GSA
24/10/24

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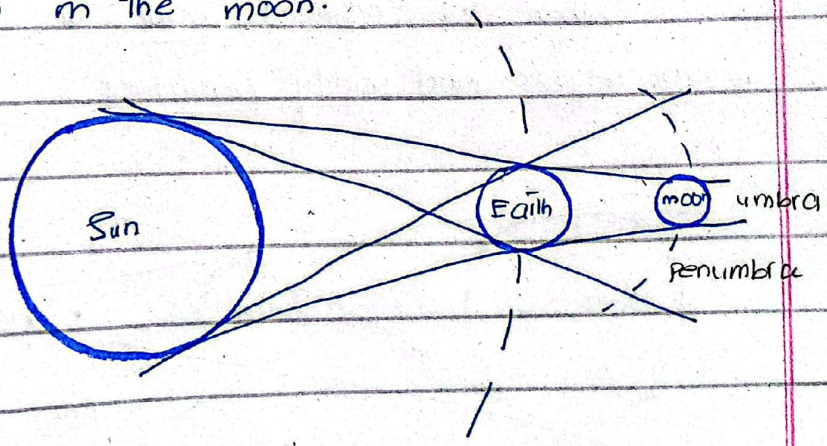
Q3.

(a) What is Lunar eclipse? Explain in detail with apt diagrams.

Lunar eclipse is a phenomenon when the earth comes in between the sun and the moon blocking the light on the moon.

How does Lunar eclipse occur?

The moon ~~rotates~~ revolves around the earth and the earth revolves around the sun. Sometimes, the revolution is so that all three are axially aligned with earth in the centre causing a shadow on the moon.



umbra : the region of complete blackout of sunlight.

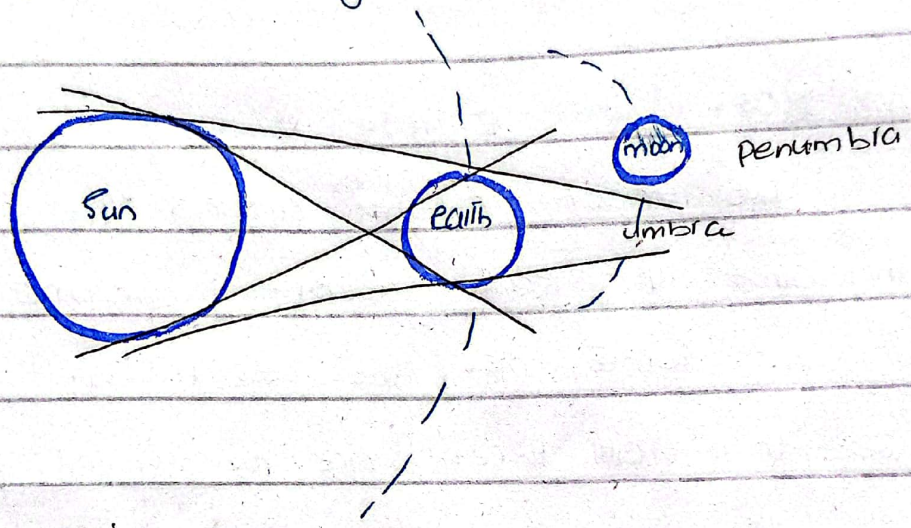
penumbra : the region of partial blocking of sunlight.

Types of lunar eclipses

Lunar eclipses can be categorised into three types.

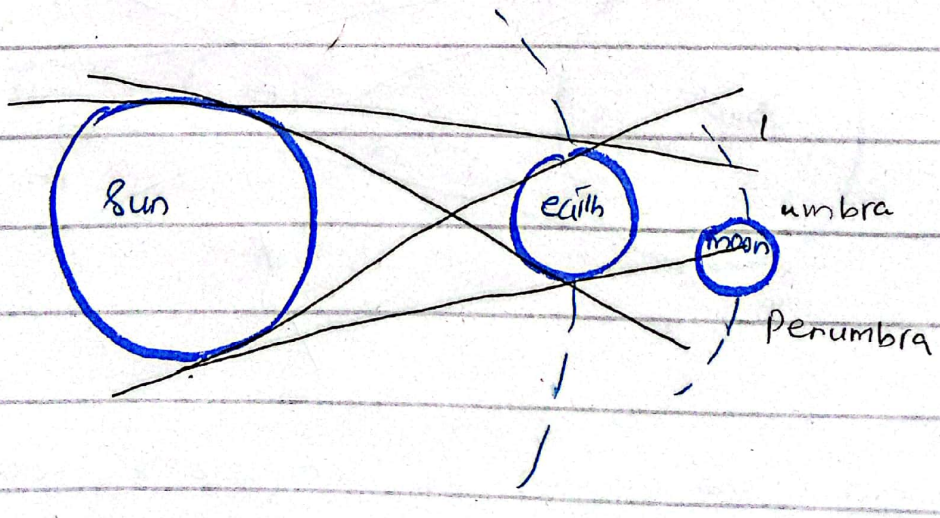
1) Penumbral Lunar eclipse

When the moon passes through the penumbral region of earth's shadow.



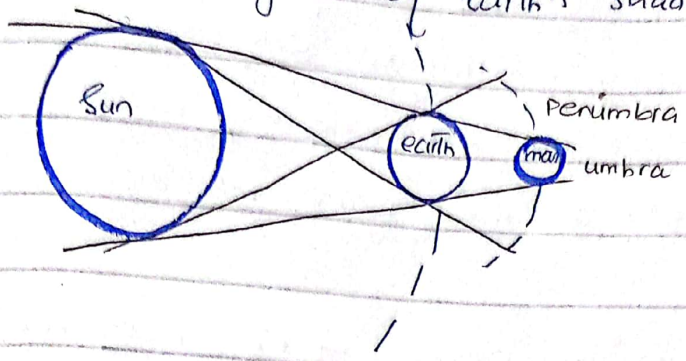
2) partial Lunar eclipse

When the moon is partly in umbral region and partly penumbral.



3) ~~Com~~ Total Lunar Eclipse.

When the moon falls completely in the umbral region of Earth's shadow.

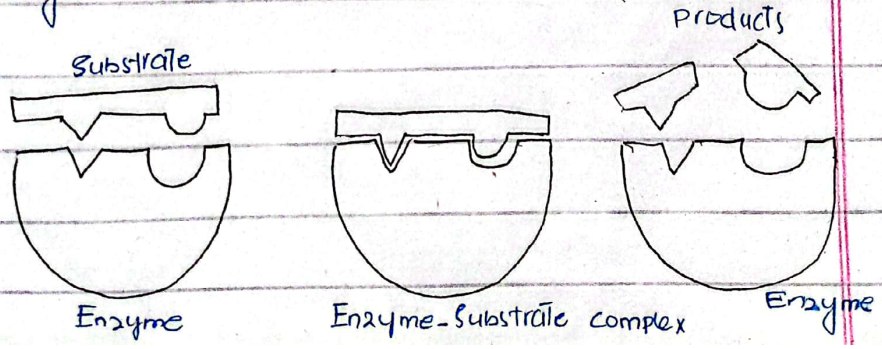


(b) **Explain the function of enzymes in details with examples**

Enzymes are sophisticated organic compounds composed of amino acids that act as catalysts hence also called biocatalysts.

Structure of enzymes

Enzymes catalyze selective reactions only.



Functions of Enzymes

As the name biocatalyst imply, They are catalysts in living organisms. Catalysts only speed up reactions, in this case bio-reactions and do not take part in them

i) Aid in breakdown of large molecules into smaller ones.

Large molecules $\xrightarrow{\text{Enzymes}}$ smaller molecules

Examples: Digestion, breathing.

ii) Take part in body movement such as muscle contraction

iii) Aid in blood clotting, healing of wounds, controlling hormone production of hormones.

Specific Enzymes and their functions

Lipase → digest fats in gut.
Amylase → in saliva – starch into sugars.
maltase → maltose into glucose.
Trypsin → in small intestine – break protein into amino acids
Lactase → lactose into glucose and galactose

(c) Give a brief account of electromagnetic radiations. What is EMR Spectrum

Electromagnetic radiations are waves in the electromagnetic field that travel through space. They do not require a medium and thus can travel through a vacuum.

They are basically a energy form.

Examples of EMR

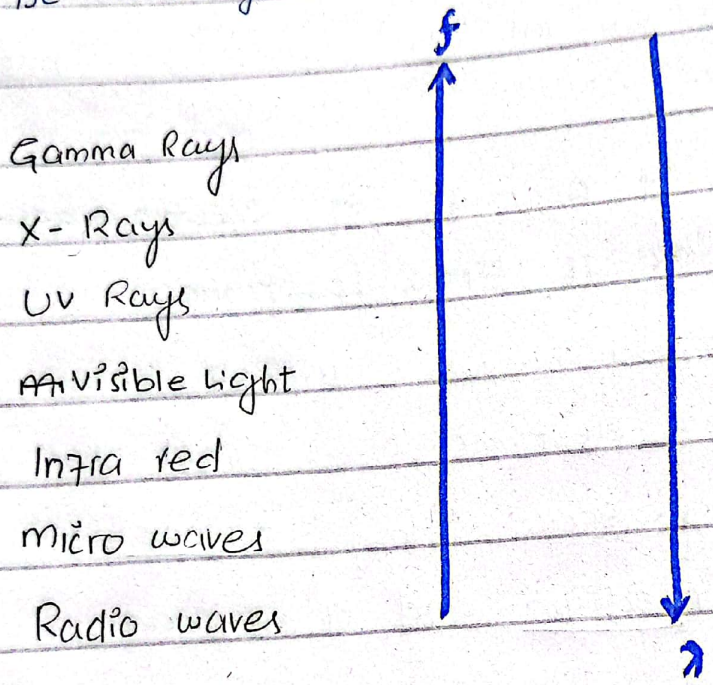
EMRs include :

- Radio waves
- microwaves
- X- rays
- Gamma rays
- visible light

The EMR Spectrum

It is a full range of electro-magnetic radiation organized by frequency and wavelength.

The mentioned types can be arranged as:

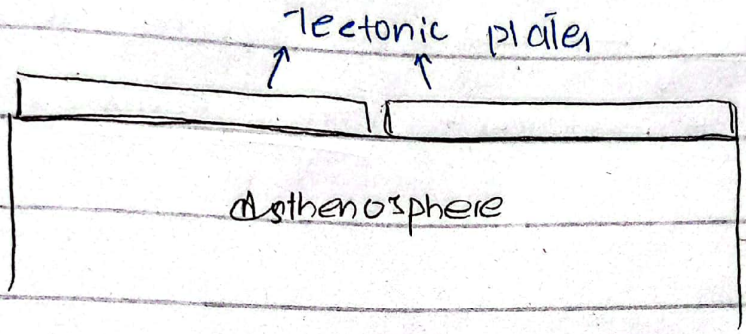


As visible:

- Gamma rays have highest frequency but lowest wavelength.
- Radio waves have lowest frequency and longest wavelength.
- Visible light falls in the middle of the spectrum..

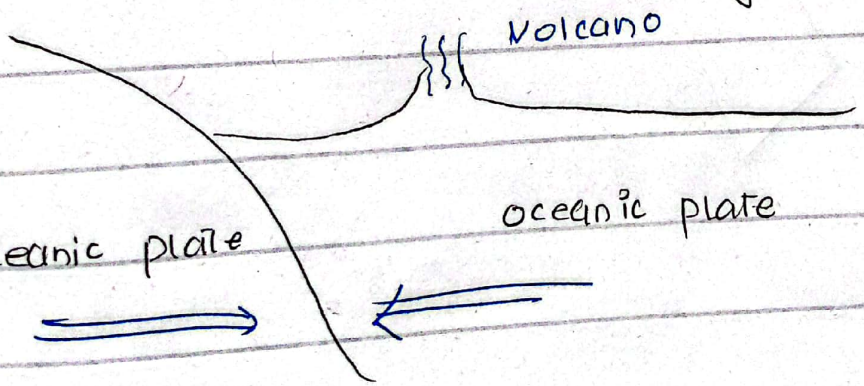
(d) Are earth quakes and volcanoes connected?

Yes, earth quakes and volcanoes connected. It is because both are connected with the tectonic plates. These are large slabs floating above the earth's Asthenosphere.



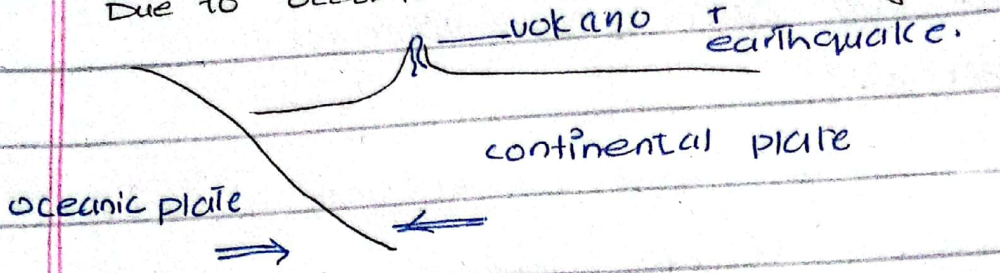
These plates move towards or away from each other. Their relative motion result in earthquakes or eruption and formation of volcanoes.

Due to oceanic - oceanic convergence



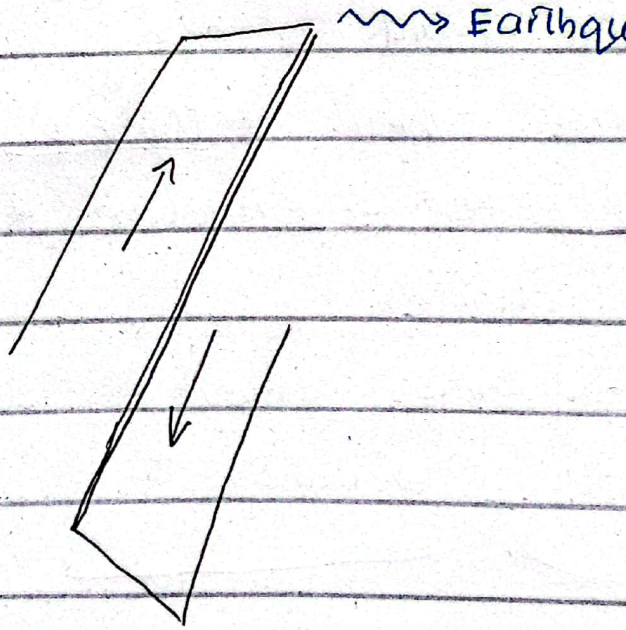
There also occur earth quakes.

Due to oceanic - continental convergence



Thus, through the plate convergencies, both the phenomena occur.

However in case of transform boundary — when two plates slide past one another, only earthquakes occur.



Q.4.

(a) What is noise pollution? Give its harmful effects and ways to curb.

Noise pollution is when there is unnecessary noise in the environment and the noise is to the point that it harms the human health.

A report backed by multiple researcher reports said that every 5 decibel increase in noise increases heart-related risks by 34%.

Harmful Effects of noise pollution

The following are the adverse effects of noise pollution.

- Hypertension

  noise pollution → elevated blood levels

- Hearing loss

  noise pollution → damage to eardrums

- Sleeping disorders

  Lack of sleep → fatigue, irritation

- Cardiovascular issues
noise pollution → heart-related issue → probable death.
Nearly [40-45] patients of heart-related problems are admitted in [Karachi] only

prevention of noise pollution

- Banning unnecessary honking of vehicles.

- Soundproof buildings especially hospitals, schools and residential areas

- Alternatives in using explosives for mining.

- Reforestation and afforestation
Since plants absorb noise effects.

(b) What is the importance of dietary fibers in diet? How would be a platter of food considered balanced.

Dietary fibers are the indigestable material in food. Its main role is to keep the digestive system healthy. Since it is mostly non-nutritional in value, it is also called roughage.

Importance of dietary fibers

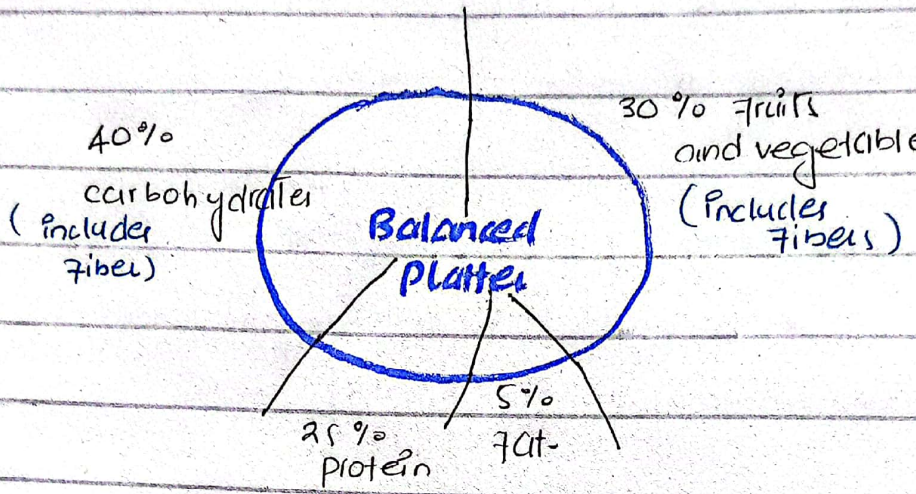
It performs the following functions in the body.

- Help manage weight loss
  fiber is filling → less need to eat → stays in the guts longer with out being absorbed → weight loss.

- Help reduce risks of heart disease and type 2 diabetes
  → absorb water → lower cholestrol levels → regulate blood sugar levels.

Adds bulk to the stool → prevents constipation, easy faecal movement.

A platter of balanced diet



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c) Elaborate drinking water quality standards

Drinking water quality standards describes the quality parameters set for drinking water.

They vary from country to country.

Pakistan Environmental agency protection gave guidelines in 2008 on National Standards for Quality Drinking water (NSQDW). Similarly, WHO set up Guideline for Drinking-water Quality (GDWQ) in in 1993.

Standard parameters for quality drinking water

The parameters include:

parameter	Pakistani standard	WHO standard
o E-Coli	must be undetectable	must be undetectable
o Taste	Acceptable	Acceptable
o chloride	< 250 mg/L	<250 mg/L.
o mercury	< 0.001 mg/L	< 0.001 mg/L

Safe drinking water in pakistan

PCRWR, 2021 report – (safe water %)

o 31% in country.

Islamabad → 71%

Lahore → 69%

peshawar → 50%

Quetta → 35%

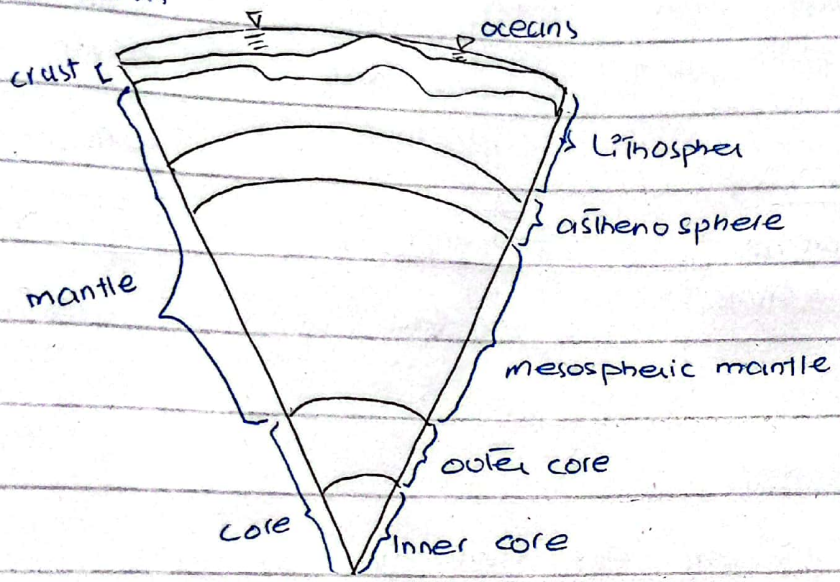
Karachi → 7%

Recommendations to maintain standards of Quality Drinking water (NSQDW):

- Standard examination of water
- public awareness
- Low cost measures — cheaper water to poorer households
- Increased water quality and quantity in water scare areas such as Balochistan and western Sindh.
- Contingency plans for water access after disasters such as floods.

Q1 Explain Lithosphere. What are rocks and minerals

Lithosphere is the mechanical part of the earth based on physical properties such as rheology into the earth.



As can be seen from the diagram, Lithosphere is upper mantle and crust together.

The Lithosphere comprises Rocks and minerals.

Rocks

Rocks are naturally occuring material comprising one or more minerals.

Rock

Sedimentary	Metamorphic	Igneous
↓	↓	↓
made from smaller other rocks fused together.	made under earth surface and fused due to heat and pressure	made from the cooling of lava outside the earth and magma within earth.
Example	Example	Example
Basalt, Sandstone	marble	Granite

Minerals

Minerals are naturally occuring inorganic solids that have crystaline structures and definite chemical composition.

98% of mineral are made from eight elements:

magnesium, Iron, Silicon, Oxygen, calcium, Aluminium, Sodium and Pottassim.

Examples

Quartz, Diamond, Gypsum.

SECTION-B

Q.6

(a) Determine 'K'.

Given numbers

9, 8, 10, K, 12

Arithmetic mean. = 15

As,

$$AM = \frac{\text{Sum of observations}}{\text{No. of observations.}}$$

$$15 = \frac{9 + 8 + K + 10 + 12}{5}$$

$$39 + K = 15(5)$$

$$K = 75 - 39$$

$$\boxed{K = 35}$$

(b) Initial quantity of sugar solution

Ratio of sugar sol and colored water

= 4 : 3

With the addition of 10 L of colored water, the new ratio is

4 : 5

Let the quantity of sugar sol be x and that of water be y.

$\Rightarrow x : y = 4 : 3$

$$\frac{x}{y} = \frac{4}{3} \quad \text{— (1)}$$

After addition of 10 L colored water

$$\frac{x}{y+10} = \frac{4}{5} \quad \text{— (2)}$$

From eq (1) we get

$$x = \frac{4y}{3} \quad \text{— (3)}$$

putting eq (3) in (2).

$$\frac{4y}{3(y+10)} = \frac{4}{5}$$

$$20y = 12(y+10)$$

$$20y = 12y + 120$$

$$8y = 120$$

$$y = 15$$

putting y in eq (3)

$$x = \frac{4(15)}{3}$$

$$x = 20$$

Thus, the initial quantity of sugar solution was $\boxed{20 \text{ L}}$.

(c) Volume of a football

Radius of football = 12cm = r

The volume of a sphere = $\frac{4}{3}\pi r^3$

Substituting 'r'

Volume of the football is:

$$\frac{4}{3}\pi(12)^3$$

$$= \frac{4}{3}\pi(1728)$$

$$= 2304\pi \text{ cm}^3$$

or

taking π at 3.14

$$7234.56 \text{ cm}^3$$

(d) missing number in the series

$-10, -8, 6, 40, 102, ?$

The series is such that the difference of the differences has an increment of 8.

2 14 34 62 $\Rightarrow$ 62 + 36 = 98

$-10, -8, 6, 40, 102,$

12 20 28 $\Rightarrow$ 36

Thus the missing number is $102 + 98$

$= 200$.

Q7.

(a) value of y% of 20 in terms of x

Given

20% of $x = y \rightarrow y = 0.2x$

$\therefore$ y% of 20

Substituting y with x

$(0.2x)\%$ of 20.

$$= \frac{0.2x}{100} \times 20$$

$$= \frac{4x}{100}$$

$\therefore$ y% of 20 in terms of x

$$\boxed{= \frac{4x}{100}} \text{ or } \boxed{0.04x}$$

(b) Find the monthly salary of P

Given

Average salary of P and Q = Rs 5050

$$\Rightarrow \frac{P+Q}{2} = 5050 \quad \text{---(1)}$$

$$P + Q = \text{Rs } 10,100 \quad \text{---(1)}$$

Average salary of Q and R = Rs 6250

$$\Rightarrow \frac{Q+R}{2} = 6250$$

$$Q + R = \text{Rs } 12,500 \quad \text{---(2)}$$

Average salary of P and R = Rs 5200

$$\frac{P+R}{2} = 5200$$

$$P + R = Rs\ 10,400 \quad \text{—} (3)$$

From eq (1)

$$P = 10,100 - R \quad \text{—} (4)$$

putting eq (4) in eq (2)

$$10,100 - P + R = 12500$$

$$-P + R = 2400 \quad \text{—} (5)$$

Adding eq (3) and (5)

$$2R = 12800$$

$$R = Rs\ 6400 \quad \text{—} (6)$$

putting eq (6) in eq (3)

$$P + 6,400 = 10,400$$

$$P = 4000$$

Thus, The monthly salary of P is

Rs 4000

(c) probability of each event to occur

Given

Two coins tossed 500 times.

Events
- Two heads = 105 times
- One head = 275 times
- No head = 120 times.

$$\text{probability} = \frac{\text{Number of favorable outcomes}}{\text{Total number of favorable outcomes}}$$

$$P(\text{Two head}) = \frac{105}{500} = \frac{21}{100} = \boxed{0.21 \text{ or } 21\%}$$

$$p(\text{one head}) = \frac{275}{500} = \frac{55}{100} = \boxed{0.55 \text{ or } 55\%}$$

$$p(\text{no head}) = \frac{120}{500} = \frac{24}{100} = \boxed{0.24 \text{ or } 24\%}$$

..

(d) Sum of Jamie's age now and Jamie's dad's age now

Given

Jamies Dad = 4 x Jamie

Now let Jamies dad age = x

and Jamies age = y

$\Rightarrow x = 4y$ — (1)

In 14 years

$x + 14 = (y + 14)\,2$ — (2)

$x + 14 = 2y + 28$

$x - 2y = 14 \quad \text{—} (2)$

putting eq (1) in eq (2)

$4y - 2y = 14$

$2y = 14$

$y = 7$

and $x = 4y = 4 \times 7 = 28$

Thus the ages are

Jamie = 7 years

Jamie's dad = 28 years