

Q21

a) Climate & Environment

Climate & environment are closely related concepts, but they refer to different aspects of our surroundings. Climate encompasses the long term patterns of temperature, humidity, wind & precipitation in a particular region. It is determined by factors such as the earth's rotation, solar radiation, & the distribution of land & oceans.

Climate is typically characterized by statistical data collected over decades or even centuries providing a comprehensive picture of weather patterns in an area.

On the other hand, the environment refers to the broader surroundings or conditions in which living organisms exist. It includes both natural elements like air, water, soil, flora & fauna as well as human made structures & system. The environment encompasses the physical, chemical, & biological components of the Earth & the interactions among them. It is shaped by natural processes such as erosion, volcanic activity & evolution as well as human activities like urbanization, indus

Date: _____

- industrialization & agriculture.

Causes of Pakistan's Air pollution.

Air Pollution is a significant environmental issue in Pakistan with various sources contributing to the degradation of air quality. Industrial emissions are a major source of air pollutants, as factories & industries release harmful substances such as sulfur dioxide, nitrogen oxides & particulate matter into the atmosphere. The combustion of fossil fuels in power plants, manufacturing facilities & vehicles also produces significant amounts of pollutants, including carbon monoxide, hydrocarbons & heavy metals.

Vehicle emissions are another prominent cause of air pollution in Pakistan, particularly in urban areas where traffic congestion is high. The increasing number of vehicles on the roads, coupled with inadequate emission control measures & poor fuel quality has led to elevated levels of pollutants in the air. Additionally

Date: _____

Additionally, agricultural activities contribute to air pollution through the burning of crop residues, uses of chemical fertilizers & pesticide & live stock farming.

Urbanization exacerbates air pollution by increasing energy consumption, waste generation & construction activities all of which release pollutants into the air. Natural factors such as dust storms, wildfires & ~~geog~~ geological emissions also contribute to air pollution in Pakistan.

Addressing air pollution requires comprehensive strategies that target various pollution sources, promote clean technologies & practices & prioritize the health & well-being of the population.

b) Vitamins & their role in human body

Vitamins are essential micronutrients that play crucial role in maintaining health & support various physiological functions in the human body. Although required in small ~~quantities~~ amounts vitamins are vital for metabolism, growth, development, immune function & overall well being. Each vitamin

Date: _____

has specific function & benefit & any deficiency can also cause health problems.

- Vitamin A₁ - Essential for vision, immune function & cell growth.
- Vitamin B₁ - Includes several types (B₁, B₂, B₃, B₆, B₁₂) they are important for energy metabolism, nerve function & red blood cell production.
- Vitamin C₁ - Acts as an antioxidant & supports immune function & aids in collagen synthesis.
- Vitamin D₁ - Crucial for bone health, immune function & calcium absorption.
- Vitamin E₁ - Functions as an antioxidant protecting cells from damage & supporting immune function.
- Vitamin K₁ - Necessary for blood clotting & bone metabolism.

In conclusion vitamins are essential nutrients that play diverse role in the human body from supporting growth & development to maintaining health & preventing disease. A balanced diet rich in a variety of fruits, vegetables

Prince

bles, whole grains & lean proteins is essential for obtaining an adequate deficiency or increased nutrient needs but it should be ^{done} under the guidance of a healthcare professional.

c) Comparison of COP-27 & COP-28 Goals:-

COP-27 & COP-28 are international conferences under the United Nations Framework specific goals of each COP may vary depending on the evolving global context & priorities, they generally aim to facilitate international cooperation & concerted action to mitigate greenhouse gas emission adapt to the impact of climate change & promote sustainable development.

COP-27 would build upon the previous objectives of the Paris Agreement.

- Enhancing commitments to reduce greenhouse gas emissions
- Strengthening adaption & mitigation efforts to address the impacts of climate change.
- Mobilizing financial resources for climate action, particularly to support developing nations

Date: _____

- Fostering international cooperation & partnerships to accelerate climate action.
- Advancing discussions on key issues such as carbon markets, transparency & climate finance

COP-28 would aim to further increase these goals

- Increasing Ambition: Building upon the outcomes of COP-27, further increasing ambition in climate action to limit global warming to well below 2 degree Celsius & striving for 1.5 degree Celsius
- Implementing Glasgow climate pact, Prioritizing the implementation of agreements made at COP-27, including negotiations on key issues such as carbon markets, transparency & climate finance
- Enhancing Adaption & Resilience, Emphasizing the need to enhance adaptation & resilience efforts, particularly in vulnerable regions & communities, in response to the increasing impacts of climate change.

• Promoting Climate Justice & Equity, Addressing the needs & concerns of marginalized & vulnerable groups. Fostering international cooperation & solidarity in climate action & promoting climate justice & equity principles.

a) Active & Passive sensors are two primary types of remote sensing devices used to gather data about earth surface & atmosphere. Each type of sensor operates differently & has distinct application in various fields including Geographic Information System (GIS).

(1) Active Sensor

(a) They emit data form electromagnetic radiation & measures the reflected or emitted radiation to gather information on target.

(b) Examples of use of such sensor is LIDAR (Light Detection and Ranging) & Sonar (For deep water & under water application)

(c) They generate own energy & thus are independent of external light source.

this enables them to operate all day & night.

(1) They can provide high-resolution data with precise distance & elevation measurements; making them suitable for terrain mapping, vegetation analysis & infrastructure monitoring.

(2) Passive sensors

(a) They detect & record natural light without emitting any energy themselves. They need energy source like sun, or thermal radiation.

(b) Passive sensors can be seen in cameras, multispectral & hyperspectral imagers & infrared sensors.

(c) They can capture infrared, thermal & visible light allowing for the characterization of different surface properties & features.

(d) They can be used in environmental monitoring, agriculture, forestry & urban planning.

GIS. uses both active & passive sensors. Active:-

① LIDAR:- is extensively used for high-resolution elevation mapping & creating Digital Elevation models (DEMs) & generating 3D accurate representations

② Radar is used to monitor land covers & detection of surface deformation due to landslide.

③ Sonar is utilized in hydrographic surveys to map underwater terrain locate submarines or objects under-water & maritime navigation.

Passive:-

① satellite & aerial imagery are captured by passive sensors that provide spatial data in GIS systems.

② Thermal sensors measure the temperature of Earth's surface enabling the detection of heat anomalies mapping of urban heat islands, wildlife fires & energy assessment of buildings.

1(Q51)

a) Cyclones :-

Cyclones are formed when atmospheric conditions are conducive typically in tropical regions during warm months. Cyclones, Hurricanes or typhoons depending on region are all powerful tropical storms that form over warm waters. Warm sea temp of 26.5°C provides the necessary energy for evaporation & the subsequent formation of clouds. As warm, moist air rises from ocean surface it creates low pressure below. The surrounding air with higher atmospheric pressure rushes to fill the void resulting in a converging wind. The Coriolis effect caused by the earth's rotation deflects the air & causes it to spiral inward & upward. This spiral motion intensifies as more warm air is drawn to system creating a rotating storm with a low pressure center known as the eye. This is the formation of cyclone.

Date: _____

b) Ionic & Covalent bond differences

- Ionic bonds form between atoms with significantly different electronegativities resulting in the transfer of one electron from one atom to another.
- Covalent bonds are formed when atoms share electrons to achieve a stable electron configuration.
- Ionic bond results in the formation of ions, with one atom losing electron configuration & becomes positively charged & another gaining electrons to become negatively charged.
- Covalent bonds involve the sharing of electron pairs between atoms, creating a stable molecular structure.
- Ionic bonds tend to form between metals & nonmetals, while covalent bonds typically form b/w non-metals.

Prince

, Radio waves Date: _____

c) Use of X-ray & Gamma rays.

- Gamma Rays are used in medical imaging (gamma ray tomography & PET scans) cancer treatment (gamma knife surgery), sterilization of medical equipment & industrial radiography.
- X-ray are widely used in medical diagnostics (X-ray images, CT scans) material testing, security screens (air-ports baggage check) & industrial application (non-destructive testing).
- Radio waves utilized in telecommunication (radio-broadcasting, Wi-Fi cellular networks) navigation systems (GPS) radar systems, remote sensing & radio astronomy.

2) Tides:-

Tides are the rise & fall of sea levels caused by the gravitational pull of the Moon & to a lesser extent the Sun as well as the rotation of Earth.

LED:-

Light Emitting Diode (LED) is a semi-conductor light source that emits light when an electric current passes through it. LEDs are highly energy efficient, durable & long lasting as compared to traditional incandescent light bulbs. LEDs are used in various applications like lighting, smartphones, traffic signals, decorations & etc. As they consume less energy & have high life spans LEDs are a major contributor to the energy saving & help the environment by reducing carbon footprint & impact.

1Q6

a) Volume of cylinder

Given

Radius $r = 8 \text{ cm}$

Height $h = 15 \text{ cm}$

Formula $V = \pi r^2 h$

$$V = \pi \times 8^2 \times 15$$

$$V = 64 \times 15 \times \pi$$

$$V = 960 \pi \text{ cm}^3$$

b) Angle of each side.

Sum of angles of octagon is $(8-2) \times 180$
 $= 1080^\circ$ In regular octagon each angle is equal. thus $\frac{1080}{8} = 135^\circ$ 135° is angle of each side.

c) Area of Lake Dal.

length $l = 4.6 \text{ miles}$

width $w = 2.2 \text{ miles}$

Area $= l \times w = 4.6 \times 2.2$

The Area of Lake $\Rightarrow A = 10.12 \text{ sq miles}$

2) Height of ladder

$$\text{height } (h) = 10 \text{ m}$$

Distance of the ladder base from house $d = 3 \text{ m}$

using pythagoras theorem

$$\begin{aligned} L^2 &= h^2 + d^2 \\ &= 10^2 + 3^2 \\ &= 100 + 9 \\ &= 109 \end{aligned}$$

sq. root

$$L^2 = \sqrt{109}$$

$$\boxed{L = 10.44}$$

Thus the height of ladder is 10.44m

Date: _____

Q7

a) Percentage error

if $3/5$ is multiplied instead of $5/3$

Formula

$$\text{Percentage error} = \frac{\text{True value} - \text{Approx value}}{\text{True value}} \times 100$$

if $5/3$ is True & $3/5$ is Approx

$$= \left[\frac{5/3 - 3/5}{5/3} \right] \times 100$$

$$= \left[\frac{\frac{25}{15} - \frac{9}{15}}{5/3} \right] \times 100$$

$$= \left[\frac{16/15}{5/3} \right] \times 100$$

$$= \left[\frac{16}{15} \times \frac{3}{5} \right] \times 100$$

$$= \left[\frac{48}{75} \right] \times 100$$

$$= \left[\frac{16}{25} \right] \times 100$$

$$\text{Percentage error} = 64\%$$

Date: _____

b) Number of Ice cream cones -

Ratio of chocolate = 5:8

Number of chocolate = 30

Let x be the number of total cones

$$\frac{30}{x} = \frac{5}{8} = \left[\frac{\text{Number of chocolate}}{\text{Total number of cone}} = \frac{5}{8} \right]$$

$$\frac{30}{x} = \frac{5}{8}$$

$$5x = 30 \times 8$$

$$x = \frac{8 \times 30}{5}$$

$$x = 48$$

Therefore there are 48 ice cream cones

Date: _____

c) Number of tablets

Tablet contain 30mg
Mrs Smith needs 240mg

Let n be the number of tablets needed

Total meds = no of tablets \times Medication per tablet

$$240 = 30 \times n$$

$$n = \frac{240}{30}$$

$$n = 8$$

Thus Mrs needs 8 tablets

d) Avg of remaining numbers

Avg of 50 numbers is 20.
Two numbers (37 & 43) are discarded

Sum of remaining numbers = Total sum of 50 numbers

- (37+43) \times 2

$$= 50 \times 20 - 80$$

$$= 1000 - 80$$

$$= 920$$

Sum of remaining numbers

Prince

Date: _____

Therefore $50 - 2 = 48$ remain

$$\text{Avg} = \frac{\text{Sum of number}}{\text{quantity of numbers}} = \frac{920}{48}$$

$$\boxed{\text{Avg} = 19.17}$$

$\boxed{\text{Thus the remaining avg} = 19.17}$