⇒ **Climate**

A general prevailing weather conditions of a region i.e the temperature, air pressure, Humidity, sunshine, cloudiness, winds etc. Throughout the year, averaged over a series of years.

'climate change'

A gradual change in the weather conditions over a period, short or long, time.
This is majorly due to change in natural habitat caused by man made or natural reason. eg- changes in ocean current, melting of ice and loss of biodiversity are included in climate change, they are not discussed as conventional events of weather.

Burning fossil fuel generates greenhouse gases that act like a blanket wrapped around the earth, trapping the sun's heat & raising temp.
Examples of greenhouse gas emission that are causing climate change include carbon dioxide & methane. These come from using gasoline for driving a car or coal for heating a building for eg - clearing land and forests can also release carbondioxide. Landfills for garbage are a major source of methane emissions. Energy, industry, transport wilding, agriculture & land use among the main emitters.

And emissions continue to rise. As a result, earth is now about 1.1°C warmer than it was in late 1800's. The last decade (2011-2020) was the warmest on record.

Many people think climate change mainly means warmer temperatures. But temperature rise is only the beginning of the story. Because earth is a system, where everything is connected changes in one area can influence changes in all others.

The consequence of climate change now include among others, intense droughts, water scarcity, severe fires, rising sea levels, flooding, melting polar ice, catastrophic storms & declining biodiversity.

Climate change can affect our health, ability to grow food, housing, safety and work. Some of us are already more vulnerable to climate impacts, such as people living in small island nations & other developing countries. Conditions like sea-level rise & saltwater intrusion have advanced to the point where whole communities have had to relocate & protracted droughts are putting people at risk of famine. In the future, the number of "climate refugees" is expected to rise.

causes & effects :-

Natural Causes

- Forest Fire
- Methane Emissions
- Ocean currents
- Sunspot & Solar cycle
- Volcanic Eruptions

Man-Made Causes

- Deforestation
- Fossil Fuel
- Fertilizer use
- Landfills
- Meat consumptions
- Overpopulation

→ Forest Fire

Forest Fires emit carbon-filled smoke into the atmosphere. New forests growth is slow & not stable enough to produce the much needed oxygen into the newly, suffocating carbon air.

Eg→ The Uttrakhand forest dept. estimated that 8,600 acres of forests had been burnt. Nearly 1,600 incidents of fires were detected & brought under control by 2 May 2016.

→ Methane Emissions

Methane remains in the atmosphere for 11-12 years, less time than most other greenhouse gases.

Eg- Indian methane emissions have grown 18.85 T in 1985 to 20.56 T in 2008. Enteric fermentation contributes 50-60% over the years.

U.P & A.P are the hotspot methane emitting states of India.

→ Ocean currents

A rise in global sea level due to climate change poses many threats such as - inundate coastal wetlands & lowlands, erode beaches, increase the risk of flooding etc. If the ocean life currents slow down, fewer nutrients are brought to sustain ocean life, resulting in a crumbling of the food chain. & damage to the marine ecosystem.

The ocean is largest sink with in which carbon is stored. When waters become saturated with carbon; excess carbon has nowhere to go.

→ Sunspot & solar cycle

They can change the energy radiating to earth's atmosphere & thus increase climate temperature.

Eg→ An increase of 0.1% of solar radiation could substantially increase atmospheric water vapour, suggesting the solar radiation has a strong influence on the Indian monsoon rainfall.

Volcanic
On eruption
particles

Volcanic Eruptions →

On eruptions, they emit a mixture of gases & particles into the air. Emitted ash & SO_2 have a cooling effect, because they reflect sunlight away from the earth. Others such as CO_2 cause warming by adding to the greenhouse effect.

Eg ⇒ When Mount Pinatubo erupted in the Philippines June 15, 1991, an estimated 20 million tonn of SO_2 & ash particle blasted more than 20 km into the atmosphere.

Barren Island, in Andaman is the only confirmed active volcano in India.

"Man-Made Causes"

→ **Deforestation**

It have a negative effect on the environment. The most dramatic impact is loss of habitat for millions of species.

Eg ⇒ India's forests now cover only 21.34% of the country (2016) India is losing about 1.5 m hectares of forests cover each year.

→ **Fossil Fuel**

GHG has far-reaching effects including rising sea levels, increasing wildfires, more extreme weather, deadly heat waves, more severe

droughts and warming the planet.

Eg→ The 7 largest emitters – The U.S, the E.U, China, Russia, Japan, India and canada – accounted for > 70% of energy-related CO_2 emissions.

→ Fertilizer Use

Nitrous oxide creates nitric oxide when it reacts with oxygen atoms and so reacts with the Ozone layer. NO_2 is 300 times more dangerous than CO_2.

Eg→ In 2015-2016 India produced 17,901.7 T, Imported 10,056.7 T & Consumed 29,752.6 T (approx.) of Fertilizer Products.

→ Landfills

Most of the time that garbage is burnt which releases toxic gases including methane into the atmosphere. These enormous amounts of toxic greenhouse gases when go into the atmosphere make global warming worse.

Eg→ 43 millions t of solid waste are collected annually in India, out of which 11.9 million are treated & 31 million are dumped at landfill sites.

, Over Population :-

Since CO_2 contributes to global warming, the increase in populations makes the problem worse because we breath out more CO_2 in the atm. More people means more demand for food, more CO_2 in the atm, more demand for cars & more demand for house.

Eg → The world population will reach 9.8 billion in 2050, 31% from an estimated 7.5 billion now (Aug 2017).

⇒ Impact on Businesses

→ ① Logistics & Transport

climate change → Damaged transport Infrastructure → Extensive adaptation & changes to route planning

Direct transport carbon emissions could double by 2050.

⇒ Impact on Air Transport

→ more storms → delays & cancellations
- Intense heat & rainfall → impact airport runway
- Higher temperature → reduce take off weight.

⇒ on Road Transport

- Reduction in fuel efficiency
- Increase energy consumption for refrigeration of goods.

⇒ Impact on Water Transport:-

- Frequent droughts & flood → smaller vessels
- Storms → longer route → increase in cost of shipping
- Increase in ship / vessel maintenance.

⇒ On Road Transport:-

- Increased rainfall - decreased visibility
- Increased temperature - expansion & buckling.

⇒ ② Travel & Tourism

- Climate is an essential resource for Tourism
- Changing climate significantly affect the tourists comfort & their travel decisions.
- Significant reduction in tourist arrivals will have serious employment impacts & generate further poverty in developing countries.

⇒ ③ Funding & Technology:-

- Global warming may lead to new inventions to reduce warming effects.
- Change & increase of Investments in the renewable energy Sector.
- New Technology sustenance, requires a high amount of investments & quick adaptability.
- May lead to shift in Funding Habits with regards to the existing Technology.

Remedies / Precautions

For Man-Made Causes (deforestation)

(1) Green Business →
Rooftoping - lift lobby Plantation
Balcony Gardening.

(2) Law & Regulations →
Use less paper - Recycling Activities - Smart Products

(3) Community Forestry :-
Community or corporate Tree plantation Activities - Plantation & Gardening with in a premises.

(4) Land-Use Farming
Vertical gardening - office Plantation
- Pavement Plantation

(5) Joint organizations

(6) Educative campaigns

(7) Eco-forestry

(8) Replanting (Reforestation)

(Fossil Fuel)

(1) Plant a Tree

(2) Replace your light bulbs (with CFL's)

(3) Drive less & Drive Smart

④ Buy - energy efficient Products
⑤ Use less hot water
⑥ Use the "off" switch
⑦ Use less Air conditioning
⑧ Encourage others to conserve.

(Fertilizer Use)

① Making your own Homemade Fertilizer
② Use Fruit Skins as Fertilizers
③ Use renewable Organic waste as Fertilizers
④ Eco Ganeshas, Eco Pencils etc.

(Land Fills)

① Reduce food waste
② Eat Healthy
③ Save leftovers for Next Day
④ Buy things with less Packaging
⑤ Boycott Plastic Water Bottles
⑥ Composting
⑦ Buy rechargable batteries
⑧ Purchase Recycled Products
⑨ Recycle & Reuse
⑩ Clean Smarter
⑪ Donate if you have extra (Clothes, stationery)

"Global Warming"

A gradual increase in the overall temperature of the earth's atmosphere generally attributed to the green house effect caused by increased levels of CO_2, CFC's & other pollutants.

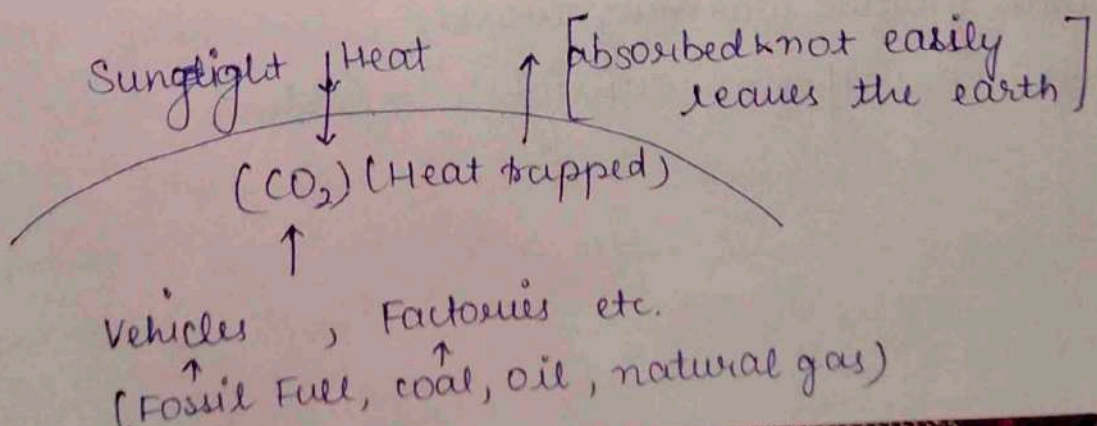
OR

Global warming is the long term heating of Earth's surface observed since the pre-industrial period (between 1850 and 1900) due to human activities, primarily fossil fuel burning, which increases heat-trapping greenhouse gas levels in Earth's atmosphere.
This term is not interchangeable with the term "climate change".

How global warming work?

Earth transforms sunlight's visible light energy into infrared light energy, which leaves Earth slowly because it is absorbed by greenhouse gases. When people produce greenhouse gases, energy leaves Earth even more slowly - raising Earth's temperature.

How it works



→ causes of Global Warming :-

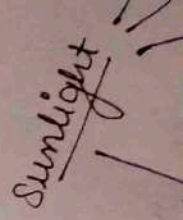
→ greenhouse gases
→ Aerosols & soot
→ Solar Activity
→ Variations in Earth's orbit
→ climate models

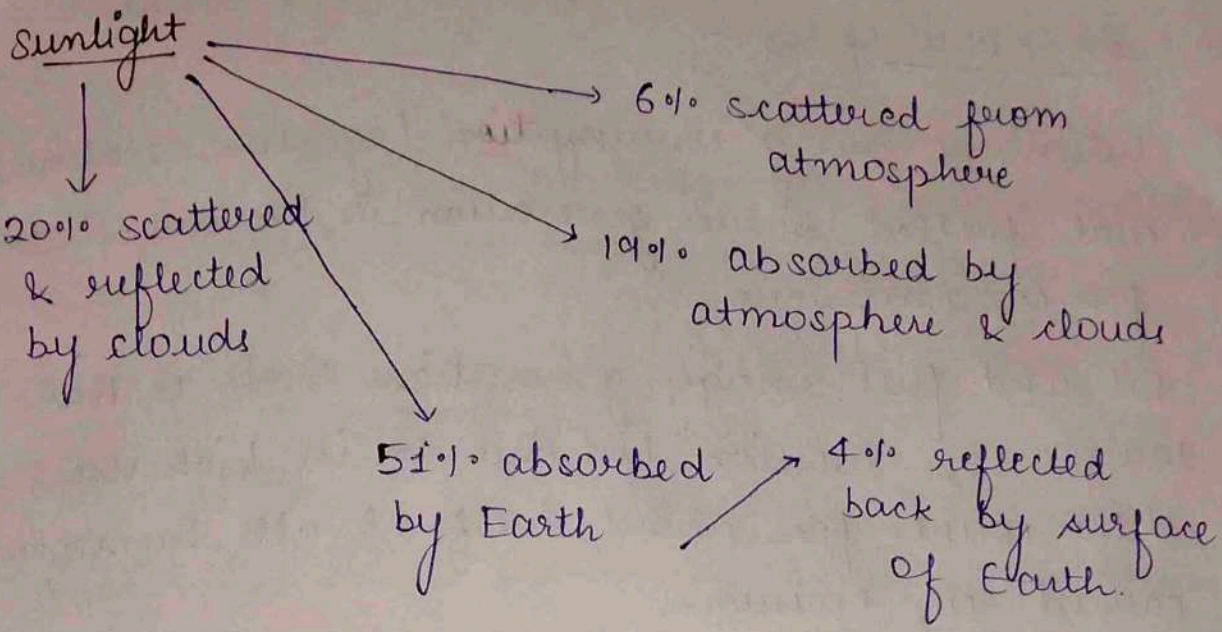
'Greenhouse'

→ The trapping of sun's warmth in a planet's lower atmosphere, due to the greater transparency of the atmosphere to visible radiation from the sun than to infrared radiation emitted from the planet's surface.

⇒ How does the greenhouse effect work?
Gases in the atmosphere such as CO_2 do what the roof of a greenhouse does. During the day, the sun shines through the atm., Earth surface warms up in the sunlight. At night, earth's surface cools, releasing the heat back into the air.

→ How global warming works?
[Earth transforms sunlight's visible





⇒ What are the greenhouse gases?

Many chemical compounds found in the Earth's atmosphere act as "greenhouse gases". These gases allow sunlight to enter the atmosphere freely. When sunlight strikes the Earth's surface, some of it is reflected back towards space as infrared radiation (heat). Greenhouse gases absorb this infrared radiation and trap the heat in the atmosphere.

⇒ Direct Greenhouse Gases CO_2 :→

CO_2 dioxide is without doubt the most well known greenhouse gas. It is also the greenhouse gas man contributes to most, primarily through burning fossil fuels. Since the industrial revolution concentrations of CO_2 in our atmosphere have increased at an even faster rate.

⇒ Main Sources of CO_2 :-

① Stationary Energy consumption (eg - Power stations)

- coal fuelled power generation is the worst culprit for CO_2 emissions.
- Oil and fuel energy generations tends to have a lower CO_2 emission but due to its high use, still counts for about half of all human caused CO_2 emissions.
- Even those energy generation strategies without apparent use of fossil fuels generally have some associated CO_2 emissions. Nuclear Power, for instance, relies on large amounts of electricity for fuel processing and so indirectly results in CO_2 emissions.

② Transportation :-

- Globally, transport related emissions of CO_2 are growing rapidly. The use of petroleum as a fossil fuel for transportation dominates CO_2 emissions from this source.

- Despite the rising cost of fuel, fuel consumption levels continue to rise. The large consumption of gas through vehicles is impacted by many factors including the following ;→ no. of vehicles on the road, types of vehicles on road (SUVs, smart car, transport trucks), traffic condition, urban sprawl

and maintenance of vehicles (emission tests, oil changes).

- Energy use (stationary & transportation) are the main contributors to human made CO_2.

⇒ Direct Greenhouse gases:-

① Methane (CH_4):

⇒ Sources: Natural - wetlands, termites, The oceans.

Human made - Ruminants (livestock), waste treatment, Rice Agriculture, Biomass burning

- Engy industries (5%)
- Manufacturing ind. (4%)
- Transport (38%)
- Commercial (1%)
- Residential (49%)
- Agriculture | Forestry | Fishing (3%)

② N_2O ⇒ Nitrous Oxide

- Energy Industries (24%)
- Manufacturing ind. (22%)
- Transport (31%)
- Commercial (1%)
- Residential (18%)
- Agricultural | Forestry | Fishing (4%)

⇒ Other Direct Greenhouse Gases:-

- Tropospheric ozone
- Water vapor (in stratosphere)
- CFC's
- HFC's
- PFC's & SF_6 with atm. lifetimes of more than 1000 years.

⇒ Indirect Greenhouse Gases:-

Nitrogen oxides (NO_x) act as indirect greenhouse gases by producing the tropospheric greenhouse gas 'ozone' during breakdown in the atmosphere.

Carbon-monoxide (CO) can lead to the formation of tropospheric greenhouse gas 'ozone'.

Hydrogen (H_2) :- H_2 increases the lifetime of some direct greenhouse gases, such as methane.

- Volatile Organic compounds (VOC's) - Encompasses many compounds including hydrocarbons, alcohols, & organic acids. Man-made emission tend to be concentrated in highly populated areas such as cities.

cause & effects :-

① global temp. will rise!

global surface temp. have increased about 0.6°C since the late 19th century & about to 0.2 to 0.3°C overt past 25 years.

② Drought:

An increase increase in the occurrence of drought - Areas that lack precipitation over a long period of time.

As fast as global warming is transforming the oceans & the ice caps, its having an even more immediate effect on land.

③ Extreme weather

As the world warms, some extreme climate events, like the frequency of heat waves & very heavy precipitation, are expected to increase.

Blizzards & snowstorms may actually increase in intensity and frequency in some colder locations.

As climate change gathers pace, devastation by extreme weather is becoming more common.

④→ Fires

Forest fires, bushfires are becoming more & more common due to intense heat & long periods without precipitation.
specially in US & Australia.

⑤ Tornadoes are increasing in no. & in severity, perhaps an effect of global warming.

⑥ Hurricanes are increasing & in severity, Hurricanes require warm ocean temp. in order to form.

⑦ Rise in sea level.

⑧ Increased Temp.

⑨ Habitat damage & species Affected.

⑩ Changes in water supply.