

# Question: 3a

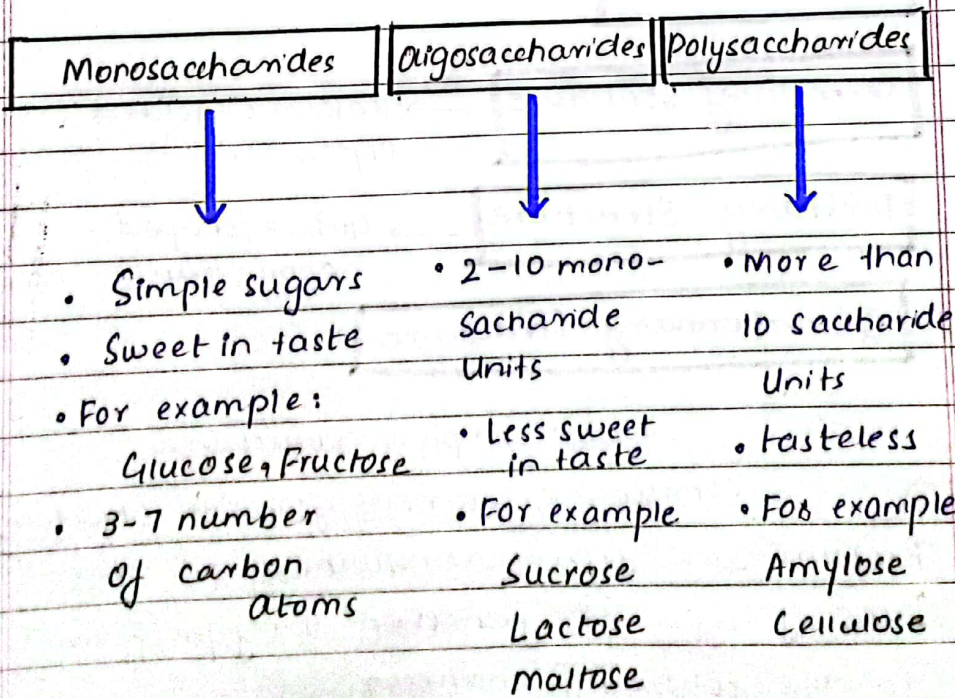
What are the proteins and carbohydrates?  
Give their digestion.

## Carbohydrates

Carbohydrates are the organic compounds defined as polyhydroxy aldehydes or polyhydroxy ketones. They perform various structural and junctional roles in the bodies of living organisms. They are also referred as sugars because of their sweet taste. They have general formula  $C_n(H_2O)_n$ .

### TYPES

Carbohydrates are mainly classified into three types based on the number of saccharide units



# Proteins

proteins are the polymers of Amino acids. Amino acids are the basic structural and functional units of protein. Proteins perform wide range of functions in the bodies of living organisms. From being the structural components of cell membrane to performing role in genetic expression, proteins hold significance importance for living organisms.

## Types

proteins are divided into following types based on their structural conformations

**Primary structure**

→ straight single polypeptide chain

**Secondary structure**

→ Helical or folded appearance

**Tertiary structure**

→ Globule shaped appearance.

**Quaternary structure**

↳ complex structure

consisting of various globules structures

Proteins are also distinguished on the basis of type of function they perform in the following manner.

3

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### Functional Proteins

↓  
Have functional roles, for example enzymes, antibodies

### Structural Proteins

↓  
Perform structural functions e.g., keratin

## Digestion of Carbohydrates and Proteins

Digestion of carbohydrates start from mouth. Salivary Amylase enzyme in saliva digests 3-5% of carbohydrate content of food. Further then in stomach digestion of carbohydrate continues alongwith mixing and churning action of stomach. In small intestine carbohydrate content of food is further digested by enzyme named Pancreatic amylase released from pancreas.

Digestion of protein starts in stomach by the action of enzyme pepsin. In small intestine proteins are further digested by hormonal secretion of pancreatic juice containing Trypsin. Further by the action of carboxypeptidase digestion of protein is completed in small intestine, converting proteins to amino acids.

## Question: 3b

Explain the following

### Atmospheric Pressure

Atmospheric pressure refers to the pressure exerted by air on earth's atmosphere. It is measured in pascals / mm of mercury. Atmospheric pressure is directly proportional to the density of air, and thus it decreases with increasing altitude.

$$\text{Atmospheric pressure} \propto \frac{1}{\text{Altitude}}$$

### Temperature

Temperature refers to the degree of hotness or coldness of atmosphere. Atmospheric temperature varies in different layers of earth's atmosphere mainly due to their composition and altitude differences.

Troposphere	→	0 to -51°C
Stratosphere	→	-51°C to 15°C
Mesosphere	→	-90°C to +15°C
Thermosphere	→	-90 - 2000°C

## Humidity

Humidity refers to the amount of water vapours present in the air. Warm air holds more humidity than cold air. Air humidity is measured using **hygrometer**. There are three types of humidity.

### **Absolute Humidity**

The real content of vapours in air

### **Relative Humidity**

Ratio of present to maximum humidity

### **Specific Humidity**

mass of water vapour per unit mass of air

## Question: 3C

## Earthquake

Phenomenon of earthquake refers to the shaking of earth due to sudden release of energy in the form of seismic waves from earth crust. This release of energy can be due to movements of tectonic plates, volcanic activity or human activities like mining etc.

These seismic waves produced as a result of release of energy from earth's crust travel from hypocenter (point of production) towards earth's surface. The intensity vary depending upon the depth of source. Intensity of earthquake is measured by Richter scale.

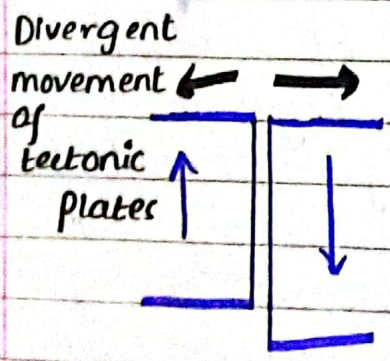
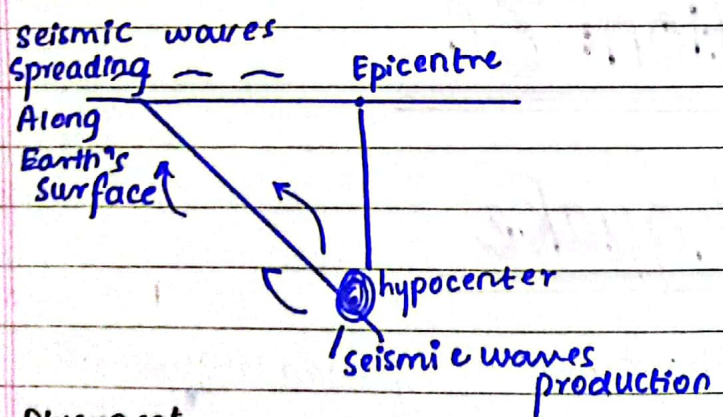
## Causes

### (i) Tectonic plate movements

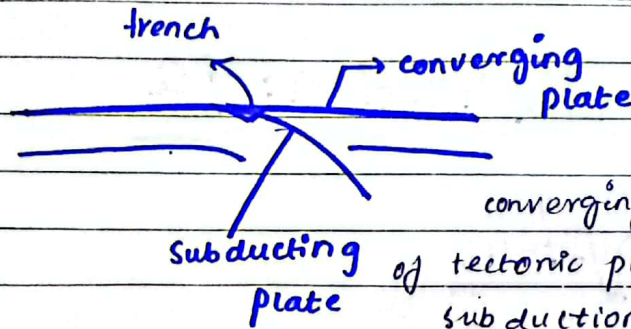
convergent, Divergent and transform boundaries.

### (ii) Volcanic Eruptions

## Diagrams explaining process of Earthquake



Tectonic plate movements:  
 Transform Boundaries  
 Tectonic plates slide past each other causing earthquake

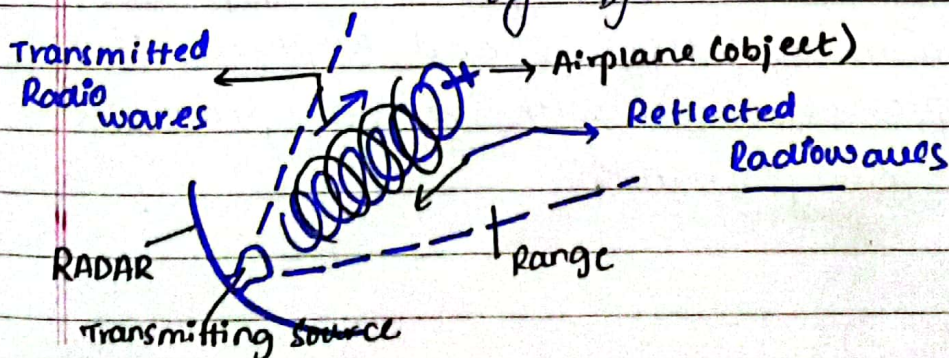


converging movements of tectonic plates, with subduction of ~~any~~ a particular tectonic plate also causes earthquake.

## Question: 3d

### Working of RADAR

Radio Detection and Ranging (RADAR) is used for various purposes including defence, aviation, weather forecast, and remote sensing etc. RADAR is the device operating using radio waves. Radio waves are transmitted by the RADAR to determine the distance, speed and presence of any object in the air. When these radio waves hit the target and are reflected by the target. Operating on the principle of doppler effect, RADAR interprets this reflected signal and presents details about the speed, and direction of object in the air.



## Question: 4a

### Solar System

Solar system refers to the Sun and the planets revolving around it. It is the system of a star and its revolving bodies. Solar system comprise of planets, asteroids, comets, dwarf planets and other celestial bodies in the space surrounding sun. Solar system is the part of galaxy named "milkyway". Solar system has a Sun and various celestial bodies including planets

**Sun:** Small sized star of milkyway in the Orion cygnus arm of wilkyway, 260 - 270 million terrestrial years away from the galactic centre.

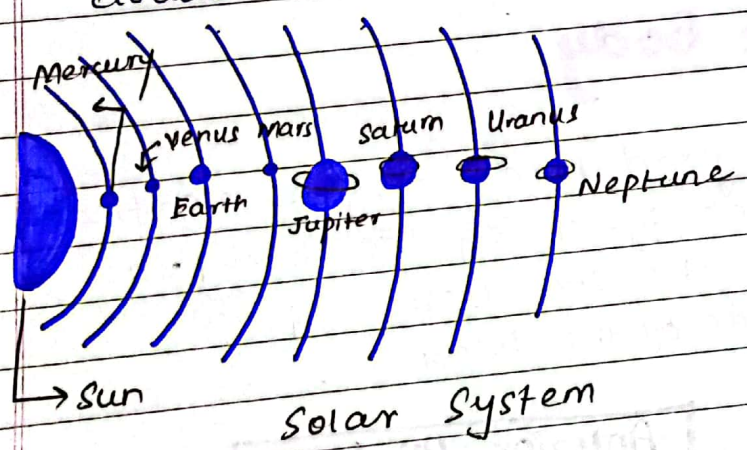
### Planets

Solar system consist of eight planets. Planets are the bodies revolving around Sun in the particular orbit and have particular shape. Solar system has Mars, Venus, Mercury, Earth, Jupiter, Saturn and, Uranus and Neptune as its planets, each with unique properties and composition.



# Others Celestial Bodies

Besides planets, solar system also comprise of various celestial bodies including dwarf planets, comets, materoids and asteroids. Dwarf planets are the planet like structures but do not fully fulfill the criteria of being the planet e.g. Pluto, Eres, Ceres. Asteroids are usually present in asteroid belt spreading from Mars to Jupiter. Comets, generally referred as dirty snowballs, are composed of ice, dust and gaseous clouds.

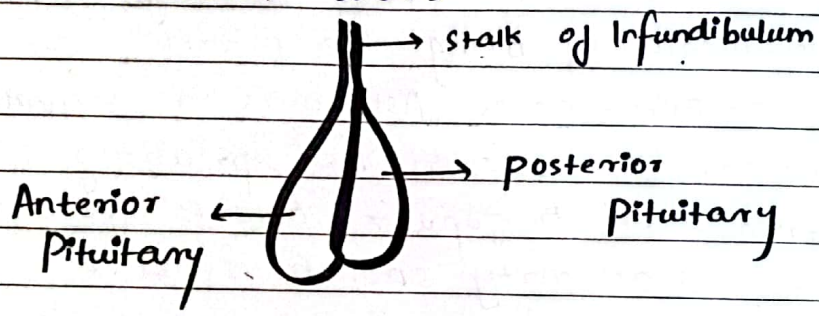


## Question: 4b

# Importance of Pituitary Gland

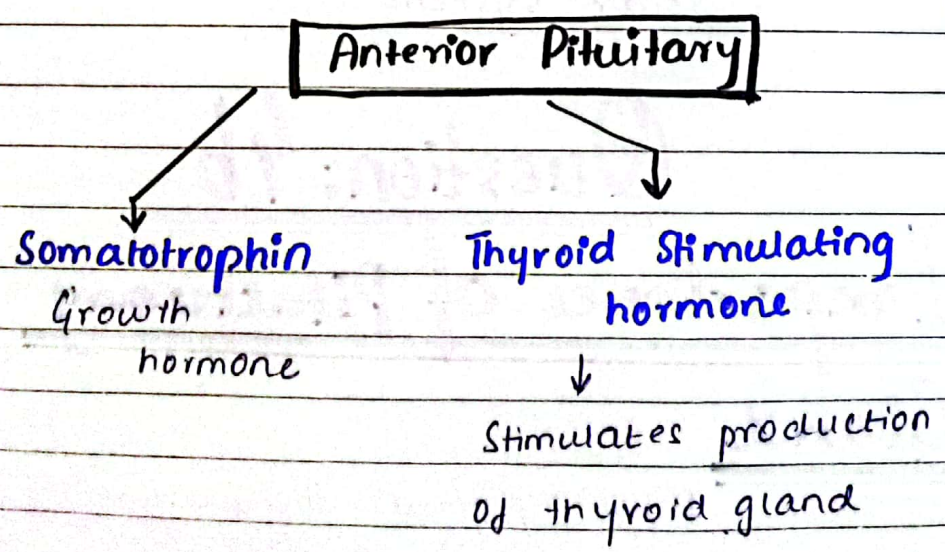
Pituitary gland is the master

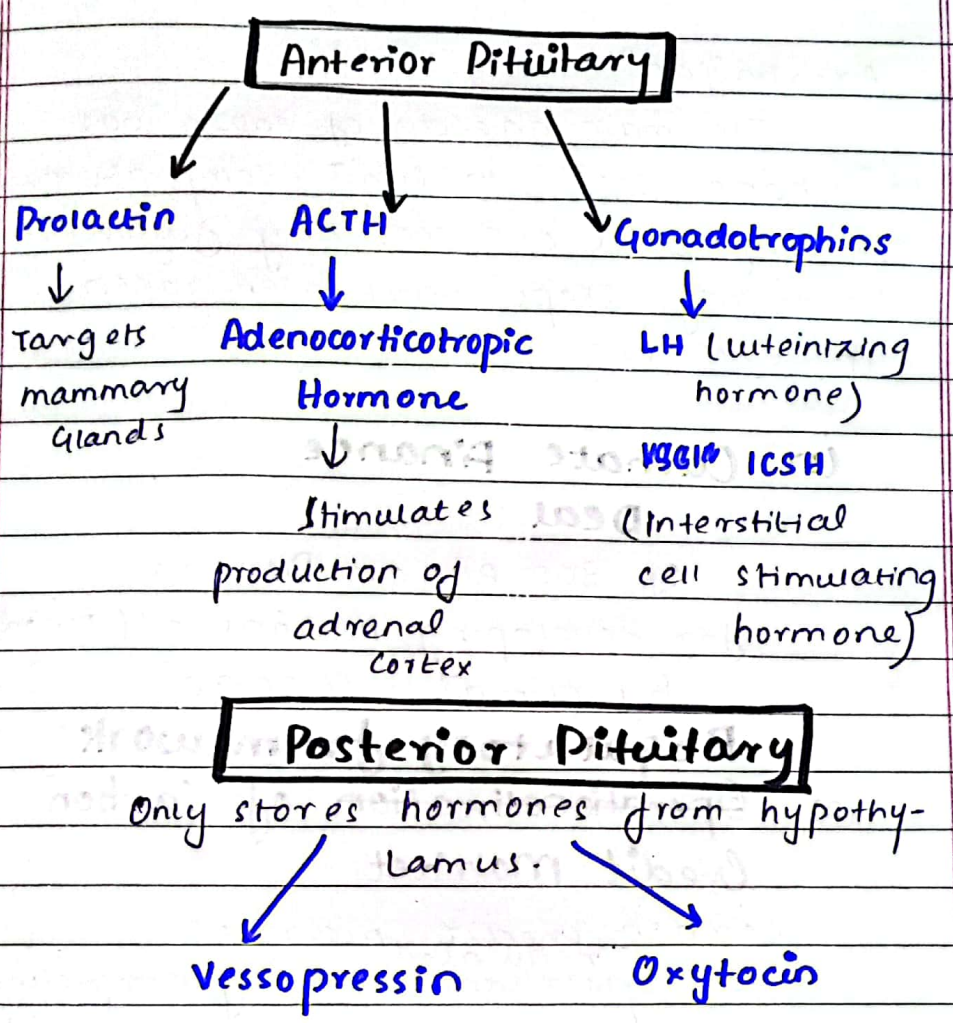
gland of the body. It is found just below the hypothalamus. Hypothalamus and pituitary gland are connected by a stalk of infundibulum made up of neurosecretory cells. Pituitary gland consists of posterior, anterior and median lobes.



## Importance: Master Gland of the Body

Pituitary gland holds central significance in endocrine system of the body, as it controls the secretions of all other glands of the body.





## Question: 4d

### **COP29 Limiting Temperature Rise by 1.5°C**

Conference of Parties (COP) meets annually to discuss progress and plans regarding climate change, as an international and joint effort to fight climate change. COP29 has ~~been~~ been held recently in Baku,

Azerbaijan.

The main agenda of COP29 was to enhance steps to limit temperature rise by 1.5°C and not any further. Following steps have been taken in this regard.

**(1) Climate Finance**

**Deal**

of 300 Billion Dollars for developing nations effected by climate change

**Regulatory framework**

**(2) Operationalization of Carbon Credit Market**

Carbon credit market was <sup>regulated</sup> operationalized by completing its initial regulatory framework.

**(3) Operationalization of Loss and Damage Fund**

**(4) Reduction in Methane Emissions**

## Question: 6b

### Solution

let the age of daughter =  $x$ .

Age of father =  $4x$ .

	Father	daughter
Ages current:	$4x = y$	$x$
After 5 years:	$y+5 = 3(x+5)$	$x+5$
After 5 more years:	?	? (Ratio?)

$$y+5 = 3(x+5)$$

$$y = 3x + 15 - 5$$

$$y = 3x + 10 \quad \text{--- (1)}$$

$$4x = y \quad \text{--- (2)}$$

Putting value of eq (2) in eq (1)

$$4x = 3x + 10$$

$$4x - 3x = 10$$

$$\boxed{x = 10}$$

current age of daughter = 10 years

current age of father =  $4x = 40$  years

Age of daughter after 10 years = 20 years

Age of father after 10 years =  $40 + 10 = 50$  years

$$\begin{array}{r} \text{Father} \\ \hline \text{daughter} \end{array} = \frac{50}{20}$$

father is now 2.5 times the daughter's age.

### Question: 6bC

### Solution:

Diameter of football = 12cm.

$$\text{Radius} = \frac{12}{2} = 6\text{cm.}$$

Volume = ?

$$\text{Volume} = \frac{4}{3} \pi r^3$$

Putting values in the formula.

$$= \frac{4 \times 3.14 \times (6)^3}{3}$$

$$= \frac{4}{3} \times 3.14 \times 216$$

$$= \frac{4}{3} \times 678.5$$

$$= 904.7 \text{ cm}^3.$$

Volume of football = 904.7 cm<sup>3</sup>.

### Question: 7a

### Solution

Average of consecutive numbers = 20

largest of number = ?

Let the numbers be =  $x, x+1, x+2, x+3, x+4, x+5, x+6$

$$\text{Average} = \frac{\text{sum of numbers}}{\text{total numbers}}$$

$$20 = \frac{x + x + 1 + x + 2 + x + 3 + x + 4 + x + 5 + x + 6}{7}$$

$$20 \times 7 = 7x + 21$$

$$140 = 7x + 21$$

$$140 - 21 = 7x$$

$$119 = 7x$$

$$x = \frac{119}{7}$$

$$x = 17$$

$$\begin{aligned} \text{Largest number} &= x + 6 \\ &= 17 + 6 \\ &= 23 \end{aligned}$$

## Question: 70

### Solution

Pedigree.    □ male  
                   ○ female

A's  
 C is father's nephew.

~~A's cousin of D~~

Thus C and A are cousins.

D is also A's cousin.

C and D are not brothers.

Date: \_\_\_\_\_

Day: \_\_\_\_\_

Thus C and D are also cousins.