

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:

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Subject = General Science and Ability

Part-II Section-I:

1. For a 5-mark part, aim to write at least 2 and at most 3 sides of the answer sheet. Often, a question has two or three parts, and the marks are divided accordingly — so address each part fairly.
2. Manage your time wisely — you have about 35 minutes per full question, which comes down to around 8 minutes for each 5-mark part. Stick to this to avoid rushing later.
3. Make your answers look scientific; not just theoretical. Use flowcharts and diagrams wherever they add clarity.
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.

(a) Yes, I agree that "Data is the new oil". Just like oil was the main source of power and wealth in the industrial age, data has become the most valuable resource in today's digital world.

Importance of Data:

- It helps in "decision making".
- It fuels "technology".
- It drives business growth.

Here's a brief key/sample of your Ability questions

Q.6

Everyday Examples:

a) Candy ratio problem
Given: Packets of users to show traffic updates and the fastest route in real time.
Given: Packets in flavors Apple : Berry : Cherry : Date = 3 : 6 : 2 : 5.

Asked: If Apple candies exceed Date candies by 35, how many Berry candies are there?

Note (consistency check): The ratio shows Apple = 3 parts

2. Social Media: Platforms like Facebook and Instagram analyze user data to show posts and ads that match our interests.

3. Online Shopping: Websites like Daraz or Amazon use customer data to suggest products that we may like. especially, the websites in which we accept "cookies" saves our interests and show us the relevant items.

(b)

The expansion of universe can easily be understood with an example of a "blowing balloon".

Phenomenon of Blowing Balloon:

When we blow air into the balloon, the balloon surface keeps stretching and every point of it moves away from every other point. Similarly, galaxies are also moving away from each other as space itself expands.

Resemblance to Universe:

- (o) The surface of balloon represents "space".
- (o) The dots on the balloon represent "galaxies".
- (o) As balloon inflates, the distance between the dots increases, just like distance between galaxies increases in expanding universe.

Representation

The representation can be done through "Hubble's law" which states that "The farther away a galaxy is, the faster it is moving away from us".

Formula:

$$v = H_0 \times d$$

→ It relates to blowing Balloon analogy because both shows expansion in all directions.

_____ (C) _____

Balanced Diet:

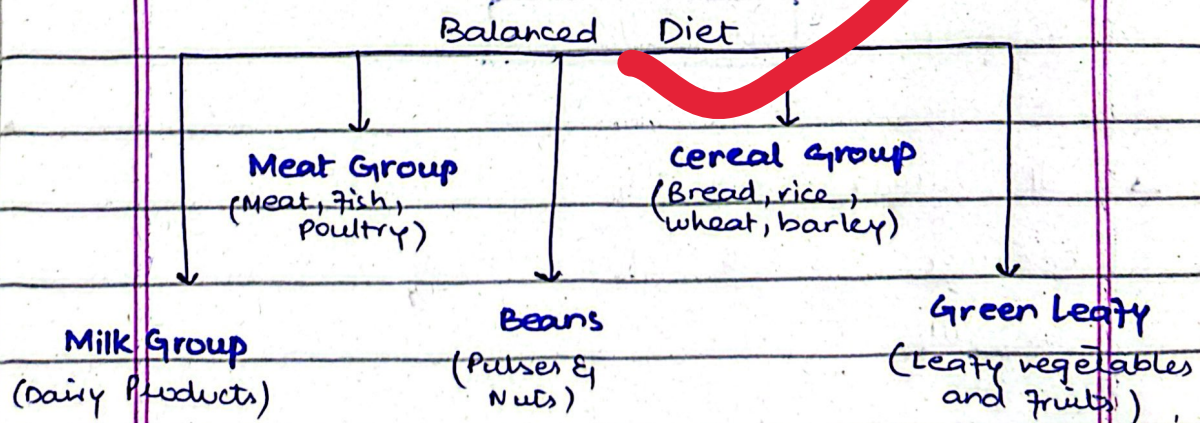
A quote says,

"LET THY FOOD BE THY
MEDICINE..."

Definition:

A balanced diet is the one that contains an adequate proportions of food from five basic groups of food so as to supply essential nutrients in order to fulfil requirements of the body.

Five Groups and Their Nutrients:



Nutrients:

These 7 nutrients are as follows:

- Proteins, Fats and Carbohydrates.
- Minerals and vitamins.
- Water and Fibres.

Deficiency of Vitamins:

The deficiency of vitamins A, D and E causes following imbalances in body:

Vitamin A → leads to sterility,
night blindness, keratinosis

Vitamin D → leads to Rickets and
Osteomalacia.

Vitamin E → leads to mild hemolytic
anemia in newborn
infants.

(d)

Working of GPS:

What actually GPS is?

- GPS is a "Global Positioning system"
- It is owned by American Govt.

- It is operated by US Airforce

Working:

GPS works on the principle of "Trilateration".

- It uses distances from multiple satellites, the receiver points its exact position on Earth.
- 3 satellites give a 2D position while 4 satellites give a 3D position.

What is Fiber optic?

"It is a thin, flexible strand of glass or plastic that transmits light signals over long distances with minimal loss."

Structure:

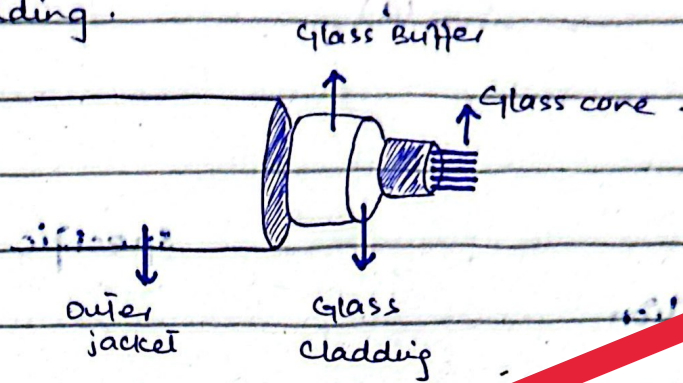
It includes

- (i) core
- (ii) cladding
- (iii) jacket

Principle:

When light enters the core at an angle greater than the critical angle, it reflects entirely inside the

core instead of passing into cladding.



How 2D and 3D locations measured by satellites?

2D locations: (Latitude and longitude).

- When signals from atleast **3** Satellites reach your receiver.
- You can find your horizontal position on Earth's surface with...
- e.g: like marking a point on flat map.

3D locations: (latitude, longitude and altitude)

- When signals from **4** or more satellites are used.
- It provides the vertical position.
- e.g: An exact point in space.

Q3:

(a)

Cells form organelles to perform their work efficiently.

Each cell performs a **specific function**, without organelles, their functions might get mix up causing confusion and inefficiency.

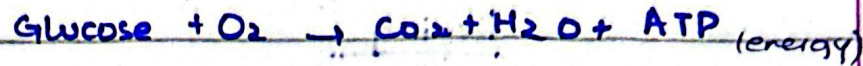
Mitochondria: (powerhouse of cell).

Structure:

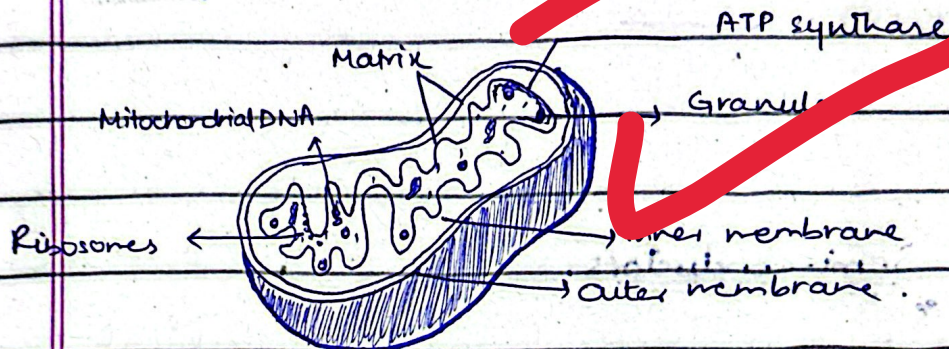
- (a) These are double-membrane organelles.
- (b) The inner membrane folds into structure called "**cristae**".
- (c) Inside the inner membrane, there is a **matrix** containing enzymes, DNA and ribosomes.
- (d) The outer membrane is a **phospholipid bilayer** that surrounds **inner membrane space**.
- (e) Outer membrane acts as a **barrier** between mitochondria and cell's cytoplasm.

Functions:

- Production of ATP through a process called "cellular respiration".



- regulation of immunity.
- calcium balance.
- stem cell regulation.



(b)

Doping:

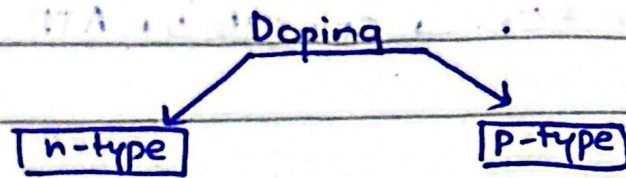
"It is the addition of small amounts of impurity atoms into a pure semi-conductor to change its electrical conductivity"

Purpose:

Pure semi-conductors do not conduct electricity well. Doping increases the

number of free charge carriers,
thus improving conductivity.

Types:



- Add atoms with extra electrons

- increases negative charge carriers (electrons)

- Add atoms with fewer electrons

- increases positive charge carriers (holes).

Semi-conductors:

"It is a material whose electrical conductivity lies between a conductor and an insulator"

Example:

- Silicon (Si)
- Germanium (Ge)

Types:

Semi-conductors are of 2 types.

1. Intrinsic semi-conductors.
2. Extrinsic Semi-conductors.

Intrinsic Semiconductors:

1. They are pure form of semiconductors without any impurity added.
2. Their electrical conductivity is low.
3. At absolute zero (0K), they act as insulators.
4. When temp. increases, electrons gain energy, moving from valance band to covalent band creating:
 - Free electrons
 - Holes.
5. $\text{No. of electrons} = \text{No. of Holes}$.

Extrinsic Semiconductors:

1. They are doped semi-conductors. Impurities are added which is also known as doping.
2. Their electrical conductivity is higher than intrinsic ones.
3. The type and amount of impurity determines the conductivity level.
4. As temp increases, more electrons gain energy thus conductivity increases.
5. They are used to make transistors, LEDs, solar cells etc.

(c)

Volcanic eruption:

"A volcanic eruption is a natural event in which magma along with gases and ash escapes from a volcano onto the Earth's Surface."

Merits :

1. Volcanic eruption forms islands, plateaus and mountains.

E.g: Hawaiian islands were formed by volcanic activity.

2. Volcanoes bring valuable minerals (gold, silver, copper etc) from deep inside Earth to surface.

3. The heat from volcanoes is used to produce geothermal electricity.

4. Volcanoes are a source of tourist attraction.

5. Volcano ash and lava break down into rich minerals making soil fertile for farming.

Demerits:

1. Volcanoes **explosive eruptions** can destroy villages, forests and cities.
2. Volcanic ash blocks **sunlight**, causing temporary cooling of Earth's climate.
3. People living near volcanoes are often forced to leave their homes.
4. Ash and lava also **bury farmlands**, killing crops and causing contamination.
5. Such ash, smoke and gases do also **pollute** the air.

(d)

Dengue:

- (a) Dengue is a **viral disease** transmitted to humans through bite of infected **Aedes mosquito**.
- (b) It is also known as "breakbone fever" because it causes severe joint and muscle pain.

Symptoms:

1. High fever.
2. Muscle and joint pain.
3. Severe headache.
4. Skin rash.
5. Weakness.

Causative Agents:

- Dengue virus belongs to Flavivirus family.
- They have their 4 strains.
- Infection with one type gives lifelong immunity to that type but not to others.

Remedies:

- Drinking plenty of fluids.
- Rest as much as possible.
- Take antibiotics recommended by your doctor.
- Monitor platelet count.
- Use mosquito repellents.
- Wear full sleeves and trousers.



Section II

Q1:

(a)

data:

Diameter of sphere = 14 cm.

$$\text{radius of sphere} = \frac{d}{2} = \frac{14}{2}$$

$$= 7 \text{ cm}$$

Volume of sphere = ?

Solution:

As we know,

$$\text{Volume of sphere} = \frac{4}{3} \pi r^3 \quad (\because \pi = \frac{22}{7})$$

$$= \frac{4}{3} \left(\frac{22}{7} \right) (7)^3$$

$$= \frac{4 \times 22 \times 7^3}{3}$$

$$= \frac{4}{3} \times \frac{22}{7} \times 343$$

$$= \frac{4}{3} \times 1078$$

$$= \frac{4312}{3}$$

$$V = 1437.3 \text{ cm}^3$$

(b)

Data: No. of friends = 5
Total savings = Rs. 25,000
ratio = 1:2:3:4:5
Smallest share = ?

Solution: Sum of all 5 friends ratio
 $1+2+3+4+5 = 15$

$$\text{Smallest share} = \frac{1}{15} \times 25,000$$

$$= \frac{25000}{15} = \frac{5000}{3}$$

$$\boxed{\text{Smallest share} = 1666.6}$$

(c)

(i) Which no. doesnot fit?

2, 6, 18, 54, 162, 486

This is a geometric sequence
with common ratio "3".

Each term is multiplied with 3 →
next.

2, 6, 18, 54, 162, 486
x3 x3 x3 x3 x3

All of terms are in sequence, no one is out of order/place number.

(ii) 3, 5, 7, 11, 13,

These are consecutive prime numbers.

After 13, the next prime number is 17.

So, series becomes:

3, 5, 7, 11, 13, 17.

(d)

Sides of triangle = 5cm, 12cm, 13cm

Find Angles = ?

Solution:

First, in order to determine whether the triangle is right-angle triangle, we use Pythagorean Theorem,

$$a^2 + b^2 = c^2, \text{ where } a=5, b=12, c=13.$$

$$5^2 + 12^2 = 13^2$$

$$25 + 144 = 169$$

$$169 = 169.$$

Since, triangle is right angle triangle, one of the angle must be 90°.

Using inverse trigonometric functions to find other two angles,

let say,

Angle opposite the 5cm side be θ_1

Angle opposite the 12cm side be θ_2

To find θ_1 we use:

$$\sin \theta_1 = \frac{\text{opposite}}{H} = \frac{5}{13}$$

$$\theta_1 = \sin^{-1} \left(\frac{5}{13} \right)$$

$$\boxed{\theta_1 = 22.6^\circ}$$

To find θ_2 , we use:

$$\cos(\theta_2) = \frac{\text{adjacent}}{H} = \frac{5}{13}$$

$$\theta_2 = \cos^{-1} \left(\frac{5}{13} \right)$$

$$\boxed{\theta_2 = 67.38^\circ}$$

Sum of angles in a triangle is 180° so,

$$\begin{aligned} \theta_2 &= 180^\circ - 90^\circ - 22.6^\circ \\ &= 67.38^\circ \end{aligned}$$

The 3 angles of triangle are:

$$90^\circ, 22.6^\circ, 67.38^\circ$$

Q6:

(a)

Flavours =

Apple : Berry : Cherry : Date

$3x : 6x : 2x : 5x$

As Apple candies exceed ^{Pales} by 35.

The ratio of Apple ($3x$) is smaller than ratio of dates ($5x$)

Solving for x ,

$$5x - 3x = 35$$

$$2x = 35$$

$$x = 35/2$$

$$x = 17.5$$

For Berry candies,

No. of berry candies = 6

$$= 6 \times 17.5$$

No. of berry candies = 105.

(b)

Data:

Original price = \$200.

Discount = 25% of 200

$$\frac{25}{100} \times 200 = 50$$

Price after discount = ?

Solution:

$$\text{Price after discount} = 150 - 50$$

= 100

$$\text{Sale tax} = 6\% \text{ of } \$150$$

$$= \frac{6}{100} \times 150$$

$$= 9$$

$$\text{Total amount paid} = 150 + 9$$

$$= \$159$$

(C)

Data:

$$\text{distance} = 36 \text{ km}$$

$$\text{Speed} = 18 \text{ km/h}$$

$$\text{time} = ?$$

$$\text{Start at} = 1 \text{ pm}$$

Solution:

$$\text{As, Speed} = \frac{\text{Distance}}{\text{time}}$$

$$\text{Time} = \frac{\text{Distance}}{\text{Speed}}$$

$$= \frac{36}{18}$$

$$\text{Time} = 2 \text{ hour.}$$

Departed time = 1pm

Travel time = 2 hours

Arrival time = 1pm + 2 hours

= 3pm

The bicycle reaches its destination
at

(d)

Unscrambles:

(i) STATISTICS

(ii) GEOMETRY

You have done well, for
improvement have a look at the
general set of instructions and
you are good to go