

## Profit & loss

Q) A Vendor bought toffees at 6/- per rupee. How many for a rupee must he sell to gain 25%?

~~Rs 6/-~~

$$\text{CP of 6 toffees} = \text{Rs } 6 \\ 6 \text{ toffees} = 100 \text{ paisa}$$

CP →

$$\text{Profit} = \frac{20}{100} \times 100 = \text{Rs } 20$$

$$SP = C.P + \text{Profit}$$

$$100 + 20 = 120 \text{ paisa}$$

$$120 \rightarrow 6 \text{ toffees}$$

$$100 \rightarrow \frac{5}{6} \text{ of 6 toffees}$$

$$\frac{100}{x}$$

$$1 = \frac{5}{6} \text{ of } x$$

$$1 - \frac{1}{6} = \frac{5}{6}$$

$$SP = \frac{100}{\frac{5}{6}} = \frac{600}{5} = \frac{1200}{100} = \text{Rs } 1200$$

b) The percentage profit earned by selling an article for Rs 1920 is equal to the percentage loss incurred by selling the same article for Rs 1280. At what price should the article be sold to make 25% profit?

~~CP = 1920~~

~~SP = 1280~~

$$\text{Profit \%} = \text{Loss \%}$$

$$SP < \text{Rs } 1920 \quad SP = \text{Rs } 1280$$

$$\text{Let Cost} + P \text{ be } x$$

~~P~~

$$\frac{P}{x} \times 100 = \frac{\text{Loss} \times 100}{C.P}$$

$$\frac{SP - CP \times 100}{CP} = \frac{C.P - SP \times 100}{C.P}$$

$$\frac{1920 - x \times 100}{x} = \frac{x - 1280 \times 100}{x}$$

$$1920 - x = x - 1280$$

$$2x = 1920 + 1280$$

$$2x = 3200$$

$$C.P = 1600$$

$$P\% = \frac{\text{Profit} \times 100}{C.P} = \frac{25 \times 100}{1600}$$

$$\frac{SP - CP}{C.P} \times 100$$

$$C.P$$

$$25 = \frac{SP - 1600}{1600} \times 100$$

$$1600$$

7. A shopkeeper expects a gain of 22.5% on his goods. If in a week, his sale was of Rs 392, what was his profit?

Soln Let the C.P be Rs 100.

$$S.P = C.P + \text{gain}$$

$$S.P = \frac{Rs 100}{100} + 22.5 \cdot \frac{Rs 100}{100}$$

$$= 122.5 - 100$$

$$\begin{array}{r} 1 \\ 122.5 \\ \hline 100 \end{array} \rightarrow 100 \quad (\text{By})$$

Unitary method

$$392 - \frac{100}{100} \times 392$$

$$\begin{array}{r} 40 \\ 122.5 \\ \hline 200 \end{array}$$

$$\underline{1000 \times 392}$$

$$122.5$$

$$\begin{array}{r} 51 \\ 245 \\ \hline 49 \end{array}$$

$$40 \times 392 = 320$$

$$69$$

$$292$$

$$\begin{array}{r} 320 \\ 72 \\ \hline 2 \end{array}$$

$$Rs = (392 - 320)$$

8. A man buys a cycle for Rs. 1400 and sells it at a loss of 15%. What was his percentage profit? (Ans. 40%)

Cycle.

$$C.P = 1400 \quad \text{Loss} = 15\%$$

$$\text{Loss \%} = \frac{S.P - C.P}{C.P} \times 100$$

$$C.P$$

$$25\% = \frac{1400 - S.P}{1400} \times 100$$

$$\begin{array}{r} 2 \\ 1400 - S.P \\ \hline 1400 \end{array}$$

$$\begin{array}{r} 2 \\ 1400 - S.P \\ \hline 1400 \end{array}$$

$$\begin{array}{r} 2 \\ 1400 - S.P \\ \hline 1400 \end{array}$$

$$\begin{array}{r} 2 \\ 1400 - S.P \\ \hline 1400 \end{array}$$

$$\begin{array}{r} 2 \\ 1400 - S.P \\ \hline 1400 \end{array}$$

$$15\% = \frac{1400 - S.P}{1400} \times 100$$

$$15 \times 14 = 1400 - S.P$$

$$210 = 1400 - S.P$$

$$1400 - 210$$

$$= 1190$$

- 9) Sam purchased 20 dozens of toys at the rate of Rs 375 per dozen. He sold each one of them at the rate of Rs 33.

What was his percentage profit?

$$\begin{array}{r} 12 \times 3 \\ 36 \\ 12 \cancel{3} \\ \hline 15 \end{array}$$

$$\text{Cost price of 1 toy} = \text{Rs } \frac{375}{12} = 31.25$$

Selling Price of 1 toy = Rs 33

$$\begin{aligned} \text{Gross Profit} &= \text{Rs } (33 - 31.25) \\ &= 1.75 \\ \text{Profit \%} &= \frac{1.75}{31.25} \times 100 \\ &= 28\% = 5.6\% \end{aligned}$$

10. Some articles were bought at 6 articles for Rs 5 and sold at 5 articles for Rs 6. Gross profit is:

$$\begin{array}{r} 6 \quad 5 \\ 5 \quad 6 \\ \hline 2 \quad 1 \\ 2 \times 4 \quad 3 \times 5 \\ 100 \quad 11 \\ 25 \quad 25 \\ \hline 11 \times 15 \\ = 44\% \end{array}$$

(2) When a plot is sold for Rs 18,700, the owner loses 15%. At what price must that plot be sold in order to gain 15%?

11) On selling 17 balls for Rs 720, there is a loss equal to the cost price of 5 balls. The cost price of 1 ball is:

$$\begin{array}{r} \text{SP of 17} \rightarrow 720 \\ \text{CP} \rightarrow 7200 \end{array}$$

$$\begin{array}{r} 7200 \\ 19 \\ \hline 18 \times 4 \quad 18 \times 5 \\ 6 \quad 8 \quad 8 \times 5 \\ \hline 17 \times 8 \end{array}$$

$$\begin{aligned} (\text{CP of 17 balls}) - (\text{SP of 17 balls}) &= (\text{CP of 5 balls}) \\ \Rightarrow \text{CP of 12 balls} &= \text{SP of 12 balls} \\ \text{CP of 1 ball} - 720 &= 0 \\ \text{CP of 1 ball} &= 720 \end{aligned}$$

$$\begin{array}{r} 12 \times 5 \quad 60 \\ 60 \quad 12 \quad 720 \\ 12 \times 6 \quad 720 \\ 72 \quad 720 \\ \hline 9 \\ 100 \\ 85 \\ 15 \end{array}$$

$$\text{SP} = 18,700, L = 15\%$$

$$\text{L.P.} = \frac{\text{SP} - \text{CP}}{\text{SP}} \times 100$$

$$85 \times 18,700 = 115.5\%$$

$$18,700 \times 15 = 2805$$

$$\frac{18,700}{115.5} \times 100 = 16,700$$

Rs.



Boat & stream

Formula :-

$$\text{Speed of boat in still water} = \frac{1}{2}(a+b)$$

$$3) \text{ Speed of stream} = \frac{1}{2}(a-b)$$

$$4) \text{ Boat upstream speed} = (U-V) \text{ kmph}$$

$$5) \text{ Boat downstream speed} = (U+v) \text{ kmph}$$

Q) A boy can row upstream 10 kmph downstream 20 kmph. Find the man's rate in still water and rate of current?

$$\text{still water} = \frac{1}{2}(a+b)$$

$$\frac{1}{2} \left( 20+10 \right) = 15$$

$$6) \text{ Speed of stream} = \frac{1}{2}(a-b)$$

$$\frac{1}{2} \left( 20-10 \right) = 10$$

2) A boat can travel at a speed of 13 km/hr in still water. If the speed of stream is 4 km/hr, find the time taken by the boat to go 68 km downstream.

$$\frac{13}{4} \times t = 68$$

$$t = 16$$

Speed of boat in still water

$$\text{Downstream speed} = \frac{1}{2}(U+V) = \frac{1}{2}(13+17) = 15$$

$$\frac{13+17}{2} = \frac{30}{2} = 15$$

$$\frac{13}{2} + \frac{17}{2} = \frac{30}{2} = 15$$

$$\frac{13}{2} + \frac{17}{2} = \frac{30}{2} = 15$$

$$\frac{13}{2} + \frac{17}{2} = \frac{30}{2} = 15$$

3) A boat covers 10 km downstream & 30 km upstream in 5 hrs each. Find the velocity of current.

~~$$V.C.F = \frac{1}{2} (S_d - S_u)$$~~

~~$$\frac{1}{2} (40 - 10) = 15$$~~

~~$$D_s = \frac{1}{2} (40+10) = 15$$~~

~~$$D_u = \frac{1}{2} (10+40) = 15$$~~

~~$$S_d = 40 \text{ kmph}$$~~

~~$$S_u = 10 \text{ kmph}$$~~

~~$$\frac{1}{2} (8-4) = \frac{4}{2} = 2$$~~

Q) A boat takes 8 min less to travel Shonka in still water if it travels D.S. than to travel H.S. If speed of wind is  $\frac{1}{2}$  of its same distance U.S. It takes half the time to go. Speed of the boat in still water and come back. Now SW is 10 km/hr. How far is the place?

Speed of stream?

$$D = S \rightarrow 10+x$$

$$U = S \rightarrow 10-x$$

$$D = 36$$

$$\begin{array}{r} 36 \\ - 10 \\ \hline 26 \end{array}$$

$$\begin{array}{r} 36 \\ - 10-x \\ \hline 26+x \end{array}$$

$$\begin{array}{r} 36 \\ - 10-x \\ \hline 26 \end{array}$$

$$\begin{array}{r} 36(10-x) \\ - 36(10+x) \\ \hline 36(10+x) - 36(10-x) = 3 \\ 10^2 - x^2 \end{array}$$

$$360 + 36x - 360 - 36x$$

$$\begin{array}{r} 96 \\ - 144 \\ \hline 48 \end{array}$$

$$= 48x = 3$$

$$100 - x^2 = 2$$

$$72x \times 2 = 3(100 - x^2)$$

$$144x = 300 - 3x^2$$

$$3x^2 + 144x - 300$$

$$x^2 + 48x - 100$$

$$8 = 48$$

$$P = -100$$

$$x = -50$$

$$81 > 0$$

5) A man can row at 5 km/h in still water. If he rows 8 km/h in the same direction. If he rows his boat to a place 10 km away and comes back. How long does he take?

Speed?

Distance?

$$\text{still water} = \frac{1}{2}(a+b)$$

$$\frac{1}{2}(5+1) = 3$$

$$\frac{P+D}{2} = 10$$

$$\frac{5+1}{2} = 3$$

$$D = 3$$

$$x + x = 1$$

$$6 \quad 4$$

$$4x + 6x = 1$$

$$10x$$

$$2x + 6x = 1$$

$$8x = 1$$

$$10x = 2$$

$$2x = 1$$

$$x = \frac{1}{2}$$

$$10x = 5$$

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

$$10x = 25$$

$$2x = 5$$

A man can row 18 km/hr in still water. It takes him twice as long as to row down the river. Find the rate of the stream?

a = downstream

b = upstream

$$a = 3b \quad | \frac{18}{b}$$

$$\text{Speed} = \frac{1}{2}(a+b) \quad | \frac{18}{b}$$

$$18 = \frac{1}{2}(3b + b)$$

$$18 = \frac{4b}{2}$$

$$3b = 4b$$

$$4b = 3b$$

$$b = \frac{3b}{4} = \frac{9}{4}$$

4

$$a = 3b = 27$$

$$a = 3 \times 9$$

Speed of river & stream

$$= \frac{1}{2}(a-b)$$

$$\frac{1}{2}(27 - 9)$$

$$+ \frac{9}{2}$$

A man can row 40 km in 10 hrs. He can also row 20 km in 4 hrs. Find the speed of the man in still water & current?

$$\text{Speed} = \frac{D}{T} = \frac{L \cdot D}{S}$$

$$40 \text{ km} \rightarrow 55 \text{ km} / \rightarrow 10 \text{ hrs} \quad (1)$$

$$20 \text{ km} \rightarrow 44 \text{ km} \rightarrow 4 \text{ hrs} \quad (2)$$

$$(1) \frac{40 + 55}{b} = 10 \quad (1) \times 3$$

$$\frac{30 + 44}{b} = 10 \quad (2) \times 4$$

$$\Rightarrow \frac{120}{b} + \frac{176}{a} = 34 \quad (1)$$

$$\frac{120}{b} + \frac{176}{a} = 40 \quad (2)$$

(-) □

$$= \frac{11}{a} = 1$$

$$a = \frac{1}{11} \times 11 = 1$$

$$\frac{40 + 55}{b} = 13 \quad (1)$$

$$\frac{1}{2}(11-5) = 8$$

$$\frac{40}{b} = 13 - 5$$

$$\frac{40}{b} = 8$$

$$40 = 8b$$

$$8b = 40$$

Indie b/w

$$1) D = 68 \text{ km}$$

$$\frac{t_0 + D}{S} = 12 + 4 = 17$$

$$t = \frac{68}{17} = 4$$

- 2) A man's speed with current is 15 km/hr and the speed of the current is 2.5 km/hr. The man's speed against the current is:

$$\frac{1}{2}(a+b)$$

$$\frac{1}{2}(15+2.5)$$

$$\begin{array}{ccc} 12.5 & 17.5 & 17.5 \\ \cancel{2.5} & \cancel{5} & \cancel{2.5} \\ 10.0 & & 15 \end{array}$$

$$\begin{aligned} \text{man's rate on st' ll water} \\ = 15 - 2.5 \text{ km/hr} \\ = 12.5 \text{ km/hr} \end{aligned}$$

man's rate against the current

$$= 12.5 - 2.5$$

$$\frac{11x+5x}{2} = \frac{11x-x}{2}$$

$$\frac{16x}{2} = \frac{10x}{2}$$

$$\frac{16x}{5} = \frac{10x}{5}$$

$$=\frac{8}{5} : \frac{3}{5}$$

- 3) A boat running upstream takes 8 hours 42 minutes to cover a certain distance while it takes 4 hours to cover the same distance running downstream. What is the ratio between the speed of boat and speed of water current respectively?

Let the man's rate upstream be  $x$  and that downstream be  $y$  kmph

Then distance covered upstream in 8 hrs  $8x$  m = Distance

$$\text{Covered downstream in 4 hrs} \\ (x + y) \times 4 = 4y \\ (x + y) = y \\ x = y$$

$$x \times \frac{4y}{s} = \frac{4y}{s}$$

$$y = \frac{44x}{5x} \quad y = \frac{11x}{5}$$

Required Ratio

$$\frac{y+x}{2} : \frac{y-x}{2}$$

$$\frac{11x+x}{5} = \frac{11x-7}{5}$$

$$\frac{11x+2x}{5} : \frac{11x-7}{5}$$

h)

A motorboat whose speed in still water goes 30 km/hour along the stream downstream and comes back in a total of 4 hours. The speed of the boat in still water is 30 km/hour. The speed of the stream is (km/hr) is:

30 km/hour. The speed of the stream is (km/hr)

$$\frac{30 \times 15}{15+y} + \frac{30 \times 15}{15-y} = 4$$

$$\frac{30 \times 15}{15+y} \\ \frac{30 \times 15}{15-y}$$

$$\text{down} = 11$$

$$\text{up} = 5 \text{ km}$$

$$1(a+b)$$

$$\frac{1(11+5)}{2} = \frac{8}{2}$$

$$\frac{1}{2} (11+5) = \frac{8}{2}$$

$$\frac{1}{2} (11+5) = \frac{8}{2}$$

$$30(15+y) + 30(15-y) = 9$$

$$450 - 30y + 450 - 30y = 9$$

$$60y = 9$$

$$12(5)y = 9$$

$$\frac{2150 - 30y + 30y + 450}{15^2 - y^2} = \frac{9}{2} \quad \frac{1(a+b)}{2}$$

6. A boat running downstream covers a distance of 16 km in 2 hours while for covering the same distance upstream, it takes 4 hours. What is the speed of the boat in still water?

downstream speed =  $\frac{8}{2}$

$$\frac{900}{225-y^2} = \frac{9}{2}$$

$$\frac{s-p}{t-p} = \frac{8}{2}$$

$$900 \times 2 = 9(225-y^2) \quad \text{upstream speed} = \frac{4}{2} = 2 \text{ km/h}$$

$$1800 = 2025 - 9y^2$$

$$= \frac{1(a+b)}{2} = \frac{8-4}{2} = 2$$

$$9y^2 = 1800 + 2025$$

$$y^2 = 200 + 225$$

$$y = 5 \text{ km/hr}$$

$$\frac{12}{2} = 6 \text{ km/hr}$$

$$\begin{array}{r} 10x4 \\ 240 \end{array}$$

$$\begin{array}{r} 60x4 \\ 240 \end{array}$$

$$\begin{array}{r} 60x3 \\ 180 \end{array}$$

$$\begin{array}{r} 60x3 \\ 180 \end{array}$$

$$\begin{array}{r} 60 \\ 180 \\ - \\ \hline 360 \end{array}$$

3.6

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7) The speed of a boat in still water is 18 km/hr, and the rate of current is 3 km/hr. The distance travelled downstream in 1 minute is

$$\frac{D}{15+3} = \frac{12}{60}$$

$$\frac{D}{18} = \frac{12}{60}$$

$$216 = 60D$$

10. A boat covers certain distance downstream in 1 hour, 20 minutes; coming back in

$\frac{1}{2}$  hours hours. If the

speed of the stream be 3 kmph

what is the speed of

the boat in still water

$$\frac{S+3}{2}$$

$$\frac{S-3}{2}$$

$$\frac{6+9}{2} = \frac{21}{2}$$

$$\left(\frac{x+3}{2}\right) \left(\frac{x-3}{2}\right)$$

15 kmph

$$D = \frac{D}{S+3}$$

$$S+3 = S+3$$

$$(S+3)x_1 = (S-3)x_2$$

$$x+3 = \frac{3x-9}{2}$$

$$\frac{6-18}{2}$$

13) Speed of a boat in  
standing water is 9 km/h  
and the speed of the stream  
is 1.5 kmph. A man  
wants to travel a distance of  
105 km and comes  
back to the starting point.  
The total time taken by  
him is:

$$(105) + (105)$$

$$9 + 1.5 \quad (9 - 1.5)$$

~~$$105(9-1.5) + 105(9+1.5)$$~~

$$\frac{105}{10.5} + \frac{105}{7.5} = \frac{9}{1.5}$$

$$24 \text{ hours} \quad \frac{9}{1.5} = 8$$

14) A man takes twice as  
long to row a distance  
against the stream as  
down the same distance  
in favor of the stream.  
The ratio of the speed  
of the boat and the stream  
is:

$$a = 2b$$

$$\frac{1}{2}(a+b) : \frac{1}{2}(a-b)$$

$$\frac{1}{2}(2b+b) : \frac{1}{2}(2b-b)$$

$$\frac{3b}{2} : \frac{b}{2}$$

$$3 : 1$$

15) A man rows to a place  
148 km distant and comes  
back in 14 hours. If finding  
he can swim 4 km with  
the stream in the same time  
3 km against the stream.  
The ratio of the stream is:  
 $a : b = 3 : 4$

$$\text{down} = \frac{24}{x} \text{ km/h}$$

$$= \frac{48}{x} + \frac{48}{x} = 14 \quad \frac{48x + 48x}{4x} = 14 \quad \frac{48x}{4} = 14 \quad x = 12$$

$$\frac{148}{4} + \frac{148}{3} = 14 \quad \frac{148x + 148x}{12} = 14 \quad \frac{148x}{12} = 14 \quad x = 12$$

$$\frac{96x}{12} - \frac{112x}{12} = 14 \quad \frac{336}{12} - \frac{336}{12} = 14 \quad 336 = 14$$

$$\frac{48}{4} + \frac{48}{3} = 12 \quad \frac{48x}{4} + \frac{48x}{3} = 12 \quad \frac{48x}{12} = 12 \quad x = 12$$

$$\frac{48x}{4} + \frac{48x}{3} = 14 \quad \frac{336}{12} = 14 \quad 336 = 14$$

$$\frac{48}{2x} + \frac{48}{3x} = 1 \text{ hr}$$

$$\frac{x+1}{2}$$

$$P_s = \frac{4}{x} - \frac{4}{3} = \frac{1}{2}$$

$$U_p = \frac{3}{x} - \frac{3}{2} = \frac{1}{2}$$

Rate of stream

$$\frac{1}{2} (a-b) \\ = 8 - 6 = 1 \text{ km/h}$$

$$\frac{1}{2} (7+3) = \frac{5}{2}$$

Q) Alex can row a boat at 7 kmph  
downstream and 3 kmph  
upstream. Calculate  
her rowing speed  
in still water and  
the rate of stream.

$$= \frac{1}{2} (a+b)$$

$$\frac{1}{2} (7+3) = \frac{5}{2} \text{ kmph}$$

$$= \frac{1}{2} (a-b) = \frac{1}{2} (7-3) \\ \therefore 4 = 0$$

Q) Sam's boating speed is 10 kmph but he takes double time in rowing the boat upstream as compared to downstream calculate the rate of the stream?

$$a = 2b$$

$$\frac{1}{2} (10-b) \\ 2 \\ \frac{1}{2} (20+b) \\ 2$$

$$\frac{1}{2} (10-2 \times 10) = \frac{1}{2} (10)$$

$$\text{Speed of stream} = \frac{1}{2} (a-b)$$

Let Sam's speed upstream be  $a$   
then his speed downstream  $= 2a$   
 $\therefore \text{Average speed} = \frac{a+2a}{2} = \frac{3a}{2}$

$$3a = 20$$

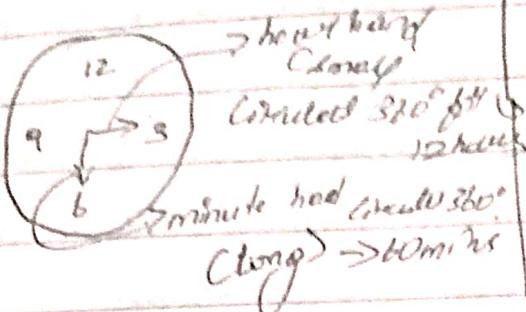
$$a = \frac{20}{3} = 6 \frac{2}{3} \text{ kmph}$$

$$\text{Upstream} = 6 \frac{2}{3} - 6 = \frac{2}{3} \text{ kmph}$$

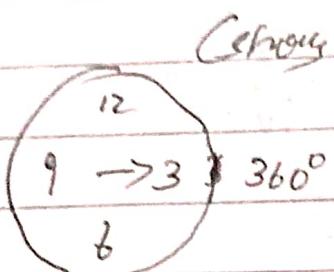
$$\text{Downstream} = 6 \frac{2}{3} + 6 = 13 \frac{1}{3} \text{ kmph}$$

$$\text{Rate of stream} = \frac{1}{2} (a-b) \\ = \frac{1}{2} (13 \frac{1}{3} - 6 \frac{2}{3}) \\ = 3 \frac{3}{4} \text{ kmph}$$

Clock

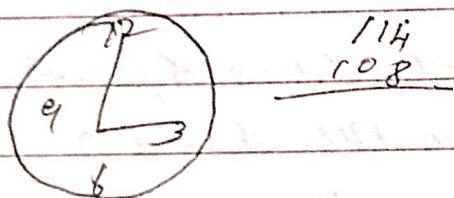


Hour hand



deg it moves/hr

$$\frac{360^\circ}{12} = 30^\circ \text{ per hour}$$



360° every 60 mins

min hand moves 6 min

$$\approx 360^\circ \rightarrow 6^\circ$$

$$6 \times$$

Q) Find the angle b/w min hand and hour hand of a clock when time is 6:30

Hour hand

$$6 + \frac{30}{60}$$

$$360 + 30 = \frac{390}{60} = 6.5$$

$$360^\circ \rightarrow 12$$

$$12 \rightarrow 39$$

$$\begin{array}{r} 6 \\ 60 \\ \hline 12x = 360 \times 39 \\ 12x = 1560 \\ \hline x = 130 \end{array}$$

$$x = 2340$$

$$\begin{array}{r} 19-5 \\ 12 ) 2340 \\ 12 \\ \hline 108 \\ 108 \\ \hline 0 \end{array}$$

min hand

$$6 \times 60 = 360$$

$$\begin{array}{r} 30 \\ 390 \\ \hline \end{array}$$

$$360^\circ \rightarrow 60$$

$$x \rightarrow 390 \text{ min}$$

$$x \times 60 = 360 \times 390$$

$$360 \rightarrow 60$$

$$x \rightarrow 30 \text{ min}$$



A clock started at noon  
By 10 hrs 5 mins past 5, the hand of the clock as  
hour hand turned through?

$$\textcircled{1} \rightarrow 5 \text{ hrs } 5 \text{ mins} = 5 \times 60 + 5 = 300 + 5 = 305$$

$$\begin{array}{r} 10 \\ \times 60 \\ \hline 600 \\ 305 \\ \hline 310 \\ \begin{array}{r} 6 \\ \times 5 \\ \hline 30 \end{array} \\ \hline 155 \end{array}$$

$$10 \times 60 = 600$$

$$\begin{array}{r} 600 \\ \times 5 \\ \hline 3000 \\ 600 \\ \hline 625 \end{array}$$

$$\begin{array}{r} 600 \\ \times 5 \\ \hline 3000 \\ 600 \\ \hline 625 \\ - 600 \\ \hline 25 \end{array}$$

Angle b/w min hand & hr hand when time is  $4:22:00$

$$4 \times 60 = 240$$

$$\begin{array}{r} 240 \\ \times 60 \\ \hline 14400 \\ 3600 \\ \hline 10800 \end{array}$$

$$\begin{array}{r} 10800 \\ \times 22 \\ \hline 217600 \end{array}$$

min hand

$$\begin{array}{r} 360 \\ \times 22 \\ \hline 7920 \end{array}$$

$$0 \times 60 \\ 120$$

$$120 = 120 - 100$$

$$= 10^{\circ}$$

hr hand

$$\begin{array}{r} 360 \\ \times 5 \\ \hline 1800 \end{array}$$

$$\begin{array}{r} 1800 \\ \times 22 \\ \hline 39600 \\ 1800 \\ \hline 73200 \end{array}$$

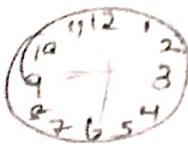
Reflex angle

$$360^{\circ} - \frac{73200}{360} = 360^{\circ} - 20^{\circ} = 340^{\circ}$$

$$360^{\circ} - \frac{325}{2} = 360^{\circ} - 162.5^{\circ} = 197.5^{\circ}$$

$$= \frac{197.5}{2} = 98.75^{\circ}$$

$$= 197.5^{\circ}$$



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j) An accurate clock shows 8 o'clock in the morning. Through how many degrees will the hour hand deviate when the clock shows 2 o'clock in the afternoon?

$\frac{15}{360}$

$\frac{30}{360}$

$\frac{325}{360}$

$$360^\circ - \left[ \frac{125 - 150}{3} \right]$$

$$360^\circ - \left[ \frac{625 - 300}{2} \right]$$

$$360^\circ - \left[ \frac{325}{2} \right]$$

$$360^\circ - \frac{325}{2}$$

$$\frac{325}{325}$$

$$720 - 325 = \frac{395}{395}$$

$$\begin{array}{r} 395 \\ - 395 \\ \hline 0 \end{array}$$

$$\begin{array}{r} 197 \\ - 182 \\ \hline 15 \end{array}$$

$$\begin{array}{r} 14 \\ - 14 \\ \hline 0 \end{array}$$

2) The reflex angle b/w the hands of a clock at 10:25 is

$$10 \times 60 = 600$$

$$\frac{25}{60}$$

$$\frac{625}{60}$$

$$600 \times$$

$$\frac{6}{12}$$

$$260 - \frac{960 \times 625}{12 + 60} = \frac{625}{2}$$

$$12 + 60$$

$$\sum 7$$

min. hand : 5

$$360 \times 25 = 150^\circ$$

$$60 \times 2$$

$$1$$

3) A clock started at noon. By 10 minutes p.m., the hour hand has turned through 5 full rounds.

$$5 \times 60 = 300$$

$$\frac{15}{300}$$

$$\frac{10}{300} = \frac{1}{30}$$

$$\frac{31}{30} = \frac{11}{10}$$

$$360 \times \frac{31}{30} = \frac{310}{10}$$

$$12 \times 60 = \frac{120}{2}$$

$$120 \times 5 = \frac{120}{2}$$



11. Find the ratio in which sugar at Rs 7.20 a kg be mixed with sugar at Rs 5.70 a kg to produce a mixture worth Rs 6.30 a kg.

$$\begin{array}{ccc} 7.20 & 5.70 & 6.30 \\ 7.20 - 6.30 & 6.30 - 5.70 \\ 0.90 & 0.60 & 0.60 \\ \hline 90 & 60 & 60 \\ 30 & 20 & 20 \\ \hline 3 & 2 & 2 \end{array}$$

12. In what ratio must a grocer mix two varieties of sugar to get a mixture worth Rs 60 a kg and by selling the mixture at Rs 68.20 a kg he may gain 10%?

$$\begin{array}{ccc} 60 & 65 & 62 \\ & 62 & \end{array}$$

$$65-62 = 3 \quad 62-60 = 2$$

$$3 : 2$$

$$SP = CP + \text{Gain}$$

$$SP = 100 CP / 10$$

$$SP = 110 CP$$

$$68.20 = 110 \\ 100$$

$$68.20 \times 100 \\ 110$$

$$\begin{array}{r} 110 \\ \times 68.20 \\ \hline 682 \\ 660 \\ \hline 740 \\ 22 \\ \hline 22 \end{array}$$

$$6.2 \times 10$$

$$6.2$$

13) The cost of type 1 sugar is Rs 15 per kg and type 2 sugar is Rs 20 per kg. If both types of sugar are mixed in the

$$15 : 20$$

$$15 C$$

$$20 C$$

$$2 \quad D-M \quad 3$$

$$D-M = 2 \quad 20-M = 2 \\ M-C = 3 \quad M-15 = 3$$

$$20-M = 2 \\ M-15 = 3$$

$$3(20-M) = (M-15)2$$

$$60 - 3M = 2M - 30$$

$$18 = 5M \quad M = 3.6$$

pump insta.

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1) A cheater shop keeper confesses to sell his pulses at cost price but he mixes it with pebbles and thereby gains 25%. The percentage of pebbles in the mixture is

Cost price = 1

2) A vessel comprises 100 litres of fresh juice out of the vessel 12 litres of juice was pulled out and replaced by water. This whole process was done two more times. Now calculate the quantity of fresh juice contained by the vessel

1

0

$$\frac{100}{12} \times \frac{12}{98}$$

$$T = \left( \frac{1-R}{P} \right)^3$$

$$\frac{100}{12} \times \frac{12}{88}$$

$$\frac{Q}{100} = \left( \frac{100-12}{100} \right)^3$$

$$\frac{Q}{100} = \left( \frac{88}{100} \right)^3$$

$$\frac{Q}{100} = \left( \frac{22}{25} \right)^3$$

$$22 \times 22 \times 22$$

$$44 \times 44 \times 44$$

$$\frac{Q}{100} = \frac{22 \times 22 \times 22}{25 \times 25 \times 25} = \frac{484 \times 484 \times 484}{625 \times 625 \times 625}$$

$$\frac{1 \times 100}{125} = \frac{0.8 \times 4}{5}$$

$$\frac{4}{5} : \frac{1}{5} = 4 : 1$$

$$\frac{1}{5} \times 100\% = 20\%$$

$$\frac{Q}{100} = \frac{22 \times 22 \times 22}{25 \times 25 \times 25} = \frac{484 \times 484 \times 484}{625 \times 625 \times 625}$$

$$\frac{1}{25} \times \frac{22}{25} \times \frac{22}{25} = \frac{1}{70625}$$

$$4 \times 10648$$

$$625$$

3. A shop costing INR 130 per kilogram and INR 139 per kilogram are combined along a new type in the ratio 1:2. If the combination cost 100 then find out the price of the new type per kilogram.

$$\begin{array}{r} 130 \\ 139 \\ \hline 269 \\ 134.50 \\ \hline 269 \end{array}$$

D

163

1

$$\begin{array}{r} 163 \\ 28.50 \\ \hline 134.50 \\ 28.50 \\ \hline 91.50 \end{array}$$

$$D = 28.50 + 163$$

$$= 191.50$$

$$= D - 163 = 1$$

$$\begin{array}{r} 163 \\ 269 \\ \hline 209 \\ 209 - 163 \\ \hline 46 \\ 163 \\ \hline 106 \end{array}$$

$$2(D - 163) = 106 \quad \text{INR 14 and INR 21 per kg}$$

$$2D - 326 = 106$$

$$2D = 326 + 106$$

$$2D = 432$$

4. A dealer in 2 types of black-eyed peas. Each costing

INR 14 and INR 21 per kg. what ratio should the

both types be mixed to get

a combination worth INR

21

18.20

3.20

18.50 per kg

14

18.20

14

18.20

21

21

18.20

20

2

3

14 21

22.42

2 3

3.20 4.20

2 3

2.8

1.2

14.91

= 130 + 139

2 139.50 1

2 19.25 2

2

134.50

2

163

163 - 20, x - 163 = 1

163 - 134.50

163

- 28.50

134.50

- 28.50 = 20 - 163 = 1

28.50

163

- 28.50

134.50

- 28.50 = 20 - 163 = 1

28.50

163

- 28.50

134.50

- 28.50 = 20 - 163 = 1

28.50

5. A vessel is filled with 6. Two jugs 2 and 7 having liquid, 3 parts of which cocacola and water mixed in equal ratio and 5 parts the proportion is 2:6  
displace much of H<sub>2</sub>O respectively. Now if we want a mixture must be drawn new mixture is jug 2 having Coca Cola and replaced with Cola and water in proportion  
Water do not H<sub>2</sub>O 8:3 then what will be the mixture may be half ratio?  
Water and half by jugs 5:2      7:6      13  
                                      9                  12

$$8:5$$

$$\begin{array}{r} 5 \times 13 \\ 7 \times 13 \end{array} \quad \begin{array}{r} 7 \times 2 + 7 \\ 13 \times 1 \end{array} \quad \begin{array}{r} 7, 13, 13 \\ 1, 13, 13 \end{array}$$

$$8+7 \quad 5+1$$

$$13+7 \quad 3+13$$

$$65 \quad 49 \quad 91$$

$$= 56$$

$$7 : 9$$

7) In what proportion must be  
be mixed with petrol to earn  
16 ( $\frac{2}{3}$ )% if we sell the combination  
at cost price?

$$16\left(\frac{2}{3}\right)\%$$

$$= 50$$

$$3$$

$$SP = CP + \text{gain}$$

$$SP = 100 + \frac{50}{3}$$

$$1 \times \frac{350}{3} - \frac{3}{1} = \frac{300 + 50}{3} = \frac{350}{3}$$

$$\begin{array}{r} 10 \\ \times 3 \\ \hline 30 \\ 300 \\ \hline 330 \end{array}$$

$$\begin{array}{r} 6 \\ \times 6 \\ \hline 36 \\ 36 \\ \hline 72 \end{array}$$

$$35$$

$$\frac{Q}{40} = \left( \frac{1-4}{40} \right)^3$$

$$\frac{Q}{40} = \left( \frac{36}{40} \right)^3$$

$$\frac{Q}{40} = \frac{36}{40} \times \frac{36}{40} \times \frac{36}{40}$$

$$40 \times 36 \times 36 \times 36$$

$$40 \times 40 \times 40$$

$$18 \times 10$$

$$36 \times 9 \times 9$$

$$10 \times 10$$

$$18 \times 9 \times 9$$

$$18 \times 81$$

$$5 \times 10$$

$$50$$

$$\frac{1458}{50}$$

$$\frac{6}{18} \dots$$

$$\frac{18}{144}$$

$$50) \overline{1458}$$

$$100\cancel{6}$$

$$458$$

$$450 \cancel{50} \times 6$$

$$5002$$

$$100$$

$$880^0$$

$$5003$$

$$50 \cdot$$

$$150$$

$$50 \cancel{5}$$

$$250$$

$$5002$$

$$0 \quad 12$$

$$\begin{array}{r} 8 \\ 12 - 8 \quad 8 - 0 \quad 50 \times 0 \\ \hline 4 \quad 2 \quad 400 \\ 4 \times 8 = 8 \quad 50 \times 9 \\ \hline 450 \end{array}$$

8. A fixed amount of water is mixed with Sangria costing Rs 12 per litre. The scale of mixture is 8:0 or 1:1. Find out the proportion of water and Sangria in the new combination.

Let Q be the cost of 1 litre.

Water      Sangria      Cost

0              12              12

12 - 8      8 - 0      50 × 0

$\frac{1}{2} : \frac{1}{8} = 8 : 0$

$50 \times 9$

$450$

10. A sells 3 types of  
material seeds and prepared  
grain 12t per kg and in 4t  
13.5 per kg and 3t of variety  
in the cost of 3.25 if  
the cost of one kg of maize  
is 15.5 per kg find  
the rate of third type  
of material goods

$$\begin{array}{r}
 13.5 \\
 12.6 \\
 \hline
 2.9 \\
 \begin{array}{r}
 2.6 \\
 0.9 \\
 \hline
 1.0 \\
 \end{array}
 \end{array}
 \begin{array}{r}
 12.6 \\
 13.5 \\
 \hline
 2.6 \\
 \begin{array}{r}
 2.6 \\
 0.9 \\
 \hline
 1.0 \\
 \end{array}
 \end{array}
 \begin{array}{r}
 2.61 \\
 2.61 \\
 \hline
 0.0 \\
 \end{array}
 \begin{array}{r}
 2.61 \\
 2.61 \\
 \hline
 0.0 \\
 \end{array}
 \begin{array}{r}
 2.61 \\
 2.61 \\
 \hline
 0.0 \\
 \end{array}$$

201      10      1

2x13.5 = 27.0

13.5 (1)

155 per M.

$$\begin{array}{r}
 D - R \\
 D - 155 = 2 \\
 M - C \\
 155 - 13.5
 \end{array}$$

$$D - 155 = 2$$

$$155 - 13.5$$

$$D - 155 = 2$$

$$24.5$$

$$D - 155 = 2 \times 24.5$$

$$49$$

$$10$$

$$DC$$

$$15$$

$$3$$

$$2$$

$$15 - 15 = 3$$

$$15 - 10 = 2$$

$$24.5$$

$$45$$

$$05$$

$$4$$

$$10$$

$$2(D - 15) = 15$$

$$\begin{array}{r}
 2x - 30 = 15 \\
 2x = 45
 \end{array}
 = 22.5$$

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$$\begin{array}{r}
 = 12.6 \times 3 + 13.5 \times 2 + 5x \\
 3 + 2 + 5
 \end{array}$$

$$12.6 \times 3 + 13.5 \times 2 + 5x = 155$$

10

$$87.8 + 27.0 + 5x = 153 \times 100$$

$$\begin{array}{r}
 000 \\
 155 \times \\
 648 + 5x = 1530 \\
 \hline
 1350
 \end{array}$$

$$5x = 1550 - 648 = 1542$$

$$5x = 902$$

$$= 180.40$$

$$10$$

$$DC$$

## Logarithm

$$\begin{array}{c}
 \log_a x = m \\
 \log_a x^m = m
 \end{array}$$

Base formula

$$\log_a x = m \Rightarrow a^m = x$$

$$eg: 3^4 = 81$$

$$\log_3 81 = 4$$

$$10^3 = 1000.$$

$$\log_a x = m$$

$$\log_{10} 1000 = 3$$

$$\log_a(xy) = \log_a x + \log_a y$$

$$\log_a\left(\frac{x}{y}\right) = \log_a x - \log_a y$$

$$\log_x x = 1, \log_x 1 = 0$$

$$\log_a(x^n) = n \log_a x$$

Part I

$$\log_{58} x = \frac{10}{3}$$

Find the value of  $x$

$$\log_a x = m$$

$$(58)^{\frac{10}{3}} = x$$

$$(2 \times 2 \times 2)^{\frac{10}{3}} = x$$

$$(2^3)^{\frac{10}{3}} = x$$

$$\log_7(343) = \log_7 1 - \log_7 343$$

$$\log_7\left(\frac{1}{343}\right)$$

$$= \log_7(7^{-3}) + \log_7 7^{-3}$$

$$= -3$$

$$\log_{10}(0.01)$$

$$= \log_{10}\left(\frac{1}{100}\right)$$

$$10^{-2}$$

$$\log_{10} 100^{-1}$$

$$= -1$$

Formula  $\log_x 1 = 0$

$$\log_{34} 34 = 1$$

$$(8)^{\frac{10}{3}} = x$$

$$(8^{\frac{1}{3}})^{\frac{10}{3}} = x$$

$$(2^3)^{\frac{10}{3}} = x$$

$$(2^{\frac{3}{3}})^{\frac{10}{3}} = x$$

$$2^{\frac{10}{3}} = x$$

$$2 \times 2 \times 2 \times 2 \times 2 = x$$

Simplify

$$\log \frac{75}{16} - 2 \log \frac{5}{9} + \log \frac{32}{243}$$

$$\log \frac{75}{16} - \log \left( \frac{5}{9} \right)^2 + \log \frac{32}{243}$$

$$\log \frac{75}{16} - \log \left( \frac{25}{81} \right) + \log \frac{32}{243}$$

$$\log \left( \frac{15}{16} \times \frac{2}{3} \times \frac{27}{81} \right)$$

$$\frac{1}{16^2} \quad \frac{2}{3^2}$$

$$\begin{array}{r} 54 \\ 2 \\ \times 2 \\ \hline 18 \\ 3 \\ \hline 15 \end{array} \quad \begin{array}{r} 30 \\ 3 \\ \hline 10 \\ 3 \\ \hline 2 \end{array}$$

$$\begin{array}{r} 75 \\ 8 \\ \hline 15 \\ 3 \\ \hline 25 \\ 27 \\ \hline 75 \times 25 \times 27 \end{array}$$

$$\begin{array}{r} 16 \\ 3 \\ \hline 48 \\ 81 \\ \hline 16 \\ 81 \\ \hline 9 \\ 3 \end{array} \quad \begin{array}{r} 25 \\ 27 \\ \hline 5 \\ 1 \end{array}$$

$$\log \frac{3 \times 2}{x}$$

$$\log 2$$

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Q  
1m lk

$$\frac{75}{16} \times \frac{32}{243} \times \frac{1}{81}$$

$$\begin{array}{r} 243 \\ 16 \\ 3 \\ \hline 25 \\ 1 \end{array}$$

$$\log 2$$

7  
up

$$3(4x+1) = 10 + 10(x+1)$$

$$12x+3 = 10x+10$$

$$12x-10x = 10+3$$

$$\begin{array}{l} 2x = 7 \\ \hline x = \frac{7}{2} \end{array}$$

$$\frac{1}{\log_{xy}(xy)} + \frac{1}{\log_{yz}(xyz)} + \frac{1}{\log_{zx}(xyz)}$$

$$\log_{(xy)} \frac{xy}{(xyz)} + \log_{(yz)} \frac{yz}{(xyz)} + \log_{(zx)} \frac{zx}{(xyz)}$$

$$\log_{(xyz)} \frac{(xy)(yz)(zx)}{(xyz)^2}$$

$$= 2 \log_{(xyz)} xy$$

$$2 \log 2 \times 1 = 2$$

Simplify the following.

$$\log_{10} 3 + \log(4x+1) = \log_{10} (x+1) + 1$$

$$= \log_{10} 3 + \log_{10} (4x+1) = \log_{10} (x+1) + \log_{10} 10.$$

$$\log_{10} 3(4x+1) = \log_{10} 10(x+1)$$

Simplify the following

$$\begin{aligned} & \log_a ab - \log_a ac + \log_a abc^4 - \\ & 3 \log_a bc \\ & \log ab^2 - \log_a ac + \log_a abc^4 \\ & (-\log_a b^6 c^3) \\ & = \log_a \left[ \frac{ab^2 \times abc^4}{ac \times b^3 c^3} \right] \\ & \log_a a = 1 \end{aligned}$$

Part 4.

Find the Value sum

$$\log_{10} 2 = 0.3010 \text{ find}$$

$$\log_{10} 50 = \log_{10} \left( \frac{100}{2} \right)$$

$$= \log_{10} 100 - \log_{10} 2$$

$$\log_{10} 10^2 - \log_{10} 2$$

$$2 \log_{10} 10 - \log_{10} 2$$

$$2 - 0.3010$$

$$= 1.699.$$

$$\log \frac{9}{2}$$

$$2 \times 0.4771, 0.9542$$

$$\log 9 - \log 2$$

$$\log 3 > \log 2$$

$$2 \log 3 - \log 2$$

$$2 \times 0.4771 - 0.3010$$

$$0.9542 - 0.3010$$

$$= 0.6532$$

$$0.9542$$

$$0.3010$$

$$0.6532$$

$$\log 25$$

$$\log 5^2$$

$$2 \log 5$$

$$\log 25 \Rightarrow \log \left( \frac{100}{4} \right)$$

$$\log 100 - \log 4$$

$$\log 10^2 - \log 2^2$$

$$2 \log_{10} 10 - 2 \log_{10} 2 \quad 2 \times 0.3010, 0.6020$$

$$2 \times 1 - 2 \times 0.3010$$

$$2 - 0.6020 \quad 1.3980 \quad 1.3980 \quad 0.6020$$

$$= 0.4080$$

Find the Value Sum

$$\log 2 = 0.3010 \& \log 3 =$$

$\log 10^2$  find the value

$$\text{of } \log 4.5$$

Find the no of digits

If  $\log 2 = 0.3010$  find the  
no of digits in  $2^{56}$

$$2^{56}$$

$$1193656$$

characteristic

$$56 \log 2$$

$$56 \times 0.3010$$

$$- 16.8560$$

If  $\log_3 4 = 100$  &  $\log_2 x = 10$   
find the value of  $y$ ?

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$$\log_2 x = 10 \Rightarrow x = 2^{10}$$

$$\log_3 4 = 10$$

$$\log_2 10^y = 100$$

$$10^y = \frac{100 \times 10}{100} = 1000$$

$$10^y = 2^{10} \times 10^2$$

$$10^y = 2^{1000}$$

$$3) \log_9 (3 \log_2 (1 + \log_3 (1 + 2 \log_2 x))) = 0$$

Find  $x$

$$= 3 \log_2 (1 + \log_3 (1 + 2 \log_2 x)) = 0 \Rightarrow ?$$

$$3 \log_2 (1 + \log_3 (1 + 2 \log_2 x)) = 3$$

If  $\log_{10} 7 = 0$  then  $\log_{10} \left(\frac{1}{70}\right)$

is equal to:

- (a)  $-(1+a)$  (b)  $(1+a)^{-1}$   
 (c)  $\left(\frac{1}{10}\right)$  (d)  $\left(\frac{1}{10a}\right)$

$$\log_{10} \left(\frac{1}{70}\right)$$

$$\log_{10} 1 - \log_{10} 70$$

$$-\log_{10} 70$$

$$-\log_{10} (7 \times 10)$$

$$-(\log_{10} 7 + \log_{10} 10)$$

$$-(1 + \log_{10} 7)$$

$$-(1+a)$$

$$\log_2 (1 + \log_3 (1 + 2 \log_2 x)) = 0$$

$$1 + \log_3 (1 + 2 \log_2 x) = 2$$

$$\log_3 (1 + 2 \log_2 x) = 2 - 1 = 1$$

$$\log_3 (1 + 2 \log_2 x) = 1$$

$$1 + 2 \log_2 x = 3$$

$$1 + 2 \log_2 x = 3$$

$$2 \log_2 x = 2$$

$$\log_2 x = 1$$

$$x = 2$$

India bix question

2) If  $\log 2 = 0.3010$  and  $\log 3 = 0.4771$ , the value of  $\log 512$  is

$$\log 512 = \frac{\log 512}{\log 5}$$

$$\log 2^9 = 9 \log 2$$

$$\log \left(\frac{10}{2}\right) = \log 10 - \log 2$$

$$= \frac{9 \times \log 2}{1 - 0.3010} = \frac{9 \times 0.3010}{1 - 0.3010}$$

$$= 3.878$$

~~for  $\Delta$  adequate~~

~~log s~~ ~~log (a)s~~ ~~log (a)s~~  
~~log s~~ ~~log a~~ ~~log (a)s~~

$$\log(\beta) \stackrel{?}{=} \log \beta$$

$$5 \log 8 = \log 8^5$$

$$\log \phi = \log 10^3$$

~~319923892~~

$\log(8^3)$

~~100 (2 3/4)~~

Sept 28

$$100 \cdot 12^2 - 100 \cdot 2^2$$

$$\frac{1}{2} \log 2 - \frac{1}{2} \log(2)$$

$$= \log \sqrt{8}$$

Aug 2

$$\frac{1}{2} \log(8) \approx 1.39$$

legs

∴  $\log 27 = 1.431$ , then  
the value of  $\log 9$  is

100274 1431

~~100(32) + 10131~~

$$\log 3 = 0.477$$

$$\log 3 = 3^{0.477}$$

$$\log 3 = \frac{1.47}{2}$$

$$\log 3 = 0.477$$

~~1099~~ 1099

$$\frac{1}{\log 3^2}$$

2 Log 3

24.0.477

~~0.954~~

$$4) \text{ If } \log_a b + \log_b a = \log(a+b) \\ \text{then.}$$

$$\log \left( \log \frac{a}{b} + \log \frac{b}{a} \right) = \log (a+b)$$

$$\log\left(\frac{a+b}{b-a}\right) = \log(b+a)$$

$$\log(1), \log(a+b)$$

Ques. Find the value of  $\log_2 x$

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$$\log_2 x = 10.$$

$$\log_{10} x = m \quad a^m = x.$$

$$2^{10} = x$$

$$\log_x 4 = 100$$

$$\log_2 10^4 = 100.$$

$$\log_a x = m$$
  
$$a^m = x$$
  
$$(2^{10})^{100} = x$$
  
$$2^{10 \times 100}, 1000 \times 40$$
  
$$0000 \times$$
  
$$\underline{+ 1000}$$
  
$$10000$$

P.M.C.P

Q) If the value of  $\log 3 = 0.477$   
then find the number of digits in

$$3^{36}$$

$$36 \log 3$$

$$36 \times 0.477$$

$$10^{2.5}$$

$$0.477 \times 36$$

$$2.862$$

$$14.31$$

$$3.5172$$

$$2.2 \dots$$

$$2.44 \dots$$

$$0.427 \times 36$$

$$12.862$$

$$14.31 \dots$$

$$17.172$$

Q) The value of  $\log_2 16^{15}$

$$\log_2 (2^4)$$

$$4 \log 2$$

$$4 \times 0.3010$$

$$1.2040$$

$$= 4$$

$$18 \times 18$$

$$114.4$$

$$18 \times$$

$$324$$

$$\log_x \left( \frac{5}{18} \right)^{-\frac{1}{2}}$$

$$x^{-\frac{1}{2}} = \frac{5}{18}$$

$$\log_x 5 - \log_x 18 = \frac{1}{2} \quad x = \left( \frac{5}{18} \right)^2$$

$$x = \frac{25}{324}$$

Q) The value of  $\log_3 27^{15}$

$$\log_3 3^3$$

$$3 \times \log 3$$

Evaluate the value of  $x$  in the  
Equation:  $\log_5 x + \log_5 2 = 3$

$$\log_5 x + \log_5 2 = 3$$

$$\log_{\frac{1}{5}}(x+2) = 3 \quad \begin{matrix} x+2 & \times 5 \\ x+2 & \times 5 \\ 125 & \end{matrix}$$

$$2x - 2x = 5^3$$

$$x = \frac{105}{2} = 52\frac{1}{2}$$

262-3

$$\log_3 x + \log_3 2 = 1$$

$$\log_3(\beta(x_{202})) = 1$$

$$\frac{\int_0^3 \log_2 x}{\int_0^3}$$

922 3'

$$\frac{22}{3}$$

$$\text{Solve for } x: \ln(2x+1) = 3$$

$$= 4 \log_9 \left( 3 \log_2 \left( 1 + \log_3 \left( 1 + 2 \log_2 x \right) \right) \right)$$

$$\log_9 \left( 3 \log_2 (1 + \log_3 (1 + 2 \log_2 x)) \right) = -4 \quad x = -2 \quad x = 5$$

$$\log_9(8\log_2(1+\log_3(1+2\log_2 x))) = \frac{3}{2}$$

Simple Interest  
 Principal  
 no years  
 $SI = P \times R \times t$

100

$$P=1000, n=1, r=20\%$$

$$SI = \frac{P \times R \times t}{100}$$

$$\frac{1000 \times 1 \times 20}{100} = 2000$$

$$NA = OA + Int$$

$$\begin{cases} 1000 + 200 \\ \searrow \\ \geq 1200 \end{cases}$$

Q) How much time will it take for an amount of Rs 450 to yield Rs 81 as interest at 4.5% annum of SI  
 briefly.

$$Interest = 81$$

$$Year = 4.5$$

$$P = 450$$

$$T = ?$$

$$S.I. = P \times R \times$$

$$100$$

$$\frac{81 \times 100}{100} =$$

$$81 \times 100 = 450 \times 4.5 \times n$$

$$8100 = 2250 \times n$$

$$81 = \frac{450 \times n \times 4.5}{100}$$

$$81 \times 200 = \frac{24300}{450} \times n$$

$$200$$

$$\frac{16000}{16200}$$

$$16200 = 4050n$$

$$= 1$$

$$4050n = 16200$$

$$\frac{16200}{4050} = 4$$

$$= 16200 - 4050$$

$$= 12150$$

$$= 12150 - 4050$$

$$= 8100$$

$$= 8100 - 4050$$

$$= 4050$$

$$= 4050 - 4050$$

$$= 0$$

$$= 0 - 0$$

$$= 0$$

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3) A sum of money at simple interest amounts to Re 815.00

3 years and to Rs. 854  
or in 4 years. The  
sum is

$$\text{S.I for 1 year} = \text{Rs } 894 - 815 = 89$$

$$S.I \text{ for } 3 \text{ years} = 39 \times 3$$

$$\begin{array}{r} \underline{815 - 117} \\ = 698 \end{array}$$

formula =

Long Account - Pt

Interes

815 - P+117

P-815-117

$$= 698$$

2) Adam fetched a  
tall glass with water

Total amount invested  
of Rs. 1016.00 at the

in Syria - what

is the Sun.

$$4016 \cdot 25 = \frac{P \times 9 \times 5}{100}$$

$$= \frac{812450 \times 7 \times 4.5}{2} = 4$$

$$= 0 \text{ km} - 0 \text{ kilometers} = 8100 =$$

Mr. Thomas invested an amount of Rs 13,900 divided in two different schemes A and B at the simple interest rates of  $11\frac{1}{2}\%$  p.a. and  $11\frac{1}{4}\%$  p.a. respectively. If the total amount of simple interest earned by him be Rs 350, what was the amount invested in Scheme B?

$$= 3508 = \left[ \frac{x \times 14 \times 2}{100} \right] + \left[ \frac{(13900 - x) \times 12}{100} \right]$$

$$3508 = \left[ \frac{x \times 14 \times 2}{100} \right] + \left[ \frac{(13900 - x) \times 12}{100} \right]$$

$$3508 = \left[ \frac{x \times 28}{100} \right] + \left[ \frac{(13900 - x) \times 22}{100} \right]$$

$$\begin{array}{rcl} 22x & 13900 \times 22 \\ 27800 & 27800 \\ \hline 12000 & 305800 \end{array}$$

$$\frac{50}{100}$$

$$3508 = \left( \frac{28x}{100} \right) + \left( \frac{305800 - 22x}{100} \right)$$

$$28x - 22x = 350800 -$$

$$R^2 = 36$$

$$R = \sqrt{36}$$

$$R = 6$$

~~260 43.00~~

16 Nov 2000	13000- 45 N. 4°	6 h bur P Pa 12,500 etc + Pa 15,000 in 4 years at the noted S. I. would be 44 &
-------------	--------------------	--

$$\frac{2500 - 2500 \cdot 14 + (13900 - 2)}{100} = 8 \text{ MA-DA} + 5 \cdot 5$$

$$\text{Is: } x = 28x + (1300 - x) \cdot 28 \quad \Rightarrow \quad x = 3000$$

100 S.I. Pmt

$$25000 = 20x + 12000 \times 22 - 22x$$

$$\begin{aligned} 220 - 220 &= 305800 - 350800 \quad 3000 \rightarrow 12000 \times 4 \times 7 \\ &= 245000 \end{aligned}$$

$$\Delta x = 45000 \quad 75$$

~~2-15006~~ 0.45000

~~1000~~ 2500

421  
30  
30

500Rs 3000

R. Todd

560

2.2 ~~for~~ B = 13900

~~7500~~

10

10) A man took loan from a bank at the rate of 12% p.a. S.I. After 3 years he had to pay Rs 5400

3) An automobile finance company lent only for the period the  
to be lending money at Principal amount borrowed  
8% p.a. but the individual to pay him was.  
Interest money after months  $5400 = \frac{P \times 3 \times 12}{100}$   
for calculating for Principal

With the addition of shipping on \$400000 = 3.6 P

Interest of 10% for 3 years 36P = 540000

## Notes on plant biology

$$P = \underline{3000000} \rightarrow 15000$$



$$33-50 = \frac{725 \times R}{100 \times 12} + \frac{36250 \times 5 \times R}{100 \times 12} \quad \text{RA} = 0A + S-I$$

$$350 = \frac{500 \times R}{1200} + 2900R$$

$$40200 = 8700R \quad | \frac{1}{4} - \frac{1}{3}$$

$$8700R = 40200 \quad | \cancel{R}, \cancel{3}$$

Here, original rate is for 1 year  
(i) ; the new rate is for  
only 4 months i.e.  $\frac{1}{3}$  years

$$\left[ \frac{725 \times R \times 1}{100} \right] + \left[ \frac{3625 \times R \times \frac{1}{3}}{100 \times 3} \right] - 2205 = 145040R$$

$$(2175 + 725)R = 3320 \times 100 \times \frac{1}{3}$$

$$(2175 + 725)R = 10050$$

$$(2900)R = 10050$$

$$R = \frac{10050}{2900} \times 3.46$$

original rate  
= 3.46%

$$12005 = 9800 + S-I$$

$$12005 - 9800 = S-I$$

$$12005 - 9800 = 37$$

$$12005 - 9800 = 2205$$

$$9800$$

$$2205$$

$$2205 = 2205 = 9800 \times 5 \times$$

$$2205 = \left[ \frac{9800 \times 5 \times R}{100} \right] +$$

$$12005 \times 8 \times R$$

$$100$$

$$220500 = 49000 + 96040$$

$$= 145040R$$

$$= 220500$$

$$145040$$

$$= 1.52\%$$

$$S-I \text{ for } 3 \text{ years} = 12005 - 9800$$

$$= 2205$$

$$S-I \text{ for } 3 \text{ years} = \frac{735}{235 \times 5} \times 2205$$

$$= 2.35$$

$$= 367.5$$

1) A sum of money amounts to Rs 9800 after 5 years  
and to Rs 12005 after 8 years  
at the same rate of S.I.

The rate of interest per  
annum is:

$$P \text{ for } 5 \text{ years} = \text{total mat} - S-I$$

$$9800 - 3675$$

$$= 6125$$

$$S-I = P \times R \times \frac{3675}{6125 \times 5 \times R}$$

$$100 \quad 100$$

$$367500 = 367500 \times 62.5R$$

Q) find the number of years the sum of Rs 1500 will take to grow into Rs 15000, if the rate of investment is 5% simple interest?

Ans:

$$\text{NA} = \text{OA} + \text{S.I}$$

$$15000 = 1500 + \frac{1500 \times 5 \times t}{100}$$

$$15000 - 1500 = 13500$$

$$= 13500$$

$$13500 = 1500 \times \frac{5 \times t}{100}$$

$$1350000 = 7500 \times t$$

$$285000n = 1350000$$

$$285000 \cancel{n} = 1350000$$

$$285000$$

$$285000 = 1350000$$

$$285000 \cancel{n} = 1350000$$

$$285000$$

$$11250$$

$$337500$$

$$675000$$

$$11250$$

$$5625$$

$$62500$$

$$337500$$

$$5625$$

$$1125$$

$$13500$$

$$675000$$

$$1125$$

$$225$$

$$2700$$

$$13500$$

$$225$$

45

~~$$\frac{900}{215}$$~~

$$\frac{900}{15}$$

$$60$$

~~$$\frac{900}{15}$$~~

$$\frac{900}{15}$$

$$15$$

$$1$$

$$900$$

60

9  
gup

6

3  
jdn

400

~~$$\frac{400}{2800}$$~~

$$\frac{400}{5000}$$

$$100$$

~~$$\frac{400}{4800}$$~~

$$8 \cdot 13 = 5200 \times 1 \times R$$

100

~~$$813 = 5200R$$~~

Q) Ashish lends Rs 20000 in four different parts if he gets 8% on Rs 4000, 7.5% on Rs 8000, and 8.5% on Rs 2800. Find the percentage he will receive on the remaining amount of the annual interest he gets is 8.13%?

3. And gave a smooth  
Bhakti file of your life  
also gave all 10000/-  
cheque for typhoid. The  
money he gave was on  
Simple interest and at  
similar interest rate.

The interest rate he received from both of them was also found to be the interest rate of previous

$$3060 = \left( \frac{7000 \times 2 \times 8}{100} \right) + \left( \frac{5000 \times 2 \times 12}{100} \right) \quad 100.50 = 100.50 - 8.00$$

$$206000 = 4000R^2 + 200R \quad | :2$$

$$\frac{306000}{341000} = \frac{158}{171} = \frac{51}{57}$$

$$\frac{6}{18} \times 10^6 = 315000$$

153

17

卷之三

comes two times the additional  
over. The total statement has  
been read, however, and the  
leave does stand as it was offered  
and the original statement.

(B-300)  $\left( \frac{17.05 \times 1.1}{100} \right) \left( \frac{131.0 \times 50}{100} \right)$

13 S-SON100M1725R1362-2014P

17292 + 545d<sup>o</sup>

三 7175R

5) A bank took loan @ 12%

13.22- sonly poly affers yearbook  
Rs.450.00 is intended to pay Rs.

5400 S.I, then find the  
Principal amount be

$$\frac{5400}{100} = \frac{P_{T E X S}}{75}$$

4) Re 1725 is given by  
Pratha on loan at  
the starting of a year at  
certain interest rate. She  
also gave Rs. 1302.50. ther  
friend after 4 months  
at this time the rate

find in how many years a person will get 87 as S.I at 4% p.a. on Rs 725

$$S.I = PIR$$

$$\frac{100}{1}$$

$$87 = \frac{725 \times 4 \times n}{100}$$

$$8900 = 2900n$$

$$2900 + 8900$$

$$= \frac{8900}{2900}$$

$$= 3$$

$$2 \overline{)2900}^3$$

$$2 \overline{)89}^9$$

$$\overline{87}$$

$$\overline{00}$$

$$2 \\ 8 \\ 8 \\ 2 \times 4$$

Calculate the S.I at 9% annually for the period from 21<sup>st</sup> August 1993 to 21<sup>st</sup> August 1994 on Rs 800.

21<sup>st</sup> August 1993

Given Principal = 80

P = 80  
Time = 1 year

$$S.I = \frac{PIR}{100}$$

$$= \frac{80 \times 1 \times 9}{100}$$

$$= 72$$

$$P = R = \sqrt{\frac{900}{16}}$$

$$R = \frac{30}{2} = \frac{15}{2}$$

$$\frac{15}{2}$$

1) The amount is its simple interest. Calculate

The annual interest period ; if both are equal

Period ; if both are equal

$$\left(\frac{P}{R}\right)^2 = \frac{P \times R \times R}{100}$$

$$\frac{9}{16} = \frac{P^2}{100}$$

$$900 = 16P^2$$

$$P^2 = 900$$

$$\frac{1}{16}$$

b) A certain amount was kept to acquire S.I for 2 years at some rate. Had it put at a higher rate of 3%, it would have made Re 72 more. calculate the sum

$$= 72 = \frac{P \times 2 \times 3}{100}$$

$$100$$

$$7200 = 6P$$

$$P = \frac{7200}{6}$$

10 A sum of money is changed to Rs 767 in 3 years and to Rs 806 in 4 years. Calculate the sum.

$$767 = P \left( 1 + \frac{R \times 3}{100} \right)$$

$$806 = P \left( 1 + \frac{R \times 4}{100} \right)$$

$$\frac{767}{806} = \frac{P \left( 1 + \frac{R \times 3}{100} \right)}{P \left( 1 + \frac{R \times 4}{100} \right)}$$

$$\frac{767}{100} \left( 1 + \frac{R}{100} \right) = \frac{806}{100} \left( 1 + \frac{4R}{100} \right)$$

$$\frac{767}{100} + \frac{767 \times 4R}{100} = \frac{806}{100} + \frac{806 \times 3R}{100}$$

$$\text{Rate} = \frac{100(n-1)}{100T} = \frac{100(9-1)}{20} = \frac{800}{20} = 40\%$$

The interest received at 15% per annum simple interest after 3 years is Rs 630. What was the principal?

$$630 = P \times \frac{3 \times 15}{100}$$

$$630 = P \times 6.75$$

$$P = \frac{6300}{6.75} = 900$$

9 gap	39	Total interest for 3 years
6 gap	<del>39</del> <del>39</del> <del>39</del> <del>39</del> <del>39</del> <del>39</del>	<del>39</del> <del>39</del> <del>39</del> <del>39</del> <del>39</del> <del>39</del>
3 gap	767 117 630	767 117 630
inter		
10 gap		

A sum of money becomes 9 times in 20 years. Find the 10 times of rate of interest.

According to the formula:

$$\text{Rate} = \frac{100(n-1)}{100T}$$

$$\frac{100(9-1)}{20} = \frac{800}{20} = 40\%$$

= 10 times of  $40\% / 400\%$

13 gap	1260. 6300.	1260. 6300.
13 gap	648 13 65	648 13 65
13 gap	13x5 13x2 13 81	13x5 13x2 13 81
13 gap	13x4 13x9 13 78	13x4 13x9 13 78
13 gap	13x8 13x7 13 890	13x8 13x7 13 890
13 gap	13x2 13 120	13x2 13 120