

PART - B COMMERCIAL ARITHMETIC

Interest :- Interest is a reward or consideration for the use of capital.

It is a charge paid for the use of others money. Interest is payable by the borrower of money (Debitors) to the lender of money (Creditors).

It is an income for the lender and expense for the borrower.

Definition

It is Interest is the consideration received by the lender of money from the borrower cal' at the rate percent and for a specified time on the sum of money lent by the lender to the borrower.

Principal: The sum of money borrowed or lent is called the principal it is denoted by P

Time: The period for which the money is borrowed or lent is called time it is denoted by (T)

Rate: Normally money is borrowed at a rate per hundred rupees per year is called Rate. It is denoted by (R)

Amount:- The money repayable or receivable after the expiry of the period is called amount
 $A = P + I$

Types of Interest / Kinds of Interest

- 1) Simple interest
- 2) Compound interest

Simple Interest is the interest calculated on the original amount of principal. It is paid at the end of a specified period regularly

Time	No
Note:	
Week	= 52 weeks
day	= 365 days
Month	= 12 Months = 1 yr
Quarter	= 3 Months = 4 quarter
Half yr	= 6 Months = 2 half yr
Yearly	= 1 yr

Formula

$SI = I$

$SI = \frac{PTR}{100}$ or $P \times n \times i$ or $P \times n \times i$

$A = P + SI$ or $A = P + \frac{PTR}{100}$

$A = P(1 + ni)$ or $P(1 + \frac{RT}{100})$

and

$P = \frac{A}{1 + ni}$ or $P = \frac{A}{1 + \frac{RT}{100}}$

Problems

1. Find the simple interest on ₹ 10000 for 7 years at 5% p.a.
 $P = ₹ 10000$, $n = 7 \text{ years}$, $i = \frac{5}{100} = 0.05$

$SI = P \times n \times i = 10000 \times 7 \times 0.05$ $I = 3500$

$\frac{PTR}{100} = \frac{10000 \times 7 \times 5}{100}$ $₹ 3500$

2. How much interest earned on ₹ 2000 at 6% for 2 years
 $P = ₹ 2000$, $n = 2 \text{ years}$, $i = \frac{6}{100} = 0.06$

$SI = P \times n \times i$
 $= 2000 \times 2 \times 0.06$

$SI = ₹ 240$

$\frac{PTR}{100} = \frac{2000 \times 2 \times 6}{100}$ $₹ 240$

3. Find the simple interest 300 at 2% p.a for 14 weeks

$SI = \frac{PTR}{100} = \frac{300 \times \frac{14}{52} \times 0.02$

$₹ 76.46$

4. Find the interest on the following
1. on ₹ 860 for 5 years at $4\frac{1}{2}\%$ per annum
 2. ₹ 9000 for 9 months at $12\frac{1}{4}\%$ per annum
 3. ₹ 12500 for 146 days at 10% per annum

$$1. SI = \frac{PTR}{100} = \frac{860 \times 5 \times 4.50}{100} = \boxed{₹ 193.5}$$

$$2. SI = \frac{PTR}{100} = \frac{9000 \times \frac{9}{12} \times 12.25}{100} = \boxed{₹ 826.875}$$

$$3. SI = \frac{PTR}{100} = \frac{12500 \times \frac{146}{365} \times 10}{100} = \boxed{₹ 500}$$

5. Find the rate percent for ₹ 200 to earn ₹ 80 interest for 5 years

$$SI = \frac{PTR}{100} = \frac{80}{1} = \frac{200 \times 5 \times R}{100}$$

$$= 8000 = 1000R$$

$$8000 = 1000R$$

$$-1000R = -8000$$

$$R = \frac{-8000}{-1000}$$

$$\boxed{R = 8\%}$$

$$I = PNi$$

$$80 = 200 \times 5 \times i$$

$$80 = 1000i$$

$$\frac{80}{1000} = i$$

$$0.08 = i$$

$$0.08 = I$$

$$R = \boxed{8\%}$$

6. Find the rate percentage for 2000 to earn ₹ 500 interest for 5 years

$$SI = \frac{PTR}{100} = \frac{500}{1} = \frac{2000 \times 5 \times R}{100}$$

$$= 50000 = 10000R$$

$$= 50000 = 10000R$$

$$-10000R = -50000$$

$$R = \frac{-50000}{-10000}$$

$$\boxed{R = 5\%}$$

\$ 2000 is deposited in a bank for 2 yrs at simple interest of 6.5%. How much will be the balance at the end of

Time years?

$$SI = \frac{PTR}{100} = \frac{2000 \times 6.5 \times 2}{100} \quad \boxed{SI = 260}$$

$$A = P + I$$

$$A = 2000 + 260$$

$$A = 2260$$

\$ Find the amount of ₹ 2000 at 5 1/2% p.a. in 4 1/2 years

$$SI = \frac{PTR}{100} = \frac{2000 \times 5.50}{100}$$

$$A = P + \left(\frac{PTR}{100} \right)$$

$$= 2000 + \left(1 + \left(\frac{5.5 \times 4.5}{100} \right) \right) \times 2000$$

$$= 2000 + (1 + 0.2475) \times 2000$$

$$= 2000 + (1.2475) \times 2000$$

$$= \boxed{2495.00}$$

Q) Find the period in which ₹ 5000 will amount ₹ 6050.

At 4% p.a.

$$\text{Amt due} = 6000$$

$$\text{Prinpal lent} = 5000.$$

$$CI = 600$$

$$SI = \frac{PTR}{100} = \frac{500 \times T \times 4}{100}$$

$$= 5000 = 5000 + TX4$$

$$= 5000 = 22000T$$

$$= 22000T = 5000$$

$$= T = \frac{5000}{22000}$$

$$= T = 0.22727$$

$$= T = 2.2727 \text{ years}$$

$$= T = 2.27 \text{ years}$$

$$= T = 2.27 \text{ years}$$

$$= T = 2.27 \text{ years}$$

25) Eshwar Borrowed ₹ 25300 from a Narayan at 18.5% p.a. after 5 years Eshwar paid 20500 and gave a gift to clear the debt. find the

Cost of gift
Cost of gift will be.

$$A = P(1 + \frac{TR}{100}) \quad D = P(1 + \frac{TR}{100})$$

$$20500 = 25300(1 + 5 \times \frac{18.5}{100})$$

$$20500 + Z = 25300(1.925)$$

$$20500 + Z = 48702.5$$

$$Z = 48702.5 - 20500$$

$$Z = 28202.5$$

27) Swiya borrowed ₹ 12300. After 3 years 4 months 65 days Swiya paid ₹ 19000 in cash with giving and clear the amount of the rate of interest $5\frac{1}{2}$ percent p.a.

Find the value of giving

Cost of giving will be

$$A = P(1 + \frac{TR}{100}) \quad 0.3333 \quad 0.1780$$

$$19000 = 12300(1 + 3.5 \times \frac{5.50}{100})$$

$$19000 + Z = 12300(1.35 \times 0.055)$$

$$19000 + Z = 12300(1.1925)$$

$$19000 + Z = 15264$$

$$Z = 15264 - 19000$$

$$Z = 3264$$

216) Monohan borrowed ₹ 12650 from a money lender at 18% p.a. After 3 years he paid ₹ 10381 and gave a buffalo to clear the debt. find the cost of buffalo.

Cost of buffalo will be x

$$P = ₹ 12650$$

$$A = P \left(1 + \frac{TR}{100}\right)$$

$$R = 18\%$$

$$10381 + x = 12650 \left(1 + \frac{3 \times 18}{100}\right)$$

$$T = 3 \text{ yrs}$$

$$10381 + x = 12650 (1.3 \times 0.219)$$

$$A = 10381 + \text{buffalo}$$

$$10381 + x = 12650 (1.054)$$

$$\text{Cost of Buffalo} = x$$

$$10381 + x = 12650 (1.054)$$

$$10381 + x = 19481$$

$$x = 19481 - 10381$$

$$x = 9100$$

25) Devaram borrowed ₹ 6400. After two years & 3 months Devaram paid ₹ 6136 in cash with a horse and cleared the amount of the rate of interest was $3\frac{1}{2}\%$ p.a. find the value of the horse.

Cost of horse will be x

$$A = P \left(1 + \frac{TR}{100}\right)$$

$$A = P \left(1 + \frac{TR}{100}\right)$$

$$6136 + x = 6400 \left(1 + \frac{2.25 \times 3.5}{100}\right)$$

$$6136 + x = 6400 (1 + 0.02875)$$

$$A = P \left(1 + \frac{TR}{100}\right)$$

$$6136 + x = 6400 (1.02875)$$

$$6136 + x = 6400 (1.02875)$$

$$6136 + x = 6904$$

$$x = 6904 - 6136$$

$$x = 768$$

$$A = P \left(1 + \frac{TR}{100}\right)$$

28) Raja invested a total of ₹ 9500 in two different banks which give 5% and $7\frac{1}{2}\%$ SI.

If both the amounts are going to be equal in 7 years find the individual investment

Let the 1st Bank invested will be 'x'

The 2nd Bank invested will be $9500 - x$

Ist Bank

$$A = P \left(1 + \frac{TR}{100}\right)$$

$$A = x(1 + 7 \times 0.05)$$

$$A = x(1 + 0.35)$$

$$A = 1.35x \quad \dots \textcircled{1}$$

II Bank

$$A = P \left(1 + \frac{TR}{100}\right)$$

$$A = 9500 - x(1 + 7 \times 0.075)$$

$$A = 9500 - x(1 + 0.525)$$

$$A = 9500 - x(1.525)$$

$$A = 14487.5 - 1.525x \quad \dots \textcircled{2}$$

III Bank

$$P = 9500 - x$$

$$T = 7 \times 75$$

$$R = 7\frac{1}{2}\%$$

$$A = ?$$

Equating ① and ②

$$1.35x = 14487.5 - 1.525x$$

$$1.35x + 1.525x = 14487.5$$

$$2.875x = 14487.5$$

$$x = \frac{14487.5}{2.875}$$

$$x = 5039$$

$$x = 5039$$

Ist bank Invested 5039

IInd Bank Invested 4461

9500

∴ IInd Bank Invested $9500 - 5039 = 4461$

29) Raja invested a total of ₹ 19500 in two different banks which gave 5% and $7\frac{1}{2}\%$ SI. If both the amounts are going to be equal in 7 years find the individual investment

Let the 1st Bank invested will be 'x'

The 2nd Bank invested will be $19500 - x$

I Bank

$$A = P \left(1 + \frac{TR}{100}\right)$$

$$A = x(1 + 7 \times 0.05)$$

$$A = x(1 + 0.35)$$

$$A = 1.35x \quad \dots \textcircled{1}$$

II Bank

$$A = P \left(1 + \frac{TR}{100}\right)$$

$$A = 19500 - x(1 + 7 \times 0.075)$$

$$A = 19500 - x(1 + 0.525)$$

$$A = 19500 - x(1.525)$$

$$A = 29737.5 - 1.525x \quad \dots \textcircled{2}$$

COMPOUND INTEREST

compound interest is the interest calculated on the accumulated sum of the principal and previous interest left unpaid.

compound interest is the interest on the growing principal that means if at specified intervals the interest due is to added to the principal then the interest is said to be compounded into the principal and also earns interest there after

Meaning of compound amount.

The principal increases periodically interest is compounded into the principal also increases periodically through out term the sum due at the end of the term is called compound amount

actually compound interest is the difference between the compound amount and the original principal
Both principal & compound interest change from time to time.

Difference b/w Simple Interest & Compound interest

Simple Interest	Compound Interest
* Simple interest calculated always on the principal only	* Compound interest calculated on growing sum.
* It is uniformly equal for any period of time	* It can be calculated by yearly, quarterly, yearly, monthly.
* Simple interest calculated yearly	* It changes from period to period as the principal changes
* Should not problems → relation formula Time Growth annually D.P. E.M.C.A. etc are solved.	* The problems relation population growth annuals. Dep. Em. cal. etc are solved.

The following formula are used to solved relating to Compound Interest

$$1) A = P \left(1 + \frac{R}{100}\right)^T$$

$$2) P = CI - O.P \quad C$$

$$3) A = P \left(1 + \frac{R}{100 \times 2}\right)^T \quad \text{if int. paid half yearly \& 'T' is the no. of half years}$$

$$4) A = P \left(1 + \frac{R}{100}\right)^T \left(1 + \frac{R'}{100}\right)^T \quad \text{if int. is paid annually but for each period, a different rate of int. is paid}$$

Problems

1) Find the CI ₹ 20000 for 2 yrs @ 10% p.a for 2 yrs

CI paid annually

$$P = ₹ 20000$$

$$T = 2 \text{ yrs}$$

$$R = 10/100 = 10\%$$

$$CI = A - P$$

$$CI = 24200 - 20000$$

$$CI = 4200$$

$$A = P \left(1 + \frac{R}{100}\right)^T$$

$$A = 20000 (1 + 0.1)^2$$

$$A = 20000 (1.1)^2$$

$$A = 20000 (1.21)$$

$$A = 24200$$

2) Find the CI on ₹ 9000 for 2 1/2 yrs @ 10% p.a CI paid annually.

$$P = ₹ 9000, T = 2 \frac{1}{2}, R = 10/100$$

$$A = P \left(1 + \frac{R}{100}\right)^T \left(1 + \frac{R}{100 \times 2}\right)^T$$

$$A = 9000 (1 + 0.1)^2 (1 + 0.05)$$

$$A = 9000 (1.1)^2 (1.05)$$

$$A = 9000 (1.21) (1.05)$$

$$A = 9000 (1.2705)$$

$$A = 11434.50$$

$$CI = P - A$$

$$= 9000 - 11434.50$$

$$CI = 2434.50$$

3) Find the CI on ₹ 10000 for 2% yrs @ 8% p.a. CI paid half yearly.

$$A = P \left(1 + \frac{R}{2}\right)^T$$

$$CI = A - P$$

$$A = 10000 \left(1 + \frac{8}{2}\right)^5$$

$$CI = 12166.52 - 10000$$

$$A = 10000 (1.04)^5$$

$$CI = 2166.52$$

$$A = 10000 (1.02)^5$$

$$A = 12167.9$$

4) Find the CI on ₹ 1000 for 2 yrs @ 10% p.a. CI paid quarterly

$$A = P \left(1 + \frac{R}{4}\right)^T$$

$$A = 1000 \left(1 + \frac{10}{4}\right)^2$$

$$A = 1000 (1.25)^2$$

$$A = 1000 (1.5625)$$

$$A = 1562.5$$

$$A = 1218.40$$

Find the CI on ₹ 15000 for 2% yrs @ 8% p.a. CI paid half yearly

$$A = P \left(1 + \frac{R}{2}\right)^T$$

$$A = P \left(1 + \frac{R}{100}\right)^T$$

$$A = 15000 \left(1 + \frac{8}{2}\right)^2$$

$$= 15000 \left(1 + \frac{8}{100}\right)^2$$

$$A = 15000 (1.04)^2$$

$$= 15000 (1.0816)$$

$$A = 15000 (1.2432)$$

$$= 19218.96$$

$$A = 19218.96$$

Find the CI on ₹ 18000 for 2 years @ 5% p.a
CI paid annually.

$$A = P \left(1 + \frac{R}{100}\right)^T$$

$$= 18000 \left(1 + \frac{5}{100}\right)^2$$

$$= 18000 (1 + 0.05)^2$$

$$= 18000 (1.05)^2$$

$$= 18000 (1.1025)$$

$$A = 19845$$

$$CI = A - P$$

$$= 19845 - 18000$$

$$CI = 1845$$

Find CI on ₹ 95000 for 4½ years @ 10% p.a
CI is paid annually.

$$A = P \left(1 + \frac{R}{100}\right)^T \left(1 + \frac{R}{100}\right)^T$$

$$= 95000 \left(1 + \frac{10}{100}\right)^4 \left(1 + \frac{10}{100}\right)^1$$

$$= 95000 (1 + 0.1)^4 (1 + 0.05)^1$$

$$= 95000 (1.01)^4 (1.05)^1$$

$$= 95000 (1.4641) (1.05)$$

$$= 95000 (1.5373)$$

$$= 38432.625$$

$$CI = A - P$$

$$= 38432.625 - 25000$$

$$CI = 13432.62$$

Q68) Find the dif/b/w Compound int and Simple Interest on ₹ 8000 for 5 years @ 8% p.a.

$$SI = \frac{PTR}{100} = \frac{8000 \times 5 \times 8}{100} = 8000 \times 5 \times 0.08$$

$$SI = 3200$$

$$A = P \left(1 + \frac{R}{100}\right)^T$$

$$= 8000 \left(1 + \frac{8}{100}\right)^5$$

$$= 8000 (1 + 0.08)^5$$

$$= 8000 (1.08)^5$$

$$= 8000 (1.4693)$$

$$A = 11754.6$$

$$CI = A - P$$

$$= 11754.6 - 8000$$

$$CI = 3754.62$$

$$CI - SI$$

$$= 3754.62 - 3200$$

$$= 554.62$$

14(b)
2013

Find the d/r b/w CI & SI on ₹ 5000 invested for 4 years @ 8% p.a.

$$SI = \frac{PTR}{100} = \frac{5000 \times 4 \times 8}{100} = \boxed{SI = 1600}$$

$$\begin{aligned} A &= P(1 + \frac{R}{100})^T \\ &= 5000(1 + \frac{8}{100})^4 \\ &= 5000(1 + 0.08)^4 \\ &= 5000(1.08)^4 \\ &= 5000(1.3604) \end{aligned}$$

$$\boxed{A = 6802.44}$$

$$\begin{aligned} CI &= A - P \\ &= 6802.44 - 5000 \\ &= \boxed{1802.44} \end{aligned}$$

$$\begin{aligned} CI - SI \\ &= 1802.44 - 1600 \\ &= \boxed{202.44} \end{aligned}$$

15(a)
2013

The d/r b/w SI & CI on a certain sum of money for 5 years @ 3% p.a. was ₹ 54.9. find the sum.

$$SI = \frac{PTR}{100} = \frac{54.9 \times 5 \times 3}{100} \quad \boxed{SI = 8.235}$$

$$\begin{aligned} A &= P(1 + \frac{R}{100})^T \\ &= 54.9(1 + \frac{3}{100})^5 \\ &= 54.9(1 + 0.03)^5 \\ &= 54.9(1.03)^5 \\ &= 54.9(1.1592) \end{aligned}$$

$$\boxed{A = 63.641}$$

$$\begin{aligned} CI &= A - P \\ &= 63.641 - 54.9 \\ &= \boxed{CI = 8.741} \end{aligned}$$

$$\begin{aligned} \text{d/r b/w CI \& SI} \\ CI - SI \\ &= 8.741 - 8.235 \\ &= \boxed{0.506} \end{aligned}$$

Find the sum

$$\begin{aligned} A &= P + I \\ &= 54.9 + 0.50 \\ &= \boxed{A = 55.40} \end{aligned}$$

2014 (2)
2014 1/8

@ What time will ₹ 375 to 4200 ₹ @ 4 1/2 %
Find the CI on ₹ 6000 in 4 1/2 years if int is
Compounded Annually @ 10% p.a.

$$SI = \frac{PTR}{100} = \frac{45}{1} = \frac{375 \times T \times 4.5}{100}$$

$$4500 = 375 \times T \times 4.5$$

$$= 4500 = 1500 \times T$$

$$-1500T = -4500$$

$$T = \frac{-4500}{-1500}$$

T = 3 yrs.

$$A = P \left(1 + \frac{R}{100}\right)^T \left(1 + \frac{R}{2}\right)^T$$

$$A = 6000 (1.05)^4 (1.025)^4$$

$$A = 6000 (1.4642) (1.05)$$

$$A = 6000 (1.5273)$$

$$A = 9163.80$$

$$CI = A - P$$

$$= 9163.80 - 6000$$

$$= 3163.80$$

Find the dif b/w CI & SI ₹ 18000 for 6 years @
9% p.a.

$$SI = \frac{PTR}{100} = \frac{18000 \times 6 \times 9}{100} = 9720$$

$$A = P \left(1 + \frac{R}{100}\right)^T$$

$$= 18000 (1 + \frac{9}{100})^6$$

$$= 18000 (1.09)^6$$

$$= 18000 (1.6771)$$

$$A = 30187.80$$

$$CI = A - P$$

$$= 30187.80 - 18000$$

$$= 12187.80$$

$$CI - SI$$

$$12187.80 - 9720$$

$$= 2467.80$$

Find the diff b/w CI & SI ₹ 30000 for 3 1/2 yrs @ 6% p.a.

$$SI = \frac{PTR}{100} = \frac{30000 \times 6 \times 3.5}{100} = \boxed{SI = 6300}$$

$$A = P(1 + \frac{R}{100})^T \left(1 + \frac{r}{100}\right)^T$$

$$A = 30000(1 + \frac{6}{100})^3 \left(1 + \frac{4}{100}\right)^1$$

$$A = 30000(1.06)^3 (1.04)^1$$

$$CI = A - P$$

$$= 36802 - 30000$$

$$\boxed{CI = 6802}$$

$$A = 30000(1.06)^3 (1.08)^1$$

$$A = 30000(1.1910)(1.08)$$

$$A = 30000(1.2267)$$

$$A = 36802$$

$$SO, CI - SI$$

$$6802 - 6300$$

$$\boxed{502}$$

₹ 9000 is invested at annual rate of 10% what is the amount after 3 yrs if the compounding is done
 + annually, + semiannually + quarterly + monthly + daily

$$(1.009333)^{12 \times 3} = 1.2204$$

$$\text{daily } (1.000724)^{360 \times 3} = 1.22137$$

what sum amounts to ₹ 8000 after 4 yrs @ 15% p.a
 Compound interest?

$$A = P(1 + \frac{R}{100})^T$$

$$= 8000(1 + \frac{15}{100})^4$$

$$= 8000(1.015)^4$$

$$= 8000(1.7490)$$

$$= 8000(1.7490)P$$

$$1.7490P = 8000$$

$$P = \frac{8000}{1.7490}$$

$$\boxed{P = 4574}$$

$$CI = A - P$$

$$= 8590 - 4574$$

$$\boxed{= 3426}$$

What sum amount to ₹ 8000 after 4 years @ 5% p.a.

$$A = P \left(1 + \frac{R}{100}\right)^T$$

$$CI = A - P$$

$$8000 = P \left(1 + \frac{5}{100}\right)^4$$

$$= 8000 - 6592$$

$$8000 = P(1.05)^4$$

$$CI = 1418$$

$$8000 = P(1.2155)$$

$$8000P = 1.2155$$

$$P = \frac{8000}{1.2155}$$

$$P = 6599.8$$

$$P = 6599.8$$

What sum lent @ CI would amount to 6615 @ 5% p.a in two years 6000

$$A = P \left(1 + \frac{R}{100}\right)^T$$

$$CI = A - P$$

$$6615 = P \left(1 + \frac{5}{100}\right)^2$$

$$6615 - 6000$$

$$6615 = P(1.05)^2$$

$$CI = 615$$

$$6615 = P(1.1025)$$

$$6615P = 1.1025$$

$$P = \frac{6615}{1.1025}$$

$$P = 6000$$

$$P = 6000$$

$$A = P \left(1 + \frac{R}{100}\right)^T$$

$$CI = A - P$$

$$A = 2000 \left(1 + \frac{10}{100}\right)^2$$

$$= 2420 - 2000$$

$$A = 2000(1.1)^2$$

$$CI = 420$$

$$= 2000(1.21)$$

$$A = CI + P$$

$$= 2000(1.21)$$

$$420 + 2000$$

$$A = 2420$$

$$A = 2420$$

Annually

$$A = P(1 + \frac{R}{100})^T \quad CI = A - P$$

$$A = 5000(1 + \frac{10}{100})^1 \quad \sim 5500 - 5000$$

$$A = 5000(1 + 0.1)^1 \quad \boxed{CI = 500}$$

$$A = 5000(1.1)^1$$

$$A = 5500$$

Semi Annually

$$A = P(1 + \frac{R}{2})^T \quad CI = A - P$$

$$A = 5000(1 + \frac{10}{2})^1 \quad \sim 5100 - 5000$$

$$A = 5000(1 + 0.05)^1 \quad \boxed{CI = 250}$$

$$A = 5000(1.05)^1$$

$$A = 5250$$

Quarterly

$$A = P(1 + \frac{R}{4})^T \quad CI = A - P$$

$$A = 5000(1 + \frac{10}{4})^1 \quad \sim 5207.6 - 5000$$

$$A = 5000(1 + 0.025)^1 \quad \boxed{CI = 207.6}$$

$$A = 5000(1.025)^1$$

$$A = 5207.6$$

$$A = 5207.6$$

Monthly

$$A = P(1 + \frac{R}{12})^T$$

$$A = 5000(1 + \frac{10}{12})^1$$

$$A = 5000(1 + 0.0833)^1$$

$$A = 5000(1.0833)^1$$

$$A = 5416.67$$

Bills Accounting :-

Business transactions may be cash transaction or credit transaction in cash transaction immediate payment or receipt of cash takes place. but credit transaction involves postponed payment of for goods purchased up to a specified future date. So in case of credit transaction sometimes, the trader who sells goods on credit (creditor) wants to have a ~~set~~ written document signed by the purchaser of the goods. the documents which contain the details of amt payable, the person to whom payable, date of document, date of maturity etc. along with an undertaking by the ~~for~~ is called an instrument of credit.

The credit instrument may be of 2 types

1. Bill of Exchange
2. promissory note

1. Bills of Exchange when a seller makes (draws) the Document of Credit & the purchaser (buyer) takes to honor it by signing on it the instrument is called bill of exchange.

2. Promissory note :- if the credit instrument prepared (drawn) by the purchaser himself and he undertakes to pay a fixed sum the instrument is called a promissory note.

* Discounting of a bill :-

The holder of a bill receivable is in need of immediate cash before the due date immediate of the bill he can get the bill discounted from a bank. in such a case he sells the bill to the bank or bill broker and receives cash. the banker pays the holder of the bill after deducting certain amt (interest) on the amt of the bill unexpired period) from the face value of bill

Meaning of Discount: Discount is deduction from the price of the goods sold given by the seller to the purchaser

Meaning of Discounting bill - the process of paying immediate cash on the purchase of a bill from a holder of the bill after deducting the int on the face value of the bill for the unexpired period is called Discounting of the bill

The Debet or amt calculated on the face value of the bill for unexpired period is called bills Discount

Discount = amt of the bill \times remaining period to maturity \times rate of interest

* Types of Discount

There are 2 types of Discount they are

1. Trade Discount or True Discount (TD)
2. Banker's Discount (BD)
3. Cash Discount.

Trade Discount or True Discount.

True Discount is the interest calculated on the present value of the bill it is also called retaining Discount or

Trade Discount is a Reduction from the list price or catalogue price of an article. It allowed b/w wholesaler & to a retailer or Manufacturer to a wholesaler it shows in accounts because the invoice price of an articles is recorded @ after deducting the trade Discount

It is calculated by using the formula

$$TD = \frac{ANR}{100 + NR} \quad \text{or} \quad TD = \frac{PNR}{100}$$

A = Amount or face value of the bill

N = No of days (period of Discounting)

R = Rate of interest

P = Present value of the bill.

Bankers Discount:- is the simple interest on the face value (amt of the bill) it is also known as Commercial Discount. It is calculated using this formula

$$BD = \frac{ANR}{100}$$

Bankers gain (BG):- The excess of bankers discount (BD) over true discount (TD) is called Bankers gain (BG)

$$BG = BD - TD \quad \text{or} \quad BG = \frac{AN^2R^2}{100(100+NR)}$$

* Present value or present worth of the bill due at the end of any period is its actual value at the present

It is the value which is receivable @ present from the party liable on it

present value = face value - True Discount

$$\text{present value} = \frac{A \times 100}{100 + NR} \quad \text{or} \quad P = \frac{TP \times 100}{NR}$$

Face value or Amount of the bill.

It is the value of the bill that is always payable after a certain period. It is present on present value for the credit period granted

$$A = P + I \quad \text{or} \quad A = P \left(1 + \frac{NR}{100}\right) \quad \text{or} \quad A = \frac{BD \times TD}{BD - TD}$$

Discounted value: It is the net amount received by the holder of the bill after deducting Bank BD from the fv of amt of the bill.

Formula

$$Dv = Fv - BD$$

Problems

1. Find the TD on ₹ 600 due 4 yrs hence @ 5% p.a. also find BD

$$\text{True Discount} = \frac{ANR}{100 + NR}$$

$$= \frac{600 \times 4 \times 5}{100 + 4 \times 5} = \frac{12000}{120}$$

$$\boxed{TD = ₹100}$$

$$\text{Banker's Discount} = \frac{ANR}{100} = \frac{600 \times 4 \times 5}{100}$$

$$\boxed{BD = ₹120}$$

- 2) Find the TD, BD, BG on a bill of ₹ 10,450 due 3 months hence @ 5% p.a.

$$TD = \frac{ANR}{100 + NR} = \frac{10450 \times \frac{3}{12} \times 5}{100 + \frac{3}{12} \times 5} = \frac{13062.5}{101.25}$$

$$\boxed{TD = 129.019}$$

$$BD = \frac{ANR}{100} = \frac{10450 \times \frac{3}{12} \times 5}{100}$$

$$\boxed{BD = 130.625}$$

$$BG = BD - TD$$

$$= 130.625 - 129.01$$

$$\boxed{BG = 1.615}$$

3 Find the PV, TD, BD & BG on a bill of ₹ 10900 due in 9 months @ 5% p.a.

$$PV = \frac{A \times 100}{100 + NR} = \frac{10900 \times 100}{100 + \frac{9}{12} \times 5} = \frac{1090000}{103.75}$$

$$PV = 10506.02$$

$$TD = \frac{ANR}{100 + NR} = \frac{10900 \times \frac{9}{12} \times 5}{100 + \frac{9}{12} \times 5} = \frac{40875}{103.75}$$

$$TD = 393.97$$

$$BD = \frac{ANR}{100} = \frac{10900 \times \frac{9}{12} \times 5}{100} = \frac{40875}{100}$$

$$BD = 408.75$$

$$BG = BD - TD \\ = 408.75 - 393.97$$

$$BG = 14.78$$

4) Find the PV, BD, TD & BG on a bill of ₹ ~~1050~~ 10450 due for 9 months @ 6% p.a.

$$PV = \frac{A \times 100}{100 + NR} = \frac{10450 \times 100}{100 + \frac{9}{12} \times 6} = \frac{1045000}{104.6}$$

$$PV = 10000$$

$$TD = \frac{ANR}{100 + NR} = \frac{10450 \times \frac{9}{12} \times 6}{100 + \frac{9}{12} \times 6} = \frac{47025}{104.6}$$

$$TD = 450.25$$

$$BD = \frac{ANR}{100} = \frac{10450 \times \frac{9}{12} \times 6}{100} =$$

$$BD = 470.25$$

$$BG = BD - TD \\ = 470.25 - 450.25$$

$$BG = 17$$

5. Find BD, TD, BG & Discounted value of bill of ₹ 10500 due 9 months @ 12% p.a

$$BD = \frac{ANR}{100} = \frac{10500 \times \frac{9}{12} \times 12}{100}$$

$$BD = 945$$

$$TD = \frac{ANR}{100 + NR} = \frac{10500 \times \frac{9}{12} \times 12}{100 + \frac{9}{12} \times 12} = \frac{94500}{109}$$

$$TD = 866.97$$

$$BG = BD - TD = 945 - 866.97$$

$$BG = 78.03$$

$$PV = \frac{A \times 100}{100 + NR} = \frac{10500 \times 100}{100 + \frac{9}{12} \times 12} = \frac{1050000}{109}$$

$$PV = 9633.02$$

$$A = \frac{BD \times TD}{BD - TD} = \frac{945 \times 866.97}{945 - 866.97} = \frac{819286.65}{78.03}$$

$$A = 10499.63$$

$$DV = FV - BD = 10499.63 - 945$$

$$DV = 9554.63$$

6. A sum of money invested in Compound Interest Amt to ₹ 44100 in 2yrs and 48,620.25 in 4yrs. Find the sum & Rate of interest p.a.

$$\left(\frac{1 + R}{100} \right)^T \text{ Amt to FV } 44100 \text{ (2yrs)}$$

$$\text{Amt to FV } 48,620.25 \text{ (4yrs)}$$

Sum = ?

Rate of int: ?

$$\text{Amt due in 2yrs} = \frac{\text{FV in 4yrs}}{\text{FV in 2yrs}} = \frac{48,620.75}{44100} = \boxed{1.1025}$$

$$\left(\frac{1+R}{100}\right)^T = \sqrt{1.1025} \Rightarrow \left(\frac{1+R}{100}\right)^2 = \sqrt{1.1025} \Rightarrow \left(\frac{1+R}{100}\right)^2 = 1.05$$

$$\frac{1+R}{100} = 1.05 \Rightarrow \frac{R}{100} = 1.05 - 1 \Rightarrow \frac{R}{100} = 0.05 \times 100$$

$$\boxed{R = 5\%}$$

Calcⁿ of principal (sum)

$$A = P\left(1 + \frac{R}{100}\right)^T$$

$$44100 = P\left(1 + \frac{5}{100}\right)^2$$

$$44100 = P(1.05)^2$$

$$44100 = P(1.1025)$$

$$44100 = 1.1025P$$

$$44100 = 1.1025P$$

$$P = \frac{44100}{1.1025}$$

$$\boxed{P = 40000}$$

A sum of money invested @ CI amounted to ₹10816 @ the end of two years and to ₹11,248.64 @ the end of 3rd year find the rate of interest & the

Amt to for 10816 (2yrs)

Amt to FV 11248.64 (3yrs)

$$\text{Amt due in 3 years} = \frac{\text{FV in 3yrs}}{\text{FV in 2yrs}} = \frac{11248.64}{10816} = \boxed{1.04}$$

$$\left(\frac{1+R}{100}\right)^T = \sqrt{1.04} \Rightarrow \left(\frac{1+R}{100}\right)^3 = 1.04 \Rightarrow \frac{1+R}{100} = 1.0133 \Rightarrow \frac{R}{100} = 0.0133$$

$$R = 0.0133 \times 100 = \boxed{R = 1.33\%}$$

$$A = P \left(1 + \frac{R}{100}\right)^T$$

$$10816 = P \left(1 + \frac{4}{100}\right)^1$$

$$10816 = P(1 + 0.04)^1$$

$$10816 = P(1.04)^1$$

$$10816 = 1.04P$$

$$P = \frac{10816}{1.04}$$

$$1.04$$

$$P = 10400$$

41. Determine the rate of CI @ which a sum of ₹ 62500 amounts to ₹ 67600 after three years.

The d/p between True and banker's Bill amount on a bill due after 6 months at 8% p.a. If True find: ① True Bill amount ② Banker Bill amount ③ face value

Calculation	True Bill	Banker's Bill
$BG = 80 - TP$ $R = 8\%$ $T = \frac{6}{12}$ $TD = 400$	$TD = \frac{ANR}{100 + NR}$ $100 + NR$	$TD = \frac{ANR}{100 + NR}$ $100 + NR$
$BG = AN^2 R^2$ $100(100 + NR)$	$= \frac{260000 \times 0.5 \times 8}{100 + 0.5 \times 8}$	$= \frac{260000 \times 0.5 \times 8}{100 + 0.5 \times 8}$
$400 = \frac{AN \times 0.5^2 \times (8)^2}{100(100 + 0.5 \times 8)}$	$= \frac{1040000}{104}$	$= \frac{1040000}{104}$
$400 = \frac{AN \times 0.25 \times 64}{100(100 + 4)}$	$TD = 10000$	$TD = 10000$
$400 = \frac{A \times 16}{100(104)}$	$BD = \frac{ANR}{100}$	$BD = \frac{ANR}{100}$
$400 = \frac{16A}{10400}$	$= \frac{260000 \times 0.5 \times 8}{100}$	$= \frac{260000 \times 0.5 \times 8}{100}$
$16A = 4160000$	$10.40.000$	$10.40.000$
$A = \frac{4160000}{16}$	100	100
$A = 260000$	$BD = 10.400$	$BD = 10.400$
$BG = BD - TP$	$FV = \frac{BD \times TD}{BD - TP}$	$FV = \frac{BD \times TD}{BD - TP}$
$400 = 10.400 - TP$	$= \frac{10400 \times 10000}{10400 - 10000}$	$= \frac{10400 \times 10000}{10400 - 10000}$
$400 = 400$	$= \frac{104000000}{400}$	$= \frac{104000000}{400}$
	$FV = 260000$	$FV = 260000$

Another method

2014 difference b/w TD and BD on a bill ^{due} after 6 months @ 4% p.a. is ₹ 24 find the TD, BD, & BA. or F.V.

calcⁿ of amount

$$BG = \frac{AN^2R^2}{100(100+NR)}$$

$$TD = \frac{ANR}{100+NR}$$

$$24 = \frac{A \times (0.5)^2 \times (4)^2}{100(100+(0.5 \times 4))}$$

$$= \frac{61200 \times 0.5 \times 4}{100 + 0.5 \times 4}$$

$$24 = \frac{A \times 0.25 \times 16}{100(100+2)}$$

$$= \frac{122400}{100+2} = \frac{122400}{102}$$

$$24 = \frac{A \times 4}{100(102)}$$

$$TD = 1200$$

$$24 = \frac{4A}{10200}$$

$$BD = \frac{ANR}{100}$$

$$4A = 244800$$

$$= \frac{61200 \times 0.5 \times 4}{100} = \frac{122400}{100}$$

$$A = \frac{244800}{4}$$

$$BD = 1224$$

$$A = 61200$$

$$FV = \frac{BD \times TD}{BD - TD} = \frac{1224 \times 1200}{1224 - 1200} = \frac{1468800}{24}, FV = 61200$$

$$BG = BD - TD$$

$$24 = 1224 - 1200$$

$$PV = FV - TD$$

$$= 61200 - 1200$$

$$24 = 24$$

$$PV = 60000$$

2015 The diff b/w TD and BD on a bill due after two years at 8% p.a. is ₹ 128.

$$BG = \frac{AN^2R^2}{100(100+NR)}$$

$$128 = \frac{A \times 256}{100(116)}$$

$$128 = \frac{A \times 9^2 \times (8)^2}{100(100+2 \times 8)}$$

$$128 = \frac{256A}{11600}$$

$$128 = \frac{A \times 4 \times 64}{100(100+16)}$$

$$256A = 1494800$$

$$A = \frac{1494800}{256}$$

$$A = 5800$$

$$TD = \frac{ANR}{100 + NR}$$

$$= \frac{5800 \times 2 \times 2}{100 + 2 \times 2}$$

$$= \frac{92900}{100 + 16}$$

$$= \frac{92900}{116}$$

$$TD = 800$$

$$FV = \frac{BD \times TD}{BD - TD} = \frac{928 \times 800}{928 - 800} = \frac{742400}{128}$$

$$FV = 5800$$

$$PV = FV - BD$$

$$= 5800 - 800$$

$$PV = 5000$$

$$BD = \frac{ANR}{100}$$

$$= \frac{5800 \times 2 \times 2}{100}$$

$$= \frac{92800}{100}$$

$$BD = 928$$

$$BG = BD - TD$$

$$128 = 928 - 800$$

$$128 = 128$$

$$DV = FV - BD$$

$$= 5800 - 928$$

$$DV = 4872$$

The d/f b/w BD & TD on a bill due after 6 months @ 4% p.a is ₹16 find all.

The BG on a Certain bill 6 months hence is ₹16 the rate of SI is 10% p.a. find the F.V & P.V of the bill

BD a bill which has to run 73 days before it is legally due @ 5% p.a. the banker gain on this transaction is ₹15. for what sum the bill was drawn and for what sum the bill was discounted?

$$BG = \frac{AN^2R^2}{100(100+NR)} \quad TD = \frac{ANR}{100+NR} \quad BD = \frac{ANR}{100}$$

$$16 = \frac{A(0.5)^2(4)^2}{100(100+(0.5 \times 4))} \quad = \frac{40800 \times 0.5 \times 4}{100+0.5 \times 4} \quad = \frac{40800 \times 0.5 \times 4}{100}$$

$$16 = \frac{A \times 0.25 \times 16}{100(100+2)} \quad = \frac{81600}{102} \quad = \frac{81600}{100}$$

$$16 = \frac{4A}{100(102)}$$

$$TD = 800$$

$$BD = 816$$

$$FV = \frac{BD \times TD}{BD - TD}$$

$$PV = FV - TD$$

$$16 = \frac{4A}{10200}$$

$$= \frac{816 \times 800}{816 - 800}$$

$$PV = 40000$$

$$4A = 163200$$

$$= \frac{652800}{16}$$

$$DV = FV - BD$$

$$A = \frac{163200}{4}$$

$$= 40800$$

$$= 40800 - 816$$

$$DV = 39984$$

$$A = 40800$$

$$FV = 40800$$

$$BG = BD - TD$$

$$16 = 816 - 800$$

$$16 = 16$$

$$BG = \frac{AN^2R^2}{100(100+NR)}$$

$$TD = \frac{ANR}{100+NR}$$

$$BD = \frac{ANR}{100}$$

$$20 = \frac{A(0.5)^2(10)^2}{100(100+(0.5 \times 10))}$$

$$= \frac{8400 \times 0.5 \times 10}{100+(0.5 \times 10)}$$

$$= \frac{8400 \times 0.5 \times 10}{100}$$

$$20 = \frac{A \times 0.25 \times 100}{100(100+5)}$$

$$= \frac{842000}{100+5}$$

$$= \frac{420000}{100}$$

$$20 = \frac{95A}{100(105)}$$

$$= \frac{42000}{105}$$

$$BD = 420$$

$$20 = \frac{95A}{10500}$$

$$TD = 400$$

$$PV = FV - TD$$

$$= 8400 - 400$$

$$95A = 910000$$

$$FV = \frac{BD \times TD}{BD - TD}$$

$$PV = 8000$$

$$A = \frac{910000}{95}$$

$$= \frac{420 \times 400}{420 - 400}$$

$$DV = FV - BD$$

$$8400 - 420$$

$$DV = 7980$$

$$A = 9400$$

$$FV = 8400$$

$$BG = BD - TD$$

$$20 = 420 - 400$$

$$20 = 20$$

$$B_9 = \frac{AN^2R^2}{100(100+NR)}$$

$$TD = \frac{ANR}{100+NR}$$

$$BD = \frac{ANR}{100}$$

$$IS = \frac{A(0.2)^2(5)^2}{100(100+(0.2 \times 5))}$$

$$= \frac{151500 \times 0.2 \times 5}{100 + (0.2 \times 5)}$$

$$= \frac{151500 \times 0.2 \times 5}{100}$$

$$IS = \frac{A \times 0.04 \times 25}{100(100)}$$

$$= \frac{151500}{100 + 1}$$

$$= \frac{151500}{100}$$

$$IS = \frac{IA}{10100}$$

$$IA = \frac{151500}{101}$$

$$BD = 1515$$

$$IA = 151500$$

$$TD = 1500$$

$$A = \frac{151500}{1}$$

$$FV = \frac{BD \times TD}{BD - TD} = \frac{1515 \times 1500}{1515 - 1500} = \frac{2272500}{15}$$

$$A = 151500$$

$$FV = 151500$$

$$PV = FV - BTD$$

$$DV = FV - BD$$

$$B_9 = BD - TD$$

$$= 151500 - 1500$$

$$= 151500 - 1515$$

$$IS = 1515 - 1500$$

$$PV = 150000$$

$$DV = 14985$$

$$IS = 15$$

Ratio and Proportions

Meaning of Ratio: Ratio is Comparison of 2 numbers it Express the relation of one number with that of another number. It can be written as $A:B = \frac{A}{B}$.

or

The relationship b/w two qty of the same kind can be compared in 2 way i.e. the Difference Method and the Division Method.

Different forms of Ratio.

- Unit ratio: A unit ratio is a ratio of Equality in which both the terms are equal.

that means a ratio is which antecedent = consequent is called equality ratio or unit ratio
 ex: 1:1, 3:3, etc.

3. Inverse or Reciprocal ratio :-
 A ratio is said to be inverse of the other if their product is one.

(ex) An inverse ratio is one which is obtained by interchanging the antecedent and the consequent in given ratio
 ex: a:b, b:a

3. Compound ratio :- The a:b and c:d are two ratios then the ratio of ac:bd is called compound ratio

4. Duplicate ratio :- when a ratio is compounded by it self, then the resultant ratio is called duplicate ratio

ex: a:b is a ratio then the ratio $a^2:b^2$ is called duplicate ratio
 ex: 3:3 is $3^2:3^2 \Rightarrow 4:4$

* Sub duplicate ratio is one which is obtained by taking the square roots of the respective terms of a given ratio.
 ex: 9:16 $\Rightarrow \sqrt{9} : \sqrt{16} \Rightarrow 3:4$

* Triplite ratio :- is one which is obtained by taking cubes of respective terms of ratio
 ex: 2:4 $\Rightarrow 2^3:4^3 \Rightarrow 8:64$, $2:3 \Rightarrow 2^3:3^3 \Rightarrow 8:27$

7. Sub triplicate ratio = Cube root ratio
 Ex: $27:64 \Rightarrow 3:4$

8. Continued ratio \Rightarrow relationship b/w 3 or more aspects of same kind
 Ex: $3:4:6:8$ or $3/4 = 4/6 = 6/8$

9. Ratio of greater in Equality: in the ratio $a:b$ if $a > b$
 Ex: $3:2$ or $3 \rightarrow 5:2$ or $2:1$ etc...

10. Ratio of lesser in Equality: in the ratio $a:b$ if $a < b$
 Ex: $2:3$ or $2:5$ or $1:2$ etc...

proportions

Meaning:- when a ratio $a:b$ is equal to the another ratio $c:d$, then the terms a, b, c, d are said to be in proportion

① proportion represent two equal ratios when four qty a, b, c, d are related as $a:b, c:d$

in a is called 1st term or 1st proportional
 b is called 2nd term, c 3rd term & d 4th term
 $a:b::c:d$ a & d is called Extreme
 c & b is called means.

rules of proportion

Kind 0 ratios are equal we have product of Extreme = product of means

Problems

1. $5:20::3:x$ Find value of x
 $5x:60$
 $x = \frac{60}{5}$ $x=12$

2. $2:10::8:4$ find the value of x
 $4x:80$
 $x = \frac{80}{4}$ $x=20$

3. Find x if $2:8::x:20$
 $40:8x$
 $x = \frac{40}{8}$ $x=5$

4. Find x if $3:9::x:15$
 $45:9x$
 $x = \frac{45}{9}$ $x=5$

5. Find the 4th proportional to 153, 207 & 34
 $153:207::34:x$
 $153x:7038$
 $x = \frac{7038}{153}$ $x=46$

6. Find the 4th proportional to 3, 6 & 4.5
 $3:6::4.5:x$
 $3x:27$ $x = \frac{27}{3}$
 $x=9$

7. Find the 4th proportional to 2, 8 & 3
 $2:8::3:x$
 $2x:24$
 $x = \frac{24}{2}$ $x=12$

8 Find the 3rd proportion and 4 and 5
 $4:5::5:x$

$$4x = 25$$

$$x = \frac{25}{4} \quad \boxed{x = 6.25}$$

9 Find 3rd proportion of 2 & 8
 $2:8::8:x$

$$2x = 64$$

$$\boxed{x = 32}$$

10 Find the 3rd proportion of 3 & 6
 $3:6::6:x$

$$3x = 36$$

$$x = \frac{36}{3} \quad \boxed{x = 12}$$

11 Find the mean proportion of 91 & 84
 $91:x::x:84$

$$x^2 = 7644$$

$$x = \sqrt{7644}$$

$$\boxed{x = 87.48}$$

12 Find the mean proportion 98 & 162
 $98:x::x:162$

$$x^2 = 15876$$

$$x = \sqrt{15876}$$

$$\boxed{x = 126}$$

13 Find the mean proportion of 6.25 & 0.16
 $6.25:x::x:0.16$

$$x^2 = 1$$

$$x = \sqrt{1}$$

$$\boxed{x = 1}$$

14 Find the mean proportion 0.16 & 400

$$0.16 : x :: x : 400$$

$$64 : x^2$$

$$x = \sqrt{64} \quad x = 8$$

15 Find mean proportion of 4 & 36

$$4 : x :: x : 36$$

$$144 : x^2$$

$$x = \sqrt{144} \quad \boxed{x = 12}$$

Income - Expense = Savings

1) Ratio of incomes of a & b is 8:5 and ratio of spending (Exp) 5:3 their amt of Savings 1200 and 1800. Find their income

Let:- Income will be x $8x : 5x$

Expense will be y $5y : 3y$

$$8x - 5y = 1200 \quad \dots \textcircled{1} \times 5$$

$$5x - 3y = 1800 \quad \dots \textcircled{2} \times 8$$

$$40x - 25y = 6000$$

$$-40x + 24y = -14400$$

$$-1y = -8400$$

$$-1y = -8400$$

$$y = -8400$$

-1

$$\boxed{y = 8400}$$

Equating ①

$$8x - 5y = 1200$$

$$8x - 5(8400) = 1200$$

$$8x - 42000 = 1200$$

$$8x = 1200 + 42000$$

$$8x = 43200$$

$$x = \frac{43200}{8}$$

8

$$\boxed{x = 5400}$$

Income

$$8x = 8(5400) = 43200$$

$$5x = 5(5400) = 27000$$

2) The ratio of income of A & B is 8:5 and ratio of expenses is 5:3 their amount of saving is 1200 and 1800 find their expenses.

Income will be x $8x:5x$

Expenses will be y $5y:3y$

Expenses

$$5y = 5(8400) = 42000$$

$$3y = 3(8400) = 25200$$

$$8x - 5y = 1200 \quad \text{--- (1) } \times 5$$

$$5x - 3y = 1800 \quad \text{--- (2) } \times 8$$

$$40x - 25y = 6000$$

$$\begin{array}{r} 40x - 25y = 6000 \\ - (5x - 3y = 1800) \\ \hline -14y = -8400 \end{array}$$

$$-14y = -8400$$

$$y = \frac{-8400}{-14}$$

$$\boxed{y = 8400}$$

3) Incomes of A & B is in the ratio 5:3 and expenses 8:5 and savings 2:1 their total saving is 3600. Find their income 2400, 1200

Income will be x $5x:3x$

Expenses will be y $8y:5y$

$$5x - 8y = 2400 \quad \text{--- (1) } \times 3$$

$$3x - 5y = 1800 \quad \text{--- (2) } \times 5$$

$$15x - 24y = 7200$$

$$\begin{array}{r} 15x - 24y = 7200 \\ - (3x - 5y = 1800) \\ \hline -12x + 19y = 5400 \end{array}$$

$$-12x + 19y = 5400$$

$$y = \frac{5400}{19}$$

$$\boxed{y = 1200}$$

$$5x = 5(2400) = 12000$$

$$3x = 3(2400) = 7200$$

Equating (1)

$$5x - 8y = 2400$$

$$5x - 8(1200) = 2400$$

$$5x - 9600 = 2400$$

$$5x = 9600 + 2400$$

$$5x = 12000$$

$$x = \frac{12000}{5}$$

$$\boxed{x = 2400}$$

2010) $5:20::3:x$ find the value of

$$5x:60$$

$$x = \frac{60}{5}$$

$$x = 12$$

3) Monthly income of A and B are in the ratio of 4:5 their monthly expenses are in the ratio of 7:9 and their savings are in the ratio of 4:3. if total saving of A & B is 350 Rs find their income

$$350 \times \frac{4}{7} = 200$$

$$150$$

Income will be x $4x:5x$

Expenses will be y $7y:9y$

$$4x - 7y = 350 \dots \textcircled{1} \times 5$$

$$5x - 9y = 150 \dots \textcircled{2} \times 4$$

$$20x - 35y = 1750$$

$$\rightarrow 20x - 36y = 600$$

$$-1y = 600$$

$$y = 600$$

$$y = 600$$

Solving $\textcircled{1}$

$$4x - 7y = 200$$

$$4x - 7(600) = 200$$

$$4x - 4200 = 200$$

$$4x = 4400$$

$$4x = 3800$$

$$x = 950$$

$$x = 950$$

$$x = 1300$$

26) Find the value of x , $2:10::8:4$

$$4x:80$$

$$x = \frac{80}{4}$$

$$x = 20$$

2012) Two brothers have their annual incomes in the ratio of 8:5 and their spending is in the ratio 6:3 if they save Rs 2400 and 2000 p.a. respectively, find their incomes

Income will be x $8x:5x$

Expenses will be y $6y:3y$

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$$8x - 5y = 2400 \quad \dots \textcircled{1} \times 5$$

$$5x - 3y = 2000 \quad \dots \textcircled{2} \times 8$$

$$40x - 25y = 12000$$

$$(-) 40x + 24y = 16000$$

$$-1y = -4000$$

$$y = \frac{4000}{1}$$

$$\boxed{y = 4000}$$

$$8x = 8(2800) = 22400$$

$$5x = 5(2800) = 14000$$

Substitute equation (1)

$$8x - 5y = 2400$$

$$8x - 5(4000) = 2400$$

$$8x - 20000 = 2400$$

$$8x - 20000 + 20000 = 2400 + 20000$$

$$8x = 22400$$

$$x = \frac{22400}{8}$$

$$\boxed{x = 2800}$$

1) A number is divided into 3 parts, ratio is 1:2:3. If the third part is 39, find the other 2 parts.

$$\begin{aligned} \text{1st part} & \quad \frac{39}{3} \times 1 = 13 & 13 : 26 : 39 \\ \text{2nd part} & \quad \frac{39}{3} \times 2 = 26 \end{aligned}$$

2) A number is divided into 3 parts in the ratio 5:4:3. If the 1st part is 150, find the other 2 parts and sum of the numbers.

Given Ratio 5:4:3

$$\text{II part} - \frac{150}{5} \times 4 = 120 \quad 150 : 120 : 90$$

$$\text{III part} - \frac{150}{5} \times 3 = 90$$

Sum of the numbers is $150 + 120 + 90 = 360$.

1) The ratio of present Age of Mother and daughter is 5:3. After 10 years Hence the age would be 3:2. find their present age.

Let the present age will be 'x'

present age ratio 5x : 3x

After 10 years age ratio 3:2

∴ 10 to be added

$$\frac{5x+10}{3x+10} = \frac{3}{2} \quad \therefore 10x+20 = 9x+30$$

$$10x - 9x = 30 - 20$$

$$x = 10$$

∴ Present age of mother and Daughter is

$$5x : 3x$$

$$5(10) : 3(10)$$

$$50 : 30 \quad 5:3$$

Add 10 to 50:30

$$50+10 : 30+10$$

$$60 : 40.$$

2) The present age of father & his son is 10:6 After 8 years. Hence the age would be 6:4 find their present age.

Let the present age will be 'x'

present age ratio 10x : 6x

After 8 years age Ratio 6:4 ∴ 8 to be added

$$\frac{10x+8}{6x+8} = \frac{6}{4} \quad 40x+32 = 36x+48$$

$$40x - 36 = 48 - 32$$

$$4x = 16$$

$$x = \frac{16}{4} \quad \boxed{x = 4}$$

present age ratio 10x : 6x

$$10(4) : 6(4) \quad 40 : 24.$$

∴ After 8 years 40+8 : 24+8

$$48 : 32.$$

The ratio of no. of Boys to no. of Girls in a college of 432 Students is 5:4. If the ratio of boys to girls become 7:6. when 12 Boys and some girls joined the college. Find Increased no. of Girls.

No. of joined Boys = 12

Total strength of the college = 432

Boys and Girls ratio = 5:4

Let the no. of girls joined will be 'x'

$$\text{No. of Boys} = 432 \times \frac{5}{9} = 240.$$

$$\text{No. of Girls} = 432 \times \frac{4}{9} = 192$$

After joining ratio of students is 7:6

$$\frac{240+12}{192+x} = \frac{7}{6}$$

$$1440 + 72 = 1344 + 7x.$$

$$-7x = 1344 - 1440 - 72$$

$$-7x = 1344 - 1512$$

$$-7x = -168$$

$$x = -168 / -7 \quad x = 24.$$

The no. of Girls increased is 24.

$$\therefore 192 + x, \quad 192 + 24 = 216.$$

Boys ; Girls

$$252 : 216.$$