

# GENERAL SCIENCE AND ABILITY

## SECTION II

Explain complex concepts in simple terms.

Use real-life examples.

Include diagrams and flowcharts

for competitive edge.

Discuss practical applications of

scientific concepts.

Show all steps and working for calculations.

Use diagrams and graphs

The three digit number = ?

Solution:

Let the three digit number be =  $xyz$

According to the given conditions:

$$x + y + z = 15 \quad \text{--- (1)}$$

$$y + z = 12 \quad \text{--- (2)}$$

$$y - z = 2 \quad \text{--- (3)}$$

from equation (2)

$$y + z = 12$$

$$y = 12 - z$$

Putting the value of  $y$  in equation (3)

$$12 - z - z = 2$$

$$12 - 2z = 2$$



$$12 - z = 2z$$

$$10 = 2z$$

$$\Rightarrow 2z = 10$$

$$z = \frac{10}{2}$$

$$\boxed{z = 5}$$

Putting the value of  $z$  in ②

$$y + z = 12$$

$$y + 5 = 12$$

$$y = 12 - 5$$

$$\boxed{y = 7}$$

Putting the values of  $z$  and  $y$  in ①

$$x + y + z = 15$$

$$x + 7 + 5 = 15$$

$$x + 12 = 15$$

$$x = 15 - 12$$

$$\boxed{x = 3}$$

Therefore, the required three-digit number is: **375**



## Part b

### Given

- A man ordered 18 slices of pizza
- Each slice = 40 gm
- Price of smaller pizza = Rs. 320
- Small : medium : large = 2 : 3 : 4

### To Find

price of total pizza = ?

weight of total pizza = ?

### Solution

weight of each slice = 40 gm

$$\therefore \text{weight of total Pizza (18 slices)} = 40 \times 18 \text{ gm} \\ = 720 \text{ gm}$$

Therefore, the weight of total pizza is equal to 720 gm.

To find the total price, consider the ratios given. According to the question:

$$\text{Small : medium} = 2 : 3$$

The price of small pizza = Rs 320

$$\therefore 320 : \text{medium} = 2 : 3$$

Since product of extremes = product of means

$$\therefore 320 \times 3 = 2 \times \text{medium}$$

$$\text{or } \text{medium} = \frac{320 \times 3}{2}$$



$$\text{medium} = 160 \times 3$$

$$\text{medium} = \text{Rs. } 480$$

Similarly, according to the question

$$\text{Small: large} = 2:4$$

$$320 : \text{large} = 2:4$$

$$2 \times \text{large} = 320 \times 4$$

$$\text{large} = \frac{320 \times 4}{2}$$

$$\text{large} = 320 \times 2$$

$$\text{large} = \text{Rs. } 640$$

Now since the man ordered 18 slices,  
let each slice be equal to  $x$ .

According to the given conditions:

$$2x + 3x + 4x = 18$$

$$9x = 18$$

$$x = \frac{18}{9}$$

$$x = 2$$

Therefore, the man ordered two of all small, medium and large pizzas.



Therefore, the total price of all pizzas is given by:

$$\text{Price} = 2 \times \text{small} + 2 \times \text{medium} + 2 \times \text{large}$$

$$\text{Price} = 2 \times 320 + 2 \times 480 + 2 \times 640$$

$$\text{Price} = 640 + 960 + 1280$$

$$\boxed{\text{Price} = \text{Rs. } 2880}$$

Therefore, the total price of the pizzas is equal to Rs. 2880.

**Part c**

Given

Diameter of a circle is 6 cm

To Find

Circumference of circle = ?

Area of circle = ?

Solution

Since radius of a circle is half the diameter:

$$\text{radius} = \frac{\text{diameter}}{2}$$

$$r = \frac{6}{2}$$

$$\boxed{r = 3 \text{ cm}}$$



Circumference of a circle is given by.

$$C = 2\pi r$$

$$C = 2(3.142)(3)$$

$$= 6 \times 3.142$$

$$C = 18.852 \text{ cm}$$

Therefore, the circumference of the circle is given equal to 18.852 cm.

Area of the circle is given by

$$A = \pi r^2$$

$$= 3.142 \times (3)^2$$

$$= 3.142 \times 9$$

$$A = 28.278 \text{ cm}^2$$

Therefore, the area of the circle is equal to 28.278 cm<sup>2</sup>.

**Part d**

(i)

13, 24, 46, 90, 178, ?

13, 24, 46, 90, 178, 354

11    22    44    88    176



Looking at the series, it can be observed that the difference between the consecutive numbers keeps on doubling. For example, the difference between first two numbers is 11 and the difference between next two numbers is 22. By following this sequence the difference between 172 and the missing number will be 176. Resultantly, the missing number is 354. Therefore, the completed series is:

13, 24, 46, 90, 172, 354

(ii)  
5, 6, 9, 14, 21, ?

5, 6, 9, 14, 21,  
 $\underbrace{\quad}$   $\underbrace{\quad}$   $\underbrace{\quad}$   $\underbrace{\quad}$   $\underbrace{\quad}$   
 1 3 5 7 9

From the above series, it can be observed that consecutive odd numbers are being added to obtain the next term of the series. For example, 1 is added to the first term to get the second term and then 3 is added to the second term to obtain the third term. By following the similar sequence, 9 would be added to 21 to get the ~~the~~ missing number. Therefore, the missing number is 30.



The completed series is given by:

5, 6, 9, 14, 21, 30

Q8

**Part a**

Given

- width of a rectangular room is 60% of its length
- length of classroom is 15 ft.

To find

Dimensions of the room = ?

Solution

According to the given condition:

width = 60% of length

$$\text{width} = \frac{60}{100} \times 15$$

$$\boxed{\text{width} = 9 \text{ ft}}$$

Therefore, dimensions of the room = ~~9~~ × 15 ft  
or width × length = 9 × 15 ft



## Part b

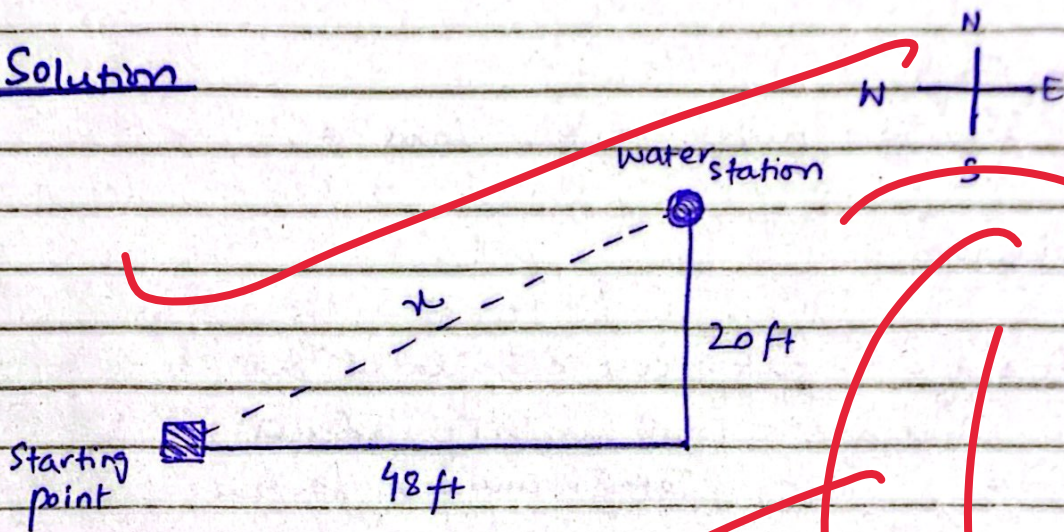
### Given

Veena ran 48ft east then turned and ran 20ft north

### To find

If she had run straight, how far would she have run = ?

### Solution



To find the distance between the starting point and the water station, using Pythagoras theorem:

$$x^2 = (48)^2 + (20)^2$$
$$= 2304$$

$$x = \sqrt{2304}$$

$$x \approx 48$$

If Veena had run straight towards the water station, she would have run



for approximately 46 ft in total.

### Part c

#### Given

Class average of 40 students was 52.15 when marks of a student were taken to be 49 instead of 85.

#### To Find

Average marks of the class = ?

#### Solution

Average marks are calculated as:

$$\text{Average} = \frac{\text{Total marks of students}}{\text{Total number of students}}$$

According to the given condition:

$$\text{Average} = \frac{39(x) + 49}{40} = 52.15$$

where  $x$  = average marks of remaining 39 students

$$\Rightarrow 39x + 49 = 52 \times 40$$

$$39x = 2080 - 49$$

$$x = \frac{2037}{39} \quad \text{--- (1)}$$

52	2080
40	49
2080	80
	49
	31
52.15	2037
40	49
0000	36
20800	31
207600	



Now the new average when 85 marks are taken instead of 49 is given by:

$$\text{New Average} = \frac{39(x) + 85}{40}$$

Putting value of  $x$  from equation ①

$$\text{Average} = \frac{39\left(\frac{2037}{39}\right) + 85}{40}$$

$$= \frac{2037 + 85}{40}$$

$$= \frac{2116}{40}$$

$$\text{Average} = 53.05$$

2037	
85	
2116	52.9
2037	40   2116
85	200
2122	116
53.05	80
40   2122	360
200	560
122	X
120	
200	
200	

Therefore, the new average is equal to 53.05.

### Part d

#### Given

37 people like vegetable pizza, 25 like chicken pizza, 3 people like neither

#### To Find

Probability that person likes <sup>chicken</sup> pizza when asked randomly = ?



## Solution

Total number of people =  $7 + 25 + 3$

$$\therefore n = 65$$

Probability that the person likes chicken pizza is given by:

$$P = \frac{25}{65}$$

$$P = \frac{5}{13}$$

Therefore, the probability that the person likes chicken pizza when asked randomly is  $\frac{5}{13}$ .

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# SECTION 1

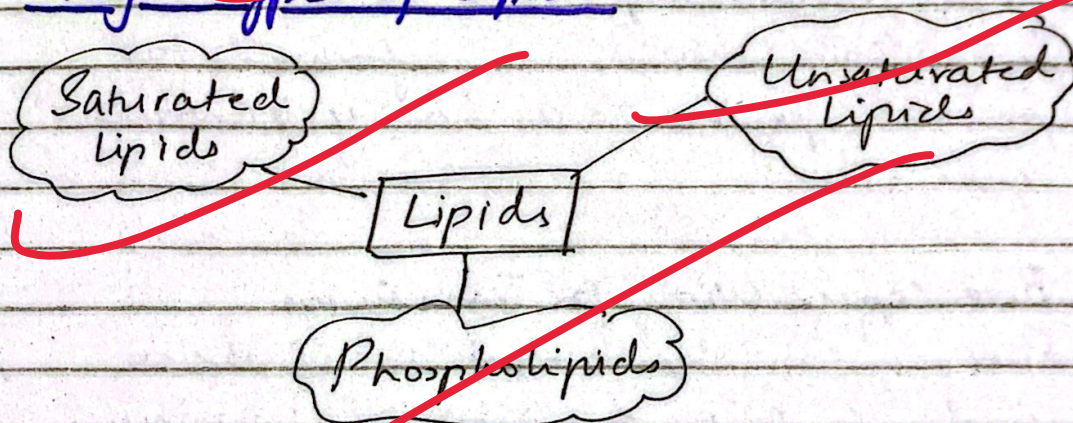
Q2

## Part a

### Lipids

Lipids are fats that consist of saturated amount of energy. Lipids are an essential part of diet that humans need to lead a healthy life.

### Major Types of Lipids



There are three major types of lipids

Saturated lipids: lipids with high fat concentration

Unsaturated lipids: lipids with low fat concentration

phospholipids: lipids consisting of phosphorus



## Functions

- 1) Keep energy in stored form
- 2) Provide energy when needed
- 3) Provide cushion between stomach wall and acids present

## Part 6

### Measures for Energy conservation

#### a) Infrastructure Reforms

Infrastructure should be reformed to prevent power losses during electricity generation.

#### b) Pure Copper Wires for Transmission

Pure copper wires should be used so that they provide minimum resistance while transmission, reducing power losses.

#### c) Proper padding of wires

Proper padding of wires should be ensured to mitigate power loss during transmission process.



#### d) Improving Public Transport

Public transport should be improved so that people prefer it over personal vehicles.

#### e) Promoting Energy Efficient Appliances

Energy efficient appliances should be promoted and encouraged through subsidies.

### Measures for Sustainable Use

#### a) Using Renewable Energy Resources

Renewable energy resources such as solar, wind, biomass, and hydropower should be used instead of fossil fuels.

#### b) Public Transport

Public transport should be used for daily commute instead of personal vehicles as it saves fuel.

#### c) Using Energy Efficient Appliances

Energy efficient appliances should be utilized in homes, offices, schools, etc., to ensure optimal use of energy.

#### d) Preventing Wastage

Wastage should be prevented at all cost. For example, light should be turned off before leaving the room.

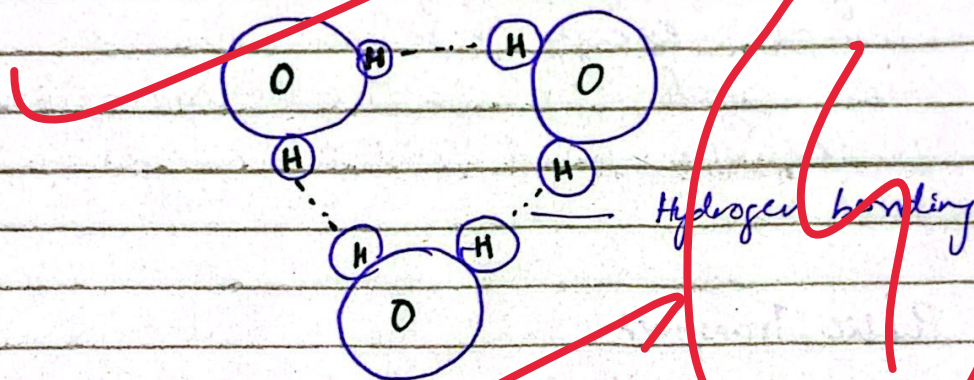


## Part C

### Hydrogen bonding

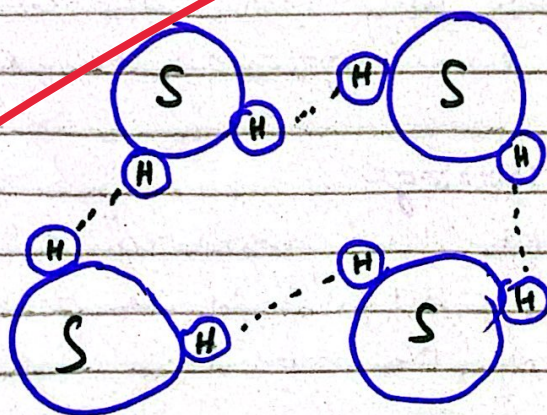
The phenomenon in which hydrogen atom of a molecule is attracted towards the hydrogen atom of another molecule, is known as hydrogen bonding. It is a weak bond.

### Structure of $H_2O$



Hydrogen bonding, as depicted by dotted lines is observed in water ( $H_2O$ ) molecules

### Structure of ~~$H_2S$~~ $H_2S$





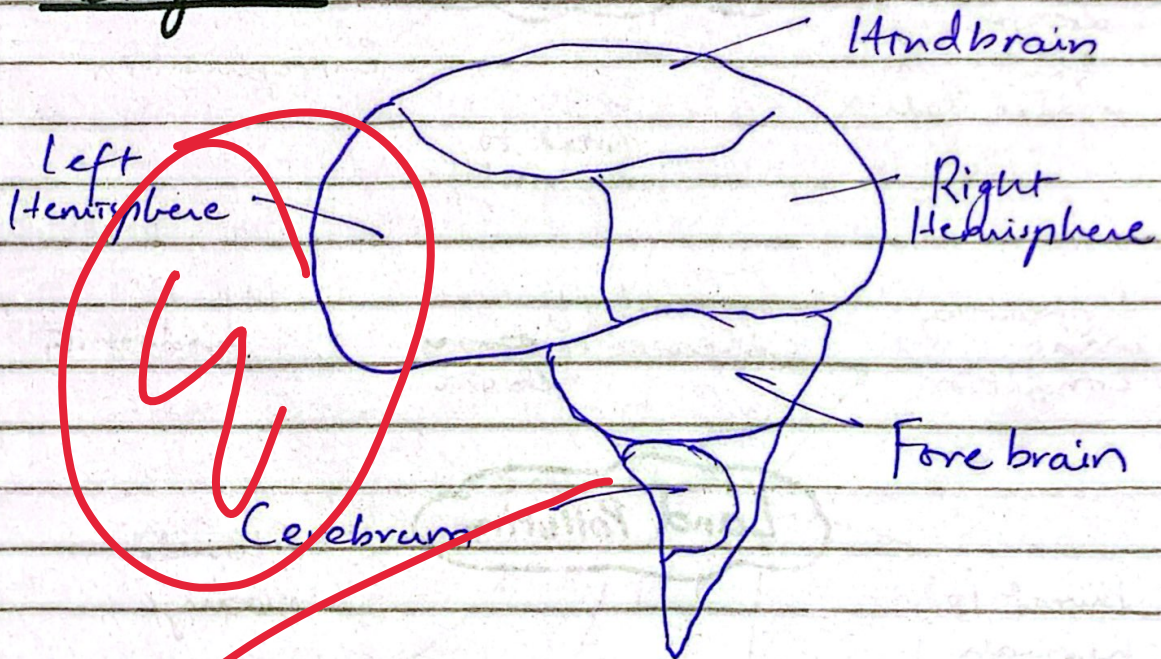
Hydrogen bond is also present in  $H_2O$  molecules as shown in the diagram above.

## Part 2

### Nervous System

Nervous system of the body is controlled by brain through nerves. The brain sends and receives electrical and chemical signals using nerves throughout the body.

### Diagram





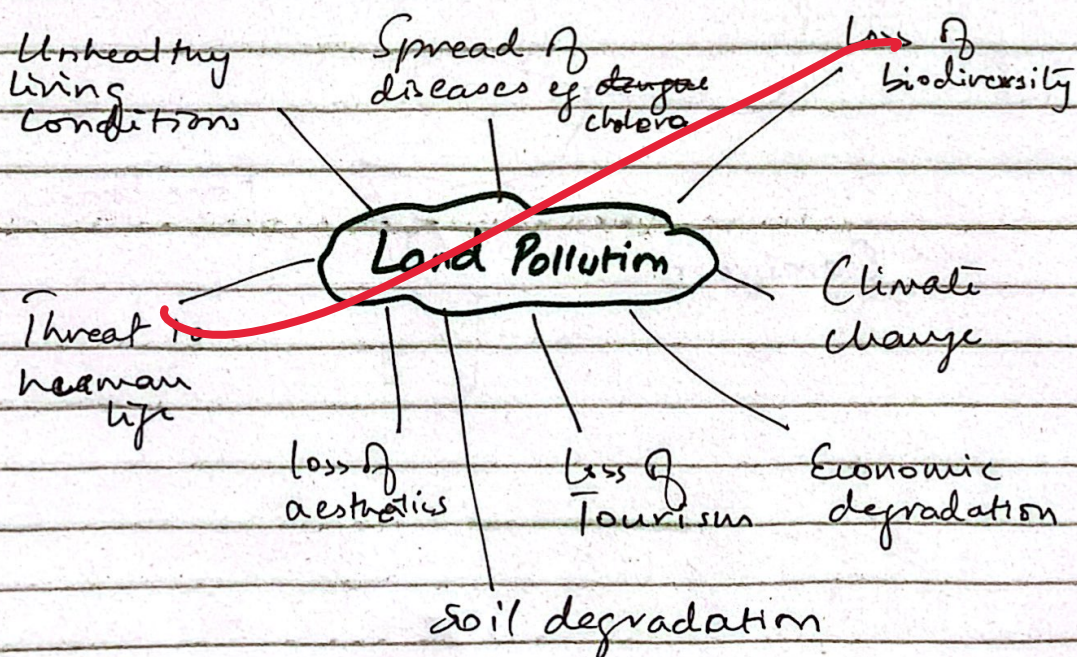
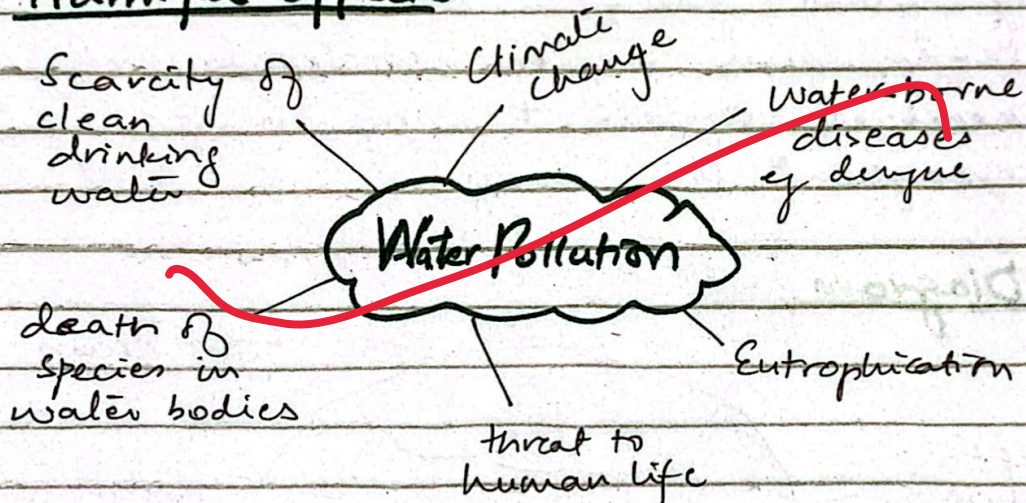
## Question 3

### Part C

## Environmental Pollution

Environmental pollution refers to an unhealthy concentration of pollutants into the atmosphere including land, water and air.

## Harmful Effects







### Measures to curb it

- a) Proper waste disposal
- b) Renewable Energy
- c) Carbon taxes to discourage use of fossil fuels
- d) Subsidies for renewable energies to encourage their use
- e) Sustainable practices such as Direct Air capture (DAC) and carbon mineralization in Industries
- f) Vertical farming and precision farming using Artificial Intelligence and drones in Agriculture to ensure optimal use of land and resources
- g) Afforestation and Reforestation campaigns
- h) Raising awareness and promoting climate education
- i) Investment in green technology
- j) Green infrastructure to ensure rainwater harvesting