

SECTION # 1

QUESTION # 03

a. ANSWER:

INTRODUCTION

Eye is special sensory organ of human body, which gives sight to human. It contains various parts, that collectively function and transmit signals from eye to brain. It contains cornea, lens, sclera, retina, vitreous and humorous body fluid. Due to defectness caused by lens, light rays sometimes converge in front or behind the retina, due to which the sight get blurred. In order to correct vision, convex lens is prescribed for-sightedness (hyperopia) and concave lens is used in condition of near-sightedness (myopia).

DIFFERENT PARTS OF EYE:

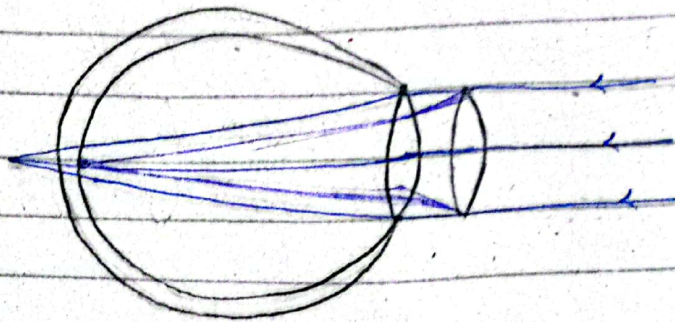
The parts of an eye are mentioned below:

- a. **Cornea:** Cornea is outer most layer of an eye, it is clear and transparent, bloodless. Due to this the light rays easily transmits inside the eye.
- b. **Lens:** Humans have convex lens, which 'converge' light rays on the retina for further transission to the brain.
- c. **Retina:** It is innermost layer of the eye, which contain rods and cons and several nerve endings. It then send signals to brain through optic nerve.
- d. **Iris:** Iris is muscular layer in the eye, which adjusts the entry of light rays inside the eye. It also helps in accommodation.
- e. **Schlera:** It is outmost layer of eye and contributes to around 70% of the eye. It is the white part of eye and continue with cornea at limbus.

CORRECTION OF EYE-SIGHT:

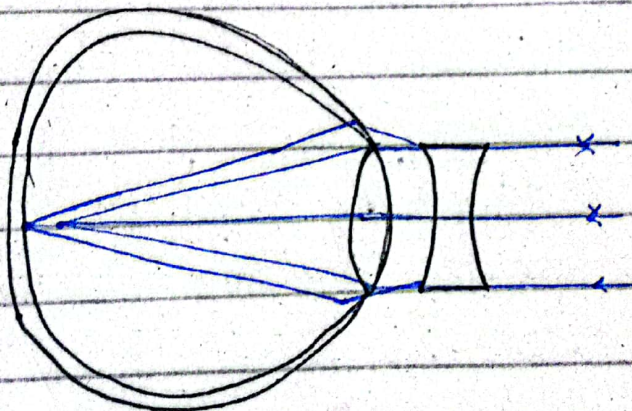
i. FAR-SIGHTEDNESS:

It is a condition, in which light rays converge beyond retina and thus convex lens is used to correct the vision.



ii. NEAR-SIGHTEDNESS:

It is a condition, in which light rays converge in front of retina and thus concave lens is used to correct the vision.



(b) ANSWER:

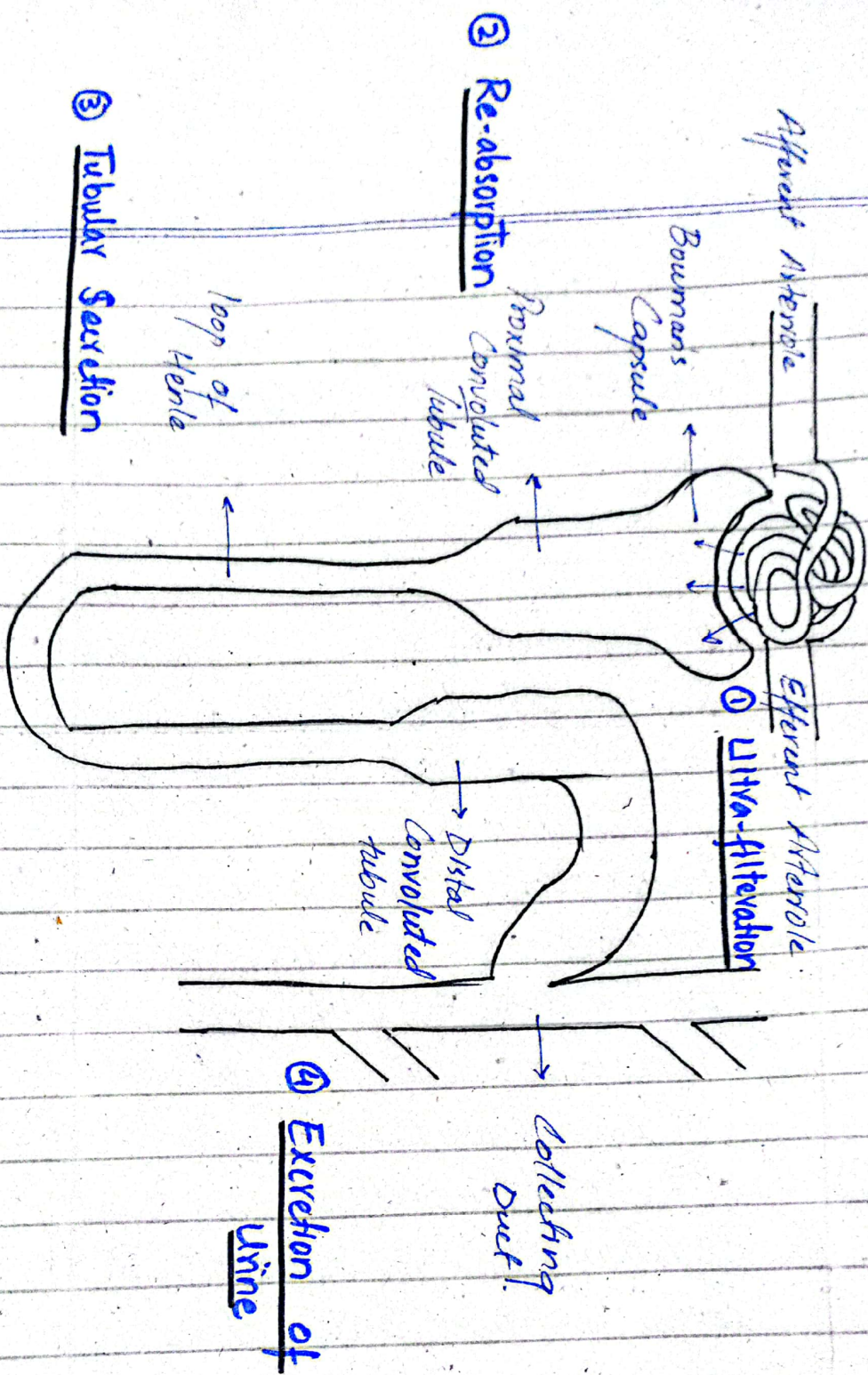
INTRODUCTION:

Kidney is an osmoregulatory organ of a body, which functions to purify blood and removes waste from the body. The human contains two kidney, which works through ultra-filtration, reabsorption, tubular secretion and excretion. Furthermore, it is also under the influence of several hormones, such as ADH and aldosterone. Kidney absorbs important molecules that were filtered from glomerulus capsule and secretes harmful waste products which escaped filtration, thus maintaining the balance of nutrients in the body. Moreover, it also helps in regulating the water content in human body by the help of osmotic pressure.

FUNCTIONING OF KIDNEY:

The kidney works through following steps:

- i. **Ultra-filtration:** This step involves filtration of blood through glomerulus and filters almost every waste from the body.
- ii. **Reabsorption:** This process involves reabsorption of important molecules such as proteins, carbohydrates, sodium, Potassium etc. These molecules filtered from the Bowman's capsule due to their small molecules.
- iii. **Secretion:** After the absorption of several molecules, many harmful substances ^{are} secreted from the interstitial fluid into the tubule.
- iv. **Formation and Excretion of Urine:**
At last, the water content is adjusted to finally excrete the urine, the distal convoluted tubule and collecting ducts adjust the water content and concentration of Na and K. This finally results in the excretion of urine.



FUNCTIONING OF URINE-

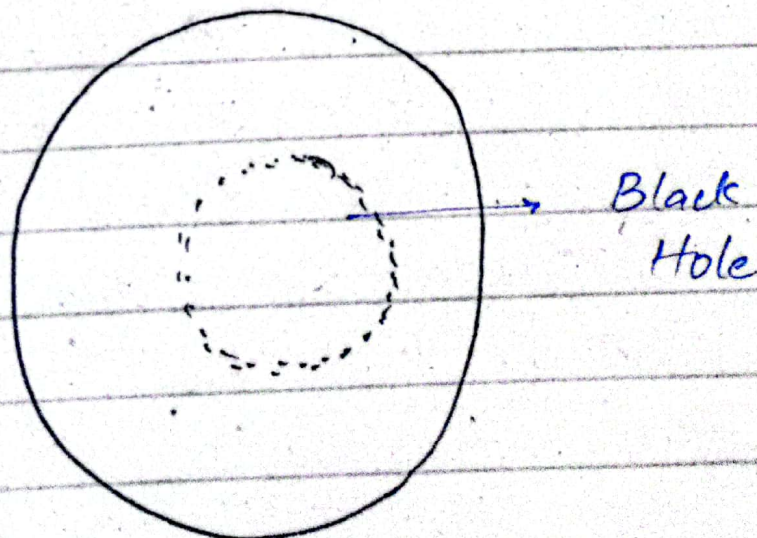
DIAGRAMMATIC

REPRESENTATION:

(c) ANSWER:

INTRODUCTION:

Black holes are the regions in the space, which have strong gravitational pull that even light cannot escape from it. These black holes were mystery for the world until Einstein gave the concept of black holes in his "theory of relativity". The black holes are formed, when stars collapses under its own gravitational pull. Recently, the image of Black hole was launched through hubble space telescope, which helped scientists to further study the existence of black holes in detail.



FORMATION OF BLACK HOLE:

The black hole is formed through following steps:

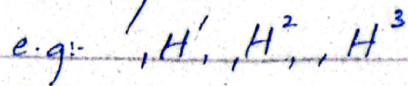
- i. Depletion of Nuclear fuel:
The star balances the forces of its gravitational pull and outward push through nuclear fusion reaction. This balance of forces eventually get altered due to depletion of nuclear reaction in the star.

- ii. Collapse of Star:
This resultantly, collapse the star under its own gravitational pull. The implosion of star is so great that it can also pull the adjacent bodies under its influence. Furthermore, the gravitational pull of black hole not even allow light photon to escape from it and thus absorbs light rays as well.

(d) ANSWER:

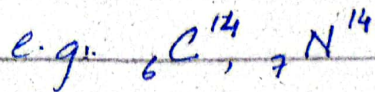
(i) ISOTOPES:

Elements which contain same number of Atomic number, but different number of mass number are called isotopes.



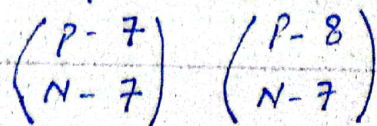
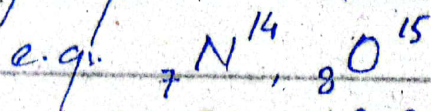
(ii) ISOBARS:

Elements which contain same number of mass number, but different Atomic number are called Isobars.



(iii) ISOTONES:

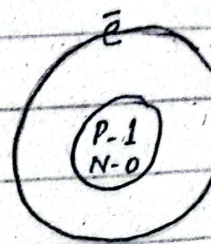
Elements which contain same number of neutrons, but different number of protons are called isotones.



ISOTOPES OF HYDROGEN:

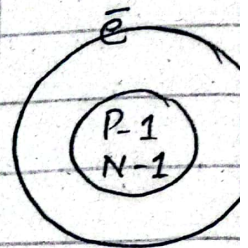
i. PROTIUM: ${}^1_1\text{H}$

It is simplest and most abundant form of hydrogen. It contains one proton and no neutron. Thus, it contains atomic number and mass number as one.



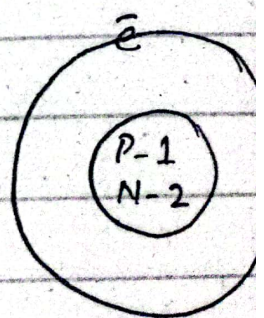
ii. DEUTERIUM: ${}^2_1\text{H}$

It is second isotope of hydrogen, which contains one proton, one neutron and one electron in its atomic structure.



iii. TRITIUM: ${}^3_1\text{H}$

It is radioactive form of hydrogen, which contains one proton and electron along with two neutrons in its atomic structure.



QUESTION - 04

(a) ANSWER

i) INTRODUCTION:

Earthquakes are generated, when there is disruption in the earth crust. The energy is then released resulting in seismic waves of earthquake. The earth crust contains tectonic plates, which move against each other resulting in loss of huge ~~to~~ shocks at the surface of earth. Earthquakes are different from tsunami in the nature of occurrence. The tsunami results from the disruption of oceanic plates, while earthquakes result from movement of tectonic plates. Tsunami moves the entire water ~~and~~ column from ocean floor to ocean surface.

ii. GENERATION OF EARTHQUAKES:

The earthquake is generated when tectonic plates of earth crust are moved and disrupts the earth surface. The resulting energy is lost in all direction, gives seismic shock at the surface. The tectonic moves in various categories mentioned below:

i. Convergent Movement:

The tectonic movement can either move towards each other and converge with each other.

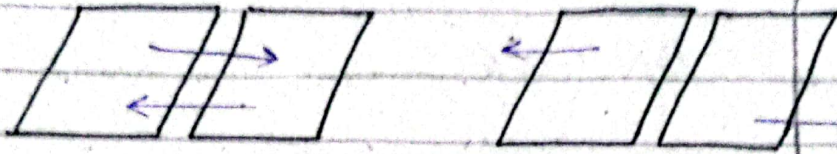
ii. Divergent Movement:

The tectonic movement can either move away each other, resulting in divergent movement.

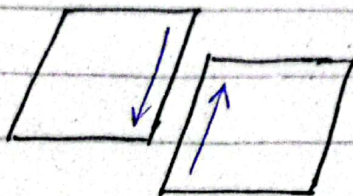
iii. lateral movement:

The lateral movement of tectonic plates results when plates moves or rub against each other, resulting in lateral movement.

Convergent
movement



Divergent
Movement



lateral
Movement:

DIFFERENCE FROM TSUNAMI::

Earthquakes are different from tsunami in their nature of occurrence. The tsunami occurs when the oceanic plates are disrupted resulting in the movement of entire oceanic water column from ocean floor to ocean surface. This causes the movement of ocean water at the earth's coastal surface and can cause huge destruction. However, earthquakes occur when tectonic plates are moved, resulting in huge damage at earth's surface.

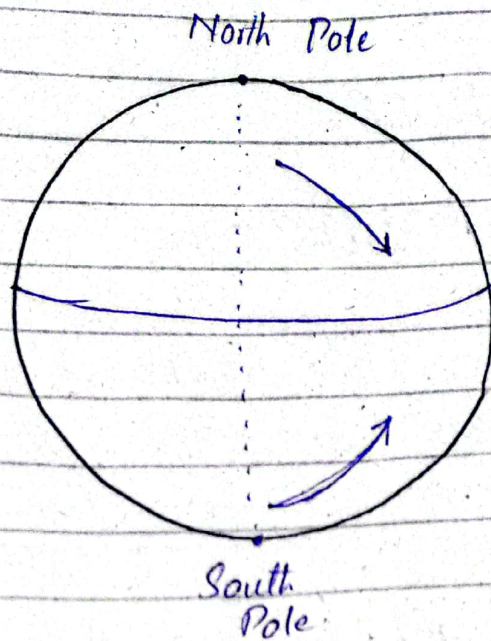
(b) ANSWER:

INTRODUCTION:

The rotation of earth is in such a way that it deflects the movement of object to the right of Northern hemisphere and to the left of Southern hemisphere. This apparent force that pushes the direction of moving object is known as Coriolis force. This force is responsible for oceanic currents, weather changes and wind direction.

CORIOLIS FORCE.

Coriolis force is apparent force, which moves the direction of object to the right of Northern hemisphere and to the left of Southern hemisphere. This results in seasonal direction of winds, oceanic currents and weather.



Coriolis
force:

FORMATION OF HURRICANES:

The hurricanes are formed at low-pressure areas with high winds and warm waters. The warm water evaporates resulting in condensation of water into clouds and thunderstorm. These cyclones occur in tropical regions and when attain a speed of 74 mph, it is considered as hurricane.

The cyclic movement of hurricanes moves the water resulting from Coriolis effect, which moves counterclockwise in Northern hemisphere and clockwise in Southern hemisphere.

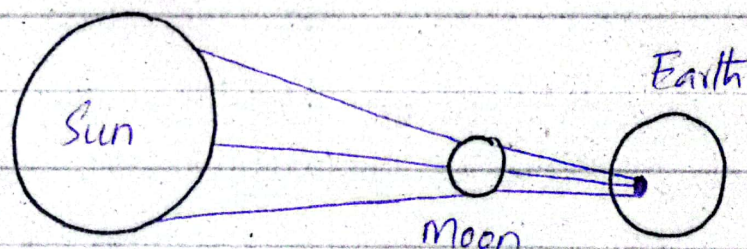
(c) ANSWER:

INTRODUCTION:

The rotation of moon and earth around the sun sometimes results in solar and lunar eclipses. This rotation may sometimes block the light of sun and forms the shadow on earth, resulting in eclipse. There are two types of eclipse explained below.

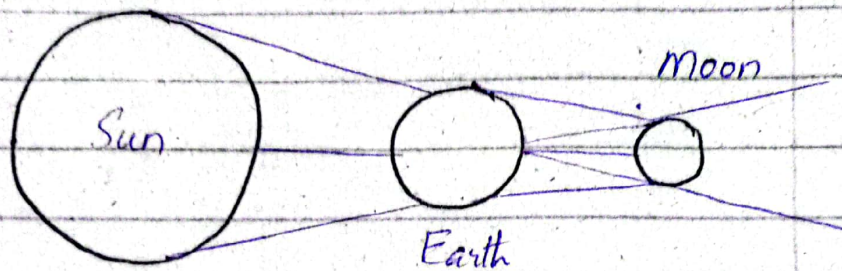
i. SOLAR ECLIPSE:

When the moon comes in between earth and sun, it results in solar eclipse. These are further categorized into total solar eclipse, partial solar eclipse and annular solar eclipse.



(ii) LUNAR ECLIPSE.

This type of eclipse occurs when the earth comes in between sun and moon, resulting in lunar eclipse. It is further categorized into total, partial or penumbral lunar eclipse.



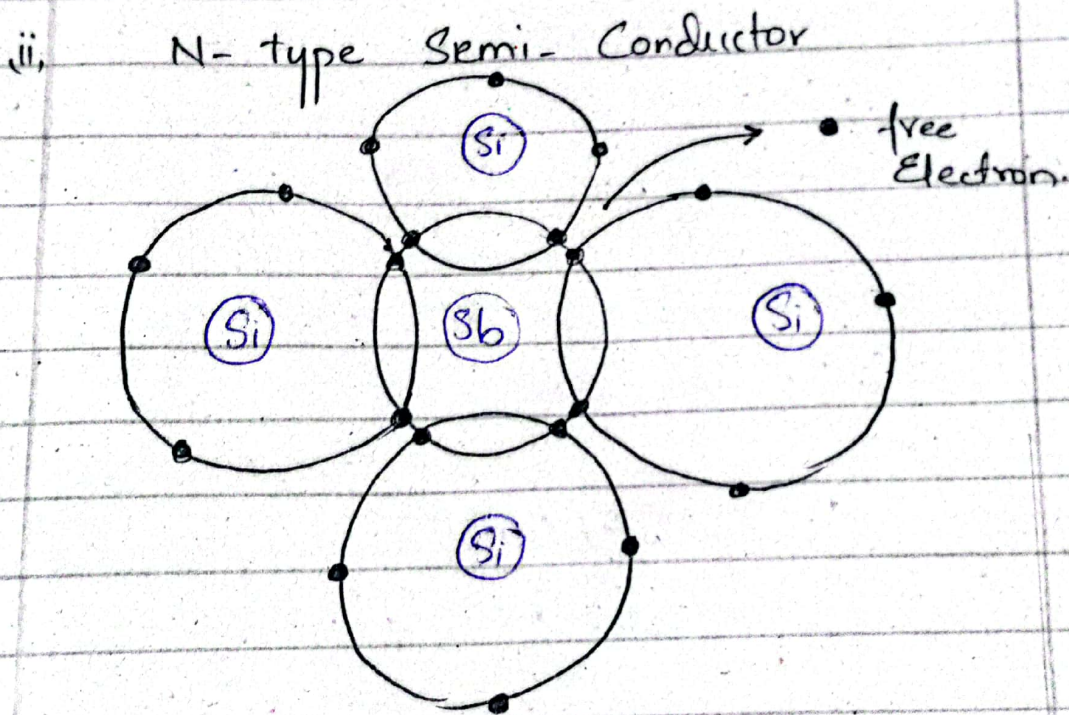
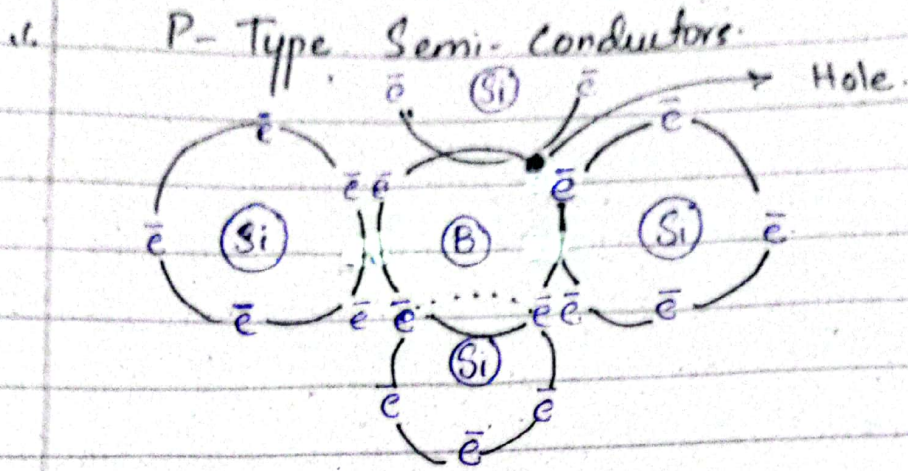
1d) ANSWER:

INTRODUCTION:

The semiconductor are certain elements that conduct electricity efficiently and thus are utilized in various electronic devices. However, these elements are sometimes added with impurities i.e. elements of IIIA and VA elements. This addition is called doping, which enhance their conducting capacity.

DOPING IN SEMI-CONDUCTORS.

The doping in semi-conductors occurs in two forms. Either IIIA group elements are added or doped to form N-type semi-conductors, or VA elements are doped to form P-type semi-conductors.



DIFFERENT TYPES OF CERAMICS:

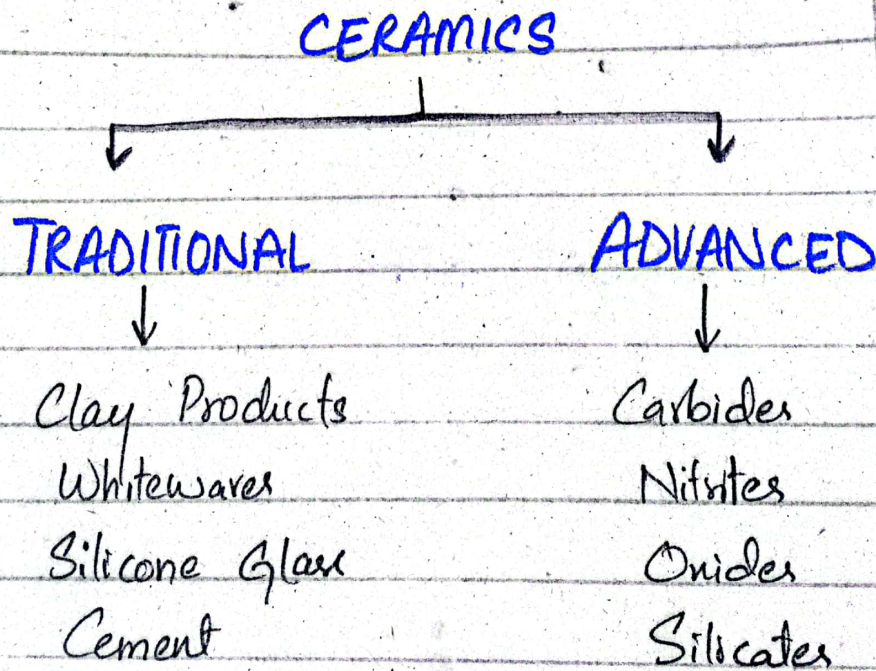
Ceramics have various types. Among them two broad category distinguish ceramics with each other. The different types of ceramics are given below.

i. Traditional Ceramics.

In this type of ceramics traditional clay products, whitewares, silicone glass and cement are included.

ii. Advanced Ceramics:

These ceramics include electroceramics consisting of silicate, carbides, pure oxides, nitrides and non-silicate glasses.



SECTION - II

QUESTION # 06:

(a) ANSWER:

Data:

Current age of son = 30 yrs

Father = y

Son = x

Solution:

According to condition:

5 years ago.

Father (y) = three the age of son (x)

Hence, $y - 5 = 3x$

Putting the values.

$$y - 5 = 3(30)$$

$$y - 5 = 90$$

$$y = 90 + 5$$

$$y = 95$$

Hence the current age of father

is 95 years.



(b) Data:

Mean: 50

Numbers: 10, 30, Y, 50

Solution:

Mean = $\frac{\text{Sum of Numbers}}{\text{Total no. of Numbers}}$

$$50 = \frac{10 + 30 + Y + 50}{4}$$

$$200 = 90 + Y$$

$$Y = 200 - 90$$

$$Y = 110$$

Hence the value of Y is 110.



c) Find the missing number.

a) 2, 6, 18, 54, _____

Solution:

Every number is multiplied
to 3.

$$2 \times 3 = 6$$

$$6 \times 3 = 18$$

$$18 \times 3 = 54$$

$$\text{Hence, } 54 \times 3 = 162$$

Thus, the missing number is 162.

b) 3125, 256, _____, 4, _____

Solution:

Each number illustrates
square-root of numbers.

$$\text{i.e. } 1^2 = 1$$

$$2^2 = 4$$

$$16^2 = 256 \text{ e.t.c.}$$

Thus,

The missing number is 64
which is square root of 8.



id. Data:

product of two numbers = 320
ratio of two numbers = 1:5
Difference of square of both
numbers = ??

Solution:

Suppose the numbers are x
and y .

Hence,

$$xy = 320 \text{ --- (1)}$$

$$x:y = 1:5 \text{ --- (2)}$$

$$x^2 - y^2 = ?? \text{ --- (3)}$$

According to eq (1)

$$\frac{x}{y} = \frac{1}{5}$$

$$y = 5x$$

Putting this in eq (2)

$$xy = 320$$

$$x(5x) = 320$$

$$5x^2 = 320$$

$$x^2 = \frac{320}{5} = 64$$

$$x^2 = 64$$

Taking square root on both sides

$$\sqrt{x^2} = \sqrt{64}$$

$$\boxed{x = 8}$$

Putting this value in y

$$y = 5x$$

$$y = 5(8)$$

$$\boxed{y = 40}$$

Therefore

$$x^2 - y^2 = (8)^2 - (40)^2$$

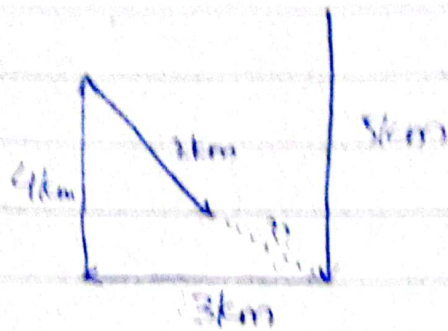
$$= 64 - 1600$$

$$= -1536 \text{ Ans.}$$



QUESTION # 08

10. Data and Identification of Data.



Solution:

According to the Diagram

$$H^2 = P^2 + B^2$$

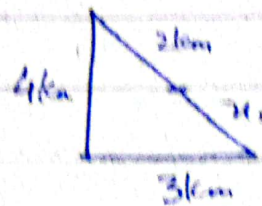
(Pythagorean theorem)

$$H^2 = (3)^2 + (4)^2$$

$$H^2 = 9 + 16$$

$$\sqrt{H^2} = \sqrt{25}$$

$$H = 5$$



Thus, as the cow already traveled 2km in this direction
Therefore,

$$5\text{km} - 2\text{km} = 3\text{km}$$

Hence, Cow is 3km away from the initial position.

b) Data:

Pizza divided into 8 slices.

If shirza picks 3 slices.

Probability to have slice with raisin = ?

Solution:

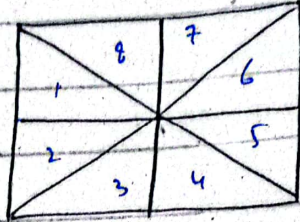
$$\text{Probability} = \frac{\text{Probability of event}}{\text{Total no. of events}}$$

$$\text{Probability} = \frac{3}{8}$$

Hence, the probability that shirza take the slice with raisin is three times out of 8 attempts.



(c) Dada:



No. of triangles = ?

Solution:

According to the diagram
there are 8 triangles in the
figure.



(d) Factors which can affect IQ:

(a) Genetics:

Many chromosomal abnormalities such as Down Syndrome, Klinefelter syndrome severely affect Intelligent quotient.

(b) Environment:

Environment also affect the IQ of a person, the external pressure of social groups, parents severely affects the IQ of a man.

(c) Socio-economic conditions:

Socio-economic conditions can put a toll on human's mental health, Poverty, unemployment can affect IQ of human.

(d) Nutrition:

Nutrition of a man have huge impact on human's IQ, Inadequate supply of nutrition hampers normal brain development, resulting in low IQ.