

## Simple & Compound Interest.

Indian Bank  
 cat  
 prep date:    
 YOUVA

- Q. Suresh borrow 10000 ₹ for 4% and 2 years and lends to Ramesh at 6% for 2 years find gain per year ?  
 → for gain of suresh =  $\frac{10000}{100}[(6 \times 2) - (4 \times 2)]$  IMP  
 $= 400 \text{ ₹}$

But profit per year 200 ₹

- Q. In how many years amount doubles at rate of 5% pa  
 → No. year =  $\frac{100(2-1)}{\text{Rate \%}} = \frac{100(2-1)}{5} = 20 \text{ years.}$

- Q. Nikhil borrowed ~~85~~ amount at 5% for 2 year, 8% for 5 years and 10% for remaining year and after 10 years he pays 18000 ₹ find principal he borrowed  
 →

$$18000 = P \times \frac{5 \times 2}{100} + P \times \frac{8 \times 5}{100} + P \times \frac{10 \times 3}{100} + P$$

$$= 0.1P + 0.4P + 0.3P + P$$

$$P = 10000 \text{ ₹}$$

- Q. SI at 4 years 15% is 180 ₹ more than SI on same sum for 5 years at 10% per annum. find sum?

$$180 = \frac{P}{100} [(4 \times 15) - (5 \times 10)] = \frac{P \times 10}{100} = \frac{P}{10}$$

$$P = 1800 \text{ ₹}$$

- Q. Certain amount sums to 1008 ₹ at 2 years and 1164 ₹ at 3.5 years what is rate?

$$\frac{1008 - P}{1164 - P} = \frac{P \times 2}{P \times 3.5} = \frac{2}{3.5}$$

$$3.5 \times 1008 - 3.5P = 2 \times 1164 - 2P$$

$$3500 - 2300 \approx 1.5P$$

$$1.5P \approx 1200$$

$$P \approx 800$$

$$(1008 - 800) = \frac{800 \times 2 \times R}{100}$$

$$R \approx 13\%$$

Q.

Q. In how many years money doubles at 10% rate  
 → No. years =  $\frac{100 (2-1)}{\text{Rate \%}} = \frac{100 \times (2-1)}{10} = 10 \text{ years}$

Q. Sum was put at SI at certain rate for 4 years if it had been put at 3% higher rate it would be fetching ₹ 460 more. Find sum?

$$\frac{S+460}{S} = \frac{P \times (R+3) \times 4}{P \times R \times 4}$$

$$1 + \frac{460}{S} = \frac{R+3}{R}$$

$$\frac{S}{R} = \frac{460}{3}$$

$$S = \frac{PRN}{100}$$

$$\frac{460R}{3} = \frac{P \times R \times 4}{100}$$

$P \approx 3833 \dots$
$P = 3833.33$

Q. CI on ₹ 5000 for 9 months at 6% per annum. If the interest is reckoned quarterly.

$$A = P \left[ 1 + \frac{(R/4)}{100} \right]^{4n} \quad \text{--- quarterly.}$$

$$A = 5000 \left[ 1 + \frac{6}{4 \times 100} \right]^{4 \times \frac{3}{4}}$$

$$A = 5228.39$$

$$CI = A - P = 5228.39 - 5000 = 228.39 \text{ ₹}$$

Q. Population increases by 5%, but decreases  $\frac{1}{4}\%$  due to migration what is population increase percent after 3 years?

$$\rightarrow \text{Net increase} = (5 - 1/4)\% = (19/4)\%$$

$$\frac{A}{P} = \left[ 1 + \frac{19}{4 \times 100} \right]^3$$

$$= \left[ \frac{419}{400} \right]^3$$

Q. 500₹ becomes 583.20 in two years compounded yearly find Rate of interest.

$$583.20 = 500 \left[ 1 + \frac{R}{100} \right]^2$$

$$\frac{583.20}{500} = \left[ 1 + \frac{R}{100} \right]^2$$

$$= \frac{583.20}{50000} = \frac{2.1664}{10000} = \frac{12.9184}{100000} = \frac{12.9184}{10^6}$$

$$= \frac{11664}{10000} = \left[ 1 + \frac{R}{100} \right]^2$$

$$= \left[ \frac{108}{100} \right]^2 = \left[ 1 + \frac{R}{100} \right]^2$$

$$= [R = 8\%]$$

Q. A certain sum amounts to ₹ 7000 in 2 years and ₹ 8000 in 3 years find the sum?

→ to find rate

∴ Rate of interest of CI can be determined by SI  
∴ for one year amount of interest is

$$1000 = \frac{P \times R \times N}{100}$$

$$1000 = \frac{7000 \times R \times 1}{100}$$

$$\frac{1000}{70} = R$$

∴ for compound interest

$$7000 = P \left[ 1 + \frac{R}{100} \right]^2$$

$$7000 = P \times \frac{8}{7} \times \frac{8}{7}$$

$$P = 5359.37$$

Q. If sum doubles in 10 years in how many years it 8 times

$$2P = \left[ 1 + \frac{R}{100} \right]^{10}$$

$$8P = \left[ 1 + \frac{R}{100} \right]^{10}$$

$$[2^3] = \left[ 1 + \frac{R}{100} \right]^{10}$$

$$\left[ 1 + \frac{R}{100} \right]^{10 \times 3} = \left[ 1 + \frac{R}{100} \right]^n$$

$$n = 30 \text{ years}$$

Q. Diff of CI and SI on certain sum at 10% and 2 years is ₹ 530 find sum.

$$CI = P \left[ 1 + \frac{R}{100} \right]^2 - P$$

$$= \frac{121}{100} P - P$$

$$= \frac{21}{100} P$$

$$SI = \frac{P \times 10 \times 2}{100} = \frac{20P}{100}$$

$$CI - SI = \frac{21P}{100} - \frac{20P}{100} = \frac{P}{100}$$

$$530 = \frac{P}{100}$$

$$\boxed{P = 53000 \text{ ₹}}$$

Q. Diff of CI and SI on amount ₹ 20,000 in 2 years is ₹ 392 find ~~what~~ rate of interest per annum?

$$\rightarrow CI = P \left[ \frac{1+R}{100} \right]^n = p = 20000 \left[ \frac{1+R}{100} \right]^2 - 20000$$

$$SI = \frac{20000 \times 2 \times R}{100} = 400R$$

$$CI - SI = 20000 \left[ \frac{1+R}{100} \right]^2 - 20000 - 400R$$

$$392 = 20000 \left[ \frac{1+R}{100} \right]^2 - 20000 - 400R$$

$$20392 = 20000 \left[ \frac{1+R}{100} \right]^2 - 20000 - 400R$$

$$10171 = 1 + R^2 + 2R - 400R$$

$$R^2 - 398R - 10170 = 0$$

$$\boxed{R = 14.1\%}$$

Q. 80% increase in amount in 8 years at SI what will CI of 80% increase in amount in 8 years at SI?

What will be CI of ₹ 14,000 after 3 years same rate?

$$0.8P = P \times R \times N = \frac{P \times R \times 8}{100}$$

$$\boxed{R = 10\%}$$

$$A = 14000 \left[ 1 + \frac{10}{100} \right]^3 = \frac{14000 \times 11^3}{10000} = 14 \times 121 \times 11$$

$$A = 18634$$

$$CI = 18634 - 14000$$

$$\boxed{CI = 4634}$$

Q. amount becomes 3 times in 10 years then in how many years it becomes 9 times? Compoundedly.

$$\rightarrow 3P = P \left(1 + \frac{R}{100}\right)^{10}$$

$$9P = (3P)^2 = \left[\left(1 + \frac{R}{100}\right)^n\right]^2 = \left[\left(1 + \frac{R}{100}\right)\right]^{20}$$

$$\boxed{n = 20}$$

$$1000 \times 3^2 = 9000$$

Q. amount 1000 ₹ becomes 1331 at 10% rate in years? Compoundedly.

$$\rightarrow 1331 = 1000 \left(1 + \frac{10}{100}\right)^n$$

$$1331 = 1000 \left(\frac{11}{10}\right)^n$$

$$\boxed{n = 3}$$

Roughly 3 years

Q. Rate if total amount return 2205 ₹ for 2000 ₹ in 2y

$$\rightarrow 2205 = 2000 \left(1 + \frac{R}{100}\right)^2$$

$$\frac{441}{400} = \left(1 + \frac{R}{100}\right)^2$$

$$\frac{21}{20} = 1 + \frac{R}{100}$$

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

Q. tree grows  $\frac{1}{8}$  its height annually what will be height after two years if today it is 64 cm?

$$\rightarrow \text{height} = 64 \left[1 + \frac{1}{8 \times 100}\right]^2$$

$$= 64 \left(\frac{9}{8}\right)^2$$

$$\boxed{\text{Height} = 81 \text{ cm}}$$

Q. difference between compound interest and simple interest on 2 years is 18 ₹ with 6% rate. What is sum.

$\rightarrow$  for 100 ₹ let -

$$SI = \frac{100 \times 6 \times 2}{100} = 12$$

$$CI = 100 \left(1 + \frac{6}{100}\right)^2 - 100 = \frac{100 \times 309}{2500} - \cancel{\frac{100 \times 250}{2500}}$$

$$CI - SI = \frac{309}{25} - 12 = \frac{189}{25}$$

When  $a=100\%$  diff =  $9/25$  then diff = 18 then

$$a = 5000\%$$

Q. man deposits 1600₹ each on 1 Jan & 1 July as amount gain 5% half yearly what is gain interest?

$$\rightarrow \text{total amount} = 1600 \left[ 1 + \frac{5}{2 \times 100} \right]^{2 \times 1} + 1600 \left[ 1 + \frac{5}{2 \times 100} \right]^{2 \times \frac{1}{2}}$$

$$= 1600 \left[ \left( \frac{41}{20} \right)^2 + \frac{41}{20} \right]$$

$$= 1600 \left[ \left( \frac{41}{20} \right) \left( \frac{41}{20} + 1 \right) \right] = 1600 \left[ \frac{41}{20} \times \frac{61}{20} \right]$$

$$= 91 \times 81$$

$$= 3321$$

$$[\text{Interest}] = 3321 - 3200 = 321\text{₹}$$

(Imp)

Q. diff. of CI & SI at 4% for 2 years is ₹1 what is P?

$$\rightarrow CI - SI = \left[ P \left( 1 + \frac{4}{100} \right)^2 - P \right] - \left[ \frac{4 \times 2 \times P}{100} \right]$$

$$1 = \left( P \left( \frac{52}{50} \right)^2 - P \right) - \left( \frac{4P}{50} \right)$$

$$1 = \frac{204P}{2500} - \frac{4P}{50}$$

$$1 = \frac{4P}{2500}$$

$$625 = P$$

Q. compound interest on 30000 at 7% is 4347₹ in year?

$$\frac{34347}{30000} = \left( \frac{107}{100} \right)^n$$

$$\frac{11449}{10000} = \left( \frac{107}{100} \right)^m$$

$$m = 2$$

$$(\because 100^2 = 10000)$$

Q. Sum ₹ 12000 become ₹ 134832 in 2 years Rate?

$$\frac{1348.32}{12000} = \left(\frac{1+R}{100}\right)^2$$

12000      1000  
always try to get lower denominator to be in perfect square or most oftenly in terms of  $(10)^2$  or  $(1000)^2$  or anything like this so that denominator of 10, 100 or 1000 will cancel and we can easily predict power/years or Rate/ denominator.

here

$$\therefore \frac{134832}{1200000} = \frac{(1+r)}{100}$$

$$\frac{11236}{10000} = \left(\frac{1+R}{100}\right)^2$$

$$\frac{106}{100} = \frac{100+R}{100}$$

$$R = 6\%$$

Q. least perfect years to double or more than double the amount at 20% is .

$$\rightarrow t = \frac{72}{R} \Rightarrow t = \frac{72}{20} = 3.6 \approx 4 \text{ years.}$$

Q. effective annual rate if amount is payable half yearly at 6%.

Let amount is 100 £ then amount payable at end of year is

$$A = 100 \left[ 1 + \frac{6}{2 \times 100} \right]^{2 \times 1} = 100 \times \frac{103 \times 103}{100 \times 100} = \frac{10000 + 9 + 6}{100}$$

$$A = \frac{10609}{100} -$$

$$CI = 106,09 - 100 = 6,09 \%$$

$$R = 6.09 \text{ y.}$$