Dos and Don'ts for Generaral Science & Ability Paper

Hi there, you've done well. Know that acquiring knowledge is one thing and reproducing it in paper acccording to what's asked is another. There are a few things I would like to highlight.

1. A 5 marks part requires at least 2 and at max 3 sides of a paper. Know that there can be two or three parts of a question and their marks are divided accordingly. So, address all of them in a just manner.

2. Focus on time management. You get 35 minutes to solve one question and about 8 minutes per 5 mark part. Manage your time accordingly.

3. You need to understand that your paper is supposed to look more scientific than theoretical. So, add flowcharts and diagrams where required.

4. Your handwriting and neatness can be really impactful. Avoid cutting and overwriting.

5. Focus on your spellings and your grammar. Here, in GSA there's no deduction in marks but your expression will definitely create an impact.

6. In ability portion, give explanation for analytical ability question in words. You need to understand that a 5 mark part requires all steps written and explained.

Good luck for CSS 2025. You're gonna rock in sha Allah. :)

Q. No. 4

(a) Floods

Floods are natural disasters caused by an overflow of water onto normally dry land. The main causes of floods can be categorized into natural and human-induced factors.

1. Natural Factors

[diagram/flowchart:]
Heavy Rainfall — River Overflow — Storm Surges — Snowmelt

Causes of Floods

Natural

1. Heavy Intense rainfall... floods... cannot cope with the volume of water... in regions where the drainage systems cannot cope with the volume of water. The monsoon season in Pakistan (July to September) often brings intense rainfall. For example, during 2022 floods, Sindh received over 500% more rainfall ... leading to severe flooding.

2. River overflow
River ... Snowmelt. The Indus River flowing through much of Pakistan is prime to overflowing during periods of heavy rains. In the 2010 floods, the overflow of Indus affected 20 million people, submerging one-fifth ...

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CS CamScanner

3. Storm Surges

Coastal areas can be flooded when strong winds from storms or hurricanes push sea water inland, leading to storm surges. Cyclone Yemyin in 2007 caused significant flooding and damage in coastal Balochistan, resulting in 380 deaths and affecting 2.5 million people.

4. Snowmelt

Rapid melting of snow in the mountain regions can cause rivers and streams to overflow, especially spring. Pakistan's northern regions, including KPk and GB, experience significant snowmelt, contributing to rising water levels in Indus. This increases risk of floods, especially during years of heavy snowfall.

<div align="center">

Human-Induced Factors

↙   ↓   ↘

Dam   Urbanization   Climate
Breaks   Change

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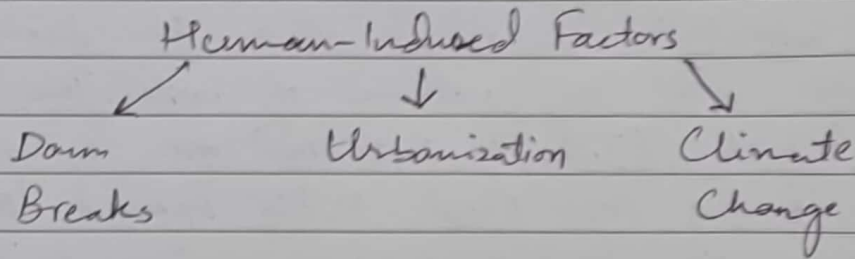
Human-Induced Causes of floods

1. Dam Breaks

Structural failures of dams or levees can lead to sudden and catastrophic flooding downstream. While large-scale dam failures are rare in Pakistan, smaller dam breaches have occurred. For example, the Shadi-kaur Dam in Balochistan collapsed in 2005 due to heavy rainfall leading to floods that killed more than people and displaced thousands.

2. Urbanization

Human activities like deforestation, urbanization, and poor land management increase flood risk by reducing the lands' natural ability to absorb water

3. Climate Change

Exacerbated by human activities, changing climate patterns, including more frequent and intense storms, are contributing to an increase in flood events worldwide.

Differences Between 2022 and 2010 Floods in Pakistan

	Floods of 2010 (Super floods)	Floods of 2022
1. Scale and ~~Impact~~	Were termed "super floods" due to unprecedented scale. One-fifth of total land was submerged	One-third of the country submerged. Sindh & Balochistan severely affected
2. Impact	20 million people affected. 1985 deaths and 1.6 million homes destroyed	33 million people affected. 1700 deaths and 2 million homes destroyed
3. Economic loss	Estimated at $10 billion	Estimated at $15.2 billion
4. Geographic Spread	Affected almost all provinces	Concentrated in southern part Sindh and Balochistan severely affected
5. Causes	Exceptional monsoon rains which overwhelmed indus river system	Due to extreme monsoon rains exacerbated by climate change.

Q No. 4. (a)

Role of NDMA (National Disaster Management Authority)

The NDMA has the following roles and responsibilities with regards to floods;

1. Disaster Preparedness and Response
   It is tasked with developing policies, plans, and strategies for disaster risk reduction, preparedness, and response.

2. Early warning Systems
   Collaborates with various meteorological and hydrological departments to improve early warning systems.

3. Coordination and Resource Mobilization
   Coordinates with Provincial Disaster Management Authorities (PDMAs), military, NGOs, and international agencies to mobilise resources, including personnel, goods, and finances.

4. Relief and Rehabilitation
   Played a crucial role during 2010 and 2022 floods in organising relief operations, including provision of shelters, food, medical supplies, and safe drinking water. Also focuses on rehabilitation efforts, helping rebuild homes, infrastructure, and livelihoods.

5. Public Awareness and Education
   NDMA works on raising awareness about disaster preparedness and risk reduction.

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Ⓞ No. 4.

(b)

Difference between a Star and a Planet

	Star	Planet
1. Nature	Massive Luminous sphere of plasma	Round body in space orbiting a star
2. Orbit	Around center of galaxy	revolue around a star
3. Composition	Hydrogen and Helium	Rock, metal, gas, or combination
4. Light Emission	Generate light and heat	Does not generate heat or light
5. Size and Mass	Larger and more massive Sun is 333,000 times Earth	Smaller than stars i.e Jupiter is 1/1000th mass of Sun
6. Life Cycle	Has a beginning and ends	Do not have a natural end except for disasters
7. Temperature	can reach 6,800°C	Drive energy from Sun.

How a Star becomes a Black Hole.

A star becomes a black hole at the end of its life cycle. The process starts when a star exhausts its hydrogen fuel, fusing heavier elements like He, Carbon, and Oxygen. This causes the star to expand into a red giant or supergiant. As iron forms into the core, it collapses as the star can no longer sustain outward pressure of gravity. The core collapses rapidly under its own gravity, and it leading to a Supernova explosion. The collapse continues, until the core is massive enough 3 times that of sun — gravity overwhelms other forces, and the core collapses into a point of infinite density known as singularity. This singularity is surrounded by an event horizon, beyond which nothing, not even light, can escape

continued...

Q No. 4 (b) continued...

horizon, beyond which nothing not even light can escape —
this is a black hole.

Graphical Representation is as follows;

End of fusion → Core Collapse → Supernova Explosion → Black hole.

Q No 4.

(c) Chemical bonds refers to the strong electrical force of
attraction between the atoms or ions in the structure.

~~Why do Atoms are Chemical~~

Why do Atoms form chemical Bonds

Atoms form chemical bonds to achieve greater
Stability. This is reached when an ~~an~~ atoms outer most
shell of electrons is full, which is often ~~off~~ referred to
as having a "complete" or "full" valence shell. Many
atoms tend to form bonds to attain a full outer shell of
8 electrons, known as the "octet rule". For example, in the
case of Oxygen (O), it needs two additional electrons
to complete its outer shell of 8 electrons. This can be
achieved by another Oxygen atom to form O_2 by
Sharing two electrons each, or by two Hydrogen to form H_2O
which is water.

Structure of Water

Water (H_2O) is a simple molecule composed of two
hydrogen atoms and one oxygen atom. The ~~org~~ oxygen shares
electrons with two hydrogen atoms, forming covalent bonds.
Each hydrogen atom shares one electron with the
oxygen atom, allowing oxygen to achieve a full valence
shell of 8 electrons. ~~Water (H_2O) molecule is represented~~
as,
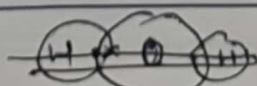
Representation of Water Molecule
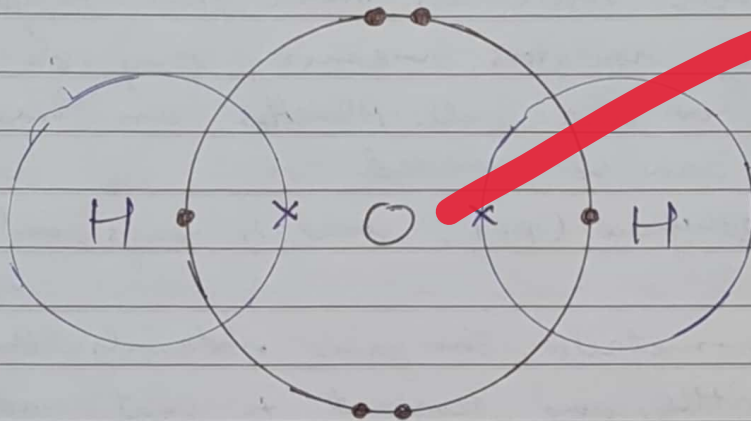
Q. No. 4

(d) 1. Conductors

Conductors are materials that allow easy flow of electric current due to free movement of electrons. They have low resistance and high conductivity.
Example: Copper (Cu); used in electrical wiring

2. Semiconductors

They have electrical conductivity between that of conductors and insulators. Their conductivity can be controlled by doping (adding impurities) or by light or heat.
Example: Silicon (Si); used in integrated circuits

3. Metals

Are elements that have high electrical and thermal conductivity, malleability, ductility, and a shiny appearance. They tend to lose electrons easily, which is why they are good conductors of electricity.
Example: Aluminum (Al); used in aircrafts

4. Plastics

Plastics are synthetic materials made from polymers. They are typically insulators, meaning they do not conduct electricity or heat well. Plastics are versatile, lightweight, and can be molded.

Example: Polyethylene (PE); used in bags and bottles.

5. Ceramics

Ceramics are non-metallic, inorganic materials that are typically hard, brittle, and resistant to heat and corrosion. They are generally poor conductors of electricity and are often used as insulators.

Example: Porcelain; used in power lines.

Q.No. 5

(a) What is Radioactivity

Radioactivity is the process by which unstable nuclei spontaneously decay or disintegrate, releasing energy in the form of particles or electromagnetic waves. This decay occurs because the nucleus of an atom is in an unstable state and seeks to reach a stable configuration. The emitted radiation can radiate include alpha (helium), beta (electrons) or gamma (protons) particles.

Difference between Artificial and Natural Radioactivity

Diagram? ?

	Artificial	Natural
1. Origin	produced by humans	Occurs naturally
2. Control	can be controlled	cannot be controlled
3. Sources	Nuclear reactors, weapons etc.	Earth's crust, atmosphere, etc.
4. Method	Bombarding nuclei with particles	Spontaneous decay of nuclei
5. Examples	Cobalt-60, Technetium-99m	Uranium-238, Carbon-14

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Qno. 5

(b) What is Polio?

Polio, or poliomyelitis, is a highly contagious viral disease caused by the poliovirus. It primarily affects young children but can also infect adults. The virus invades the nervous system and can cause irreversible paralysis within hours. In severe cases, polio can lead to death by immobilizing the muscles used for breathing.

Symptoms of Polio

The symptoms of Polio are ~~characterised~~ categorized as;

1. Assymptomatic (90-95%) cases

2. Non-paralytic Polio:

   Symptoms include;

      (i) Fever
      (ii) Sore throat
      (iii) headache
      (iv) fatigue
      (v) nausea
      (vi) abdominal pain
      (vii) stifness
      (viii) muscle weakness
      (ix) muscular pain

3. Paralytic Polio (less than 1% cases)

   Symptoms include;

      (i) Severe muscle pain
      (ii) Spasms
      (iii) loss of reflexes
      (iv) Sudden weakness
      (v) paralysis.

QNo 5.

b) Causes of spreading

Polio is highly contagious and spreads through;

1. Fecal-oral route

The virus is excreted in the feces of infected person. Can spread through contaminated water, food, or hands that come into contact with infected feces. Poor sanitation and hygiene significantly contribute to this cause.

2. Oral-Oral route

The virus can also spread through droplets from or sneeze or cough of infected person

3. Incubation Period

Prevention of Polio

The most effective way to prevent polio is through vaccination and maintaining good hygiene and sanitation practices.

1. Handwashing; can reduce risk of spreading
2. Safe-drinking water; can prevent fecal-oral transmission
3. Proper Sanitation; proper disposal of human waste and clean living can prevent spread.

4. Vaccination

Has been instrumental in reducing incidence of polio worldwide. Two main types of vaccine include;

(a) Oral-Polio Vaccine (OPV)

Contains weakened form of virus and given orally. used in mass immunization campaigns.

(b) Inactivated Polio Vaccine (IPV)

Given by injection and contains inactive (killed) virus. used in routine immunization.

Q No 5.

(c) Solid Waste Management

It is a supervised activity to handle the solid waste from its generation points (collection) through recovery process up to the disposal. Refers to the systematic management of generation, collection, transfer, treatment, recycling, recovery, and disposal of solid waste.

Steps involved in Solid Waste Management.

1. Waste Generation
   Materials no longer considered of value are either thrown away or gathered for disposal.

2. Storage and Collection
   (a) Storage: Temporary storage at source in bins or containers.
   (b) Collection: Collection of waste from sources using pickups.

3. Transport
   Transporting collected waste to processing or disposal sites. using specialized vehicles.

4. Processing and Treatment
   Involves methods to reduce the volume and toxicity of waste, making it easier to handle and dispose off. Includes processes of recycling, composting, mechanical treatment, chemical treatment, and biological treatment.

5. Recovery and Reuse.
   Extracting useful materials or energy from waste.

6. Disposal
   Involves safe disposal of residual waste that cannot be treated or recycled. Done through; open dumping, composting, Incineration, and/or landfills.

Date:...........................

Q No 6.

(a) New Enrollment = 1120
   Old Enrollment = 850
   ∴ Increase in Enrollment = 1120 − 850 = 270

   ~~Percentage Increase = $\dfrac{270 \times \frac{20}{100}}{\frac{850}{17}}$ = $\dfrac{540 \ 270 \ 13.5}{17 \ 85. \ 2.} = \dfrac{13.5}{425}$~~

   ~~= 0.2716~~

   Percentage increase = $\dfrac{270}{0.856} \times 100 = \dfrac{27}{0.85}$

   = 31.76 %

(b) Son's age = x
    Father's age = 5x

   Two years ago, Son's age = x − 2
                  father's age = 5x − 2

   $(x-2)^2 + (5x-2)^2 = 114$
   $x^2 - 4x + 4 + 25x - 20x + 4 = 114$
   $26x^2 - 24x + 8 = 114$
   ~~$26x^2 - 24x$~~ $2(13x^2 - 12x + 4) = 114$
   $13x^2 - 12x + 4 = 57$
   $13x^2 - 12x - 53 = 0$

   $x = \dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

   $x = \dfrac{-(-12) \pm \sqrt{(24)^2 - 4(13)(-53)}}{2(13)}$

   $x = \dfrac{12 \pm \sqrt{576 + 2756}}{26}$ ⟹ $x = \dfrac{12 \pm \sqrt{2900}}{26}$

   cannot be solved without Calculator !!!

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QNo 6.

(c) lens = h

    cong = c

$\therefore$ $h + c = 48$ —①

$2h + 4c = 140$ —②

$$2h + 4c = 140 \qquad h + c = 48$$
$$-(h + c = 48) \qquad h = 48 - c — ③$$
$$\overline{h + 3c} \qquad 2h + 4c = 140$$

$2(48 - c) + 4c = 140$

$96 - 2c + 4c = 140$

$2c = 140 - 96$

$2c = 44$

$c = \dfrac{44}{2} \; 22 = 22 \quad \boxed{c = 22}$

$\therefore$ $h = 48 - 22 = 26$ (Ans)

$\boxed{h = 26}$

(d) 1st half speed = 40 km/h

    2nd half speed = 60 km/h

Avg speed $= \dfrac{40 + 60}{2} = \dfrac{\cancel{100}\;50}{\cancel{2}} = 50$ km/h

$\boxed{\text{Avg speed} = 50 \text{ km/h}}$

Q.No. 7.

(a) $\dfrac{x}{6} + 50 = 60$

$\dfrac{x}{6} = 10$

$\boxed{x = 60}$

(b) $8, 16, 24, \textcircled{34}, 40, 48$

Odd one out is 34 because all others are multiples of 8.

(c) ~~H = 15 m~~ $P = 15\,m$
    ~~B =~~ $B = 20\,m$

$\cancel{H^2} \quad H^2 = \cancel{P^2} + B^2 = 15^2 + 20^2 = 225 + 400$

$\sqrt{} = \cancel{400} \sqrt{625}$

$H = 25$

Aerial distance is 25 m

(d) $x =$ odd days stayed, $y =$ even days stayed

$\therefore 1000x + 2000y = 30,000 \Rightarrow x + 2y = 30 \quad —①$

suppose $y = 10$

$\therefore x + 2(10) = 30$

$x + 20 = 30 \Rightarrow x = 10$

$\therefore 10$ odd days and 10 even days

$\therefore$ the men stayed for 20 days.

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