

# Riviera International Academy

## Assignment-2077

(Shrawan 13, 2077, Tuesday)

Class: Ten

### Subject- Mathematics

Source: Photo of exercise are given below

Work: Read & write all examples of compound interest.

Do your work neatly

Compound Interest

**Example 8:** A floriculturist takes a loan of Rs 40,000 from an Agricultural bank. If the rate of compound interest is 5 paisa per rupee per year, in how many years will he pay the compound interest of Rs 6,305?

**Solution:**

Here, the rate of interest (R) = 5 paise per Re 1 per year  
= 500 paise, i.e. Rs 5 per Rs 100 per year = 5 % per annum

Also, principal (P) = Rs 40,000 and C.I. = Rs 6,305

Now,  $C.I. = P \left[ \left( 1 + \frac{R}{100} \right)^T - 1 \right]$

or,  $6,305 = 40,000 \left[ \left( 1 + \frac{5}{100} \right)^T - 1 \right]$

or,  $\frac{6,305}{40,000} = \left( \frac{21}{20} \right)^T - 1$

or,  $\frac{1261}{8000} = \left( \frac{21}{20} \right)^T - 1$

or,  $\left( \frac{21}{20} \right)^T = \frac{1261}{8000} + 1$

or,  $\left( \frac{21}{20} \right)^T = \frac{9261}{8000} = \left( \frac{21}{20} \right)^3$

or,  $T = 3$  years

So, the required time is 3 years.

**Alternative process**

(C.A.) = P + C.I.  
= Rs 40,000 + Rs. 6,305  
= Rs 46,305

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

or,  $Rs\ 46,305 = 40,000 \left( 1 + \frac{5}{100} \right)^T$

or,  $\frac{46,305}{40,000} = \left( \frac{21}{20} \right)^T$

or,  $\left( \frac{21}{20} \right)^T = \frac{9,261}{8,000}$

or,  $\left( \frac{21}{20} \right)^T = \left( \frac{21}{20} \right)^3$

or,  $T = 3$  years

**Example 9:** Mr. Gupta deposited a sum of Rs 50,000 in a commercial bank for 3 years. the bank provided 4% interest compounded annually for the first year a the rate of interest was gradually increased by 1% every year, how much interest did he get in 3 years?

**Solution:**

Here, principal (P) = Rs 50,000

Rate of interest in the first year,  $R_1 = 4\%$  p.a.

Rate of interest in the second year  $R_2 = 5\%$

Rate of interest in the third year  $R_3 = 6\%$  p.a.

Now, compound amount (C.A.) =  $P \left( 1 + \frac{R_1}{100} \right) \left( 1 + \frac{R_2}{100} \right) \left( 1 + \frac{R_3}{100} \right)$

$= 50,000 \left( 1 + \frac{4}{100} \right) \left( 1 + \frac{5}{100} \right) \left( 1 + \frac{6}{100} \right)$

$= 50,000 \times \frac{104}{100} \times \frac{105}{100} \times \frac{106}{100} = Rs\ 57,876$

$\therefore$  Compound interest (C.I.) = C.A. - P

$= Rs\ 57,876 - Rs\ 50,000$

$= Rs\ 7,876$

Hence, he got the interest of Rs 7,876 in 3 years.

Excel in Mathematics

**Example 8:** A floriculturist takes a loan of Rs 40,000 from an Agricultural bank. If the rate of compound interest is 5 paise per rupee per year, in how many years will he pay the compound interest of Rs 6,305?

**Solution:**

Here, the rate of interest (R) = 5 paise per Re 1 per year

= 500 paise, i.e. Rs 5 per Rs 100 per year = 5% per annum

Also, principal (P) = Rs 40,000 and C.I. = Rs 6,305

$$\text{Now, C.I.} = P \left[ \left( 1 + \frac{R}{100} \right)^T - 1 \right]$$

$$\text{or, } 6,305 = 40,000 \left[ \left( 1 + \frac{5}{100} \right)^T - 1 \right]$$

$$\text{or, } \frac{6,305}{40,000} = \left( \frac{21}{20} \right)^T - 1$$

$$\text{or, } \frac{1261}{8000} = \left( \frac{21}{20} \right)^T - 1$$

$$\text{or, } \left( \frac{21}{20} \right)^T = \frac{1261}{8000} + 1$$

$$\text{or, } \left( \frac{21}{20} \right)^T = \frac{9261}{8000} = \left( \frac{21}{20} \right)^3$$

$$\text{or, } T = 3 \text{ years}$$

So, the required time is 3 years.

#### Alternative process

$$\text{(C.A.)} = P + \text{C.I.}$$

$$= \text{Rs } 40,000 + \text{Rs } 6,305$$

$$= \text{Rs } 46,305$$

$$\text{Now, C.A.} = P \left( 1 + \frac{R}{100} \right)^T$$

$$\text{or, Rs } 46,305 = 40,000 \left( 1 + \frac{5}{100} \right)^T$$

$$\text{or, } \frac{46,305}{40,000} = \left( \frac{21}{20} \right)^T$$

$$\text{or, } \left( \frac{21}{20} \right)^T = \frac{9,261}{8000}$$

$$\text{or, } \left( \frac{21}{20} \right)^T = \left( \frac{21}{20} \right)^3$$

$$\text{or, } T = 3 \text{ years}$$

**Example 9:** Mr. Gupta deposited a sum of Rs 50,000 in a commercial bank for 3 years. If the bank provided 4% interest compounded annually for the first year and the rate of interest was gradually increased by 1% every year, how much interest did he get in 3 years?

**Solution:**

Here, principal (P) = Rs 50,000

Rate of interest in the first year,  $R_1 = 4\%$  p.a.

Rate of interest in the second year  $R_2 = 5\%$

Rate of interest in the third year  $R_3 = 6\%$  p.a.

$$\text{Now, compound amount (C.A.)} = P \left( 1 + \frac{R_1}{100} \right) \left( 1 + \frac{R_2}{100} \right) \left( 1 + \frac{R_3}{100} \right)$$

$$= 50,000 \left( 1 + \frac{4}{100} \right) \left( 1 + \frac{5}{100} \right) \left( 1 + \frac{6}{100} \right)$$

$$= 50,000 \times \frac{104}{100} \times \frac{105}{100} \times \frac{106}{100} = \text{Rs } 57,876$$

$$\therefore \text{Compound interest (C.I.)} = \text{C.A.} - P$$

$$= \text{Rs } 57,876 - \text{Rs } 50,000$$

$$= \text{Rs } 7,876$$

Hence, he got the interest of Rs 7,876 in 3 years.

**Example 10:** The compound amount of a sum of money in 3 years is Rs 26,620 and in 4 years is Rs 29,282. Find the compound rate of interest per annum and the sum.

**Solution:**

Here, the C.A. in 3 years = Rs 26,620

$$\text{or, } P \left( 1 + \frac{R}{100} \right)^3 = \text{Rs } 26,620$$

$$\text{or, } P \left( \frac{100 + R}{100} \right)^3 = \text{Rs } 26,620 \dots\dots(i)$$

Also, the C.A. in 4 years = Rs 29,282

$$\text{or, } P \left( 1 + \frac{R}{100} \right)^4 = \text{Rs } 29,282$$

$$\text{or, } P \left( \frac{100 + R}{100} \right)^4 = \text{Rs } 29,282 \dots\dots(ii)$$

Now, dividing equation (ii) by (i), we get,

$$\frac{P \left( \frac{100 + R}{100} \right)^4}{P \left( \frac{100 + R}{100} \right)^3} = \frac{29,282}{26,620}$$

$$\text{or, } \frac{100 + R}{100} = 1.1$$

$$\text{or, } R = 10\%$$

Again, putting the value of R in equation (i),

$$P \left( \frac{100 + 10}{100} \right)^3 = \text{Rs } 26,620$$

$$\text{or, } P \left( \frac{11}{10} \right)^3 = \text{Rs } 26,620$$

$$\text{or, } P = \text{Rs } 20,000$$

Hence, the required sum is Rs 20,000 and the rate of interest is 10% p.a.

**Example 11:** The yearly compound interest on a sum of money for two successive years are Rs 320 and Rs 336 respectively. Calculate the rate of interest and the original sum.

**Solution:**

Here, difference between the C. I. of two successive years = Rs 336 - Rs 320 = Rs 16

$\therefore$  Rs 16 is the simple interest of one year on Rs 320.

$$\therefore \text{Rate of interest} = \frac{1 \times 100}{P \times T} = \frac{16 \times 100}{320 \times 1} = 5\% \text{ p.a.}$$

#### Alternative process

Here,  $(\text{C.A.})_1 = \text{Rs } 26,620$

$(\text{C.A.})_2 = \text{Rs } 29,282$

$$\text{Now, } (\text{C.A.})_2 - (\text{C.A.})_1 = \text{Rs } 29,282 - \text{Rs } 26,620$$

$$= \text{Rs } 2,662$$

Here, Rs 2,662 is the simple interest (S.I.) of Rs 26,620 for 1 year.

$$\therefore \text{Rate (R)} = \frac{1 \times 100}{P \times T}$$

$$= \frac{2,662 \times 100}{26,620 \times 1} = 10\%$$

$$\text{Again, } (\text{C.A.})_1 = P \left( 1 + \frac{R}{100} \right)^3$$

$$\text{Rs } 26,620 = P \left( 1 + \frac{10}{100} \right)^3$$

$$\text{or, } P = \text{Rs } 20,000$$

#### Answer checking:

$$P = \text{Rs } 20,000 \quad T = 3 \text{ years} \quad R = 10\% \text{ p.a.}$$

$$\text{C.A.} = \text{Rs } 20,000 \left( 1 + \frac{10}{100} \right)^3 = \text{Rs } 26,620$$

$$\text{C.A.} = 20,000 \left( 1 + \frac{10}{100} \right)^4 = \text{Rs } 29,282$$

which are given in the question.

Again, the interest of the original sum (P) for the first year = Rs 320

$$P \left[ \left( 1 + \frac{R}{100} \right)^T - 1 \right] = \text{Rs } 320$$

$$\text{or, } \left[ \left( 1 + \frac{5}{100} \right)^1 - 1 \right] = \text{Rs } 320$$

$$\text{or, } \frac{P}{20} = \text{Rs } 320$$

$$\text{or, } P = \text{Rs } 6,400$$

Hence, the rate of interest is 5% p.a. and the original sum is Rs 6,400.

**Example 12:** The compound interest calculated yearly on a certain sum of money for the second year is Rs 1,650 and for the third year is Rs 1,815. Calculate the rate of interest and the original sum of money.

**Solution:**

Here, the difference between the C. I. of two successive years = Rs 1,815 - Rs 1,650 = Rs 165

∴ Rs 165 is the interest on Rs 1,650.

$$\text{Now, rate of interest (R)} = \frac{I \times 100}{P \times T} = \frac{165 \times 100}{1650 \times 1} = 10\% \text{ p.a.}$$

$$\text{C.A. for the first year} = P \left( 1 + \frac{R}{100} \right)^T = P \left( 1 + \frac{10}{100} \right)^1 = \frac{11P}{10}$$

So,  $\frac{11P}{10}$  is the principal for the second year.

$$\therefore \text{C. I. in the second year} = \frac{11P}{10} \left[ \left( 1 + \frac{R}{100} \right)^T - 1 \right] = \frac{11P}{10} \left[ \left( 1 + \frac{10}{100} \right)^1 - 1 \right] = \frac{11P}{100}$$

From the question,

$$\frac{11P}{100} = \text{Rs } 1,650$$

$$\text{or, } P = \text{Rs } 15,000$$

Hence, the rate of interest is 10% p.a. and the original sum is Rs 15,000.

**Example 13:** The simple interest of a certain sum of money for 2 years is Rs 1,600 and the compound interest of the same sum at the same rate of interest for the same duration of times is Rs 1,680. Find the rate of interest and the sum.

**Solution:**

Here, S. I. = Rs 1,600 and T = 2 years

$$\text{Now, principal (P)} = \frac{I \times 100}{T \times R} = \frac{1600 \times 100}{2 \times R} = \frac{80000}{R} \dots\dots\dots (i)$$

$$\text{Also, C. I.} = P \left[ \left( 1 + \frac{R}{100} \right)^T - 1 \right]$$

$$\text{or, } 1,680 = P \left[ \left( 1 + \frac{R}{100} \right)^2 - 1 \right] = \left[ \frac{(100 + R)^2 - 10000}{10000} \right] \\ = \frac{P}{10000} [(100 + R)^2 - 10000] \dots (ii)$$

Putting the value of P from equation (i) in equation (ii), we get.

$$1,680 = \frac{80000}{10000R} [(100 + R)^2 - 10000]$$

Compound Interest

$$\text{or, } 210R = 10000 + 200R + R^2 - 10000$$

$$\text{or, } R^2 - 10R = 0$$

$$\text{or, } R = 10\% \text{ p.a.}$$

$$\text{Again, from equation (i), } P = \frac{80000}{R} = \frac{80000}{10} = \text{Rs } 8,000$$

Hence, the required rate of interest is 10% p.a. and principal is Rs 8,000.

**Example 14:** Suresh lent altogether 6,600 to Manoj and Pradeep for 2 years. Manoj agreed to pay simple interest at 15 % p.a. and Pradeep agreed to pay compound interest at the same rate. If Manoj paid Rs 112.50 more than Pradeep as the interest, find how much did Suresh lend to each of them?

**Solution:**

Suppose the money lent to Pradeep =  $P_1$  = Rs x.

∴ the money lent to Manoj =  $P_2$  = Rs (6,600 - x)

Here, time (T) = 2 years and rate (R) = 15 % p.a.

$$\text{Now, the simple interest to Manoj} = \frac{P_2 TR}{100} = \frac{\text{Rs } (6,600 - x) \times 2 \times 15}{100} = \text{Rs } \frac{19,800 - 3x}{10}$$

Also, the compound interest to Pradeep

$$= P_1 \left[ \left( 1 + \frac{R}{100} \right)^T - 1 \right]$$

$$= \text{Rs } x \left[ \left( 1 + \frac{15}{100} \right)^2 - 1 \right]$$

$$= \text{Rs } x \left[ \left( 1 + \frac{3}{20} \right)^2 - 1 \right]$$

$$= \text{Rs } x \left[ \left( \frac{23}{20} \right)^2 - 1 \right]$$

$$= \text{Rs } x \left[ \frac{529}{400} - 1 \right]$$

$$= \text{Rs } x \left[ \frac{529 - 400}{400} \right] = \text{Rs } \frac{129x}{400}$$

According to the question,

$$\text{or, } \frac{19,800 - 3x}{10} - \frac{129x}{400} = \text{Rs } 112.50$$

$$\therefore x = \text{Rs } 3,000$$

So, the money lent to Pradeep = x = Rs 3,000

The money lent to Manoj = 6,600 - x = 6,600 - 3,000 = Rs 3,600

**Example 15:** Mrs. Nepali borrowed Rs 75,000 from a commercial bank at the rate 10% p.a. compounded annually for 2 years. After one year, the bank changed its policy to pay the interest compounded semi-annually at the same rate. What is the percentage difference between the interest of the first year and second year? Write reason with calculation.

Solut  
Here  
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**Answer checking:**

$$\text{S.I. paid by Manoj} = \frac{3600 \times 2 \times 15}{100} \\ = \text{Rs } 1,080$$

$$\text{C.I. paid by Pradeep} = 3000 \left[ \left( 1 + \frac{15}{100} \right)^2 - 1 \right] \\ = \text{Rs } 967.50$$

Now, Rs 1,080 - Rs 967.50 = Rs 112.50 which is given in the question.

### Compound Interest

$$\text{or, } 210R = 10000 + 200R + R^2 - 10000$$

$$\text{or, } R^2 - 10R = 0$$

$$\text{or, } R = 10\% \text{ p.a.}$$

$$\text{Again, from equation (i), } P = \frac{80000}{R} = \frac{80000}{10} = \text{Rs } 8,000$$

Hence, the required rate of interest is 10% p.a. and principal is Rs 8,000.

**Example 14:** Suresh lent altogether 6,600 to Manoj and Pradeep for 2 years. Manoj agreed to pay simple interest at 15 % p.a. and Pradeep agreed to pay compound interest at the same rate. If Manoj paid Rs 112.50 more than Pradeep as the interest, find how much did Suresh lend to each of them?

#### Solution:

Suppose the money lent to Pradeep =  $P_1 = \text{Rs } x$ .

$\therefore$  the money lent to Manoj =  $P_2 = \text{Rs } (6,600 - x)$

Here, time (T) = 2 years and rate (R) = 15 % p.a.

$$\text{Now, the simple interest to Manoj} = \frac{P_2 \cdot T \cdot R}{100} = \frac{\text{Rs } (6,600 - x) \times 2 \times 15}{100} = \text{Rs } \frac{19,800 - 3x}{10}$$

Also, the compound interest to Pradeep

$$= P_1 \left[ \left( 1 + \frac{R}{100} \right)^T - 1 \right]$$

$$= \text{Rs } x \left[ \left( 1 + \frac{15}{100} \right)^2 - 1 \right]$$

$$= \text{Rs } x \left[ \left( 1 + \frac{3}{20} \right)^2 - 1 \right]$$

$$= \text{Rs } x \left[ \left( \frac{23}{20} \right)^2 - 1 \right]$$

$$= \text{Rs } x \left[ \frac{529}{400} - 1 \right]$$

$$= \text{Rs } x \left[ \frac{529 - 400}{400} \right] = \text{Rs } \frac{129x}{400}$$

According to the question,

$$\text{or, } \frac{19,800 - 3x}{10} - \frac{129x}{400} = \text{Rs } 112.50$$

$$\therefore x = \text{Rs } 3,000$$

So, the money lent to Pradeep =  $x = \text{Rs } 3,000$

The money lent to Manoj =  $6,600 - x = 6,600 - 3,000 = \text{Rs } 3,600$

**Example 15:** Mrs. Nepali borrowed Rs 75,000 from a commercial bank at the rate of 10% p.a. compounded annually for 2 years. After one year, the bank changed its policy to pay the interest compounded semi-annually at the same rate. What is the percentage difference between the interest of the first year and second year? Write reason with calculation.

#### Solution:

Here, principal (P) = Rs 75,000 and rate (R) = 10% p.a.

$$\begin{aligned} \text{Now, C.I. in the first year} &= P \left[ \left( 1 + \frac{R}{100} \right)^T - 1 \right] \\ &= 75,000 \left[ \left( 1 + \frac{10}{100} \right)^1 - 1 \right] \\ &= 75,000 \left( \frac{11}{10} - 1 \right) \\ &= \text{Rs } 7,500 \end{aligned}$$

Then, the principal for the second year = Rs 75,000 + Rs 7,500

$$P' = \text{Rs } 82,500$$

$$\begin{aligned} \text{Again, C. I. in the second year} &= P' \left[ \left( 1 + \frac{R}{2 \times 100} \right)^{2T} - 1 \right] \\ &= 82,500 \left[ \left( 1 + \frac{10}{200} \right)^2 - 1 \right] \\ &= 82,500 \left[ \frac{21 \times 21 - 400}{400} \right] \\ &= 206.25 \times 41 \\ &= \text{Rs } 8,456.25 \end{aligned}$$

$$\begin{aligned} \therefore \text{The difference between the interest of second and first years} &= \text{Rs } 8,456.25 - \text{Rs } 7,500 \\ &= \text{Rs } 956.25 \end{aligned}$$

$$\text{And, the difference of interest in percent} = \frac{956.25}{7,500} \times 100\% = 12.75\%$$

Since, the interest compounded semi-annually is paid at the end of every six months, it is greater than the interest compounded annually by 12.75%.

#### Answer checking:

$$\text{S.I. paid by Manoj} = \frac{3600 \times 2 \times 15}{100}$$

$$= \text{Rs } 1,080$$

$$\text{C.I. paid by Pradeep} = 3000 \left[ \left( 1 + \frac{15}{100} \right)^2 - 1 \right]$$

$$= \text{Rs } 967.50$$

Now, Rs 1,080 - Rs 967.50 = Rs 112.50 which is given in the question.

### Compound Interest

#### Alternative process

$$\begin{aligned} \text{S.I. in the first year} &= \frac{P \cdot T \cdot R}{100} = \frac{75,000 \times 1 \times 10}{100} \\ &= \text{Rs } 7,500 \end{aligned}$$

## EXERCISE 3.1

### General section

1. a) If C.A. and C.I. are the compound amount and compound interest of a sum P in T years at R% p.a. respectively, write the relationships among the following variables.
  - (i) P, T, R, and CA (Compounded annually)
  - (ii) P, T, R and CI (Compounded annually)
  - (iii) P, T, R and CA (Compounded semi-annually)
  - (iv) P, T, R and CI (Compounded semi-annually)

## Subject- Computer

### Answer the following questions:

- What is modular programming? Mention any four advantages of modular programming.
- What is a procedure? List the types of procedures.
- Mention any two differences between Sub procedure and Function procedure.
- What do you mean by argument and parameter?
- What do you mean by argument passing by reference method?
- Mention the difference between local variable and global variable.

## विषय - नेपाली

क ) हाम्रो देशमा सं वधान बन्यो तर अझै राम्ररी कार्यान्वयन गर्न स कएको छैन।

ख ) अब त मा स्वदेशमै बसेर काम गर्छु।

ग) आज त हामी गुरु सत नगरकोट गर्यौं अनि सुर्योदय नियल्यौं।

घ ) धत् ! तिमी जस्ता ज्ञानी मान्छेले यस्तो कुरा गर्न सुहाउँछ ।

ङ) अचेल हरि आफ्नो कताब लएर खुरुखुरु पढ्न बस्छ। प्रश्न :मा थका वाक्यबाट तलका शब्दको

पदवर्ग पहिचान गर्नुहोस्। हाम्रो अब धत् ! लएर सं वधान त गर्न खुरुखुरु बन्यो हामी ज्ञानी बस्छ तर

सत अचेल कताब राम्ररी अनि आफ्नो कुरा

## Subject- HPE

### 1. Write short notes on:

- Basal body temperature method
- Rate of natural increase
- Depo-provera
- Permanent methods of contraception

**The End.**