

GSA

Section : II

Question No: 2

a) Artificial Intelligence in Healthcare
Benefits Of AI in Healthcare

1: Personalized Medicine and Treatment Plans: AI creates special treatment for the patients, based on their body condition and health history.

2: Accelerated Drug Discovery and Medicine Development:

AI speeds up drug development by identifying candidates and predicting outcomes.

3: Improved Patient Monitoring and Remote care: AI powered gadgets helps doctor in tracking patients health from anywhere. letting doctors know if there is a problem.

Personalized Medicine
and Treatment
Plans

Accelerated
Drug Discovery

Benefits

Improved patient
monitoring and
Remote care.

Challenges of AI in Healthcare

1: Data Privacy and Security

Imperatives: Safeguarding sensitive information (patient data) from breaches and ensuring anonymity with AI systems presents formidable challenges.

2: Substantial Implementation and Maintenance Costs:

Developing, deploying and sustaining AI solutions in healthcare demands significant financial investment in infrastructure, computing power and specialized expertise.

3: Regulatory Ambiguity and

Compliance: The government should create clear rules for AI use, but unfortunately,

Technology moves faster than rules.

Data privacy and
Security Imperatives

Challenges

Regulatory
Ambiguity
and Compliance

Substantial Infrastructure
and Maintenance Costs

Impact of AI on patient care
and Medical Diagnosis:

1: Revolutionizing Diagnosis:

AI significantly improves
the speed and accuracy of
disease detection by analyzing
complex medical images and
patient data with unparalleled
precision, leading to earlier
intervention and better
prognosis.

2: **Enabling Personalized Treatment:** AI customizes healthcare by processing individual patient information (including genetics), allowing for highly tailored treatment plans that optimize effectiveness and minimize side effects.

3: **Streamlining Operations and Proactive Care:** AI automates routine administrative tasks and supports remote monitoring, which frees up healthcare professionals for direct patient engagement and enables predictive interventions, shifting focus towards preventive health.

"6"

The Big Bang Theory:

The most accepted cosmological model for the origin and evolution of the universe. It states "The universe began approx 13.8 billion years ago from an extremely hot, dense singularity."

- **Initial Expansion and Cooling:**

Rapid expansion followed by cooling, allowing fundamental particles, then matter, and anti-matter to form.

- **Matter Survival:** A slight asymmetry in matter, anti-matter annihilation left a tiny surplus of matter, forming everything, a person can see.

- **Formation of Elements:**

1 second after Big Bang: Quarks and leptons formed. These quarks combined into protons and neutrons.

3 minutes after Big Bang: Universe cooled enough for protons and neutrons to fuse forming hydrogen, Helium and trace lithium (Big Bang Nucleosynthesis).

380,000 years later: Universe cooled to approx 3,000 K, allowing electrons to combine with nuclei to form stable, neutral atoms. This "recombination", made the universe transparent, allowing the Cosmic Microwave Background (CMB) radiation to travel freely.

Continued Expansion: The universe continued to expand, accelerated by dark energy.

Evidence ; Supporting the Big Bang Theory:

1. Cosmic Microwave Background (CMB) Radiation: Discovered by Penzias and Wilson in 1964, its uniform background radiation, the leftover heat from Big Bang. Its spectrum perfectly matches a black body at 2.7 Kelvin.

2. Hubble's Law (Red shift): Edwin Hubble's observation showed that distant galaxies are moving away from earth, and the further they are, the faster they recede, directly proving an expansion.

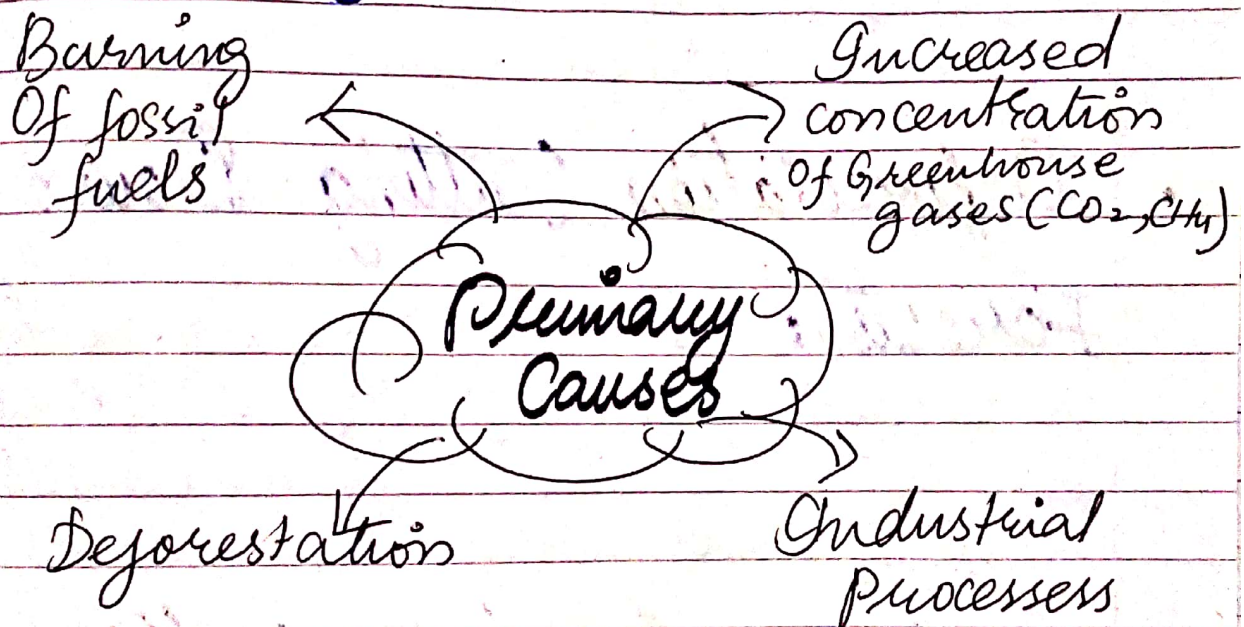
• Abundance of light element: The observed cosmic abundance of Hydrogen, Helium and Lithium perfectly matches Big Bang

Nucleosynthesis predictions.

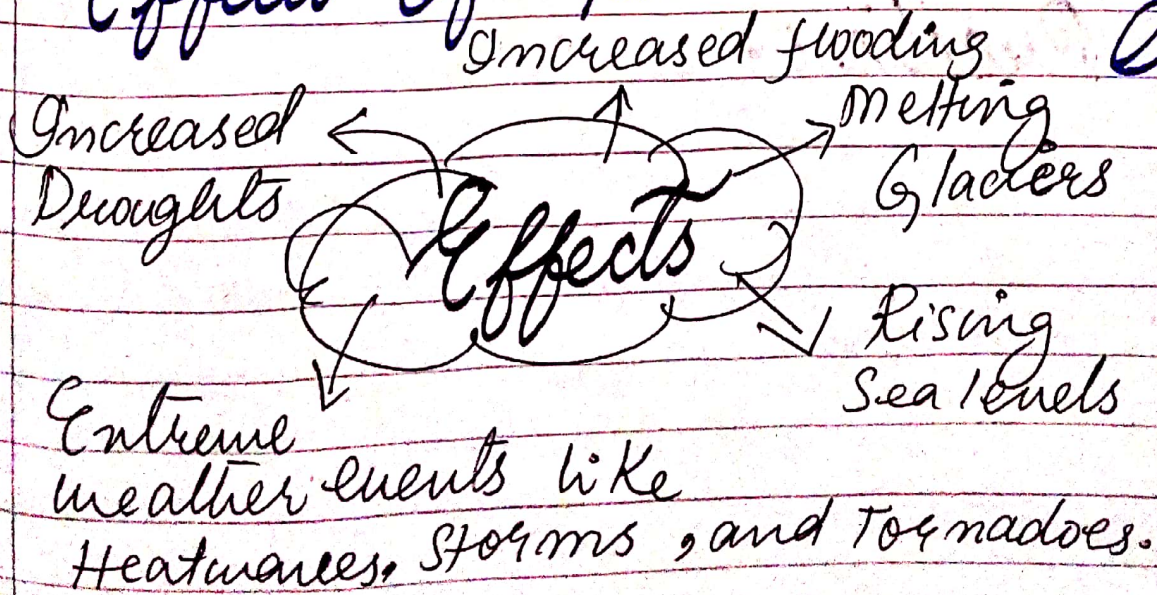
Large-Scale Structure: The distribution of galaxies and galaxy clusters is consistent with the Big Bang model, explaining how initial density fluctuations evolved under gravity.

Global Warming

Primary Causes Of Global Warming



Effects Of Global Warming



Human Activities Contributing to Global Warming:

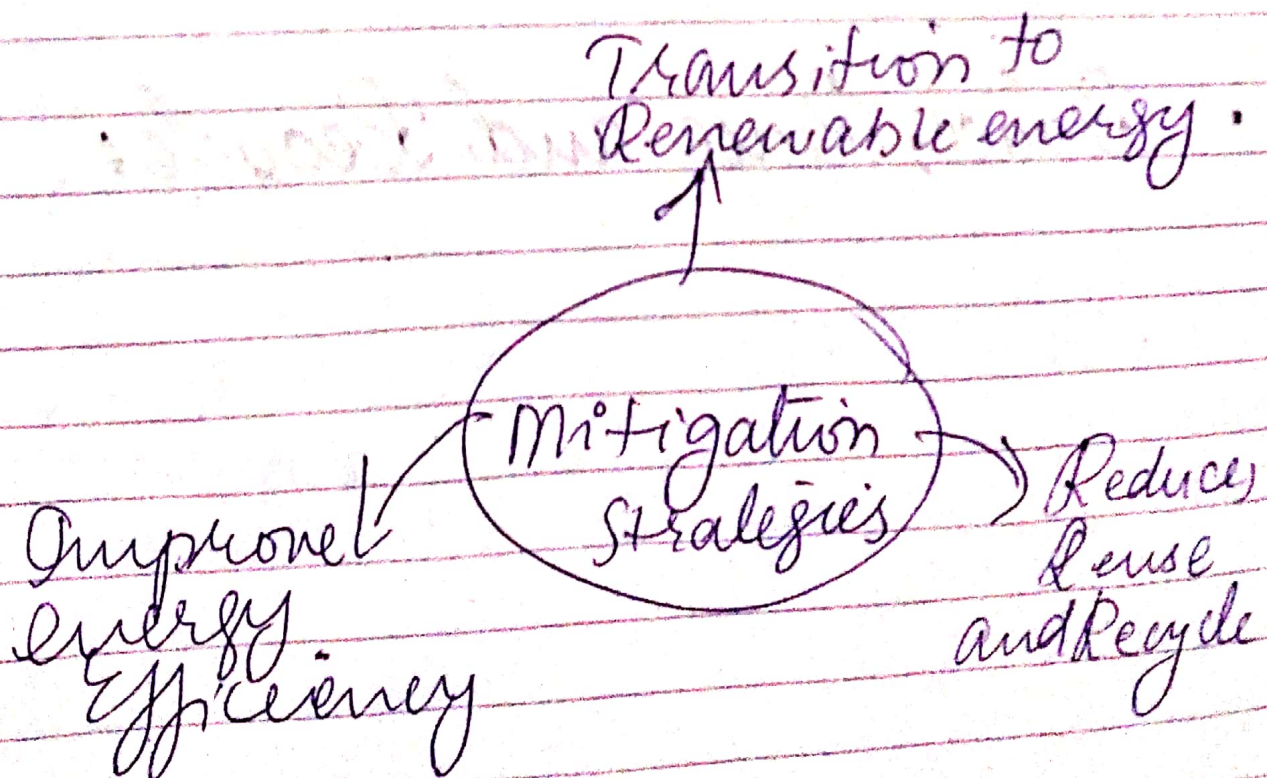
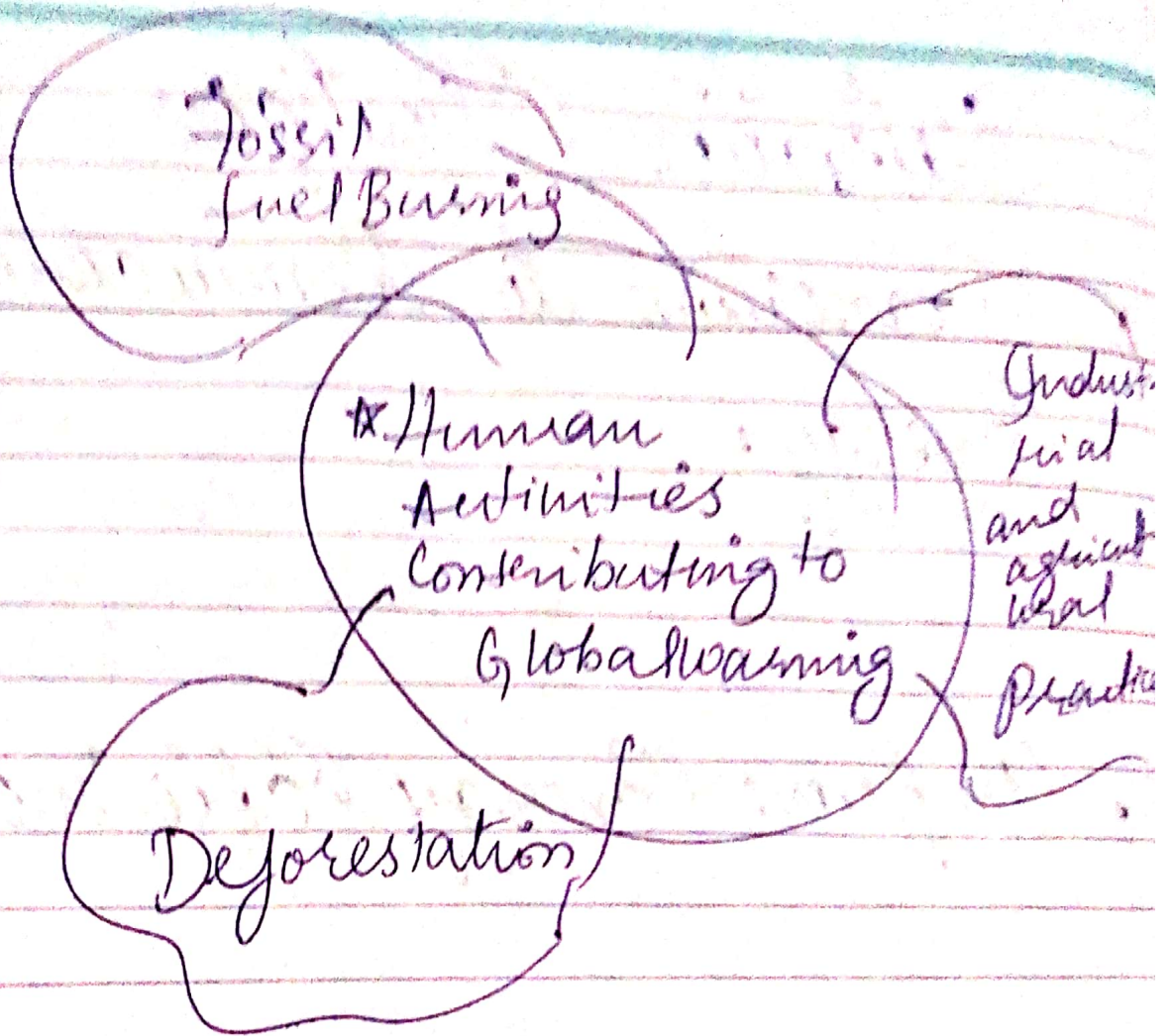
- **Fossil Fuels Burning:** Using coal, oil and gas for power, cars, and factories release heat-trapping gases like CO_2 .
- **Deforestation (Cutting Down Forests):** Destroying forests removes natural CO_2 absorbers, and burning them releases stored carbon.
- **Industrial and agricultural Practices:** Livestock (methane producers) and certain fertilizers (nitrous oxide) from agriculture plus industrial processes, add powerful greenhouse gases.

Mitigation Strategies

- **Transition to Renewable Energy:** Shifting away from fossil fuels towards solar, wind and hydropower to reduce emissions from electricity.

- **Improve Energy Efficiency:** Make homes, buildings and transport more efficient to reduce overall energy use and emissions.

- **Reduce, Reuse and Recycle:** Decreasing consumption, reducing items, repairing things and recycling reduces the energy needed for manufacturing and waste disposal, lowering emissions.



"d"

Disaster Management Plan:

Key Components:

1. **Risk Assessment:** Spotting likely disasters and vulnerable areas.
2. **Prevention / Mitigation:** Actions to reduce disaster risk or impact (e.g. strong building).
3. **Preparedness:** Planning before a disaster: drills, supplies and communication.
4. **Response:** Quick actions during/after a disaster. It includes saving lives and providing urgent aid.
5. **Recovery:** Long-term rebuilding to make areas stronger than before.

Importance of Preparedness, Response and Recovery:

1: Preparedness (Before)

Gets ^{communities} communications ready
it will allow quick actions

2: Response: Saves lives and provide urgent help

3: Recovery: Rebuilds communities making more resilient.

*: Examples Of Successful Strategies.

1: Japan's Earthquake Warning: Advance system warns people seconds before quakes (Preparedness)

2: Netherlands Flood Defenses: Huge barriers built after floods, protecting the nation (Mitigation).

Q NO: 4

Characteristics of a Tropical Cyclone:

Low-Pressure eye: Calm, clear center.

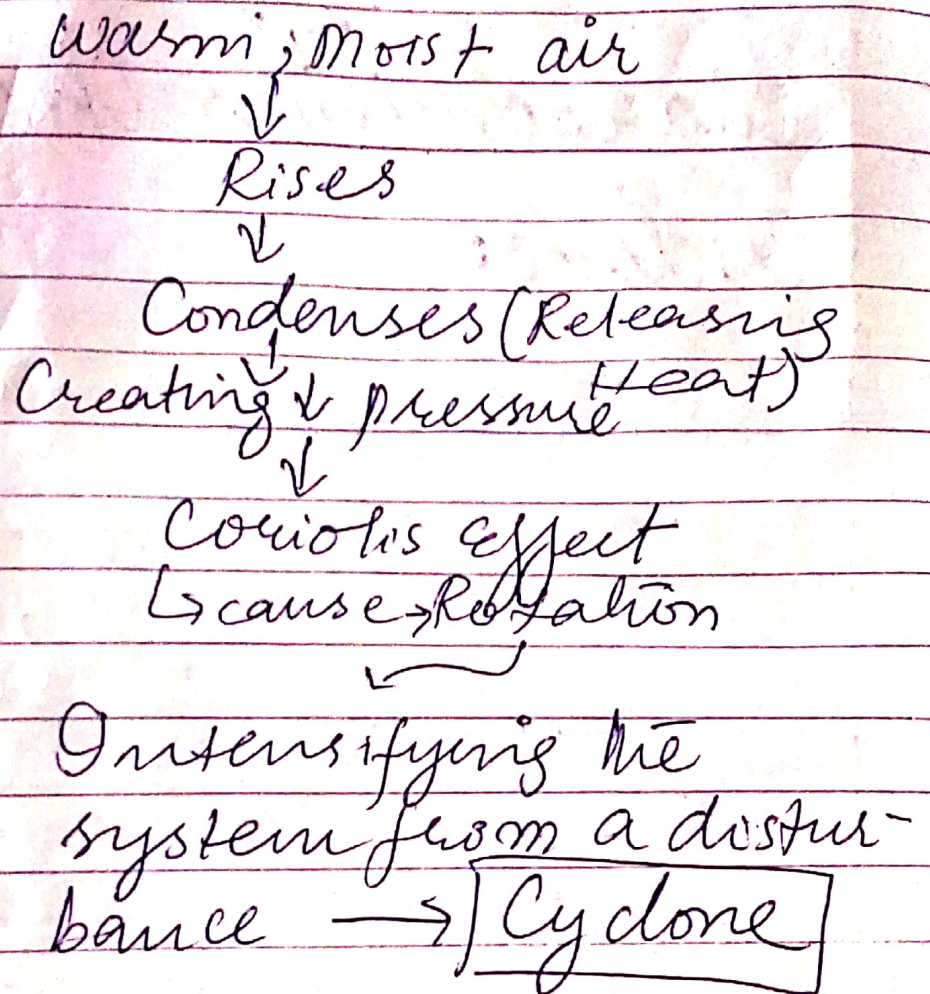
Rotating winds: Strong winds spiraling inwards, counter clockwise (Northern Hemisphere) or clockwise (Southern Hemisphere).

Eye wall: Intense thunderstorms with strongest wind around the eye.

Warm core: Air in the center is warmer due to latent heat release.

Storm surge: Abnormal rise in sea level.

Formation:



Factors Influencing Intensity:

① Sea Surface Temperature and Ocean Heat Content → warmer.

② Vertical Wind Shear:
Low Shear (strengthening)
High Shear (weakens) -

3: Mid level Humidity²

Moist Environment $\rightarrow$ Convection^o

4: Internal Dynamics²

Eye wall cycles $\xrightarrow{\text{causes}}$ Intensity fluctuations.

Impacts:

1. Widespread property damage.

2. Long term economic disruption.

3. Fatalities / mortalities.

4. Epidemic chances.

"6"

Remote Sensing :

The process of detecting and monitoring the physical characteristics of an area by measuring its reflected and emitted radiations at a distance.

Remote Sensing Environmental Monitoring:

- 1: **Land Use/cover mapping :**
Tracks changes like urbanization and deforestation.
- 2: **Vegetation Monitoring :** Assesses plant health, type and density, revealing stress or growth.

Advantages :

- 1: **Land Area Coverage :** Efficiently monitors vast and often inaccessible regions.

Historical Analysis:

Provides consistent data over time to track environmental changes.

Limitations

1) Atmospheric Interference

Clouds and haze can block or distort imagery.

High Cost : Requires significant investment in technology and skilled analysis.

Fat Soluble:

*Stored in fatty tissues

K, E, D, A

Vitamin A (Retinoic acid).

Deficiency:

Night Blindness.

Improves
Vision,
and Immunity.

Vitamin E (Tocopherol).

Deficiency:

Hemolytic Anaemia

Antioxidant,
Supports
Immunity.

Vitamin K

Deficiency:

Bleeding
Issues.

Essential
for Blood
Clotting

Vitamin D (Calciferol).

Deficiency
rickets
Osteomalacia

Improves
Bone Growth

Water Soluble

Not stored
in body.

B and C.

Vitamin C

(Ascorbic
acid).

→ Deficiency
causes
Scurvy.

→ acts as
an
antioxidant

Vitamin B

1) B1 (Thiamine)

Beri Beri

2) B2 (Riboflavin)

3) B3 (Niacin)

4) B5 (Pantoic
acid)

5) B6 (Pyridoxine)

6) B7 (Biotin)

7) B9 (Folic acid)

8) B12 (Cyanocobalamin)

→ Deficiency
causes
Pernicious Anemia



"C"

Types Of Vitamins

Fat Soluble

* Stored in fatty tissues

K, E, D, A

Water Soluble

Not stored in body.

B and C.

Vitamin A (Retinoic acid).

Deficiency:
Night Blindness.

Improves
Vision,
and Immunity.

Vitamin C
(Ascorbic acid)

→ Deficiency causes Scurvy.

→ acts as

an antioxidant

Vitamin E (Tocopherol).

Deficiency:
Hemolytic Anaemia

Antioxidant,
Supports
Immunity.

Vitamin B

Vitamin K & Co

Deficiency:
Bleeding
Issues.

Essential
for Blood
Clotting

- 1) B1 (Thiamine)
- 2) B2 (Riboflavin)
- 3) B3 (Niacin)
- 4) B5 (Pantoic acid)
- 5) B6 (Pyridoxine)
- 6) B7 (Biotin)
- 7) B9 (Folic acid)
- 8) B12 (Cyanocobalamin)

Vitamin D2 (Calciferol).

Deficiency:
Rickets
Osteomalacia

Improves
Bone Growth

→ Deficiency causes Pernicious Anaemia



^{"d"} Poliomyelitis

: An illness caused by a virus that primarily affects nerves in the spinal cord or brain stem, potentially leading to paralysis

* Transmission

Causative Agent:

Enterovirus
↓
Poliovirus

Poliovirus
Enterovirus

Mouth → multiplies in
Oropharynx and GIT.

↓
Invades
Nervous System
↓ Destroy
Motor Neurons.

↓
Paralysis

Eradication Efforts

October 24
World Polio
Day

Global Polio Eradication
Initiative →

Polio
↓ 99%

through mass vaccination
campaigns.

Challenges

1) Conflict and Insecurity

2) Vaccine Derived Poliovirus
(VDPV).

Can cause outbreaks in low
immunized areas.

Vaccine Importance

1) Prevents Paralysis

2) High vaccination rates
protects everyone.



Q NO: 5.

Data:

Students Below 8 years = 20%
Students Above 8 years = $\frac{2}{3}$

Students of 8 years age = 48.

Required Total number of students = ?

Solution:

$$\frac{2}{3} \times 48 = 32 \text{ Students}$$

Students of 8 years age + Students above
8 years

$$32 + 48 = 80$$

Below 8 = 20%.

$$80 \text{ are making} = 100\% - 20\% \\ = 80\%$$

$$\frac{\text{Total Students}}{80} = \frac{80}{80} \times 100$$

$$= 100 \text{ Students.}$$

Q

Let F = Father's age.
 R = Radha's age.

$$F = R + 3R$$

$$F = 4R \quad (\text{eq. 1})$$

After 5 years

$$F + 5 = R + 5$$

$$F = R$$

$$F + 5 = 2.5(R + 5) \quad (\text{eq. 2})$$

Substitute eq. (1) in eq. (2).

$$4R + 5 = 2.5(R + 5)$$

$$4R + 5 = 2.5R + 12.5$$

$$4R - 2.5R = 12.5 - 5$$

$$1.5R = 7.5$$

$$R = \frac{7.5}{1.5}$$

$$R = 5$$

$$F = 4R$$

Current age of Father is F

$$F = 4R = 4 \times 5 = 20$$



$$\begin{array}{r} 1 \\ 32 \\ + 8 \\ \hline \end{array}$$

after 8 years. 40

$$F = 32 + 8 = 40 \quad \begin{array}{l} \text{further} \\ 8 \text{ years} \end{array}$$

$$R = R + 8 = 8 + 8 = 16$$

$$16 + 8 \quad \begin{array}{l} \text{further} \\ \text{eight} \\ \text{years} \end{array}$$

$$= 24$$

= Father's age

Rasheed's age

$$= 40 = 2 \text{ times}$$

$$\underline{24}$$

"Q"

• Each die = 6 faces.

possible outcomes = $6 \times 6 = 36$.

= favourable outcomes

Total outcomes

$$= \frac{15}{36} = \frac{5}{12}$$

"d"

average age = x

Total age = $11x$.

Captain's age = 26.

Wicket Keeper's age = 3.

$$26 + 3 = 29.$$

Remaining 9 players.

$$11x - 29.$$

$$\frac{11x - 29}{9} = x - 1.$$

$$11x - 29 = 9(x - 1)$$

$$11x - 29 = 9x - 9$$

$$11x - 9x = -9 + 29.$$

$$2x = 20$$

$$2 \times 2 = \frac{38}{2} = 19$$

$$2 \times \frac{20}{2} = 20 \text{ years}$$