

Date: _____

Part = II

Section - I



Q = 2 (a)

Dengue:

It is mosquito-borne disease that has spread from tropical regions to all over the world.

Dengue virus is transmitted by female mosquito, mainly family of *Aedes aegypti*.

Types:

- | | |
|---------|---------|
| ① DEN-1 | ③ DEN-3 |
| ② DEN-2 | ④ DEN-4 |

Symptoms:

Usually begin four to six days after infection and last for up to 10 days may include.

- Sudden, high fever
- Severe headaches
- Pain behind the eyes
- Severe joint and muscle pain
- Fatigue
- Nausea
- Vomiting.
- Skin rash, which appears two to five days after onset of fever,
- Mild bleeding (such as nose and gums bleeding).

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Causative Agents:

Dengue is caused by the dengue virus (DENV), which belongs to the Flavivirus genus. There are four distinct serotypes of the dengue virus: DENV-1, DENV-2, DENV-3 and DENV-4. Infection with one serotype provides lifelong immunity against that specific type but does not protect against the others.

Prevention:

- ① Stay away from populated areas
- ② Use mosquito repellents.
- ③ Wear long-sleeved shirts
- ④ Use mosquito nets.

Q. 2 (b)

Dark Matter:

Dark Matter is a hypothetical form of matter that makes up about 27% of the universe's total mass energy content. Unlike ordinary matter (like stars, planets, and gas) dark matter does not emit, absorb, or reflect light, making it invisible and detectable only through its gravitational effects. It plays a crucial role in the formation of galaxies, as it provides



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the necessary gravitational pull to hold galaxies together, preventing from flying apart due to their rotational speeds. observations, such as the rotation curves of galaxies and the behavior of galaxy clusters, suggest the presence of dark matter

Dark Energy:

It is an unknown form of energy that is believed to make up about **68%** of universe. It is thought to be responsible for the observed acceleration in the expansion of the universe.

Unlike dark matter, which has a gravitational effect that pulls matter together, dark energy exerts a repulsive force that drives galaxies apart.

The exact nature of dark energy remains one of the biggest mysteries in cosmology, with various theories proposing it could be a **property of space itself** (vacuum energy) or a new field that permeates the universe.

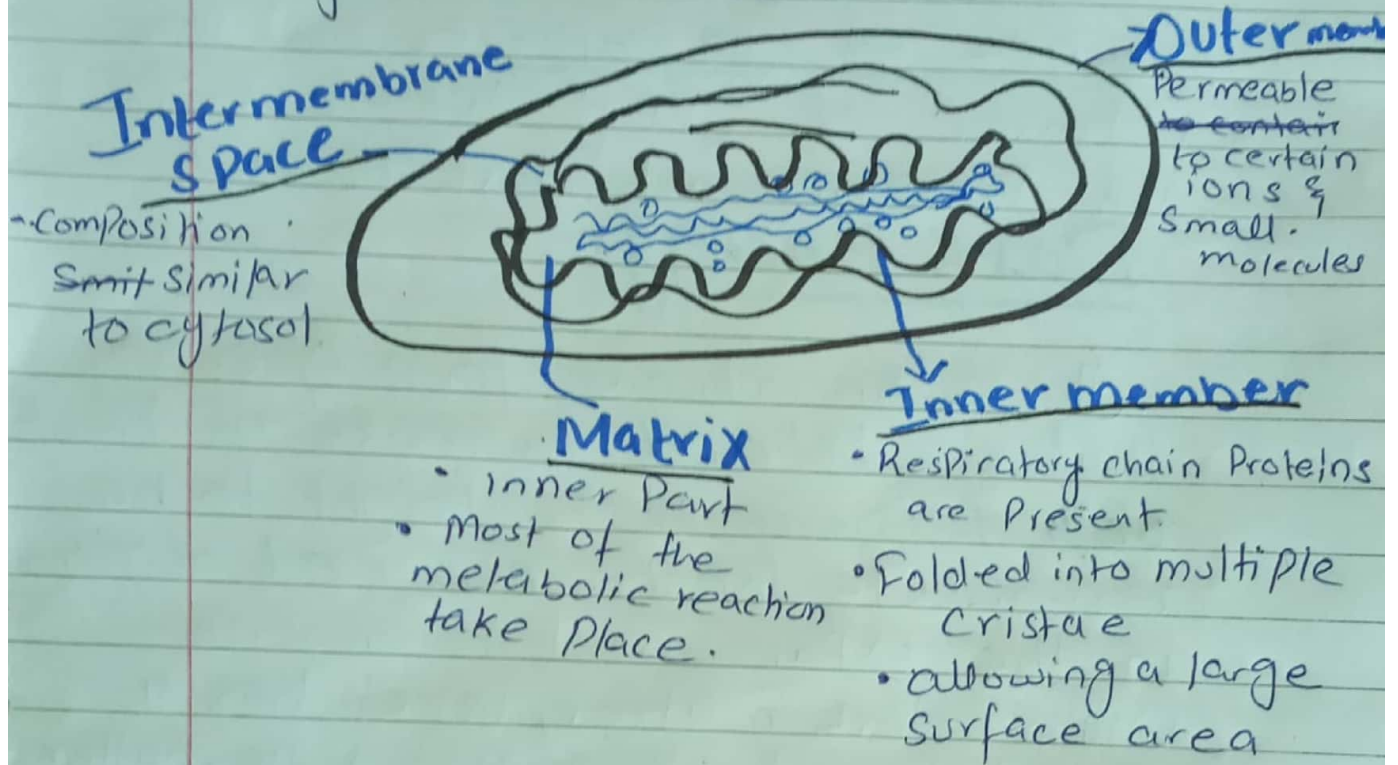
Q=2 (C)

Mitochondria:

- Size is 1 micrometer
- sausage shaped

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- Power house of cell in eukaryotes.
- Liver cell \rightarrow 2000 μ m,
- Muscle cell makes new by fussion on regular exercise.



Function:

- Essential for aerobic metabolism
- Energy Production through Oxidative Phosphorylation.
- Involved in metabolic Pathways
 - Beta-oxidation
 - Krebs cycle
 - Synthesis of Iron-Sulphur Clusters
- ~~Maintain~~ Maintain, replicate, & transcribe their own DNA
- Import and assembly of Proteins.



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- Remodeling of the mitochondrial network.

~~Additional notes:~~
~~A. Q. 2 (d)~~

Mitochondria as the Power house

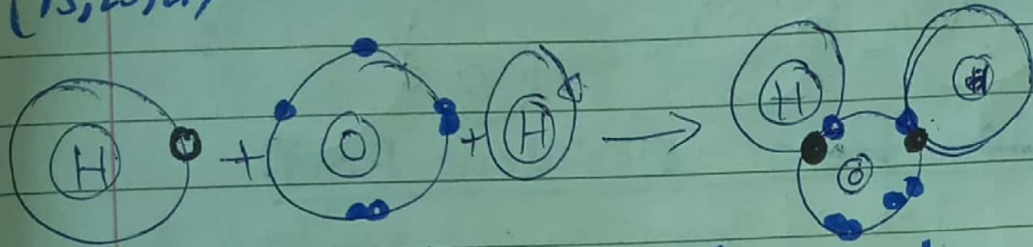
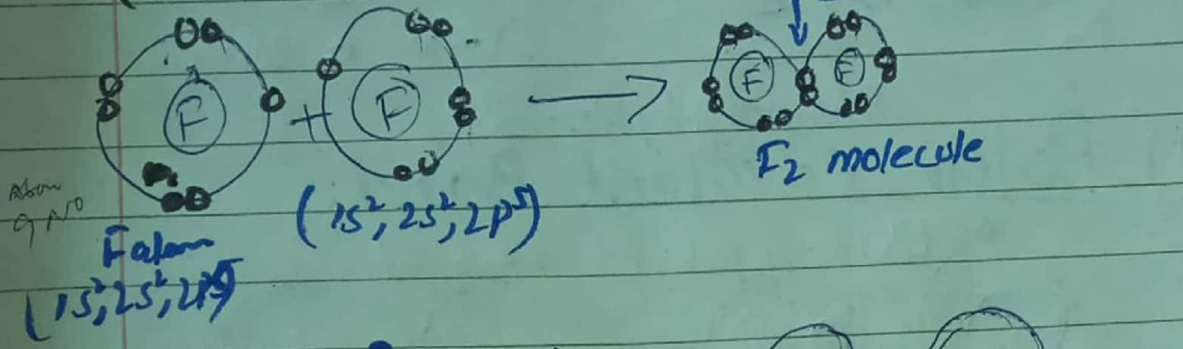
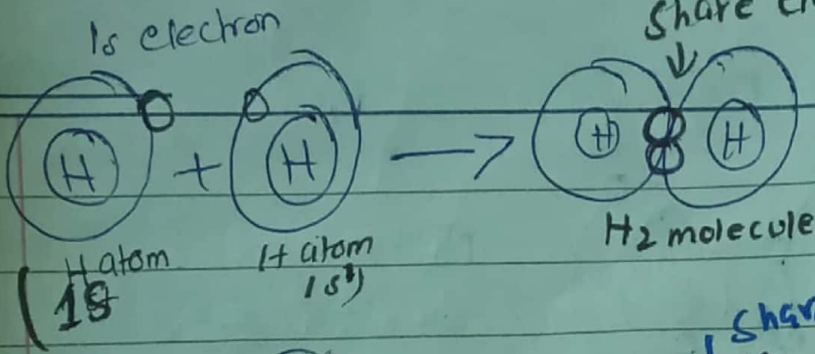
Due to their critical role in energy production. The ATP generated is utilized for various cellular processes, including muscle contraction, nerve impulse propagation, and biosynthesis of ~~max~~ macromolecules.

Q = 2 (d)

Covalent Bonds: atoms share electrons to achieve a more stable electron configuration.

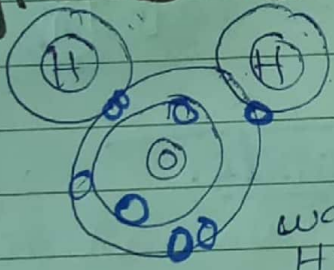
This type of bond is common in molecules where atoms are held together by shared electron pairs.

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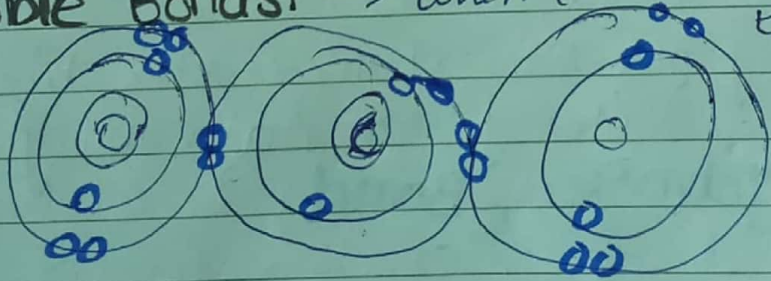
Types of Covalent Bonds

Single Bonds: → when two atom share one pair of electron



water:
H₂O: H-O-H
share 2 electrons.

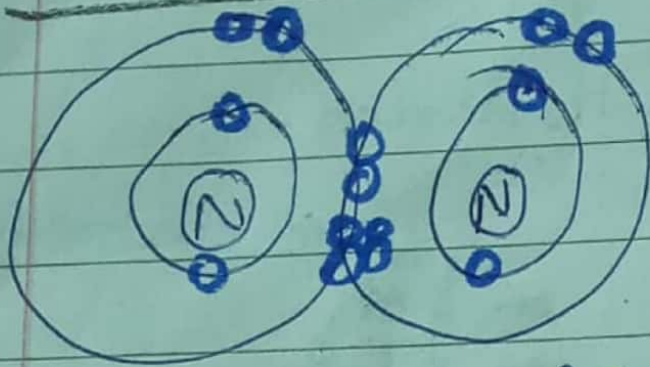
Double Bonds: → when two atom share two pairs of electron



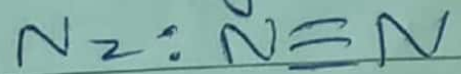
Carbon dioxide
CO₂: O=C=O
Share 4 electrons

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Triple Bonds.



Nitrogen

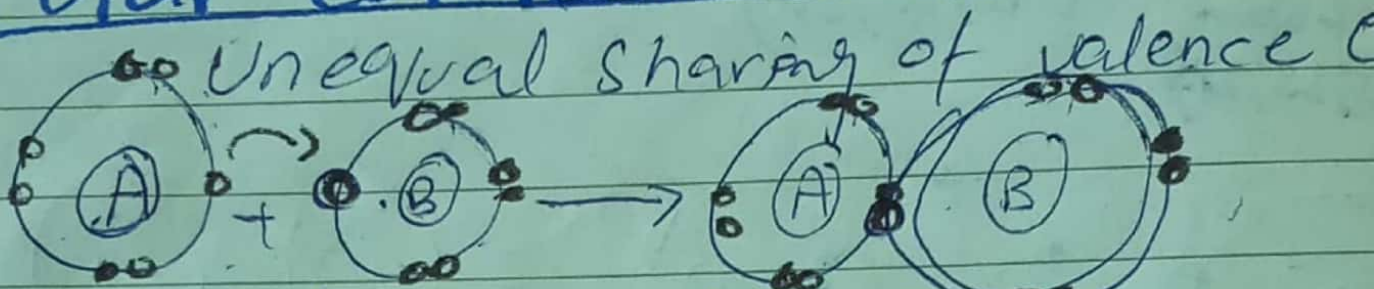


Share 6 Electrons

Sharing type - 2)

①

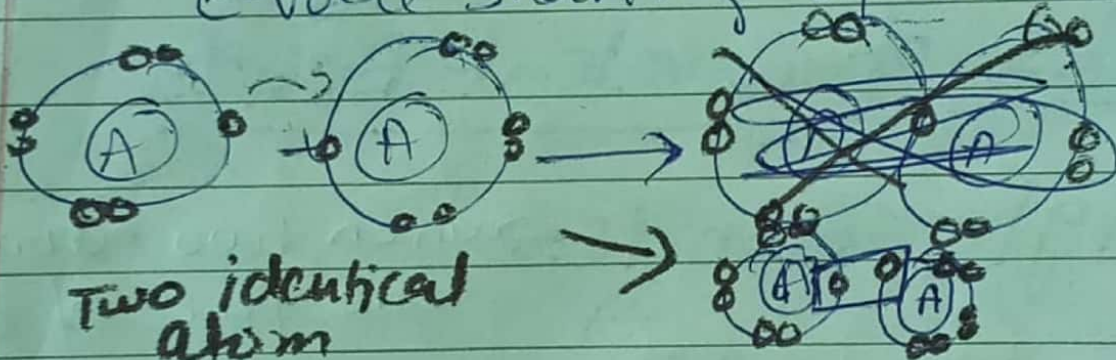
Polar Covalent Bond:



②

Non-polar Covalent Bond.

Equal sharing of valence elect

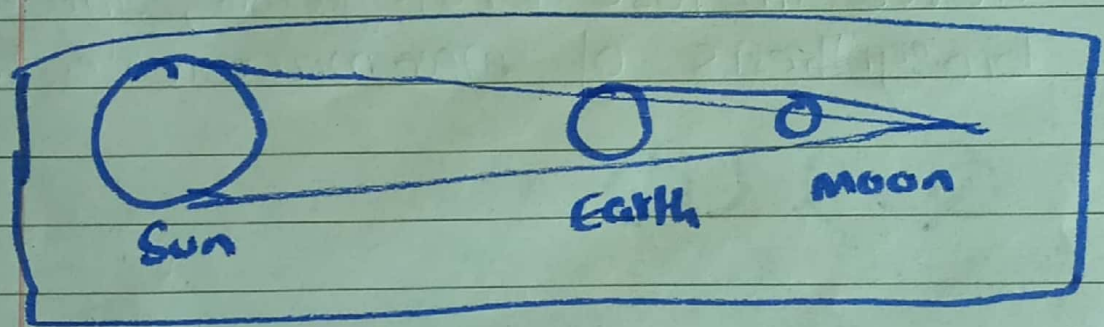


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Q=3 (a)

Lunar Eclipse:

- It occurs when the Sun, Earth and Moon align so that the moon passes into earth's shadow.
- The Moon is a cold, rocky body about 2,160 miles (3,476 km) in diameter.
- The Moon orbits Earth about once every 29 and half days.



Position: Earth lies b/w sun and moon

Frequency: Twice a year

occurrence occurs during night

Phase : Full moon

Duration: An hour.

~~zone where earth block part of~~

n



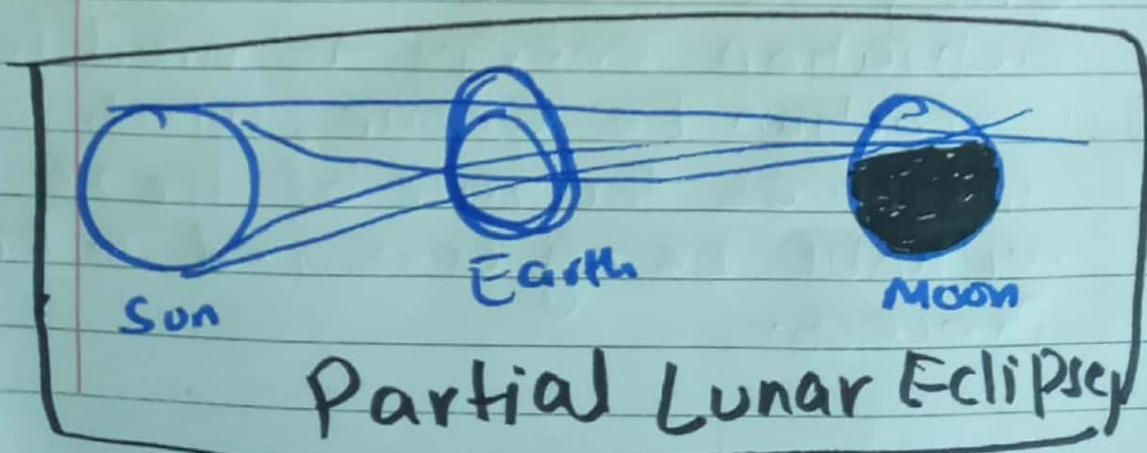
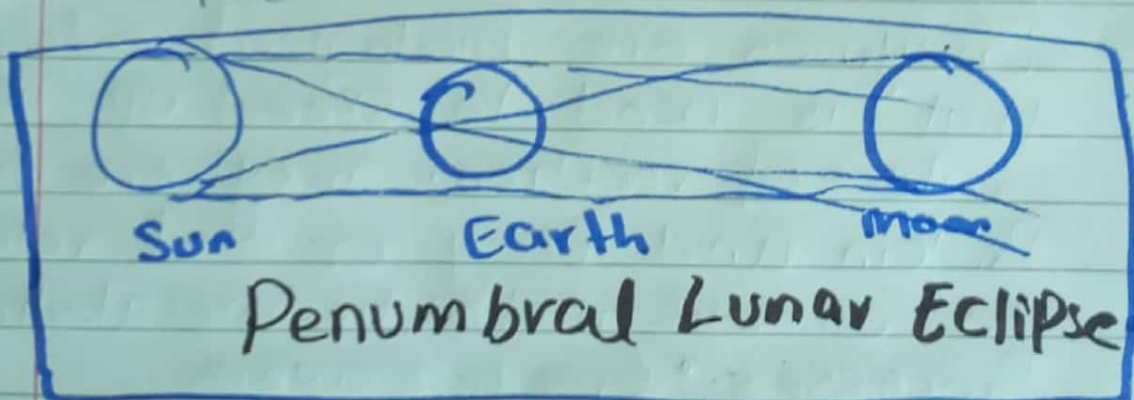
Types of lunar eclipses

Penumbral Lunar Eclipse:

- The Moon passes through Earth's penumbral shadow.
- These events are of only academic interest because they are subtle and hard to observe.

Partial Lunar Eclipse

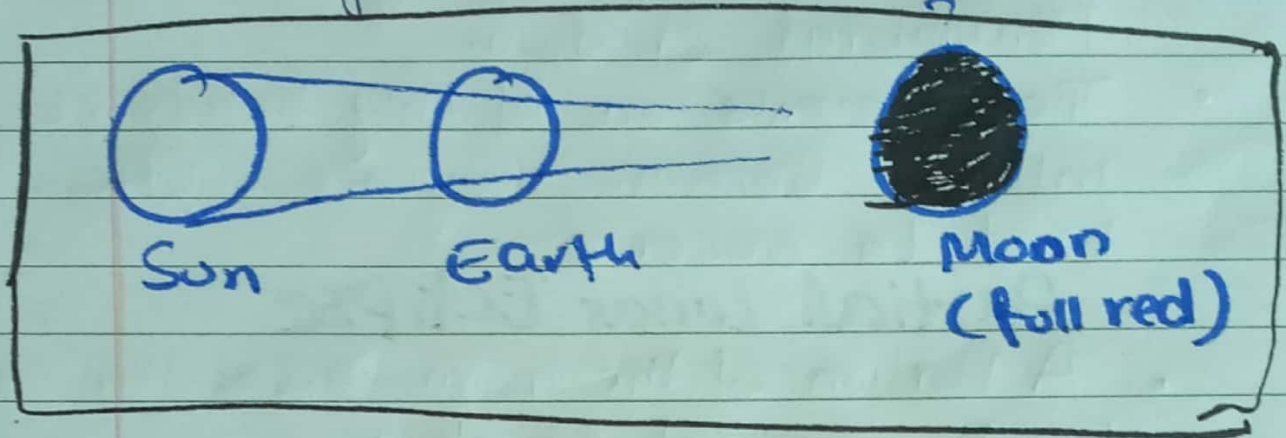
- A portion of the moon passes through Earth's umbral shadow.
- These events are easy to see, even with the unaided eye. Some portion is visible and another eclipsed.



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The entire Moon Pass through Earth's Umbra shadow.

These events are quite striking due to Moon's vibrant red color during the total phase.



Q-3 (b)

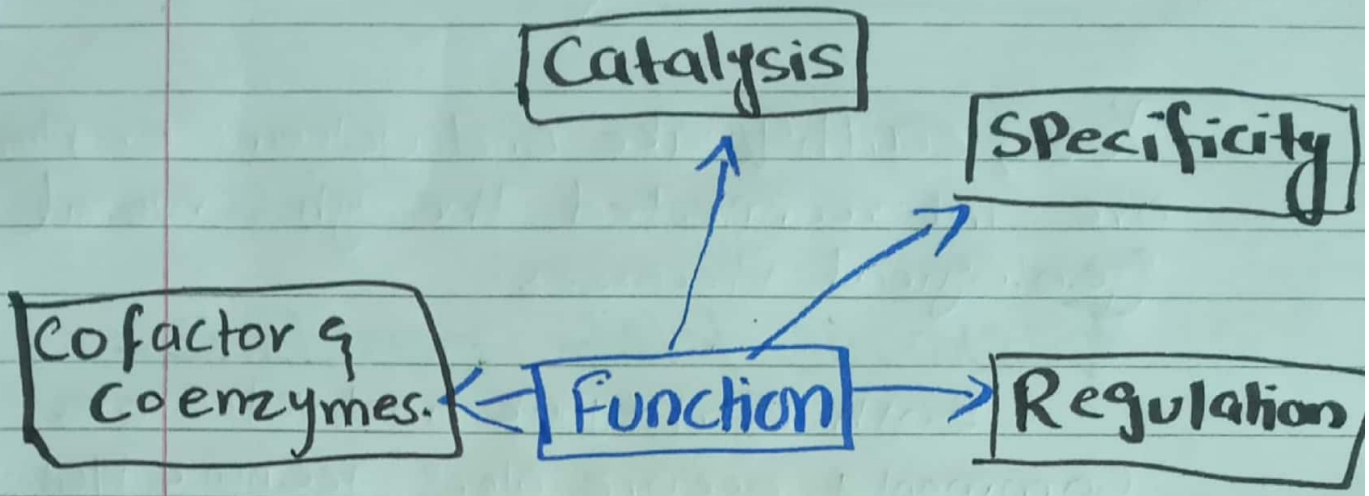
Function of Enzymes

Enzymes are biological catalysts that is used to speed up the rate of reaction. They are typically protein and play crucial role in various metabolic processes.

- ~~Enzymes work~~
Enzymes work by lowering the activation energy required for a reaction to occur; which increases the rate of the reaction without being consumed in the process.



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Amylase
Break down starch into simpler sugars (maltose and glucose)

Lipase
Break down fat into fatty acid

Protease
Breaks down proteins into smaller peptides or amino acids

Examples

Catalase
Enzymatic decomposition of hydrogen peroxide into water and oxygen, protecting cells from oxidative damage

DNA Polymerase
Synthesizes DNA molecules from nucleotides during DNA replication.

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Q23 (d)

Yes, earthquake and volcanic eruption are interconnected through several geological processes.

Tectonic Plate Boundaries:

Both earthquakes and volcanoes commonly occur along tectonic plate boundaries.

Earthquakes result from plate interactions while volcanoes often ~~form~~ ^{form} at subduction zones when magma rises.

Magma Movement:

The ascent of magma can generate earthquakes as it fractures surrounding rocks. Significant seismic activity can also create pathways for magma to erupt.

Geothermal Energy:

Hot spots can generate both ~~hydro~~ volcanic + volcanic activity and earthquakes as magma shifts.

Historical Example:

→ Even occurred in Sep 2024 at Kilauea, Hawaii.

→ Event like the 1980 Mount St. Helens eruption were preceded by earthquakes.



Q = 6 (a)

To Find k use the formula of Arithmetic mean:

$$\text{Mean} = \frac{\text{sum of number}}{n}$$

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

This simplifies to:

$$39+k = 75 \Rightarrow k = 36$$

Q = 6 (b)

Let initial quantities of sugar Sol. and Colored water be $4x$ and $3x$. After adding 10 liters of colored water, the new quantities are $4x$ and $3x+10$.

$$\frac{4x}{3x+10} = \frac{4}{5}$$

Cross-multiplying

$$5 \times 4x = 4 \times (3x+10)$$

$$20x = 12x + 40$$

$$20x - 12x = 40$$

$$8x = 40$$

$$x = 5$$

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Calculating the initial Quantity

$$\text{Sugar solution} = 4x = 4 \times 5 = \boxed{20 \text{ liters}}$$

Q26 (c)

$$V = \frac{4}{3} \pi r^3$$

V = volume of the sphere

$\pi = 3.14$ constant

r = Radius of the sphere

radius of r = 12cm

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

$$12^3 = 12 \times 12 \times 12 = 144 \times 12$$

$$= \boxed{1728}$$

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

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

$$4 \times 1728 = 6912$$

$$\frac{6912}{3} = 2304$$

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

Now $\pi = 3.14$

$$V \approx 2304 \times 3.14 \approx \boxed{7238.23 \text{ cm}^3}$$

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Q = 6 (d)

Given a series.

-10, -8, 6, 40, 120, **200**

Q = 7 (a)

Given that 20% of $x = y$.

$$y = 0.2x$$

$y\%$ of 20%

$$\frac{y}{100} \times 20 = \frac{0.2x}{100} \times 20$$

$$= \frac{2x}{100} = 0.02x$$

Q = 7 (b)

Let salaries of P, Q, R be P, Q, R

Average monthly salary of P and Q

$$\frac{P+Q}{2} = 5050$$

$$P+Q = \frac{5050 \times 2}{1} = 10100 \text{ --- (1)}$$

Average monthly sal of Q and R

$$\frac{Q+R}{2} = 6250$$

$$Q+R = 12500 \text{ --- (2)}$$

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~~From~~ 11 of Panel R

$$\frac{P+R}{2} = 5200$$

$$P+R = 10400 \text{ --- (3)}$$

Find P

$$P = 10100 - Q \text{ --- (1)}$$

$$R = 12500 - Q \text{ --- (2)}$$

substituting R into 3

$$P + (12500 - Q) = 10400$$

substituting P from (1)

$$(10100 - Q) + (12500 - Q) = 10400$$

$$2600 - 2Q = 10400$$

$$2Q = 12200$$

$$Q = 6100$$

Substituting Q back into (1)

$$P + 6100 = 10100$$

$$P = 4000$$

monthly salary of P is RS = 4000

$$Q = 7d$$

Jamie current age be J

Jamie dad's age = 4J

In 14 years:

Jamie: $J + 14$

Jamie father: $4J + 14$

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Equation representing the relationship
in 14 years will be.

$$4J + 14 = 4(J + 14)$$

$$4J + 14 = 4J + 56$$

$$14 = 56$$

This is not possible thus there's no
contradiction in age relationships.