WORKSHOP FOR FINAL YEAR MGNMR COLLEGE STUDENTS

DOCUMENT ON APTITUDE, LOGICAL REASONING, COMMUNICATION SKILLS & COMPUTER BASICS

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Aptitude Content

Compound Interest

As we know that when we borrow some money from bank or any person, then we have to pay some extra money at the time of repaying. This extra money is known as **Interest.** If interest accrued on principal, it is known as Simple Interest. Sometimes, it happens that we repay the borrowed money bit late. After the completion of a specific period, interest is accrued on the principal as well as the interest due on the principal. This interest is known as **Compound Interest (CI).**

- Compound Interest (CI) = Amount (A) – Principal (P)
- The amount at the end of each year becomes the principal for the next year.
- In this case of simple interest, the principal remains constant for the whole time but in case of compound interest, principal keeps on changing every year.

Basic Formulae Related to Compound Interest

Let principal = P, rate = R% per annum and time = n yr.

1. If the interest is compounded annually, then

$$\text{Amount} = P\left(1+\frac{R}{100}\right)^{n}$$

Also, compound interest = Amount (A) – Principal (P)

(or) $$CP = P\left(\left(1+\frac{R}{100}\right)n-1\right)$$

2. If the interest is compounded half – yearly, then R = $\left(\frac{R}{2}\right)$ and n =2n

$\therefore$ $$\text{Amount} = P\left(1+\frac{R}{2\ X\ 100}\right)^{2n}$$

3. If the interest is compounded quarterly, then R = $\left(\frac{R}{2}\right)$ and n =4n

$\therefore$ $$\text{Amount} = P\left(1+\frac{R}{4\ X\ 100}\right)^{4n}$$

4. If the interest is compounded annually but time is in fraction (suppose time = n $\frac{a}{b}$ yr), then

$$\text{Amount} = P\left(1+\frac{R}{100}\right)^{n} X \left(1+\frac{(\frac{a}{b})R}{100}\right)$$

5. If the rates of interest are R_1 % R_2 % and R_3 % for 1st, 2nd , 3rd yr respectively, then

$$\text{Amount} = P\left(1+\frac{R1}{100}\right)\left(1+\frac{R2}{100}\right)\left(1+\frac{R3}{100}\right)$$

Ex: 1 Find the compound interest on ₹ 8000 at 4% per annum for 2 yr, compounded annually.

Sol. Given that, principal (P) = ₹ 8000, rate (R) = 4% and time (n) = 2 yr

Now, according to the formula,

$$\text{Amount} = P\left(1+\frac{R}{100}\right)^{n} = 8000\left(1+\frac{4}{100}\right)^{2}$$

$$= 8000 \text{ X } \frac{26}{25} \text{ X } \frac{26}{25}$$

$$= ₹ 8652.80$$

∴ Compound Interest (CI) = Amount – Principal $= ₹ 8652.80 - ₹ 8000$

$$= ₹ 652.80$$

Ex: 2 Ruchi invested ₹ 1600 at the rate if compound interest for 2 yr. She got ₹ 1764 after the specified period. Find the rate of interest.

Sol. Given that, P = ₹ 1600, n = 2 yr and A = ₹ 1764

Now, according to the formula,

$$\text{Amount} = P\left(1+\frac{R}{100}\right)^{n}$$

$$1764 = 1600\left(1+\frac{R}{100}\right)^{2}$$

$\frac{1764}{1600} = \left(\frac{100+R}{100}\right)^2$ => $= \frac{441}{400} = \left(\frac{100+R}{100}\right)^2$

$= \left(\frac{21}{20}\right)^2$ $= \left(\frac{100+R}{100}\right)^2$

$\frac{100+R}{100} = \frac{21}{20}$

$100 + R = \frac{21}{20} \times 100$

$100 + R = 105$

∴ $R = 105 - 100 = 5\%$

Ex: 3 Find the compound interest on ₹ 5000 in 2 yr at 4% per annum, if the interest being compounded half – yearly.

Sol. Given that, Principal (P) = ₹ 5000, rate (R) = 4% per annum and time (n) = 2yr

Now, according to the formula,

∴ $\text{Amount} = P\left(1 + \frac{R}{2\ X\ 100}\right)^{2n}$

$= 5000\left(1 + \frac{4}{200}\right)^{4n}$

$= 5000 \times \frac{51}{50} \times \frac{51}{50} \times \frac{51}{50} \times \frac{51}{50}$

$= \frac{51X51X51X51}{1250} = ₹\ 5412.16$

∴ CI = A – P = 5312.16 – 5000 = ₹ 412.16

Ex: 4 Find the compound interest on ₹ 8000 at 20% per annum, for 9 months, compounded quarterly.

Sol. Given that, P = ₹ 8000 , n = 9 months = ¾ yr and R = 20% per annum

According to the formula,

∴ $\text{Amount} = P\left(1 + \frac{R}{4\ X\ 100}\right)^{4n}$

$= 8000\left(1 + \frac{20}{400}\right)^{3/4 \times 4}$ $= 8000\left(1 + \frac{5}{100}\right)^{3}$

$= 8000 \times \frac{21}{20} \times \frac{21}{20} \times \frac{21}{20}$

$= ₹\ 9261$

∴ CI = 9261 – 8000 = ₹ 1261

Ex: 5 What sum of money at compound interest will amount to ₹ 4499.04 in 3 yr, if the rate of interest is 3% for the 1st yr, 4% for the 2nd yr and 5% for the 3rd yr ?

Sol. Given that, A = ₹ 4499.04, R_1 = 3%, R_2 = 4% , and R_3 = 5%, P = ?

Now, according to the formula,

$$\text{Amount} = P\left(1+\frac{R1}{100}\right)\left(1+\frac{R2}{100}\right)\left(1+\frac{R3}{100}\right)$$

$$4499.04 = P\left(1+\frac{3}{100}\right)\left(1+\frac{4}{100}\right)\left(1+\frac{5}{100}\right)$$

4499.04 = P (1.03) (1.04) (1.05)

$$\therefore \quad P = \frac{4499.04}{1.03\ X\ 1.04\ X\ 1.05} = \frac{4499.04}{1.12476}$$

= ₹ 4000

Instalments

When a borrower pays the sum in parts, then we say that he/she is paying in instalments II

$$\therefore \quad P = \left([x/(1+\frac{R}{100})] + [x/\left(1+\frac{R}{100}\right)^2] + [x/\left(1+\frac{R}{100}\right)^3] + \cdots + [x/\left(1+\frac{R}{100}\right)^n]\right)$$

Where, x = Value of each instalment

Total amount paid in n instalments, $A = P\left(1+\frac{R}{100}\right)^n$ n= Number of instalments

Ex: 6 Sapna borrowed some money on compound interest and returned it in 3 yr in equal annual instalments. If rate of interest is 15% per annum and annual instalment is ₹ 486680, Then find the sum borrowed.

Sol. Given that, rate of interest, R = 15% per annum

Annual instalment, x = ₹ 486680

And total number of instalments, n = 3

$$\therefore \quad P = \left([x/(1+\frac{R}{100})] + [x/\left(1+\frac{R}{100}\right)^2] + [x/\left(1+\frac{R}{100}\right)^3]\right)$$

$$= x\left([100/(100+R)] + [(100)^2/(100+R)^2] + [(100)^3/(100+R)^3]\right)$$

$= 486680\ ([100/(100+15)] + [(100)^2/(100+15)^2] + [(100)^3/(100+15)^3])$

$= 486680\ X \left(\frac{20}{23} + \left(\frac{20}{23}\right)^2 + \left(\frac{20}{23}\right)^3\right)$

$= 486680\ X \frac{20}{23}\left(1 + \frac{20}{23} + \frac{400}{529}\right)$

$= 486680\ X \frac{20}{23}\left(\frac{529+460+400}{529}\right)$

$= 486680\ X \frac{20}{23}\ X \frac{1389}{529}$

$= ₹\ 1111200$

Hence, the principal borrowed is = ₹ 1111200.

Technique 1

(i) Different between CI and SI for 2 yr, D= P $\left(\frac{R}{100}\right)^2 = \frac{SI\ X\ R}{200}$

(or) CI – SI = SI X $\frac{R}{100}$ => CI = SI $\left(1 + \frac{R}{100}\right)$

(ii) Different between CI and SI for 3 yr, D = P $\left(\frac{R}{100}\right)^2 \left(\frac{R}{100} + 3\right)$

- SI and CI for one year on the same sum and at same rate are equal.

Ex: 7 The difference between compound interest and simple interest for 2 yr at rate of 5% per annum is ₹ 5, then find the sum.

Sol. Given that, D=CI – SI = ₹ 5 , rate (R) = 5%

D= P $\left(\frac{R}{100}\right)^2$ $(P = 2000)$

Technique 2 If a certain sum at compound interest becomes x times in n_1 yr and y times is n_2 yr, then $x^{1/n1} = y^{1/n2}$.

Ex: 8 If a certain sum at compound interest becomes double in 5 yr, then in how many years, it will be 16 times at the same rate of interest?

Sol.

Here, n_1 = 5 yr, x = 2, y = 16 and n_2 = ?

According to the formula,

$= x^{1/n1} = y^{1/n2} \Rightarrow 2^{1/5} = 16^{1/n2}$

$= 2^{1/5} = (2)^{4X\,1/n2} = \frac{1}{5} = \frac{4}{n2}$

$= n_2 = 5 X 4 = 20$ yr

Technique 3 If a certain sum at compound interest becomes A_1 in n yr and A_2 in (n +1) yr, then

(i) Rate of Compound Interest = $\frac{(A2 - A1)}{A1}$ x 100%

(ii) Sum = $A1 \left(\frac{A1}{A2}\right)^n$

Ex: 9 A sum of money invested at compound interest amounts to ₹ 800 in 2 yr and ₹ 840 in 3 yr. Find the rate of interest per annum and the sum.

Sol. Amount of 2 yr (A_1) = 800, amount of 3 yr (A_2) = 840, n_1 = 2 and $n_2 = n_1 + = 3$

Here, A_1 = ₹ 800 and A_1 = ₹ 840

According to the formula,

Rate of compound interest = $\frac{A1 - A2}{A1}$ X 100%

$= \frac{800 - 840}{800}$ X 100%

$= \frac{40}{8}$ % = 5%

And Sum = $A1 \left(\frac{A1}{A2}\right)^n$

$= 800 \left(\frac{800}{840}\right)^2$

$= 800\ X\ \frac{800}{840}$ X $\frac{800}{840} = \frac{320000}{441}$

= ₹ 725.62

Problems Based on Ages

Age is defined as a period of time that a person has lived or a thing has existed. Age is measured in **months, years, decades and so on.**

Problem based on ages generally consists of information of ages of two or more persons and a relation between their ages in **present/future/past**. Using the information, it is asked to calculate the ages of one or more persons in **present/future/past**.

Important Rules for Problems Based on Ages

Rule 1

If the ratio of present ages of A and B is x : y and n yr ago, the ratio of their ages was p : q, then

$\frac{kx-n}{ky-n} = \frac{p}{q}$, where k is a constant.

Ex: 1 The ratio of the ages of A and B at present is 3:1. Four years earlier, the ratio was 4:1. Find the present age of A.

Sol. Let the present ages of A and B be 3 x yr and x yr, respectively.

Now, 4 yr ago, age of A = $(3x - 4)$ yr

And age of B = $(x - 4)$ yr

According to the question,

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

$$= 3x - 4 = 4x - 16$$

$$= 4x - 3x = -4 + 16$$

$$x = 12$$

∴ Present age of A = 3 x = 3 X 12 = 36 yr

Rule 2

If the ratio of present ages of A and B is x : y and after n yr ago, the ratio of their ages was p : q, then

$\frac{kx+n}{ky+n} = \frac{p}{q}$, where k is a constant.

Ex: 2 At present, the ratio of the ages of Maya and Chhaya is 6:5 and fifteen years from now, the ratio will get changed to 9:8. Find the present age of Maya.

Sol. Let the present ages of Maya and chhaya be 3 x yr and x yr, respectively.

According to the questions,

After 15 yr, = $\frac{6x+15}{5x+15} = \frac{9}{8}$

$= 48x + 120 = 45x + 136$

$3x = 15 \Rightarrow x = 5$

∴ Hence, present age of Maya = 5 X 6 = 30 yr

Mind IT!

Mostly questions on ages can be solved with the use of linear equations. So, the method to solve linear equations is important for this chapter which is discussed in chapter equations.

Technique 1 If t yr after, age of one person is n times the age of another person and at present the age of first person is m times the ages of another person, then

Age of first person =tm $(\frac{n-1}{m-n})$ yr

And age of second person = t $(\frac{n-1}{m-n})$ yr

Ex 3 The present age of Karan is 5 times the age of Shivam. After 10 yr, Karan will be 3 times as old as shivam. What are the present ages of Karan and Shivam?

Sol.

Here, t = 10, m = 5, and n = 3

Karan's present age =tm $(\frac{n-1}{m-n})$ yr = 20 yr

Shivam's present age = t $(\frac{n-1}{m-n})$ yr = 10 yr

Technique 2 If t_1 yr before, age of a person was m times the age of another person. After t_2 Yr, age of a person will be n times the age of second person, then

$$\text{Age of first person} = \frac{t2\ m\ (n-1)+ t1\ n\ (m-1)}{m-n} \text{ yr}$$

And $$\text{Age of second person} = \frac{t2\ (n-1)+ t2\ (m-1)}{m-n} \text{ yr}$$

Ex 4 Mukesh he told his granddaughter Sailee that five years earlier, he was seven times as old as she was. After 15 yr, he will be thrice as old as she will be. Find the sum of their present ages.

Sol.

Here, t_1 = 5, m = 7, t_2 = 12 and n = 3

∴ Mukesh's age = $\frac{t2\ m\ (n-1)+ t2\ n\ (m-1)}{m-n}$

$$= \frac{15\ x\ 7\ (3-1)+ 15\ x\ 3(7-1)}{7-3} = \frac{300}{4} = 75 \text{ yr}$$

And Sailee's age = $\frac{t2\ (n-1)+ t2\ (m-1)}{m-n}$

$$= \frac{15\ (3-1)+ 15\ (7-1)}{7-3} = \frac{60}{4} = 15 \text{ yr}$$

∴ Sum of their present ages = 75 + 15 = 90 yr

Technique 3 If M is as elder to N as he is younger to P and sum of ages of N and P is t yr, N < M <P, then

$$\text{M 's age} = \frac{Sum\ of\ ages\ of\ N\ and\ P}{2} = \frac{S}{2}, \text{ where S = Sum.}$$

Ex 5 If Akshaya is as much elder than Vinay as he is younger to Karthik and sum of ages of Vinay and Karthik is 48 yr, then find the age of Akshya.

Sol.

Present age of Akshay = $\frac{Sum\ of\ ages}{2}$

$= \frac{48}{2}$ = 24yr

Profit and Loss

Profit and loss are the terms related to monetary transactions in trade and business. Whenever a purchased article is sold, then either profit is earned or loss in incurred.

Cost Price (CP) The price at which an article is purchased or manufactured, is called the cost price.

Selling Price (SP) The price at which an article is sold, is called the selling price.

Overhead Charges Such charges are the extra expenditures on purchased goods apart from actual cost price. Overhead charges include freight charges, rent, salary of employees, repairing cost on purchased articles etc.

- If the overhead charges are not specified in the question, then they are not considered.

Profit (SP > CP) When an article is sold at a price more than its cost price, then profit or gain is earned.

Loss (CP > SP) When an article is sold at a price lower than its cost price, then loss is incurred.

Basic Loss Formulae Related to Profit and Loss

1. Profit or gain = SP – CP	**2.** Loss = CP-SP
3. Gain % = [Gain(G)/CP] X 100%	**4.** Loss % = [Loss (L)/CP] X 100%

5. SP = $\{(100 + Gain\ \%)/100\}$ X CP
6. SP = $\{(100 + Loss\%)/100\}$X CP
7. CP = $\{100/(100 + Gain\ \%)\}$ X SP
8. CP = $\{100/(100 - Loss\%)\}$ X SP

MIND IT!

1. Profit and loss percentage are always calculated on cost price unless otherwise stated in the question.
2. If an article is sold at a certain gain (say 45%), the SP = 145% of CP
3. If an article is sold at a certain loss (say 25%), then SP = 75% of CP

Ex: 1 A man buys an article for ₹ 300 and sells it for ₹ 900. Find profit/loss.

Sol. Here, SP > CP

∴ Profit is earned.

According to the formula,

Profit = SP – CP = 900 – 300 = ₹ 600

Ex: 2 Raman purchased a car for ₹5 lakh and sold it for ₹4 lakh. Find profit/loss in this transaction.

Sol. Here, SP < CP

∴ Loss is incurred in this case.

According to the formula,

Loss = CP – SP = (5-4) lakh = ₹ 1 lakh

Ex: 3 A person buys a toy for ₹50 and sells it for ₹75. What will be his gain per cent?

Sol. Given, CP = ₹50 and SP = 75

∴ Gain = SP- CP = 75-50= Rs 25

According to the formula,

Gain % = $\frac{Gain}{CP}$ X 100% = $\frac{25}{50}$ X 100% = 50%

Ex: 4 A person buys a cycle for ₹450 but because of certain urgency, he sells it for ₹350. Find his loss per cent.

Sol. Given, CP = ₹ 540 and SP = ₹ 350

∴ Loss = CP – SP = 450 – 350 = ₹ 100

According to the formula,

Loss% = $\frac{Loss}{CP}$ X 100% = $\frac{100}{450}$ X 100% = $\frac{200}{9}$ % = $22\frac{2}{9}$ %

Ex: 5 Find the SP, when CP is ₹80 and gain is 20%.

Sol. Given, CP = ₹ 80 and gain = 20%

∴ SP = $\{(100 + Gain\ \%)/100\}$ X CP

= $[(100 + 20)/100)]$ X 80

= $\frac{120}{100}$ X 80 = 12 X 8 = ₹ 96

Fast Track Techniques to solve the Question

Technique 1 If a person sells two different articles at the same selling price, one at a gain of a% and another at a loss of a%, then the seller always incurs a loss which is given by

Loss % = $(a/10)^2$%

- In this case, SP is immaterial.

Ex 1 A man sold two radios for ₹2000 each. On one he gains 16% and on the other he losses 16%. Find his gain or loss per cent in the whole transaction.

Sol. Here, a = 16%

According to the formula,

Loss = $(a / 10)^2$ %

= 2.56%

Technique 2 If a path of some items is sold at χ% loss, then required gain per cent in selling rest of the items in order that there is neither gain nor loss in whole transaction, is $\frac{ax}{1-a}$ %.

Ex 2 A medical store owner purchased medicines worth ₹6000 from a company. He sold 1/3 part of the medicine at 30% loss. On which gain he sold sell his rest of the medicines, so that he has neither= gain nor loss?

Sol. Given, a = $\frac{1}{3}$ and x = 30%

Required gain% = $\frac{ax}{1-a}$ %

= $\frac{\frac{1}{3} X\ 30}{1\ -\ 1/3}$ %

= $\frac{10\ X\ 3}{2}$ % = 15%

Technique 3 A businessman sells his items at a profit/loss of a %. If he had sold it for ₹R more, he would have gained/loss b % . Then, CP of items = $\frac{R}{b+a}$ X 100

' –' = When both are either profit or loss.

'+ ' = When one is profit and other is loss.

Ex 3 A person sold a table at a profit of $6\frac{1}{2}$ % . If he had sold it for ₹1250 more, he would have gained 19%. Find the CP of the table.

Sol.

Here, a = $6\frac{1}{2}$ % = $\frac{13}{2}$ %, b= 19% and R = Rs 1250

According to the formula,

CP of table = $\frac{R}{b-a}$ X 100

= $\frac{1250}{19-13/2}$ X 100

= $\frac{1250\ X\ 2}{25}$ 100

= ₹ 10000

Technique 4 If the cost price of ' a ' articles is equal to the selling price of ' b ' articles, then Profit percentage = $\frac{a-b}{b}$ X 100%

Ex 4 If the cost price of 20 articles is equal to the selling price of 18 articles, then find the profit per cent.

Sol.

Here, a = 20 and b = 18

According to the formula,

Profit % = $\frac{a-b}{b}$ X 100% = $\frac{20-18}{18}$ X 100% = $\frac{2}{18}$ X 100 = $\frac{100}{9}$ % = $11\frac{1}{9}$ %

Technique 5 If a man purchases m item for ₹ x and sells n items for ₹ y , then profit or loss per cent is given by $\frac{my-nx}{nx}$ X 100%.

[here, positive result means profit and negative result means loss]

Ex 5 If Karan purchases 10 oranges for ₹ 25 and sells 9 oranges for ₹ 25, then find the gain percentage.

Sol.

Here, m = 10, x = 25, n = 9 , y = 25

∴ Profit per cent = $\frac{my-nx}{nx}$ X 100%

= $\frac{(25\ X\ 10\ )-(9\ X\ 25)}{9\ X\ 25}$ X 100% = $\frac{250-225}{225}$ X 100%

= $\frac{25}{225}$ X 100%

$= \frac{100}{9}\ \% = 11\frac{1}{9}\%$

Ex 6 Shakshi bought pens at a rate of 10 pens for ₹ 11 and sold them at a rate of 11 pens for ₹ 10. Then, find the profit or loss per cent.

Sol. Here, $m = 10, x = 11, n = 11, y = 10$

∴ Profit per cent $= \frac{my-nx}{nx}$ X 100%

$= \frac{(10X\ 10)-(11X\ 11)}{11\ X\ 11}$ X 100% $= \frac{-21}{121}$ X 100% $= -\ \frac{2100}{121}\ \% = -17\frac{43}{121}\%$

[∴ negative sign Indicates a loss]

Technique 6 If a sold an article to B at a profit (loss) of r_1 % and B sold this article to C at a profit (loss) of r_2 %, then cost price of article for C is given by

Cost Price for A X $\left(1 \pm \frac{r1}{100}\right)\left(1 \pm \frac{r2}{100}\right)$

- Use positive sign for profit and negative sign for loss

Ex 8 Nikunj sold a machine to Sonia at a profit of 30%. Sonia sold this machine to Anu at a loss of 20%. If Nikunj paid ₹ 5000 for this machine, then find the cost price of machine for Anu.

Sol. ∴

Here, r_1 = 30% (profit) and r_2 = 20% (loss)

CP of a machine for Nikunj = ₹ 5000

∴ CP of machine for Anu = CP of machine for Nikunj $\left(1 + \frac{r1}{100}\right)\left(1 - \frac{r2}{100}\right)$

$= 5000\left(1 + \frac{30}{100}\right)\left(1 - \frac{20}{100}\right)$

$= 5000\ X \frac{130}{100}$ X $\frac{80}{100}$

= ₹ 5200

Technique 7 If a dishonest trader professes to sell his items to CP but uses false weight, then

Gain % = $\frac{Error}{True\ value - Error}$ X 100 = $\frac{True\ weight - False\ weight}{False\ weight}$ X 100%

- Here, while calculating gain or profit per cent, we have taken false weight as a base Because CP is what is paid when an item is purchased or manufactured. In this case, dishonest trader is telling false weight to be the CP and he is gaining only when sells at false weight.

Ex 9 A dishonest dealer professes to sell his goods at cost price but he uses a weight of 930g for 1 kg weight. Find his gain per cent.

Sol.

Gain % = $\frac{Error}{True\ value - Error}$ X 100%

= $\frac{70}{1000 - 70}$ X 100% = $7\frac{49}{93}\%$

Technique 8 If a shopkeeper sells his goods at a % loss on cost price but uses b g instead of c g, then his percentage profit or loss is $\left((100 - a)\frac{c}{b} - 100\right)\%$

- Positive result indicates profit and negative result indicates loss.

Ex 10 A dealer sells goods at 6% loss on cost price but he uses 14 g instead of 16 g. what is his percentage profit or loss?

Sol.

Given, a = 6%, b = 14 g and c = 16 g

According to the formula,

Required answer = $\left((100 - 6)\frac{16}{14} - 100\right)\% = \left(94\ X\ \frac{8}{7} - 100\right)\%$

$= \left(\frac{752}{7} - 100\right)\% = \left(\frac{752 - 700}{7}\right)\% = \frac{52}{7}\% = 7\frac{3}{7}\%$ gain **[' + ve ' sign shows that there is a gain]**

Technique 9 If a dealer sells his goods at a % profit or loss on cost price and uses b % less weight, then his percentage profit or loss will be $\frac{(b \pm a)}{100 - b}$ X 100%.

- Positive result indicates profit and negative result indicates loss.

Ex 11 A dealer sells his goods at 20% loss on cost price but uses 40 % less weight. What is his percentage profit or loss?

Sol.

Given, a = 20 % and b = 40 %

According to the formula,

Required answer $= \frac{(b-a)}{100-b} \times 100\% = \frac{(40-20)}{60} \times 100\%$.

$= 33\frac{1}{3}\%$ profit

Technique 10 If ' a ' part of an article is sold at x % profit/loss, ' b ' part at y % profit/loss and c part at z % profit/loss and finally there is a profit/loss of ₹ R, then

Cost price of entire article = ₹ $\frac{R\ X\ 100}{ax+by+cz}$, where X or Y or Z is

Negative, if it indicates a loss.

Ex 12 If $\frac{2}{3}$ part of an article is sold at 30% profit, $\frac{1}{4}$ part at 16% profit and remaining part at 12% profit and finally, there is a profit of ₹ 75, then find the cost price of an article.

Sol.

Here, a = $\frac{2}{3}$, x= 30 % , b = $\frac{1}{4}$, y = 16 % , z = 12 % , R = ₹ 75

Then, remaining part (c) = $1-\left(\frac{2}{3}+\frac{1}{4}\right)=\frac{1}{12}$

∴ Cost price of entire article = $\frac{R\ X\ 100}{ax+by+cz}$

$= \frac{75\ X\ 100}{\frac{2}{3}\ X\ 30+\frac{1}{4}\ X\ 16+\frac{1}{12}\ X\ 12}$

$= \frac{75\ X\ 100}{20+4+1} = \frac{7500}{25}$

= ₹ 300

Technique 11 If there are two successive profits or losses at a % and b % respectively. Then a resultant profit or loss = $\left(a+b+\frac{ab}{100}\right)$ % , where a (or) b is negative, if it indicates a loss.

- If result is positive (+), then there is a profit and if result is a negative (−), then there is a loss.

Ex 13 The $price\ of\ a\ commodity\ is\ diminished\ by\ 15\%$ **and its demand increases by 20%. Fin the resultant profit/loss.**

Sol. Here, a = − 15%, b = 20%

∴ Resultant profit = $\left(a + b + \frac{ab}{100}\right)$ %

= $-15 + 20 + \frac{(-15)X\ 20}{100}$ = − 15 + 20 −3 = 2 %

Simple Interest

Principal (P) Principal is the money borrowed or deposited for a certain time.

Amount (A) The sum of principal and interest is called amount.

∴ Amount = Principal + Simple Interest (SI)

Rate of Interest (R) It is the rate at which the interest is charged on principal. It is always specified in percentage terms.

Time (T) The period, for which the money is borrowed or deposited, is called time.

Simple Interest (SI)

If the interest is calculated on the original principal for any length of time, then it is called simple interest.

Simple Interest (SI) = $\frac{Principal\ (P)X\ Rate\ (R)X\ Time\ (T)}{100}$

Basic Formulae Related to Simple Interest (SI)

1. P = $\frac{100\ X\ A}{100+RT}$ 2. SI = $\frac{ART}{100+RT}$ 3. A = P $\left(1 + \frac{RT}{100}\right)$

Where, SI = Simple Interest, P = Principal, R = Rate of Interest, T = Time and A = Amount

Ex 1 Find the simple interest on ₹ 200 for 5 yr at 6% per annum.

Sol. Here, P = ₹ 200, T = 5 yr, R = 6%

$$SI = \frac{P\ X\ R\ X\ T}{100} = \frac{200X\ 6\ X\ 5}{100} = ₹\ 60$$

Ex 2 A sum at simple interest of 4% per annum amounts to ₹ 3120 in 5 yr. Find the sum.

Sol.

Let the sum be ₹ P.

Then, $SI = \frac{P\ X\ R\ X\ T}{100} = \frac{P\ X\ 4\ X\ 5}{100} = ₹\frac{P}{5}$

∴ Amount (A) = P + SI = $P + \frac{P}{5} = ₹\frac{6P}{5}$

According to the question,

Amount = 3120 = $\frac{6P}{5}$ = 3120

$P = \frac{3120\ X\ 5}{6}$ = ₹ 2600

Ex 3 Amit takes some loan from Akash for 2 yr at the rate of 5% per annum and after 2 yr he gave back ₹ 6600 to Akash and completed the payment of his loan. Find the interest paid by Amit.

Sol. Here, T = 2 yr, R = 5%, A = ₹ 6600

Here, $SI = \frac{P\ X\ R\ X\ T}{100} = \frac{P\ X\ 5X\ 2}{100} = ₹\frac{P}{5}$

We know that, A = P + SI

$= P + \frac{P}{10} = 6600 = \frac{11P}{10} = 6600$

11 P = 66000 => P = 6000

∴ Required interest = Amount – Principal = 6600 – 6000 = ₹ 600

Mind IT!

1. If rate interest is half – yearly, then rate = $(R/2\ )$ % and time = 2T
2. If rate interest is quarterly, then rate = $(R/4\ )$ % and time = 4T
3. If rate interest is monthly, then rate = $(R/12\ )$ % and time = 12T
4. To calculate interest, the day on which amount is deposited, is not counted but the day on which amount is withdrawn, is counted.

Instalments

When a borrower pays the total money in some equal parts (i.e. not in a single amount), then we say that he/she is paying in **Instalments.**

For example, A borrowed ₹ 100 from B and he pays back it to B in several parts, i.e. ₹ 20 in 5 times or ₹ 50 in 2 times etc. The important point is that borrower has to pay the interest for using the borrowed sum or purchased article. In general, the value of the each instalment is kept constant. If a loan of ₹ A at R% interest per annum is to be repaid in n equal yearly instalments, then

$$A=\left(x+(x+\frac{x\ X\ R\ X1}{100})+(x+\frac{x\ X\ R\ X\ 2}{100})+(x+\frac{x\ X\ R\ X\ 3}{100})+\ldots+(x+\frac{x\ X\ R\ X\ (n-1)}{100})\right)$$

Where, A = Total amount paid, x = Value of each instalment

Also , $A=P+\frac{P\ X\ n\ X\ R}{100}$

Where, P = Principal, n = Number of instalments and R = Rate of interest

Ex 4 A scooty is sold by a automobile agency for ₹ 19200 cash or ₹ 4800 cash down payment together with five equal monthly instalments. If the rate of interest charged by the company is 12% per annum, then find the value of each instalment.

Sol. ∴ Balance of the price to be paid through instalments,

P = 19200 – 4800 = ₹ 14400

Now, according to the formula,

$$A=\left(x+\left(x+\frac{x\ X\ R\ X1}{100}\right)+\left(x+\frac{x\ X\ R\ X\ 2}{100}\right)+\left(x+\frac{x\ X\ R\ X\ 3}{100}\right)+\left(x+\frac{x\ X\ R\ X4}{100}\right)\right)$$

where $A=P+\frac{P\ X\ n\ X\ R}{100}$

$$\left(14400+\frac{14400\ X12\ X\ 5}{12\ X\ 100}\right)=\left(x+\left(x+\frac{12x}{12\ X\ 100}\right)+\left(x+\frac{12x\ X\ 2}{12\ X\ 100}\right)+\left(x+\frac{12x\ \ X\ 3}{12\ X\ 100}\right)+\left(x+\frac{12x\ \ X4}{12\ X\ 100}\right)\right)$$

$15120 = 5x + x/10$

$x = 151200/51$

= ₹ 2964.70

- In the left hand side and right hand side, given amounts are equal. Each amount is equal to the total amount payable after 5 months.

Technique 1 If a sum of money becomes n times in T yr at simple interest, then formula for calculating rate of interest will be given as

$$R=\frac{100(n-1)}{T}\%$$

Ex 5 A sum of money becomes four times in 20 yr at SI. Find the rate of interest

Sol.

Here, T = 20 yr and n = 4

$$R=\frac{100(n-1)}{T}\%$$

∴ R = 15%

Technique 2

(i) If a sum of money at certain rate of interest becomes n times in T_1 yr and m time in T_2 yr, then

$$T_2 = \frac{(m-1)}{(n-1)} \times T_1$$

(ii) If a sum of money in a certain time becomes n times at R_1 rate of interest and m times at R_2 rate of interest,

$$R_2 = \frac{(m-1)}{(n-1)} \times R_1$$

Ex 6 A sum becomes two times in 5yr at a certain rate of interest. Find the time in which the same amount will be 8 times at the same rate of interest.

Sol.

Here, n = 2, m = 8, $T_1 = 5$ $T_2 = ?$

$$\therefore \quad T_2 = \frac{(m-1)}{(n-1)} \times T_1$$

$$= 35 \text{ yr}$$

Technique 3

If a certain sum P in a certain time T amounts to ₹ A_1 at the rate of R_1% and the same sum amounts to ₹ A_2 at the rate of R_2% in same time, then

$$P = \frac{(A2R1 - A1R2)}{(R1 - R2)} \text{ and } P = \frac{(A1 - A2)}{(A2R1 - A1R2)} \times 100$$

If the rate of interest is uniform in above mentioned condition and time is variable, then

$$P = \frac{(A2T1 - A1T2)}{(T1 - T2)} \text{ and } P = \frac{(A1 - A2)}{(A2T1 - A1T2)} \times 100$$

Where, T_1 and T_2 are the time for first and second conditions, respectively.

Ex 7 A certain sum in certain time becomes ₹ 500 at the rate of 8 % per annum SI and the same sum amounts to ₹ 200 at the rate of 2 % per annum SI in the same duration. Find the sum and time.

Sol.

Here, R_1 = 8%, R_2 = 2%, A_1 = ₹ 500, and A_1 = ₹ 200

Now, According to the formula,

$$P = \frac{(A2R1 - A1R2)}{(R1 - R2)} = ₹\ 100$$

and time ,

$$P = \frac{(A1 - A2)}{(A2R1 - A1R2)} \times 100 = 50 \text{ yr}$$

Technique 4

If SI for a certain sum P_1 for time T_1 and rate of interest R_1 is I_1 and SI for another sum P_2 for time T_1 and rate of interest R_2 is I_2, then

$$\text{Difference of SI} = I_2 - I_1 = P = \frac{(P2R2T2 - P1R1T1)}{100}$$

- In the above-mentioned condition, if all the parameters are constant but time is variable, then $I_2 - I_1 = \frac{PR(T2 - T1)}{100}$
- When only rate of interest is variable, then $I_2 - I_1 = \frac{PT(R2 - R1)}{100}$
- When only sum is variable, then $I_2 - I_1 = \frac{RT(P2 - P1)}{100}$
- When only one parameter remains constant and the remaining are variables, then

(i) $I_2 - I_1 = \frac{P(R2T2 - R1T1)}{100}$

(ii) $I_2 - I_1 = \frac{R(P2T2 - P1T1)}{100}$

(iii) $I_2 - I_1 = \frac{T(P2R2 - P1R1)}{100}$

Ex 7 The simple interest on a certain sum of money at 5% per annum for 4 yr and 3 yr differ by ₹ 42. Find the sum (in ₹).

Sol.

Here, $I_2 - I_1 = 42$, $T_2 = 4$ yr, $T_1 = 3$ yr and $R = 5\%$

According to the formula,

$$I_2 - I_1 = \frac{PR(T2-T1)}{100}$$

P =₹ 840

Technique 5

If $\frac{1}{x}$ part of a certain sum P is lent out at R_1 % SI, $\frac{1}{y}$ part is lent out a R_2 % SI and the remaining $\frac{1}{z}$ Part at R_3 % SI and this way the interest received be I , then $P = \frac{I\ X\ 100}{\frac{R1}{x}+\frac{R2}{y}+\frac{R3}{z}}$

Ex 8 Alok lent out a certain sum. He lent 1/3 part of his sum at 7% SI, ¼ part at 8% SI and remining part at 10% SI. If ₹ 510 is his total interest, then find the money leant out.

Sol.

Here, $R_1 = 7\%$, $R_2 = 8\%$, $R_3 = 10\%$,

And $\frac{1}{x} = \frac{1}{3}$, $\frac{1}{y} = \frac{1}{4}$ I = ₹ 510

$\therefore \quad \frac{1}{z} = \left(1 - (\frac{1}{3} + \frac{1}{4})\right) = \frac{5}{12}$

According to the formula,

$$P = \frac{I\ X\ 100}{\frac{R1}{x}+\frac{R2}{y}+\frac{R3}{z}}$$

$$P = \frac{500\ X\ 100}{\frac{7}{3}+\frac{8}{4}+\frac{50}{12}}$$

= ₹ 6000

Technique 6

A sum of ₹ P is lent out in n parts in such a way that the interest on first part R $_1$% for T $_1$ yr, the interest on second part at R $_2$% for T $_2$ yr and the interest on third part ar R $_3$% for T $_3$ ye and so on, are equal, then the ratio in which the sum was divided in n parts is given by

$$\frac{1}{R\,1\;T\,1} : \frac{1}{R2\;T2} : \frac{1}{R\,3\;T\,3} : \ldots\ldots : \frac{1}{R\,n\;T\,n}$$

Ex 9 A sum of ₹ 7700 is lent out in two parts in such a way that the interest on one part at 20% for 5 yr is equal to that on another part at 9% for 6 yr. Find the two sums.

Sol.

Here, sum = ₹ 7700, R $_1$= 20%, T $_1$= 5 yr, R $_2$= 9%, and T $_2$= 6 yr

Ratio of two sums = $\frac{1}{R\,1\;T\,1} : \frac{1}{R\,2\;T\,2} = \frac{1}{20\,X\,5} : \frac{1}{9\,X\,6}$

$= \frac{1}{10\,X\,5} : \frac{1}{9\,X\,6}$ $= = \frac{1}{50} : \frac{1}{27}$ = 27: 50

∴ First part = $\frac{27}{27+50}$ x 7700 = $\frac{27}{77}$ x 7700 = ₹ 2700

and Second part = $\frac{50}{27+50}$ x 7700 = $\frac{50}{77}$ x 7700 = ₹ 5000

Technique 7

The annual payment that will discharge a debt of ₹ P due in T yr at the rate of interest R % per annum is given by

$$\frac{100\,P}{100\,T+RT\frac{(T-1)}{2}}$$

Ex 10 What annual payment will discharge a debt of ₹ 848 in 8 yr at 8% per annum?

Sol. Here, P = ₹ 848, T = 8yr and R = 8%

According to the formula,

$$\text{Annual Payment} = \frac{100\,P}{100\,T+RT\frac{(T-1)}{2}}$$

$$= \frac{100\ X\ 848}{100\ X\ 8 + \frac{8\ X 8\ (8-1)}{2}}$$

$$= \frac{848\ X\ 100}{800 + 32\ X\ 7} \qquad = \frac{84800}{1024} = ₹\ 82.8125$$

Speed, Time and Distance

Speed

The rate at which a body or an object travel to cover a certain distance is called the **Speed** of that body.

Time

The duration in hours, minutes or seconds spent to cover a certain distance is called the time.

Distance

The length of the path travelled by any object or a person between two places is known as distance.

Units of speed, time and distance should be in the same metric system.

Relation between Speed, Time, and Distance

Speed is the distance covered by an object in unit time.
It is calculated by dividing the distance travelled by the time taken.

1. Speed = $\frac{Distance}{Time}$ 2. Time = $\frac{Distance}{Speed}$

3. Distance = Speed X Time

Ex 1 If a car covers 125 Km in 5 h, then find the speed of the car.

Sol. We know that, Speed = $\frac{Distance}{Time}$

Required Speed = $\frac{125}{5} = 25\ km/h$

Ex 2 A trian covers a distance of 200 km with a speed of 10 km/h. What time is taken by train to cover this distance?

Sol. Given, speed = 10km/h and distance = 200 km

Time = $\frac{Distance}{Speed}$ = = $\frac{200}{10}$ = 20 h

Ex 3 A bike crosses a bridge with a speed of 108 km/h. What will be the length of the bridge, if the bike takes 8 h to cross the bridge?

Sol. Given, speed = 108 km/h , time = 8h

∴ Length of the bridge = Speed X Time = Distance travelled by bike in 8h

= 108 X 8 = 864 km

Basic Formulae Related to Speed, Time and Distance

Formula 1

Conversion of units a km/h = $\frac{a\ X\ 1000\ m}{3600\ S} = \frac{5a}{18}$ m/s

a m/s = $\frac{a\ X\ 1/1000\ km}{1/3600\ h} = \frac{18a}{5}$ km/h

Ex 4 Convert 72km/h into m/s.

Sol. We know that, akm/h = $\left(a\ X\ \frac{5}{18}\right)$ m/s

∴ 72 km/h = $\left(72\ X\ \frac{5}{18}\right)$ m/s = 4 X 5 = 20 m/s

Formula 2

If speed is kept constant, then the distance covered by an object is proportional to time.

i.e Distance ∝ Time (speed constant) or $\frac{D1}{T1} = \frac{D2}{T2}$

Ex 5 A person covers $20\frac{2}{5}$ km in 3 h. What distance will he cover in 5 hr?

Sol. Here, speed is kept constant. Therefore, according to the formula,

$$\frac{D1}{T1} = \frac{D2}{T2}$$

Given that, $D_1 = 20\frac{2}{5} = \frac{102}{5}$ km,

$T_1 = 3$ h , $T_2 = 5$ h and $D_2 = ?$

$= 34$ km

Hence, the distance covered by the object in 5 h is 34km.

Formula 3

If time is kept constant, then the distance covered by an object is proportional to speed,

i.e. distance ∝ speed (time constant) or $\frac{D1}{S1} = \frac{D2}{S2}$

Ex 6 A person covers a distance of 12km, while walking at a speed of 4 km/h. How much distance he would cover in same time, if he walks at a speed of 6km/h ?

Sol. Given, $D_1 = 12$km, $S_1 = 4$km/h, $D_2 = ?$, and $S_2 = 6$km/h

Since, the time is kept constant.

$$\frac{D1}{S1} = \frac{D2}{S2}$$

$D_2 = 18$km

Hence, the person will cover 18km.

Formula 4

If distance is kept constant, then the speed of a body is inversely proportional to time,

i.e speed $\propto 1/time$ (distance constant)

(or) $S_1 T_1 = S_2 T_2 = S_3 T_3 = \ldots$

- If the ratio of speeds of two objects is x : y, then to cover same distance, the ratio of time taken will be y : x

Ex 7 A person covers a certain distance with a speed of 18km/h n 8 min. If he wants to cover the same distance in 6 min, what should be his speed?

Sol.

We know that, if distance is same, then speed is inversely proportional to time.

Given, S_1 = 18km/h, S_2 = ?, $T_1 = 8/60$ h, and $T_2 = 6/60$ h

According to the formula, $S_1 T_1 = S_2 T_2$

Where S_1 and S_2 are speeds and T_1 and T_2

$18 \times 8/60 = S_2 \times 6/60$

$S_2 = 18 X 8/6 = 24$ km/h

Formula 5

When two bodies A and B are moving with speed a km/h and b km/h respectively, then the relative speed of two bodies is

(i) (a + b) km/h (if they are moving in opposite directions)

(ii) (a-b) km/h (if they are moving in same direction)

Ex 8 Two persona are moving in the directions opposite to each other. The speeds of the both persons are 5km/h and 3km/h, respectively. Find the relative Speed of the two persons in respect of each other.

Sol. We know that, if two persons are moving in opposite direction, then sum of their speeds is the required relative speed.

∴ Required relative speed = 5 + 3 =8 km/h

Ex 9 Two buses are running in the same direction. The speeds of two buses are 5km/h and 15 km/h, respectively. What will be relative speed of second bus with respect to first?

Sol. We known that, if two buses are running in same direction, then difference in speeds is the required relative speed.

∴ Required relative speed = 15 − 5 =8 km/h

Formula 6

When a body travels with different speeds for different durations, then average speed of that body for the complete journey is defined as the total distance covered by the body divided by the total time taken to cover the distance,

$$\textbf{i.e Average Speed} = \frac{Total\ distance\ covered\ by\ a\ body}{Total\ time\ taken\ by\ the\ body}$$

Ex 10 A person covers a distance of 20km by bus in 35 min. After deboarding the bus, he took rest for 20 min and covers another 10 km by a taxi in 20 min.

Sol. Total distance covered = (20 + 10) km = 30 km.

Total time taken = (35 + 20 + 20) min = 75 min = $75/60$ h = $5/4$ h

According to the formula,

$$\text{Average speed} = \frac{Total\ distance\ covered\ by\ a\ body}{Total\ time\ taken\ by\ the\ body} = 30/(5/4) = 24 \text{ km/h}$$

So, the average speed of person for the whole journey is 24 km/h.

Mind IT!

If a body covers a distance D_1 at S_1 km/h, D_2 at S_1 km/h at D_3 at S_3 km/h and so on upto D_n at S_n , then

$$\textbf{Average Speed} = \frac{D1+D2+D3+D4+\ldots+Dn}{\frac{D1}{S1}+\frac{D2}{S2}+\frac{D3}{S3}+\frac{D4}{S4}+\ldots+\frac{Dn}{Sn}}$$

$$\textbf{Average Speed} \neq \frac{S1+S2+S3+S4+\ldots+Sn}{n}$$

Ex 11 A person covers 20 km distance with a speed of 5km/h, then he covers the next 15 km with a speed of 3km/h and the last 10 km is covered by him with a speed of 2 km/h. Find out his average speed for the whole journey.

Sol. Here, P = 20 km, Q = 15 km, R = 10 km and x = 5km/h, y = 3km/h, z = 2km/h

∴ Required average speed $=\frac{P+Q+R}{\frac{P}{x}+\frac{Q}{y}+\frac{R}{z}}=\frac{20+15+100}{\frac{20}{5}+\frac{15}{3}+\frac{10}{2}}$ = 45/14km/h = 3 (3/14) km/h.

Technique 1 When a certain distance is covered at speed A and the same distance is When a certain distance is covered at speed A and the same distance is

given by $\frac{2AB}{A+B}$.

Ex 12 Shantanu covers a certain distance by car driving at 35 km/h and he returns back to the starting point riding on a scooter with a speed of 25 km/h. Find the average speed for the whole journey.

Sol.

Here, A = 35 km/h and B = 25 km/h

According to the formula,

Average speed $=\frac{2AB}{A+B}$ = 29.16 km/h

Technique 2 If a person covers three equal distances at the speed of A km/h, B km/h and C km/h respectively, then the average speed during the whole journey will be

$$\frac{3ABC}{AB+BC+CA}.$$

Ex 13 If a person covers three equal distances at the speed of 30 km/h, 15 km/h and 10 km/h respectively, then find out his average speed during the whole journey.

Sol.

Here, A = 30 km/h, B = 15 km/h and C = 10 km/h

Required average speed = $\frac{3ABC}{AB+BC+CA}$ = 15 km/h

Technique 3 If a person covers P part of his total distance with speed of z Q part of total distance with speed of y and R part of total distance with speed of z and so on, then the average speed of a person for the whole journey,

Average speed = $\frac{1}{\frac{P}{x}+\frac{Q}{y}+\frac{R}{z}...}$.

Ex 14 Mr. Sharma travels by car and covers 25% of his journey with a speed of 10 km/h, 45% of his journey with a speed of 5 km/h and remaining 30% of his journey with a speed of 15km/h. What will be the average speed of Mr. Sharma for the whole journey?

Sol.

Here, P = 25% = $1/4$, x = 10km/h, Q = 45% = $45/100$ = $9/20$, y = 5 km/h

R = 30% = $30/100$ =$3/10$ and z = 15 km/h

∴ Required average speed = $\frac{1}{\frac{P}{x}+\frac{Q}{y}+\frac{R}{z}...}$ = 7.40 km/h

Technique 4 When a person covers a certain distance between two places with Technique speed 'a', but he reaches his destination late by time ti but when he covers the same distance with speed 'U, he reaches his destination t2 time earlier. In this case, the distance between two places is given by

D =$\frac{ab(t1+t2)}{b-a}$

Ex 15 Aashutosh covers a certain distance between his home and college by cycle. Having an average speed of 30 km/h, he is late by 20 min. However, with a speed of 40 km/h, he reaches his college 10 min earlier. Find the distance between his house and college.

Sol.

Here, a = 30, b = 40, $t_1 = 20/60$ and $t_2 = 10/60$

According to the formula,

Required distance, D = $\frac{ab(t1+t2)}{b-a}$

= 60km

- t_1 time late and t_2 time earlier make a difference of $(t_1 + t_2)$

Technique 5 When a person reaches a certain distance with speed 'a', he gets late by ti time and when he increases his speed by 'b' to cover the same distance, then he still gets late by t2 time. In this case, the distance is calculated by

$$D = (t_1 - t_2)\ (a + b)\ \frac{a}{b}$$

Ex 16 A boy walking at a speed of 20 km/h reaches his school 30 min late. Next time, he increases his speed by 4 km/h but still he is late by 10 min. Find the distance of the school from his home.

Sol.

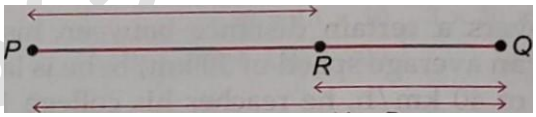
Here, a = 20 km/h, b = 4 km/h, t1 = 30 min and t2 = 10 min

According to the formula, required distance = $(t_1 - t_2)\ (a + b)\ \frac{a}{b}$

=40 km

Technique 6 When two persons A and B travel distance D between two points P to Q with speeds 'a' and 'b', respectively and B reaches Q first, returns immediately and meets A at R, then

Distance covered by A



Distance covered by B

Distance travelled by A (PR) = 2 X D $\frac{a}{a+b}$

Distance travelled by B (PQ + QR) = 2 X D $\frac{b}{a+b}$

Ex 17 Sonu and Monu travel from point P to Q, a distance of 42 km at 6 km/h and 8 km/h, respectively. Monu reaches Q first and returns immediately and meets Sonu at R. Find the

distance from points P to R.

Sol. Given that, D = 42 km ,a = 6km/h and b = 8km/h

Distance travelled by Sonu = PR = 2 X D $\frac{a}{a+b}$ = 36 km

Technique 7 A policeman sees a theif a ata distance of d. He starts chasing the thief who is running at a speed of 'a' and policeman is chasing with a speed of 'b' (b>a). In this case, the distance covered by the thief when he is caught by the policeman,is given by

$$d\,\frac{a}{b-a}$$

Ex 18 A policeman sees a chain snatcher at a distance of 50 m. He starts chasing the chain snatcher who is running with a speed of 2 m/s, while the policeman chasing him with a speed of 4 m/s. Find the distance covered by the chain snatcher when he is caught by the policeman

Sol.

Here, d = 50 m, a = 2 m/s and b = 4 m/s

According to the formula, required distance = $d\,\frac{a}{b-a}$ = 50m

Technique 8 Two persons A and B start running at the same time in opposite directions from two points and after passing each other, they complete their journeys in 'x' h and 'y' h, respectively.

Then, A's speed: B's speed = $\sqrt{y}:\sqrt{x}$

Ex 19 A man sets out to cycle from points P to Q and at the same time, another man starts to cycle from points Q to P. After passing each other, the complete their journeys in 9 h and 4 h, respectively. Find the ratio o speeds of 1st man to that of 2nd man.

Sol.

According to the formula,

1st man's speed : 2nd man's speed = $\sqrt{y}:\sqrt{x} = \sqrt{4}:\sqrt{9}$

= 2:3

Technique 9 If a man changes his speed to $\left(\frac{x}{y}\right)$ of his usual speed and gets late by t min or reaches early by t min, then the usual time taken by him

$= \frac{tx}{y-x}$ if $(y > x)$ and $= \frac{tx}{x-y}$ if $(x > y)$

Ex 20 If a man increases his speed to 7/5 times of his original speed and reaches his office 20 min before to fixed time, then find the usual time taken by him.

Sol.

Given that, $x/y = 7/5$, $x = 7$, $y = 5$ and $t = 20\ min$

Now, required time $= \frac{tx}{x-y} = 70$ min $[\because x > y]$

Work and Wages

Activity involving physical efforts, done in order to achieve a result is known as **Work**.

Money received by a person for a certain work is called the **Wages of the person for that particular work.**

In other words, we can find the entire wages of any person by the following formula

Entire wages = Total number of days X Wages of 1 day of any person

For example, If Arjun's monthly wages is ₹ 4200 and he worked for all 30 days, then his daily wages will be calculated as

Total wages = Number of days X Daily wages

4200 = 30 X Daily wages

$\therefore$ Daily wages $= \frac{4200}{30} =$ ₹ 140

Some Important Points

- Wages is directly proportional to the work done. It means, more money will be received for more work and less money will be received for less work.

- Wages is indirectly proportional to the time taken but the individual.
- Wages is directly proportional to 1-day work of each individual.
  - For example, If Karan can do a piece of work in 10 days and Arun can do the same piece of work in 15 days. Then, ratio of Karan and Arun's wages will be 15:10 i.e. 3:2.
- If X,Y and Z can do a piece of work in d_1 , d_2 , d_3 , days respectively, then ratio of their shares is

$$d_2 d_3 : d_3 d_1 : d_1 d_2$$

Formula 1

If A and B can do piece of work in x and y days respectively, the ratio of their wages will be $y : x$. Then, the wages earned by A and B will be

$$\text{A' s wages} = \frac{Total\ wages}{x+y} \times y \text{ ; B's wages} = \frac{Total\ wages}{x+y} \times x$$

Ex: 1 Akanksha can do a piece of work in 6 days, while Vasudha can do the same work in 5 days. If the total amount to be given for this work is ₹ 660, then what will be the share of Vasudha, if both work together?

Sol. Time taken by Akanksha = 6 days

$\therefore$ 1 day's work of Akanksha = $\frac{1}{6}$

Time taken by Vasudha = 5 days

$\therefore$ 1 day's work of Vasudha = $\frac{1}{5}$

Given, total amount earned = ₹ 660

$\therefore$ Ratio of their incomes = $\frac{1}{6} : \frac{1}{5}$ = 5 : 6

$\therefore$ Vasudha's share $\frac{660}{5+6}$ x 6 = ₹ 360

Formula 2

If A, B and C can do a piece of work in x, y and z days respectively, the ratio of their wages will be $yz : xz : xy$. Then, wages earned by A, B and C respectively will be

A' s wages = $\frac{Total\ wages}{yz+:xz+xy}$ X yz ; B's wages = $\frac{Total\ wages}{yz+xz+xy}$ X xz ;

C's wages = $\frac{Total\ wages}{yz+xz+xy}$ X xy

Ex: 2 A, B and C taken ₹ 660 for doing a piece of work together. If working alone, each takes 5 days, 6 days and 7 days respectively, then find the share of each.

Sol. Given, total wages = ₹ 535

A can do a work in 5 days, B can do a work in 6 days; C can do a work in 7 days.

∴ A' s share = $\frac{535}{(7\ X6)+(\ 7\ X\ 5)+(\ 6\ X\ 5)}$ X $(7\ X\ 6)$

= $\frac{535}{42+35+30}$ X 42

= $\frac{535}{107}$ X 42

= 42 X 5 = ₹ 210

B' s share = = $\frac{535}{107}$ X 35

= 5 X 35 = ₹ 175

And C' s share = = $\frac{535}{107}$ X 30

= 5 X 30 = ₹ 150

Formula 3

Total wages earned by certain persons in doing work

= (1 person's 1 day wages) X (Number of persons) X (Number of days)

∴ Required number of persons

$$= \frac{Total\ wages}{Number\ of\ days\ X\ 1\ person's\ 1\ day\ wages}$$

Ex: 3 Wages of 45 women for 48 days amount to ₹ 31050. How many men must work for 16 days to receive ₹ 11500, if the daily wages of a man being double those of a woman?

Sol. 1 day's wages of a woman = $\frac{31050}{45\ X45}$ = ₹ $\frac{115}{8}$

1 day's wages of a man = $\frac{115}{8}$ x 2 = ₹ $\frac{115}{8}$

∴ Required number of men = $\frac{11500}{16\ X\ \frac{115}{4}}$ = 25 men

Formula 4

A can do a piece of work in x days. With the help of B, A can do the sae work in y days. If they get ₹ a for that work, then

Share of A = ₹ $\left(\frac{ay}{x}\right)$ and share of B = ₹ $\left(\frac{a(x-y)}{x}\right)$

Ex: 4 Suresh can do a work in 20 days. Suresh and Surendra together do the same work in 15 days. If they got ₹ 400 for that work, then find the share of Suresh and Surendra.

Sol.

Here, x = 20, y = 15 and a = 400

Now, according to the formula,

Share of Suresh = $\frac{a\ X\ y}{x}$ = $\frac{400\ X\ 15}{20}$ = ₹ 300

Share of Surendra = $\frac{a(x-y)}{x}$ = $\frac{400\ X(20-15)}{20}$ = $\frac{400\ X\ 5}{20}$ = ₹ 100

Formula 5

X, Y and Z undertaken to do a work for ₹ R. If X and Y together do only m/n of the work and rest is done by z alone, then the share of z is given by

$$R\left(1+\frac{m}{n}\right)$$

Ex: 5 A, B and C undertake to do a work for ₹ 480. A and B together do ¼ od the work and rest is done by the C alone. How much should C get?

Sol. Here, R = ₹ 480, m = 1 and n = 4

Now, according to the formula,

$$\text{Share of C} = R\left(1-\frac{m}{n}\right)$$

$$= 480\left(1-\frac{1}{4}\right)$$

$$= 480 \times \frac{3}{4}$$

$$= ₹\,360$$

WORK AND TIME

SOME IMPORTANT RELATIONS

1. **Work and Person:** Directly proportional (more work, more men and conversely more men, more work)
2. **Time and Person:** Inversely proportional (more men, less time and conversely more time, less men)
3. **Work and Time:** Directly proportional (more work, more time and conversely more time, more work)

RULE: 1

If a person can do a piece of work in n days (hours), then that person's 1 day's (hour's) work = $\frac{1}{n}$.

Example:

Vandana completes a work in 35 days. What work will she do in 1 day?

Sol:

Here, n=35

Required work done = $\frac{1}{35}$

RULE: 2

If a person's 1 day's (hour's) work = $\frac{1}{n}$, then the person will complete the work in n days (hours).

Example:

Kavi completes $\frac{1}{13}$ part of a certain work in 1 days. In how many days, will she complete the whole work?

Sol:

Here, $\frac{1}{n} = \frac{1}{13}$

Required number of days = 13.

RULE: 3

If a person is n times efficient than the second person, then work done by

First person : Second person = n : 1

And time taken to complete a work by

First person : Second person = 1 : n

Example:

P can do a work 3 times faster than Q and therefore takes 40 days less than Q. Find the time in which P and Q can complete the work individually.

Sol:

Time taken to co0mplete the work by P : Q = 1 : 3

According to the question,

Time taken by Q – Time taken by P = 40

3K - K = 40

2K = 40

K = 20

Therefore, number of days required by P = 20

and number of days required by Q = 60.

RULE: 4

If ratio of number of men required to complete a work is m : n, then the ratio of time taken by them will be n : m .

Example:

If 12 men can finish a work in 20 days, then find the number of days required to complete the same work by 15 men.

Sol:

Ratio of numbers of men = 12 : 15 = 4 : 5

Therefore, ration of time taken = 5 : 4

Let us suppose 15 men can finish a work in x days.

Then, 20 : x = 5 : 4

x = 16

RULE: 5

(i) If A can do a piece of work in x days and B can do the same work in y days, then (A+B)'s 1 day's work = $\frac{1}{x}+\frac{1}{y}=\frac{x+y}{xy}$

Time taken by (A+B) to complete the work = $\frac{xy}{x+y}$ days

(ii) If A can do a piece of work in x days, B can do the same work in y days and C can do the same work in z days, then (A+B+C)'s 1 day's work = $\frac{1}{x}+\frac{1}{y}+\frac{1}{z}=\frac{yz+xz+xy}{xyz}$

Time taken by (A+B+C) to complete the work = $\frac{xyz}{yz+xz+xy}$ days

Examples:

1. A can do a piece of work in 10 days and B can do the work in 12 days. How long will they take to finish the work, If both awork together.

Sol:

Here x = 10 and y = 12

Number of days taken by A and B = $\frac{xy}{x+y}=\frac{10*12}{10+12}=\frac{120}{22}=\frac{60}{11}=5\frac{5}{11}$ days.

2. If A can do a piece of work in 4 days, B can do the same work in 8 days and C can do the same work in 12 days, then working together, how many days will they take to complete the work?

Sol:

Here x = 4, y = 8 and z = 12.

Time taken by (A+B+C) to complete the work = $\frac{xyz}{yz+xz+xy}$

$= \frac{4*8*12}{32+96+48} = \frac{4*8*12}{176} = \frac{24}{11} = 2\frac{2}{11}$ days.

RULE: 6

If A and B can complete a work in x days and A alone can complete that work in y days, then the number of days required to complete the work by B = $\frac{xy}{y-x}$ days.

Example:

A and B together can do a piece of work in 12 days and A alone can do it in 18 days. In how many days can B alone do it?

Sol:

Here x = 12 and y = 18

Time taken by B = $\frac{xy}{y-x} = \frac{12*18}{18-12}$ = 36 days

RULE: 7

If M_1 persons can do W_1 work in D_1 days working T_1 h in a day and M_2 persons can do W_2 work in D_2 days working T_2 h in a day, then the relationship between them is

$M_1D_1T_1W_2 = M_2D_2T_2W_1$

Example:

10 persons can make 20 toys in 12 days working 12 h per day. Then, in how many days can 24 persons make 32 toys working 16 h per day?

Note: M_1=10, M_2=24, D_1=12, D_2=?, T_1=12, T_2=16, W_1=20 and W_2=32

RULE: 8

If A and B can do a piece of work in x days, B and C can do the same work in y days and A and C can do it in z days, then working together A, B and C can do that work in $\frac{2xyz}{xy+yz+zx}$ days.

Example:

A and B can do a piece of work in 3 days, B and C can do the same work in 9 days and A and C can do it in 12 days. Find the time in which A, B and C can finish the work, working together.

Note: x=3, y=9 and z=12.

RULE: 9

If a_1 men or b_1 women can finish a work in D days, then time taken by a_2 men and b_2 women to complete the work in $\frac{D(a1b1)}{a2b1+a1b2}$ days.

Example:

If 6 men or 8 women can reap a field in 86 days, how long will 14 men and 10 women take to reap it?

Note: a_1= 6, b_1=8, a_2=14, b_2=10 and D=8.

RULE: 10

If A can do a work in x days and B can do y% faster than A, then B will complete the work in $\frac{100x}{100+y}$ days

Example:

Kamal can do a work in 15 days and Vimal is 50% more expert than Kamal to complete the same work, then find total time taken to complete the work by Vimal.

Note: x=15 and y=50%

RULE: 11

If 'a' men can do a piece of work in x days and 'b' boys can do the same work in y days, then time taken to complete the same work by 'c' men and 'd' boys will be $\frac{1}{\frac{c}{ax}+\frac{d}{by}}$ days.

Example:

If 5 men can do a work in 2 days and 3 boys can do the same work in 5 days, then find the time taken to complete the same work by 10 men and 3 boys.

Note: a=5, b=3, x=2, y=5, c=10 and d=3.

RULE: 12

If a_1 men and b_1 boys can complete a work in x days, while a_2 men and b_2 boys can complete the same work in y days, then

$$\frac{1\ day\ work\ of\ 1\ man}{1\ day\ work\ of\ 1\ boy} = \frac{yb2-xb1}{xa1-ya2}$$

Example:

If 12 men and 16 boys can complete a work in 5 days, while 13 men and 24 boys can complete the same work in 4 days. Compare the one day's work of 1 man and 1 boy.

Note: $a_1 = 12$, $b_1 = 16$, $x = 5$, $a_2 = 13$, $b_2 = 24$ and $y = 4$.

RULE: 13

A and B, each alone can do a piece of work in a and b days, respectively Both begin together and if

(i) A leaves the work x days before its completion, then total time taken for completion of work will be given as T = $\frac{(a+x)b}{(a+b)}$ days.

(ii) B leaves the work x days before its completion, then total time taken for completion of work will be given as T = $\frac{(b+x)a}{(a+b)}$ days.

Example:

A can do a piece of work in 10 days while B can do it in 15 days. They begin together but 5 days before the completion of the work, B leaves off. Find the total number of days for the work to be completed.

Note: a = 10, b = 15, x = 5 and T = ?

RULE: 14

A and B do a piece of work in a and b days, respectively. Both begin together but after some days, A leaves off and the remaining work is completed by B in x days. Then, the time after which A left, is given by T = $\frac{(b-x)a}{(a+b)}$.

Example:

A and B do a piece of work in 40 days and 50 days, respectively. Both begin together but after a certain day, A leaves off. In this case, B finishes the remaining work in 20 days. After how many days did A leave?

Note: a = 40, b = 50, x = 20 and T = ?.

SIMPLIFICATION

VBODMAS Rule

To simplify arithmetic expressions, which involve various operations, like brackets, multiplication, addition, etc., particular sequence of the operations has to be followed. The operations have to be carried out in the order, in which they appear in the word **VBODMAS**, where different letters the word stand for following operations.

V = Vinculum or Bar -

B = Brackets

O = Of

D = Division

M = Multiplication

A = Addition

S= Subtraction

MIND IT! Absolute Value of a Real Number

If m is a real number, then its absolute value is defined as

$|m|=\{x, if\ m>0\ -x, if\ m<0$

For examble |3|=3 and |-3|=-(-3)=3

Ex.1 Simplify 4-[6-{12-(10-8-6)}]

Sol. Given Expression = 4-[6-{12-(10-(8-6)}]

=4-[6-{12-(10-2)}]

=4-[6-{12-8}]

=4-[6-4]

=4-2 **=2**

Ex.2 Simplify $\left(9.6\times 3.6\div 7.2+10.8\ of\ \frac{1}{18}-\frac{1}{10}\right)$

Sol. Given Expression $=9.6\times 3.6\div 7.2+10.8\ of\ \frac{1}{18}-\frac{1}{10}$

$=9.6\times 3.6\div 7.2+0.6\ -\frac{1}{10}$

$=9.6\times\frac{3.6}{7.2}+0.6-0.1$

$=4.8+0.6-0.1$

=5.4-0.1 **=5.3**

Some Basic Formulae

- $(a+b)^2=a^2+2ab+b^2$
- $(a-b)^2=a^2-2ab-b^2$
- $(a+b)^2+(a-b)^2=2(a^2+b^2)$
- $(a+b)^2-(a-b)^2=4ab$
- $a^2-b^2=(a+b)(a-b)$
- $(a+b)^3=a^3+b^3+3ab(a+b)$
- $(a-b)^3=a^3-b^3+3ab(a-b)$

- $a^3+b^3=(a+b)(a^2-ab+b^2)$
- $a^3-b^3=(a-b)(a^2ab+b^2)$
- $\frac{a^3+b^3+c^3-3abc}{(a^3+b^3+c^3-ab-bc-ca)}=(a+b+c)$

EX.3 solve

$$\frac{(5.9)^3+(1.8)^3+(4.8)^3-3\times5.9\times1.8\times4.8}{(5.9)^3+(1.8)^3+(4.8)^3-5.6\times1.8-1.8\times4.8-4.8\times5.9}$$

Sol.We know that,

$$\frac{a^3+b^3+c^3-3abc}{(a^3+b^3+c^3-ab-bc-ca)}=(a+b+c)$$

Here,a=5.9, b=1.8 and c=4.8

$$\frac{(5.9)^3+(1.8)^3+(4.8)^3-3\times5.9\times1.8\times4.8}{(5.9)^3+(1.8)^3+(4.8)^3-5.6\times1.8-1.8\times4.8-4.8\times5.9}$$

= (5.9+1.8+4.8)

=12.5

EX.4 solve

$$\frac{(9.8)^3-(6.8)^3}{(9.8)^2+9.8\times6.8+(6.8)^2}$$

Sol.We know that,

$$a^3-b^3=(a-b)(a^2+ab+b^2)$$

$$\frac{a^3-b^3}{(a^2+ab\quad+b^3)}=(a-b)$$

Here a=9.8and b=6.8

$$\frac{(9.8)^3-(6.8)^3}{(9.8)^2+9.8\times6.8+(6.8)^2}$$

= (9.8-6.8)

=3

PROBLEMS BASED ON TRAINS

Basic Rules Related to Problems Based on Trains

Rule 1

Speed of the train(s)= $\frac{Distance\ Covered\ (d)}{time\ taaken\ (t)}$ or S = $\frac{d}{t}$

Here ,unit of speed is m/s or km/h.

(i) a km/h= $\left(a\ X\ \frac{5}{18}\right)$ m/s

(ii) a m/s=$\left(a\ X\ \frac{18}{5}\right)$ km/h

Ex.1 Convert 360 km/h into m/s.

Sol:1 km/h = $\frac{5}{18}$ m/s

360 km/h=360 x $\frac{5}{18}$ m/s=100m/s

Ex.2 Convert 150 m/s into km/h.

Sol:1 m/s = $\frac{5}{18}$ km/h

150m/s=150 X $\frac{18}{5}$ km/h

=(30x18)km/h

=540 km/h

Rule 2

The distance covered by a train in passing a pole or a standing man or a signal post or any other object (of negligible length) is equal to the length of the train.

Ex.3 A train covers 85 m in passing a signal post. What is the length of the train?

Sol:

We know that the distance covered by a train in passing a pole or a standing man or signal post or any other object (of negligible length) is equal to the length of the train. So, in this case, train covers 85 m to pass a signal post.

Length of the train = 85 m

Rule 3

If a train passes a stationary object (bridge, platform etc.) having some length, then the stance covered by train is equal to the sum of the length of train and that particular stationary object which it is passing

Ex.4 A 29 m long train passes a platform which is 100 m long. Find the distance covered by the train in passing the platform.

Sol.

We know that when a train passes a stationary object having some length, then the distance covered by train is equal to the aim of the length of train and that particular stationary object. In this case, stationary object is 100 m long platform.

Required distance = Length of train+ Length of platform

= (29+ 100)

m= 129 m

Rule 4

If two trains are moving in opposite directions, then their relative speed is equal to the sum of the speeds of both the trains

Ex.5 Two trains are moving in opposite directions with speeds of 4 m/s and 8 m/s, respectively. Find their relative speed.

Sol.

Given, speed of first train 4m/s and speed of second train= 8 m/s We know that when two trains are moving in opposite directions, then their relative speed-Sum of speeds of both the trains

Required relative speed of trains=(4+8) m/s=12 m/s

Rule 5

If two trains are moving in the same direction, then their relative speed is equal to the difference of speeds of both the trains

Ex.6 Two trains are moving in the same direction with speeds of 19 km/h and25 km/h, respectively. What will be the relative speed of the train running at 25 km/h in respect of the train running at 19 km/h?

Sol.

Given, speed of first train 25 km/h and speed of second train- 19km/h We know that when two trains are running in the same direction, then Their relative speed = Difference of speeds of both the trains

Required relative speed of trains = (25-19) km/h=6km/h

Rule 6

If trains of lengths x and y are moving in opposite directions with speeds of and u and v respectively, then time taken by the trains to cross each other is equal to = $\frac{(x+y)}{(u+v)}$

Ex.7 Two trains of lengths 80 m and 90 m are moving in opposite directions at 10 m/s and 7 m/s, respectively. Find the time taken by the trains to cross each other.

Sol.

Here, x = 80 m, y = 90m, u = 10m/s and v = 7 m/s

Both trains are moving in opposite directions.

According to the formula, required time

$= \frac{x+y}{u+v} = \frac{80+90}{10+7} = \frac{170}{17} = 10s$

Rule 7

If two trains of lengths x and y are moving in the same direction with speeds of u and y respectively, then time taken by the faster train to cross the slower train is equal to $\frac{(x+y)}{(u-v)}$

[here, u> v]

Ex. 8 Two trains of lengths 75 m and 95 m are moving in the same direction at 9 m/s and 8 m/s, respectively. Find the time taken by the faster train to cross the slower train.

Sol.

Here, z= 75 m, y = 95m. = 9m/s and v = 8 m/s (u>v) Both trains are moving in the same direction. According to the formula, required time

$= \frac{x+y}{u-v} = \frac{75+95}{9-8} = 170s$

RATIO AND PROPORTION

RATIO:

The ratio of two quantities is the number of times one quantity contains another quantity of the same kind.

The ratio between x and y can be represented as x:y,

where **x** is **antecedent** and **y** is **consequent**.

i.e. $\frac{x}{y}$ or x:y

DUPLICATE RATIO	x:y implies $\mathbf{x^2:y^2}$	(2:3 implies 4:9)
SUB-DUPLICATE RATIO	x:y implies $\sqrt{x}:\sqrt{y}$	(16:25 implies 4:5)
TRIPLICATE RATIO	x:y implies $\mathbf{x^3:y^3}$	(2:3 implies 8:27)
SUB-TRIPLICATE RATIO	x:y implies $\sqrt[3]{x}:\sqrt[3]{y}$	(64:27 implies 4:3)
INVERSE RATIO	x:y implies y:x (or) $\frac{1}{x}:\frac{1}{y}$	(4:5 implies 5:4)
COMPOUND RATIO	$\frac{x}{y}$ & $\frac{z}{w}$ implies $\frac{xz}{yw}$	$\frac{5}{8}$ & $\frac{7}{3}$ implies $\frac{35}{24}$

RULE:1

If the given ratios are a:b and c:d, then

(i) a:b > c:d, if ad > bc
(ii) a:b < c:d, if ad < bc
(iii) a:b = c:d, if ad = bc

Example: Which is greater $\frac{5}{8}$ or $\frac{9}{14}$?

Sol:

5*14 & 9*8

70 < 72

So $\frac{5}{8} < \frac{9}{14}$

PROPORTION:

An equality of two ratios is called proportion.

If $\frac{x}{y} = \frac{z}{w}$ or x:y = z:w. (x is to y = z is to w)

Here, **x** and **y** are called **"extremes"**

z and **w** called **"means"**

RULE:2

If x:y::y:z, then z is called the third proportional to x and y.

x:y::y:z implies x:y = y:z implies $y^2 = x*z$ implies $z = \frac{y^2}{x}$.

Example:

Calculate the 3rd proportional to 16 and 32.

Sol:

x = 16, y = 32 and 3rd one is z.

$z = \frac{y^2}{x}$ implies $z = \frac{32*32}{16}$

z = 64.

RULE :3

If x:y::z:w, then w is called the fourth proportional to x, y and z.

x:y::z:w implies x:y = z:w implies $x*w = y*z$ implies $w = \frac{yz}{x}$.

Example:

Find the 4th proportional to 3, 7 and 9.

Sol:

x=3, y=7, z=9 and 4th one is w.

$w = \frac{yz}{x}$ implies $w = \frac{7*9}{3}$

w = 21.

RULE :4

Mean proportional between a and b is $\sqrt{ab}$

Example:

What will be the mean proportional between 4 and 25?

Sol:

Let the mean proportional be x

a=4 and b=25.

x=$\sqrt{100}$ = 10.

RULE: 5

If $\frac{x}{y} = \frac{z}{w}$, then

(i) Invertendo : $\frac{y}{x} = \frac{w}{z}$

(ii) Alternendo : $\frac{x}{z} = \frac{y}{w}$

(iii) Componendo : $\frac{x+y}{y} = \frac{z+w}{w}$

(iv) Dividendo : $\frac{x-y}{y} = \frac{z-w}{w}$

(v) Componendo and dividendo : $\frac{x+y}{x-y} = \frac{z+w}{z-w}$

Problems:

1. Find the value of $\frac{x+y}{x-y}$, if $\frac{x}{y} = \frac{5}{3}$.
2. If $\frac{3}{a} = \frac{18}{b} = \frac{24}{c} = \frac{9}{5}$, then find the value of a+b+c.

RULE: 6

If A:B = a:b and B:C = m:n, then

A:B:C = am:mb:nb and A:C = am:bn

RULE: 7

If A:B = a:b , B:C = c:d and C:D = e:f , then

A:B:C:D = ace : bce : bde : bdf

Problems:

1. If a:b = 5:14 and b:c = 7:3, then find a:b:c.
2. The ratio of A:B = 1:3, B:C = 2:5, C:D = 2:3. Find the value of A:B:C:D.

RULE: 8

If x is dividend in a:b, then 1st part = $\frac{ax}{a+b}$; 2nd part = $\frac{bx}{a+b}$

RULE: 9

If x is dividend in a:b:c, then 1st part = $\frac{ax}{a+b+c}$; 2nd part = $\frac{bx}{a+b+c}$; 3rd part = $\frac{cx}{a+b+c}$

Problems:

1. Divide 1111 in the ratio of 8:3.
2. Divide 2324 in the ratio 35:28:20.
3. The sum of three numbers is 315. If the ratio 1st and 2nd is 2:3 and the ratio between 2nd and 3rd is 4:5, then the 2nd number.

RULE: 10

The incomes of two persons are in ratio of a:b and their expenditures are in the ratio of c:d. If each of them saves Rs.X, then their incomes are given by $\frac{x(d-c)}{ad-bc} * a$ and $\frac{x(d-c)}{ad-bc} * b$, respectively and their expenditures are given by $\frac{x(b-a)}{ad-bc} * c$ and $\frac{x(b-a)}{ad-bc} * d$, respectively.

Problem:

1. The ratio of incomes of Balu and Siva is 4:3 and ratio of their expenditures is 3:2. If each person saves Rs.2500, then find their incomes and expenditures.

RULE: 11

If two numbers are in ratio a:b is added to the numbers, then the ratio becomes c:d. Two numbers will be $\frac{xa(c-d)}{ad-bc}$ and $\frac{xb(c-d)}{ad-bc}$, respectively

Problem:

1. Two numbers are in the ratio of 2:3. If 5 is added to both the numbers, then the ratio between two numbers becomes $\frac{11}{14}$. Find the greatest number.

RULE: 12

Two numbers are in ratio a:b and x is subtracted from the numbers, then the ratio becomes c:d. The two numbers will be $\frac{xa(d-c)}{ad-bc}$ and $\frac{xb(d-c)}{ad-bc}$, respectively.

Problem:

1. Two numbers are in the ratio of 3:5. If 9 is subtracted to both the numbers, then the ratio between two numbers becomes 12:23. Find the greatest number.

Logical reasoning

Number Series

Series Classified into Three Types, Namely

A. Number Series

B. Alphabet Series

C. Letter Series

NUMBER series

Case1.'Missing terms of the series

In this type the questions we have to identify the missing term of the series real according to a specific pattern of the series rule to form its code. The students are required to detect the missing number of the series and answer the questions accordingly.

Example I: Find the missing term of the series 2, 7, 16,_____ , 46, 67, 92

Explanation: Here the terms of the series are +5, +9, +13, +17, +21 , +25. ..

Thus, 2 +5 = 7; and 7+ 9 = 16 ...

So missing term = 16 + 13 = 29

Example 2: Find the wrong terms of the series 9, 29, 65, 126, 217, 344

Explanation: 2^3+1, $3^3 + 1$, $4^3 + 1$,.....

Here 29 iswrong
term of series

Example3: **Find** the missing term of the series 1,9, 25, 49, 81, 121, ...

solution: The given terms of the series are consists square of consecutive odd number 12 32 52 72

so missing value is $13^{2 =169}$

B. Alphabet Series

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1

The coding and decoding is classified into, They are

TYPE 1: Letter coding
TYPE 2: Decoding

EXAMPLE 6: If in a certain language MYSTIFY is coded as NZTUJGZ, as is MNESIS coded in that language ,

EXPLANATION: Clearly, each letter in the word MYSTIFY is moved one step forward to obtain the corresponding letter of the code.

M Y S T I F Y

+1

N Z T U J G Z

So in MENSIS, N will be coded a O,E as F,M as Nand so on. the code between NFOFTJT

EXAMPLE7: If TAP coded as SZO, then How is FRIEND coded?

EXPLANATION: Clearly each letter in the word TAP is moved one step Backward to obtain the corresponding letter of the code.

S Z O

-1

T A P

Thus, in FRIEND, F will be coded as E, R as Q, I as H, N as H, E as D, N as M,D as C, So the code becomes EDHDMC

EXAMPLE 8: IN a certain code MENTION is written as LNEITTO. How is PRESENT written in that code?

EXPLANATION: Clearly, to obtain the coded, the first letter of the MENTION is moved one step backward and the remaining letters are.

Reversed in order, taking two at time. So, in the present P will be a coded as O and the sequence of the remaining letter in code would be ERESTN. Thus the code becomes OERESTN. Hence the answer OERSTN.

EXAMPLE 9: IF in a certain language A is coded as 1, B is coded 2, and so on ,how AICCI is coded in that code?

EXPLANATION:

A B C D E F G H I

1 2 3 4 5 6 7 8 9

So, in ACCI, A is coded as1, I as 9, and C as 3. Thus, ACCI is coded as 19339.

EXAMPLE10: IF PAINT is coded as 74128 and EXCEL is coded as 93596, then how would you encode ANCIENT?

EXPLANTION: Clearly, in the given code, the alphabets are coded as follows:

P A I N T E X C I

7 4 1 2 8 9 3 5 8

So, in ANCIENT A is coded 4, N is coded as 2, C as 5, I is coded as 3, E as 9, I as 8. Hence, the correct code is 4251928.

ODD MAN OUT

EXAMPLE11: January, May, July, November

(a) January
(b) May
(c) July
(d) November

EXPLANATION: all the months above are 31 days, whereas, November 30days

EXAMPLE12: 10,14,16,18,23,24and26

(a) 26
(b) 17
(c) 23
(d) 9

EXPLANATION: Each of the above series are even number, except 23.

EXAMPLE 13:6,9,15,21,24,26,30

(a) 9
(b) 26
(c) 24
(d) 30

EXPALNATION: All are multiplies of 2 except 26.

EXAMPLE14: 1,5,14,30,51,55,91

(a) 5
(b) 55
(c) 51
(d) 91

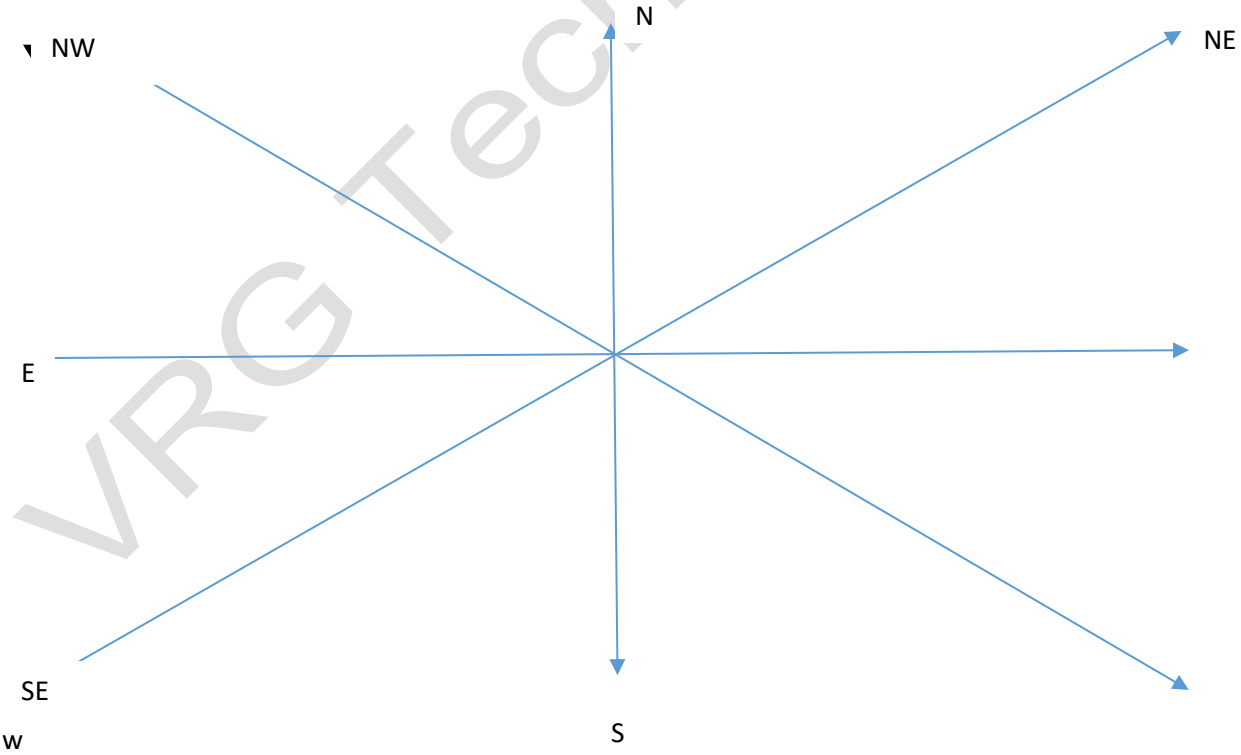
EXPLANTION:1

But 51 is not in the pattern.

EXAMPLE 15:16.25,36,62,144,196,225.

(a) 36
(b) 62
(c) 196
(d) 144
(e)

EXPLANATION: Each of the number except 62, is a perfect square root



Left+ left	Down

Left+ Right	UP
Right+ left	UP
Right+ right	Down
Up+ left	Left
Up+ right	Right
Down+ Left	Right
Down+ right	Left

ALWAYS REMEMBER

Example: A man starts from a point and walks 2 km toward north,turns towards his right and walks 2 km , turns right again .What is the direction now be facing?

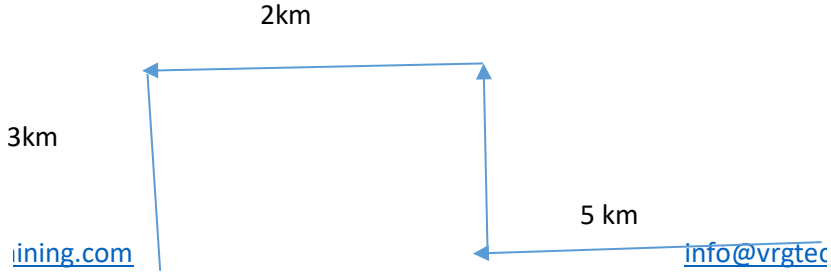
(a) South
(b) South-East
(c) North
(d) West

Explanation: (a) The diagram given above helpful solving the question and Direction test.

Examples: Rau walks 5 kms from his house towards west turned right and walks 3km.Therafter she turns left turn and walks 2km. Further, she turns left and walks 3km.Finally, she turns right and walks 3kms.In what direction she is now from her house?

(a) West
(b) North
(c) South
(d) East

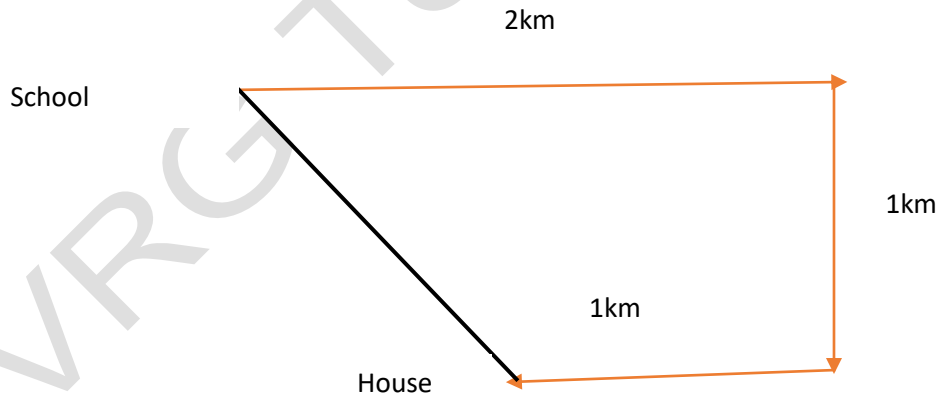
Explanation:



Its clearly from the diagram Ramu is West of her house.

EXAMPLE: GOPAL starts walking 2 km straight from his school. Then he turned Right and walked 1 km. Again he turned right and walked 1 km to reach his reach. If his house is South-West from his school, then in which direction did gopal start walking from his school?

(a) East
(b) West
(c) South
(d) North

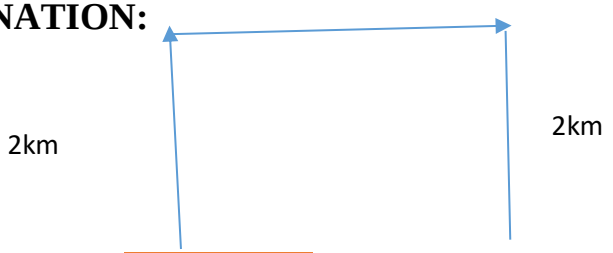


From the diagram that gopal Started walking towards East from the school.

(a) South
(b) East
(c) North
(d) West

2km

EXPLANATION:



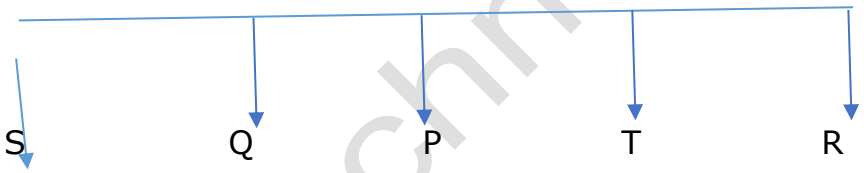
SEATING ARRA S

- ❖ Linear Arra
- ❖ Circular Arrangements
- ❖ Polygon Arrangements

Example 1: There are Five houses P, Q, R, S, T, P is right of Q and T is left of R and right of P. Q is right of S. Which house in the middle.

(a) P (b) (c) R (d) T

Solution: According to the question the houses can be arranged as follows.

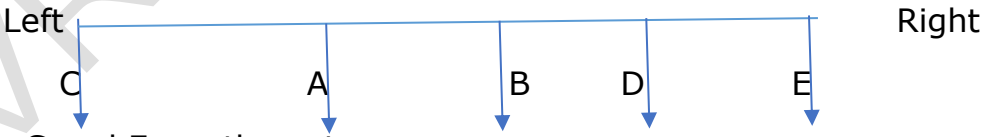


Therefore, house P. is middle.

Example 2: Five Friends are sitting on a bench. A is to the left of B but on the right of C, D is to the rig B but one the left of E. Who are at the extremes?

(a) A, B (b) A, D (c) C, E (d) B,D

Solution: Arrangements according to the question as follows.



Clearly C and E are the extremes.

Example 3: In a college party, 5 girls are sitting in a row. P is to the left of M and to the right of O is sitting to the right of N but to the left of O. Who is sitting in the middle?

(a) O (b) R (c) P (d) M

Solution: (a) arrangements of the question as follows.

Left Right

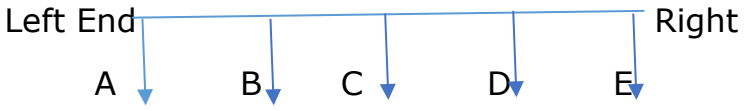
N R O P M

Therefore, O is sitting in the middle.

Example 4: Five boys A, B, C, D and E are standing in a row. D is on the right of E, B is on the E but on the right of A. D is on the left of C, who is standing on the extreme right. Who is sta in the middle?

(a) B (b) C (c) D (d) E

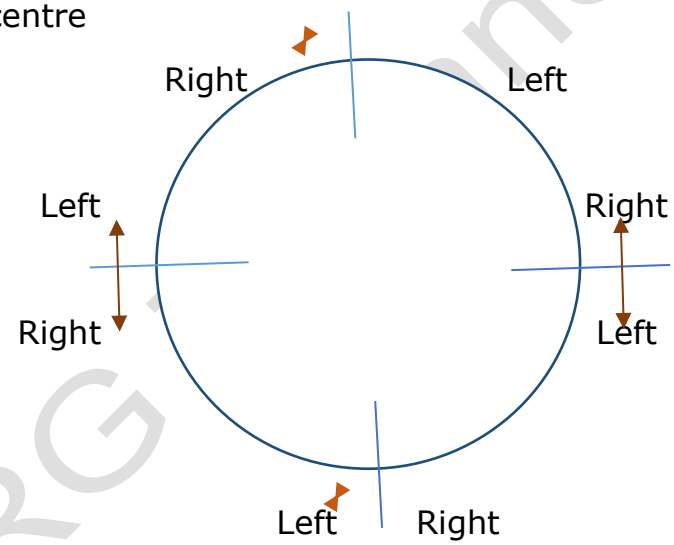
Solution: The sequence of Boys as follows.



There E is standing in the middle.

Circular Arrangement:

In this arrangement,some persons are sitting around a circle and they are facing the centre



Example 5: (Q Nos. 1 to 3) Study the following Question carefully and answer the given questions. Four ladies & A, B, C and D and Four Gentlemen E, F, G and H are sitting in a circle around a table facing each other.

I. No two ladies or gentlemen are sitting side by side
II. C, who is sitting between G and E, is facing D.
III. F is between D and A and facing G
IV. His to the right of B.

(1) Who is sitting left of A?

(a) E (b) F (c) G (d) H

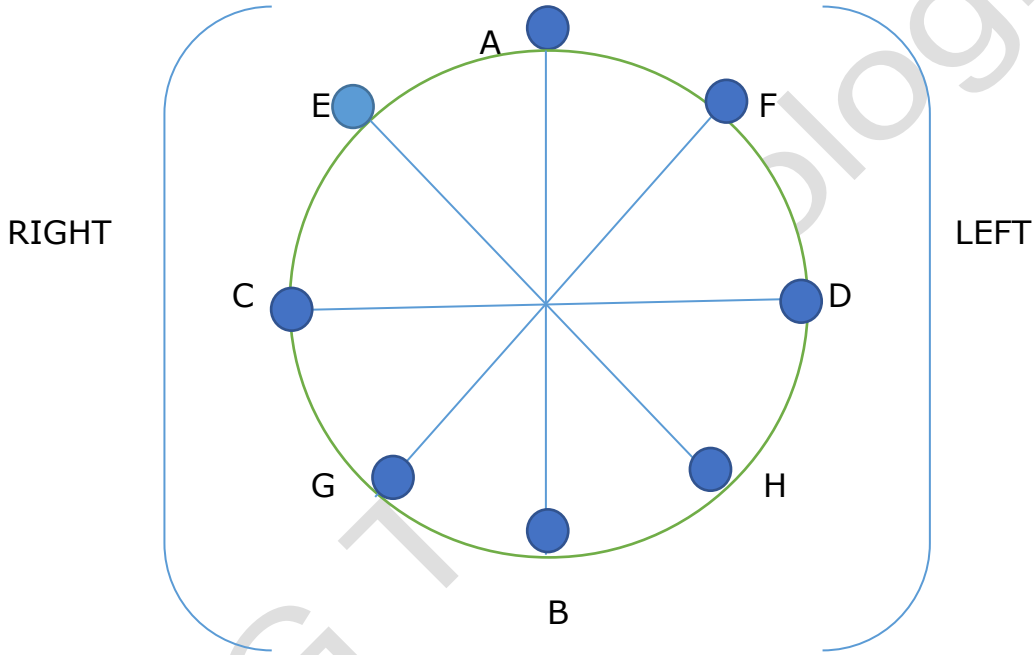
(2) E is facing whom?

(a) F (b) B (c) G (d) H

(3)Who is immediate neighbour of B?

(a)G and H (b)E and F (c)E and H (d)F and H

Solution: On the basis of given information in the question, the seating arrangements of the persons are as follows.



1) (b) Clearly, F is sitting left of A.

2) (d) Clearly E is facing H.

3) (a) G and H are neighbours of B.

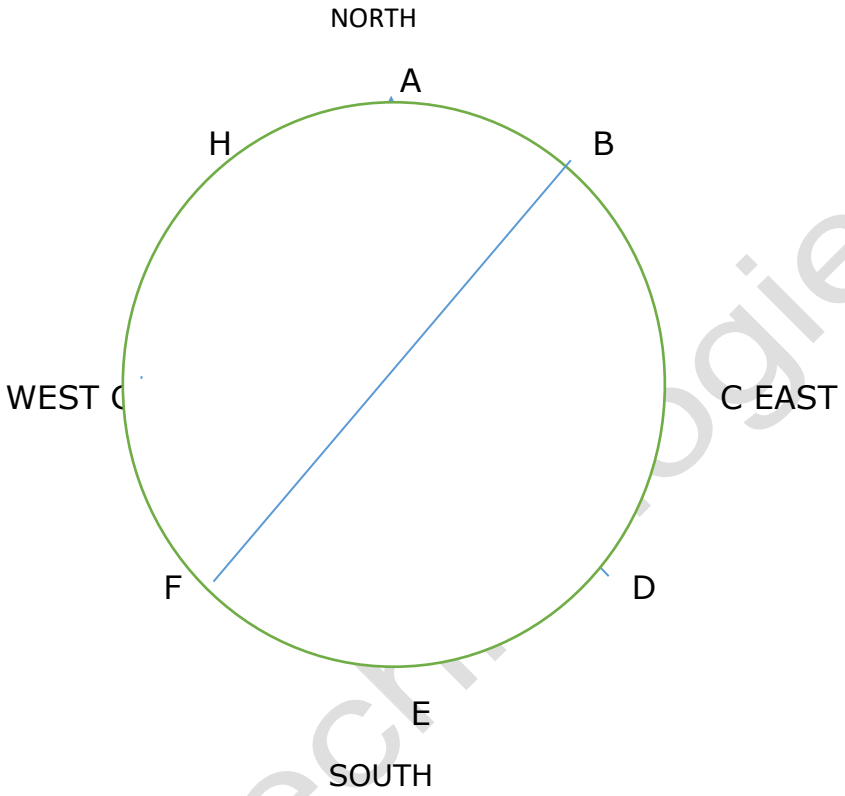
Example 6: Eight persons A, B, C, D, E, F, G and H are sitting around the circle as given in the figure They are facing the direction opposite to centre. If they move upto three places anti-clockwise, then.

(a) B will face west

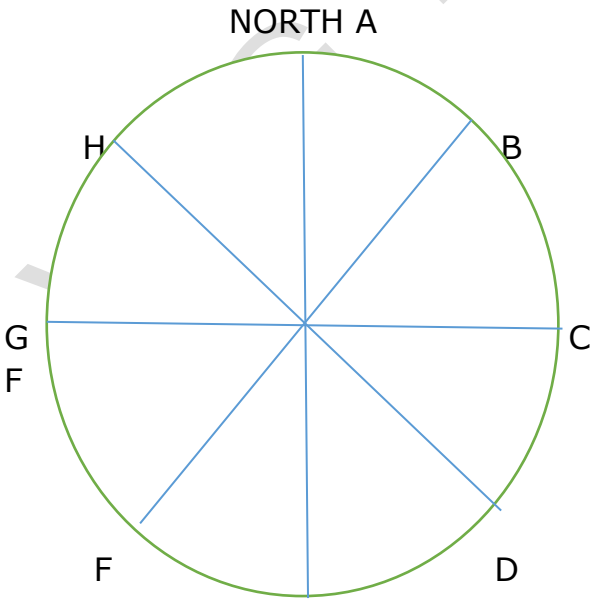
(b) E will face East

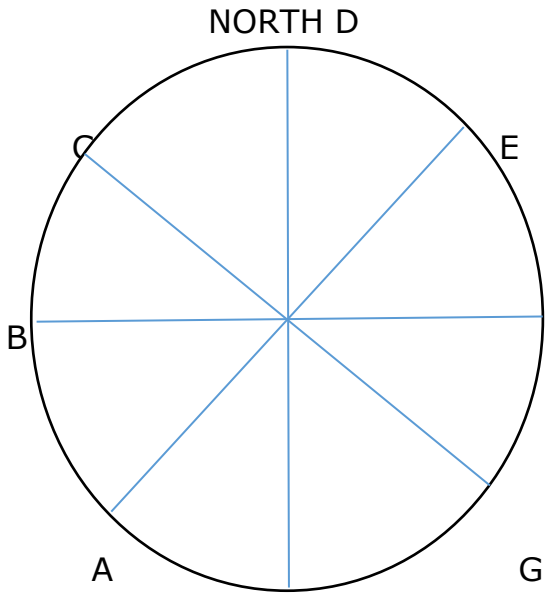
(c) H will face North-West

(d) A will face South



Solution: Following Seating arrangement is formed from the given information





E H

South Original South New Portion

Clearly B will face west

Blood relations

To remember easily the relation may be divide into sides as given below:

Relations of Paternal uncle

Father's father	Grandfather
Father's mother	Grandmother
Father's brother	Uncle
Father's sister	Aunt
Children of uncle	Cousin
Wife of uncle	Aunt
Children of aunt	Cousin
Husband of aunt	Uncle

Relations of maternal side

Mother's father	Maternal Grandfather
Mother's mother	Maternal grandmother
Mother's brother	Maternal uncle
Mother's sister	aunt
Children of maternal uncle	Cousin
Wife of maternal uncle	Maternal aunty

RELATIONS

Grandfather's son	Father or uncle
Grandmother's son	Father or uncle

Grandfather's only son	Father
Grandmother's only son	Father
Mother's or father mother	Grandmother
Son's wife	Daughter-in-law
Daughter's Husband	Son-in-law
Husband's or wife's sister	Nephew
Brother's son	Nephew
Brother's daughter	Niece
Uncle or aunt's son or daughter	Cousin
Sister's husband	Brother-in-law
Brother's wife	Sister-in-law
Grandson's or grand daughter's daughter	Great grand Daughter

The efficiency in doing the problems of blood relations depends upon the knowledge of the blood relations.

Some of the important relations are given below:

a) My mother's or father's son is my Brother.

b) My mother's or father's daughter is my Sister.

c) My mother's or father's father is my Grandfather.

d) My mother's or father's sister is my Aunt. e) My mother's or father's brother is my Uncle.

f) My son's wife is my Daughter-in-law.

g) My daughter's husband is my Son-in-law.

h) My brother's son is my Nephew.

i) My brother's daughter is my Neice.

j) My sister's husband is my Brother-in-law. k) My brother's wife is my Sister-in-law

EXAMBLE:

(1) A is B's daughter, B is C's mother. D is C's brother. How is D related to A?

(a) Father(b) Grandfather(c) Brother(d) Son

Explanation: A is daughter B.

B is mother of C. 'D' is Brother of 'A'

Therefore, D is Son of B, Thus 'D' brother of 'A'

(2) P is Q's brother. R is Q's mother. S is R's father. Tis S's mother. How is P related to T?

(a) Grand-daughter (b) Great grandson(c) Grandson(d)Grandmother

Explanation: P is brother of Q. Therefore, P is a male.

R is mother of P and Q and R is daughter of S. S is Son of T.

S is grandfather of P.

(3) A is B's brother. C is D's father. E is B's mother. A and D are brothers. How is E related to C?

(a) Sister (b) Sister-in-law (c) Niece (d) Wife

Explanation: A is brother of B. Therefore, A is male.

C is father of D. Therefore, C is male.

E is mother of B. Therefore, E is Female.

A and D are brothers.

Therefore, D is male.

Deductions:

(i) A and D are brothers of D

(ii) C is the father of A, B and D

(iii) C is the mother of A, B and D

(iv) E is wife of C

(4) B is the brother of A. whose only sister is mother of C. D is maternal grandmother of C. How is A related to D?

(a) Daughter-in-law (b) Daughter (c) Aunt (d) Nephew

Explanation: Although sex of A is not mentioned clearly in the question. On the basis of information given is A is daughter of D.

(5)A and B are sisters, R and S are brothers A's daughter is R's sister. What is B's relation to S?

(a) Mother (b) Grandmother (c) Sister (d) Aunt

Explanation: A's daughter is the sister of 'R' and 'S'

B is sister of A. Bis aunt of S.

(6) E is the sister of B. A is the father of C. B is the son of C. How is A related to E?

(a) Grandfather (b) Grand-daughter (c) Father (d) Great-grandfather

Explanation: 'B' is the Son of C and Grandson A.

E is sister of B.

Therefore, A is Grandfather of E

(7)A is D' brother. Dis B's father. B and C are sisters. How is A related to C?

(a) Son (b) Grandson (c) Father (d) Uncle

Explanation: B and C daughters of D

A is brother of D.

Therefore A is uncle of C.

(8) A is B's sister, C is B's mother, D is C's father, E is D's mother, then how A is related to D?

(a) Grandfather (b) Daughter (c) Grandmother (d) Granddaughter

Explanation: D is Father of C and B is mother of C.

Thus, A is grand daughter of D

(9) A is father of C and D is son of B. E is brother of A. If C is sister of D how is B related to E?

(a) Sister-in-law (b) Sister (c) Brother (d) Brother-in-law

Explanation: C and D are Children of A and B.

B is mother of C and D.

Therefore, B is Sister-in-law of E.

Basics of Computers Brief Document

Why Computers in important and why to know about basics of computer

- Computers are everywhere and everyone is using them! Computers are in our cars, our kitchens, our stores and in our workplaces. They are used to communicate, to play, and to make everyday tasks easier. Using a computer and the Internet will help you to keep in touch with friends and family. You will also be able to complete common tasks more quickly.
- Computers can help you pay bills or find information on health or other topics. Computers can also help you reach goals like finding a job and improving your career.

How Computer Works

Computer is a device that transforms data into meaningful information.

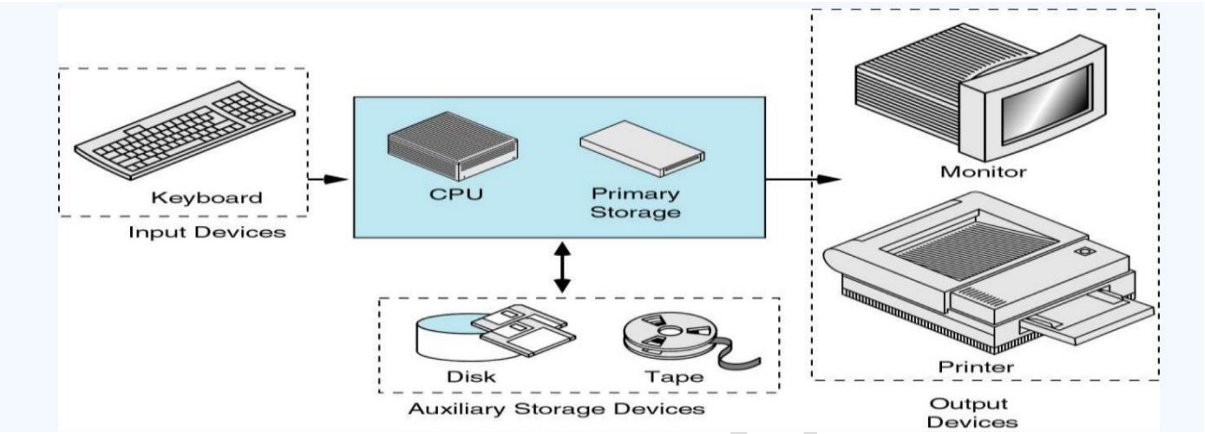
- The computer completes 4 basic functions that make up the information processing cycle.
  - Input - data that you put into the computer
  - Process - how your data changes
  - Output – data that you can take off of your computer
  - Storage – where data is stored

The way that the computer processes information is kind of like the way your own brain works.

- Input = what you take in through your eyes, ears, mouth & nose

- Processing = your brain
- Output = your verbal and written reactions
- Storage = what you save and where and what you throw away

How Computer Works



It intakes raw data, manipulates it and gives accurate output in the form of information.

Memory and Storage

Memory: RAM (Random Access Memory) and ROM (Read Only Memory)

- RAM: This is the short term memory. The computer holds information it needs while it is working. When the computer turns off, the information in RAM disappears.
- ROM: These are Instructions that are a permanent part of the computer. These instructions are built on pieces of the computer called chips. These are used to start up the computer, keep time, and do other things that never change.

Storage: This is where the computer keeps your information. There are many types of storage:

- Hard Drive: The hard drive is inside the actual computer.
- CD/DVD: You can read information from CD's and DVD's. On some computers you can also write information on CD's and DVD's.
- USB drive: This is a small object that many people use to store data. USB drives are easy to take with you from one place to another. People call USB drives other names:

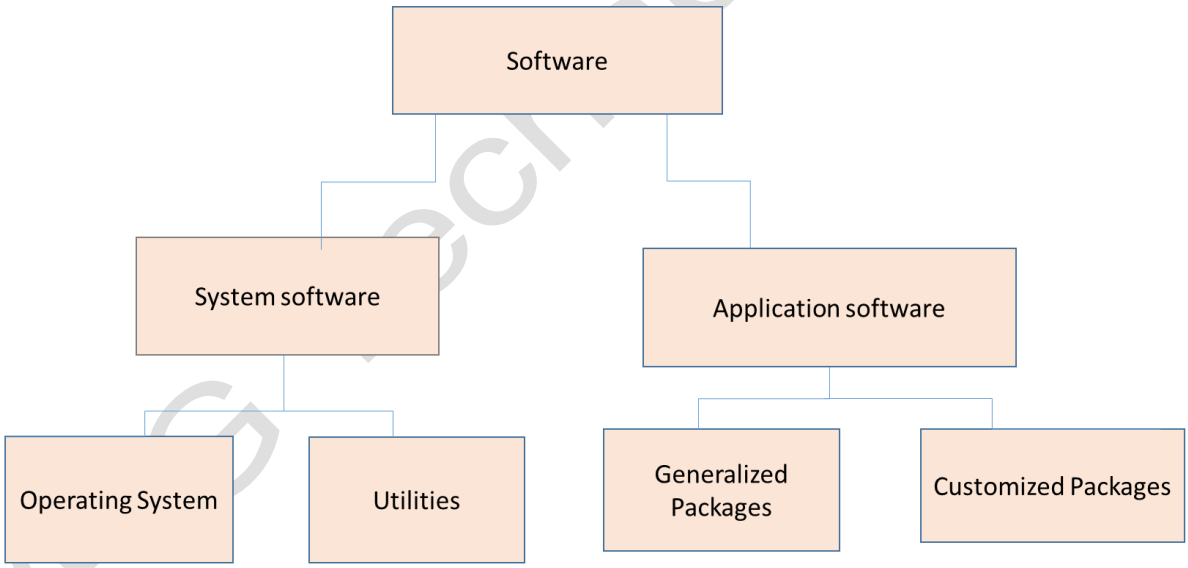
- Thumb drive
- Jump drive
- Flash drive

- The Cloud: The cloud is another word for the Internet. There are many free ways to store information in the cloud. Some examples are Google Drive, Dropbox, and OneDrive

Software

- Computer cannot do anything on its own. It is the user who instructs computer; what to do, how to do and when to do.
- In order to perform any task, you have to give a set of instructions in a particular sequence to the computer. These sets of instructions are called Programs.

Classification of Software



1. System Software

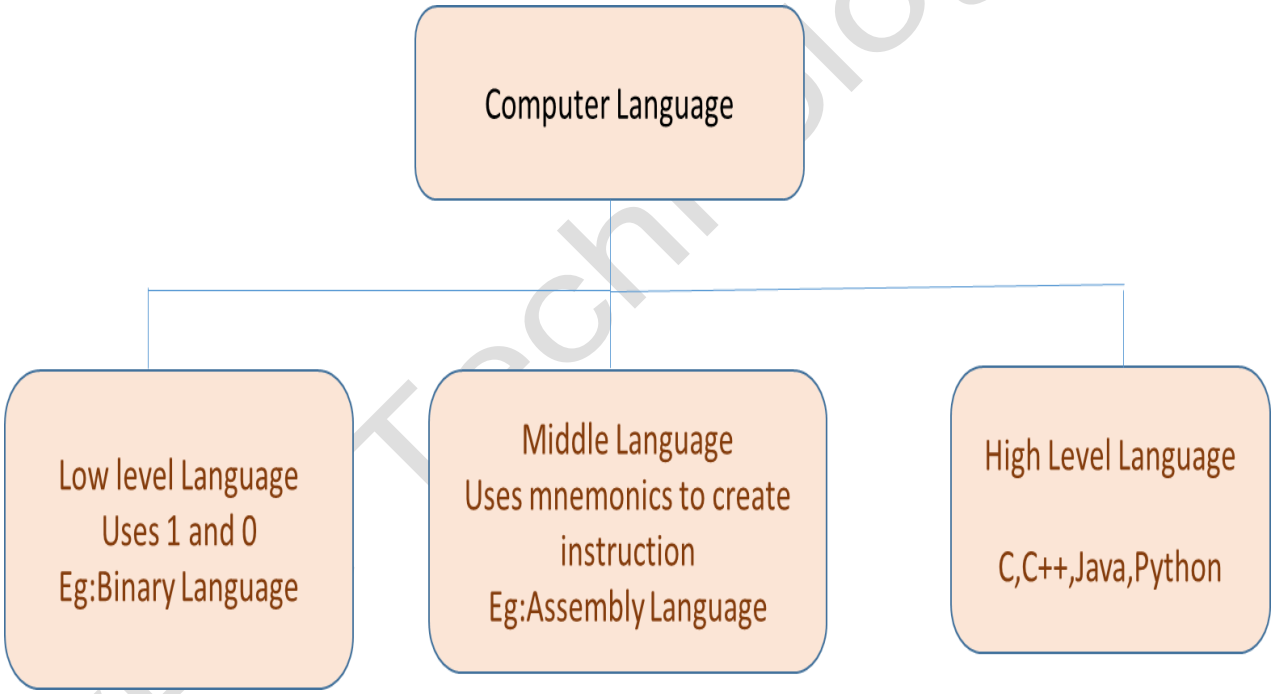
This software works with the operating system. It controls how you, the Software, and the hardware work together. Windows, Apple, Android, and

Chrome are common operating systems. Computers and laptops usually use Windows or Apple. Cell phones and tablets usually use Apple, Android, or Chrome software.

2. Application Software

This software is what the computer uses to carry out a job as specified by the user.

COMPUTER LANGUAGES



Compiler, Assembler and Interpreter

- The software (set of programs) that reads a program written in high level language and translates it into an equivalent program in machine language is called as Compiler.

- The program written by the programmer in high level language is called source program and the program generated by the compiler after translation is called as object program
- The software (set of programs) that reads a program written in assembly language and translates it into an equivalent program in machine language is called as Assembler
- An interpreter is a program that directly executes the instructions in a high-level language, without converting it into machine code. In programming, we can execute a program in two ways.

Commonly used Internet terms

1. Internet
   - A global network web of millions of computer networks linked and accessible to users around the world.

2. Website
   - A collection of World Wide Web pages or files.

3. Homepage
   - The first page that is viewed when the browser starts. It is also the page of a Web site that provides the introduction or content with links.

4. Domain Name
   - A method of identifying computer addresses. Infact every e-mail address has a domain address.
   - For e.g. – an email address with extension of ".com" refers email having business account. If a mail address has an "edu" at the end of your e-mail address that means the account is affiliated with an educational institution.

5. WWW
   - World Wide Web. WWW is an interconnected computer system which links documents and pictures into a database stored and distributed globally across computers and can be accessed from everywhere.

6. HTTP

- HTTP means Hypertext Transfer Protocol. HTTP is the underlying protocol used by the World Wide Web and this protocol defines how messages are formatted and transmitted, and what actions Web servers and browsers should take in response to various commands.

7. Hyperlink

- A hyperlink may be a word, button or an image that you can click on to directly to a new document or page on a different website. Hyperlinks are extensively used in nearly all Web pages, allowing users to jump from page to page.

8. Search Engine

- A search engine is a web site that collects and organizes content from internet. Search engines are search documents/pages/content for specified keywords as input by Internet users and returns a list of the content where the keywords were found.Eg Google,Yahoo

9.URL

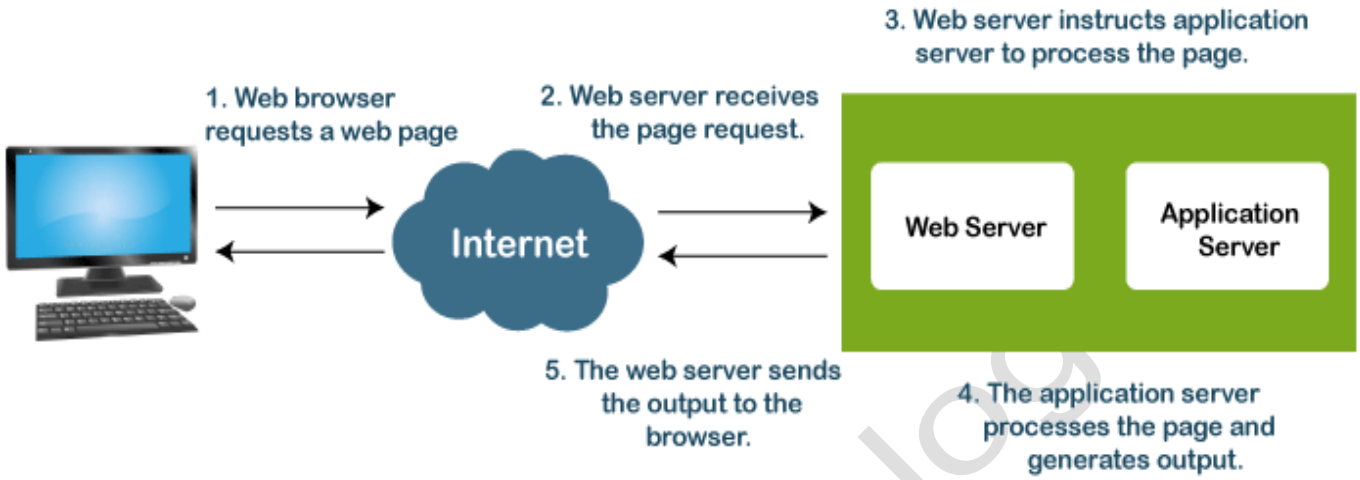
"Universal Resource Locator", URL is another name for a web address, the text that users input into internet browser when a website needs to be accessed.

10. Web browser

- A web browser is a software program software that searches for, retrieves, and presentations material which includes Web pages, photos, videos, and different files.
- The browser sends a request to the Webserver, which then transmits the statistics returned to the browser, which presentations the findings at the laptop.
- Example – Mozilla Firefox, Microsoft Edge, Google Chrome, Safari etc.

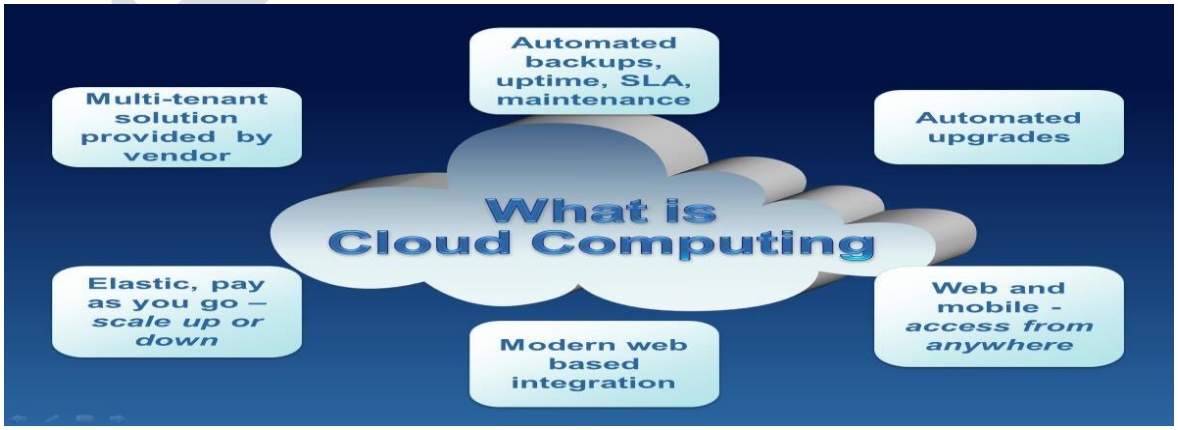
A Web Application

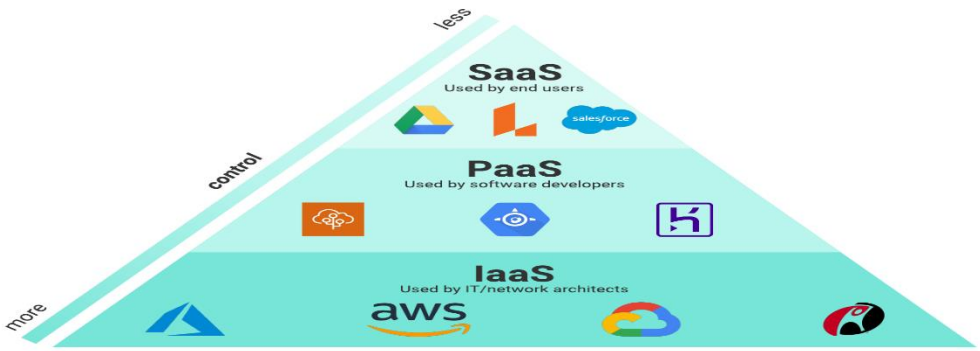
- A web application (web app) is an application program that is stored on a remote server and delivered over the internet through a web browser interface



Cloud computing

Cloud computing is a range of services delivered over the internet, or "the cloud." It means **using remote servers to store and access data instead of relying on local hard drives and private data centres**.





1.SaaS

Software as a service (SaaS) is a software distribution model in which a cloud provider hosts applications and makes them available to end users over the internet. In this model, an independent software vendor (ISV) may contract a third-party cloud provider to host the application. Or, with larger companies, such as Microsoft, the cloud provider might also be the software vendor.

2.Paas

Platform as a service (PaaS) is a complete development and deployment environment in the cloud, with resources that enable you to deliver everything from simple cloud-based apps to sophisticated, cloud-enabled enterprise applications.

3.IaaS

IaaS (infrastructure as a service) is a cloud service model that offers on-demand infrastructure resources, such as compute, storage, networking, and virtualization, to businesses and individuals via the cloud.

Microsoft Office

Microsoft Office is a suite of applications designed to help with productivity and completing common tasks on a computer.

You can create and edit documents containing text and images, work with data in spreadsheets and databases, and create presentations and posters. Word,Excel and PowerPoint.

Applications of MS Office

- Microsoft Word: Helps users in creating text documents.
- Microsoft Excel: Data visualization, faster calculations, organization and reconstruction, filtering, planning, and many more
- Microsoft PowerPoint: Application for creating Multimedia Presentation
- Microsoft Access: Database Management application
- Microsoft Outlook: Send and receive email messages, manage your calendar, store names and numbers of your contacts, and track your tasks.

Communication Skills

Business English Phrases

LANGUAGE FOR INTERVIEWS

A good example that comes to mind...

I'm particularly proud of...

Timekeeping is important to me.

STRUCTURING ANSWERS FOR INTERVIEW

Firstly, this job is an ideal match for my skills and experience.

Secondly,...

Above all, the reason I want this job is...

Language for making suggestions

Can I make a suggestion?

Why don't you try...?

Have you tried asking your colleagues?

Maybe I could do a big office search for you...?

How about looking through your rubbish bin...? I have an idea.

Introducing yourself

Hello, I don't think we've met.

You must be Tom.

I've just joined the team.

Nice to meet you!

Have you worked here long?

Language for polite requests

I was wondering if you could do something for me...

Would you be able to print out a file for me?

Could I have it within ten minutes please?

Could you possibly help me with the printer?

Would you mind writing your email later?

Language for offering help

Is there anything I can do?

Let me help.

Can I give you a hand?

Give me a shout if you need anything.

I have an idea!

Apologizing

I'm really sorry to hear that.

That's totally unacceptable.

It must have been very inconvenient for you.

You have my word that we will sort this out.

And we could include some of our latest-edition imitation oranges to make up for the inconvenience.

I promise you, it won't happen again.

Language for giving praise

Well done.

You were in a difficult situation and you handled it well. Great job.

I'm really impressed.

Language for checking information

I just want to make sure that...

Could you possibly clarify...

I just want to check...

Just to be absolutely clear...

One thing I wasn't sure of was...

Language for disagreeing

Well, I'm not so sure about that...

I see your point but I actually think...

Language for working long hours

Burning the candle at both ends.

Doing overtime.

Putting in the hours.

Burning out.

Language for opening a presentation

Today I'm going to ….

(and explain) I'll start by…

Then I'm going to move on to discuss…

And finally…

Giving feedback

I'm a little bit concerned about...

You need to work on...

Perhaps you should think about..

Language for talking on he phone

Hello? Tip Top Trading. This is Anna speaking.

Hello? Anna speaking.

Hello Mrs. Smith, how can I help you?

Hello Mrs. Smith, how are you?

I'm really sorry, he's not available at the moment. Can I take a message?

I'm afraid he's busy - shall I ask him to call you back? Thank you for calling, goodbye.

Language for politely refusing

Thank you for your offer. But I'm really sorry, I won't be able to.

I'm afraid it is against company policy…

It wouldn't be appropriate.

With regret, I'm going to have to say no.

Language for placing an order

I'd like to place an order for...

We're going to need...

Could you send...

Could we also have...

When can we expect to receive them?

Language for writing an email

Dear Mr. Lime...

I hope you are well.

I am writing regarding...

Please could you confirm...

Best wishes.

Language for explaining a misunderstanding

I think there's been a misunderstanding.

There's been a bit of a mix-up.

Let me explain what happened.

Language for setting an agenda at a meeting

There are four items on the agenda today. Firstly...

Secondly...

After that...

Then...

And finally...

Any other business.

And then we can wrap up.

Language for asking for help

I would be most grateful if you could give me some help.

Please could I ask you for some advice?

I know you're busy but could you spare me a few minutes of your time please?

Language for making polite requests

Would you mind not doing that please?

I'm afraid it's against company policy.

I'm afraid it's not permitted.

Sorry to have to ask you this but…

Language for health and safety

If you see a fire, raise the alarm.

Walk calmly to your nearest fire exit.

Meet at the fire assembly point.

No smoking on company premises.

Language to use in an emergency

There's no need to panic.

Please leave the building and meet outside.

Use the stairs not the lift.

Is anybody missing?

Language for booking a hotel room

Hello, I'd to check availability and prices for a room please.

Does the price include breakfast?

Are there any business facilities such as internet and wi-fi?

I'd like to go ahead and make the reservation please.

Language for complaining

I'm very disappointed with your service.

The standard of service is not good enough.

The room I booked did not meet my expectations.

I would like this matter resolved as quickly as possible,… I would like to cancel my reservation and get a full refund.

Language for delivering bad news

I've got to give it to you straight

The outlook is gloomy

I've got to announce a profit warning

Language for keeping the language professional

It's not appropriate to talk like that…

Could we change the subject, please?

Can we keep our conversation professional, please?

Language for making a cold call

My name is Anna. Can you spare a few minutes of your time?

I'd like to tell you about our great new…

How much (……..) do you buy?

Thank you for your time. We hope to hear from you soon.

Language for negotiation

What kind of price are you willing to pay?

I don't think we can go that low.

If you buy more stock I can offer you a bigger discount.

I'll meet you halfway.

Further language for negotiating a deal

I'm sorry to hear you're not happy with our price.

Tip Top Trading prides itself on quality products and good value for money.

You are a valued customer and your business is very important to us.

We can match the price of our competitors.

Language for project management

We've got to compete on price.

We need to price our rivals out of the market.

We need to corner the market.

We need to build good relationships with our customers.

Language for booking a flight

What is the outbound and return date?

Do you want to fly business or economy?

Do you want a fixed or flexible ticket?

Would you like a window or aisle seat?

Have you got a frequent flyer number?

Language for clinching the deal

Thank you for sparing the time to see us.

Each lemon comes with a satisfaction guarantee - I know you won't be disappointed.

I would be grateful if you could just sign the contract.

Thank you. It was a pleasure doing business with you.

Language for briefing the manager

It's good news – I've closed the deal with and the contract is signed.

We need to proceed with the order as quickly as possible.

I'm committed to getting the order delivered on time… but I will need some help.

Language for working with someone new

I understand you have lots of experience so I would like to use your skills to help with the task.

Together we can do this job really well.

Let's discuss this so we can agree on a plan of action. Please respect my decision and let's move on.

Language for dealing with a difficult colleague

I'm concerned that she's made a mistake that might affect the business.

She's not pulling her weight.

I'm finding it very difficult to work with her.

Language for maintaining good customer relations

Hello I'm Anna from Tip Top Trading. How are you today?

I hope you have received our order and are happy with it.

We do hope you are pleased with our service and that you may use us again.

Do you have any questions you may want to ask?

Language for giving someone a verbal warning

You've made some serious mistakes.You need to consult me before you contact any of our clients.

These mistakes cannot happen again otherwise

I will have to refer the matter to someone higher.

Language to use in an appraisal

What has gone well for you this year? Give me some examples.

And what didn't go so well?

What should you do more of?

Let's look ahead and set some objectives.

Language to use in a health and safety report

How did the accident happen?

What was the cause of the accident?

Were there any injuries?

How could the accident have been avoided?

Language to use in a business proposal

Exceptional! Fantastic!

Quality. Profit.

Efficiency.

Value for money.

Language to use in customer research

Could I ask for your opinion on a new product we are hoping to develop?

What (plastic products) do you currently use?

What products would you like to see us sell in the future?

How do you feel about the idea of selling (plastic vegetables)?

Any particular (vegetable) you would like to see?

Language to use in dealing with IT (information technology) problems

I am having problems with my computer.

The screen keeps freezing.

I seem to have lost some documents.

I have turned the computer off and on but that hasn't fixed it. Can you help, please?

Language to use in an 'elevator pitch'

We've come up with an exciting new product.

This fantastic product will be a great addition to table decorations in the cafe and restaurant market.

We can increase efficiency but maintain quality.

By my calculations, we can increase profits by 20%. I'm confident this new product will be a huge success.

Language to use when you're in charge

If anyone has any issues about their work please come and speak to me.

I would like to have a meeting to discuss our work.

If there is anything you want to ask, my door is always open.

Language to use for clearing up confusion

There are some rumours going around that are not true.

Please don't listen to rumours.

I am trying to establish the facts and if I get any information

I will let you know straight away. Ignore the rumours and please don't pass them on.

Please just carry on with your work as normal. Thank you.

Language for networking

Excuse me, hello, I'm Anna. I work as a Sales Executive at (Tip Top Trading).

Can you tell me about your company?

Can I briefly tell you about what our company does?

I think we might be able to help you.

Here's my business card should you want to call.

Language to use when accepting an award

Ladies and gentlemen, on behalf of everyone at (Tip Top Trading),thank you for our award.

Our company is at the forefront of (plastic) innovation.

This award is a real boost for everyone working at the company. This award really means a lot to us.

Language to use when making someone redundant

We've got to move the furniture around.

I'm afraid I've got to let you go.

I'm giving you seven days' notice.

Other related language:

Facing redundancy

Getting the sack

Terminating your employment Leaving the company

Language to use for conveying your ideas to others

I have a specific idea in mind.

I'm interested in hearing your thoughts on how to improve my idea.

I'd like to use your design skills to produce a fantastic product.

I need to sign off your designs before they go into production.

Language for helping others with advice about their career

You need to think positively.

Try looking in the job section in the newspaper.

There are loads of job-finding websites you could sign up for.

What about ringing some of the people you know?

You could register with a recruitment agency.

Language to use when taking a phone message at a busy time

We're a bit busy at the moment; could I take your name and we'll call you back?

When would be a convenient time to call you?

Could I take a message please and I'll make sure he/she calls you back?

Language for justifying your position

You're the boss and I think the news is better coming from you.

It was your decision in the first place so you need to explain that the situation has changed.

This is your responsibility.

And here are some phrases your boss might use to apologise:

I've been rethinking our staffing situation in the office.

Sorry, I made a mistake.

I miscalculated my staffing numbers. I would love to have you back in the office.

Language for telling someone what to do

Let me show you the ropes. Watch what I do for a while.

Why don't you make a start on this?

I'm here to help, so please ask me if you need to know what to do.

Language to use when trying to set priorities

I've got to prioritise. This task is the most important so I'm going to concentrate on this first.

It would be a great help if you could do this for me please.

I'm going to have to put that off until tomorrow I'm afraid.

Language for booking a venue

Could I check availability for your venue please?

What business facilities do you have?

How many people can the room or venue hold?

Can you provide hospitality?

How much does it cost?

Language for getting things done quickly

We've got to pull out all the stops.

We have an order we need to process urgently.

We need to pull out all the stops to get this sorted.

Language for presenting a new product

It is made of the highest quality plastic and I'm convinced it's something your business needs.

This product has been designed to the highest specifications. It's tough and durable. It is the perfect decoration on any café or restaurant table.

We can offer you a generous discount. Plus, all our products come with a money back guarantee.

Language related to getting the sack

I've been doing a strategic review of the company.

I need to downsize.

I need you to step aside.

The company needs new direction and more dynamic leadership.

You are surplus to requirement.

Language relating to being offered and accepting a promotion

This promotion recognises your achievements at the company.

It's an opportunity of a lifetime.

You would be my right-hand man/woman.

And what you might say:

I'd be delighted to accept. Thank you.

When would I start?

Could we discuss the terms and conditions of the new job?

Language to announce your decision

I have had some head space and a chance to chew things over.

I've come to a final decision.

I'll give it a go.

You won't regret your decision.

Language to persuade someone to change their mind

Don't be too hasty.

Don't rush into making a decision.

Language for getting down to business

I'll be advertising for a replacement for Tom today.

I want to make some changes in the office.

I need to turn this business round.

I'm keen to hear your ideas.

Language to say you've changed your mind

I've been doing a lot of thinking.

I didn't realise how much I missed you until you had gone.

I've changed my mind, I will postpone the meeting!

Business English Words and Phrases

1. Cut corners

"The new filing system won't work if we cut corners."

"To cut corners" is to complete a task in a fast and careless way. It means to do something without paying attention to details, thereby making mistakes or causing new problems.

2. Back to the drawing board

*"The client hated your proposal, so we'll have to go **back to the drawing board**."*

*"He's going **back to the drawing board** on this one."*

To go "back to the drawing board" means to start again from the beginning with completely new ideas. The phrase makes you think of a blackboard being wiped clean. It is most often used when an idea or project is rejected.

It sounds quite friendly when you use it to say that you're scrapping your own idea. However, asking someone else to "go back to the drawing board" on a project can come off a bit strong!

3. Call it a day

*"Right team, we've made plenty of progress, I think it's time to **call it a day**!"*

*"The trial hasn't worked, I'm afraid we're going to have to **call it a day**."*

To "call it a day" means to quit working on a project, assignment, or task for the rest of the day because you have reached a good stopping point. It can be negative or positive, depending on the context.

Taken literally, it is a phrase stating that the working day is officially over; as in, that was a whole day of work, and I now declare that day finished!

4. Workflow

*"I am having some **workflow** issues and won't be able to help you until next week."*

*"How is your **workflow** at the moment?"*

This extremely ungrammatical business phrase has become very common in offices. "Workflow," unsurprisingly, refers to the pace and sequence of tasks that an employee is expected to complete.

When someone says that they have "workflow issues," they often mean that they are overworked. It places the blame on the "flow" of incoming tasks (i.e., communication within the workplace) rather than the work itself, which is quite smart, and a good way of explaining a missed deadline!

In rare cases, the term "workflow issues" also describes not having enough work. Most companies actually use project management software to manage their workflows and projects to not have workflow issues.

"How is your workflow?" is a way of asking a colleague whether they have too much work to do, or whether they feel underused. People can be reluctant to answer or ask a direct question about how busy they are at their job, so this is a polite way to talk about the problem.

5. Touch base

*"If you could just **touch base** with Ritesh after the meeting, that would be great."*

To "touch base" with someone is to talk to them, whether digitally or in person, and usually briefly. It typically describes keeping someone up-to-date with developments on something you are both working on.

This is an expression that business jargon has adapted from the world of sports. In baseball, players touch a base with their feet in order to be "safe."

6. Reach out

*"Don't hesitate to **reach out** to Helen if you have any questions."*

To "reach out" is to get in contact with someone, usually a person who you do not know well. It is very common, but can seem like a very strange use of the word "reach," which implies physical stretching!

7. Keep me in the loop

***"Keep** Stuart **in the loop** when discussing the merger, please."*

"Keep me in the loop *on decisions about the targets for the next quarter."*

To "keep me/you/her/him/them in the loop" means to keep someone involved and updated about developments in a project or situation. It comes from "looping" someone into an email chain — that is, cc'ing them into the digital conversation. In addition, you can "keep someone in the loop" by informing them of what happens in meetings, and alerting them when decisions are made.

8. Drill down into

"I think we can ***drill down into*** *this further when we meet with the Product team."*

To "drill down into" something is to explore it in more depth.

9. As of yet

"As of yet*, we have no plans to hire a Social Media Manager."*

This is very commonly seen in emails, and means "at the moment."

10. Forward planning

"I think we need a degree of ***forward planning*** *on this issue."*

Many business terms make basic concepts sound complicated to come across a little more impressive, and this is one of them. "Forward planning" just means "planning," since all planning is done for activities that will take place in the future.

11. At the end of the day

*"****At the end of the day****, we did the best we could in a difficult situation."*

Despite the reference to the ending of the day, this phrase has nothing to do with time or with going home after work. It means "when everything is taken into consideration" and is used to signify that a speaker is giving their concluding statement on a matter. It can be exchanged for the word "ultimately,"

"At the end of the day" is often heard in business English but is also quite informal.

12. Proactive

*"I would really appreciate it if you could be **proactive** in attracting new clients, George."*

This word is not solely used in corporate speak, but it is overused in an office setting. To be "proactive" is to take the initiative on something — which usually means embarking on a new task yourself, without waiting for your colleagues or boss to prompt you. It might also mean taking the first step in contacting someone you are going to work with.

13. Action points

*"I came out of the meeting with three **action points**. One – email Facilities about the printer…"*

*"As an **action point**, I will listen to some training podcasts."*

"Action points" are, as you might guess, proposals for specific actions to be taken. This phrase is often heard towards the end of a meeting, or written at the end of a long email.

It is not grammatical, but it is useful since it indicates that you intend to translate ideas from a discussion into practical steps.

14. Actionable

*"I love your idea about painting the fence, but I don't think it's **actionable** at the moment."*

To describe something as "actionable" means that it is possible to get it done.

15. Cut to the chase

*"Let's **cut to the chase**: are you going to finish the report on time, or not?"*

To "cut to the chase" means to "get to the point without wasting time." It was first used in the movie industry to mean "skip to the car chase" — the most interesting and action-packed part!

It is quite an informal and lesser-used business idiom, but a useful term to be aware of.

16. Get the ball rolling

*"Hopefully, we can **get the ball rolling** on the new pitch next week."*

To "get the ball rolling" means to get started on something or to begin making meaningful progress.

17. Stay ahead of the curve

*"We need to **stay ahead of the curve**, otherwise our competitors will wipe us out."*

Something — like a product or company — that is "ahead of the curve" is more advanced than others of its kind. "The curve" refers to a line on an imaginary graph that shows the growth of a trend. For instance, Instagram was "ahead of the curve" in anticipating how much people would enjoy sharing pictures of their lunch.

To "stay ahead of the curve" is to maintain any advantage you have gained over the competition. It is also sometimes used more generally to describe the need to work hard to avoid losing progress.

18. Due diligence

*"We've done our **due diligence** in researching the candidates and none of the other contractors seem more qualified."*

Until very recently, "due diligence" was a term only used in a legal context. It used to describe the action that is considered reasonable for people to take to stay safe and on the correct side of the law.

In business jargon, "due diligence" refers to the necessary research behind a good decision. If you have done your "due diligence," you have given an issue the attention it deserves and weighed alternatives to the action you intend to take.

19. Best practice

*"The CEO decided that organized desks are **best practice**."*

*"I completed the article following all the SEO **best practices**."*

A "best practice" is a method accepted to be the most effective way of doing something. It can be industry-wide or specific to a company. Many businesses encourage employees to follow a set of "best practices" described in a company

handbook — that is, the rules, procedures, and techniques to use in day-to-day operations.

20. Upskill

*"We chose to **upskill** a junior employee rather than hire someone senior straight away."*

This business term is another formal yet ungrammatical replacement for an existing word: to train. To some, "upskilling" sounds more youthful than "training." Regardless, both terms mean to teach employees additional competencies or skills needed to do their jobs.

21. Dynamic

*"We launched a **dynamic** new website in February."*

The word "dynamic" is not exclusive to corporate speak, but it is over-used in professional settings. It is often heard as a more office-friendly way of saying "exciting," "interesting," or "new."

22. Streamline

*"We need to **streamline** the archiving process; it's taking far too long to organize our filest."*

To "streamline" is to simplify and expedite a process by eliminating unnecessary work. Beware if someone talks of "streamlining" your team: the word is sometimes used to hint that non-essential employees will soon lose their jobs.

23. Align

*"I think we need to **align** with the customer service department on this issue."*

Businesses with high staff numbers often talk about "alignment" between teams. This means ensuring that different departments are working towards the same goals, and not accidentally working against each other or doing similar tasks without sharing what they have learned.

If your boss says you "need to align" on something, that usually means a meeting is coming up soon to get everyone on the same page.

24. Go the extra mile

*"We always **go the extra mile** for our customers."*

To "go the extra mile" is to put more effort into a task in order to gain a result which is even better than what was expected or necessary. If someone says you "went the extra mile" on a project, they are praising your work ethic and/or the work you produced!

25. Expedite

*"Can you ask Basil to **expedite** the payment process for this, please?"*

The word "expedite" is a little old-fashioned for standard conversation, but it is commonly heard in business English. It is a formal way of saying to "speed up."

26. Down the line

*"They won't make a difference now, but we will benefit from positive reviews **down the line**."*

"Down the line" is a friendly expression for "at some point in the future." It generally refers to an action that will occur in a few months or years' time, but this time frame is vague.

Anything that is promised "down the line" will almost certainly happen. That said, it is a useful phrase for making promises you aren't sure you can keep or referring to results you are not confident in!

27. Micromanage

*"Olga is a good boss because she doesn't **micromanage** her team."*

This is a negative word employees might use to discuss the behaviour of controlling bosses. To "micromanage" someone means, literally, to manage them on a micro level.

In other words, to watch the details of their work too closely instead of giving them the chance to take responsibility for the work themselves. If your boss stands behind your desk and edits your emails, you might feel that they are "micromanaging" you.

28. Going forward

*"We need to find out if increasing the budget will be sustainable **going forward**."*

*"**Going forward**, I want you to work on your time management."*

The phrase "going forward" is extremely common in business English, especially in emails. It is a more formal way to say "from now onwards."

It refers to an action that will start now and continue into the immediate future indefinitely.

29. Let go

*"We need to **let** Simon **go**; he has been very late almost every day this month."*

*"Due to budget cuts, half of the Video Team has been **let go**."*

"Let go" is a gentle way of saying employees are being fired or made redundant. It is more commonly heard than "fired" since it is considered much more polite. The word "let" sounds like it could refer to someone leaving their job willingly, but this is not the case: "let go" is never used to talk about someone who has left a company by choice.

30. Close of play

*"We're going to need the report by **close of play** Wednesday."*

This is one of the many English idioms which was stolen from the world of sports. In cricket, "close of play" refers to the end of a day's matches. In the office, it refers to the end of the working day.

Business Vocabularies for work and career

1.team-player (n)

She has all the qualities of an excellent team-player.

2.collaborate (v) / collaborative (adj) / collaboration (n)

A British company collaborated with a French firm to develop the product.

3.coworking / shared workspace (n)

One of the benefits of coworking / shared workspace is that people don't have the isolation of working from home or in a noisy café.

4.start-up (n)

Many start-ups fail in their first year because there is little or no market for their product.

5.entrepreneur (n)

These entrepreneurs made their money in technology and media.

6.multinational (n)

Tesco is one of the biggest multinationals in the UK.

7.disruption (n) / disruptive (adj)

Airbnb, Netflix and Uber are examples of disruptive brands that have created new markets.

8.gig economy (n)

In a gig economy, workers are paid for the "gigs" that they do, such as couriers for delivery companies.

9.budget (n/v)

The marketing budget will be announced in the next meeting.

10.diversify (v) diversification (n)

The company has diversified into new product areas.

11.expand (v) / expansion (n)

We're planning to expand our sales division next year, so we'll be hiring 100 new staff.

12.freelance (n)

After working at the company for many years, he decided to go freelance.

13.consultant (n) / to consult (v) / consulting (n)

He now works as an IT consultant in various organisations.

14.skill set (n)

We offered her the job as she has the right skills set for it.

15.launch (n/v)

They're launching their new product tomorrow.

16.revenue (n)

We really need to increase our revenue from ticket sales.

17.sector (n)

Salaries in the public sector have fallen again.

18.invest (v) / investment (n)

It's important for companies to invest in their staff.

19.leadership (n) / lead (v)

Her leadership style has been described as democratic as she asks for input and considers feedback from her team before making a decision.

20. deadline (n)

He's met all of his important deadlines this month.

21. **core business (n)** *The company has decided to focus on their core business – affordable fashion.*
22. **go into administration (v)** *The company has gone into administration as it is unable to pay back its debts.*
23. **added value (n)** *With her experience and contacts, the new Business Development Manager clearly offers added value.*
24. **emerging markets (n)** *Emerging markets such as Mexico and Indonesia are popular with traders as they tend to experience fast growth.*
25. **agenda (n)** *There are several items on the agenda for today's meeting.*
26. **sustainability (n) / sustainable (adj)** *High-sustainability organisations take into account environmental and social performance of the company, as well as financial performance.*
27. **outsource (v) / outsourcing (n) / insourcing (n)** *Companies may choose to outsource their IT support in order to reduce costs.*
28. **merger (n) / merge (v)** *The merger between these two companies has created the world's second biggest carmaker.*
29. **takeover (n) / take over (v)** *Employees are often concerned about losing their jobs when a bigger company takes over their firm.*
30. **crowdfunding (n)** *They raised money for the film through crowdfunding.*
31. **board of directors (n)** *She currently sits on the board of directors.*
32. **brand awareness (n)** *Working with influencers on social media is an effective way of increasing brand awareness.*
33. **staff (n)** *10 members of staff are attending the conference.*
34. **impact (n)** *Social networks are making a huge impact on sales.*
35. **capital (n)** *We need to raise more capital in order to implement our new strategy*
36. **close a deal (v)** *After months of negotiations, we finally closed the deal.*
37. **competitor (n) / compete (v) / competition (n)** *Our major competitor is able to offer much lower prices.*
38. **conference call (n)** *Conference calls have reduced the need for business travel.*39. **retailer (n)** *Many high-street retailers are closing stores due to competition from online outlets.*
40. **creditor (n)** *We need to pay our creditors by the end of next month.*

41. **economies of scale (n)** *Bigger companies that operate globally often benefit from economies of scale.*
42. **HR / Human Resources (n) / (adj)** *As an HR professional, I specialise in training and development.*
43. **network (n/v)** *Conferences provide a great opportunity to network.*
44. **project (n)** *I'm working on an exciting new project.*
45. **go public (v)** *Many private companies go public by selling shares on the stock exchange; one example is Manchester United plc.*
46. **shareholder (n)** *Shareholders own shares in a company and are usually paid dividends when the company makes a profit.*
47. **stakeholder (n)** *Stakeholders of a company include employees, suppliers, customers, shareholders and the local community.*
48. **digital strategy (n)** *Digital strategy involves the use of new technologies to maximise a company's competitive advantage.*
49. **overheads (n)** *Overheads, or ongoing business expenses, include rent, utilities and insurance.*
50. **balance sheet (n)** *A balance sheet reports a company's assets, liabilities and shareholders' equity at a given point in time.*

Business Idioms

1) Ahead of the pack

to be more successful than other people who are trying to acquire the same things as you

Example:

Our new management system has kept the company far **ahead of the pack** in terms of product development.

2) Back to square one

If someone is back to square one, they have to start working on a plan from the beginning because their previous attempt failed completely.

Example:

If this idea doesn't work you're **back to square one**.

3) Bring something to the table

to provide or contribute something that will be a benefit

Example:

Dev was the right person to hire – he **brings** a lot of experience and some important skills **to the table**.

4) By the book

by following the official rules very strictly

Example:

Our boss insists on doing everything **by the book**.

5) Call it a day

to stop doing something because you do not want to do any more or think you have done enough

Example:

I've been studying hard – I think I should call it a day.

6) Call the shots (also call the tune)

to be in charge of what is happening and what should happen

Example:

Your staff has to do what you say because you're the boss, and you **call all the shots** here!

7) Corner the market

If a company corners the market in a specific product, it is more successful than any other company at selling that product.

Example:

The company quickly **cornered the market** on video games.

8) Cut corners

to not do a task as thoroughly as you should, especially because you want to finish it quickly or save money

Example:

You could finish this project early only if you **cut corners**.

9) Cut-throat

a cut-throat situation or activity is one in which people behave in an unfair or immoral way in order to get an advantage over other people

Example:

The competition is going to be **cut-throat** today.

10) Get (something) off the ground

If an activity or plan gets off the ground or you get it off the ground, it starts or succeeds.

Example:

A lot more money will be required to **get** this plan **off the ground**.

11) Get/set/start the ball rolling

to begin an activity or process

Example:

At the meeting, he tried to **get the ball rolling** by asking a few questions.

12) Go the extra mile

to do more than you are required to do

Example:

She is a nice girl, always ready to **go the extra mile** for her friends.

13) Hands are tied

If someone says that their hands are tied, they mean that something is preventing them from acting in the way that they want to.

Example:

I'd like to help you, but my **hands are tied**.

14) In a nutshell

very briefly, giving only the main points

Example:

Just tell me the truth **in a nutshell**.

15) It's not rocket science

used to say that someone doesn't think that something is very difficult to do or to understand

Example:

Our trainer always said, "Basketball **is not rocket science**. It's about putting the ball in the basket."

16) Keep your eye on the ball

to give your attention to what you are doing at the time

Example:

He really needs to **keep his eye on the ball** if he wants to win the election.

17) Know/learn the ropes

to know or learn how to do something, especially a job

Example:

It will take a few days for new employees to **know the ropes**.

18) Put the cart before the horse

to do things in the wrong order

Example:

Isn't she **putting the cart before the horse** by deciding what to wear for the wedding before she's even been invited to it?

19) Red tape

official rules, laws and processes that seem unnecessary and delay results

Example:

She couldn't get her passport in time because of **red tape**.

20) The bottom line

the final line in the accounts of an organisation or company, stating the total profit or loss that has been made

Example:

Kiara keeps a careful eye on **the bottom line**.

21) The elephant in the room

a serious problem that everybody is aware of but no one wants to talk about

Example:

I do not want to ask the question, but it's **the big elephant in the room**.

22) Think outside the box

to find new ways of doing things, especially of solving problems

Example:

To solve this problem, you'll have to **think outside the box**.

23) Twist someone's arm

(informal) to try to force somebody to do something

Example:

I didn't want to go but Nisha **twisted my arm**.

24) Up in the air

If a plan is up in the air, you haven't yet decided what will happen.

Example:

The whole future of our project is still **up in the air**.

25) Uphill battle

a very difficult struggle

Example: Starting her own firm has proven to be an **uphill battle**.

One Word Substitution Related to Speech & Written Work

One Word Substitution Related to Speech & Written Work	
One Word Substitution	**Phrase**
Omnibus	Book containing all the published work of an author
Telegraph	A written message from far off place
Colloquial	Informal, less grammatically rigid language
Circumlocution	Talking around, a method of talking indirectly
Magniloquent	Generous, forgiving talk
Eloquent	Expressive in the use of words
Grandiloquent	High sounding pompous speech or writing
Autograph	A signature of a celebrity (signature of oneself)
Preamble	Walk before-hand or an introductory statement
Biography	Writing of one's life story
Autobiography	Writing of one's own life story
Photograph	Written by light
Laconic	Few words packed with meaning, concise
Soliloquy	A speech to oneself, alone

Technology words scramble with answers

QUESTIONS	ANSWERS
1. TOMPREUC	1. COMPUTER
2. TGDGEAS	2. GADGETS
3. ERESAHRC	3. RESEARCH
4. EWN	4. NEW
5. ECTSIELNOCR	5. ELECTRONICS
6. TESFAWRO	6. SOFTWARE
7. UOIINNOMMTACC	7. COMMUNICATION
8. OOTSL	8. TOOLS
9. DWNLOODA	9. DOWNLOAD
10. ECINSEC	10. SCIENCE
11. ECNIMAH	11. MACHINE
12. EERNGY	12. ENERGY
13. ORTTPNSRA	13. TRANSPORT
14. ABTRYET	14. BATTERY
15. ERNTTNEI	15. INTERNET
16. RFTUEU	16. FUTURE
17. IMALRITY	17. MILITARY
18. CESAP	18. SPACE
19. NNTNOVOAII	19. INNOVATION
20. DCOTANUEI	20. EDUCATION