SECTION - A

QUESTION : 3

(a) What are proteins and carbohydrates? Give their digestion.

PROTEINS :

Proteins are the cheif-builders of the body. They are complex organic compounds made up of carbon, hydrogen, oxygen and nitrogen. (sometimes sulphur and phosphorus.)

Composition:

The proteins are polymers made up of monomers called the amino acids. Amino acids are small nitrogen-containing molecules that serve as a building blocks for proteins and other organic compounds.

Functions:

1 : Proteins are used to synthesize enzymes (e.g. pepsine, trypsine), hormones (e.g. insuline, adrenaline), carrier proteins (eg. heamoglobin), and contractile proteins (e.g. myosine, actin).

2 : Proteins build new tissues of the body and maintain and replace damaged tissues.

3 : Proteins are protective as antibodies.

Protein Digestion:

1: **Ingestion:** Proteins are eaten.

2: **Mouth:** Saliva breaks down proteins slightly.

3: **Stomach:** Gastric juices (e.g. pepsin) break down proteins into smaller peptides.

4: **Small Intestine:** Pancreatic juices (eg trypsin) further break peptides into amino acids.

5: **Absorption:** Amino Acids are absorbed into the blood stream.

CARBOHYDRATES:

Carbohydrates are organic compounds composed of only carbon, hydrogen and oxygen.

They are the body's key source of energy. When carbohydrates are broken down by the body, glucose is produced.

Empirical Formula:

The empirical formula of carbohydrates is $C_m(H_2O)_n$.

Functions:

1: Carbohydrates are chief energy source in many animals.

2: Carbohydrates aid in regulation of nerve tissues and is the energy source for the brain.

3: Carbohydrates gets associated with lipids and proteins to form surface antigens, receptor molecules, vitamins and antibiotics.

Carbohydrate digestion:

1: **Ingestion:** Carbohydrates are eaten.

2: **Mouth:** Saliva contains amylase, which breaks down carbohydrates into simpler sugars.

3: **Stomach:** Gastric juices have little effect on carbohydrates

4: **Small Intestine:** Pancreatic juices (e.g. amylase) further break carbohydrates into simple sugars (e.g., glucose).

5: **Absorption:** Simple sugars are absorbed into the bloodstream.

(b) Explain the following.
Atmospheric pressure / temperature & humidity.

ATMOSPHERIC PRESSURE:

Atmospheric pressure is the force per unit area exerted by a body of air above a specified area, called an atmospheric column.

Measurement Device:

The device used to measure

atmospheric pressure is known as mercury barometer.

SI Unit:

The SI unit of atmospheric pressure is pascal (Pa).

Explanation:

Near Earth's surface atmospheric pressure decreases with hight at a rate of 3.5 millibars for every 100 feet. However, over cold air the decrease in pressure can be much steeper because its density is greater than warmer air. At heights above 1500 to 3000 meters, the pressure is low enough to produce mountain sickness and severe physiological problems.

TEMPERATURE:

Temperature is the measure of hotness or coldness expressed in terms of any of several scales, including Fahrenheit and Celsius.

Temperature Scales:

Three temperature scales are in general use today.

1: Fahrenheit scale (°F)
2: Celsius scale (°C)
3: Kelvin scale (K)

Explanation:

Temperature indicates the direction in which heat energy will spontaneously flow from a hotter body (one at higher temperature) to a colder body (one at a lower temperature).

HUMIDITY :

Humidity is the concentration of water vapours present in air. Water vapours, the gaseous state of water, is generally invisible to human eye.

Measurements of Humidity :

Three primary measurements of humidity are widely employed :

1: Absolute humidity

2: Relative humidity

3: Specific humidity

Explanation:

Humidity depends on the temperature and pressure of the system of interest. The small droplets of moisture in the air help the air hold on to heat better. So, in winter, when the temperature drops, we get even colder than we should, because the humidity also drops.

(c) Explain the ephemeron of Earth quake with diagram.

EARTH QUACKE:

Earth quake is the sudden release of energy in the form of seismic waves that create vibrations in the earth crust as a result of abrupt movement of tectonic plates.

Fault:

The surfaces where the earth slips are called fault

Hypocenter:

The surface where the earthquake starts is known as hypocenter.

Epicenter:

The surface directly above the hypo-center is called epicenter

Causes of Earthquake:

The surface of the earth is in continuous slow motion and the entire surface of the globe is covered by tectonic plates. Since they are all moving they rub against each other in some places (e.g San Andreas in california), sink beneath each other

in other (like the Peru-Chile Trench, South America) and spread apart from each other (like Mid Atlantic Ridge). At such places the plates stuck together at the edges but the rest of each plate is continuing to move, so the rocks along the edges are distorted. As the motion continues, the strain builds up to the point where the rock cannot withstand further bending. Hence, the rock breaks. An Earthquake is the shaking that radiates out from the breaking rock.

Earthquake can also occur due to volcanic eruptions, isostatic adjustments and some localised causes such as heavy drilling, nuclear experiments etc.

epicenter

fault

hypocenter
(focus)
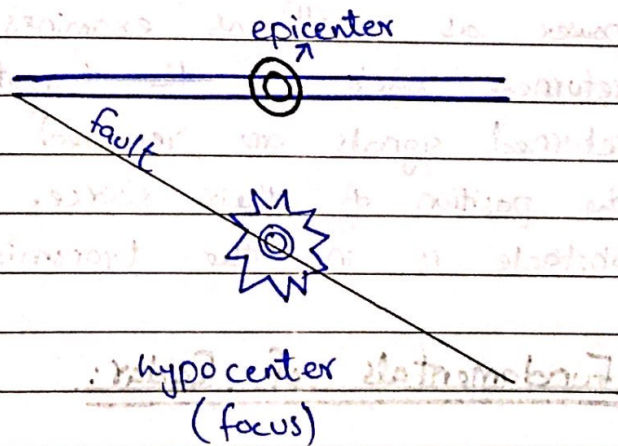
(d) Explain the working of RADAR.

RADAR :

RADAR stands for Radio Detection and Ranging System.

It is an electromagnetic system used to detect the location and distance of an object from the point where the RADAR is placed.

Working Principle of Radar:

It works by radiating energy into space and monitoring the echo or reflected signal from the objects. It operates in the UHF and microwave range. The radar working principle is very simple because it transmits electromagnetic power as well as examines the energy returned back to the target. If the returned signals are recieved again at the position of their source, then an obstacle is in the transmission way.

Fundamentals of Radar:

The RADAR system generally consist of a transmitter that produces an electromagnetic signal which is radiated into space by an antena. When this

signal strikes an object, it gets reflected or reradiated in many directions. This reflected or echo signal is received by the radar antenna which delivers it to the receiver, where it is processed to determine the geographical statistics of the object.

The range is determined by calculating the time taken by the signal to travel from the RADAR to the target and back. The target's location is measured in angle, from the direction of the maximum amplitude echo signal, the antenna points to. To measure the range and location of the moving object, the Doppler Effect is used.

The essential parts of this system includes:
1: Transmitter
2: Waveguides
3: Antenna
4: Duplexer
5: Receiver
6: Threshold Decision

target

transmitted pulse.

echo pulse from target

antenna beam width

radar antenna
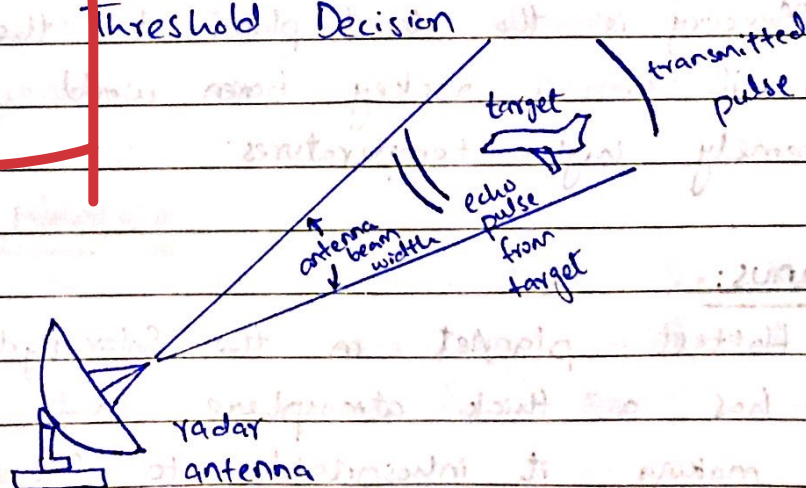
QUESTION : 4

(a) Write a note on solar system.

SOLAR SYSTEM :

The solar system consists of the sun, planets, dwarf planets, moons, an asteroid belt, comets, meteors and other objects. The **Sun** is the center of our solar system and all the other objects in the solar system revolve around the sun.

The solar system is **eliptical** in shape, which means that it is shaped like an egg.

Age of solar system :

Our solar system is around 4.5 billion years old.

Inner Planets :

1: Mercury :

Mercury is the closest planet to the Sun, it is a rockey barren world with extremely high temperatures.

2: Venus :

Hottest planet in the Solar system. It has a thick atmosphere that traps heat making it inhospitable to life.

3: Earth:
Our home planet, Earth is a terrestrial world with a diverse range of environments, supporting a wide variety of life forms.

4: Mars:
Known as the red planet, Mars is a rocky world with a thin atmosphere, a potential candidate for supporting life.

Outter Planets:

1: Jupiter:
Largest planet in our solar system, Jupiter is a gas giant with massive storms, including the famous Great Red Spot.

2: Saturn:
Another gas giant, Saturn is known for its stunning ring system, composed of ice and rock particles.

3: Uranus:
An icy planet with a tilted axis, Uranus has a thin atmosphere and a system of rings and moons.

4: Neptune:
The farthest planet from the Sun, Neptune is a cold, icy world with strong winds and a few small moons.
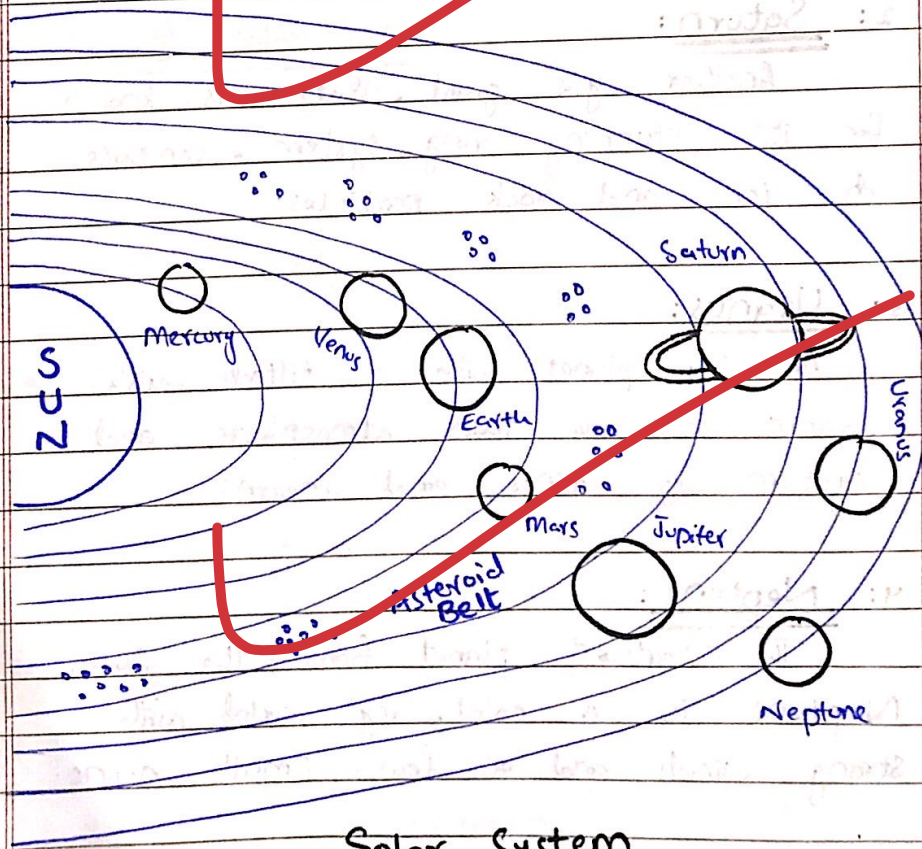
Other Objects:

Dwarf Planets:
Dwarf planet is defined as a celestial body that orbits around the sun such as pluto, Eris.

Asteroids:
Small, rocky objects that orbit the sun, mostly found in the asteroid belt between Mars and Jupiter.

Comets:
Icy bodies that release gas and dust as they approach the sun, creating bright tails in the sky.

Solar System

(b) Give the importance of pituitary gland.

PITUITARY GLAND :

Pituitary gland is a very small, equal to size of pea, oval gland lying atea the base of the brain.

Master Gland :

The pituitary gland is refferred to as the "master gland" because it monitors and regulates many bodily functions through the hormones that it produces.

Importance / Function of the Pituitary gland :

The main function of the pituitary gland is to produce and release several hormones that help carry out important bodily functions, including:

- Growth
- Reproduction
- Lactation
- Metabolism
- Water and sodium (salt) balance
- Labor and childbirth.

The pituitary gland sends signals to the organs and glands - via its hormones - to tell them what functions are needed and when.

Anatomy of Pituitary Gland :

Pituitary gland is divided into two lobes. Each of which has different cells and produces different types of hormones.

1 : Anterior lobe

2 : Posterior lobe

1 : Anterior Lobe :

It makes up 80% of the pituitary gland. It regulates growth, metabolism and reproduction through the hormones that it produces.
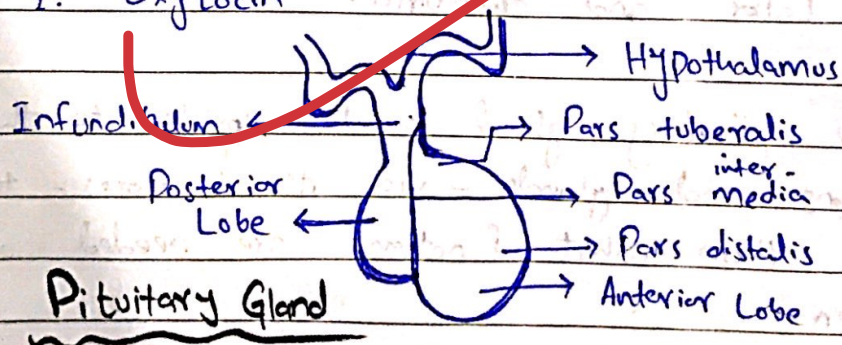
Hormones released from anterior lobe are :

1 : Tyroid-stimulating Hormone (TSH)

2 : Adrenocorticotrophic Hormone (ACTH)

3 : Follicle-stimulating Hormone (FSH)

4 : Luteinizing Hormone (LH)

5 : Prolactin

6 : Growth Hormone (GH) or Somatotrophin

7 : Melanocyte Stimulating Hormone (MSH)

2 : Posterior Lobe :

Posterior Lobe produces two hormones which are :

1 : Vasopressin

2 : Oxytocin

Infundibulum →

Posterior Lobe ←

→ Hypothalamus

→ Pars tuberalis

→ Pars inter-media

→ Pars distalis

→ Anterior Lobe

Pituitary Gland

(c) Differentiate RAM and ROM; also define the term Nibble, USB and motherboard.

RAM	ROM
a) RAM stands for Random Access Memory.	a) ROM stands for Read Only Memory.
b) RAM is volatile and data is erased when the computer is switched off.	b) ROM is non-volatile and data in ROM is permanent.
c) RAM is used for both reading & writing.	c) ROM is used for reading only.
d) RAM needs electricity to flow to retain information.	d) ROM is permanent.
e) Store data in MBs.	e) Store data in GBs.
f) Used in normal operations.	f) Used for startup process of computer.
g) Writing data is faster	g) Writing data is slower.

<u>Nibble:</u>

In computing, a nibble is a unit of information that is an aggregation of four bits; half of a byte. The unit is alternatively called nyble, half-byte or tetrade.

USB:

Universal Serial Bus (USB) is an industry standard, developed by USB Implementer Forum (USB-IF), that allows data exchange and delivery of power between many types of electronics.

Motherboard:

A motherboard is the main printed circuit board (PCB) in general purpose computers and other expandable systems.

It holds and allows communication between many of the crucial electronic components of a system, such as the central processing unit (CPU) and memory, and provides connectors for other peripherals.

QUESTION : 6

(a) The value of a washing machine depriciates at the rate of 10% every year. If its present value is Rs 8748 then what was the price of washing machine 3 years ago.

Given :

Final value = Rs 8748

rate = - 30 %

no. of years = 3 years

Required :

Initial price = ?

Solution :

We know that

$$Final\ price = initial\ price \left(1 + \frac{rate}{100}\right)^{no.\ of\ years}$$

The rate is negative since the price is depriciating.

Let the initial price = Rs x

$$x \times \left(1 + \frac{10}{100}\right)^3 = 8748$$

$$x \times \frac{9}{10} \times \frac{9}{10} \times \frac{9}{10} = 8748$$

$$x = 8748 \times \frac{10}{9} \times \frac{10}{9} \times \frac{10}{9}$$

$$x = Rs\ 12000$$

Conclusion: So, the price of machine 3 years back is equal to RS . 12000 .

(b) A father is 4 times the age of his daughter. If after 5-years, he would be three times of daughter's age, then further after 5-years, how many times he would be of his daughter age?

Given:
Father's age = 4 × daughter
Five years later
Father's age = 3 × daughter

Required:
how many times father would be of his daughter age after further 5-years.

Solution:
Let the present age of the daughter be x years.

So, the father's present age = $4x$ years

After 5 years
$$4x + 5 = 3(x+5)$$
$$4x + 5 = 3x + 15$$
$$4x - 3x = 15 - 5$$
$$x = 10$$

Present age of daughter is 10 years
Father's present age is $4 \times 10 = 40$ years

Ratio asked after 10 years
Age after 10 years will be
Father : Daughter = 50 : 20
$$= 5 : 2$$

Conclusion :

Father's age will be 2.5 times of daughter age after 10 years.

(c) What will be the volume of a football with diameter 12 cm ?

Given :

diameter of football = 12 cm

Required :

volume of football = ?

Solution :

We know that

$$\text{volume of a sphere} = \frac{4}{3} \pi r^3$$

So, radius = $\frac{d}{2}$ = $\frac{12}{2}$ cm

$$= 6 \text{ cm}$$

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

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

$$= \frac{4}{3} (3.14) \times 72$$

$$= 904.32 \text{ cm}^3.$$

Conclusion :

The volume of the football is 904.32 cm^3

QUESTION : 7

(a) <u>Average of 7 consecutive numbers is 20.</u>
Find the largest of these numbers.

<u>Given</u> :

Average = 20

<u>Required</u> :

largest number = ?

<u>Solution</u> :

Let consecutive numbers

x , $x+1$, $x+2$, $x+3$, $x+4$, $x+5$, $x+6$

We know that

$$Average = \frac{Sum\ of\ all\ the\ numbers}{total\ numbers}$$

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

$7 \times 20 = 7x + 21$

$140 = 7x + 21$

$7x = 119$

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

$x = 17$

Hence, highest number = $x + 6$

= $17 + 6$

= 23

<u>Conclusion</u> :

The largest of these numbers is 23.

(b) A told B that C is his father's nephew. D is A's cousin but not the brother of C. What relationship is there between D and C?

Given:

A is giving some information about his family to B.

(i) C is his father's nephew.

(ii) D is his cousin but not C's brother.

Required:

D and C's relationship = ?

Solution:

A and D are cousins.
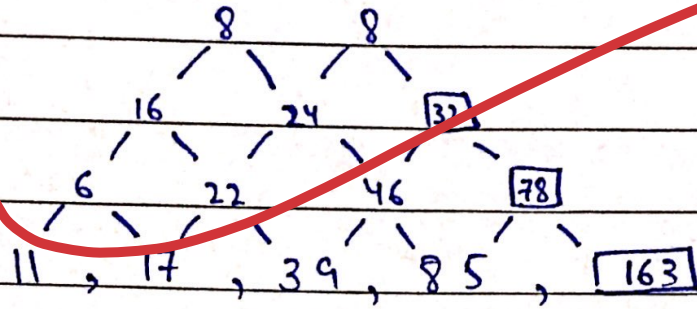
A and C are cousins

D is not C's brother

So it means

D and C are also cousins.

Conclusion:

Hence, D and C are cousins.

(c) Find the missing number in the sequence:

(iii)   11, 17, 39, 85, ___

$$
\begin{array}{ccccc}
& 8 & & 8 & \\
& \diagup\diagdown & & \diagup\diagdown & \\
16 & & 24 & & \boxed{32} \\
\diagup\diagdown & & \diagup\diagdown & & \diagdown \\
6 & 22 & & 46 & \boxed{78} \\
\diagup\diagdown & \diagup\diagdown & & \diagup\diagdown & \diagdown \\
11, & 17, & 39, & 85, & \boxed{163}
\end{array}
$$

Hence, the missing number is 163

Improve content
Use scientific terminologies
Use scientific examples from daily life

Keep proportion in all answers