

## Section II

### Question 6

- a) Ratios of Blocks = 4 : 7 : 3 : 1  
Block A = 50 times more than the C  
B Number blocks = ?

Solution

Let number of blocks  $x \Rightarrow 4x + 7x + 3x + x = 50$   
and equate the  
statement

A = 50 times more than C

$$4x = 50 + 3x \Rightarrow 4x - 3x = 50 \Rightarrow x = 50$$

Since A = B then,  $7(50) \Rightarrow \boxed{350}$

So, the number of block 'B' one 350

- b) Pair of shoes = 80 \$  
Discount = 15%  
Sales Tax = 10% , Final Price = ?

Solution

Finding discount amount = 15% of 80  $\Rightarrow 0.15 \times 80 = 12$

Discounted Price = Original - Discounted Price  
 $= 80 - 12 \Rightarrow \boxed{68}$

Sales Tax Price = 10% of 68  $\Rightarrow 0.10 \times 68 = 6.8$

Final Price = Discounted P. + Sales tax P.  
 $= 68 + 6.8 \Rightarrow \boxed{74.8}$

↳ Distance train travelled = 42 km  
Average Speed = 36 km/h  
Time taken = ?

Solution

$$\therefore t = \frac{\text{distance}}{\text{Speed}} = \frac{42 \text{ km}}{36 \text{ km/h}} \Rightarrow \frac{7}{6} \text{ hours}$$

$t = 1 \text{ hour and } 10 \text{ mins.}$

Adding  $t$  into departure time (4:00 PM):

Arrival Time  $= 5:10 \text{ PM}$

↳ Unscrambled words:

i) Superintendent

ii) White

## Question 7

a) Cylinder radius  $r = 30 \text{ cm} =$   
Height  $h = 1 \text{ m} \Rightarrow 100 \text{ cm}$   
Volume  $V = ?$

Solution

$$\therefore V = \pi r^2 h$$

Putting values in the formula,

$$V = \pi (30 \text{ cm})^2 (100 \text{ cm})$$

$$= 90000 \pi \text{ cm}^3$$

b) Average age of 3 boys = 15 years  
 Ages ratio = 3:5:7  
 Age of the youngest = ?

Solution

Let  $x$  be the ages,  $3x$ ,  $5x$ ,  $7x$

$\therefore$  Average age =  $\frac{\text{Mean}}{\text{No. of boys}}$

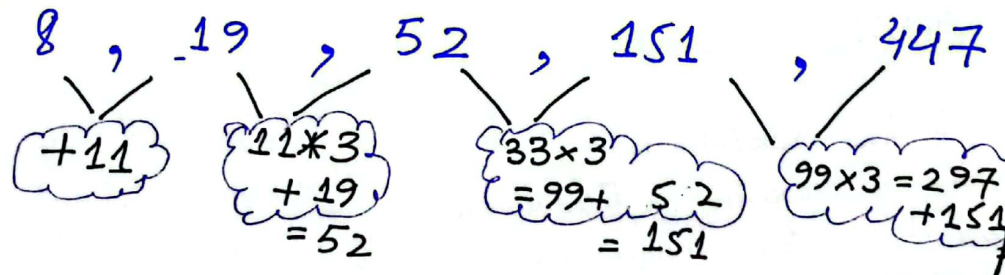
$\frac{15x}{3} = 15 \Rightarrow 5x = 15$

$x = 3$  so the age of the youngest boy :-

$3x \Rightarrow 9$

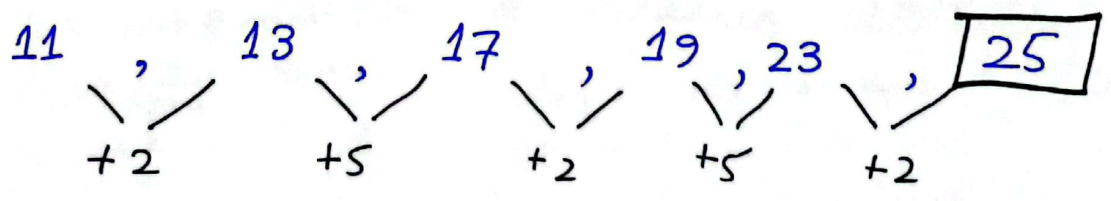
c) Identified series :-

if wrong number will be 447 because the pattern being followed is :-



448 and not 447  
 So, 447 is wrong

The correct answer is 25 because:



# Section I

## Question 2

### Artificial Intelligence the new electricity

Following is the tabulation of similarities showing how artificial Intelligence (AI) is the new electricity :-

Domain	AI	Electricity
Industry	It also automated industry as AI-driven robots not only maintain the supply chain but also enhances the inspection processes.	Enabled factory automation from power machinery to the assembly lines -
Household	Now AI-powered assistants control household devices and optimize energy usage through the smart appliances.	From lighting to assisting daily life chores through electric appliances, it assisted daily life -
Education	It has revolutionized the pre-existing technologies and took them one step ahead with AI-driven tools such as language translation tools and online learning platforms	Expanded access to the education technology such as computer and digitised the learning environment.
Governance	It helps in smooth public service delivery, from online complaint portals to predictive policing, it is ubiquitous -	From supporting public utilities to supplying power to the government offices, it became inevitable part of governance.



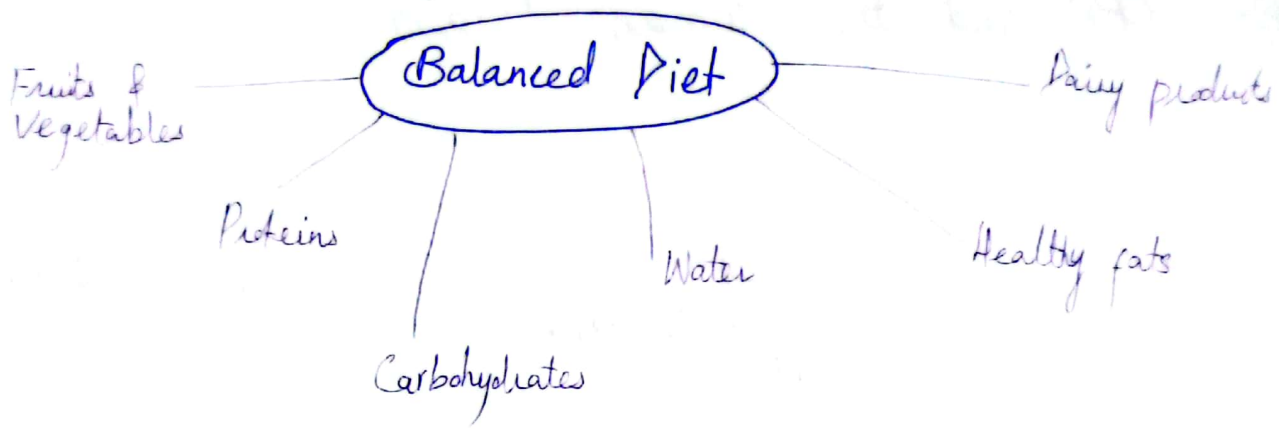
## 6) CPU and the Human Brain

CPU resembles the Human brain functioning in the following aspects:

Aspect	CPU (Central Processing Unit)	Human Brain
Function	Processes data and instructions of computer	Processes information and controls body functions
Processing Speed	Nanoseconds	Milliseconds to seconds
Parallel Processing	Multiple tasks performed simultaneously	Inputs and Outputs concurrently
Memory	Stores and <del>executes</del> <sup>accesses</sup> data in RAM	Stores and retrieves data in neural connections
Learning	Programmed and learned from data	Learns, adapts, forms new neural connections
Energy efficiency	Low power consumption for operation	Energy consumption based upon the activity.

## 7) Balanced diet & Vitamin deficiency disorders

A balanced diet, as the name suggests, is an intake that refers to eating food which maintains health and prevents nutritional deficiencies and excesses.



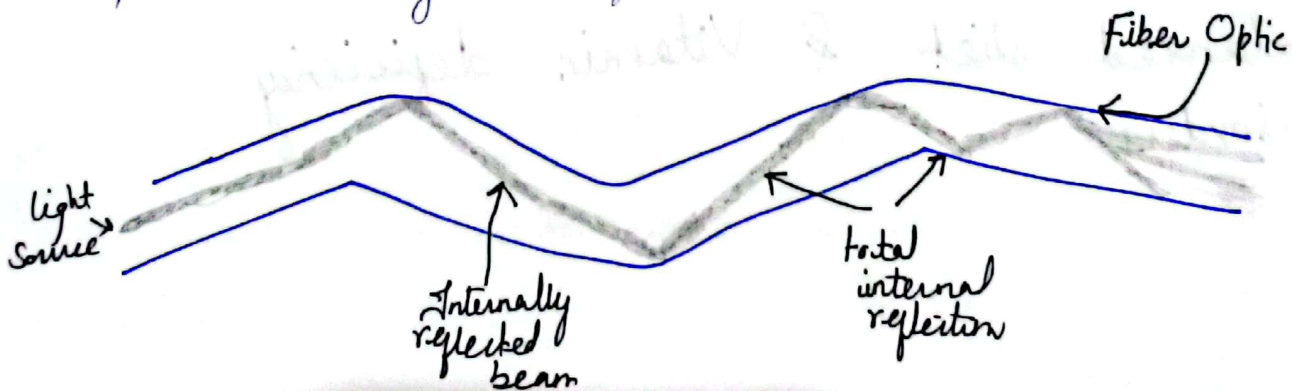
## Vitamin

## Deficiency Effects

- |   |  |
|---|--|
| A | <ul style="list-style-type: none"> <li>- Night blindness / Vision Problems</li> <li>- Weak Immune System</li> </ul>                    |
| B | <ul style="list-style-type: none"> <li>- Anaemia</li> <li>- Neurological disorders</li> <li>- Skin &amp; digestive problems</li> </ul> |
| C | <ul style="list-style-type: none"> <li>- Oral Problems</li> <li>- Weak Immune system<br/>(impaired wound healing, Scurvy)</li> </ul>   |

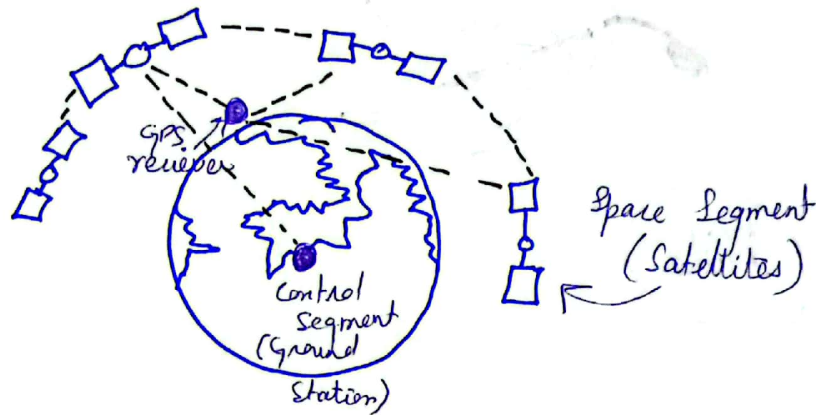
## d) Working of Optical Fibres:

Photons travel across the Optical fiber through the perpetual bouncing ~~are~~ of the cable walls as shown in:



# Global Positioning System (GPS)

It is a technology which provides location and time information anywhere on earth where there is an unobstructed path of light. Its working is demonstrated below:-



## Measuring 2D & 3D Locations

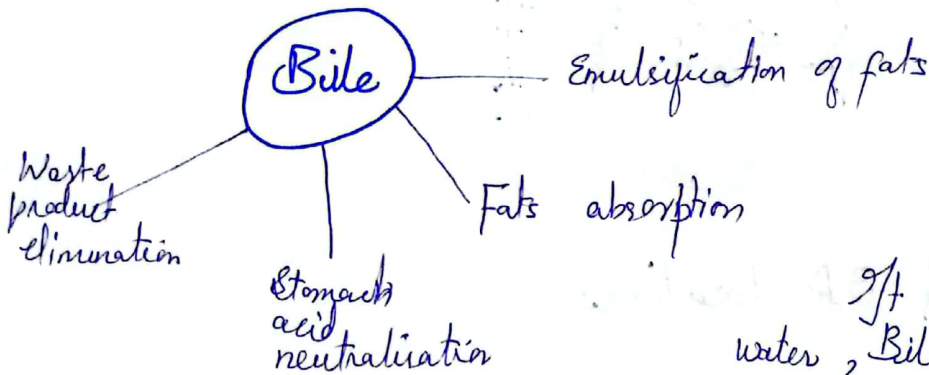
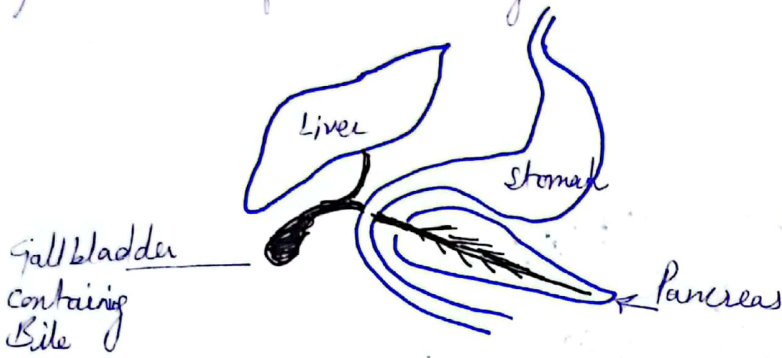
Through the process of trilateration, a 2-dimensional position comprising of  $\pm$  Latitude and Longitude are determined by GPS. GPS receiver needs the coverage of the object by atleast three satellites, it then measures the distance between the body/object and the satellite and their point of intersection determines the 2D location of something on earth. Whereas, for the 3-dimensional location determination where altitude adds into the preexisting dimensions, GPS needs coverage by atleast four satellites. The process of trilateration besides altitude above sea level gives the 3rd dimension of an object's location.

## Question 4



## a) Bile

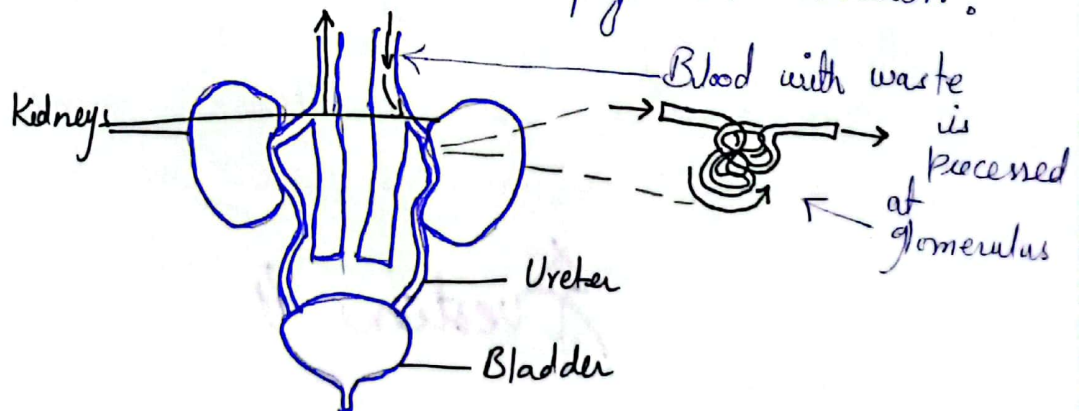
Bile is a digestive fluid produced by liver and stored in gallbladder before releasing into the small intestine -



It is composed of water, Bile salts, bilirubin, cholesterol and electrolytes that help in digestion -

## b) Kidney's role in excretion

Kidneys play a key role in maintaining homeostasis of the body through regulating electrolyte balance, blood pressure and removing waste products from the blood stream - Here are the roles it plays in excretion:





## Kidney's role in excretion

Hormone Production  
like erythropoietin  
and renin

Filteration  
to remove waste  
products from blood

Detoxification  
of drugs and  
related  
substances

Reabsorption of  
nutrients and added  
to the bloodstream

Homeostasis  
through acid-base,  
ion regulation

Secretion of  
ions to  
be secreted as  
an additional waste product

## c) Methods of Solid Waste Management

It can be managed through various methods such as:-

i) Source reduction and ~~design~~ as less packaging, reusable products, efficient manufacturing process.

ii) Recycling & reuse — Repurposing materials conserves natural resources, reduces energy consumption and decreases landfill waste

iii) Composting — <sup>Biological</sup> decomposition of organic waste that add nutrients back to the soil such as food scraps and trimmings.

iv) Landfilling — Nonreusable waste is buried in landfills

v) Incineration and Waste to energy — Takes place through combustion and gasification processes.

vi) Bioremediation — Microorganism breakdown waste through aerobic and anaerobic digestion

vii) Pyrolysis & Gasification — Thermal gases converting waste into valuable gases such as biochar, liquid fuels.

## d) Define terms:

### i) Anaemia

Insufficient red blood cells

Symptoms: fatigue, weakness, shortness of breath

Causes: Iron deficiency, vit B12 deficiency, genetic disorder

Treated with supplements & causes

Diagnosed through blood test

### ii) Appendicitis

Appendix Inflammation

Symptoms include the abdominal pain, vomit, fever

Caused by blockage of appendix lumen or infection

Treatment includes appendectomy or antibiotics

Diagnosed through imaging, blood test

### iii) Spleen

filters blood, removes damaged cells and stores platelets

Reservoir of immune cells

Located in upper left abdomen

Diseases include

Splenomegaly and splenic rupture

Corrective surgery and glasses

### iv) Myopia

Vision problem where distant objects appear blurry

Diagnosed by eye exam

Caused when eyeball too long or cornea too curved

### v) Isotones

Same number of neutrons but different number of protons in atomic nuclei

Used in classification scheme

For example, Carbon-12, Nitrogen-13, Oxygen-14