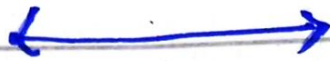


①

Fahad Bashir
37252



{SECTION-II}

(Question # 5)

Given Data:

Sum of 3 consecutive prime numbers = 187
Numbers = ?

Solution:

Acc. to the given data:

$$(6x+1) + (6x+1) + (6x-1) = 187$$

$$18x + 1 = 187$$

$$18x = 187 - 1$$

$$18x = 186$$

$$x = 186/18$$

$$x = 10$$

$$\begin{array}{r} 10. \\ 18 \overline{) 186} \\ \underline{180} \\ 60 \end{array}$$

So,

$$6x+1 = 6(10)+1 = 61$$

$$6x+1 = 6(11)+1 = 67$$

$$6x-1 = 6(10)-1 = 59$$

So, the consecutive prime numbers
are

59, 61, 67

$$59 + 61 + 67 = 187$$

b. Given Data:

$$x+17 = 60 \frac{1}{x}$$

Sol:

$$x+17 = 60 \frac{1}{x}$$

$$x(x+17) = 60$$

$$x^2 + 17x = 60$$

$$x^2 + 17x - 60 = 0$$

So, ~~$x^2 + 17x$~~

$$a = 1, b = 17, c = -60$$

Acc. to Quadratic equation

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2(a)}$$

$$\text{So, } x = \frac{-17 \pm \sqrt{(17)^2 - 4(1)(-60)}}{2(1)}$$

$$x = \frac{-17 \pm \sqrt{289 + 240}}{2}$$

$$x = \frac{-17 \pm \sqrt{529}}{2}$$

$$x = \frac{-17 \pm \sqrt{(23)^2}}{2} = \frac{-17 \pm 23}{2}$$

$$x = \frac{-17 + 23}{2} = \frac{6}{2} = 3$$

$$x = \frac{-17 - 23}{2} = \frac{-40}{2} = -20$$

So, the positive number is 3.

$$\begin{array}{r} \textcircled{4} \\ 17 \\ 17 \\ \hline 119 \\ 17 \times \\ \hline \textcircled{1} 289 \\ 240 \\ \hline 29 \end{array}$$

For Cross-check:

$$3 + 17 = \overset{20}{60} \times \frac{1}{3}$$

$$20 = 20$$



c. Given Data:

Previous population = 1,75,000

Current population = 2,62,500

Time frame = 10 years

Average population increase per year = $r\%$?

Sol:

As we know:

$$r = \left(\left(\frac{P_{\text{current}}}{P_{\text{previous}}} \right)^{1/n} - 1 \right) \times 100$$

$$\text{So, } r = \left(\left(\frac{262500}{175000} \right)^{1/10} - 1 \right) \times 100$$

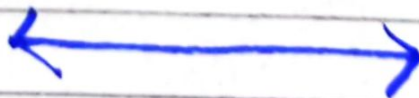
$$\begin{array}{r} 1.5 \\ 1750 \overline{) 2625} \\ \underline{1750} \\ 9750 \\ \underline{9750} \\ 0 \end{array}$$

$$r = (1.5^{1/10} - 1) \times 100$$

$$r = (1.04138 - 1) \times 100$$

$$r = 0.04138 \times 100$$

$$\boxed{r = 4.138\%}$$



$$\begin{array}{r} 375 \\ 20 \\ \hline 000 \\ 7500 \\ \hline 7500 \end{array}$$

$$\begin{array}{r} 33 \\ 12 \\ \hline 66 \\ 336 \\ \hline 396 \end{array}$$

$$\begin{array}{r} 396 \\ 20 \\ \hline 000 \\ 792 \\ \hline 7920 \end{array}$$

$$\begin{array}{r} 31.2 \\ 12 \overline{) 375} \\ \underline{36} \\ 15 \\ \underline{12} \\ 30 \end{array}$$

d. **Given Data:**

Price of 20 dozens of eggs = 375

Sold 1 egg at price = 33

%age profit = ?

Sol:

If price of 1 dozen of egg = 375

So, price of 1 egg will be = $\frac{375}{12} = 31.25$

and

Price of 20 dozens of egg will be =

$$375 \times 20 = 7500 \text{ Rs}$$

Now, he sells one egg at price = 33

and one dozen at = $33 \times 12 = 396$

and 20 dozens of egg at = 7920 Rs

It means the Cost Price = 7500

and

Selling Price = 7920

So,

$$\text{The percentage Profit} = \frac{SP - CP}{CP} \times 100$$

$$\begin{array}{r} 7920 \\ 7500 \\ \hline 420 \end{array}$$

$$= \frac{7920 - 7500}{7500} \times 100$$

$$\begin{array}{r} 5 \\ 75 \overline{) 420} \\ \underline{375} \end{array}$$

$$= \frac{420}{7500} \times 100$$

$$\boxed{\% \text{age profit} = 5.6\%}$$



Question #07

a. Given Data:

Unit digit exceeds it's ten's digit by 2.

Product of the given number and

Sum of it's digit = 144

Sol:-

let the ten's digit = x

So, unit's digit = $x+2$

$$\text{So, } 10x + (x+2) = 11x+2$$

Now, the sum of 2 digits =

$$x + (x+2) = 2x+2$$

So, the product will be

$$(11x+2)(2x+2) = 144$$

$$11x(2x+2) + 2(2x+2) = 144$$

$$22x^2 + 22x + 4x + 4 = 144$$

$$22x^2 + 26x + 4 = 144$$

$$22x^2 + 26x + 4 - 144 = 0$$

$$22x^2 + 26x - 140 = 0$$

÷ing whole eq by 2, we get

$$11x^2 + 13x - 70 = 0$$

Acc. to Quadratic eq.

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} = \frac{-13 \pm \sqrt{(13)^2 - 4(11)(-70)}}{2(11)}$$

$$x = \frac{-13 \pm \sqrt{169 + 3080}}{22}$$

$$x = \frac{-13 \pm \sqrt{3249}}{22}$$

$$x = \frac{-13 \pm 57}{22}$$

$$x = \frac{-13 + 57}{22} = \frac{44}{22} = 2$$

$$x = \frac{-13 - 57}{22} = \frac{-70}{22} = -\frac{35}{11} \quad \left(\begin{array}{l} \text{not} \\ \text{applicable} \\ \text{b/c not a} \\ \text{+ve number} \end{array} \right)$$

So, the $x = 2$

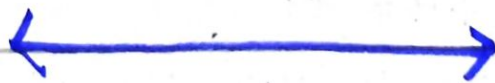
Then - $x + 2 = 4$

Means the number is 24.

For crosscheck.

$$\text{Sum} = 2 + 4 = 24$$

$$\text{and their product} = 24 \times 6 = 144$$



b. Find the missing terms.

i. 53, 53, 40, 40, 27, 27, 14, 14

ii. 14, 28, 20, 40, 32, 64, 50, 100

iii. 8, 6, 9, 23, 87, ...

iv. B, F, R, B

v. V, U, W, V, X, W, Y.



c. Given Data:

$$20\% a = b$$

then b% of 20 =

Sol:-

$$20\% \text{ of } a = b$$

$$\frac{20}{100} a = b$$

$$\frac{1}{5} a = b$$

b% of 20 =

$$\frac{b}{100} \times 20 = \frac{20b}{100} = \frac{b}{5}$$

$$\text{as, } b = \frac{1}{5} a$$

So,

$$\frac{b}{5} = \frac{\frac{a}{5}}{5}$$

$$= \frac{a}{25}$$

So,

$$\text{b\% of } 20 = \frac{a}{25}$$

d. Given Data:

Age of Father 10 years ago = $3x$ of his son

After 10 years Father's age = $2x$ of his son

Ratio of their present ages = ?

Acc. to data:

10 years ago;

$$F - 10 = 3(S - 10)$$

$$F - 10 = 3S - 30$$

$$~~F - 10 = 3~~ \quad F = 3S - 20 \rightarrow (1)$$

After 10 years

$$F + 10 = 2(S + 10)$$

$$F + 10 = 2S + 20 \rightarrow$$

$$F = 2S + 10 \rightarrow (2)$$

Equating eq (1) & (2)

$$3S - 20 = 2S + 10$$

$$3S - 2S = 10 + 20$$

$$S = 30$$

Then

$$F = 2(30) + 10$$

$$F = 70$$

Finding Ratio

$$\frac{F}{S} = \frac{70}{30}$$

$$\frac{F}{S} = \frac{7}{3}$$

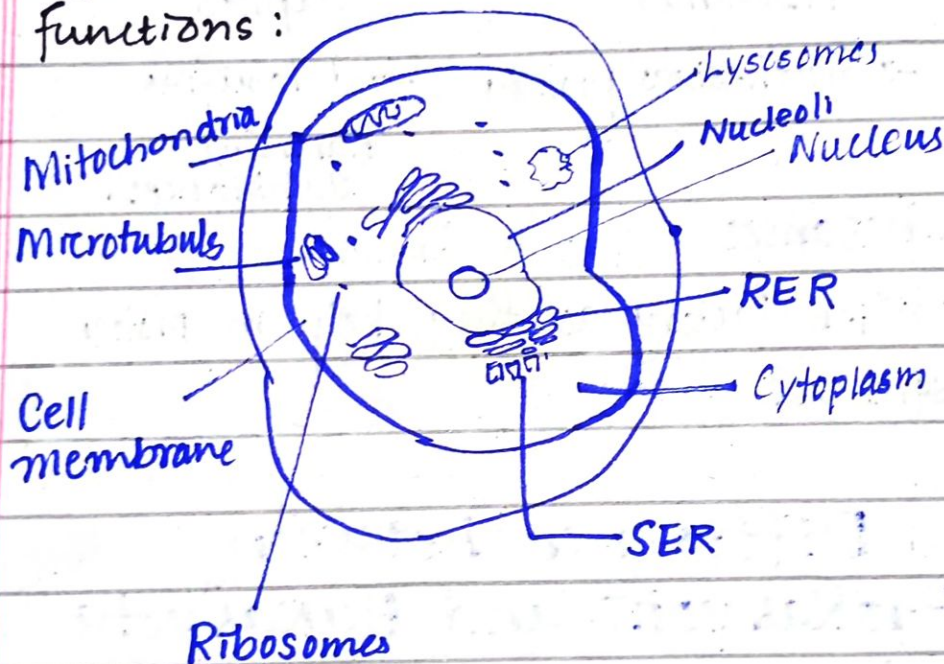
So, the ratio of their present ages
is $7:3$

SECTION-I

QUESTION # 2

a. Main Components of Cell:

Cell is the basic functional unit of life. It was discovered by Robert Hooke in 1665. It consists of various organelles which perform different functions:



i. **Cell Membrane**: It is a selectively permeable membrane that regulates entry and exit of substances.

ii. **Cytoplasm**: A semi-fluid medium where metabolic reaction occurs.

iii. **Nucleus**: It is the brain of cell.

as it controls all the functions of cell. It contains DNA.

Mitochondria: It is the site of cellular respiration and produces ATP. It is known as the powerhouse of cell.

Endoplasmic Reticulum: It is of two types

RER

→ Studded with ribosomes

→ Synthesizes proteins

SER

→ Synthesizes lipids

→ detoxifies harmful substances.

Ribosomes • They are known as the protein factory as they help in protein synthesis.

2. Difference between Prokaryotic and Eukaryotic Cell

Prokaryotic Cell

- Lack true nucleus
- No membrane-bound organelles
- Smaller (1-10 μm)
- Reproduce by binary fission

Eukaryotic Cell

- Have true nucleus
- Certain membrane bound organelles
- Larger (10-100 μm)
- Divide by mitosis or meiosis.

3. Cellular Response to External Stimuli:-

Cell constantly interact with their environment through:

- **Signal Transduction Pathways:**

Chemical signals (hormones, neurotransmitters) bind to receptors on the plasma membrane, triggering a cascade of intracellular response.

- **Chemotaxis:**

Movement towards/away from chemical stimuli.

- **Phototropism:**

Plant cells elongating towards light due to auxin hormone.

- **Stress Response:**

Cell produce heat-shock proteins under thermal stress to prevent protein denaturation.

4. Homeostasis in Cells

Homeostasis is maintaining internal stability despite external fluctuations.

Cells maintain homeostasis through osmoregulation, pH balance, and ion balance.



b. How do Mobile Phones Work:

A mobile phone is a two-way radio that communicates using electromagnetic waves.

i. Voice/Data Conversion

Data is converted into electrical signals by a microphone.

ii. Digital Encoding

These signals are digitalized into binary data.

iii. Radio Transmission

The data is sent ~~to~~ as radio waves to the nearest cell tower.

iv. Routing

The tower relays the signals to a base station, which routes it through the mobile network to the recipient.

2. Key Technologies:

Following Key technologies are present in mobile phones:

i. GSM/CDMA

iv. GPS

ii. 3G/4G/5G

iii. WiFi and Bluetooth