

GSA (mock)

Section II

Question 6)

- (a) Pipe A time to fill a tank = 10 hrs.
 Pipe B time to fill a tank = 15 hrs.
 Pipe C time to empty a tank = 30 hrs.

After 1 hour how much of tank is filled:

$$= \frac{1}{10} + \frac{1}{15} - \frac{1}{30}$$

$$= \frac{3+2-1}{30}$$

$$= \frac{4}{30} = \frac{2}{15}$$

taking LCM

5	30, 15, 10
2	6, 3, 1
3	3, 3, 1

LCM = 30

$$= \frac{2}{15} \text{ of the tank is filled after 1 hour}$$

$$\text{After 7 hrs} = \frac{2}{15} \times 7 = \frac{14}{15} \text{ of the tank will}$$

be filled.

so assuming $\frac{2}{15}$ of the tank is filled after 1 hour,

$\frac{1}{15}$ of the water will be filled after

half an hour so it will take

$$7 + 0.5 = 7.5 \text{ hrs to fill the tank}$$

(b) Original ratios

$$4:5:7$$

$$X:4:2$$

X's salary is increased by 10% and Z's salary is decreased by 25% percent.

So, changing the ratios.

$$5 \times \frac{10}{100} = 0.5 + 5 = 5.5$$

$$7 \times \frac{1}{4} = 1.75 \quad 7 - 1.75 = 5.25$$

$$\cancel{4:5:7}$$

New ratios: $4:5.5:5.25$

$$4x + 5.5x + 5.25x = 1,69,500$$

$$14.75x = 1,69,500$$

$$x = 11500$$

$$4 \times 11500 = 46000$$

(c) $\frac{3}{5}$ of the road completed in 60 days.

$$\frac{3}{5} \text{ expressed in percentage is } = \frac{3}{5} \times 100\%$$

$$= 60\%$$

So originally the work was supposed to be completed in a hundred days.

But adding 10 workers doubled the productivity as the remaining work was completed

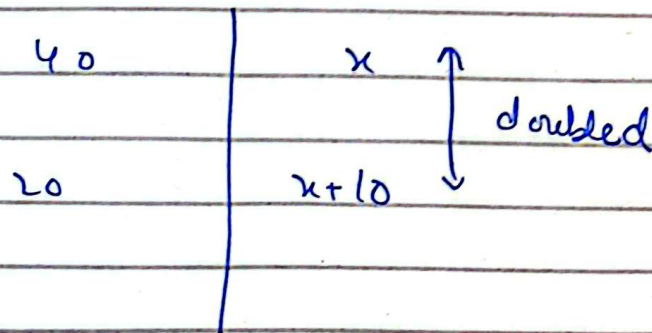
in 20 days as opposed to the predict no of 40 days.

Original no of workers = x .

Remaining days = 40.

New no of workers = $x + 10$.

Remaining days = 20.



So the original number of workers = 10.

(d) Average score of the class = 78.

Average score of the class after removing the top 5 grades = 75.

$$\text{Mean / Average} = \frac{\sum x}{n}$$

$$\frac{\sum x}{n} = 78$$

$$\sum x = 78n$$

$$\frac{95 + 95 + 92 + 90 + 85 + \sum x}{n - 5} = 75$$

$$-460 + \sum n = 75n - 375$$

$$-460 - 835 + \sum n = 75n - 375$$

$$-460 + 375 = 75n - \sum n$$

$$-85 = (75 - 78)n$$

$$+85 = +3n$$

$$n = 28.33$$

round off to 28

no of students

Question 8)

(b) The woman is the wife of his nephew, as the son of the speaker's sister is his nephew and the woman is the wife of the nephew making her his niece in law.

(c) i) 13.5 : Reason because the first number was multiplied by 3 and the resultant number was then divided by 2 for the next result, then this result was multiplied by 3, and the resulting number was divided by 2 thus creating a pattern.

ii) 720 : Reason because the first number was multiplied by 2, then multiplication by 3, then 4, then 5 so the next number must be multiplied by 6.

(c1) P, Q, R, S, T

From the First statement the order of their heights is

$$\begin{array}{c} Q > P > R \\ \downarrow \\ R \end{array}$$

From the 2nd statement.

$$T > S > Q > P > R$$

From this order we can see that Q is the third tallest with the range of the data being $180 - 150 = 30 \text{ cm}$.

(a) 'ROAD' = 'UADG'.

1	2	3	4	5	6	8	10	12	14	16	18	20	22	24	26
a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p
						7	9	11	13	15	17	19	21	23	25

R → U | 3 letters
10 21

O → Q | 2 letters
15 17

A → D | 3 letters
1 4

D → G | 3 letters
4 7

So LAKE should be represented as .

L → O

12 18

A → C

1 3

K → N

11 14

B → H

5 8

OCNH

Reason The First letter is replaced ^{by} the one two letters after it. The Second letter is replaced by the one after the next letter. The Third letter is replaced by the one that is two letters after it and the fourth letter is replaced by the one that is two letters after it.

Section I)

Question 1)

Criterion

Star

Planet .

Formation

Collapse of a molecular cloud core

~~Accretion~~ Growth in the protoplanetary disc around a young star.

Structure

high pressure core
radiative / convective
Zones

Solid or Fluid interior

Temperature	Very hot (thousand to millions of $^{\circ}\text{C}$)	Much cooler
Size	Ranges from 0.08 solar distance to greater than 100 million solar distance	Ranges from km-scale to the radius of Jupiter
Lifespan	Millions to trillions on years depending on the mass	Indefinite lifespan due to planets not burning out
Luminosity	Emits own light	Do not produce visible light.
Examples	The Sun	The Earth

Most the stars begin from a nebula which is a cold, dense region of interstellar gas and dust. Gravity causes local clumps to collapse, the collapsing core becomes dense and hot; energy is released in the form of thermal radiation. The resulting protostar continues growing in mass from its envelope. The object keeps contracting and heating until the core temperature is high enough for sustained hydrogen fusion. The stars then approach a stable period where nuclear fusion in the core provides pressure to balance gravity. The conversion of stars to black holes occurs in high mass stars in which the fusion results in the making of Iron, the Iron core keeps growing until it exceeds a critical mass

The core implodes, rebound and neutron processes drive a powerful explosion that ejects the outer layers.

This results in either a neutron star or black hole as a remnant.

(b) Semiconductors are typically group IV elements that are both insulators and conductors at the same time.

They are normally insulators but their conductivity can be changed by changing the temperature, electric fields or doping. Semiconductors are of two types

Intrinsic: Semiconductors in their pure form.

Extrinsic: Doping is used to increase the conductivity.

Now the Doping is of two types.

(i) n-type

(ii) p-type

N-type: Group V elements are added to improve the electrical conductivity (Group V elements include Phosphorus) -

This means that when Group V elements are added they create an extra ~~free~~ electron which is the reason for the conductivity increase, this results in holes becoming the ~~second~~ minority charge carriers.

This results in the creation of n-pn junctions.

P-type: Group III elements are added to improve the electrical conductivity (Group III elements include Aluminium)

This means that when Group III elements are added.

They create an extra hole which is the reason that

conductivity increases (holes are the majority charge carriers here) with electrons being the minority charge carriers. This results in the creation of pnp junctions.

Uses

n types	p types
(1) Used in transistors, FETs	(1) Used in solar cells
(2) Used in Integrated Circuits	(2) Used in LEDs

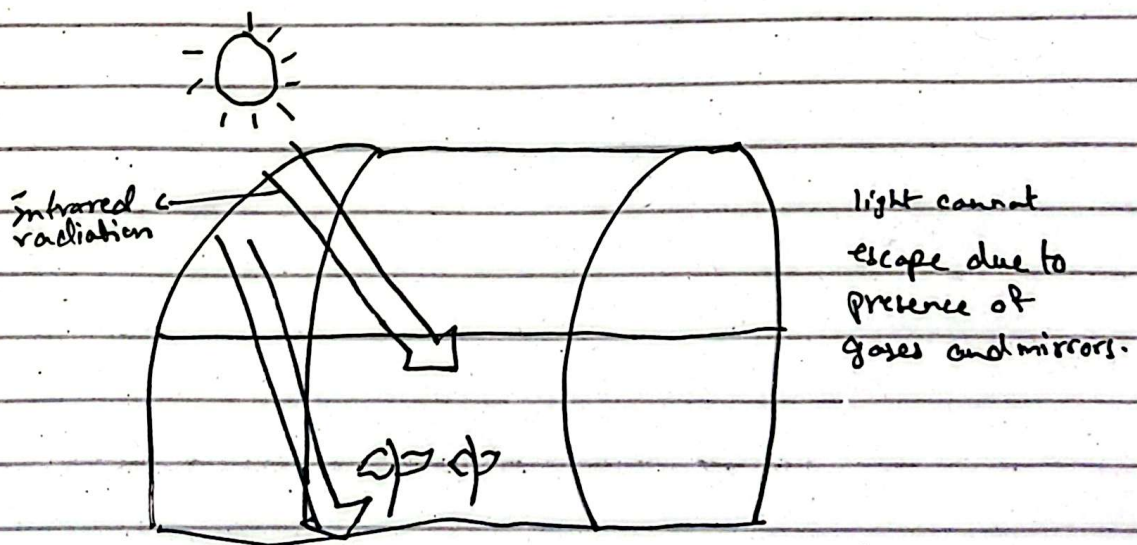
(C) Global Warming:

Global warming is the long term increase in the Earth's average surface temperature primarily caused by the rise of greenhouse gases such as Carbon dioxide, methane, and nitrous oxide released through human activities. Scientists ^{at NASA} have observed a 1.2°C rise in the earth's Temperature from 1850 to 2024. With the April of 2022 recorded as being hottest ever April of all time. This phenomena contributes to rising sea levels, melting glaciers and increase in natural disasters such as floods and droughts.

Greenhouse Effect:

Greenhouse Effect is the natural process by which the Earth's atmosphere traps some of the sun's heat, keeping the planet warm. This process begins when the sun emits energy. This energy passes through the atmosphere, the land and oceans absorb the sunlight and become warm, after this the earth re-radiates this energy back toward space, but greenhouse gases like carbon dioxide, methane and water vapor absorb the escaping radiation. This trapped heat keeps the Earth's average temperature normal and sustainable for life.

This effect can be seen in the greenhouses effect namesake greenhouses.



(d) Tsunami: A tsunami is a long sea wave caused by the rapid displacement of a large volume of water. Unlike normal wind driven waves, tsunamis

involve the entire water column.

Causes:

Earthquakes

When tectonic plates move or slip, the ocean floor rises or sinks, this pushes the water above it. This disturbed water forms waves that travel outwards.

Underwater volcanic eruptions:

Explosive eruptions or collapse of a volcano under the sea displaces water suddenly. Causes waves that can turn into tsunamis.

Glacier melting:

When huge chunks of ice fall into the ocean, they can generate tsunami like waves.

Landslides:

Landslides on the ocean floor displace water causing the rise of waves.

Impacts:

- (1) Tsunami waves can flood several meters inland.
- (2) Destruction of infrastructure such as bridges, roads etc.
- (3) Tsunamis can cause thousands of deaths, especially in densely populated areas such as Karachi.
- (4) Water logging and salinity due to large amount of sea water.

⑤ All of these factors disrupt industries and lead to long term Economic Impacts.