

Section B

Q #06 (9)

ANALYTICALLY:

5 years ago, son is age of $(30-5) = 25$.
 $25 \times 3 = 75$ (father's age 5 years ago)

5 years + 75 years = 80 years age of father now

MATHEMATICALLY:

Let 'y' be father's age now.
Let 'x' be son's current age

Given that, (5 years ago)

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

Since x is given as equal to 30

$$\therefore y-5 = 3(30-5)$$

$$y = 3(25) + 5$$

$$y = 80 \text{ years} \quad \text{Father's current age}$$

Q#06

(b)

Let x be the income.

$$= 10\% \text{ of } x = 1500$$

$$= \frac{10}{100} \times x = 1500$$

$$\therefore \boxed{x = 15,000 \text{ Rs}} \text{ Man's income}$$

Q#06

(c)

FORMULA:

Arithmetic Mean = $\frac{\text{Sum of numbers}}{\text{no. of numbers}}$

$$= \text{Let sum of numbers} = x$$

Given that AM = 20 for 6 numbers

$$\therefore 20 = \frac{x}{6} \Rightarrow x = 120$$

AFTER REMOVING ONE NUMBER,

sum = y ; AM = 15 and no. = 5

$$\therefore 15 = \frac{y}{5} \Rightarrow y = 75$$

$$x - y = 120 - 75$$

$$= \boxed{458}$$

The number that was removed from the list of 6.

Q#06

(d)

(i)

8, 4, 32, 7, 5, 35

$$[8 \times 4 = 32; 7 \times 5 = \mathbf{35}]$$

(ii)

17, 19, 23, — 31, 37

No observable pattern found

One possibility (17⁺², 19⁺⁴, 23⁺⁸, 31⁺¹⁶, 47)

Q#07 (4)

Diameter of a circular (table) = 7 m

FORMULA:

$$\text{CIRCUMFERENCE} = \pi \times (\text{diameter})$$

$$C = 7\pi$$

$$= 7(3.14)$$

$$\boxed{C = 21.98 \text{ m}}$$

= Distance around the table a person moves to reach ^{his} starting point

Q #07

(b)

$$\frac{3}{4} \times b = 18 \quad (\text{that are 1.6m tall})$$

where b is the total number of boys.

$$b = 36$$

Since boys constitute $\frac{2}{3}$ of total students.

$$\frac{2}{3} \text{ of } T = 36 \quad (\because T = \text{total students})$$

$$T = \frac{3}{2} \times 36$$

$$T = 54$$

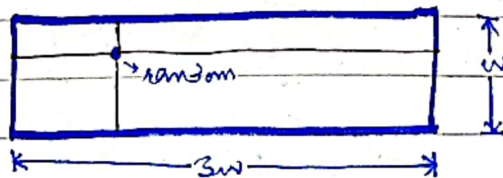
$$g = T - b = 54 - 36$$

$$= 18$$

Number of girls
in the class.

Q #07

(d)



$$\text{Total perimeter} = 2(3w) + 2(w) = 8w$$

where $w = \text{width}$

From perpendiculars, it can be observed that two

Lines constitute one length ($= 3w$) and one width (w) which are related as

$$3w + w = 240 \text{ cm}$$

$$4w = 240$$

$$w = 60 \text{ cm}$$

$$\text{Perimeter} = 8w = 8(60)$$

$$P = 480 \text{ cm}$$

Perimeter of the Rectangle

(C)

EQ

'vs'

IQ

1. Stand for emotional quotient

It stands for intelligence quotient

2. It is an individual's ability perceive, control, evaluate and show emotions

It is a measure of one's cognitive or intellectual sharpness

3. It helps build healthy social relations, work in team, be the leader or none at all depending on the measure.

It measures abilities of untangling complex problems, map the scattered dots and answer immediately.

4. Useful for identifying leaders, game players and other sociables, as well as loners and introverts

Useful for singling out mentally acute and cognitively challenged individuals

Various ~~affo~~ factors affect an individual's IQ, and they cannot always be controlled. Few of them are mapped below.

Biological / Innate Factors

1. Genetic Susceptibility
2. Premature birth
3. Autism (or other in born condition)
4. Nutrient
- 5.

Social / Environmental Parameters

1. Education
2. Drug abuse
3. Pollution

Section A

Q.02

(a)

Circulatory System

1. Definition

A system that circulates blood and lymph around the body to supply oxygen, exhaust and also nutrients and take away waste materials constitutes the circulatory system.

2. Circuits

Human's blood circulation system consists of two ~~main~~ circuits:

1. Systemic Circuit
2. Pulmonary Circuit

2.1. Systemic Circuit

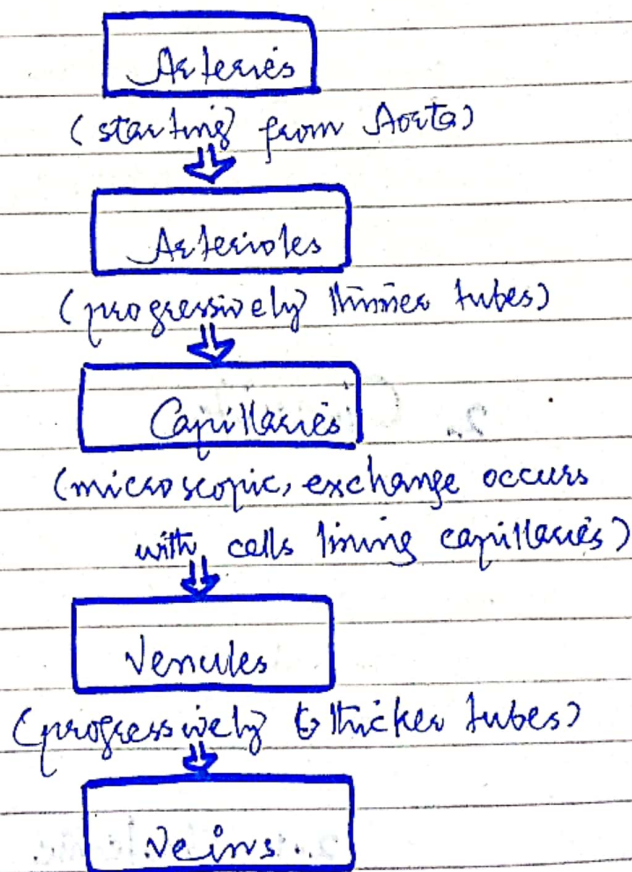
It feeds blood to the entire upper and lower body through superior vena cava (to head) and inferior vena cava (to the rest of sapien's soma).

2.2. Pulmonary Circuit

It is oxygenating circuit that removes CO₂ and other unwanted gases in the process through the action of pulmonary (breathing) system.

3. Vascular System

It is one component of the circulatory system based on a network of vessels.



4. Components

1. Vascular system

1.1. Veins

- Vena Cava (VC)
 - Superior VC
 - Inferior VC
- Pulmonary veins

1.2. Arteries

- Pulmonary Artery
- Aorta

1.3. Coronary vessels

2. Heart

Role of Heart

Heart is the chief organ in that system. Its pump action drives and draws blood in CARDIAC CYCLE.

Cardiac cycle is normally timed at 0.8 seconds. It is a coordinated sequence of heart's contraction and relaxation.

Through cardiac cycle, the blood moves in the vessels that act as containers, a paved path narrowing ^{to} microscopic scale at cellular exchange.

Besides, heart is also crucial in maintaining blood pressure.

BP:

It is pressure exerted by blood on the arterial walls

1. Systolic Pressure

(normal 110/140 mmHg)

2. Diastolic Pressure

(normal 120/80 mmHg)

Also, Abnormal Conditions can lead to disorders and even death when ~~slow~~ heart pulse rises or falls:

1. TACHYCARDIA (greater than 100 bpm)

2. BRADYCARDIA (less than 50 bpm)

Q#02

Carbohydrates

1. def.

A group of organic compounds containing hydrogen and oxygen in the same ratio as in water

(1:2)

2. Composition

They are hydrated carbons since its skeleton contain oxygen and hydrogen in the ratio 1:2 (as in water). They can be saturated or unsaturated depending on the number of Carbon-Carbon covalent bonds.

3. Classification

1. Monosaccharides (simple sugar)

Molecular formula: $C_nH_{2n}O_n$

Most common form: $C_6H_{12}O_6$ (Glucose)

2. Disaccharides

Two monosaccharides joined by glycosidic link by a \uparrow dehydration reaction.

The most prevalent form is sucrose

			GLYCOSIDIC LINK	
→	2.1. Sucrose	(Glucose	\downarrow +	Fructose)
→	2.2. Lactose	(Galactose	+	Glucose)
→	2.3. Maltose	(Glucose	+	Glucose)

3. Polysaccharide

Few hundred to thousands of polymers of monosaccharides

- 3.1. Storage Polysaccharide (hydrolyzed as needed)
- 3.2. Structural Polysaccharide (building material)

Q#02 (C)

1. Water Pollution

2. def:

"The alteration in the physical, chemical, or biological characteristics of water so that it either becomes health hazard or unfit for use"

It is surprising to know that polluted and unsafe water kills more people each year than war and all other forms of violence combined.

2. Types of Water Pollution (Based on Source)

1. POINT SOURCE

It is when contamination is traced to a particular, identifiable source

- Example:
1. Effluent discharged (legally or illegally) by oil refineries or other manufacturers
 2. Leaking of septic facilities

2. NON-POINT SOURCE

In this case, contamination is caused by diffuse sources. It's difficult to regulate

- Example
1. Agricultural (fertilizer) run-off
 2. Storm water run-off

3. Ocean Water

Main culprit is oil spillage followed by industrial waste dumping. Worryingly, just one liter of oil can pollute one million liters of water.

4. Microbial Pollution (fungal or bacterial growth)
5. Suspended (or Particulate) Matter

3. Types Based on Effluents:

1. Domestic Effluents
2. Industrial Effluents
3. Surface Runoff
4. Thermal Water Pollution

4. The Causes of Water Pollution

Various causes are attributable to water pollution, most prominent of which include:

1. Marine Dumping
2. Oil leaks
3. Industrial wastes
4. Sewage and other effluents (municipal)
5. Radioactive waste
- Global Warming leading to thermal pollution.

Q#02

(d)

Liver is indeed the chief chemist of human due to its chemical functions vital for the body. It plays a vital role in metabolism (of sugar and fats) and iron absorption. Vitrally, liver regulates body's hormonal balance and blood pressure thereby affecting weight and mood swings.

Cumulatively, it performs nearly 500

tasks that make it the CHIEF chemist among other endocrine glands. Some of these functions are given below:

1. Bile production
helps small intestine in digestive system
2. Fat Metabolization
fats broken down to be easier to digest
3. Carbs Metabolization
liver stores carbs in the form of glycogen which are broken down into glucose for energy
4. Vitamin and Mineral Storage
5. Helps in Protein Metabolization

These and hundred other functions of liver make it truly a chief chemist while gall bladder is its lab assistant.

Q#04

(b)

Pakistan is a water-stressed rather than a water-scarce country. To address its problems of water availability, the following corrective measures can be adopted that are global in nature and helpful to specifically water-stressed countries round the globe:

1. Administrative Solutions

a. Increasing efficiency of distribution system

Distribution systems such as Indus irrigation system in Pakistan's context, account for huge overall shortage. It can be cured by lining and embanking as well as maintaining current canal system.

b. Reservoirs for storage capacity

Red tape involved in the administrative setup should be streamlined and quickened to timely implement curative measures.

c. Strong Accountability Measures

2. Political Solutions

a. Building National Consensus on projects like Kalabagh dam by soft diplomacy.

b. Resolving Inter-Provincial Water Disputes

3. Innovative Solutions:

- Increasing capacity of catchment areas to store monsoon surplus
- Drip Irrigation system
- Genetic engineering to make way for less water-intensive breeds
- Desalination Plants.

Q#04

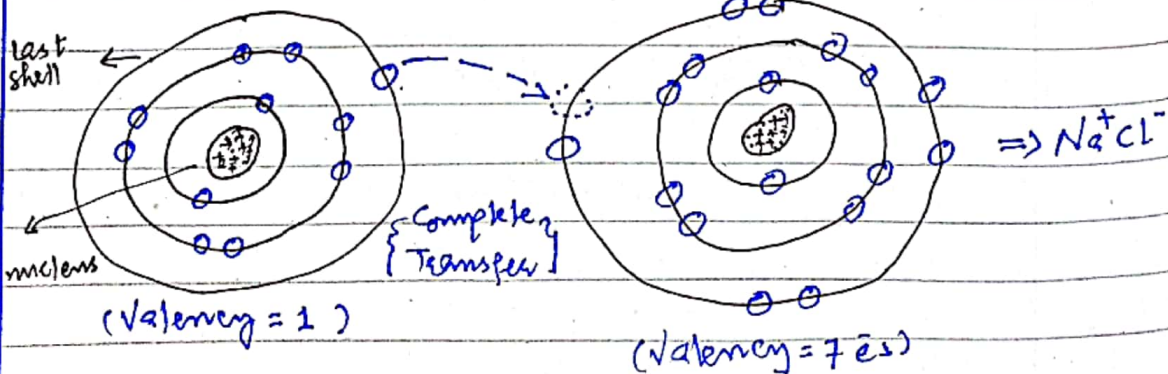
(“d”)

1. Ionic Bond

Example: NaCl

Electropositive
Sodium ($n=11$)

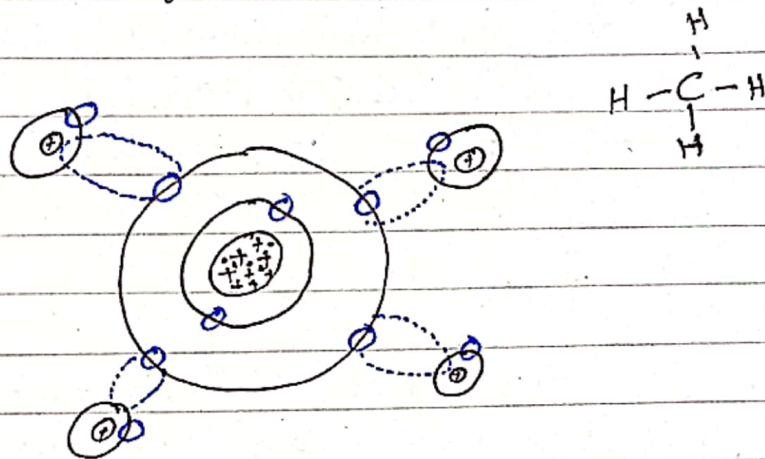
Electronegative
Chlorine ($n=17$)



Na becomes e^- deficient and acquires positive charging, losing its neutrality to electronegative, chlorine (Cl).

2. Covalent bond

Example: Methane (CH_4)



Shared transfer of electron giving more electronegative C slightly positive negative charge as it tends to attract shared electron to itself.

Q#04 (C)

Vaccine

(victory over many deadly diseases)

1. definition

"A vaccine is a harmless variant or derivative of a pathogen that stimulates the immune system to mount defense against harmful invaders."

2. Types of Vaccines

1. Live-Attenuated Vaccine

It uses numbr, dormant or weakened form of the pathogenic germ.

With 1 or 2 doses, it provides lifetime of protection

Protection against:

1. Smallpox

2. Measles and others

2. Nucleic Acid Vaccine

Use genetic material from the germ to stimulate and ready an immune response. The material can be RNA or DNA

3. Subunit Vaccine

It typically contains one or more 'flag' (specific antigens) from the surface of the germ. They do not create a strong response.

4. Recombinant Vaccine

It combines various types to ensure a strong immunization.