

Problem 1

If A and B complete a job working together in 20 days, B and C together in 15 days and C and A in 12 days, all three working together will be able to complete the same job in,

- a. 9 days
- b. 10 days
- c. 10.5 days
- d. 6 days

$$A+B+C \rightarrow \frac{1}{10}$$

fraction of work in 1 day.

$$A+B \rightarrow \frac{1}{20}$$

$$B+C \rightarrow \frac{1}{15}$$

$$C+A \rightarrow \frac{1}{12}$$

$$\frac{2(A+B+C) \rightarrow \frac{1}{20} + \frac{1}{15} + \frac{1}{12} = \frac{3+4+5}{60} = \frac{12}{60} = \frac{1}{5}}$$

Problem 2

If x is a prime number, the LCM of x and $(x + 1)$ is,

- a. x^2
- b. $(x + 1)^2$
- c. $\frac{x(x + 1)}{2}$
- d. $x(x + 1)$

5,6 7,8 11,12

Problem 3

$\left(2 - \frac{1}{3}\right) \left(2 - \frac{3}{5}\right) \left(2 - \frac{5}{7}\right) \dots \left(2 - \frac{999}{1001}\right)$ is equal to,

- a. $\frac{1003}{3}$
- b. $\frac{999}{1001}$
- c. $\frac{1001}{3}$
- d. None of these

$$2 - \frac{1}{3} = \frac{6-1}{3} = \frac{5}{3}$$

$$2 - \frac{999}{1001} = \frac{2002-999}{1001}$$

$$2 - \frac{3}{5} = \frac{10-3}{5} = \frac{7}{5}$$

$$= \frac{1003}{1001}$$

$$2 - \frac{5}{7} = \frac{14-5}{7} = \frac{9}{7}$$

$$\frac{\cancel{5}}{\cancel{3}} \times \frac{\cancel{7}}{\cancel{5}} \times \frac{\cancel{9}}{\cancel{7}} \times \dots \times \frac{\cancel{1001}}{\cancel{1001}} = \frac{1003}{3}$$

Problem 4

The value of $\frac{\sqrt{32} + \sqrt{48}}{\sqrt{8} + \sqrt{12}}$ is,

- a. 2
- b. 4
- c. $\sqrt{2}$
- d. 8

$$\sqrt{32} = \sqrt{2^5} = (2^5)^{1/2} = 2^{5/2} = 2^2 \cdot 2^{1/2} = 4\sqrt{2}$$

$$\sqrt{48} = \sqrt{16 \times 3} = 4\sqrt{3}$$

$$\sqrt{8} = 2\sqrt{2}$$

$$\sqrt{12} = \sqrt{4 \times 3} = 2\sqrt{3}$$

$$\frac{4\sqrt{2} + 4\sqrt{3}}{2\sqrt{2} + 2\sqrt{3}} = \frac{4(\sqrt{2} + \sqrt{3})}{2(\sqrt{2} + \sqrt{3})} = 2$$

Problem 5

The difference between the squares of two consecutive even integers is always divisible by,

- a. 3
- b. 4
- c. 6
- d. 7

any even integer = $2n$ where n is an integer

$$2n, 2n+2$$

$$(2n+2)^2 - (2n)^2$$

$$= 4n^2 + 8n + 4 - 4n^2 = 8n + 4 = \underset{\uparrow}{4}(2n+1)$$

Problem 6

The least number which when divided by 15, 27, 35, and 42 leaves a remainder of 7 in each division is,

- a. 1883
- b. 2007
- c. 1897
- d. 1987

$$N = 15 \times Q_1 + 7$$

$$N - 7 = 15 \times Q_1$$

$$N = 27 \times Q_2 + 7$$

$$N - 7 = 27 \times Q_2$$

$$N = 35 \times Q_3 + 7$$

$$N - 7 = 35 \times Q_3$$

$$N = 42 \times Q_4 + 7$$

$$N - 7 = 42 \times Q_4$$

$$15 = 3 \times 5$$

$$27 = 3^3$$

$$35 = 5 \times 7$$

$$42 = 2 \times 3 \times 7$$

$$\text{LCM} = 2 \times 3^3 \times 5 \times 7$$

$$= 27 \times 7 \times 10$$

$$= 189 \times 10 = \underline{1890}$$

$$N - 7 = \text{LCM}(15, 27, 35, 42)$$

$$N = \text{LCM}(15, 27, 35, 42) + 7$$

Problem 7

$\left(\frac{243}{32}\right)^{-\frac{4}{5}}$ is equal to,

- a. $\frac{81}{16}$
- b. $\frac{16}{81}$
- c. $\frac{2}{9}$
- d. $\frac{9}{2}$

$$243 = 3^5$$

$$32 = 2^5$$

$$\left(\frac{3^5}{2^5}\right)^{-\frac{4}{5}} = \left(\frac{3}{2}\right)^{5 \times \left(-\frac{4}{5}\right)} = \left(\frac{3}{2}\right)^{-4} = \left(\frac{2}{3}\right)^4 = \frac{16}{81}$$

$$x^{-a} = \frac{1}{x^a}$$

Problem 8

$\sqrt{248 + \left(\frac{\sqrt{52 + \sqrt{144}}}{64}\right)}$ is equal to,

- a. 16.6
- b. 16
- c. 14
- d. 18.8

$$\sqrt{144} = 12$$

$$52 + 12 = 64$$

$$\sqrt{64} = 8$$

$$248 + 8 = 256$$

$$\sqrt{256} = 16$$

Problem 9

The ratio of cost price to sale price is 20 : 23. What is the profit percentage?

- a. 20%
- b. 15%
- c. 5%
- d. 6%

$$CP \rightarrow 20x \quad SP \rightarrow 23x$$

$$\text{Profit} = SP - CP = 3x$$

$$\text{Profit \%} = \frac{\text{Profit}}{CP} \times 100 = \frac{3x}{20x} \times 100 = 15\%$$

Problem 10

$\sqrt[3]{0.000216}$ is equal to,

- a. 0.6
- b. 0.006
- c. 0.06
- d. 0.0006

$$0.000216 = \frac{216}{10^6} = \frac{6^3}{10^6}$$

$$\sqrt[3]{0.000216} = \left(\frac{6^3}{10^6}\right)^{1/3} = \frac{6^{3 \times 1/3}}{10^{6 \times 1/3}} = \frac{6}{10^2} = \frac{6}{100} = 0.06$$

Question 1

There is a 25% profit if an article is sold at Rs.150. At what percent should the selling price be increased so that there will be 30% profit?

- a. 10%
- b. 2.5%
- c. 4%
- d. 5%

$CP = 120$ $SP = 150$ Profit % = 25%
 $SP = \left(1 + \frac{30}{100}\right) \times 120$
 $= \frac{130}{100} \times 120 = 156$
 % increase = $\frac{156 - 150}{150} \times 100 = \frac{6}{150} \times 100 = 4$

$SP = \left(1 + \frac{\text{Profit \%}}{100}\right) CP$
 $150 = \left(1 + \frac{25}{100}\right) CP$
 $150 = \frac{125}{100} CP$
 $CP = \frac{150 \times 100}{125} = 120$

Question 2

The ratio of principal and the final amount (principal plus interest) in 1 year is 8 : 9. Then the rate of simple interest per annum is,

- a. $11\frac{1}{2}\%$
- b. $10\frac{1}{2}\%$

$$P = 8x \quad A = 9x = P + I$$

- a. $11\frac{1}{2}\%$
- b. $10\frac{1}{2}\%$
- c. $12\frac{1}{2}\%$
- d. $13\frac{1}{2}\%$

$$P = 8x \quad A = 9x = P + I$$

$$9x = 8x + I$$

$$I = x$$

$$\text{rate} = \frac{I}{P} \times 100 = \frac{x}{8x} \times 100 = 12\frac{1}{2}\%$$

Question 3

A sum of money doubles itself in 8 years at some rate of interest. In how many years would it treble itself?

- a. 12 years
- b. 16 years
- c. 14 years
- d. 15 years

$$P \xrightarrow{8 \text{ yrs.}} 2P \rightarrow \text{Amount} = P + I$$

$$I = 2P - P = P$$

$$P \rightarrow 3P \quad A = 3P \quad P + I = 3P$$

$$I = 2P$$

$$2P \rightarrow 16 \text{ yrs}$$

Question 4

Three friends P, Q and R started a business with the capitals of Rs.15000, Rs.10000 and Rs.25000 respectively. But at the end of the year, they suffer a loss of Rs.2500. How much each have to pay for the loss?

- a. Rs.500, Rs.750, and Rs.1000
- b. Rs.500, Rs.750, and Rs.1150
- c. Rs.1000, Rs.500, and Rs.700
- d. Rs.750, Rs.500, and Rs.1250

Profit/loss is shared based on the ratio of the investments.

P	Q	R
15	10	25
3	2	5
$\frac{3}{10} \times 2500$	$\frac{2}{10} \times 2500$	$\frac{5}{10} \times 2500$
750	500	1250

Question 5

What least number must be subtracted from 732 to make the remainder a perfect square?

- a. 6
- b. 5
- c. 4
- d. 3

$$\begin{array}{lll}
 11^2 = 121 & 12^2 = 144 & 13^2 = 169 \\
 14^2 = 196 & 15^2 = 225 & 16^2 = 256 \\
 17^2 = 289 & 18^2 = 324 & 19^2 = 361 \\
 20^2 = 400 & 21^2 = 441 & 22^2 = 484 \\
 23^2 = 529 & 24^2 = 576 & 25^2 = 625 \\
 26^2 = 676 & \boxed{27^2 = 729} & 28^2 = 784 \\
 29^2 = 841 & 30^2 = 900 & 31^2 = 961 \\
 32^2 = 1024
 \end{array}$$

Question 6

When price of rice increases by $12\frac{1}{2}\%$, a man can get 250 gm less rice for Rs.18. Find the present cost of rice per kg.

- a. Rs.7
- b. Rs.7.50
- c. Rs.8
- d. Rs.9

$Rx/kg \rightarrow x \rightarrow x + \frac{1}{8}x = \frac{9}{8}x$
 $Rx \rightarrow 1kg$
 $Rx1 \rightarrow \frac{1}{2}kg$
 $Rx18 \rightarrow \frac{18}{x}kg$

$50\% \rightarrow \frac{1}{2}$
 $25\% = \frac{1}{4}$
 $12.5\% = \frac{1}{8}$

$\frac{18}{\frac{9}{8}x}kg = \frac{18 \times 8}{9x}kg = \frac{16}{x}kg$

$\frac{18}{x} - \frac{16}{x} = 0.25 = \frac{1}{4} \quad \frac{2}{x} = \frac{1}{4} \quad x = 8$

Question 7

The expenses of rice, fish and oil of a family are in the ratio 12 : 17 : 3. The prices of these items are increased by 20%, 30% and 50% respectively. By what percent the total expenses for these items of the family will be increased?

- a. $27\frac{1}{7}\%$
- b. $27\frac{1}{8}\%$
- c. $29\frac{1}{8}\%$
- d. $28\frac{1}{8}\%$

$20\% \times 12 = \frac{20}{100} \times 12 = 2.4$
 $10\% \text{ of a no} = \frac{no}{10}$
 $10\% \text{ of } 12 = 1.2$

	R	F	O	Total
Present	$12x$	$17x$	$3x$	$32x$
Increased Price	$14.4x$	$22.1x$	$4.5x$	$41x$
Increase				$9x$
% inc				$\frac{9}{32} \times 100 = 28\frac{1}{8}\%$

Question 8

A man saves 20% of his income. If his expenses be increased by 35%, by what percent his income is to be raised so that he can save 10% of his income?

- a. 20%
- b. 25%
- c. 22%
- d. 30%

$\frac{7}{35} \times \frac{4}{80} = \frac{28}{2800}$

$Income = 100$
 $\downarrow \quad \uparrow$
 $x = 120$

$Save = 20$
 $Exp = 80$
 $+28$
 $\hline 108$
 \downarrow
 $10\% x$

A man saves 20% of his income. If his expenses be increased by 55%, by what percent his income is to be raised so that he can save 10% of his income?

- a. 20%
- b. 25%
- c. 22%
- d. 30%

$$\frac{7}{25} \times \frac{4}{80} = \frac{28}{200} = 14\%$$

Income = 100
 $x = 120$

Save = 20

Exp = 80
 $+28$

 108
 \downarrow
 $90\% x$

$90\% x = 108$
 $x = \frac{108}{0.9} = 120$

Question 9

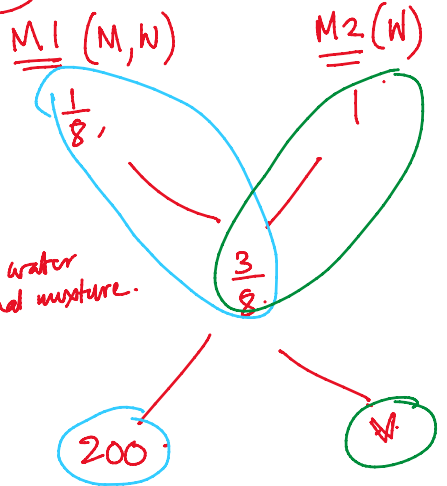
A mixture of milk and water contains $12\frac{1}{2}\%$ of water. How much water should be added to 200 gallons of such mixture so that the new mixture may contain $37\frac{1}{2}\%$ of water?

- a. 100 gallons
- b. 80 gallons
- c. 70 gallons
- d. 60 gallons

$12.5\% = \frac{1}{8}$

$37.5\% = \frac{3}{8}$

% or fraction of water



fraction of water in final mixture.

$$200 \left(\frac{3}{8} - \frac{1}{8} \right) = V \left(1 - \frac{3}{8} \right)$$

$$200 \times \frac{2}{8} = V \times \frac{5}{8} \quad V = \frac{400}{5} = 80 \text{ Vol}$$

Question 10

A retailer getting a discount of 20% on marked price sells an article at the marked price. Percentage profit of the retailer is,

- a. 30
- b. 10
- c. 20
- d. 25

MP = 100

CP of retailer = 80

SP " " = 100

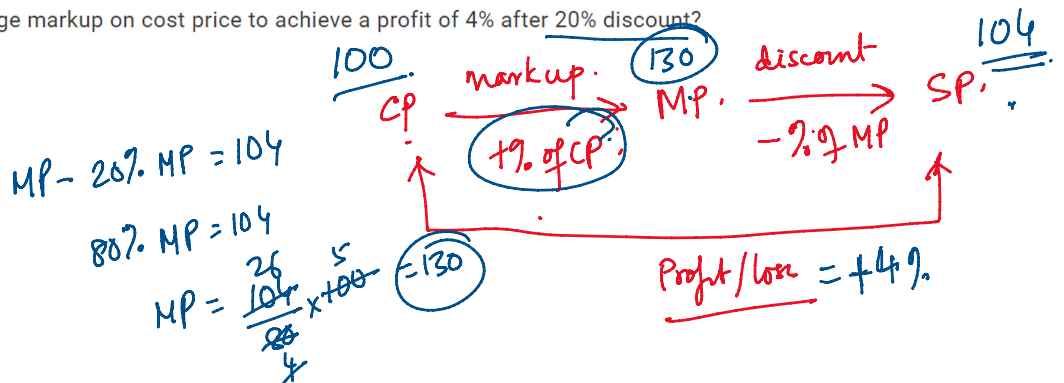
Profit = 20

% profit = $\frac{20}{80} \times 100 = 25\%$

Problem 1

What will be the percentage markup on cost price to achieve a profit of 4% after 20% discount?

- a. 10%
- b. 35%
- c. 25%
- d. 30%



Problem 2

In a 200 litre solution of sugar fully dissolved in water, sugar is 20%. On heating for a while the solution gets more concentrated with sugar percentage increasing to 80% of the solution. What is the volume of water that evaporated?

- a. 140 litre
- b. 150 litre
- c. 130 litre
- d. 100 litre

$$\begin{aligned} S + W &= 200 \text{ lit.} \\ \text{Sugar} &= 20\% \times 200 = 40 \text{ gm} \\ 80\% \times V &= 40. \\ V &= \frac{40}{80} \times 100 = 50 \end{aligned}$$

Problem 3

At what time between 1 O'clock and 2 O'clock both minute hand and hour hand will be together?

- a. $5\frac{6}{11}$ minutes past 1 O'clock
- b. $5\frac{4}{11}$ minutes past 1 O'clock
- c. $5\frac{5}{11}$ minutes past 1 O'clock
- d. $5\frac{3}{11}$ minutes past 1 O'clock

Problem 4

The simple interest over 2 years at a certain interest rate on a certain amount is Rs. 2400. If the difference between the compound interest compounded annually at same rate over same period on same amount, and the simple interest be Rs. 138, what is the percentage interest rate per annum?

- a. 13.5%
- b. 10.5%
- c. 12.5%
- d. 11.5%

Problem 5

A basketful of oranges are counted in pairs, in 3s and in 5s, and every time one orange is left over. The least number of oranges in the basket is,

- a. 31
- b. 41
- c. 61
- d. 51

Problem 6

HCF of $\frac{12}{13}$ and $\frac{3}{5}$ is,

- a. 3
- b. 12
- c. $\frac{12}{65}$
- d. $\frac{3}{65}$

Problem 7

Two rational numbers lying between $\frac{4}{5}$ and $\frac{6}{7}$ are,

- a. $\frac{29}{35}, \frac{62}{70}$
- b. $\frac{28}{34}, \frac{35}{39}$
- c. $\frac{29}{35}, \frac{5}{6}$
- d. $\frac{65}{84}, \frac{5}{6}$

Problem 8

What is the unit's digit of the product of all the prime numbers between 10 and 30?

- a. 7
- b. 9
- c. 3
- d. 1

Problem 9

Present ages (in years) of Romi and Runu are in the ratio of 5 : 6. Three years ago their ages were in the ratio 9 : 11. What will the ratio of their ages after 6 years from now?

- a. 6 : 7
- b. 1 : 2
- c. 7 : 8
- d. 3 : 4

Problem 10

Inlet pipes A and B can fill a tank independently in 15 mins and 12 mins respectively. If both are opened simultaneously and B is closed after 3 mins how much more time will A take to fill the tank?

- a. 6 mins
- b. 8 mins 15 secs
- c. 10 mins 30 secs
- d. 9 mins 15 secs