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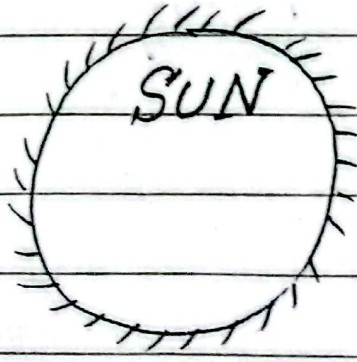
QNo-2

(a) Differentiate between a Star and a Planet. Briefly describe the life cycle of a Star from a Nebula to a Black Hole.

Solution

Star

A star is a massive, luminous sphere of plasma held together by its own gravity. The immense pressure and temperature at its core sustain nuclear fusion, which is the process of combining lighter elements into heavier ones, like fusing hydrogen into helium. Sun is a star.



fusion reaction

$H \longrightarrow He + He + \ldots$

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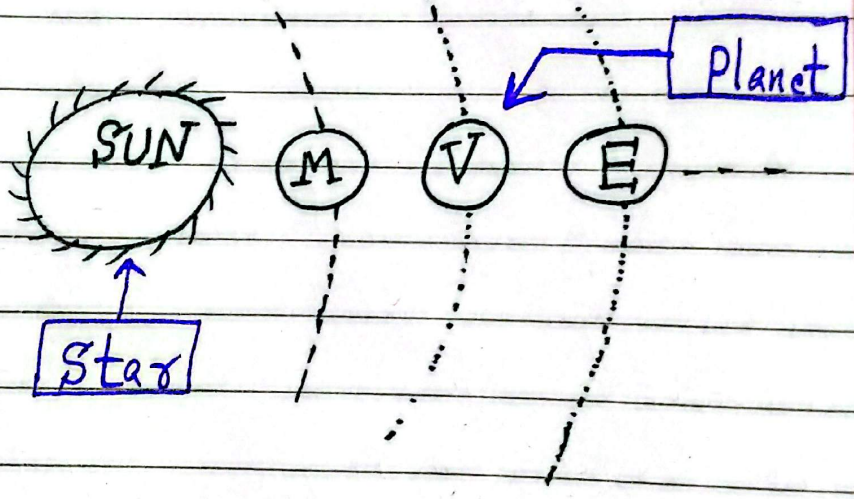
Planet

A Planet is a celestial body that orbits a star, is massive enough to be rounded by its own gravity, and has "cleared the neighbourhood" around its orbit. A planet must be orbit a star, such as our Sun is a star and Earth is a planet.



Life cycle of a star

A star's life begins in a nebula, collapsing into a protostar, then igniting as a stable, hydrogen-burning main

Contd...

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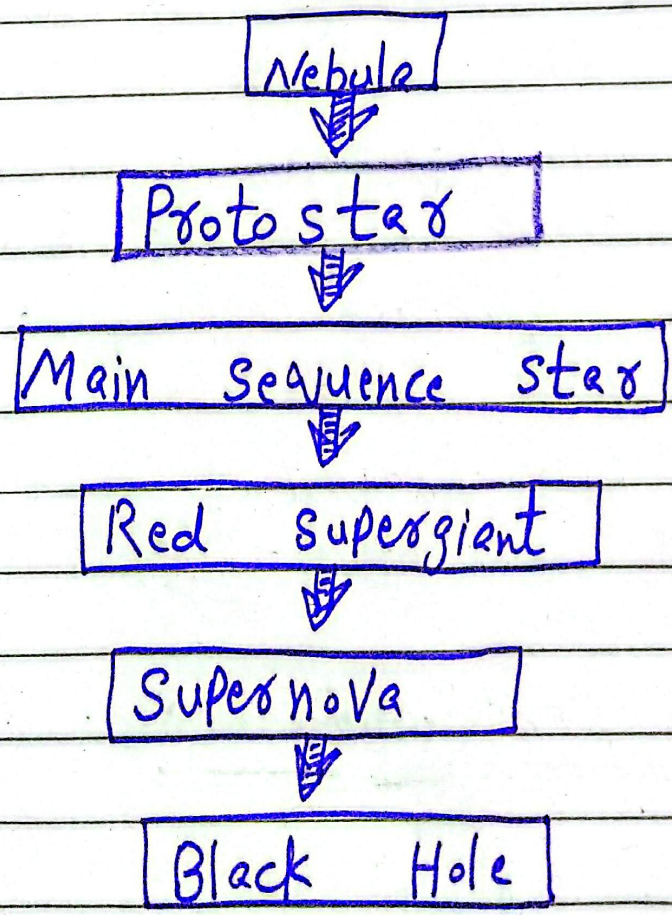
:Sequence star. When fuel runs low, massive stars expand into red supergiants, explode as supernova, and their core collapses into a black hole, a point of infinite density with gravity so strong light can't escape, marking the end for every heavy star.

path to a Black Hole



one electron

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(b) What are Semiconductor? Explain the differential between n-type and p-type Semiconductors and list two of their modern applications.

Solutions

Semiconductor

A Semiconductor is a material with an electrical conductivity between that of a Conductor and an insulator, Such as Germinium and silicon. Its Conductivity can be controlled by external factors like temperature, light, or impurities, which is essential for making electronic devices like transistors and integrated circuits (chips).

N-Type Semiconductor

An n-type Semiconductor is an extrinsic semiconductor with an

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excess of free electrons, created by doping a Pure Semiconductor (like silicon) with a pentavalent impurity, such as phosphorus or arsenic. In this material, electrons are majority charge carriers, while Wholes are the minority carriers, leading to electrical conduction primarily through electron movement. These materials are used in electronic devices like diodes, transistors and Solar cells.

P-Type Semiconductor

A P-Type Semiconductor is created by doping a Pure Semiconductor (like Silicon) with trivalent impurity atom (e.g Boron, Aluminum), which have one less valance electron, resulting in electron vacancies called holes. In this type

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of material holes are majority charge carriers.

Applications of N, P - Type Semiconductor

Diodes (PN-junction)

Rectification Converting AC to DC Power in power supplies, as allow current flow in only one direction

Light- Emitting Diodes (LEDs)

Emitting light when current flows.

Light / solar cells

Converting light energy into electrical energy.

(C) Define Global Warming. Explains the mechanism of the Greenhouse Effect and list three major greenhouse geses.

Global Warming

Global warming is the long-term heating of Earth's

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surface, primarily due to human activities like burning fossil fuels, which release heat-trapping greenhouse gases like (CO_2) into the atmosphere, causing rapid temperature increases, leading to climate change effects like extreme weather, sea-level rise, and disrupted ecosystem.

Major Greenhouse Gases

i- Carbon Dioxide (CO_2)
ii- Methane (CH_4)
iii- Nitrous oxide (N_2O)
iv- Ozone (O_3)

Mechanism of the Greenhouse Effect

When the light travels from Sun to the Earth, Earth absorbs some amount of light and reflect back the remaining heat and

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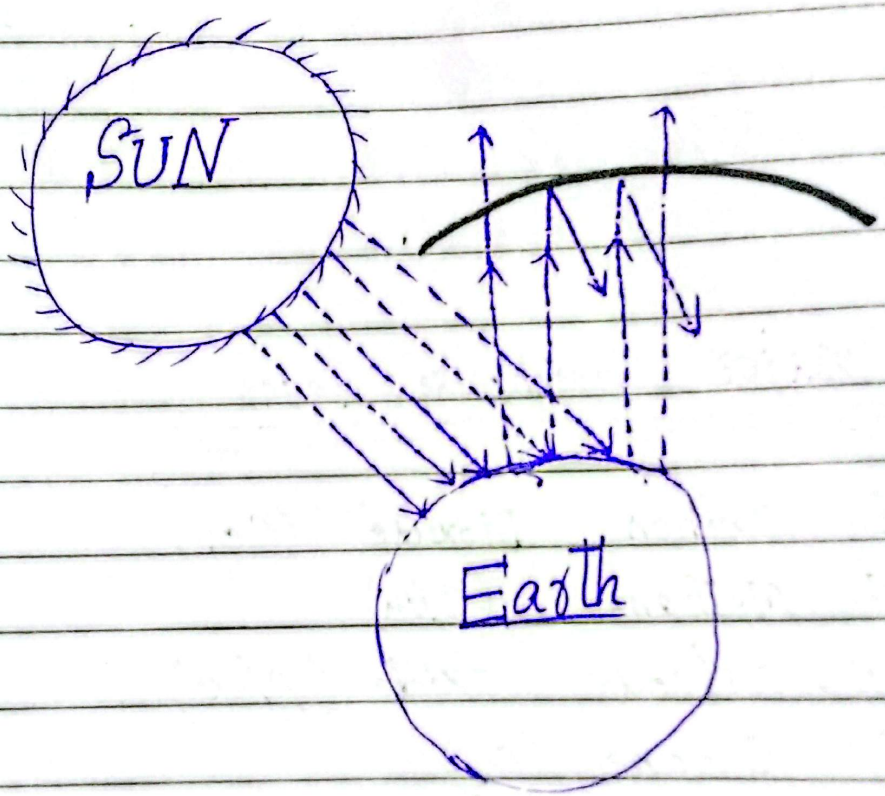
light reflected by the Earth. A strip of gases produce a hindrance infront of heat and energy ultimately the atmospheric temperature increased.



Some Solar radiations are reflected by the Earth and the atmosphere. Most of the radiations are absorbed by the Earth's Surface and warms it. Some of the infrared radiations passes through the atmosphere, some is absorbed and reemitted in all directions by greenhouse gas molecules.

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(d) what is Tsunami? Explain the natural processes that trigger a tsunami and potential impact on coastal areas?

What is Tsunami

A Tsunami is an ocean wave triggered by large earthquakes that occur near or under the ocean, Volcanic eruptions, submarine landslides, or by onshore landslides in which large volumes of debris fall into the water. Tsunami is caused by events like underwater earthquakes, volcanic eruption, or landslides.

How Tsunamis Affects Coastal life

Tsunamis affect Coastal life through immense Physical destruction and long-term environmental and Social Consequences.

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Human life and Safety

The primary and most immediate impact is the devastating loss of life. The massive force of the water can sweep people away, cause blunt-force trauma from debris.

Physical infrastructure

Buildings, bridges, roads, and communication system often completely destroyed.

Environment and Ecosystems

The influx of saltwater can contaminate fresh water sources and agricultural lands, rendering it unusable for extended periods.

Psychological and Social impacts.

Survivors often face long-term psychological trauma, including anxiety and depression. Entire community may be displaced, leading to social disruption and challenges for rebuilding.

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Q No-8.

(a) Solution

As it is code language

ROAD = UQDG

R ⟶ U (Diff of 2)
S and T are missing

O ⟶ Q (Diff of 1)
only P is missing

A ⟶ D (Diff of 2)
B and C are missing

D ⟶ G (Diff of 2)
E and F are missing

Similary

LAKE = OCNH

is the required answer.

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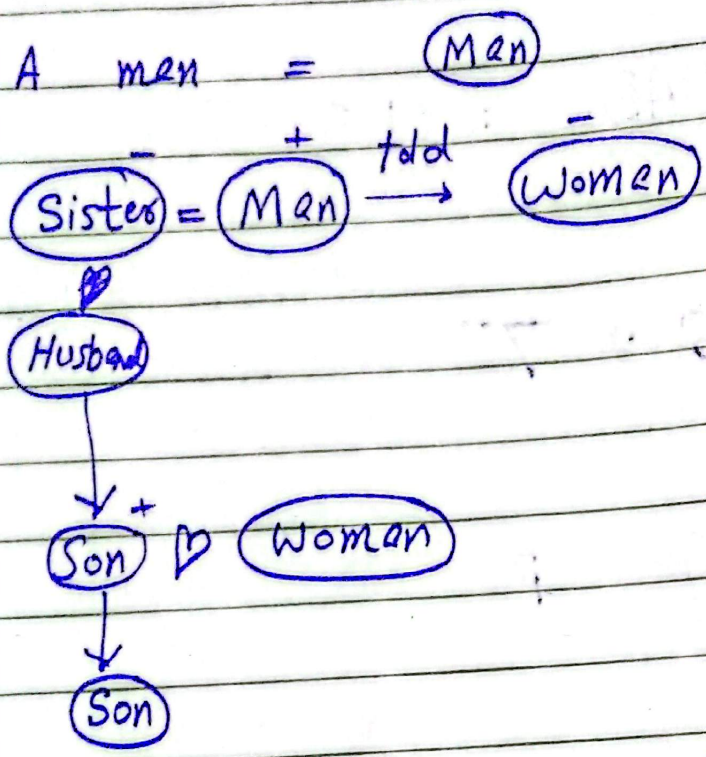
Q No-8-b.

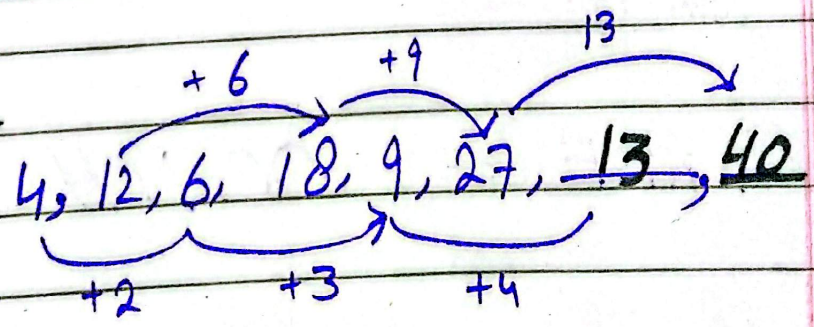
Solution



The Woman is daughter in law of men's sister.

Q No-8-c

i-



is the required Solution.

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QNo-8-c

ii-

1, 2, 6, 24, 120, ___720

×3 ×4 ×5 ×6

Hence the required answer.

QNo-8-d. Solution.

Five friends

P, Q, R, S, T

i- P is shorter than Q but taller than R

By given condition we have

$R < P < Q$ —— (1)

ii- S is shorter than T but taller than Q.

⇒ By the given condition

$Q < S < T$ —— (2)

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iii- The shortest person is 150 cm tall and the tallest is 180 cm tall. Who among the friends is the third tallest and what is the maximum possible range of their heights.

from ① and ② we have

① $\Rightarrow R < P < Q$

② $\Rightarrow Q < S < T$

$\Rightarrow R < P < Q \leq Q < S < T$

Here $R = 150$ cm

and $T = 180$ cm

then

$150\text{ cm} < P < Q \leq Q < S < T$

$\Rightarrow 150\text{ cm} < P < Q < S < 180$

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The possible range of P, Q and S is within the difference 30 cm