

(1)

Nasheen Akhtar

29088 - Nosheen Akhtar - 183.

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Subject: General Science and Ability

QNO3: What causes a cyclone? In which part of the cyclone winds are strongest and destructive?

Cyclone:

In meteorological terms, a cyclone is a wind system that rotates inwards around a strong low-pressure centre. These rotations are clockwise in Southern Hemisphere and counter-clockwise in Northern Hemisphere.

Generally, when winds rise above 118 kmph, it is known as cyclone. These rotating winds forming over the Indian ocean and Pacific ocean are termed as "cyclones".

Formation of Cyclone:

When the warm and moist air over the ocean rises upward due to less density, leaving less air near the ocean surface, then

it starts to create a low pressure zone. The surrounding areas have high pressure and air flows into this low pressure and warms up, forming a cycle. With the constant heating rising of the warm air and evaporation process, the entire cloud and wind system starts to spin and grow. With acquiring more speed, the eye of the cyclone starts to form in the center. Central zone has the lowest air pressure and is calm and clear. Further, the high pressure air from above flows towards this region.

When the wind's rotating speed reaches 63 kmph , it is called a tropical storm and when wind speed reaches 117 kmph , tropical cyclone formation takes place.

Causes of Cyclone :

Some of factors responsible for cyclone formation are as follows :

- (i) Warm temperature at sea surfaces.
- (ii) Coriolis force impacts the area that forms a low-pressure zone.
- (iii) Atmospheric instability.
- (iv) Increased humidity in the lower middle levels of troposphere.
- (v) Low vertical wind shear.
- (vi) Pre-existing low-level disturbance.

Types of Cyclones

Generally, there are two types of cyclones.

- (i) Tropical Cyclone
- (ii) Temperate Cyclone

Structure of Tropical Cyclone

The main parts of tropical cyclone are the eye, rain bands and the eye-wall.

- (i) Eye:

The cyclone's center is

relatively calm and light winds usually do not exceed 15mph. It is calmest part of storm.

The Eyewall :

The eyewall consists of a ring of tall thunderstorms that produce heavy rains and usually the strongest winds with a speed of around 74mph.

Rain-Bands :

Curved bands of clouds and thunderstorms that trail away from the eye wall in a spiral fashion.

The part of cyclone where winds are strongest and destructive:

The most dangerous and destructive part of a tropical cyclone is the **eyewall**. Here winds are strongest, rainfall is heaviest and deep convective clouds rise from close to Earth's surface to a height of 15,000 meters.

(b) What are shallow focus and deep focus? What causes earthquake? What was the magnitude of earthquake in Morocco recently?

Earthquake :

The sudden shaking or rolling of earth's surface is called an earthquake.

Shallow Focus Earthquakes :

These are commonly occurring crustal earthquakes caused by faults and movements of continental plates. Their focus is nearer to the earth's surface. They are usually of large spread and causes more damage at the surface of earth. Most often, they are not even felt due to smaller magnitudes and at lesser depths. About 75% of the world's energy released from earthquakes is from shallow focus ones.

Deep Focus Earthquakes

These are intra plate earthquakes occur within the subducting oceanic plates as they move beneath the continental plates.

It occur when two tectonic plates slide towards one another followed by subduction. They have larger magnitudes, a great deal of energy is released with the forceful collision of plates.

Causes of Earthquakes

Elastic Rebound Theory

In 1906, Henry Fielding Reid, presented "elastic rebound theory"

The crust of earth gradually stores elastic stress - that is released suddenly during earthquake. This gradual accumulation and release of stress and strain is referred as "elastic rebound theory". Most earthquakes are the result of sudden elastic rebound of stored energy.

Plate Tectonics :

Earth crust is made up of huge blocks called tectonic plates. Over the years, the movement of tectonic plates cause weak points called faults. Most faults occur along the boundaries of tectonic plates and these are zones causing earthquakes.

Volcanic Activity :

Volcanic activity can cause earthquakes as magma rises within a volcanic chamber. During volcanic activity magma pushes apart the plates which causes earthquake.

Dams :

Large storage of water in dams causes pressure on underlying rocks. When this pressure crosses elastic limit, rocks are broken and their vibrations takes place in the form of earthquake.

Other causes:

Includes land sliding, atomic bomb explosions etc.

Magnitude of earthquake in Morocco :-

A 6.8 magnitude earthquake struck in Morocco's High Atlas mountain range on Sep 8, 2023. It was a very destructive earthquake causing many deaths.

(c) Write a note on Dengue fever. causes, preventive measures - -

Dengue Fever :-

It is a viral infection and mosquito-borne disease caused by any one of five closely related dengue viruses. This virus infects 50-100 million individuals annually and is endemic in more than 100 countries throughout Africa, America, South-East Asia and Western Pacific.

Causes :

Dengue fever is caused by any one of the five closely

related dengue viruses. The virus is transmitted by several species of mosquito within the genus Aedes principally, A. aegypti.

Symptoms:

Many people experience no signs or symptoms but some feel high fever and following signs and symptoms as:
headache, muscle or joint pain, nausea, vomiting, pain behind the eyes, swollen glands, rash, and more severely it may cause stomach pain, gums bleeding, difficulty in breathing, restlessness etc.

Preventive Measures:

- i) In areas of world where dengue fever is common, one dengue fever vaccine is approved for people already having dengue i.e. Dengvaxia.

(ii) The World Health Organization stresses that vaccine is not an effective tool so protect yourself as:

- Stay away from heavily populated areas if possible
- Use mosquito repellents even indoors
- When outdoors, wear long-sleeved shirts and long pants
- When indoors, use air-conditioning
- Make sure window and door screens are secure & free of holes.
- Use mosquito nets.

(d) Distinguish between:

Ionic Bond	Covalent Bond
<p>Definition A type of bond formed by the complete transfer of electrons between two atoms due to electrostatic</p>	<p>A type of bond formed by the sharing of an electron pair between two atoms is</p>

force of attraction.
is known as
ionic bond.

known as
covalent bond

In It occurs between
between metals and non-
metals.

It occurs between
Two non-metals.

Electro- The electronegativity
negativity difference between
diff. two bonded atoms
must be greater
than 1.7.

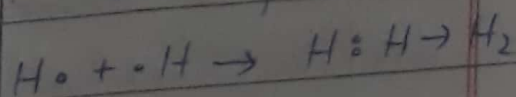
The electronegativity
difference is
smaller than
1.7.

$$\text{E.N diff} = 0.4 - 1.7$$

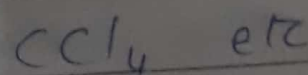
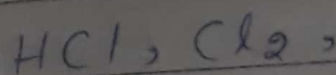
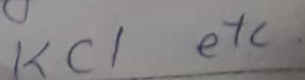
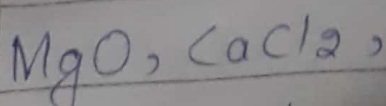
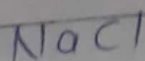
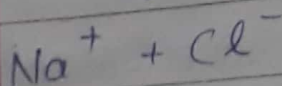
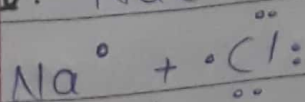
it is polar

$$\text{E.N diff} = < 0.4$$

non-polar.



Example: NaCl

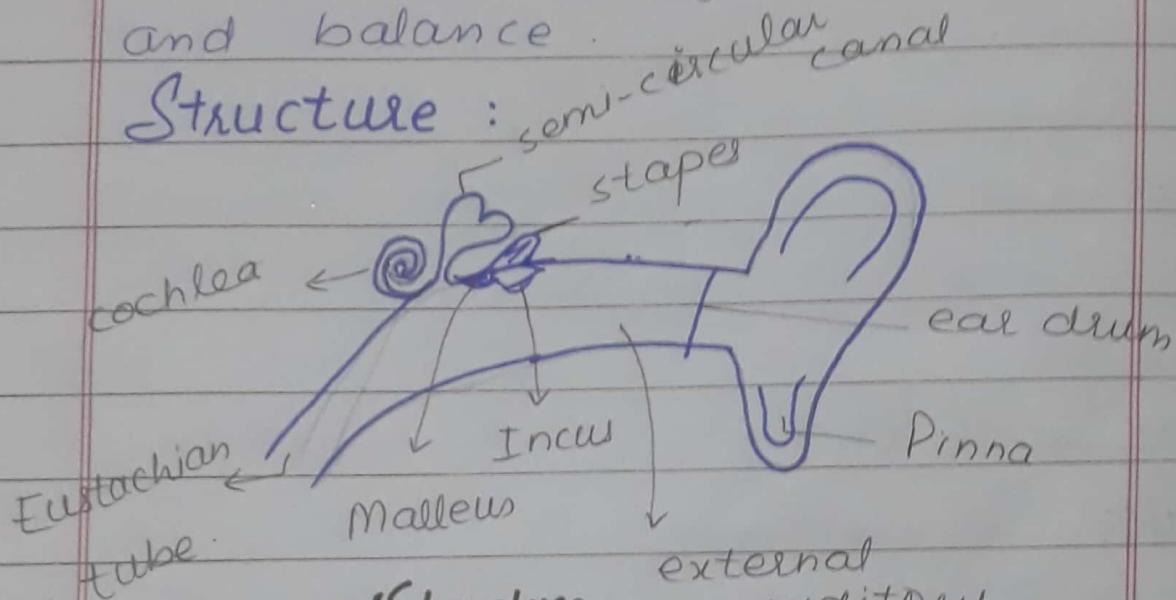


QNO5 (a) Structure and function

HUMAN EAR

The ear is an organ of hearing and balance.

Structure :



(i) Outer Structure and their Functions ^{external auditory canal}

It has three parts :

- Pinna is the outermost part with which sound waves interact first.
- External auditory canal through which sound waves enter.
- Ear drum is the part with which sound waves strike and it vibrates. This vibration produces sound.

(ii) Middle Ear :-

It is a tympanic cavity consisting of following :

Ossicles :

These are three small bones that are connected and transmit the sound waves to the inner ear. These bones are malleus, incus and stapes.

Eustachian tube :

A canal that links middle ear with back of the nose.

It helps to equalize the pressure in the middle ear.

(iii) Inner Ear

Inner ear consists of following:

Semicircular canal and vestibule:

These help in maintaining body-balance as per body positions

Cochlea

It is the hearing part of the ear which contains receptors and auditory canals in it.

The conversion of sound waves into electric signals takes place here, then auditory ~~nerve~~ nerves transmit them to brain.

Process of Hearing:

Hearing starts with outer ear. Sound waves strike the ear drum after travel down the external auditory canal. The ear drum vibrates and vibrations passed to 3 tiny bones in the middle ear. These ossicles amplify the sound. They send the sound to inner ear and into fluid-filled hearing organ. Here it is converted into electrical impulses. The auditory nerve sends them to brain. The brain translates these impulses as sound.

(b) What is digestive - - - -

† Digestive System †

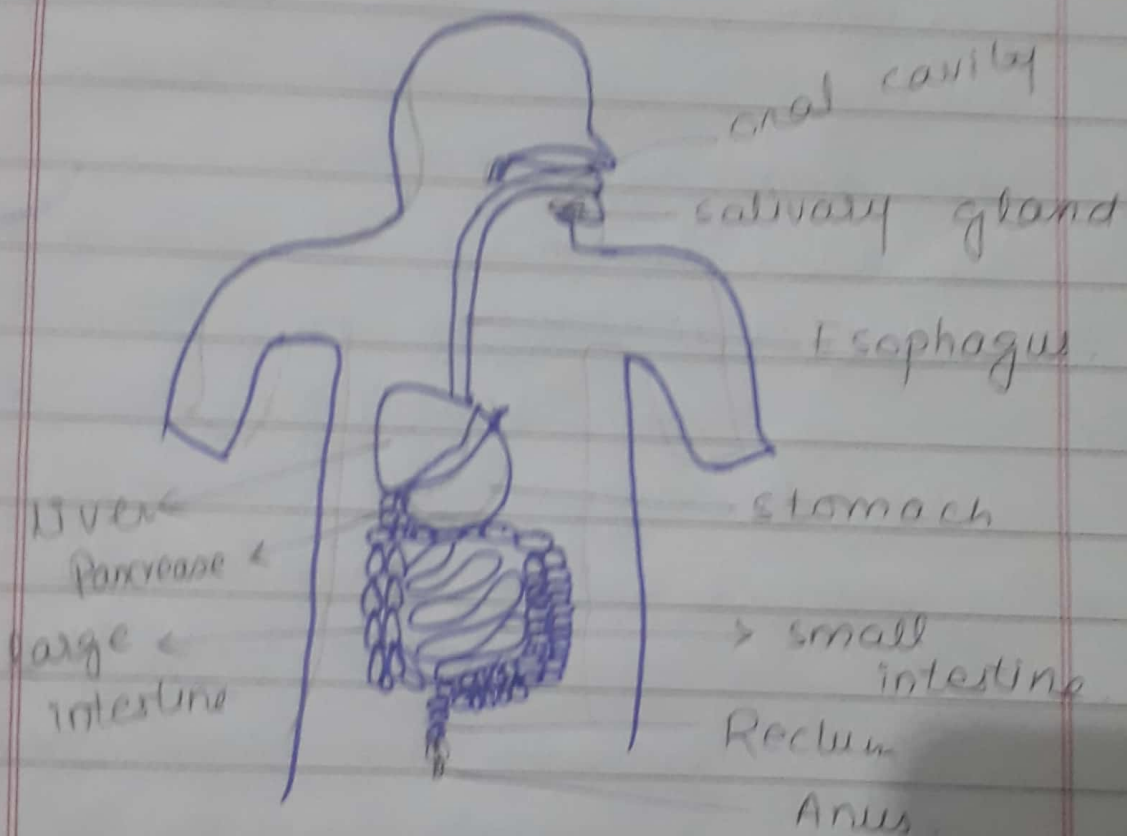
It is a system which is mainly responsible for the breakdown of larger food particles into simpler and

absorbable food particles

carbohydrates \rightarrow glucose

Lipids \rightarrow fatty acids

Proteins \rightarrow amino acids.



Role of Small Intestine in Digestion :-

It is six-meters long and 90% of digestion takes place here.

It has three parts.

(i) Duodenum

It is first part and 20-25 cm

long.

Role: When food enters into it, it activates two glands i.e.

- (i) Pancreas (ii) Liver

↳ it releases

pancreatic juice into small intestine through duct and have following secretions.

(a) Amylase: It converts starch to maltose

(b) NaHCO_3 : It neutralizes the acidic nature of chyme.

(c) Lipase: It digests fats into fatty acids.

(d) Trypsinogen: It is converted to trypsin (active form) by enterokinase and then it converts proteins to polypeptides.

(ii) Liver

It releases bile into duodenum and bile converts fats into fatty acids.

Main secretion of duodenum:

It is enterokinase which converts trypsinogen into trypsin (active form) (inactive form)

(ii) Jejunum :-

It is the second part of small intestine. It is 2.4 meters long. Food is completely digested here. Its secretions are called intestinal juice. It contains five enzymes.

Amylase :

Aminopeptidase : It converts poly-peptides to dipeptides.

Erypsin : It converts dipeptides into amino acids.

Lipase : It converts fats into fatty acids.

Maltase : It converts maltose into glucose.

Lactase : It converts lactose into glucose.

(iii) Ileum :

It is third part of small intestine. Absorption of food takes place in ileum. Internal surface has finger-like projections "villi" for absorption.

(C) Write a short ---

VITAMINS

These are the organic compounds which are essential for the growth of body, normal working and reproduction.

It has two types.

(i) Fat - Soluble Vitamins :

These are vitamin A, D, E and K.

Vitamin A - It is for growth, good vision and healthy nerve functioning.

Vitamin D - It is necessary for strong bones.

Vitamin E - It is essential for healthy hair and skin.

Vitamin K - It is essential for blood clotting and bone repairing.

These vitamins can be stored in the body and do not need to be consumed everyday.

(ii) Water - Soluble Vitamins :-

These vitamins can dissolve in water only. These cannot be stored in body so they need to be eaten daily to replenish the body needs.

These include vitamin B and C.

Vitamin B complex - It composed of eight vitamins ($B_1, B_2, B_3, B_5, B_6, B_7, B_9, B_{12}$). These are essential for growth, boosts immune system and also important for formation of RBCs.

Vitamin C - It is essential for wound healing and is present in citrus fruit. Its deficiency causes scurvy.

(d) Describe - - - .

in Pituitary Glands in

Section - II

QNO6:

(a) Identify the series:

(i) 10, 100, 200, 310, 420Explanation:

The series goes on with a difference of 90 between 10 & 100, then difference of 100, then ~~10~~ and then last difference would be 120.

(ii) 3, 7, 23, 95, 479Explanation:

$$3 \times 2 = 6 + 1 = 7$$

$$7 \times 3 = 21 + 2 = 23$$

$$23 \times 4 = 92 + 3 = 95$$

$$95 \times 5 = 475 + 4 = 479$$

(b) Given Data :-

Perimeter of rectangle = 114 cm.

Width = $(2x + 3)$ cmLength = $(3x - y)$ cm(2) = $(2x + y)$ cm

Area of rectangle = ?

Sol:

(C) Sol:

Let Nisha's age be x

Romi's age be y

$$x = 15 + y \rightarrow \textcircled{i}$$

$$x - 5 = 3(y - 7) \rightarrow \textcircled{ii}$$

$$\textcircled{i} \Rightarrow x - y = 15 \rightarrow \textcircled{1}$$

$$\textcircled{ii} \Rightarrow x - 5 = 3y - 21$$

$$x - 3y = -16 \rightarrow \textcircled{2}$$

Subtracting equ. $\textcircled{1}$ & $\textcircled{2}$.

$$\begin{array}{r} x - y = 15 \\ \oplus x \ominus 3y = \oplus 16 \\ \hline \end{array}$$

$$2y = 31$$

$$y = \frac{31}{2}$$

$$\boxed{y = 17.5 \text{ years}}$$

Putting in 1

$$x - y = 15$$

$$x - 17.5 = 15$$

$$x = 15 + 17.5$$

$$\boxed{x = 32.5 \text{ years}}$$

Nisha's present age is 32.5 years.

(d) 210 oranges - - - .

Sol:

For biggest possible number of cartons, we have to take HCF.

2	252	2	210	2	294
3	126	3	105	3	147
7	42	7	35	7	49
	6		5		7

$$H.C.F = 2 \times 3 \times 7$$

$$H.C.F = 42$$

So the biggest possible number of cartons needed

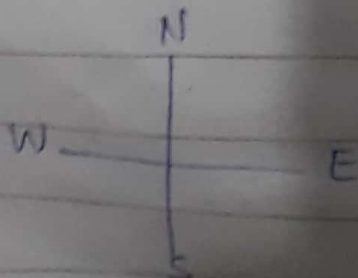
are 42

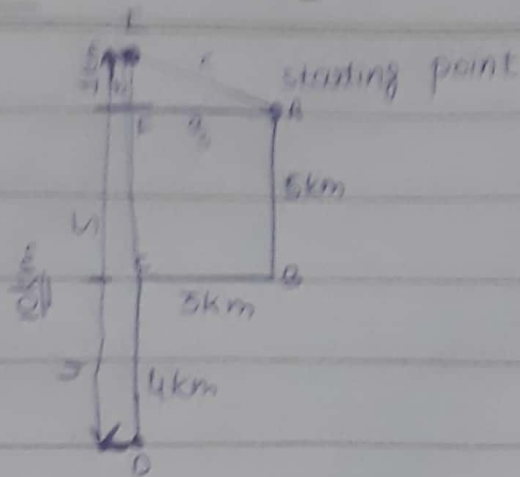
x-----x

Q NO 8:

(a) A man walks - - - .

Sol:





So, consider $\triangle AEF$

it is a right-angled triangle:

$$(c)^2 = a^2 + b^2.$$

$$c^2 = 3^2 + 1^2$$

$$c^2 = 9 + 1$$

$$c^2 = 10$$

$$c = \sqrt{10}$$

$$c = 3.16 \text{ km.}$$

So, he is 3.16 km away from his starting point and his direction is

"north-west"

(b) Sol:

cubes of 1st five prime numbers.

$$(2)^3 = 8, (3)^3 = 27, (5)^3 = 125$$

$$(7)^3 = 343, (11)^3 = 1331$$

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

$$= \frac{8 + 27 + 125 + 343 + 1331}{5}$$

$$= \frac{1834}{5}$$

$$\text{A.M} = 366.8$$

(c)

Sol:

Men	(km) distance	days
↓ 50	20 ↑	40 ↑
↘ 70	20 ↑	x ↓

$$\text{So, } \frac{x}{40} = \frac{20}{20} \times \frac{50}{70}$$

$$x = \frac{50 \times 40}{70}$$

$$x = \frac{200}{7}$$

$$x = 28.5 \text{ days}$$