

Q2(a) DENGUE:

"Dengue is a kind of viral infections transmitted through the bite of infected mosquitoes."

Causes of Dengue:

There are four types of viruses DENV-1, DENV-2, DENV-3 and DENV-4 that causes dengue virus. Dengue infection infects human up to 4 times in their life time.

Symptoms of Dengue:

There are several symptoms which are fever, flu, severe headache, pain in joints, muscles, eyes, vomiting, etc that affects infants, young children, adults and often causes death. These symptoms usually last for 2 to 10 days.

(b) DARK MATTER:

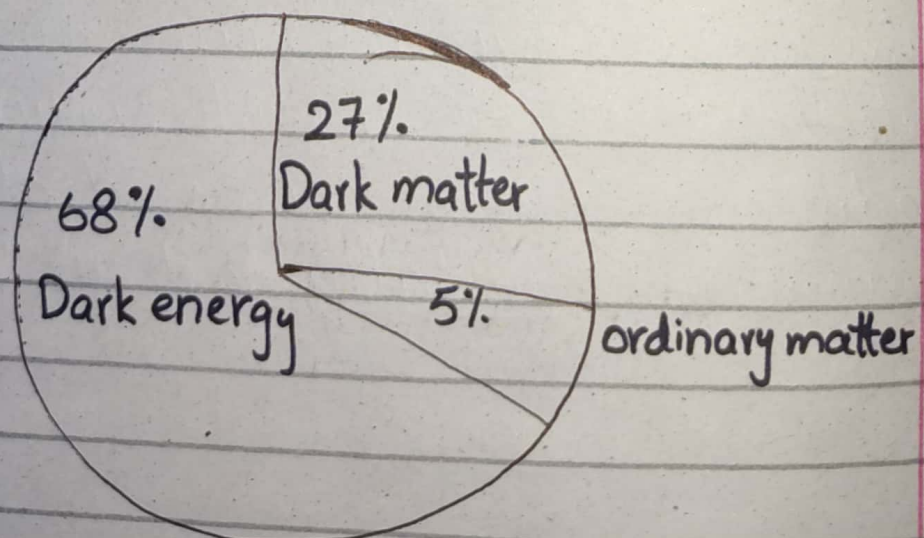
Astronomers studied that there is invisible dark matter in universe or galaxy. This matter produces gravitational force which holds galaxy in space and are on present place. 2.7% dark matter is

available on universe. It cannot be used and is present inside galaxies.

DARK ENERGY:

In 1998 astronomers studied they found out, after big bang 7.5 billion years universe is expanding with the high speed. They found that there are forces in universe which is parting galaxies from each other and that energy is called dark energy.

68% dark energy is present on universe which is present in between galaxies and cannot be controlled and used.



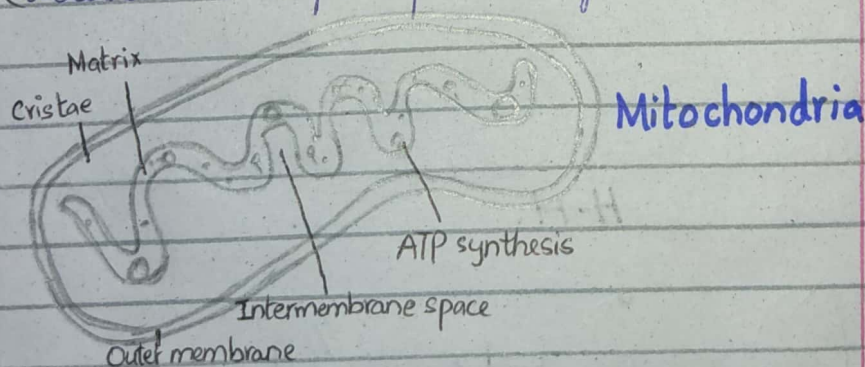
(C) MITOCHONDRIA:

A mitochondria is an organelle found in the cells of most eukaryotes such as animals, plants and fungi.

Structure of Mitochondria:

There are five distinct parts to a mitochondria.

1. The outer mitochondrial membrane
2. The intermembrane space (space between the outer and inner membranes).
3. The inner mitochondrial membrane.
4. The cristae space
5. Matrix (which is a fluid).
6. Mitochondria have folding to increase surface area, which in turn increases ATP (adenosine triphosphate production).



Functions of Mitochondria:

1. Mitochondria uses aerobic respiration to generate adenosine triphosphate (ATP) which is used throughout the cell as a source of chemical energy and

are popularly nicknamed the "powerhouse of the cell".

- 2 mitochondria can do other tasks, such as signaling, cellular differentiation and cell death and also maintaining control of the cell cycle & cell growth.

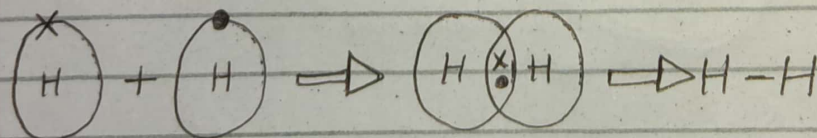
(d) COVALENT BONDS:

When two non-metal atoms combine they share one, or more, pairs of electrons.

Types of covalent bonds:

1 Single Covalent Bond:

A shared pair of electrons is called a single covalent bond. A single covalent bond is represented by a single line between the atoms. For example $H-H$.

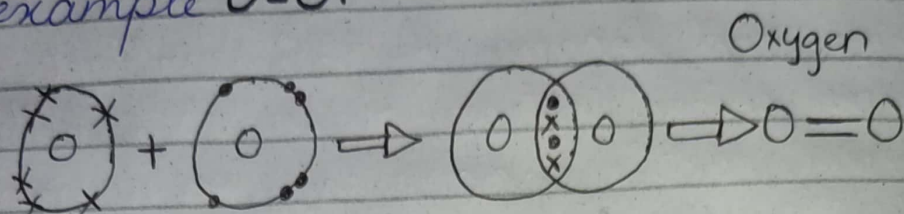


Hydrogen atoms sharing a pair of electron.

2 Double Covalent Bond:

Some atoms can bond together by

sharing two pairs of electrons. It is called double covalent bond. A covalent bond is represented by a double line between the atoms. For example $O=O$.

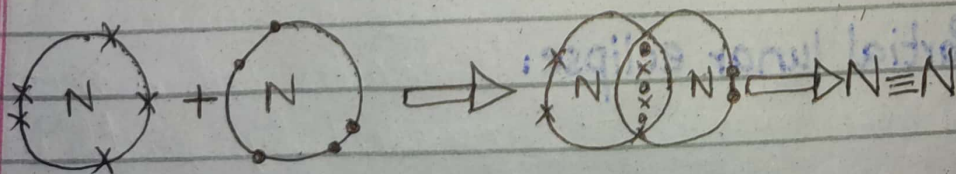


In order to form an oxygen molecule, each oxygen atom needs to gain two electrons to complete its outer shell. So two pairs of electrons are shared and two covalent bonds are formed.

3 Triple Covalent Bond:

Atoms can also bond together by sharing three pairs of electrons which is called triple covalent bond.

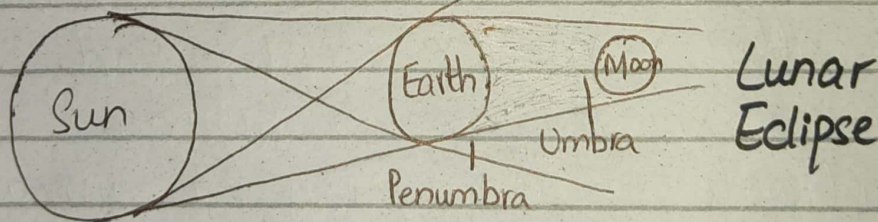
In order to form a nitrogen molecule, each nitrogen ~~molecule~~ atom needs to gain three electrons to complete its outer shell. So three pairs of electrons are shared and three covalent bonds are formed.



Q3(a) LUNAR ECLIPSE ECLIPSE:

The moon orbits around the earth and at the same time earth also orbits around the sun. Earth comes in between the sun and moon. It blocks the sunlight that reflects the moon and because of this sunlight moon shines. Instead of sunlight hitting moon, earth's shadow falls on it and this is called lunar eclipse.

A lunar eclipses can only occur when the moon is full and can be seen from earth at night. A lunar eclipse lasts for few hours and is safe to look at lunar eclipse. When sunlight cannot reach the moon and it do not have its own light so the moon will look dark.



Types of Lunar Eclipse:

- 1 **Total lunar eclipse:** It occurs when earth completely covers the moon.
- 2 **Partial lunar eclipse:** It occurs when moon is not completely covered by earth's shadow and part of a moon can be seen.

3 **Penumbral lunar eclipse:** It occurs when the moon passes through earth's penumbral shadow and is rarely visible from earth because there is slight change of color in the moon.

(b) **ENZYMES:**

Enzymes are proteins that act as catalysts to regulate the speed of chemical reactions by lowering its activation energy.

Functions of enzymes:

- 1 Enzymes take part in bodily movement with the help of the protein myosin which aids in muscle contraction.
- 2 They are also helpful in the digestive activity.
- 3 Enzymes break down large molecules into absorbable molecules.
- 4 Various enzymes work together in an order forming metabolic pathways, for example glycolysis.

(C) ELECTROMAGNETIC RADIATIONS:

Electromagnetic radiations are form of energy that is all around us such as light rays, radio waves, gamma rays, microwaves, X-rays.

Electromagnetic Spectrum:

1 Radio Waves:

These waves are longer than 1mm to several kilometers. They are longest waves but have the lowest energy connections with the lowest temperature. Radio waves carry signals for television and cellular phones. Radio waves are used to transmit data. These waves are used in satellites, radar, computer etc.

2 Microwaves:

Microwaves are shorter than radio waves but more than infra-red rays. We use microwaves to cook food, transfer information and useful in telephone communications.

3 Infra-red Rays:

They have longer wave length than visible light. These rays are invisible and contributes to climate change. Heat can be transferred through infra red radiation. Used in security lights.

4 **Visible Light:** The wavelength is less than infra-red rays but more than ultraviolet. It is easily detected by the human eye in colors of rainbow. Used in optical fibers, medicines etc.

5 **Ultraviolet:**

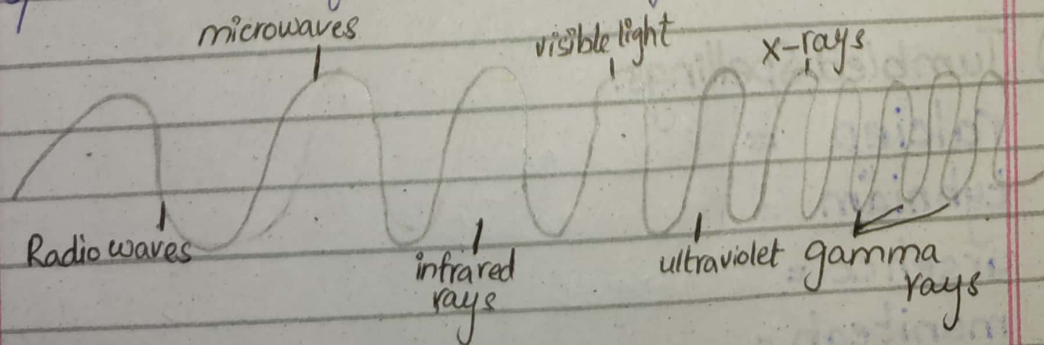
These radiations are found naturally in sunlight. There are three types of ultraviolet UVA (low), UVB (Medium), UVC (high). Mostly used in industries & medical & dental practices such as killing bacteria.

6 **X-rays:**

X-rays have high energy and are shorter than ultraviolet rays. Mostly used in hospitals such as pictures of bones.

7 **Gamma Rays:**

They have the shortest wavelengths and highest frequencies in the electromagnetic spectrum. Useful in treating cancer.



Electromagnetic Spectrum

(d) Are earthquakes & volcanic eruptions interconnected?

Yes, earthquakes and volcanic eruptions are interconnected because when there is volcanic eruption the magma in the earth rises to the surface it causes damage to the tectonic plates because the magma takes a lot of pressure and it disturbs other things in the earth which causes earthquake.

SECTION-II

Q8(a) Solution:

$$\text{Formula \& charges} = £20 + 4n$$

$$\text{Windows in a house} = 7n$$

$$= £20 + 4 \times 7n$$

$$= £20 + 28n$$

$$= 20 + 28$$

$$= 48$$

Brian will charge 48 pounds.

(b) Jumbled Spellings:

1 ralciep = Replica

2 tyhniām = Humanity

3 arsehcc = Caches

4 moniteah =

5 tareph = Threap

(C) Solution:

$$A = \{10, 11, 12, 13, 15\}$$

$$B = \{10, 12, 14\}$$

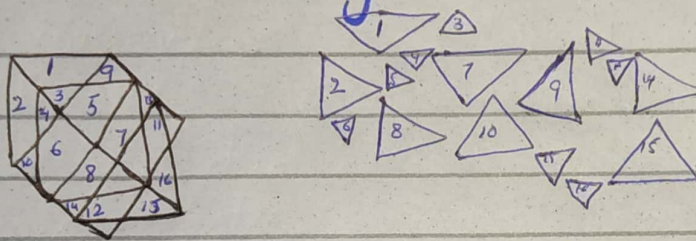
$$U = \{10, 11, 12, 13, 14, 15, 16, 18\}$$

$$\text{So } A \cup B = \{10, 11, 12, 13, 14, 15\}$$

$$A \cap B = \{10, 12\}$$

$$\text{Hence } A \cup B \{10, 11, 12, 13, 14, 15\} = A \cap B \{10, 12\}$$

(d) Number of Triangles:



There are total 16 triangles.

Q6(a) Solution:

arithmetic mean of 9, 8, 10, k, 12

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

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

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

$$k + 39 = 75$$

$$k = 75 - 39$$

$$k = 36$$