides spinning effect to it.

iii. low Pressure:

A pre-existing low pressure zone in the atmosphere.

2.2. Structure:

i. The Eye: The calm, center of the storm with the lowest pressure.

ii. The Eyewall: The area surrounding the eye where the strongest winds and heaviest rain occurs.

2.3. Impacts:

Cyclones cause high-speed winds, heavy precipitation, and storm surges (the most lethal part) where wind pushes sea water onto the land.

3. Key Comparison:

Feature	Tsunami	Cyclone
Origin	Lithosphere (Underwater)	Atmosphere (Above Ocean)

Feature	Tsunami	Cyclone
Driver	Seismic/Geological Activity	Thermal/Pressure Difference
Speed	Upto 800 km/hr in deep water	120-200+ km/hr (wind speed)
Warning Time	Minutes to hours	Days (Highly predictable)

d. Describe food preservation ... (at least 7).

ANSWER.

1. Introduction:

Definition: Food preservation is the process of treating and handling food to stop or greatly slow down spoilage, which is caused by microorganisms or enzymes, while maintaining its nutritional value, texture, and flavor.

2. Physical Methods

2.1. Refrigeration and Freezing

Low temperatures slow down metabolic and reproductive rates of bacteria and yeasts.

Examples: Storing fresh meats, dairy, and vegetables in refrigerators or deep freezers.

2.2. Dehydration (Drying)

Microorganisms require moisture to grow, which this method removes through evaporation.

Example: Sun drying dates, ~~and~~ apricots and grains.

2.3. Pasteurization

Invented by Louis Pasteur, it involves heating liquid food to a specific temperature and then rapid cooling. The heating up kills pathogens.

Example: Packaged milk.



2.4. Canning

Food is sealed in airtight containers and heated to high temperatures to destroy all microorganisms.

Example: Canned beans, fish, and soups.

3. Chemical Methods

3.1. Salting (Curing)

Salt draws moisture out of the food via osmosis, creating a dry environment, where bacteria cannot survive.

Example: Salted fish and cured meats.

3.2. Sugaring:

High sugar concentration creates a hypertonic environment that dehydrates microbes, preventing their growth.

Example: Preparation of jams and marmalades.



3.3. Using Chemical Preservatives

Modern industry uses approved chemicals like sodium benzoate and Potassium sorbate to stop mould and yeast growth.

Example: Carbonated drinks (Benzoates) and Pickles (Acids/Vinegar).

4. Biological Methods

4.1. Fermentation

Beneficial microorganisms convert sugars into alcohols or acids, acting as natural preservatives.

Example: Yougurt.

4.2. Irradiation (Cold Pasteurization)

Exposing food to ionizing radiation (Gamma Rays) kill parasites, insects and delay ripening.

Example: Spices and potatoes



SECTION-II

Q. No. 6

A) Zahid and Basit invest . . . profit is?

Given:

Investment Ratio = Zahid : Basit

$$= 3 : 2$$

Zahid's share = Rs. 8550

Profit given to

charity = 5%.

Total profit = ?

Solution:

Let total profit = x .

Then according to statement,

$$\text{Zahid's share} = \frac{3}{5} x (1 - 0.05)$$

$$8550 = \frac{3}{5} x (0.95)$$

$$\frac{2850}{3} \times 5 = x (0.95)$$

$$14250 = x$$

$$0.95$$

$$\begin{array}{r} 42 \\ 2850 \\ \times 5 \\ \hline 14250 \end{array}$$



$$x = \frac{1150}{95} \times 100$$

$$x = 15,000$$

Hence, the total profit is Rs. 15,000.

Answer: Rs. 15,000.

B) If 20% of $a = b$, then ... of a ?

Given:

$$20\% \text{ of } a = b$$

$$\text{OR, } \frac{20}{100} a = b$$

$$\text{or } b = 0.2a$$

Altho, We have to find:

$$\text{What } \% \text{ of } a = b \% \text{ of } 20$$

Solution:

$$b \% \text{ of } 20 = \frac{b \times 20}{100}$$

$$= \frac{b}{5}$$

substituting the value of b .

$$= \frac{0.2a}{5}$$

$$\begin{array}{r} .04 \\ 5 \overline{) 20} \\ \underline{20} \\ 0 \end{array}$$

$$200\% \text{ of } 20 = 0.04 a.$$

$$\text{OR } b\% \text{ of } 20 = 4\% \text{ of } a.$$

Answer: $b\%$ of 20 is 4% of a .

c) Two numbers are in ... Find the numbers.

Given:

$$\text{Ratio b/w two numbers} = 2 : 3$$

Let the common factor be x , then

the numbers are:

$$2x \text{ and } 3x.$$

Also given,

$$\text{LCM} \times \text{HCF} = \text{Product of two numbers} = 294.$$

Solution:

We know that,

$$\text{LCM} \times \text{HCF} = \text{Product of two numbers}.$$

So,

$$2x \times 3x = 294$$

$$6x^2 = 294.$$

$$x^2 = 49$$

$$\begin{array}{r} 49 \\ 6 \overline{) 294} \\ \underline{24} \\ 54 \\ \underline{54} \\ 0 \end{array}$$



taking square roots on both sides:

$$\sqrt{x^2} = \sqrt{49}$$

$$x = 7$$

With the value of x , we can find the two numbers, i.e.

$$2x = 2 \times 7 = 14$$

$$3x = 3 \times 7 = 21.$$

Answer: The two numbers are 14 & 21

D) Find the total cost . . . 22.5 cm.

Given:

Price of one brick = Rs. 30.

Dimensions of 1 brick = 25 cm x 11.25 cm x 6 cm.

Dimensions of the wall = 8 m x 6 m x 22.5 cm

\therefore 1 m = 100 cm, then

Dimension of the wall = 800 cm x 600 cm x 22.5 cm

Total cost of building wall = ?

Solution:

$$\begin{aligned} \text{Volume of the wall} &= (800 \times 600 \times 22.5) \text{ cm}^3 \\ &= 10,800,000 \text{ cm}^3 \end{aligned}$$

$$\begin{array}{r} 12 \\ 241 \\ 225 \\ \hline 48000 \\ 225 \\ 1800 \\ 700 \times \\ \hline 10800000 \end{array}$$



$$\text{Volume of one brick} = (25 \times 11.25 \times 6) \text{ cm}^3$$
$$= 1687.5 \text{ cm}^3$$

$$\begin{array}{r} 25 \\ \times 1125 \\ \hline 125 \\ 250 \\ 2500 \\ \hline 28125 \end{array}$$

Now,
number of bricks required = $\frac{10,800,000}{1687.5}$

$$\begin{array}{r} 216000 \\ \times 16875 \\ \hline 10800000 \end{array}$$

OR

$$= (800^3 \times 600^2 \times 22.5) \text{ cm}^3$$
$$(25 \times 11.25 \times 6) \text{ cm}^3$$
$$= 6400 \text{ bricks.}$$

$$\begin{array}{r} 675 \\ \times 32 \\ \hline 1350 \end{array}$$

Cost per brick = Rs 30

So, total cost = 6400×30
 $= \text{Rs } 192,000$

Answer: Total cost of wall is Rs. 192,000

Q.No. 8

A) In a garden, . . . , length of garden is?

Given:

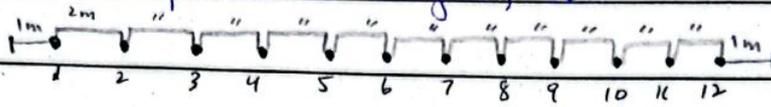
10 rows & 12 columns of trees

distance b/w 2 trees = 2 m.

distance left at sides = 1 m.

Solution:

The column having more trees (12) corresponds to length, so.



Total distance/length of the garden will be:

$$\begin{aligned} \text{length} &= (11 \text{ gaps} \times 2 \text{ m}) + (2 \text{ sides} \times 1 \text{ m}) \\ &= 22 \text{ m} + 2 \text{ m} \\ &= 24 \text{ m.} \end{aligned}$$

Answer: length of garden is 24 m.

B) A, B, C, D... which position is A sitting?

Working:

$$B - A ; D + E$$

$$C - D ; A - C$$

$$E, B, \boxed{A}, C, D$$

Answer: A is sitting in the middle of the bench.

C) If one-third number is ?

Given :

Let the number be x , then

$$\frac{1}{3} \left(\frac{1}{4} x \right) = 15.$$

Required :

$$\frac{3}{10} x = ?$$

Solution:

$$\frac{1}{3} \left(\frac{1}{4} x \right) = 15.$$

$$x = 15 \times 12$$

$$x = 180.$$

then;

$$\frac{3}{10} x = \frac{3}{10} \times 180$$

$$= 54$$

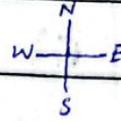
Answer: $\frac{3}{10}$ of this number is 54.

D) From his house . . . How much distance has he travelled ?

Given:



15 km North \Rightarrow position $(0, +15)$.



Turn left:

10 km West \Rightarrow position $(-10, +15)$.

Turn left again:

5 km South \Rightarrow position $(-10, +10)$

Final left turn again:

10 km East \Rightarrow position $(0, +10)$.

Solution:

If initial position is $(0, 0)$,
and
~~the~~ final position $(0, +10)$ North,
then:

① His direction from the House = North.

② Distance from the house = 10 km.

③ Total distance travelled $= (15 + 10 + 5 + 10)$ km
 $= 40$ km.

Answers:

1. North

2. 10 km

3. 40 km

