

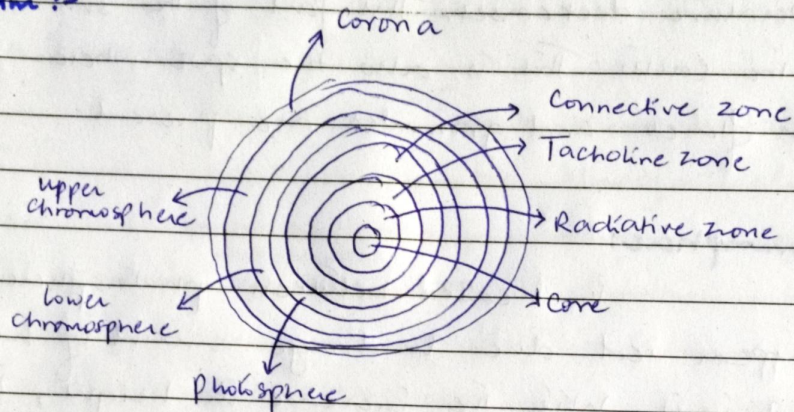
General Science and ability [Mock]

Question no. 3

(a)

'Structure of a sun'

Diagram :-



A Sun is a red giant star present in the centre of our solar system. It comprises of a core, three inner layers and three outer layers.

Core:

The core is the hottest and the central most region of the sun where nuclear fusion reactions take place i.e. where hydrogen is converted into helium.

Radiative zone:

This is the second layer of the sun which transports energy from the core of the sun to the outer layers in the form of electromagnetic radiations via photons.

Convection zone:

This is the outer most layer of the sun's interior and uses has a temperature of about 2 million degree celsius.

Photosphere:

It is the layer from which all the visible light of the sun is emitted. It is the coolest part of the sun because as its height increases, the temperature decreases. This part of the sun is visible from the earth. This is also the spot where sunspots, solar flares and granules are present.

Chromosphere:

is located between photosphere and corona. It appears red due to large amount of hydrogen present in it. With the increase in height, the temperature in this region ~~decreases~~ increases.

Corona:

Corona is the outermost layer of the sun's atmosphere. It ejects solar winds and solar flares as well.



(b) Tsunami:

A tsunami is a series of huge waves caused by the sudden displacement of the ocean usually as a result of an earthquake or a landslide under the ocean.

Effects of a Tsunami:

Once a Tsunami reaches the coast, it can cause destructive coastal flooding.

and powerful currents that can last from days to hours to days.

Recent tsunamis:-

Hunga Tonga:

The Hunga Tonga tsunami took place on 15th January, 2022, when the Hunga Ha'apai volcano erupted. This ~~tsunami~~ volcanic eruption triggered a tsunami causing ^{widespread} damage. This tsunami affected the entire Pacific ocean and was also recorded in the Atlantic ocean and the Mediterranean sea. A total of five people died from the tsunami while eighteen were injured.

Alaska tsunami event:

On July 9, 2011, an earthquake of 8.2 magnitude hit the southeast region of Alaska and triggered a small tsunami.

Generation of a tsunami:

Most of the tsunamis are caused by earthquakes at the plate boundaries. The movement causes friction, which in turn causes the plates to stick and start to accumulate energy. When the energy exceeds friction, the plates snap back into their position. This thrusts the water above, causing a wave to form which can travel large distances and are known as tsunamis.

③ Environmental pollution:

It is the degradation of our air quality, water, land and ^{of} our overall environment due to human activities such as deforestation, industrial and domestic waste, emission of green house gases, mining etc.

Effects of environmental pollution:

Environmental pollution causes air, water as well as land pollution.

Air pollution:

Uncontrolled traffic emissions and other green house gases are leading to global warming, severe and frequent climate weather patterns and are also leading to diseases such as respiratory issues, skin problems & eye issues. Similarly, it causes smog which damages both humans and crops.

Water pollution:

Water pollution contaminates drinking water and makes it unsafe for human consumption. It also disrupts ecosystem and harms aquatic life.

Land/soil pollution:

Soil pollution causes damage to crops (production, yield & quality is reduced) as well as and contaminated the water table.

Measures to curb environmental pollution:

Combating environmental pollution requires effort at multiple front by residents of the area as well as the government. Following are a few measures to curb it.

① Afforestation:

It is extremely important to plant more trees in order to curb environmental pollution. Trees not only produce oxygen but also absorb carbon dioxide and other pollutants from the environment and reduce overall temperature as well.

② Shift to renewable energy:

A shift to renewable energy such as hydro, solar and wind has become a dire need in order to reduce green house emissions and curb air pollution.

③ Proper waste management system:

It is essential to dispose waste properly so that it does not affect our water and soil.

④ Wireless communication:

Wireless communication is the transmission of information between devices without the use of wires, cables or any other physical connections. It is used in multiple technologies such as GPS, Wi-Fi, Bluetooth and satellite communication systems etc.

Working of a satellite:

A satellite relays and amplifies signals via a transponder and radio communications between a source and a receiver. In short, a satellite receives signals from the earth and retransmits those signals back via a transponder.

↔

Question no. 4

(a) Hepatitis:-

Hepatitis is the inflammation of the liver caused by various infectious viruses. Hepatitis have five main types referred to as Hepatitis A, B, C, D & E.

Causes of Hepatitis:

Hepatitis can be caused by viral infections, sharing of food and drinks, alcohol consumption, and several other conditions.

Hepatitis A is caused by Hepatitis A virus (HAV).

Hepatitis B is caused by HBV contact via blood & body secretions.

Hepatitis C is caused by HCV and is among the most common blood borne viral infections. It occurs from the contact of body fluids, vaginal secretions & semen.

Hepatitis D occurs from the contact of blood containing HDV.

Hepatitis E occurs from the exposure of HEV in food and water (especially by sharing food containers).

Symptoms of Hepatitis:

Common symptoms of Hepatitis include fatigue, flu-like symptoms, dark urine, pale stool, abdominal pain and other gastrointestinal issues.

Prevention of Hepatitis:

Some of the prevention methods are maintaining good hand hygiene, avoiding contact with contaminated food and water, practicing safe sex, avoiding sharing needles etc. Similarly it is important to refrain from alcohol and other drugs to prevent any all types of Hepatitis.

(b) Methods of food preservation

Following are the method of preserving food items for a longer period of time.

(1) Refrigeration

Refrigerating food items inhibit microbial growth because of low temperature and prevent the microbes from growing for a longer period of time. Fruits and vegetables can remain fresh in fridge/refrigerators for longer period of time.

(2) Fermentation

Is a chemical process that breaks down organic compounds like carbohydrates into acids and alcohols. The process controls spoilage i.e. the food will age & ripe but with friendly microbes instead of harmful ones. Foods like kimchi and cheese are preserved via fermentation.

③ Canning:

Involves heating food items at high temperatures to kill microorganisms before they cause spoilage. Then these food items are stored in air tight jars/cans to preserve for longer period of time.

④ Pickling:

Pickling involves preserving food in a high-acid solution such as vinegar to prevent spoilage from growing.

⑤ Fertilizers

Fertilizers are elements/^{substances} that are added to the soil to enhance its nutrients so that crop yields can increase and quality crop is ensured.

Types of fertilizers

① Cow manure

Cow manure is rich in nutrients such as nitrogen, potassium and phosphorus. It adds right nutrient balance into the soil and enhance the yield of the crop.

② Nitrogen fertilizers

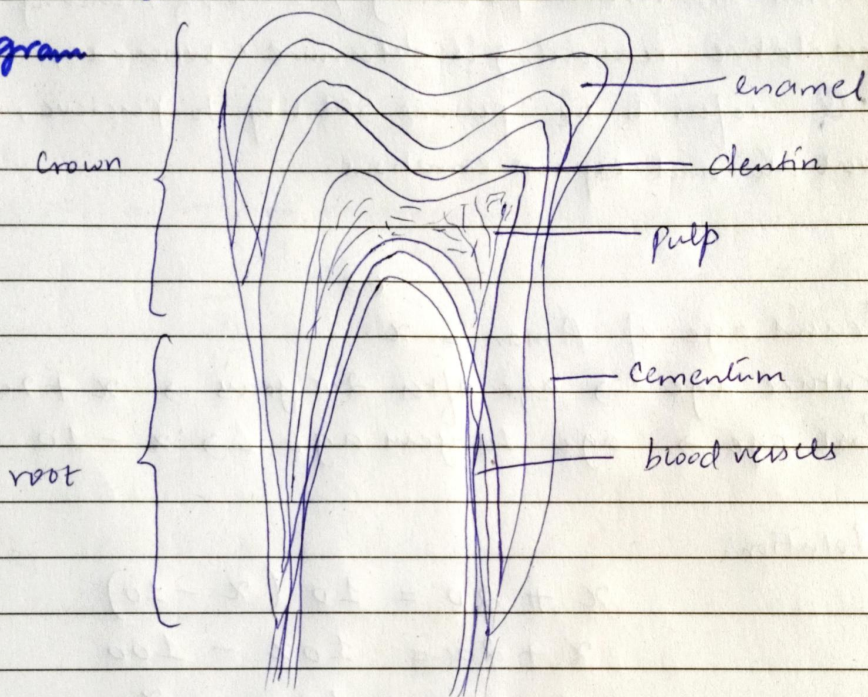
are used to promote the growth of green and leafy vegetables. These include urea, ammonium nitrate and ammonium sulfate.

(3) Phosphorus fertilizer

This type of inorganic fertilizer is added to reinforce roots and stems of the plant. It boosts flowering, seed production and fruit yield of the plant.

(d) Anatomy of a human tooth

Diagram



Tooth:

A tooth is a hard and a resistant structure present in the human jaw for the purpose of catching, chewing and masticating food. A tooth consists of a **crown** and one or more roots. The crown is a functional part that is visible above the ~~tooth~~ gum. Whereas the **root** is the unseen portion that supports the tooth in the jaw bone.



Section II

(a) I.Q and E.Q

I.Q stands for Intelligence Quotient that determines a mental ability of an individual. It is determined via a standardized test in which basic knowledge, spatial and visual processing, working memory and quantitative reasoning is determined. Whereas,

E.Q refers to the person's ability to perceive, control, evaluate and express emotions.

(b)

Present age of Aman = x

Future age \rightarrow age after 20 years $\rightarrow x + 20$

Past age \rightarrow age 10 years ago $\rightarrow x - 10$

Solution.

$$x + 20 = 10(x - 10)$$

$$x + 20 = 10x - 100$$

$$20 + 100 = 10x - x$$

$$120 = 9x$$

$$\frac{120}{9} = x$$

$$x = 13.33$$

Hence, the present age of Aman is ~~13~~ years 13.33 years

\leftrightarrow

(c)

Peter takes 40 min

John takes 60 min

Time taken per minute

$$\text{Peter} : \frac{1}{40} \text{ per min.}$$

$$\text{John} : \frac{1}{60} \text{ per min.}$$

Solution.

$$\frac{1}{40} + \frac{1}{60} = \text{Combined rate.}$$

Taking out a common denominator.

$$\begin{aligned} \frac{1}{40} + \frac{1}{60} &= \frac{3 + 2}{120} = \frac{5}{120} \\ &= \frac{1}{24} = 24 \text{ min.} \end{aligned}$$

Hence, it will take Peter and John 24 minutes to mow the lawn together.



(d)

 Let the error be x

 ideally it would have been multiplied by $5/3$

$$\text{hence} \rightarrow x \times \frac{5}{3} = \frac{5x}{3}$$

$$\text{Error} \rightarrow x \times \frac{3}{5} = \frac{3x}{5}$$

$$\text{Error} = \frac{5x}{3} - \frac{3x}{5} = \frac{25x - 9x}{15} = \frac{16x}{15}$$

 Percentage error $\Rightarrow \frac{\text{error value}}{\text{true value}} \times 100\%$

$$\frac{16/5x}{5/3x} \times 100\%$$

multiplying the fractions,

$$\left[\frac{16}{15} \right] \times \left[\frac{5}{3} \right] = \frac{16 \times 5}{15 \times 3} = \frac{80}{45} = \frac{16}{9}$$

Hence $\frac{16}{9} \times 100 = 106\%$



Question no 8

(a) Length of classroom = 15 feet.
Room's dimension = x

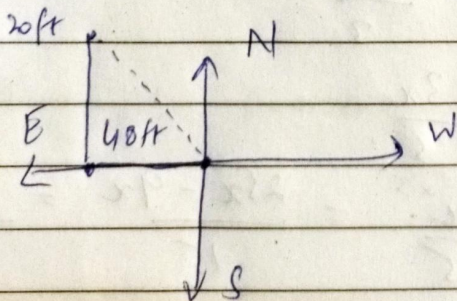
Width of classroom = 60% of its length.
6 in decimal = 0.60

$$\begin{aligned} \text{Width} &= 0.60 \times \text{Length} \\ &= 0.60 \times 15 \\ &= 9 \text{ feet.} \end{aligned}$$

Hence, the dimensions of the room are 15 feet by 9 feet.



(b)



Solution

$$\text{Hyp}^2 = \text{Base}^2 + \text{perpendicular}^2$$

$$= (\text{east}) + (\text{north})$$

$$\text{Hyp}^2 = 48^2 + 20^2$$

$$= 2304 + 400$$

$$= 2704$$

$$= \sqrt{2704}$$

$$\text{Hyp} = 52 \text{ feet}$$

If Veena had run straight to the water station, she would have run 52 feet.

(c)

$$\text{Average marks of 40 students} = 52.15$$

$$\text{Correction of marks of 1 student} = 85 - 49 = 36 \text{ marks.}$$

(to be added).

$$\text{Total marks of the 40 students} = 52.15 \times 40$$

$$= 2086.$$

$$\text{Corrected marks} = 2086 + 36$$

$$= 2122.$$

$$\text{New average} = \frac{\text{Corrected marks}}{\text{total students}}$$

$$= \frac{2122}{40}$$

$$= 53.05 \text{ (average marks of the class)}$$

(d)

Vegetable pizza = 37

Chicken pizza = 25

Neither = 3

Probability that a person like chicken pizza.

$$\begin{aligned} \text{Total people} &= 25 + 37 + 3 \\ &= 65 \text{ people.} \end{aligned}$$

$$\begin{aligned} \text{Chicken pizza} &= \frac{25}{65} \text{ people.} \\ &= \frac{5}{13}. \end{aligned}$$

 Hence $\frac{5}{13}$ people or $\frac{25}{65}$ people like chicken pizza.
