



An Institute for Civil Services

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SRISHTI MISHRA

AIR 95

CSE 2023

PHYSICAL GEOGRAPHY



8448496262



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Physical Geography

Test 32

8/2/8

55

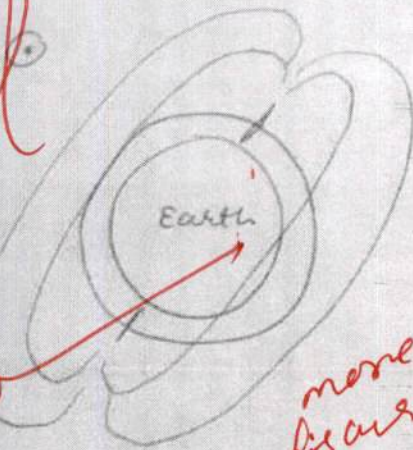
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Q1.

Geomagnetic storms are atmospheric phenomena that occur due to instability in the earth's magnetic field.

Occurrence and Sun's Role



Interaction with magnetic field lead to enhanced geomagnetic storms.

Sunspot

Sun

magnetic field of the Earth

more discussion & analysis required
linkage b/w Geomagnetic storm & sunspot activity
→ organize content under heading.

② It involves the formation of aurora borealis & aurora australis in polar regions ~ colours created due to interaction of various gases in the atmosphere with sun's flares.

③ Storms are confined to the outer atmosphere but have strong effect on life on Earth.

Intro could be better

well presented

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इस भाग में
कोई लिखना
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Effects of Geomagnetic Storms

① Harm to communication structures like satellite connections

eg: call services can be affected.
TV service, etc.

② Harm to internet services placed in space - uneven connection.

③ Harm to the natural balance of Earth's atmosphere.

What can be Done?

① Since geomagnetic storms are occur at the level of Earth-Sun interaction, not much can be done.

② Additionally, geomagnetic storms take place very infrequently, causing harm for a short time period.

Thus, their occurrence is not entirely preventable but impacts can be borne without much cost to life on Earth.

also mention
↳ past storm
↳ black out that
Quebec in Canada
suffered in
1989

ionospheric
expansion
can give satellite
drag &
enter
orbit
to control

(5)

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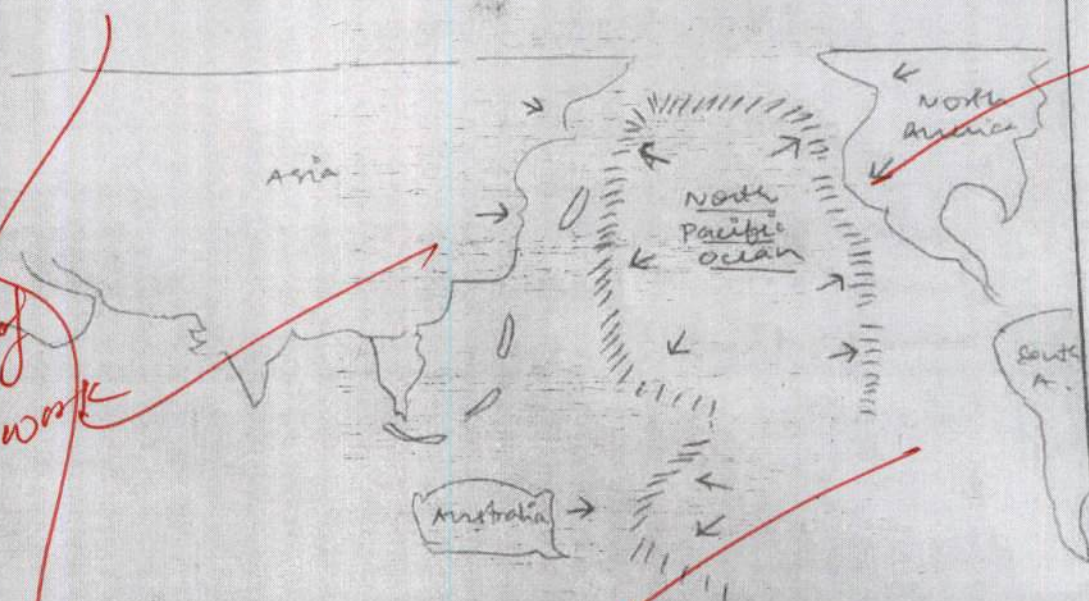
Q2.

valid
intro

Subduction refers to the process in which one object is "sucked" under another due to various forces. This is seen in the Pacific Ring of Fire.

PACIFIC RING OF FIRE

good
use
map
work



Process of subduction

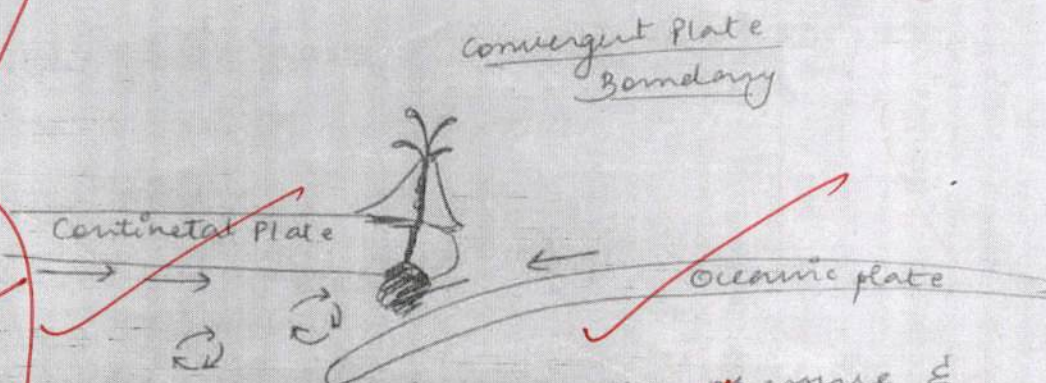
- ① This occurs when convergent plates meet each other and the heavier (more dense) plate is submerged under the less dense one.
- ② In the Pacific Ring of Fire, the Eurasian, North American & Australian plates are moving towards the North Pacific Oceanic plate.

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③ Since the oceanic plate (made of silicon and manganese) is denser than continental plate (silicon, aluminum), the Pacific plate is pushed under the continental plates.

④ This subduction causes earthquakes and volcanoes :-



Mantle: convection currents, pressure & temperature break down the contents of subducted oceanic plate.

The heat from the core powers and the friction from interacting plate boundaries causes magma to rise at these regions, resulting in volcanoes.

Hence the name "Ring of Fire".

write under heading & Geo-hazards

⑤ Earthquakes are caused due to tension created by plates rubbing together.

⑥ These tremors also cause tsunamis in oceans and near islands.

⑦ Hence this region becomes home to many geo-hazards due to subduction.

mention recent tsunami & Indonesian tsunami

Earthquake activities

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The Ring of Fire is one of various examples of plate tectonics and a reminds that all occurrences have underlying reasons and far-reaching consequences.

6.5

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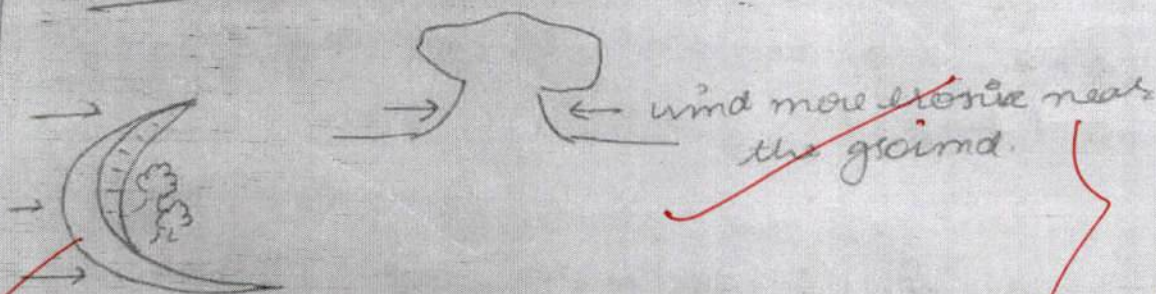
83

Climate decides temperature and rainfall in a region and thus the landform development of that place.

avoid concluding term in intro

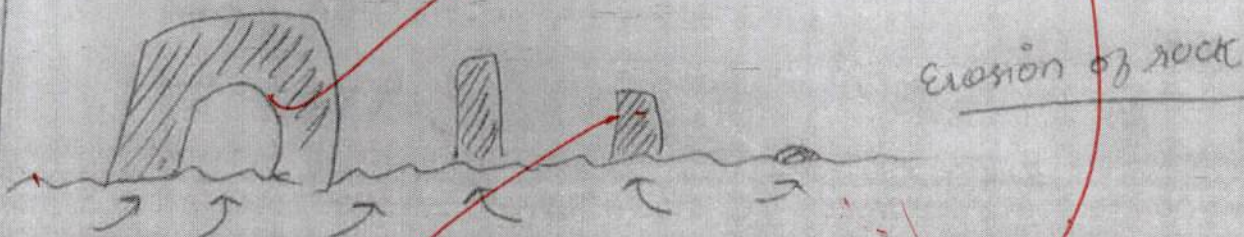
Role of Climate in Desert Landforms

- ① High temperatures cause exfoliation of rocks (due to large diurnal range of temperature).
- ② Sparse rain leads to formation of oases in deserts.
- ③ wind action leads to formation of mushroom rocks, sand dunes, barchans, etc.



Role of Climate in Ocean Landforms

- ① Creation of caves, pillars, stacks due to waves created by wind action.



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① Creation of beaches due to deposition of rocks,
silt on ocean-land boundaries through
wave action ~ guided by atmospheric wind.

Climate & Glacial Landform

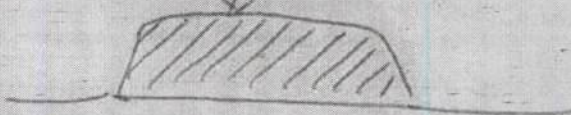
② expansion/breakage of rocks due to
alternate heating/cooling or freezing of
water in cracks.

③ Snowfall contributes to glacier formation
in mountainous regions
eg: Alps, Himalayas

Climate and Tropical Landform

① Tree cover is great due to precipitation
and adequate sunlight in the equatorial
and tropical regions.

② Inselberg (monadnock) formation due to
rainfall (erosion of soft rock).



③ Rivers (sourced from rainfall) which
in turn create various landforms
eg: v-shaped valleys, tributaries, meanders,
deltas.

→ explain
to him respect
to climate
is a controlling
factor of
is

→ also mentions
process of
weathering

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यहाँ लिखना नहीं
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उम्मीदवारों को
यहाँ लिखना नहीं
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Thus climate of a region defines biome-
type as it is the major factor that
influences weathering and erosion and
thus largely affects landforms of the
region.

Some other
factors
↳ Biological Activities
etc.

6

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Q4.

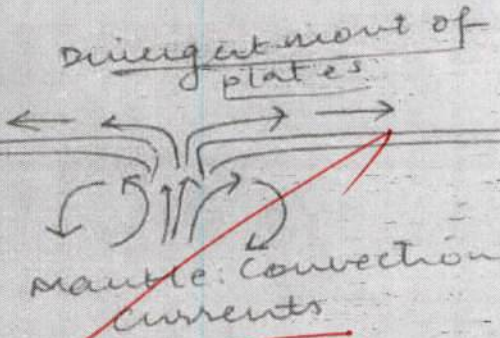
The ocean floor is not a featureless expanse, it is in fact home to many relief features resulting from plate tectonic activity.

major Relief features of Ocean floor

① Mid-oceanic Ridges

eg: mid Atlantic Ridge

older portion



older portion

intro could be better + give brief overview of ocean relief

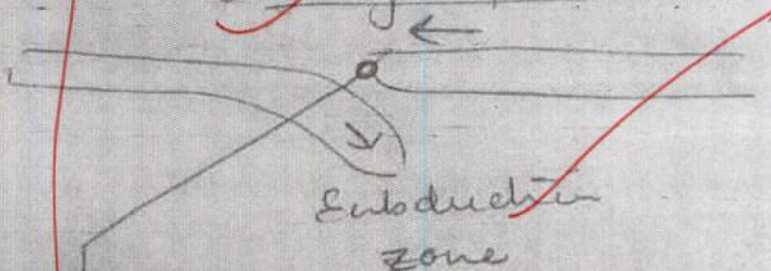
→ mention about continental shelf, continental slope, continental rise, abyssal plain

Explain term

② Deep trenches

eg: Mariana Trench

Convergent plate boundaries



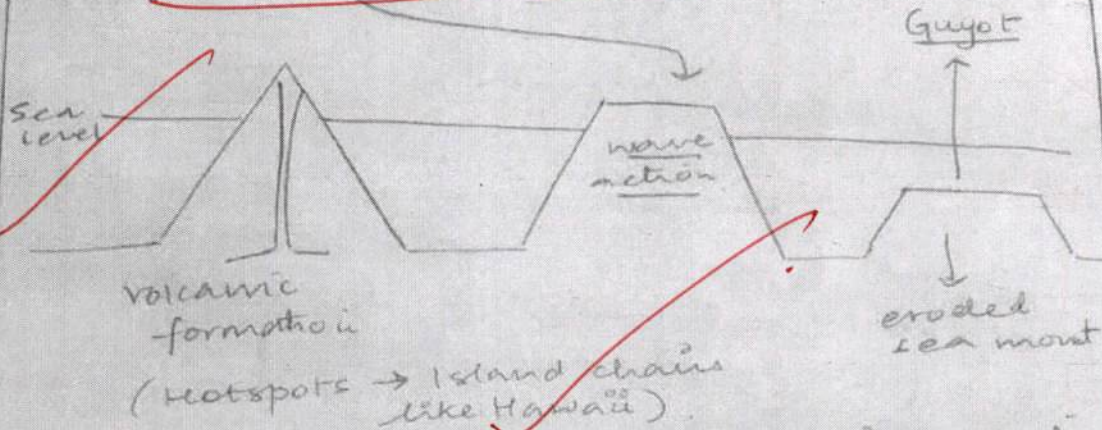
Trench
(deep sea)

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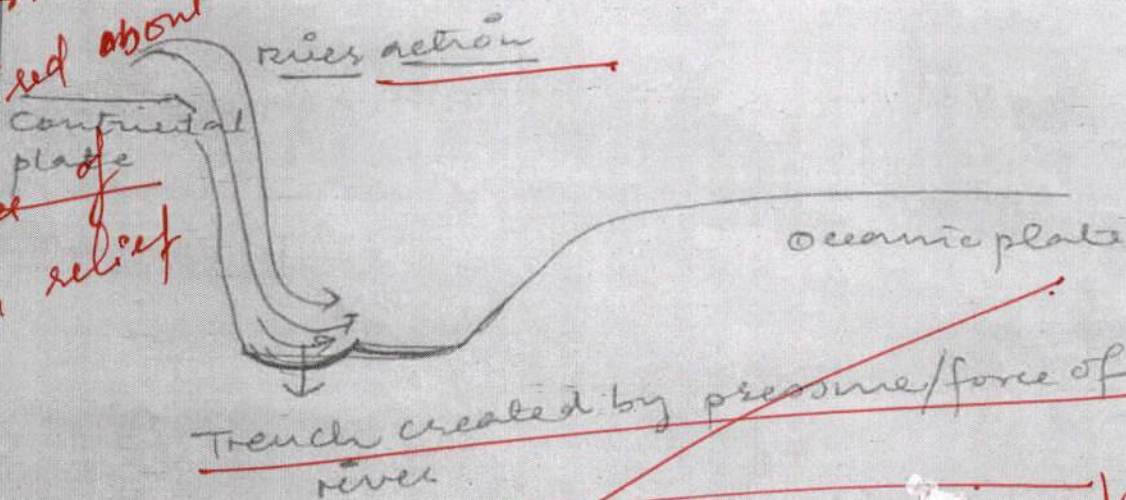
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③ Sea-mounts, guyots



④ Coastal Trenches due to river-induced erosion



Roles of Ocean Relief → ocean relief can control motion of water & influence to navigation & fishing etc.

- ① Habitat for various organisms
- ② Source of oceanic plate formation
- ③ Source of precious metals (igneous rocks emerging from mantle)
- ④ Source of geothermal energy

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- ① Recycling of plates in deep sea trenches.
- ② Evidence for continental drift theory
- ③ Area of exploration for bathymetric studies.

Thus, the ocean floor is not devoid of relief features. It is the centre of "plate production" and the powerhouse that drives continental drift.

4

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इस कठिनाई में
कोई निराला
साथी
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85.

Reservoir Induced Seismicity refers to the greater risk of earthquakes due to the creation of a reservoir (dam).

due to impoundment of water behind a dam
How it works:-

① An area is filled with great quantities of water to serve as a reservoir where earlier there was none.

② Sudden excessive pressure on land creates tension on underlying plate.

③ As a result plates can shift suddenly, resulting in tremors in the form of earthquakes.

Isostasy of the Region

① Plates are initially at equilibrium in a place prone to gradual growths and gradual transformation (urbanization, etc).

Relevant points

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① Sudden inundation with water puts a large amount of pressure on the plates in a very short time period.

can mention examples

earthquakes & greater magnitude at reservoirs

② the equilibrium is broken and plates try to adjust to the new conditions by moving to accommodate the increased pressure and retain isostasy.

Measures Against R-I-S :-

① careful data collection, logging of reservoir region before inundation through geospatial technology.

② "Earthquake Impact Assessment" & avoiding seismically active zones for creation of dams

③ mitigation & adaptation methods in case of earthquake

eg: evacuation of human settlements

④ Other means of harnessing hydro-electricity should be tried :-

① tidal energy

② micro-hydropower stations (small dams)

③ sustainable use and natural solutions to water harnessing eg. rooftop water harnessing.

well analyzed with measure.

→ physical modelling

→ scaling from pilot project to commercial injection

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As dams continue to expand as sources of hydroelectricity, recreation & water usage, it becomes essential to weigh the benefits and costs while using technology to assess its impact preemptively.

(65)

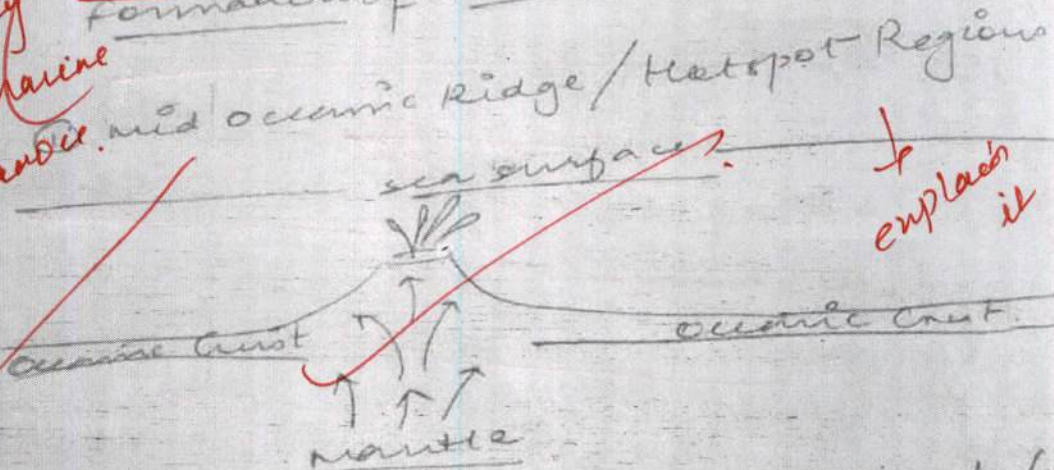
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Q6.

Submarine Volcanoes, as the name suggests, are volcanoes found under the sea. Although invisible, they can be a source of much disaster.

Formation of Submarine Volcanoes



Any area on the sea floor that has an opening where ~~water~~ magma rises, can be source of submarine volcano. More in mid Pacific, Hawaii, etc.

Disasters Caused By Submarine Volcanoes

① As the crust is thinner near the ocean floor, the magma released can be very strong in quantity, creating areas of intense underwater heat.

② source of earthquake where tremors are released.

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③ Indirectly induced tsunamis

If any of these events take place near coastal areas, they can wreak havoc on the coastal areas.

eg: Japan, Islands of Indonesia, Malaysia, Philippines, etc.

They can cause:-

① environmental damage, habitat destruction, etc.

② social loss - of lives, jobs, etc.

③ economic loss to nation - tourism, cost of repair, etc.

Hence, it is essential for to monitor submarine volcanoes to reduce risk of havoc:-

① Bathymetric mapping (of sea floor) through use of satellites - like NISAR for geospatial data collection.

② Alarm system :- mitigation of damage through early warning.
(monitoring heat levels, sudden changes, etc)

③ Adaptation strategies :- lightweight constructions, shock absorbers, etc.

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कुछ भी लिखें
सिवाय प्रश्न संख्या के
यहाँ पर।

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Nevertheless, all the monitoring and
warning systems can do is ~~at least~~ inform
coastal states of impending crisis, not
prevent it. However, this can help
save lives, economies and even
biodiversity while allowing the Earth
to continue in its evolving path.

67

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Q7.

Descent
into

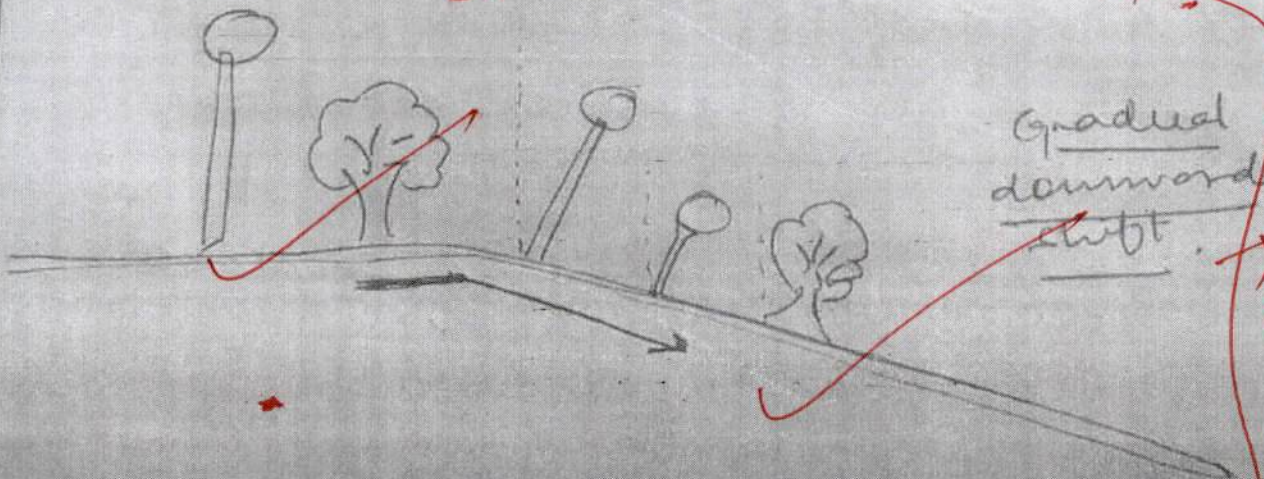
Mass movements are results of gravity which involve the slow or fast movement of large bodies of the Earth. They do not come under erosion but weathering can aid their occurrence.

Types of Mass Movement

① Falling debris in the form of avalanche in mountainous regions.
A piece of land breaks and falls under force of gravity.

② Mudflow / Earthflow: the quick movement of the soil when immersed in some water (water quickens downward movement of soil).

③ Solifluction - gradual movement of earth over a slope.
Also called soil creep.



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Factors Responsible for Origin of mass movements

① Natural factors :-

a) Gravitational force creates a downward pull on objects on Earth.

b) Water loosens fragments of soil/earth, making it easier to flow under pull of gravity.

c) Lack of tree cover/vegetation creates loose earth, unbound by the roots of plants/trees - easily moved.

→ Height of slopes & gradient -

→ Natural seepage

d) Water, wind, other forms of weathering (chemical, biological, physical, mechanical) speed up the process of mass movement.

→ peripheral points

② Anthropogenic factors :-

a) Infrastructure creation

eg: Road expansion in Himalayan region influences avalanche frequency.

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- b) ~~Unmonitored agricultural practices~~ make soil loose, susceptible to movement.
- c) ~~Urbanization and population pressure~~

Prevention

- ① Sustainable Development and Use of land.
- ② Use of terrace farming techniques to reduce erosion in mountains.
- ③ Use of nets to catch debris, save lives.

Sustainable Co-dependence can help ensure the safety and propagation of humans and the environment both.

7

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Q

Igneous Rocks are those that result from volcanic origins. They are majorly of 2 kinds: those that solidify on the surface and those that solidify within the earth's crust.

Relevant intro

Extrusive Rocks

- ① Cool quickly
- ② grains are larger
- ③ porous rocks

eg: pumice

- ① gas molecules trapped within the rocks

explain them

Intrusive Rocks

- ① Cool slowly
- ② ~~smaller~~ larger chunks of rock (melted together)
- ③ fewer pores

eg: granite

- ① gas molecules escape

when magma is solidified within the earth's surface

mention diff types of intrusive rocks.

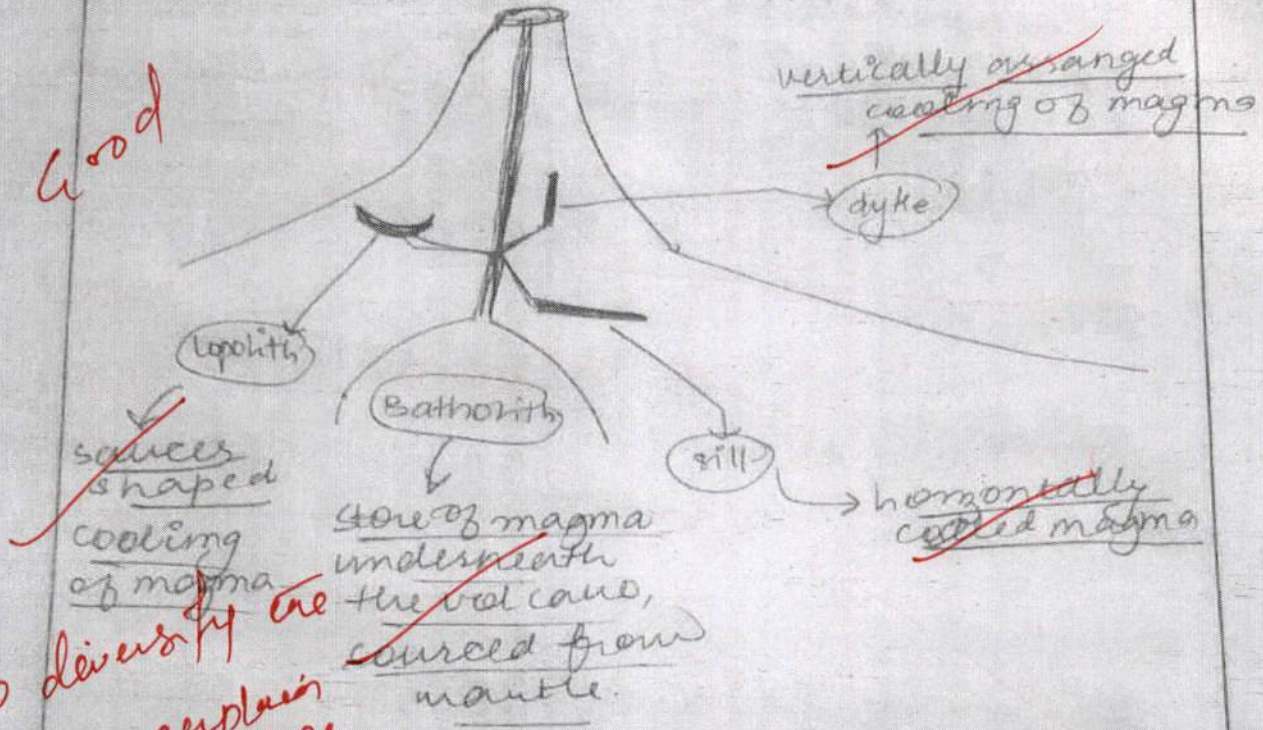
Similarly, volcanoes are also associated with various landforms both underneath the surface and above it, depending on shape, melting cooling period, etc.

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Under Ground Volcanic Landforms :-



Try to diversify the content & explain diff type rock.

Under Ground Volcanic Landforms

- ① Shield volcanoes
(not so steep)
- ② Composite volcanoes
(steep slopes)
- ③ calderas, openings of volcanoes that blew up in case of viscous lava.
- ④ Rivers of lava create fertile plain areas in their path.

You have covered only the diagram & attention the content

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Thus, igneous rocks are primary rocks that act as the parent rocks of the rock cycle, acting as recyclers of sedimentary and metamorphic rocks.

4.5

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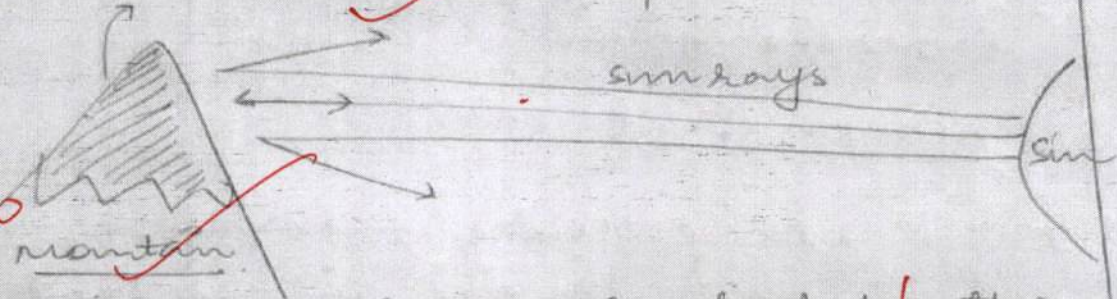
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संक्षेप में उत्तर लिखें, अधिक लिखने पर उत्तर नहीं माना जायेगा।
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Albedo refers to the reflective capacity of ice caps, ice sheets and clouds in the Earth's biosphere.

Albedo & Heat Budget

① 'white' ice caps reflect sunlight back into the atmosphere



② Thus Heat is not absorbed by the ice caps (as it would have had in case of darker surface).

③ Heat is reflected back into the atmosphere and the heat budget remains at equilibrium because incoming heat is balanced by outgoing heat through Albedo.

However, when there is deposition of black carbon on ice caps, this equilibrium undergoes disequilibrium.

valid intro

en

my a body or surface.

mention to

albedo

1.0

→ charcoal & 0.04

fresh snow has albedo of 80%

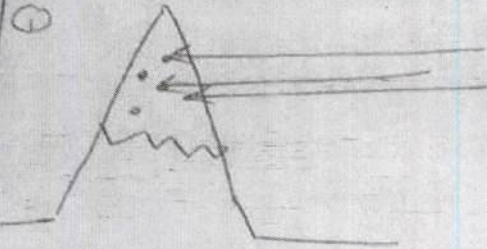
while earth avg albedo is 35%

factual substantiation required

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Black carbon Deposition & Albedo



Sunlight is absorbed
by the 'black'
particles of black
carbon.

② This enhances heat retention in polar ice caps region.

③ Albedo is reduced.

This has the following results:-

- ① Greater heat is retained leading to disbalance in Earth's heat budget.
- ② Global warming due to higher temperature as a result of reduced Albedo.
- ③ Melting of glaciers is speeded up, causing heavy flow in rivers (floods, etc). → good
- ④ Climate Change as weather phenomenon are affected by changes in pressure and temperature.

Thus, black carbon harms the entire ecosystem of the Earth despite being a short-lived pollutant.

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केवल प्रश्न के
अंकन करके
लिखें।

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किसी लिखना
बनाया
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Anthropogenic factors like incomplete
burning of fossil fuels contribute to
creation of black carbon which finds
its way into influencing climate change.

Thus, it is essential to control
human activity to maintain equilibrium
and ensure sustainability of montane
ecosystems.

← address some
measures to counter black carbon
↳ use of renewable energy sources

→ adopted Bharat - VI.

5

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12, 13

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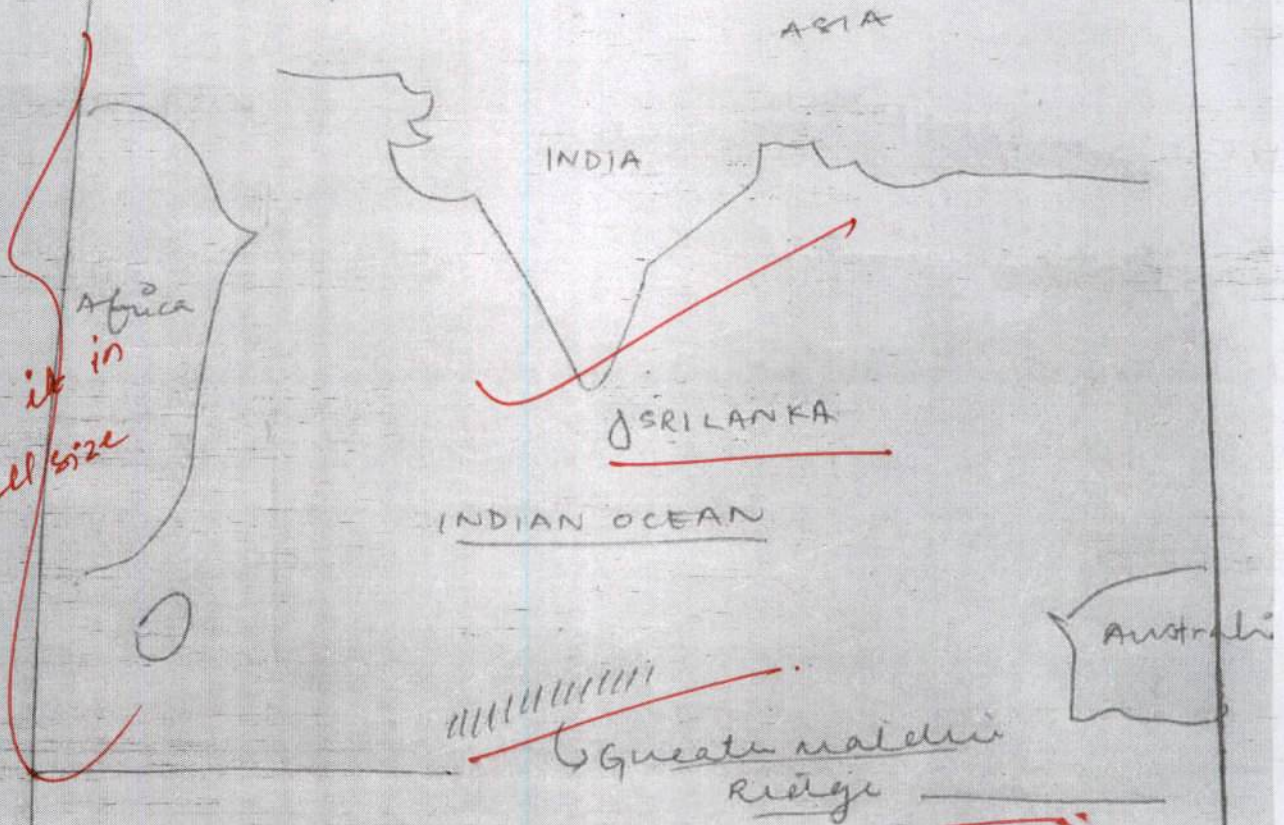
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make more
informative
intro

The Greater Maldivian Ridge is a region in the Indian Ocean with features similar to other mid oceanic Ridges like mid Atlantic Ridge that provide evidence for the development of the Indian Ocean Basin

Location of GMR

good but
try to
draw it in
small size



Evidence from GMR :-

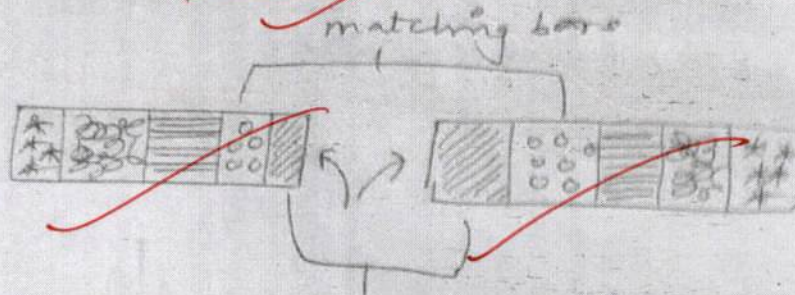
- ① Source of expansion of the Indian Ocean - ridges are the regions of magma expulsion from mantle of the Earth

due to divergent motion of plates or spreading centres, a new oceanic floor was created

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② magnetic alternations are visible
symmetrically on both sides of the
ridge, showing expansion.



matching bars

this reflects the pairing of time and
marks the shift of magnetic north &
South poles in Earth's history.

Need more
discussion of
GMR & the Indian
ocean basin
with facts &
concepts

③ this ridge allowed for the formation of
Maldive Islands which are a biological
hotspot and a source for ancient
ecology studies where there are endemic
species that match with Indian mainland
ones, reflecting continental drift and
the evolutionary effects of geographical
isolation.

Thus, the Maldive Ridge, like the
others, represents the source of plate
formation and tectonic shifts.

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It explains plate tectonics, continental drift and the evolution of ocean basins. Just like life above water, life below water is equally dependent on such geomorphic agents.

write more
balanced &
specific
conclusion

4.5