

Do's and Don'ts for General Science & Ability Paper

Question
(A)

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.

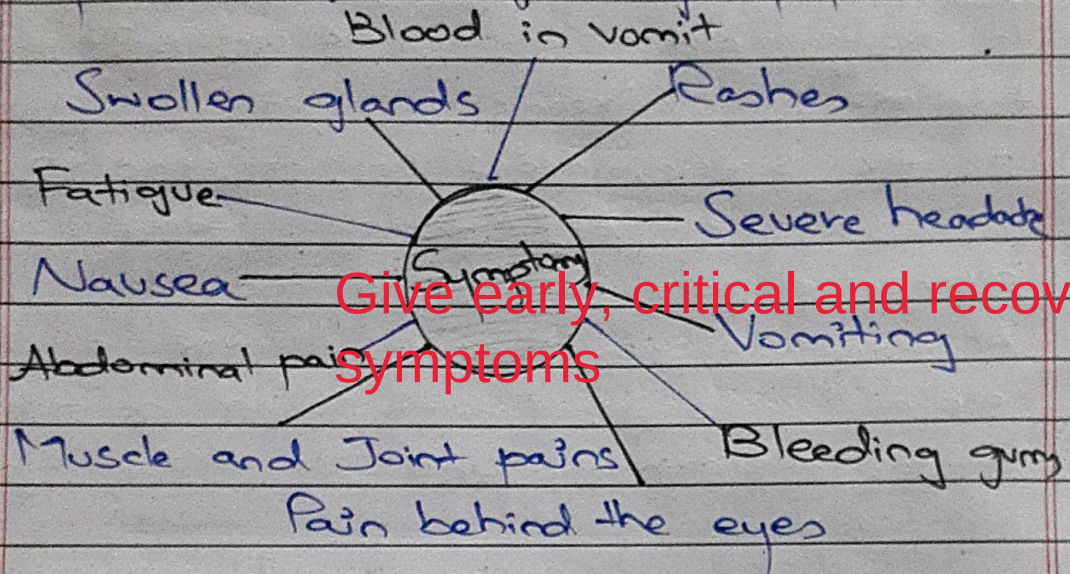
6. In ability portion, give explanation for analytical ability question in words. You need to understand that a 5 mark part requires all steps written and explained.

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

Symptoms of Dengue

The most common symptoms of dengue are following:

Dengue should be suspected when a high fever ($40^{\circ}\text{C}/104^{\circ}\text{F}$) is accompanied by two of the following symptoms:



B

Explain dark matter and dark energy.

Defining Dark Matter

Dark matter comprises particles that do not reflect, absorb, or emit light. Thus, they can not be detected by observing electromagnetic radiations. It is a material that can not be seen directly. We believe it exists because of its affects on the objects. Moreover, the force of dark matter is always attractive. It attracts all the particles even though light can not move out of them. Astronomers believe that dark matter exists because visible matter does not have enough gravita-

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ational muster to hold galaxies together.
The composition of dark matter is:
hyper-dense astronomical bodies called
massive astrophysical compact halo
objects (MACHOs) and weakly interacting
massive particles (WIMPs)

Examples $\swarrow$ Neutron stars
 $\searrow$ Black holes

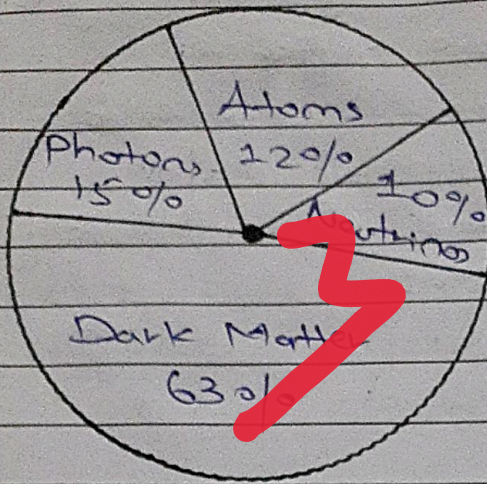
Defining Dark Energy

Dark energy is the energy that helps in the expansion of the universe. In fact in 1988, astronomers studying distant supernovae were shocked to learn that the universe began expanding faster around 7.5 billion years after Big Bang. That indicates some unknown force is fighting gravity's pull, causing galaxies to speed apart from one another. Dark energy is a repulsive force and repels the object, due to which things move far away from each other.

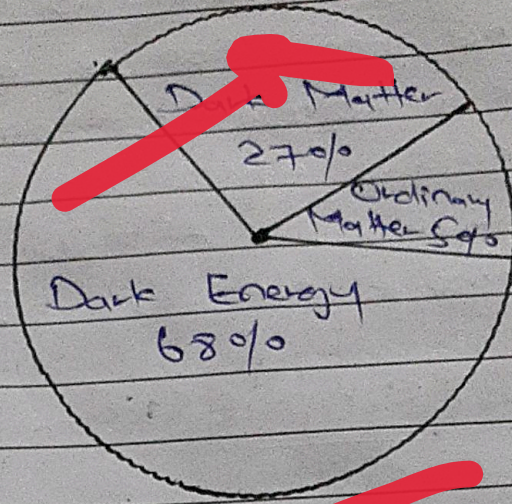
Example [Phantom dark energy, where not only its expansion accelerating, but the acceleration is also increasing over time - the Big Rip, where expansion becomes infinitely fast, tearing galaxies, atoms and the fabric of space-time itself apart.

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13.8 Billion
Years ago



Today

C Discuss structure and function of mitochondria. How is the power house?

Defining Mitochondria

Mitochondria are membrane-bound organelles present in the cytoplasm of all eukaryotic cells, that produce adenosine triphosphate (ATP), the main energy molecules produced by the cell.

Structure of Mitochondria

Mitochondria is a double-membraned, rod-shaped structure found in both in plant and animal cell.

Its size ranges from 0.5 to 1.0 micrometre in diameter.

The structure comprises an outer membrane, an inner membrane, and a gel-like material called the matrix.

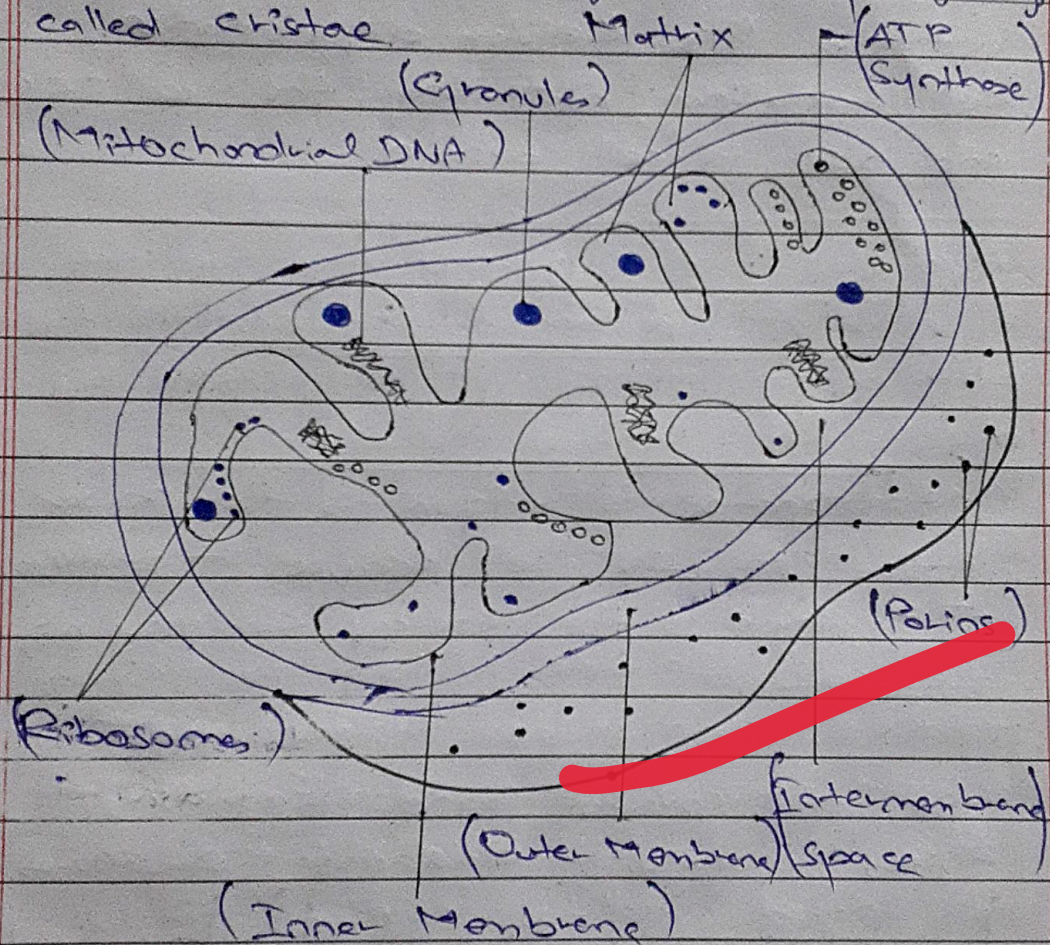
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The outer membrane and inner membrane are made of proteins and phospholipid layers separated by the intermembrane space.

The outer membrane covers the surface of the mitochondrion and has a large number of special proteins known as porins.

The inner membrane forms many infoldings called cristae.



Functions of Mitochondria

- It regulates the metabolic activity of cell.
- It promotes the growth of new cells and cell multiplication.
- It helps in detoxifying ammonia in the liver cells.

- It plays an important role in apoptosis or programmed cell death.
- It is responsible for binding certain parts of the blood and various hormones like testosterone and estrogen.
- It helps in maintaining an adequate concentration of calcium ions within the compartments of the cell.
- It is also involved in various cellular activities like cellular differentiation, cell signalling, controlling the cell cycle, and also in cell growth.

Mitochondria: Power House of the Cell

Mitochondria is known as the power house of the cell because it produces ATP which is the energy currency of the cell.

D What are covalent bonds? Explain types along with elaborating structures.

Defining Covalent Bond

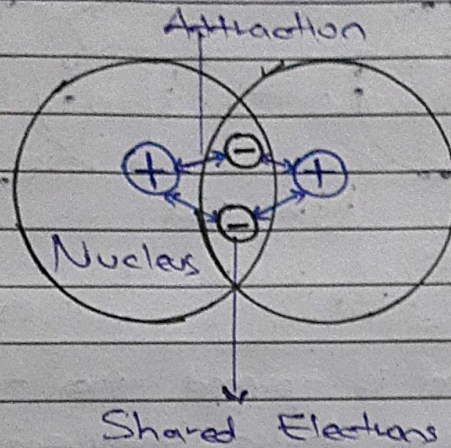
Elements having very high ionization energies are incapable of transferring electrons, and elements having very low electron affinity cannot take up electrons. The atoms of such elements tend to share their electrons with the atoms of other elements or with

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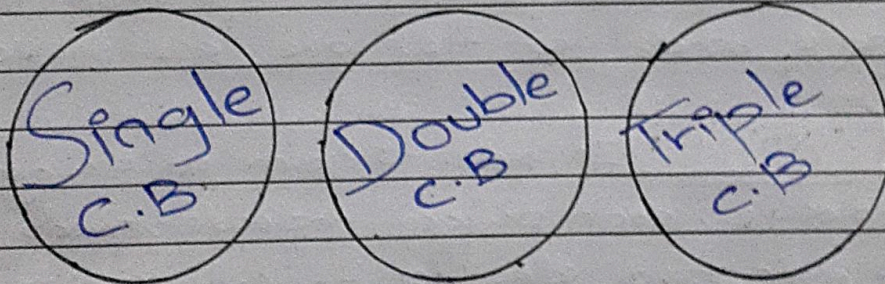
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other atoms of the same element in a way that both the atoms obtain octet configuration in their respective valence shells, and thus achieve stability.

Such association through sharing of electron pairs among different or same kind is known as covalent bond.



Types of Covalent Bonds

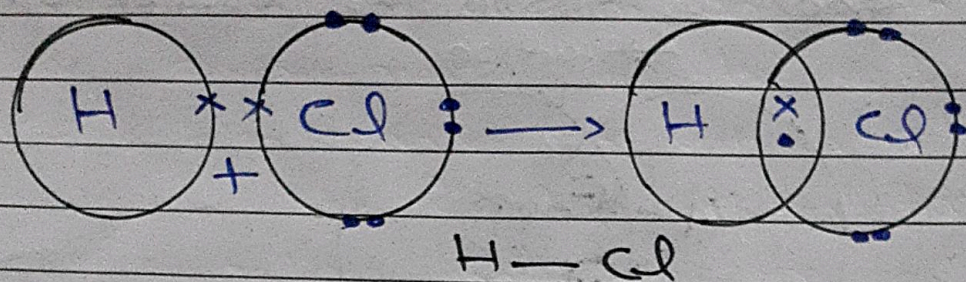


This classification is on the basis of number of shared electron pairs.

Single Covalent Bond

A single bond is formed when only one pair of electrons is shared between the two participating atoms. It is represented by a single dash (-). Although this type has a smaller density and is weaker than double and triple bond, it is the most stable one.

Example: The HCl molecule has one hydrogen atom with one valence electron and one chlorine atom with seven valence electrons. In this case, a single bond is formed between hydrogen and chlorine by sharing one electron.

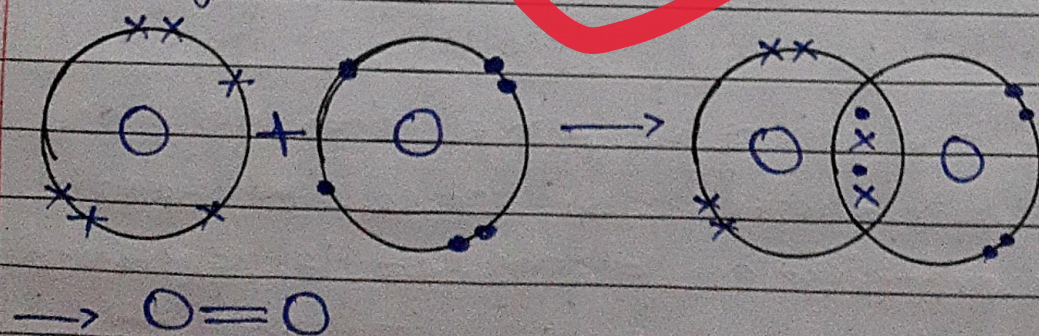


Double Covalent Bonds

A double bond is formed when two pairs of electrons are shared between the two participating atoms. It is presented by a double line between the atoms ($=$).

These bonds are much stronger than single bonds, but they are less stable.

Example: In order to form an oxygen molecule, each oxygen molecule needs to gain two electrons to complete its outer shell. So, two pairs of electrons are shared and two covalent bonds are formed.



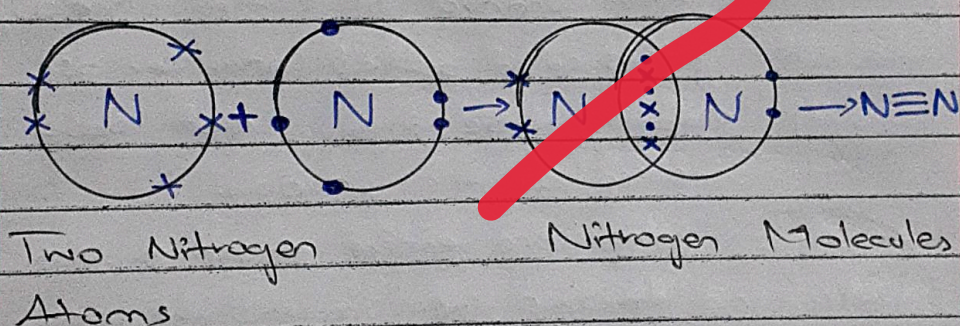
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Triple Covalent Bond

It is formed when three pairs of electrons are shared between the two participating atoms. It is represented by three dashes ($\equiv$). It is the least stable type of covalent bonds.

Example: In the formation of nitrogen molecule, each nitrogen atom needs to gain three electrons to complete its outer shell. So, three pairs of electrons are shared and three covalent bonds are formed.



Q.3 What is lunar eclipse? Explain in detail with apt diagrams.
A

Defining the term Eclipse

Eclipse means the obscuring of one astronomical object by another.

Definition of Lunar Eclipse

When earth comes between the sun and the moon and casts the shadow across the lunar surface, is known as lunar eclipse.

It is a common phenomenon, and about three lunar eclipses occur yearly. A lunar eclipse takes place on a full moon day.

Types of Lunar Eclipse

Penumbral Lunar Eclipse

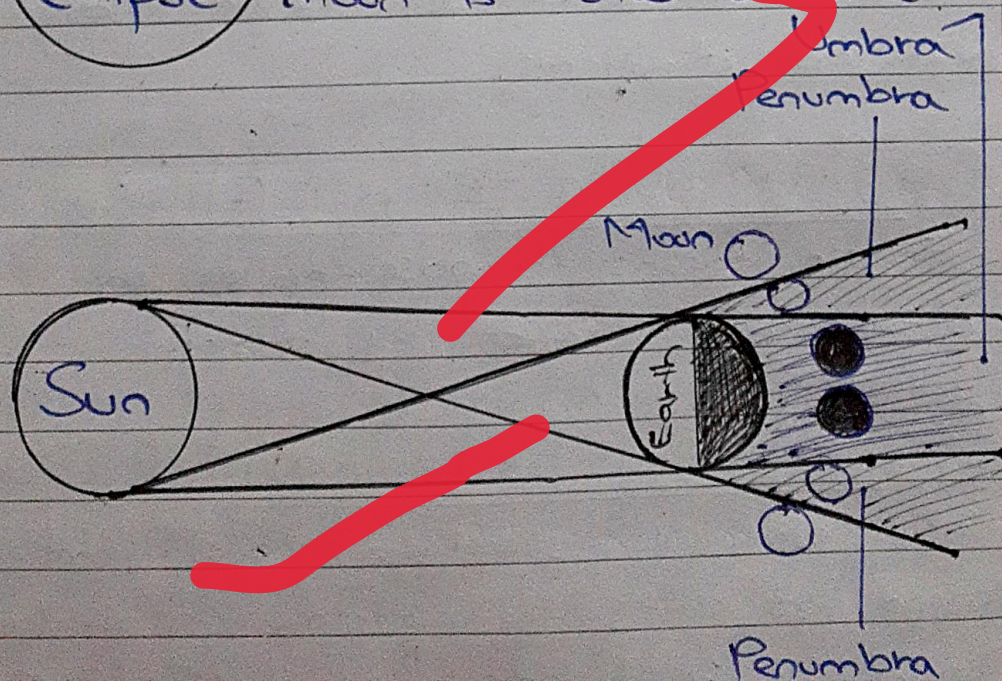
The moon only passes through the penumbra of Earth's shadow. It is rarely visible from earth as there is slight change of colour of the moon. It also occurs due to imperfect alignment of the sun, earth, and moon.

Partial Lunar Eclipse

When the moon passes through the umbra of Earth's shadow, it is called partial lunar eclipse as its whole area is not obscured by the shadow.

Total Lunar Eclipse

When the entire moon passes through the umbral region of Earth's shadow and moon is total obscured.



B

Explain functions of enzymes in detail with examples.

Definition of Enzyme

Enzyme is specialized organic substance composed of polymers of amino acids that act as catalyst to regulate the speed of the many chemical reactions involved in the metabolism of living organisms.

Functions of Enzymes

- Help in Signal transduction

Enzymes are major components in signal transduction. The most common enzyme used in the process includes protein kinase that catalyzes the phosphorylation of protein.

- Break down of large molecules

Enzymes break down large molecules into smaller substances that can be easily absorbed by the body.

- Energy generation in body

Enzyme help in generating energy in the body. ATP synthase is the enzyme involved in the synthesis of energy.

- Movement of ions

Enzymes are responsible for the movement of ions across the plasma membrane.

- Performs several biochemical reactions

They perform a number of biochemical reactions, including oxidation, reduction, hydrolysis etc. to eliminate the non-nutritive substances from the body.

- Regulation of cellular activities

Enzymes function to recognize the internal structure of the cell to regulate cellular activities.

(Given a brief account of electromagnetic radiations. What is EMR spectrum?

Defining Electromagnetic Radiations:

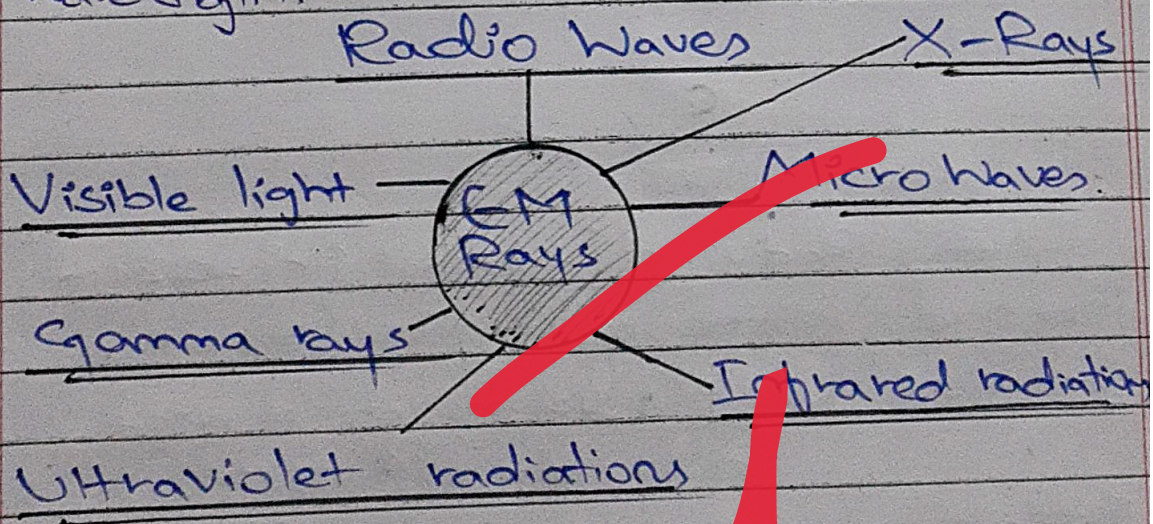
Electromagnetic radiation (EM) is a form of energy that is all around us and takes many forms, such as light rays, radio waves, micro waves, X-rays, and gamma rays. Visible light is only a small portion of EM spectrum, which contains a broad range of electromagnetic wavelengths.

Defining EMR Spectrum

The electromagnetic spectrum is a collection of frequencies, wavelengths and photon energies of EM waves spanning from 1 Hz to 10^{25} Hz , equivalent to wavelengths ranging from a few hundred kilometers to a size smaller than the size of an atomic nucleus.

EMR Waves in EMR Spectrum

Following rays make up the full range of EMR spectrum in decreasing order of frequency and rising order of wavelength.



Q6 Determine the "k" value if the A.M of 9, 8, 10, k, 12 is 15.

Solution

Formula Used: $\bar{X} = \frac{\sum x}{n}$

Given: $\bar{X} = 15$

$x = 9, 8, 10, k, 12$

Find the value of "k"

putting values in formula

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

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

$$75 = 39 + k$$

$$k = 75 - 39$$

$$\boxed{k = 36}$$

Q7

Solution

Given: Radius of football (r) = 12 cm

Required: Volume of football (V) = ?

Formula Used: Volume of a sphere
 $V = \left(\frac{4}{3}\right)\pi r^3$

Putting the value of radius in formula

$$V = \left(\frac{4}{3}\right)\pi (12)^3$$

$$= \left(\frac{4}{3}\right)\pi (1728)$$

$$= \left(\frac{4}{3}\right)\pi (1728)$$

$$= \left(\frac{4 \times 1728}{3}\right)\pi$$

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

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dGiven a series $-10, -8, 6, 40, 102$?

Q7 Solution

aGiven: 20% of $x = y$

$$\text{i.e. } 0.2x = y \quad \text{--- 1}$$

Required: find 4% of 20 terms of x

→ Multiply both sides of eq 1 with 20% = 0.2

$$(0.2)y = 0.2(0.2x)$$

$$0.2y = 0.4x$$

∴ 20% of x is equal to y , then
 20% of y is equal to 4% of x .

b

Solution

Given:

The average monthly income of:

$$P + Q = 5050 \text{ Rs.} \quad \text{--- 1}$$

$$Q + R = 6250 \text{ Rs.} \quad \text{--- 2}$$

$$P + R = 5200 \text{ Rs.} \quad \text{--- 3}$$

Required: Monthly Salary of Person
who is the sum

First, let's find the value of $P + Q + R$

Adding eq 1, 2, and 3

$$(P + Q) + (Q + R) + (P + R) = 5050 + 6250 + 5200$$

$$P + Q + Q + R + P + R = 16500$$

$$2P + 2Q + 2R = 16500$$

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$$2(P+Q+R) = 16500$$

$$P+Q+R = 16500/2$$

$$P+Q+R = 8250$$

$$P = 8250 - (Q+R)$$

$$P = 8250 - 6250$$

$$P = 2000$$

The average monthly income of P is 2000

Given	Solution	C		
	Outcome	Two Head (HH)	1 head (HT) & (TH)	No Head (TT)
	Frequency	105	275	120

Required: Find the probability of each event to occur.

Formula Used = $\frac{\text{Probability of each event}}{\text{Total probability}}$

$$1. P(HH) = \frac{105}{500}$$

$$= \frac{21}{100} \checkmark$$

$$2. P(HT/TH) = \frac{275}{500}$$

$$= \frac{11}{20} \checkmark$$

$$3. P(TT) = \frac{120}{500}$$

$$= \frac{6}{25} \checkmark$$