

Dos and Don'ts for the General Science & Ability Paper

Hi there — you've prepared well!

Remember, knowing the content is one thing, but presenting it in the paper exactly as required is another. Here are a few key points to keep in mind:

(Q28) DIFFERENCE BETWEEN STAR AND A PLANET.

STAR:

DEFINITION:

A star is a massive, luminous sphere of plasma held together by gravity, producing energy via nuclear fusion of hydrogen into helium at its core. Stars give off their own light and heat.

PLANET:

DEFINITION:

A planet is a celestial body orbiting the star, massive enough to be rounded by its own gravity, but it does not produce its own light. Planet reflects light from their parent star.

3. Make your answers look scientific, not just theoretical. Use flowcharts and diagrams wherever they add clarity.

DIFFERENCE BETWEEN PLANET AND STAR:

STAR

PLANET

4. Neatness matters — keep your handwriting clean, avoid cutting or overwriting.

5. Mind your spelling and grammar — while GSA doesn't deduct marks for these, your expression leaves an impression.

6. In the ability portion, explain analytical ability questions in words. For a 5-mark part, show all steps and provide clear explanations.

1) A star emits its own light. Does not produce its own light, reflects light from parent stars.

2) Produces energy via nuclear fusion. It mostly has gravitational/thermal energy.

3) Its mass is very high. Its mass is lower than stars.

Good luck for CSS 2026 — you're going to ace it, in sha Allah! 🌟

STAR	PLANET
4) Temperature is very high (millions of °C in core)	It's temperature is lower.
5) A star forms, evolve and die. It can later become a nebula star or a black hole	Planets have stable orbits. No life cycles like stars.
6) Examples: Sun, Sirius	Example: Earth, Mercury

LIFE CYCLE OF A STAR FROM NEBULA TO THE BLACK HOLE:

- 1. NEBULA:** 1) Stars form from giant clouds of gas or dust are called nebula.
2) Gravity causes condensation of the gases which ends up forming protostar.
- 2. PROTOSTAR:** 1) A protostar later contracts under gravity, the core temperature rises.
2) Fusion begins when temperature exceeds approximately 10 million K.

3) This becomes a main sequence star.

3. MAIN SEQUENCE STAR:

- 1) It's a stable phase when hydrogen fuses into helium.
- 2) Star shines for millions to billions of the years (Sun approximately 10 billion years)
- 3) Size and mass of it later determine evolution.

4. RED GIANT / SUPER GIANT:

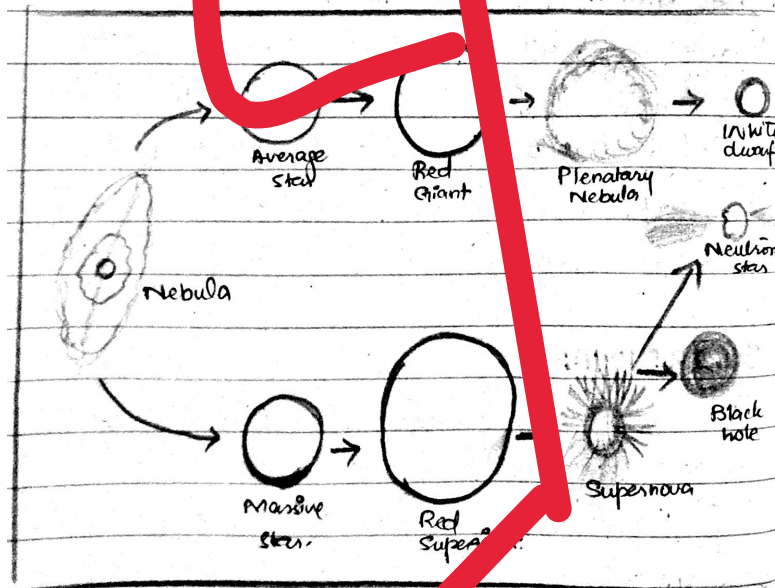
- 1) Hydrogen exhaustion contracts the core and expands outer layers. This results in formation of Red Giant (Medium star) or Super Giant (massive star)
- 2) Helium fusion occurs producing heavier elements (Carbon, Oxygen, Neon)

5. SUPERNOVA:

- 1) Core collapses for massive stars producing a violent explosion called super nova.
- 2) This violent explosion disperses heavy elements into space, which results in formation of further stars and planets.

6. NEUTRON STAR / BLACK HOLE (END STAGE)

- 1) Low to medium mass stars form white dwarfs which upon cooling become black dwarfs.
- 2) Massive star's core collapses ~~from~~ beyond neutron degeneracy results in formation of Black hole.
- 3) Black holes have intense gravity and even gravity cannot escape.



Q2b)

SEMI-CONDUCTORS:

DEFINITION:

A semiconductor is a material whose electrical conductivity is between that of a conductor and an insulator. It can only conduct electricity under certain conditions and act as an insulator under other conditions. Most of the semi-conductors are ~~crystalline~~ ^{crystalline} solids. For example Silicon and Germanium. Their electrical conductivity increases with temperature. Semi conductors form the foundation of the modern electronics including diodes, transistors and integrated circuits.

DIFFERENCE BETWEEN N-TYPE AND P-TYPE OF SEMI CONDUCTORS:-

N-TYPE:-

- 1) DOPING ELEMENT: They are doped with pentavalent elements. For example phosphorus.
- 2) MAJORITY CHARGE CARRIER: Electrons are majority charge carriers.
- 3) MINORITY CHARGE CARRIERS: Their holes are minority charge carriers.

4) CONDUCTIVITY TYPE: They conduct via negative charge carriers (Electrons)

5) SYMBOL: Denoted by "n"

P- TYPE:

1) DOPING ELEMENT: They are doped with trivalent elements eg Boron.

2) MAJORITY CHARGE CARRIER: Holes are majority charge carriers

3) MINORITY CHARGE CARRIER: Electrons are minority charge carriers

4) CONDUCTIVITY TYPE: They conduct via positive charge carriers (Holes)

5) SYMBOL: Denoted by "p"

MODERN APPLICATIONS OF SEMICONDUCTORS

i) DIODES AND TRANSISTORS:

1. They are used in switching, amplification and rectification of electronics.

ii. Examples: Mobile phones, computers and many electronics.

2) SOLAR CELLS (PHOTOVOLTIC DEVICES)

i. Semiconductors convert light energy into electrical energy.

ii. Examples: Solar panels for energy generation

Q2c) GLOBAL WARMING

DEFINITION:- Global warming is the gradual increase in the temperature of Earth's surface and oceans, primarily due to human activities like burning fossil fuels, industrial emissions, and deforestation. Global warming is gradually becoming an environmental and socio-economic threat as it leads to climate change, sea-level rise and extreme weather conditions.

MECHANISM OF THE GREEN HOUSE EFFECT:-

The greenhouse effect is a process by which certain gases in Earth's atmosphere trap heat and prevent it from escaping into space, hence warming the planet.

1) Radiation from solar energy reaches the Earth.

2) The Earth's surface absorbs energy and emits it as infrared radiation.

3) Greenhouse gases in the atmosphere trap some of this infrared radiation reflecting it back to the surface.

4) This trapped heat increases the Earth's temperature; approximately 15°C but the excess gases cause global warming.

THREE MAJOR GREEN HOUSE GASES:-

1) Carbon Dioxide: (CO_2)

- Carbon dioxide is produced by fossil fuel burning, deforestation, and cement production.

2) Methane: (CH_4)

- The main sources of methane gas are live stock, landfills, and rice paddies.

3) Nitrous Oxide: (N_2O)

- The main sources are agriculture, industrial processes and vehicle emission.

Other gases: Ozone (O_3), water vapours.

Q2d)

TSUNAMI

DEFINITION:- A tsunami is series of large, fast moving ocean waves caused by sudden displacement of water due to under sea disturbances. Tsunami, unlike normal waves is driven by wind. They are caused by geological events. They travel at 500 to 800 km/h in deep water. The waves increase high dramatically as they approach shallow coastal areas.

NATURAL PROCESSES THAT TRIGGER TSUNAMI:-

1) UNDERSEA EARTHQUAKES

Sudden movement of the tectonic plates causes vertical displacement of the seabed, generating massive waves. Most tsunamis approximately 80-90% are due to subduction zone earthquakes.

2) VOLCANIC ERUPTIONS:-

Explosive underwater eruption displaces water, causing volcanic tsunami.

Example: Krakatoa eruption (1883)

3) UNDERWATER LAND SLIDES:

Sudden collapse of the seabed material displaces large volume of water. This often occurs after earthquake or volcanic activity.

4) METEORITE IMPACTS:

Rare, but large impacts in ocean can generate tsunami waves.

POTENTIAL IMPACTS ON COASTAL AREAS:-

1) HUMAN AND ECONOMIC LOSSES:

- Massive loss of life in densely populated coastal regions.
- Destruction of houses, businesses, ports, infrastructure.

2) ENVIRONMENTAL IMPACTS:

- Flooding of farmlands and contamination with saltwater.
- Damage to ecosystem such as mangroves, coral reefs.

3) SECONDARY HAZARDS:

- Fires, disease outbreaks and disruption of water supply.
- Long-term economic setback for affected regions.

Q58)

BALANCED DIET:

DEFINITION: A balanced diet is a diet that provides all essential nutrients in the right proportion to maintain health, growth and energy.

It must include carbohydrates, proteins, fats, vitamin, mineral, water and fiber. A balanced diet prevents malnutrition, boost immunity and support normal physiological functioning.

Example: 50-60% carbohydrates, 10-15% proteins, 20-30% fats, with vitamins and minerals as required.

FUNCTIONS OF CARBOHYDRATES IN HUMAN:

1) **Primary Source Of Energy:** Carbohydrates are broken down into glucose, which fuels muscles and the brain.

2) **Energy Storage:** Excess glucose is stored as glycogen in liver and muscles to be used later.

3) **Structural Role:** Some carbs like cellulose aid in digestion and bowel movement.

4) **Protection of Protein and Fats:** Adequate carbs protect protein breakdown for energy, sparing protein for growth.

FUNCTIONS OF PROTEIN IN HUMAN BODY

- 1) Growth and Repair: Protein are building blocks of muscles, tissues, skin, hair and enzymes.
- 2) Enzyme and Hormone production: Protein form enzymes that catalyze chemical reactions and hormones like insulin.
- 3) Immune Function: Antibodies are protein that fight infection.
- 4) Energy Source (secondary): Protein provide energy only when carbs and fats are insufficient.

Q5b) FOOD PRESERVATION:

Food preservation is a process of preventing or delaying spoilage of food, maintaining its nutritional values, taste and safety for consumption over extended periods. Food preservation aims to inhibit microbial growth, enzymatic activity and chemical changes in food. Proper preservation of food can reduce wastage, ensure food availability and improve public health.

PASTEURIZATION:

Pasteurization is a heat treatment process that kills pathogenic microorganisms in food and beverages without significantly affecting its taste and nutrition.

PRINCIPLES OF PASTEURIZATION:

- 1) Uses moderate heat (60-85°C) for short time.
 - 2) Destroys disease causing microbes such as Salmonella, Listeria and E. coli.
 - 3) Does not sterilize but increases shelf life.
- Application
Example: Milk, fruit juices, beer, dairy products.

CANNING:

Canning is a method of storing food in airtight containers and heating to destroy spoilage microorganisms, allowing storage at room temperature.

PRINCIPLES OF CANNING:

- 1) Heating food in a sealed container destroys bacteria, yeast and mold.
- 2) Air removal and airtight sealing prevent recontamination.

3) Ensure long term preservation (months to years)

Examples: Applications: Vegetables, meat, fish.

Q5c) INTERNET OF THINGS (IoT)

The Internet of Things refers to a network of interconnected devices, sensors and objects that can collect, share and exchange data over the Internet without direct human intervention. Internet of Things connects physical objects to the digital world, enabling automation and smart decision making.

Eg: Includes smart homes, wearable health devices and industrial sensors.

TRANSFORMATION OF DAILY LIFE AND BUSINESS:

DAILY LIFE:

1) SMART HOMES: IoT enables automated lighting, security and temperature controls.

2) HEALTH: Wearables monitor heart rate, sleep, and activity sending alert to

smartphones and smartwatches or to doctors.

3) CONVENIENCE: Connected appliances reduce manual effort and optimize energy use.

BUSINESS AND INDUSTRY:

1) SUPPLY CHAIN MANAGEMENT: IoT track inventory, shipments and storage conditions in real time.

2) PREDICTIVE MAINTENANCE: Sensors in machines detect faults before breakdowns reducing downtime.

3) DATA DRIVEN DECISIONS: Business uses IoT data to optimize operations ^{improve} efficiency and reduce costs.

REAL WORLD EXAMPLES

1) SMART THERMOSTAT:

1) Automatically adjust home temperature based on users behavior and weather forecast.

2) Saves energy and reduces bills.

2) AMAZON GO STORES:

- i. Retail stores uses IoT sensors, cameras, RFID tags to automate checkouts.
- ii. Customers pick product and leave, payments are processed automatically.

ADDITIONAL EXAMPLES:-

- 1) Fitbit and Apple watches (monitor health)
- 2) Tesla connected cars (real time vehicle diagnosis)

Q5d) DIFFERENCE BETWEEN RAM AND ROM:

RANDOM ACCESS MEMORY:- (RAM)

Random Access Memory is a volatile memory used by computers to store data and instructions temporarily while the CPU is processing tasks. The content of RAM are lost when the computer is turned off, making it a short term workplace. It allows quick read and write operations which is essential for multitasking and running applications smoothly. The more RAM a system has, the faster

and more efficiently it can process multiple programs. Simultaneously RAM acts as a working desk of the computer where active programs are loaded with immediate processing.

2. READ ONLY MEMORY (ROM):-

Read Only Memory is a non-volatile memory that ~~reads~~ retains its data permanently even when the computer is shut down. It stores firmware or permanent instructions such as BIOS, which are essential for booting the computer and initializing hardware components. Unlike RAM, ROM is read only during normal operations, meaning the CPU can access its contents but cannot modify them easily. ROM is like a library of permanent reference books, providing essential instructions needed for the computer to start and function correctly.

BASIC ARCHITECTURE OF A COMPUTER (CPU, ALU, CU)

The Central Processing Unit (CPU) is the brain of the computer responsible for executing instructions and coordinating all operations.

The CPU mainly consist of 2 units: ALU (Arithmetic Logic Unit) and CU (Control Unit). The ALU performs all the Arithmetic Operations such as Addition, Subtraction, Multiplication and Division as well as logical operations like comparison and Boolean functions. The CU on the other hand directs the flow of the data and instructions, fetching them from RAM, decoding and signaling other components to execute them. Together the ALU & CU enables the CPU to process instructions, manage memory access and communicate with input/output devices forming core of computer operations.

SECTION - II

Q8a) $R + D = U + P + G$
 $L + E = O + C + N + H$

$$\begin{array}{lcl} R + 3 = & & L + 3 = O \\ O + 2 = A & = & A + 2 = C \\ A + 1 = D & & K + 3 = N \\ D + 3 = G & & E + 2 = H \end{array}$$

Q8b) The woman is married to the man's nephew.
 Man's nephew = husband of (man's) niece

The woman is man's niece in law

Q8c)

9) $4, 12, 6, 18, 9, 27, 13.5$

$$\begin{array}{ccc} \underbrace{4 \times 3 = 12} & \underbrace{6 \times 3 = 18} & \underbrace{9 \times 3 = 27} \\ \div 2 & \div 2 & \div 2 \end{array}$$

$$\begin{array}{l} 4 \times 3 = 12 \\ 6 \times 3 = 18 \\ 9 \times 3 = 27 \end{array}$$

ii) $1, 2, 6, 24, 120, 720$

factorial sequence = Ans 720.

Q80)

$R < P < Q < S$

Shortest tallest = R, P, Q, S

and tallest = Q

Max. Possible Range = $180 - 150 = 30$

Q6a) $A = 10 \text{ hours} = \frac{1}{10}$

$B = 15 \text{ hours} = \frac{1}{15}$

$C = 30 = \frac{1}{30}$

$A + B + C = \frac{1}{10} + \frac{1}{15} + \frac{1}{30}$

$\frac{3}{30} + \frac{2}{30} + \frac{1}{30} = \frac{6}{30} = \frac{2}{10} = \frac{1}{5}$

5 hours

7h 30 mins

Q6b) Let $x = 4k$ $z = 7k$

New $Y = 5k \times 1 = 5.5k$

New $Z = 7k + 0.7 = 5.25$

X stay same $4k$

$= 14.7k$

$\frac{1,69,000}{14.75} = 11,500$

$X = 46,000$

Q6c) Work done = $\frac{3}{5} = W \times 60$ (work per)

$20(W + 10) \cdot \frac{1}{100W} = \frac{2}{5}$

$W = 10$

Q6d) $98 + 95 + 92 + 90 + 85 = 460$

$A = 75$

$\frac{460}{N-5} = 75$

Total students