Zain

General Science and Ability.
(Part-II)

Q#2:

(a) Discuss key features of COP-28 held in UAE in Nov-Dec, 2023 in the context of Loss and Damage Fund and some other other financial issues of developing countries?

ans:

Introduction:

The COP-28 held in UAE in Nov-Dec, 2023 began on a high note. The parties adopted a resolution to operationalize the new loss and damage fund that negotiated previous year in Sharm-el-Sheikh, Egypt, and the attending parties announced their pledges for the initial capitalisation. The parties also adopted agendas to address the contentious issues, especially on the issues like the Global Stocktake (GST) under the Paris Agreement and the implementation of the framework on the Global Goal on Adaptation (GGA).

Loss and Damage Fund:

In the face of the climate emergency, the wealthy countries of

the Global North have so far pledged a combined total of $700 million (USD) to the loss and damage fund. However, it is less than 0.2% of the total irreversible damage (economic, and non-economic) that the developing countries are facing right. Thus, the fund falls far short of the estimated $400 billion in losses, developing countries face each year.

Global Stocktake (GST):

GST is a core component of the Paris Agreement. Besides, loss and damage fund, the GST negotiations will play a key role in how the world can keep the promise of limiting the planetary warming to $1.5°C$. The GST will further provide guidance and assistance to the developing countries to upgrade their own five-year climate plans

COP-28 brought some other outcomes too:

1. The conference called for tripling the renewable energy capacity globally by improving the annual energy efficiency.

2. Cutting down of the unabated coal power.

3: Accelerating efforts globally to bring down the global emission level.

4. Phasing-out of fossil fuel subsidies that neither result in elimination of poverty nor the transition to the green energy.

Other Financial Constraints

o Failure to establish a true climate reparative mechanism.

o Loss and damage fund generated more $400-700 million that is well bellow the actual damage the developing countries are facing annually.

o Paltry contribution of USA of $17·5 million the biggest polluter and largest contributor to the greenhouse gas emissions.

Conclusion

COP-28 began on a positive note. It brought the operationalisation of famous loss and damage fund, provided a framework called Global Stockage to better adapt to the climate change. Furthermore, the loss and damage fund failed to bring the actual contributions (expected) from the wealthy nations. Thus, COP-28 ~~remains a~~ has a mixed baggage, both positive and negative, however, the negative overshadows the positive.

b- What is Solid Waste Management?
Discuss different methods.

ans:

Introduction:

The term solid waste is commonly referred to the domestic and muncipal garbage, specifically the food-waste etc. It also includes the industrial and hazardous material. Similarly the term solid waste management mainly refers to the complete process of collecting, treating, and disposing of solid waste at muncipal or industrial levels.

Process of Solid Waste Management:

In the process of waste management, the wastes are collected from different sources and are disposed of. This process includes, collection, transportation, treatment, analysis and complete or partial disposal of waste. It is a completely regulated process to avoid the technical or human error.
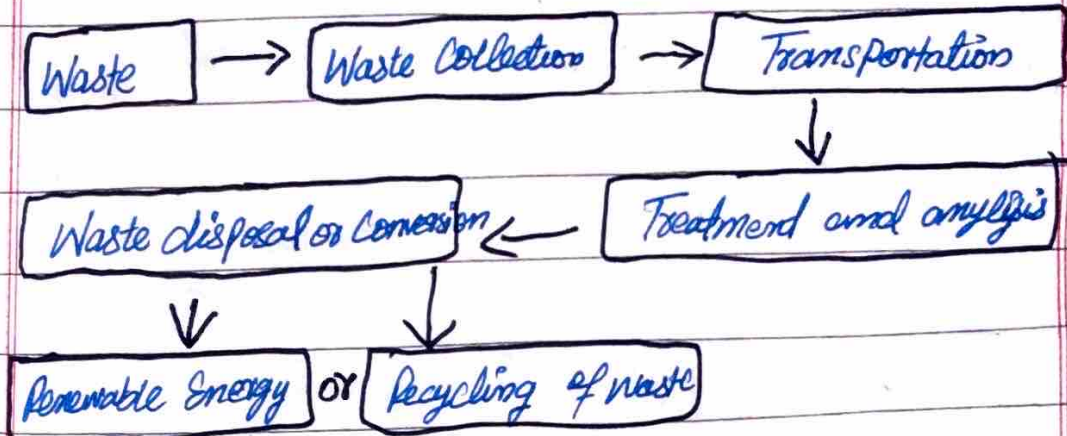
Sources of Solid waste:

1- Solid domestic garbage.

2- Waste (solid) material from various industries.

3- Solid agricultural waste.

4- Medical waste from hospitals.

5- Sewage sludge and animal dung, etc.

Solid Waste Management

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┌─────────┐      ┌──────────────────┐      ┌──────────────────┐
│  Waste  │ ───► │ Waste Collection │ ───► │  Transportation  │
└─────────┘      └──────────────────┘      └──────────────────┘
                                                     │
                                                     ▼
┌──────────────────────────┐      ┌──────────────────────────┐
│ Waste disposal or Conversion │ ◄── │ Treatment and analysis │
└──────────────────────────┘      └──────────────────────────┘
         │              │
         ▼              ▼
┌──────────────────┐  ┌────────────────────┐
│ Renewable Energy │or│ Recycling of waste │
└──────────────────┘  └────────────────────┘
```

Methods of Solid Waste Management:

(a) Muncipal Solid Waste:

Muncipal solid waste can be further divided into biodegradeable, recycleable and hazardous domestic wastes (b)The Biodegradeable waste includes rotten food, vegetables? peel and kitchen substance.

(c)Recydeable waste includes Plastics, batteries and glass. The industrial waste from chemical factories and hospital waste, as well as nuclear waste need special settings to dispose of them.

Landfills Method

      Landfills are the most common

method of disposing of solid wastes. Modern day landfills are designed by taking care of various environmental factors and types of wastes, to minimise pollution and health risks. Landfills are man-made pits dug into the ground in which solid waste is stacked, compacted and covered before being disposed of. About 146.1 million tonnes of municipal waste is landfilled.

Compositing Process:

Composting is another process of solid waste disposal, it is similar to the lanfill method. The process is controlled and requires waste to stay for longer times. Thus, the decomposition of organic waste starts, this way the composting process is used in developing countries as an alternative to fertilizers because, it increases the fertility of plants.

Incineration

Incineration is another method of treating solid wastes. The waste is transported to distant land, where the waste is burned. The garbage then transforms into

the base components, and the generated heat is trapped for deriving energy resources. This method is widely used in developed countries like Canada and USA.

Recycling:

Recycling is the most common method of converting solid municipal wastes like Plastics and glass into items like door-mats etc for recycling reuse. This is the cheapest method of solid waste management.

Conclusion

Solid Waste Management is a method to dispose of the municipal and industrial wastes by using different methods like, landfills, incineration, compost, and recycling to either treat and recycle or completely destroying the solid wastes.

(c) Write a note on Balanced Diet

ans:

Introduction

A diet that contains adequate amounts of all necessary nutrients required for healthy growth and activity of human

body is called the balanced diet.

Components of a Balanced Diet:

Different foods eaten by humans have different proportion of nutrients in it. In order to maintain a balance, some of the most essential nutrients needed by body include, fats, carbohydrates, proteins, minerals and vitamins in adequate amounts.
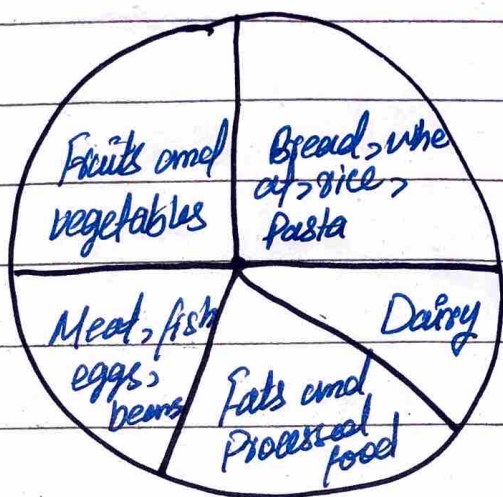

Fig. (A Balanced Diet)

Importance of a Balanced Diet:

"Let food be thy medicine and medicine be thy food." — Hippocrates (460 BC-370BC)

1. Balanced diet leads to good physical and mental health.

2. Balanced diet is required by proper growth

of body.

3- Balanced diet is required by body to work and function properly.

4- Balanced diet increases the immunity against diseases by empowering the natural immunal system

Conclusion :

Balanced diet means the adequate diet, which contains adequate amount of nutrients required by human body to work and function properly. Similarly, balanced diet guards against many diseases. Thus, balanced diet becomes the natural medicine required by human body.

$\longleftrightarrow$

(d) Discuss any three renewable energy resources under CPEC.

and

Introduction

CPEC stands for the China-Pakistan Economic Corridor, which is a flagship project of China under its Belt and Road Initiative (BRI), it was unveilled in 2014. CPEC is an economic corridor that means its important

not only for geo-economic but for geopolitical and energy-security considertation. China is investing millions of dollars into the energy sector of Pakistan. As Pakistan is pivotal for china's economic and political rise, thus, Pakistan's doemand & enefficent energy sector needs some redressing. Therefore, keeping in view the environmental and climate change related considerations, china is investing in the renewable energy sector of Pakistan instead of hydrocarbons industry.

Renewable Energy Sources under CPEC:

Under the framework of CPEC, several renewable energy projects have been initialted, aiming to address Pakistan's growing energy demand and promote sustainable development. The collaboration includes investments, technology, transfer and capacity building in the energy sector. Following are some of the renewable energy projects under CPEC:

1: Solar Energy Projects:

a- 1000 MW Quaid-i-Azam Solar Parle (Bahawalpur)

2- Wid Energy Projects:

1- 50 MW Hydro-China-Dawood Wind Farm (Thatta).

2- 50 MW Sachal Wind Farm (Thatta)

3- 100 MW Three Gorges Second and Third Wind Power Project.

4- 50 MW Cacho Wind Power Project.

3- Hydro Power Projects:

1. 720 MW Karol Hydropower Project (AJK)

2. 884 Suki Kinari Hydropower Project.

3- 700.7 MW Azad Pattan Hydropower Project (Punjab).

Important Renewable Energy Projects under CPEC for Pakistan:

1- To meet energy demand for both domestic and industrial usage.

2- Cheap renewable energy would provide relief to over-burdened economy due to circular debts and international borrowing.

3- Will boost industrial production and growth rate.

4- Would help the transition to green energy.

5- Indigenous resources will end dependence on foreign and imported hydrocarbons.

Conclusion:

China-Pakistan Economic Corridor will retool the inefficient energy sector of Pakistan

CPEC related energy projects will end Pakistan's dependence on imported hydrocarbons and would provide a boost to the dwindling economy. Furthermore, these energy projects will help in the transition to Green energy in Pakistan.

←——————————→

Q#3: (a) Discuss different parts of eye. How can far-sightedness and short-sightedness be corrected?

ans: <u>Introduction:</u>

The human eye is of the most important organs in body. A human eye is made up of three coats, which enclose the optically clear aqueous humour, lens, and vitreous body. Furthermore, far-sightedness and short-sightedness are two problems of eye-vision, which can be resolved through medical treatment and with aid of modern optical equipment.

Structure of Human Eye:

The eye is made up of three coats, which enclose the optically clear aqueous humour, lens, and vitreous body.

Furthermore, the outermost coat consists of the cornea and the sclera. The middle coat contains the main ~~bobaby~~ blood supply to the eye and consists from the back forward of the choroid, the ciliary body and the iris. The inner most is the retina, which is also the blood supply. Pupil is the small opening in the iris, its size is controlled by the iris. Behind the pupil, there is lens, a transparent structure. By the motion of the ciliary muscle, it changes its shape to focus light on the retina.
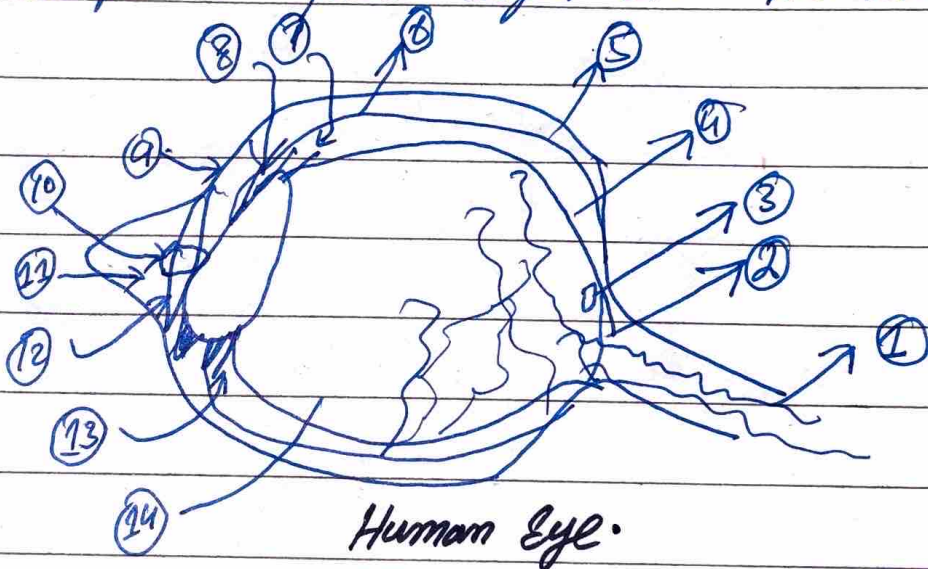
Human Eye.

1-Optic Nerve. 2. Optic disc. 3. F. Centralis
4-Retina. 5. Sclera. 6. Choroid. 7. Ciliary Body.
8-Lens. 9. Cornea. 10. Pupil. 11. Aqueous Body
12. Iris. 13. Supersensory ligament 14. Vitreous Body.

Functions of Eye: Human Eye is like

a camera. Like a mobile camera, human eye too focuses and lets the light enter to produce images. The light rays are deflected from distant objects and land on the retina after they pass through different mediums like cornea and lens. This principle is called the refraction of light. Thus, human eye is the most important sensory organ in the body.

Correction of farsightedness:

Hyperopia is commonly called farsightedness, which means the inability to see close objects with human eye. However, farsightedness can be corrected with a converging lens in glasses to increase the vision power.

Correction of Nearsightedness:

Myopia is commonly called nearsightedness, which is actually, the inability to see close objects with human eye. Thus, diverging lens in the form of contact lenses or glasses should be able to solve the problem of myopia or nearsightedness.

|| & waste (solid) material from various industries. ||

Conclusion :

Human eye is the most important sensory organ in human body. It enables human to observe and see happenings around them. It consists of a complex structure of three coats. furthermore, myopia and hyperopia are two vision related inabilities, which can be corrected by wearing the converging and diverging lenses, respectively.

$$\longleftrightarrow$$

(b) How does a kidney works? Explain with diagram.

Introduction :

Kidneys are a pair of bean shaped organs in human body. They are located below the rib cage, on each side of the spine. Kidneys help remove waste products and toxins from body by maintaining balanced electrolyte levels, and blood pressure.

Structure of Kidneys:

The kidneys are dark-red, slightly flattened, and bean shaped organs about 10 cm long, 5 cm wide, and 4 cm thick. Each weighs around 270 g. They are placed against

against the wall of the abdominal
cavity just below the diaphragm, on
either side of the vertebral column. They
are protected by the last two ribs. They
kidneys are covered with the peritoneum
in the front and on the side and rest
they are covered by the abdominal muscle.
Each kidney is bean-shaped. Their surface
is convex and their inner is concave. The
inner surface has a deep-notch called hilius.
The uretas, renal artery, renal vein, and nerves
enter the kidney through hilius.
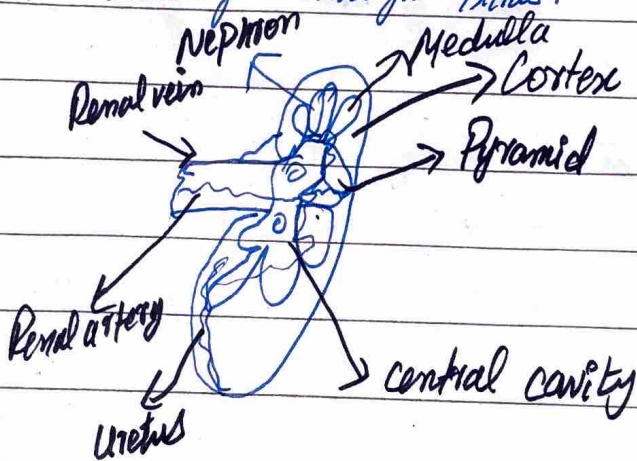
(figure of Kidney).

Each kidney is composed of numerous
microscopic coiled tabules. called nephron or
the renal tubules. The kidney is divided into
two regions; the inner region is called renal
medulla and the outer region is called the
renal cortex. The medulla is subdivided into

into conical masses and renal pyramids, each have a broad base towards the cortex and a narrow end called renal papilla towards the pelvis.

Ureters, Urinary Bladder and Urethra:

Ureters conducts urine from the kidneys to the urinary bladder. The urinary bladder is a pea shaped sac situated in the pelvic region of the abdominal cavity. It can store about 0.5 to 1 litre of urine. Urethra starts from the neck of the urinary bladder and leads to the exterior

Nephron :

Nephron or the uriniferous tubule is the functional unit of the kidney. A nephron consists of a twisted tubule closed at one end, open at the other with a network of associated blood vessels. Each kidney of a person is formed of around 1 million nephrons. Nephron is divided into four regions, Bowman's capsule, proximal convulted Tubule, loop of henle, and distal convoluted tubule.

Functions of Kidneys:

1. Kidneys maintain and regulate the balance of water in body.

2. Kidneys regulate blood pressure and the level of vital salts.

3. Kidneys regulate the acid-base (PH) of blood and other bodily fluids.

4. Kidneys help secrete the hormone erythropotein, that controls and regulate the red blood cells in body.

Conclusion:

Kidneys are red-stay, bean shappeel organs of about 270 gram weight located against the back of the abdominal cavity, just below the diaphragm. These organs produce vital functions, like Secretion, regulation of blood pressure, water and salt levels, and controls the production of red blood cells.

$\longleftrightarrow$

Q#3: (c) How Black Holes are formed?

ans

Introduction:

A place in space where gravitational pull is so strong that not even the light can escape from it. It pulls everything towards itself. The gravitational pull is greater because the matter has been squeezed into a tiny space, this place is known as a Black Hole. It happens when the Star is actually in its dying phase. The death of a star is equated with the formation of a Black Hole

Formation of a Black Hole and Life Cycle of a Star:

Following is given the formation and life cycle of a Star.

1- Main Sequence Stage:

During this stage the protons of hydrogen are converted the atoms of a helium. This reaction is exothermic and gives more heat than actually required, thus core of the main-sequence Star releases a tremendous amount of energy A star remains in the main sequence stage, unless a significant amount of hydrogen is not consumed.

2- The Giant Phases:
When a star consumes hydrogen

or exhausts it completely in its core. Then the star starts fusing hydrogen surrounding the helium core. The outer layer of the star and cools greatly as it is transformed into a reel giant

3- Reel Giant Phase :

(a) Carbon Burning Process

When helium is exhausted at the core of a giant star, the core and the temperature and pressure rises enough to fuse carbon.

$$He_2 + He_2 + He_2 \xrightarrow{\Delta} C6$$
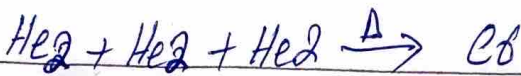
(b) The Neon, Oxygen and Silicon Burning Phase :

This burning phase continue with successive stages being fueled by neon, oxygen, and silicon.

4- Two Pathways of a Star.

Path 1.	Path 2.
A Supernova and Black Hole formation. If the star is massive it will explod as a Supernova. The star's core is itself behind the gravitational collapse is responsible for formation of	A low mass star not enough to explode as a supernova will become a white dwarf.

stellar mass and Black
Holes.

5- Death of a Star:

When a giant star will expand
exponentially, after burning and depleting
neon, oxygen and silicon that core will
contract itself and then it will transform
into a supernova, which is also called
the death of a star. At this stage the
star will explode due to the gravitation
al collapse and it will start forming
the stellar mass. Resultantly, a black hole
will be formed.

Conclusion:

A black hole is made up of
stellar mass and dark matter. The formation
of a black hole is the result of the
expansion of a star and explosion as
a supernova. A black hole is a place where
gravitational pull force is strong that it
pulls every object into it not even light
can escape it. It is also called the death of a star.

(d) what is doping in semi-conductor
. Discuss different types of ceramics.

Introduction:

Doping is a process of adding impurities to the crystaline lattice structure of semi-conductors in order to change their electricity conducting properties. There are two types of doping in semi-conductors. Furthermore, ceramics are inorganic non-metalic compounds.

Doping in Semi-conductors:

Doping is an intentional process of changing the electrical properties of semiconductors according to the required levels.

Types of Doping in Semi-Conductors:

There are two types of doping in semi-conductors as explained bellow:

(a) Doping of n-Semiconductors:

In the doping of n-type semiconductors electron donating impurities are introduced to create excessive electrons in their crystaline structure. The general dopants include phosphorous and arsenic as these elements have more electrons in their outer-shell, thus excessive

electrons create strong negative charge
and increase the conductivity.

(b) Doping of P-Semiconductors

In this
type of doping method, electron gaining
impurities are added into the crystaline
lattice of P ~~dod~~ semiconductors to create
a positive charge. For example, gallium
is the common element used in it, because
it has fewer electrons in its outer shell,
thus when an element has less electrons
its nature is to gain more and
balance its shell.

Ceramics:

Ceramics are non-multalic and
synthetic compounds having ionic and
covalent bonding within their structures.

(a) Nitride Ceramics:

Silicon nitride is a
nitride ceramic, that has high strength,
hardness and resistance to corrosion

(b) Oxide ceramics:

The ceramics comprising
of oxygen and other elements like aluminum
oxide. Oxide ceramics have high electric

insulation properties.

Conclusion :

Doping is an intentional method of adding impurities to the crystalline lattice structures of semiconductors to change their electrical properties. There are two types of doping, p-doping and n-doping. Furthermore, ceramics are inorganic and synthetic compounds created with ionic and covalent bonding. The common ceramics are nitride and oxide ceramics.

$$\longleftarrow \qquad \longrightarrow$$

(Section -II)

Q#6: Five years ago the age of father was thrice the age of son. If son is 30 years old now. What is the current age of father?

ans:

Sol: Suppose the age of father be $= x$

The age of son be $= y$.

$$x - 5 = 3 \times (y - 5) \longleftarrow \text{①} \ eq$$

putting the age of son, $y = 30$ in eq ①.

$$x - 5 = 3 \times (30 - 5)$$
$$x - 5 = 3 \times 25$$

$x - 5 = 75$

~~substituting~~

$x = 75 - 5$

$\boxed{x = 70}$

The current age of father, therefore, is 70 years. (Ans)

$\longleftrightarrow$

(b) Mean of 20, 30, y, and 50 is 50. What is the value of y?

Sol:

$$\text{Mean} = \frac{\text{Sum of values}}{\text{number of values}}$$

thus,

$$50 = \frac{20 + 30 + y + 50}{4}$$

$$50 \times 4 = 90 + y$$

$$200 = y + 90$$

$$y = 200 - 90$$

$\boxed{y = 110}$ The value of (y? answer.)

$\longleftrightarrow$

(c) Find the missing series

(i) 2, 6, 18, 54, ...

sol:

This series shows the pattern of

$2 \times 3 = 6$, $6 \times 3 = 18$, $18 \times 3 = 54$, $54 \times 3 = 104$

Day:_____

Therefore, the missing team in the given series will be 162 (answer).

(b) ii, 3125, 256, ____, 4, 1

This series is given is reverse order and the pattern looks as follows.

$(5)^2; 15; 4 = (2)^2; 1 #= (1)^2$

$= (5)^5, 2\text{ff} = (4)^4 \quad 27 = (3)^3; 4 = (2)^2; x |= (1)^1$

3125

So the above series can be written as

3125, 256, 27, 4, 1

The missing term then would be 27. (answer).

(d) If the product of two numbers is 320 and their ratio is 2:5. What is the difference between the squares of these two numbers?

Sol:

Let the two numbers be, x and y.

therefore; the product of two would be:

$$x \times y = 320 \leftarrow eq ①$$

their ratio will be:

$$\frac{x}{y} = \frac{1}{5}$$

$$x = 5y \leftarrow eq (2).$$

substituting ② eq into eq①

$$5 \overline{)320}$$
$$30$$
$$\begin{array}{r} 64 \\ \hline 28 \\ \hline 8 \end{array}$$

$$5 \overline{)320}$$
$$5 \overline{)40}$$

$$(5y) \times y = 320$$

$$5y^2 = 320$$

$$y^2 = \frac{320}{5}$$

$$y^2 = 64$$

Taking square roots on both sides

$$\sqrt{y^2} = \sqrt{64}$$

$$\boxed{y = 8} \leftarrow ③$$

putting value of $y = 8$ into eq ②

$$x = 5(8)$$

$$\boxed{x = 40}$$

Now as per statement, the difference b/w the squares of two number is given as

$$(x)^2 - (y)^2 = (40)^2 - (8)^2$$

$$x^2 - y^2 = 1600 - 64$$

$$\boxed{x^2 - y^2 = 1536}$$

Thus, the difference between squares of the two supposed number is $\boxed{1536}$ answer

$\longleftrightarrow$

Q#8: (a) A crow travels 5 km south, then 3 km ~~north~~ west, and then 4 km north. Finally it travels 2 km ~~south~~ east. How far is the crow from the initial point?

sol:
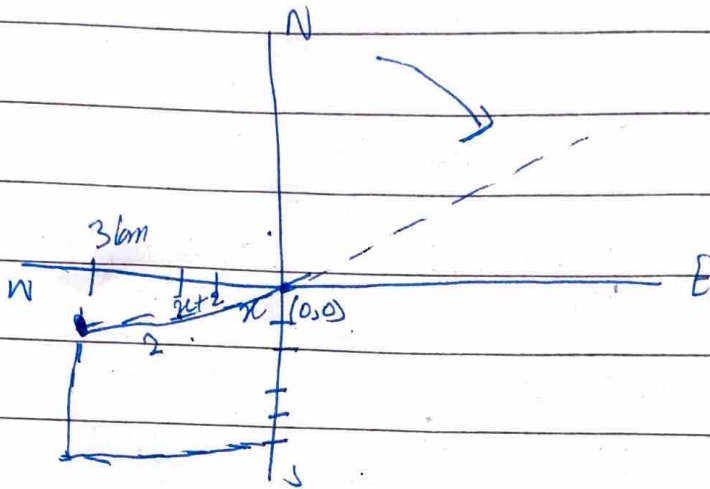
using Pythagorean formula.

$$(hyp)^2 \pm (Base)^2 + (Perpendicula)^2$$

$$(x+2)^2 = (3)^2 + (1)^2$$

$$(x+2)^2 = 9+1$$

$$(x+2)^2 = 9+1$$

$$(x+2)^2 = 10$$

Taking square root on both sides.

$$\sqrt{(x+2)^2} = \sqrt{10}$$

$$x+2 = 3.16$$

$$x = 3.16 - 2$$

$$\boxed{x = 1.16 \text{ km}}$$ The crow 1.16 km from the initial point.

(b) A Pizza is divided into 8 slices in which 3 slices contain raising in it; Shiza picks a slice, what is the probability that she will pick a slice with raisin?

Sol:

Given data is:

Total number of slices = 8

Number of slices with raisin = 3.

Probability of Raisin = $\dfrac{\text{Number of slices with raisin}}{\text{Total number of slices}}$

$= \dfrac{3}{8}$

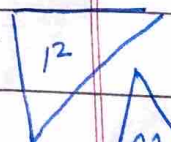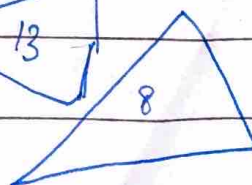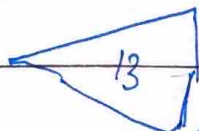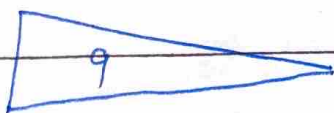Therefore, the probability that Shiza will pick a slice with raisin will be $\dfrac{3}{8}$ (answer).

$\longleftrightarrow$

(c) Find the number of triangles in the following figure:

Sol
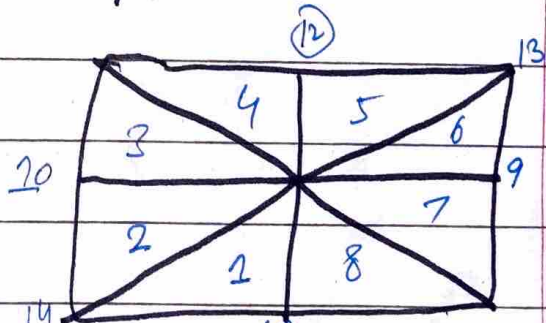
Lets number triangles in the figures as, 1, 2, 3 etc

It looks like the total number of triangles is ~~12~~ 14.

(d) Disaws the factors which can affect IQ.

(Data not proper).

⟨——————→