

Comparing Quantities 8

(Compound Interest)

Q1) Using formula calculate compound interest on:

- a) ₹62500 for 2 years 6 months at rate of 12% per annum compounded annually.
- b) ₹ 10240 for 3 years at $12\frac{1}{2}\%$ per annum compounded annually. 6

Q2) Three years ago Mohit purchased mobile phone for ₹11,000. What payment will discharge his debt now, the rate being 10% per annum, compounded annually. 3

Q3. Find the sum that amounts to Rs 18,522 in 1 year 6 months at 10% per annum compounded half yearly. 3

Q4. Find the principal if the amount at the end of 2 years at 10%, compounded annually is Rs 7986. 3

Q5. In what time will Rs 6000 amount to Rs 7986 at a compound interest of 10%? 3

Q6. At what rate of interest will Rs 3200 amount to Rs 5000 in 2 years (simple interest)? 3

Q7) Abhay borrowed ₹16,000 at $7\frac{1}{2}\%$ per annum simple interest. On the same day, he lent it to Gurmeet at the same rate but compounded annually. What does he gain at the end of two years? 4

Q1) Using formula calculate compound interest on:

- ₹62500 for 2 years 6 months at rate of 12% per annum compounded annually.
- ₹ 10240 for 3 years at 12 ½ % per annum compounded annually.

Solutions

Answer 1)

- Principle (P) = ₹62,500
Rate (r) = 12%
Time Period = n = 2 ½
Compounding Annually

$$\begin{aligned} \text{Amount} &= P \left(1 + \frac{r}{100}\right)^n \left(1 + \frac{rf}{100}\right) \\ \text{Amount} &= 62,500 \left(1 + \frac{12}{100}\right)^2 \left(1 + \frac{12}{2 \times 100}\right) \\ &= 62,500 \left(\frac{28}{25} \times \frac{28}{25} \times \frac{53}{50}\right) \\ &= ₹83,140 \end{aligned}$$

$$\text{CI} = A - P$$

$$83,140 - 62,500 = ₹20,640$$

- Principle (P) = ₹10,240
Rate (r) = 12 ½ %
Time Period = n = 3
Compounding Annually

$$\begin{aligned} \text{Amount} &= P \left(1 + \frac{r}{100}\right)^n \\ \text{Amount} &= 10240 \left(1 + \frac{25/2}{100}\right)^3 \\ &= 10240 \left(\frac{9}{8} \times \frac{9}{8} \times \frac{9}{8}\right) = ₹14,580 \end{aligned}$$

$$CI = A - P = 14580 - 10240 = ₹ 4340$$

Q2) Three years ago Mohit purchased mobile phone for ₹11,000. What payment will discharge his debt now, the rate being 10% per annum, compounded annually.

Ans) Principle (P) = ₹11,000

Rate (r) = 10 %

Time Period = n = 3

Compounding Annually

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

$$\begin{aligned} \text{Amount} &= 11,000 \left(1 + \frac{10}{100}\right)^3 \\ &= 11,000 \left(\frac{11}{10} \times \frac{11}{10} \times \frac{11}{10}\right) = ₹14,641 \end{aligned}$$

Q3. Find the sum that amounts to Rs 18522 in 1 years 6 months at 10% per annum compounded half yearly.

Ans) Principle (P) = x

$$\text{Amount} = ₹18,522$$

Rate (r) = 10 %

Time Period $1 \frac{1}{2}$, n = 3

Compounding Half yearly

$$\text{Amount} = P \left(1 + \frac{r}{200}\right)^n$$

$$\text{Amount} = x \left(1 + \frac{10}{200}\right)^3$$

$$18522 = x \left(\frac{21}{20} \times \frac{21}{20} \times \frac{21}{20} \right)$$

$$x = 16,000$$

Q4. Find the principal if the amount at the end of 2 years at 10%, compounded annually is Rs 7986.

Ans) Principle (P) = P

Amount = ₹7986

Rate (r) = 10 %

Time Period = n = 2

Compounding Annually

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

$$7986 = P \left(1 + \frac{10}{100} \right)^2$$

$$7986 = P \left(\frac{11}{10} \times \frac{11}{10} \right)$$

$$P = 7986 \times \frac{10}{11} \times \frac{10}{11}$$

Principle(P) = ₹6600

Q5. In what time will Rs 6000 amount to Rs 7986 at a compound interest of 10%?

Ans) Principle (P) = 6000

Amount = ₹7986

Rate (r) = 10 %

Time Period = n

Compounding Annually

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

$$7986 = 6000 \left(1 + \frac{10}{100}\right)^n$$

$$7986 = 6000 \left(\frac{11}{10}\right)^n$$

$$\frac{7986}{6000} = \left(\frac{11}{10}\right)^n$$

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

$$\left(\frac{11}{10}\right)^3 = \left(\frac{11}{10}\right)^n$$

$$n = 3$$

Q6. At what rate of interest will Rs 3200 amount to Rs 5000 in 2 years (simple interest)?

$$P = ₹3200$$

$$A = ₹5000$$

$$SI = 5000 - 3200 = ₹1800$$

$$SI = \frac{PRT}{100}$$

$$1800 = \frac{3200 \times R \times 2}{100}$$

$$R = \frac{1800 \times 100}{3200 \times 2} = 28.125\%$$

Q7) Abhay borrowed ₹16,000 at 7½% per annum simple interest. On same day, he lent it to Gurmeet at the same rate but compounded annually. What does he gain at the end of two years?

$$\text{Ans) } P = 16000$$

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

$$T = 2 = n$$

Simple Interest

$$SI = \frac{PRT}{100}$$

$$SI = \frac{16000 \times \frac{15}{2} \times 2}{100} = \frac{16000 \times 15}{100} = ₹2400$$



Compound Interest

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

$$A = 16000 \left(1 + \frac{15}{200}\right)^2$$

$$A = 16000 \left(\frac{215}{200}\right)^2 = 18490$$

$$CI = A - P = 18490 - 16000 = 2490$$

$$\text{Gain} = 2490 - 2400 = 90$$

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