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Batch - 37

# General Science and Ability

## Section - II

### Question - 7

#### Part - (a)

Given

$$\text{Father's age} = y = 4x$$

$$y + 5 = 3x + 3(x + 5) \quad \text{--- (1)}$$

$$y + 10 = n(x + 10)$$

To find = 'n'

### General Instructions

Solution

1. Give numbering to headings
2. Do not write lengthy paragraphs. Write medium sized paragraphs with headings.
3. Do not use table for comparison and contrast questions. Give small paragraphs with headings instead.
4. Draw figures/diagram/flowchart/map in every question.
5. Start new question from fresh page.
6. Explain the steps in your mathematical calculations.
7. Do not forget to write the unit of your answer while attempting mathematics questions.
8. Do not use lead pencil. Only blue and black colours are allowed.

as  $y = 4x$  putting in equation (1) we get

$$4x + 5 = 3x + 3(x + 5)$$

$$4x - 3x = 15 - 5$$

$$x = 10$$

$$y = 4(10) = 40$$

$$y = 40 + 10 = 50$$

$$x = 15$$

$$y = 4(15) = 60$$

$$y = 60 + 10 = 70$$

$$x = 20$$

$$y = 4(20) = 80$$

$$y = 80 + 10 = 90$$

$$x = 25$$

$$y = 4(25) = 100$$

$$y = 100 + 10 = 110$$

~~ignored as age cannot be~~

~~in (-)~~

~~from equation (1) finding now~~

$$\text{or } y = 4x$$

$$y = 4(5) = 20$$

After 10 years

$$y = 20 + 10 = 30$$

$$x = 15$$



$$\therefore n = \frac{30}{15} = 2$$

$$\therefore n = 2$$

Answer

After 15 more years (10 years) father will be 2 times of his daughter's age.

(Part-c)

I.Q : Intelligence quotient

"measures intelligence in form of mathematic value"

It tells about intelligence of a person

EQ : Emotional Intelligence

"measures emotional capacity or intelligence in form of mathematical value"

It mostly revolves about self recognition or evaluation

Median:

Exact middle value of a series of number

Sometimes it is average of 2 middle most values

e.g. 1, 2, 3, 4, 5, 6 =

$$\frac{3+4}{2} = \frac{7}{2} = 3.5 = \text{median}$$

or 1, 2, 3, 4, 5  
median = 3



Mode

Most frequent value of series.

e.g. 1, 2, 3, 4, 3, 9, 3, 6, 3, 4

$$\therefore \text{mode} = 3$$

Range

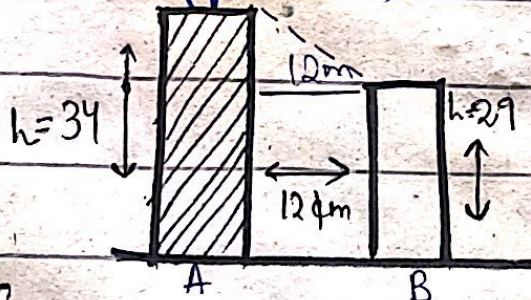
It is the difference between highest and lowest values of arithmetic series

1, 2, 3, 4, 5, 6, 7

$$7 - 1 = 6$$

$$\therefore \text{range} = 6$$

(Part-d)



Given

distance between buildings = 12m

As the buildings are vertically positioned, the distance between their roof will be same as that the distance between them. Their upper edges will be same i.e. 12m that can be made base

$$\therefore \text{Base} = 12\text{m}$$

To find out perpendicular,

$$h \text{ of building A} = 34$$



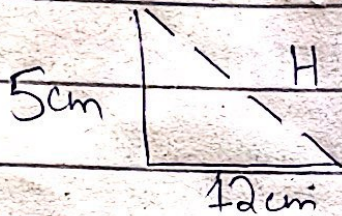
h of building B = 29

$$\therefore 34 - 29 = 5$$

$\therefore$  perpendicular = 5

Now hypotenuse will tell the actual difference between their roofs

Using pythagoras theorem



$$(H)^2 = (P)^2 + (B)^2$$

$$(H)^2 = (5)^2 + (12)^2$$

$$(H)^2 = 25 + 144$$

$$(H)^2 = 169$$

Applying  $(\sqrt{\quad})$  on both sides

$$\sqrt{(H)^2} = \sqrt{(13)^2}$$

$$\therefore H = 13$$

Answer

Distance between roofs of both buildings is 13cm

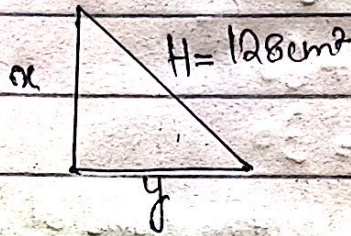


## (Part-b)

Given:

Shape: Isosceles Right Triangle  
(Hypotenuse)<sup>2</sup> = 128 cm<sup>2</sup>

To find: length of each side



Calculations:

As it is Isosceles Right Triangle Pythagoras Theorem can be applied

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

$$128 = (\text{Base})^2 + (\text{Perpendicular})^2$$

lets say base = perpendicular = x

$$128 = 2x^2$$

$$x^2 = 128/2$$

$$x^2 = 64$$

$$\sqrt{x^2} = \sqrt{64} \quad \therefore x = 8$$

Hence base = 8cm

perpendicular = 8cm



~~Question : 08~~

~~Part - (a)~~

$$N = \frac{n(n+1)}{2}$$

$$N = \frac{9(9+1)}{2}$$

$$N = \frac{9(10)}{2}$$

$$N = 45$$

Hence 45 squares are present in given diagram.

~~Part - (b)~~

Arithmetic mean = 17

number of observation = 14      Mean =  $\frac{\text{sum}}{\text{No.}}$

$$x = ?$$

$$\text{Sum} = 238$$

without  $x$ .

$$\text{sum} = 26 + 12 + 14 + 15 + 17 + 9 + 11 + 18 + 16 + 28 + 20 + 22 + 8$$
$$= 216$$

$$x = 238 - 216$$

$$x = 22$$

Therefore, missing number is 22.



(Part - c)

Solution  $4x + 6y = 260$  — (1)

$$2x + 4y = 160$$
 — (2)

Multiplying eq (2) with -2

$$4x + 6y = 260$$
 — (1)

$$-2x - 8y = -320$$

$$+2y = +60$$

$$y = 30$$

Also for  $x$ , putting value of  $y$  in eq (1)

$$4x + 6(30) = 260$$

$$4x + 180 = 260$$

$$4x = 260 - 180$$

$$4x = 80$$

$$x = 20$$

∴  $x = 20$        $y = 30$

Answer

laddu and barfi

Hence, we require 20 kg sugar and 30 kg flour.



~~(part-d)~~

1st 4 prime Number =  $\{2, 3, 5, 7\}$

1st 10 Natural Number =  $\{1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$

$A = \{2, 3, 5, 7\}$

$B = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$

Complement(A) =  $\{1, 4, 6, 8, 9, 10\}$





## — Part-11 —

### — (Section-11) —

#### — (Question :02) —

### — (Part-a) —

## Cyclone

System of rotating winds due to pressure gradient and Coriolis effect of spin motion of earth

## Causes of Cyclone



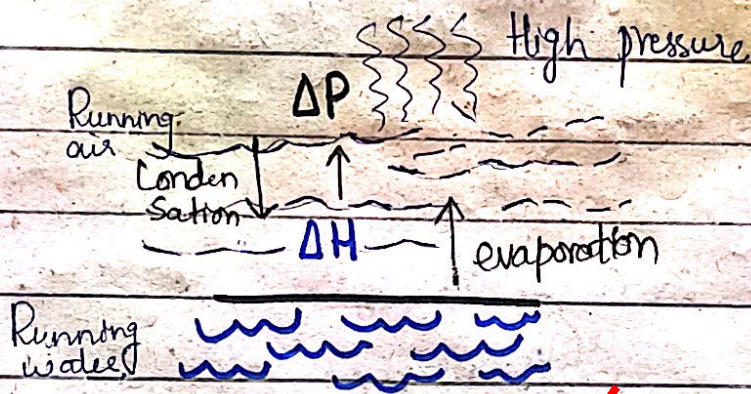
### a) Pressure gradient

It refers to change in pressure  $\Delta P =$  from high pressure to low pressure.

- Water evaporates from surface of water. change of state occurs that is from liquid to gas.



- On the other hand condensation takes place i.e. from gas to liquid which releases  $\Delta H$  (heat of condensation)
- Hot air rises (pressure) and  $\Delta H$   $\Delta P$  is observed that is from low to high.
- Pressure above water ~~to~~ body rises in air

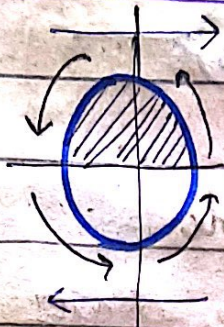


## b) Coriolis effect

- It is the force that moves northern hemisphere of earth to right and southern hemisphere to the north due to spin motion of earth
- When centripetal force originates object in moving frame moves in spin motion fastly
- Centrifugal force originates as the result of centripetal force.



Northern Hemisphere



Coriolis effect

Southern Hemisphere

Coupling of <sup>Coriolis</sup> Coriolis effect with pressure gradient generates cyclone.

Coriolis effect + pressure gradient → cyclone.

Most destructive part of Cyclone

Core or middle most part of cyclone is most destructive and strong one due to highest density pressure and heaviest rainfalls.

Core





## (Part-b)

### Black hole

An object of extreme density and strong gravitational pull. It has such strong gravitational pull that even light cannot escape it.

### Einstein concept

Black hole have very strong gravitational pull due to maximum density

It gives shows maximum capturing due to strong holding Einstein related density  $\propto$  with gravity as :-

Density  $\propto$  Gravity

more density = more gravity

less density = less gravity.

That is the reason behind very strong gravitational pull of Black hole.



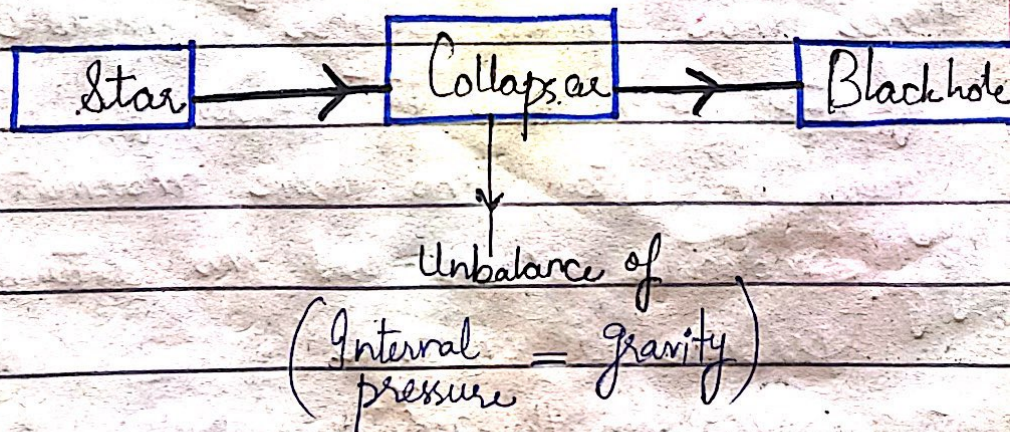
## Formation of black holes

The phenomenon of black hole formation is referred to as "Collapsar".

Collapsar is a process of collapse of star. When star collapses and more material accumulates in the centre of star i.e. more dense mass on less volume, referring to high density.

Einstein concept: Density & Gravity

Due to increased density the gravitational pull of object also increases and certainly the star becomes a black hole.



∴ Internal pressure  $\neq$  gravity  $\rightarrow$  Collapsar



## Chemistry behind collapse

Stars are objects formed of different gases and continuously under two equal and opposite forces i.e.

a. Internal pressure

b. Gravity



internal pressure

gravity

Whenever the imbalance between these two occurs, <sup>Star collapses</sup> for instance, star



less internal pressure  
more gravity

Hence, more mass collapse to middle of star and due to diffusion of gases in star, no more movement of molecules occurs and no internal pressure is observed.



Soon the gravitational pull accumulates more mass in less

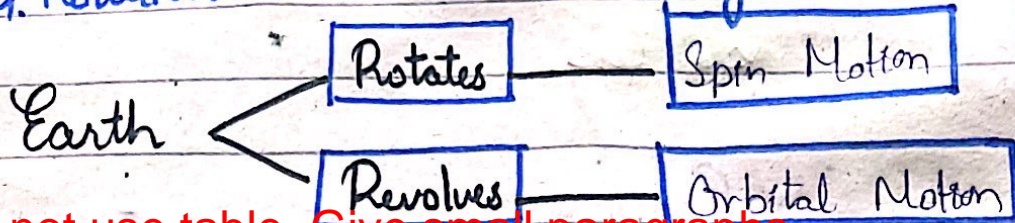
volume and object with

very strong gravity forms called black hole



## (Part-c)

### 19. Rotation and Revolution of Earth



Do not use table. Give small paragraphs with headings.

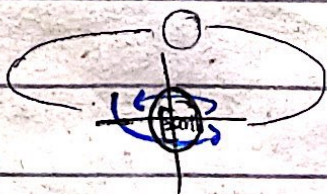
#### Rotation

It is also called spinning motion of earth

It refers to <sup>circular</sup> movement of earth around its axis

Rotation completes in 24 hours.

It is responsible for changes in day and night



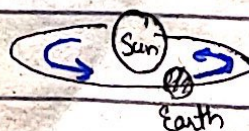
#### Revolution

It is known as orbital motion of earth

It refers to <sup>circular</sup> motion of earth around Sun along its orbit.

Revolution completes in 365 days.

It is responsible for seasonal changes.





## b. Structural parts of earth

a. Crust

b. Mantle

c. Core.

### a. Crust

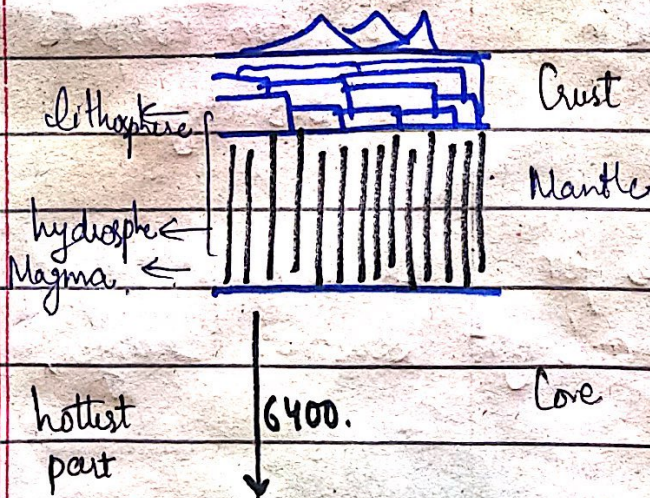
It is upper most structural part of earth and consists of rocks and silicates its depth is 70km

### b. Mantle

It contains silicates but at high pressure. Its depth is 2900km

### c. Core

It is inner most part of earth and contains metals its depth is 6400km





(part-d)

Ionic Bond

Covalent Bond.

Definit-  
-ion

It is the chemical bond formed by complete transfer of valence electron from one atom to another.

It is the chemical bond formed by mutual sharing of valence electron between 2 atoms.

Atoms

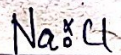
forms between metals

forms between non-metals

Represent  
ation

Represented by dot and cross diagram

Represented by dash between atoms



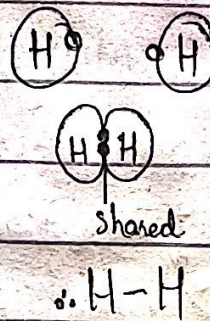
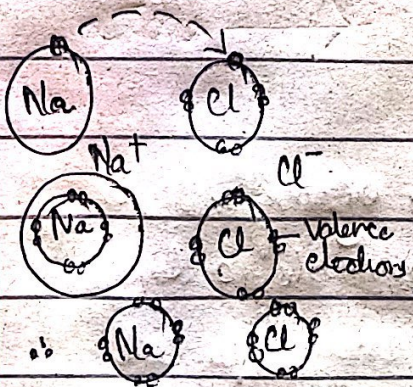
Strength

Strongest chemical bond

Relatively weaker than ionic bond.

Example;

Example;



Diagram



— (Question : 03) —

— (Part - a) —

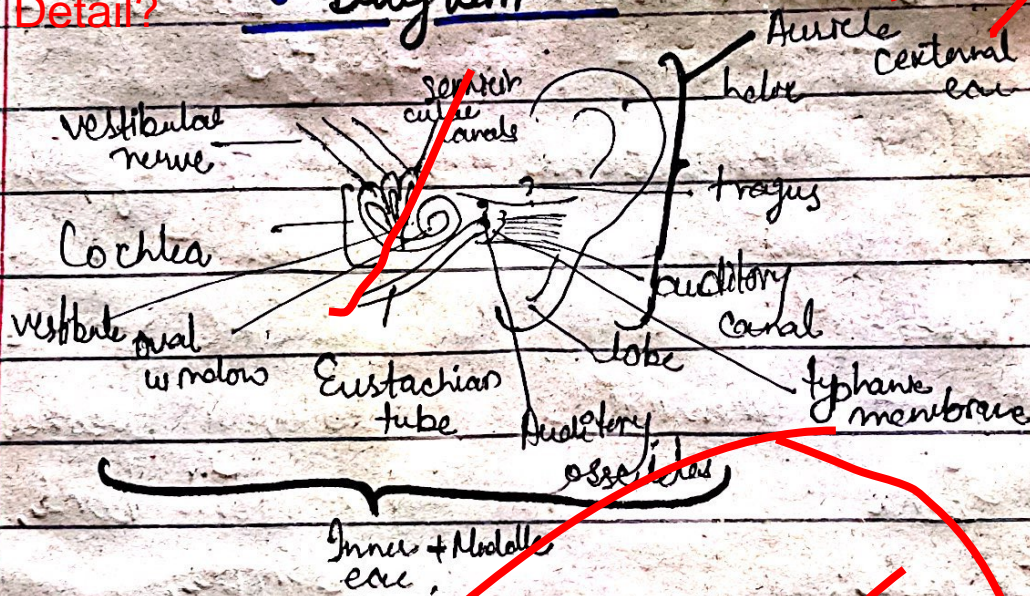
## Structure of Ear

### • Human Ear

Ear is organ specialized for hearing or sound recognition. It is one of the most vital element of human body, as it is specialized for one of 6 senses of human.

Detail?

### • Diagram



— (Part - b) —

### Mitochondria

Mitochondria is a cellular organelle. It is present in plants and animals and provides chemical energy to cell. It is commonly known as power house of cell.



"Mitochondria is power house of cell"

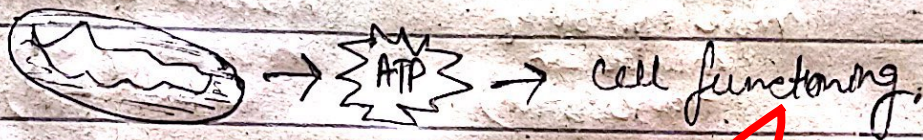
Power house: Provides energy/power

Mitochondria: Provides chemical energy

Therefore Mitochondria can be

synonymous to power house  
in context of cellular  
biology

How it provides energy



Mitochondria carry out multiple functions that release energy in the form of ATP

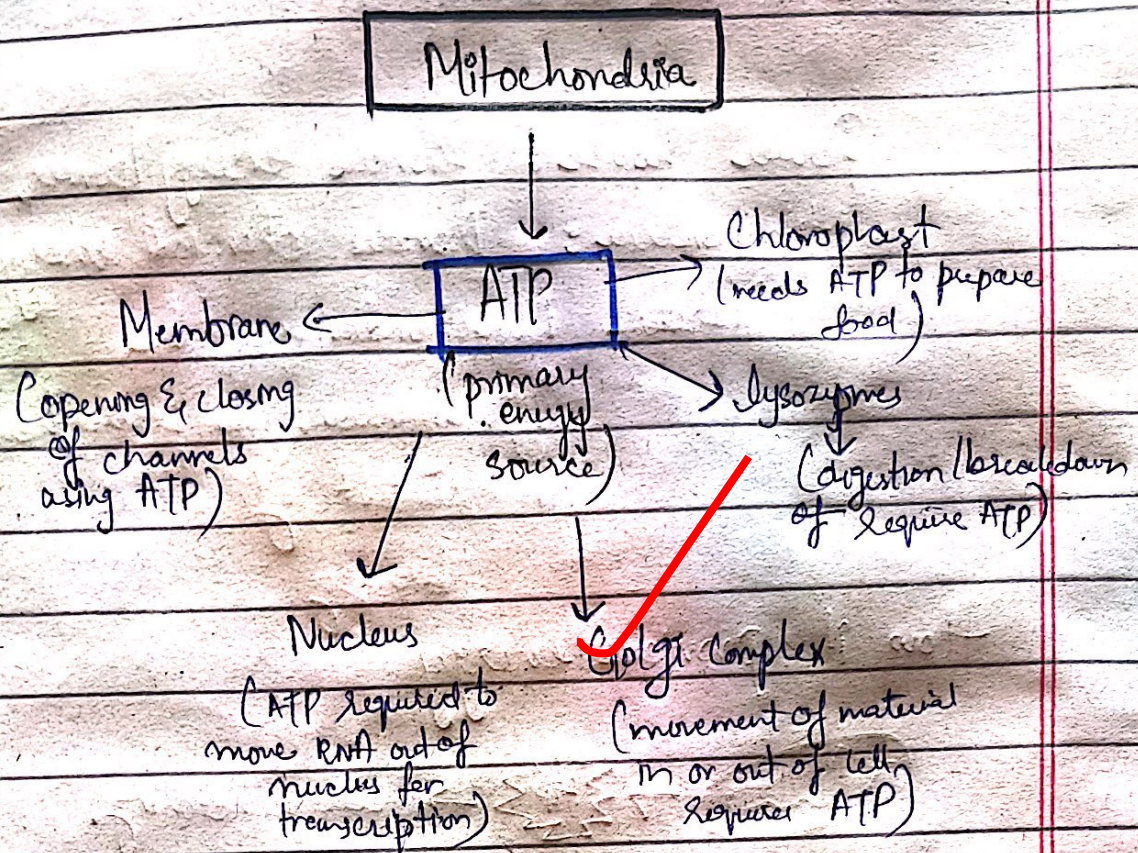
ATP ← Oxidative Phosphorylation

ATP ← Glycolysis

ATP ← Per Aerobic Respiration

These ATP molecules go to different parts of cells to carry out their relative functions that are necessary for cell survival





That's why mitochondria is known as power house of cell

— (Part-d) —

"Food adulteration can be cause food deterioration"

Food adulteration refers to mixing the foreign substance in food that changes taste, color or quality of food.

No doubt, it can lead to food deterioration

As beside multiple <sup>indicators</sup> reasons of food



deterioration one is change in color and taste.

Therefore, food adulteration is also a cause of food deterioration, that's why adulterated food results in health impacts like diarrhea and food poisoning.

## Remedial measures to curb food adulteration in Pakistan

### 1) Strict food evaluation

Effective evaluation of most adulterated food like beef and milk should be observed

### 2) Regular rounds

Regular rounds of food department authorities should be ensured with effective evaluation

### 3) Inspection teams

Inspection teams should be placed in food commercial areas to keep check and balance of food material imports in markets

### 4) Appropriate price dictation

One of reason behind food adulteration is high prices and low demand. Government must dictate reasonable food prices,