Simple and Compound Interest

There are two basic ways of calculating the amount of interest paid on money deposited:

simple interest and compound interest.

Simple interest:

The interest calculated from the original principle for any time interval and rate of interest is simple interest . If simple interest is paid, interest is calculated only on the principal P, the amount deposited (the original capital sum).

It is calculated by,

$$\text{simple interest(S.I)} = \frac{P*T*R}{100} \ ,$$

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Amount = principle + interest

$$P = \frac{100*A}{100+TR}$$

Where, p is the principal, T is the time in year and R is the rate of interest.

Note: Time taken by certain sum of money to be n times itself is given by,

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

Compound interest:

when money is deposited in a bank , the interest gained by the principal at the end of a certain period is added to the principal and again the interest is calculated for the next period and added to the principal and so on . The principle is changed for a given period .

Compound interest is always greater than simple interest .

Q. I deposit 2500 in a high-earning account paying 9% compound interest and leave it for three years. What will be the balance on the account at the end of that time?

Compound interest can be calculated by using the simple formula as,

compound interest = compound amount(CA) – principal

compound amount at the end of T years (CA) = $P\left(1+\frac{R}{100}\right)^{T}$

Now ,

If the compound interest is payable half yearly then

the rate of interest = $\frac{R}{2}\%$ per 6 months and time = 2T half yearly periods .

In this case

compound Amount (CA) = $P\left(1+\frac{R}{2*100}\right)^{2T}$ and

compound interest (CI) = $P\left[\left(1+\frac{R}{2*100}\right)^{2T}-1\right]$

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Population growth and compound depreciation

Population of the certain place increases every year with the certain rate. The increase in population is same as the compound interest.

The value of the machines and other goods decreases every year. The reduced value of goods is known as depreciation.

Calculation of Population Growth is also similar to calculation of Compound Amount.

When,

The population of a place at a specific period of time = P

Rate of growth of population per annum = R%

The population of the country after 'T' years = Pt

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

The formula P(1 +R/100)^T predicts the population after 'T' years with the same growth rate per annum.

But, factors like death and Out-Migration decrease the population of a place while In-Migration increases the population of the place.

If the rate of growth of population is different in every year.

Suppose,

Population Growth Rate in Year 1 = R1%

Population Growth Rate in Year 2 = R2%

Population Growth Rate in Year 3 = R3%

.....

Population Growth Rate in Year T = RT%

We calculate the population after years as:

$$Pt = P\left(1+\frac{R1}{100}\right)\left(1+\frac{R2}{100}\right)\left(1+\frac{R3}{100}\right)\ldots\ldots\left(1+\frac{Rt}{100}\right)$$

Let P be the population a city or a town at the beginning of a certain year. If the population decrease at the rate of R% per annum,

then:

Population after T years = $P\left(1-\frac{R}{100}\right)^{T}$

Depreciation:

When we buy products like machineries, vehicles, furniture, etc from the shop for the first time, we say those items are first hand.

When we sell those items to someone else, they become second hand items.

The decrease in the rate of an item due to its continuous use is known as depreciation

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In simple depreciation, the value of the item decreases constantly every year.

In simple Depreciation,

Cost of item after T years = Original Cost - T*Cost of Depreciation

When,

The original price of an item = P

Rate of Depreciation = R

Duration of time of depreciation = T

The depreciated value of the item after 'T' years = Pt

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

And depreciated amount = P - Pt

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Profit and loss

Profit(P)

The amount gained by selling a product with more than its cost price.

Loss(L)

The amount the seller incurs after selling the product less than its cost price, is mentioned as a loss.

Cost Price (CP)

The amount paid for a product or commodity to purchase it is called a cost price. Also, denoted as CP.

Selling Price (SP)

The amount for which the product is sold is called Selling Price. It is usually denoted as SP. Also, sometimes called a sale price

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Marked Price Formula (MP)

This is basically labelled by shopkeepers to offer a discount to the customers in such a way that,

Discount = Marked Price – Selling Price

And Discount Percentage = (Discount/Marked price) x 100

Profit and Loss Tricks

let us learn some tricks or formulas to solve maths problems based on gain and loss, starting from the general formulas.

Profit, P = SP – CP; SP>CP

Loss, L = CP – SP; CP>SP

P% = (P/CP) x 100

L% = (L/CP) x 100

SP = {(100 + P%)/100} x CP

SP = {(100 – L%)/100} x CP

CP = {100/(100 + P%)} x SP

CP = {100/(100 – L%)} x SP

Discount = MP – SP

SP = MP -Discount

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Mcq of interest:

1. After how many years will the compound interest payable yearly on rs.12000 at 5% p.a. be rs.1230?

a.3 years b.2 years

c. 4 years d. 1 years

Option b

2. How much time will be required for a Sum of money to double itself at $6\frac{1}{4}\%$ per annum Simple Interest?

a) 12 Years b) 6 Years

c) 16 Years d) 24 Years

Option c

3. In what time a sum of money treples itself at 5% p.a. at a simple interest?

a) 20 years b) 30 years

c) 40 years d) 10 years

Option c

4. The sum of annual compound interest and semi-annual compound interest on a sum of money for 2 years at the rate 20% per annum is Rs 18082. Find the differences.

a) Rs.422 b) Rs.442 c) Rs. 462 d) Rs. 482

Option d

5. If Rs. 500 amounts to Rs. 583.20 in two years compounded annually, find the rate of interest per annum.

A.7%p.a B. 8%p.a C. 9%p.a D. 10%p.a

Option B

6. If the simple interest on a sum of money at 5% per annum for 3 years is Rs. 1200, find the compound interest on the same sum for the same period at the same rate.

A.1261 B. 1234 C. 1256 D. 1287

Option A

7. What will be the Sum if Simple Interest is ₹x at x% for x years?

a) ₹(100/x) b) ₹(100x) c) ₹(100/x2) d) ₹(x)

Option a

8. If ₹64 Amount to ₹83.20 in 2 years, what will ₹86 Amount to in 4 years at the same Rate percent per annum?

a) ₹127.60 b) ₹147.60 c) ₹137.60 d) ₹117.60

Option c

9. Rahul lent ₹6,000 to Martin for 2 years and ₹1500 to Ali for 4 years and received altogether from both ₹900 as Simple Interest. What is the rate of interest?

a) 4.5% p.a b) 7% p.a c) 10% p.a d) 5% p.a

Option d

10. If x is increased by 20%. Then by how much x2 is increased?

a. 20% b. 400% c. 44% d. 444%

Option c

11. The salary of A is 25% more than the salary of B. The by how much salary of B is less than salary of A?

a. 25% b. $16\frac{2}{3}\%$ c. $22\frac{1}{2}\%$ d. 20%

Option d

12. A milkman mixes 120 l of milk containing 5% of water with 80 ltr. of milk containing 10% of water. Then the percentage of water in mixture is,

a. 7.5% b. 7% c. 10% d. 15%

Option b

Mcq of population growth :

1. In how many years will the population of town be 18522 from 16000 at the growth rate of 5% annum?

a.2 b.3 c.4 d.5

Option b

2. Three years ago the population of the village was 40000. if the birth rate and death rate are 7% and 2% ,then the present population of the village is

a.46305 b.45355 c.43234 d.46544

Option a

3. The value of the article depreciated From Rs 18000 to Rs 14580 in 2 years. Find the yearly rate depreciation.

a.5% b.8% c.10% d.12%

Option c

Mcq of profit and loss

1. If the cost price of 5 pens is equal to the selling price of 4 pens of the same kind , find the profit percent?

a. 20% b.25% c.30% d.35%

Option b

2. A dealer gains a selling price of 4 watches by selling 20 watches. What is his profit percentage?

A. 15% B. 30% C. 20% D. 25%

Option d

3.A laptop is brought for rs.65000 .At what labelled price should it be sold to gain 6.25% after 15% discount.

a.81200 b.81320 c.81250 d.81450

Option c

4. After increasing 12.5% a person gets Rs. 2700. Find his previous income

a. Rs.2000 b. Rs.2500 c. Rs. 2400 d. Rs. None

Option c

5. 8 kg of sugar costs of Rs. 240. What is the cost of 15kg of sugar?

a. Rs.550 b.Rs.450 c. Rs. 350 d. Rs. 750

Option b

6. What percent is 30 paisa of Rs. 60?

a. 0.7% b. 0.57% c. 0.5% d. None

Option c

7. What percentage is Rs. 25 of Rs. 125?

a. 20% b. 25% c. 30% d. 35%

Option a

8. What percentage is 7.5cm of 4 m.

a. 1.2% b. 1.88% c. 1.52% d. None

Option b

9. out of 60 students of a class, 40% were girls, how many students were boys?

a. 42 b. 24 c. 36 d. 50

Option c

10. A man bought an article for Rs. 1 and sold for Rs. 1.20 what is the gain %

a. 12% b. 20% c. 1.2% d. 10%

Option b

☺Thankyou☺