

Dos and Don'ts for General Science & Ability Paper

Hi there, you've done well. Know that acquiring knowledge is one thing and reproducing it in paper according to what's asked is another. There are a few things I would like to highlight.

1. A 5 marks part requires at least 2 and at max 3 sides of a paper. Know that there can be two or three parts of a question and their marks are divided accordingly. So, address all of them in a just manner.

2. Focus on time management. You get 35 minutes to solve one question and about 8 minutes per 5 mark part. Manage your time accordingly.

3. You need to understand that your paper is supposed to look more scientific than theoretical. So, add flowcharts and diagrams where required.

4. Your handwriting and neatness can be really impactful. Avoid cutting and overwriting.

5. Focus on your spellings and your grammar. Here, in GSA there's no deduction in marks but your expression will definitely create an impact.

6. In ability portion, give explanation for analytical ability question in words. You need to understand that a 5 mark part requires all steps written and explained.

Good luck for CSS 2025. You're gonna rock in sha Allah. :)

Serotypes:

There are four distinct but closely related serotypes of the dengue virus labelled as DENV-1, DENV-2, DENV-3 and DENV-4. Infection with one serotype usually provides lifelong immunity to that specific serotype but not to others, (meaning a person can be infected multiple times).

Vectors:

Aedes aegypti

Aedes albopictus

Symptoms:

- Sudden high fever
- Severe headache
- Pain behind the eyes
- Joint and muscle pain
- Rash
- Nausea and vomiting
- Swollen lymph nodes
- Mild bleeding from nose or gums
- Fatigue and weakness

Severe symptoms:

In severe cases dengue can lead to dengue haemorrhage fever or dengue

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~~shock syndromes~~ which may lead to more severe symptoms including:

- severe abdominal pain
- Persistent vomiting
- Rapid breathing

Explain Dark matter and dark energy:

Dark matter:-

Dark matter is an invisible form of matter that does not emit and absorb light making it undetectable directly by telescope

It can only be observed through its gravitational effects on visible matter.

How it is observed:-

Observations like the rotation curves of galaxies show stars orbiting faster than expected, suggesting additional "hidden" mass - this unseen mass is attributed to dark matter.

Evidences:

The existence of dark matter was proposed to explain certain gravitational phenomena that could not be explained by visible matter alone:

Galaxy rotation curves:

Stars at the edges of galaxies rotate at high speed, indicating there is much more mass in these galaxies than can be seen.

Gravitational lens:

Light from distant galaxies is bent by massive objects between the light source and the observer, suggesting the presence of "hidden" mass.

Cosmic microwave background (CMB)

Detailed measurement of the CMB indicates that more matter exists than is visible.

Possible composition:

Dark matter is likely composed of unknown particles such as:

WIMPs (weakly interacting massive particles): hypothetical particles that would interact via gravity but hardly interact with their forces.

Axions: Tiny, lightweight particles that could be the part of dark matter.

Dark matter pulls galaxies together, while dark energy pushes them apart

Dark energy

Dark energy is an unknown form of energy that makes up about 68% of the universe, believed to be responsible for the accelerated expansion of the universe.

Evidence:

The concept of dark energy arose from observation of distant supernova in the 1990s:

Accelerated expansion.

Astronomers expected the expansion of the universe to slow down over time due to gravity, but they observed that galaxies are moving away from each other at an accelerating rate.

Cosmic microwave background and large scale structure.

The CMB and distribution of galaxies support the existence of an energy component pushing the universe apart.

Difference b/w Dark matter / Dark energy

Feature	Dark Matter	Dark energy
Nature	Unseen mass influencing gravitational effects	Energy causing accelerated cosmic expansion
Constitutes	~ 27% of the Universe	~ 68% of the Universe
Observable effects	influence galaxy rotation and gravitational binding	causes accelerated expansion of the universe

In summary dark matter bound galaxies together with its gravitational effects while dark energy drive the universe's accelerated expansion. Both are critical to understanding the universe structure and fate, though their precise nature precise nature remain unknown.

Add question number

Structure and function of mitochondria:

Mitochondria:

Mitochondria are membrane-bound organelles present in the cytoplasm

of all eukaryotic cells, that produce Adenosine triphosphate, the main energy molecule used by cell.

Structure of mitochondria:-

It is rod or filament shaped. It is double membrane structure found both in animal and plant cell. Its size ranges from 0.5 to 1 micrometer. The structure comprises of outer membrane an inner membrane, and a gel like material called the matrix. The outer membrane is smooth. The inner membrane forms many infoldings. The outer and inner membrane made of proteins and phospholipids layers separated by the intermembrane space. The outer membrane covers the surface of mitochondria and has a large number of special proteins known as porins.

Chemical composition of mitochondria:

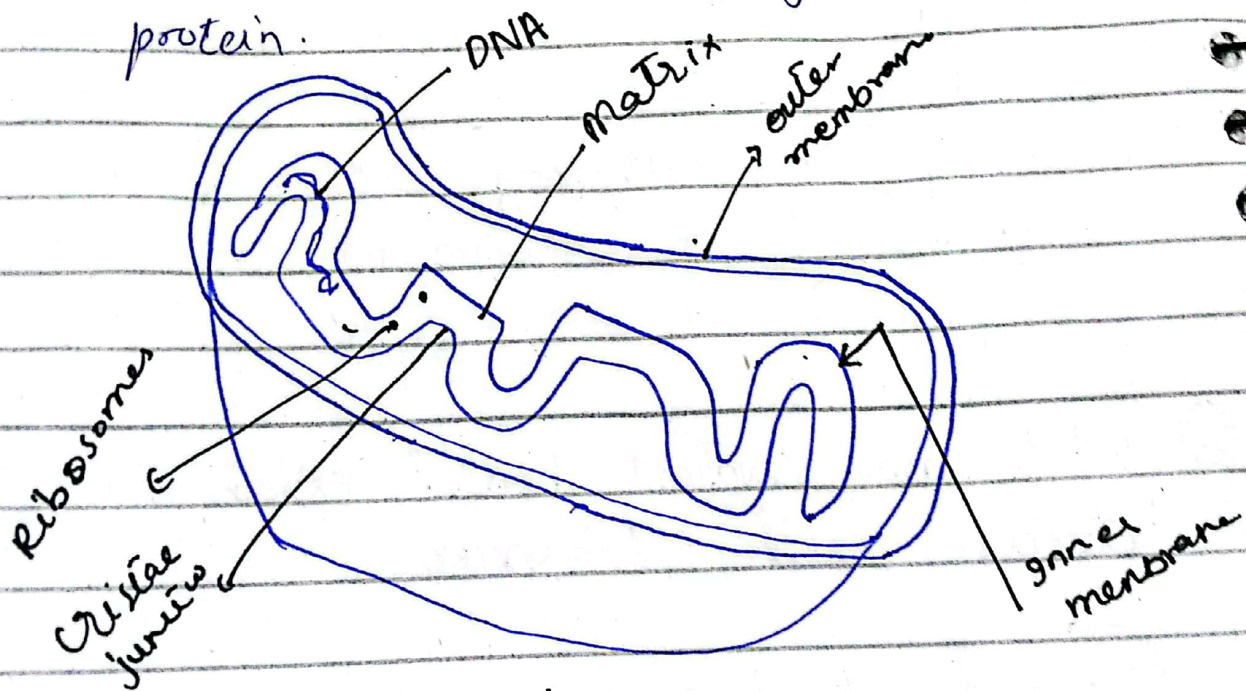
The mitochondrial membrane have similar composition and structure.

as other membranes

They are composed of lipids and protein.
The mitochondrial matrix contain large number of enzymes, coenzymes, matrix organic and inorganic salts.

It also contain DNA and ribosome.

So mitochondria can synthesize its protein.



Functions of mitochondria:-

↳ Many metabolic processes takes place in mitochondria. There are

* Krebs cycle

* Aerobic respiration

* Fatty acid metabolism

↳ Energy released during these metabolic processes.

↳ The energy is transferred to energy rich ATP compound

↳ ATP provides energy to cell on demands and ATP is broken to ADP.

↳ This ADP absorbs energy from mitochondria and again becomes ATP.

↳ Ca^{2+} plays an important role in apoptosis and cell death.

↳ Responsible for building certain parts of the blood and various hormones like testosterone and estrogen.

↳ Help in maintaining an adequate concentration of calcium ions within compartments of cell.

Q What are covalent bonds? explain in detail with diagram.

Covalent bond:

When a chemical bond is formed between two atoms by sharing of electrons to gain the nearest inert gas configuration then the bond is called covalent bond.

Types of covalent bond:

There are 3 types of covalent bond

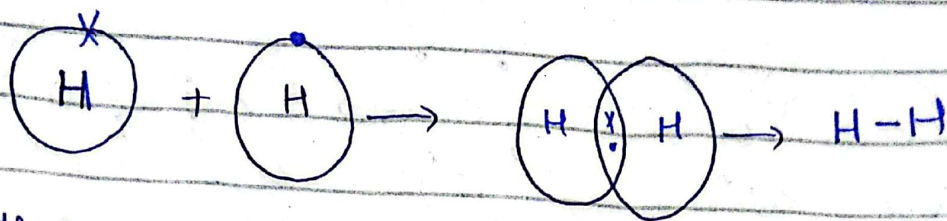
i) Single bond

ii) Double bond

iii) Triple bond

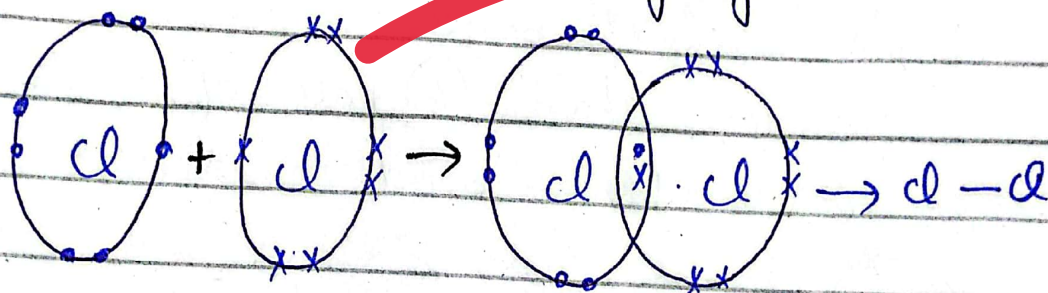
Singl bond:-

Hydrogen atom sharing pair
of electron



Hydrogen gas forms the simplest covalent
bond in the diatomic molecule.

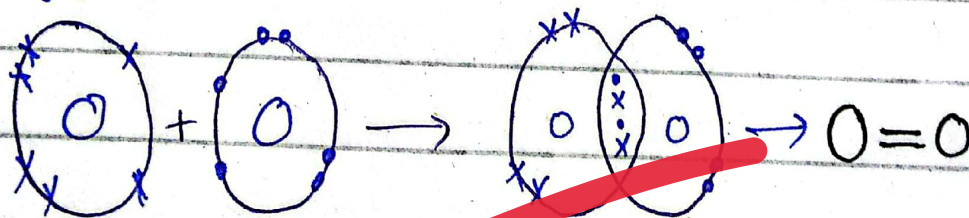
for attaining nearest noble gas configuration
each hydrogen atom share its valence
electron with other hydrogen atom



Multiple covalent bond

Double covalent bond:

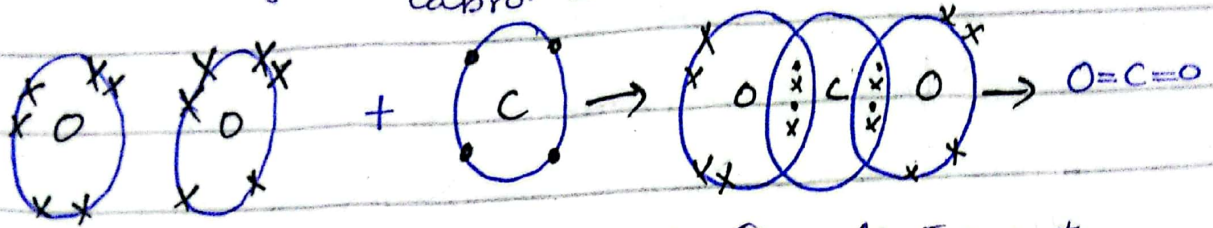
oxygen molecules



each oxygen molecule need 2 electron
to complete its valence shell
and for two covalent bond.

Carbon dioxide:-

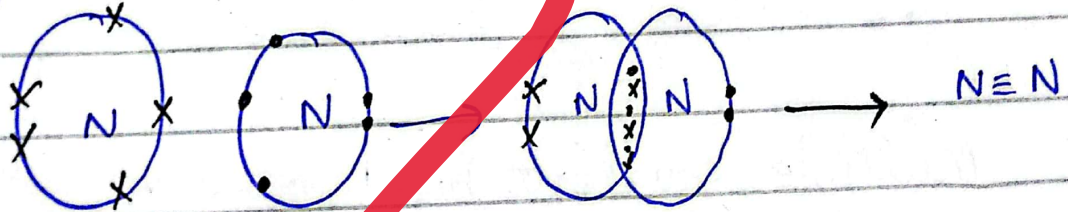
Two oxygen atoms
Carbon atom



Oxygen atoms need 2 electrons to complete its valence shell but carbon needs 4. So each oxygen share 2 e^- with carbon to complete its valence shell.

Triple covalent bond:

Nitrogen share 3 pair of e^- to form 3 covalent bond.



Ability portion:

Determine the x value of arithmetic mean of 9, 8, 10, x , 12

$$\frac{9+8+10+x+12}{5} = 15$$

Add all number of value = mean
Total number of value

$$\frac{39+x}{5} = 15$$

$$39+x = 15 \times 5$$

$$39+x = 75$$

$$x = 75 - 39$$

$$x = 36$$

A mixture contain sugar solution and colored water in the ratio 4:3. If 10 litre of colored water is added to the mixture the ratio become 4:5 Find the quantity of sugar in the given mixture.

	sug soln	color
A	4	3

Let the quantity of sugar solution and colored water = $4x, 3x$

$$4x : 3x + 10 = 4 : 5$$

$$\frac{4x}{3x+10} = \frac{4}{5} \Rightarrow 4x \times 5 = 4x(3x+10)$$

$$20x = 12x + 40$$

$$20x - 12x = 40$$

$$8x = 40$$

$$20x - 12x = 40$$

$$8x = 40$$

$$x = \frac{40}{8} = 5$$

$4x \rightarrow$ colored sugar

$$4(5)$$

$= 20$ litre

sugar in the given mixture.

Volume of foot ball

$$R = 12 \text{ cm}$$

$$\text{Formula} = \frac{4}{3} \pi R^3$$

$$\frac{4}{3} \times \pi \times (12)^3$$

$$12^3 = 1728$$

$$\frac{4}{3} \times \pi \times 1728$$

$$= 2304 \pi \text{ cm}^3$$

Given in a series $-10, -8, +6, 40, 102$

question belong to category square

$$-10 + (2^2 - 2) = -8$$

$$-8 + (4^2 - 2) = 6$$

$$6 + (6^2 - 2) = 40$$

$$4 + (8^2 - 2) = 102$$

$$102 + (10^2 - 2) = 200$$

$-10, -8, +6, 40, 102, 200$