

①

Good for theory portion

Enough length

Enough headings

Fine diagrams

Work on math portion

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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 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 mere \$400-700 million that is well below 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 operationalization of famous loss and damage fund provided a framework called Global Stockpile 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 as 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 municipal 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 municipal 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 errors.

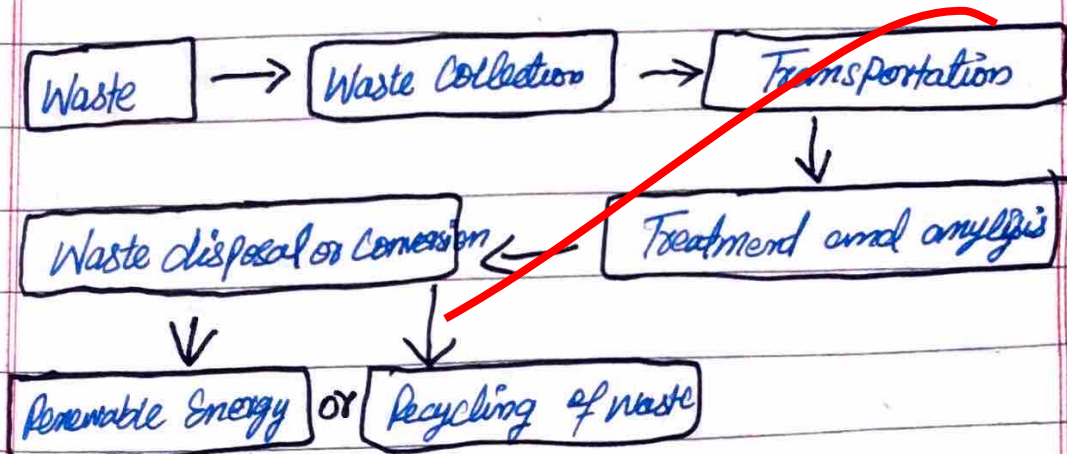
Sources of Solid waste:

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



Methods of Solid Waste Management:

(a) Municipal Solid Waste:

Municipal solid waste can be further divided into biodegradable, recyclable and hazardous domestic wastes. (i) The Biodegradable waste includes rotten food, vegetables, peel and kitchen substances.

(ii) Recyclable 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

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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 116.1 million tonnes of municipal waste is landfilled.

Compositing Process:

Composting is another process of solid waste disposal, it is similar to the landfill 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 fertilisers 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 waste, 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 proportions 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.

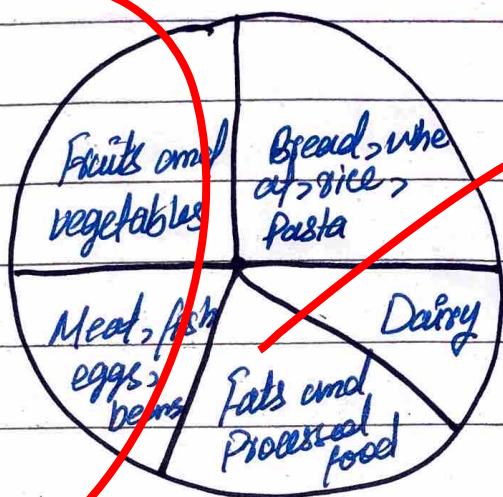


Fig. (A Balanced Diet)

Importance of a Balanced Diet:

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

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.



(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 unveiled in 2014. CPEC is an economic corridor that means its important

not only for geo-economic but for geopolitical and energy-security consideration. 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 demand of efficient energy sector needs some redressing. Therefore, keeping in mind 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 initiated, 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:

1- 1000 MW Quaid-i-Azam Solar Park (Bahawalpur)

2- Wind Energy Projects:

- 1- 50 MW Hydro-China-Darwood Wind Farm (Thatta).
- 2- 50 MW Saehal Wind Farm (Thatta)
- 3- 700 MW Three Gorges Second and Third Wind Power Project.

4- 50 MW Cacho Wind Power Project.

3- Hydro Power Projects:

1. 720 MW Karot Hydropower Project (ATK)
2. 884 Sulci 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 reform 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?

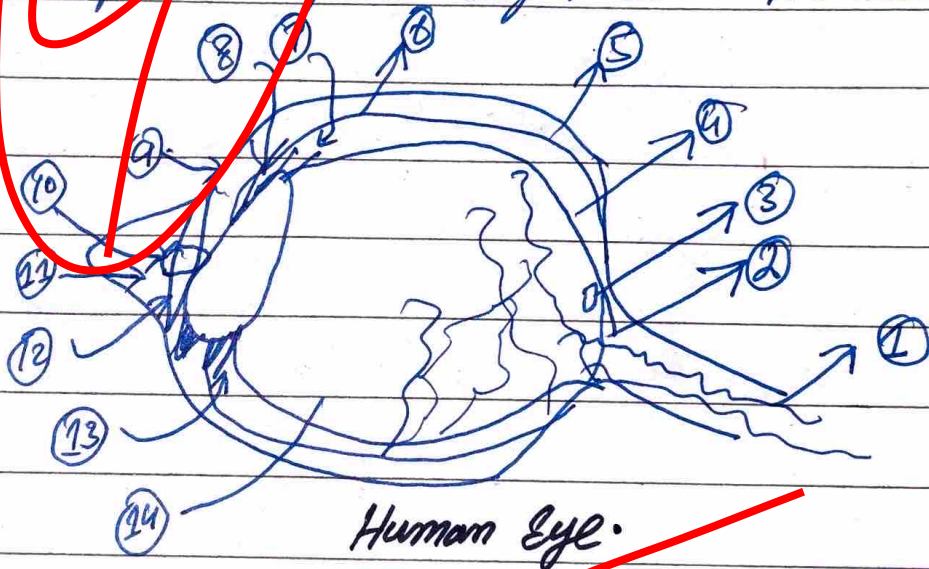
ans: Introduction:

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 ~~body~~ blood supply to the eye and consists of from the back forward of the choroid, the ciliary body and the iris. The innermost 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. Suspensory 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.

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 disabilities, which can be corrected by wearing the converging and diverging lenses, respectively.



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

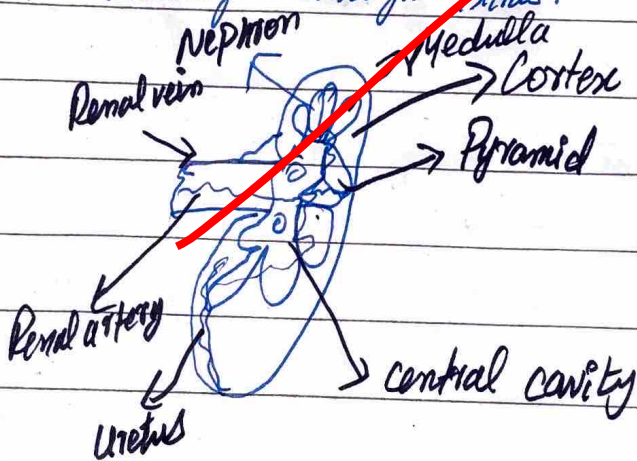
Introduction :

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. These 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 hilus. The ureters, renal artery, renal vein and nerves enter the kidney through hilus.



(Figure of kidney).

Each kidney is composed of numerous microscopic coiled tubules 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 called 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 2 million nephrons. Nephron is divided
into four regions, Bowman's capsule, proximal
convoluted 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 erythropoietin, that controls and regulate the red blood cells in body.

Conclusion:

Kidneys are red, bean shaped organs of about 170 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.



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 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 layers of the star expand and cool greatly as it is transformed into a red giant.

3- Red 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.



(b) The Neon, Oxygen and Silicon Burning Phase: This burning phase continues with successive stages being fueled by neon, oxygen, and silicon.

4. Two Pathways of a Star.

Path 1:

A supernova and Black Hole formation. If the star is massive it will explode as a supernova. The star's core is itself behind the gravitational collapse is responsible for formation of

Path 2:

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 gravitational 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-conductors

• Discuss different types of ceramics

Introduction:

Doping is a process of adding impurities to the crystalline 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-metallic 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 below:

(a) Doping of n-Semiconductors:

In the doping of n-type semiconductors electron donating impurities are introduced to create excessive electrons in their crystalline structure. The general dopants include phosphorus 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 crystalline lattice of P ~~semiconductor~~ semiconductor 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-metallic 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 aluminium 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.



(Section - II)

Qno: 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 .

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

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~~

$$x = 75 - 5$$

$$x = 70$$

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



(b) Mean of 10, 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,

$$50 = \frac{10 + 30 + y + 50}{4}$$

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

$$200 = y + 90$$

$$y = 200 - 90$$

$$y = 110 \quad \text{The value of } y \text{ (answer)}$$



(c) Find the missing series

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

sol:

This series shows the pattern of

$$2 \times 3 = 6, 6 \times 3 = 18, 18 \times 3 = 54, 54 \times 3 = 162$$

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Therefore, the missing term in the given series will be 27 (Answer).

(b) $3125, 256, \underline{\hspace{2cm}}, 4, 1$

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

$$\begin{aligned} (5)^5 &= 3125 & (4)^4 &= 256 & (3)^3 &= 27 & (2)^2 &= 4 & (1)^1 &= 1 \\ (5)^5 &= 3125 & (4)^4 &= 256 & (3)^3 &= 27 & (2)^2 &= 4 & (1)^1 &= 1 \end{aligned}$$

So the above series can be written as

$3125, 256, 27, 4, 1$

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

(c) 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:

$$x \cdot y = 320 \leftarrow \text{eq (1)}$$

Their ratio will be:

$$\frac{x}{y} = \frac{2}{5}$$

$$x = 5y \leftarrow \text{eq (2)}$$

Substituting (2) eq into eq (1)

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$$\begin{array}{r} 64 \\ 5 \overline{) 320} \\ \underline{300} \\ 20 \\ \underline{20} \\ 0 \\ x \end{array}$$

$$\begin{array}{r} 5 \overline{) 320} \\ \underline{250} \\ 70 \\ \underline{70} \\ 0 \\ \hline \end{array}$$

~~x^2~~
 $(5y) \times y = 320$

$$5y^2 = 320$$

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

$$y^2 = 64$$

Taking square roots on both sides

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

$$y = 8 \leftarrow \textcircled{3}$$

Putting value of $y = 8$ into eq (2)

$$x = 5(8)$$

$$x = 40$$

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

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

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

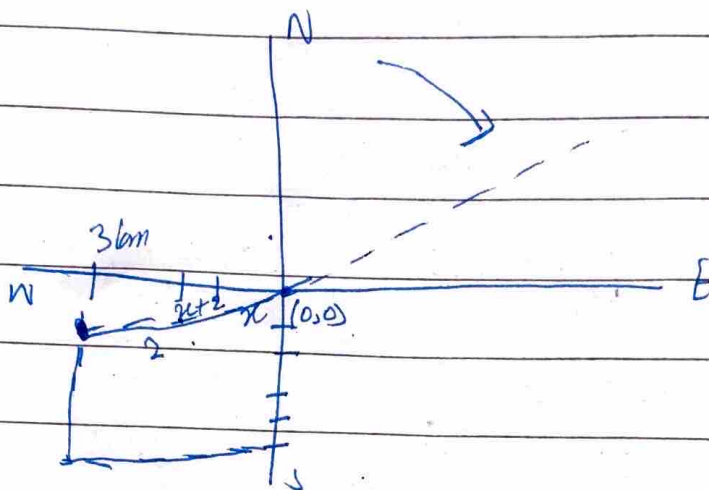
$$x^2 - y^2 = 1536$$

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



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.

$$(\text{hyp})^2 = (\text{Base})^2 + (\text{Perpendicular})^2$$

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

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

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

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

Taking square root on both sides.

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

$$x+2 = 3.16$$

$$x = 3.16 - 2$$

$$x = 1.16 \text{ km}$$

The crow 1.16 km from the initial point.

(b) A Pizza is divided into 8 slices in which 3 slices contains raisins 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

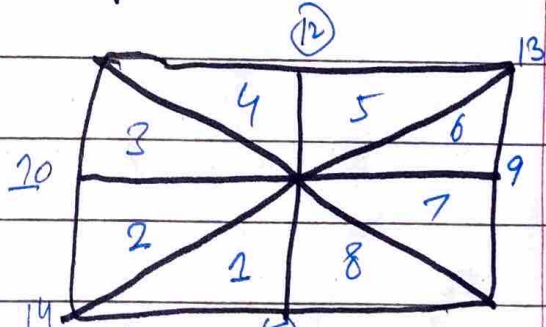
Number of slices with raisin = 3.

Probability of Raisin = $\frac{\text{Number of slices with raisins}}{\text{Total number of slices}}$

$$= \frac{3}{8}$$

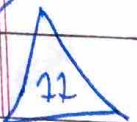
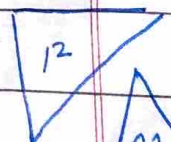
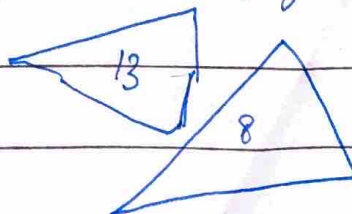
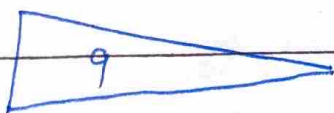
Therefore, the probability that Shiza will pick a slice with raisin will be $\frac{3}{8}$ (answer).

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



Let's number triangles in the figure as:

1, 2, 3 etc



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It looks like the total number of triangles is ~~30~~ 74.

(d) Dismisses the factors which can affect IQ.

(Data not proper).

