

CBSE Class –VIII Mathematics
NCERT Solutions
CHAPTER - 8
Comparing Quantities (Ex. 8.3)

1. Calculate the amount and compound interest on:

(a) Rs.10,800 for 3 years at $12\frac{1}{2}\%$ per annum compounded annually.

(b) Rs.18,000 for $2\frac{1}{2}$ years at 10% per annum compounded annually.

(c) Rs.62,500 for $1\frac{1}{2}$ years at 8% per annum compounded annually.

(d) Rs.8,000 for 1 years at 9% per annum compounded half yearly. (You could the year by year calculation using S.I. formula to verify).

(e) Rs.10,000 for 1 years at 8% per annum compounded half yearly.

Ans. (a) Here, Principal (P) = Rs. 10800, Time(n) = 3 years,

$$\text{Rate of interest (R)} = 12\frac{1}{2}\% = \frac{25}{2}\%$$

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

$$= 10800 \left(1 + \frac{25}{2 \times 100}\right)^3 = 10800 \left(1 + \frac{1}{2 \times 4}\right)^3$$

$$= 10800 \left(1 + \frac{1}{8}\right)^3 = 10800 \left(\frac{9}{8}\right)^3$$

$$= 10800 \times \frac{9}{8} \times \frac{9}{8} \times \frac{9}{8}$$

$$= \text{Rs. } 15,377.34 \text{ (approx.)}$$

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

$$= \text{Rs. } 10800 - \text{Rs. } 15377.34 = \text{Rs. } 4,577.34$$

(b) Here, Principal (P) = Rs. 18,000, Time (n) = $2\frac{1}{2}$ years, Rate of interest (R)

= 10% p.a.

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

$$= 18000 \left(1 + \frac{10}{100}\right)^2 = 18000 \left(1 + \frac{1}{10}\right)^2$$

$$= 18000 \left(\frac{11}{10}\right)^2 = 18000 \times \frac{11}{10} \times \frac{11}{10}$$

$$= \text{Rs. } 21,780$$

$$\text{Interest for } \frac{1}{2} \text{ years on Rs. } 21,780 \text{ at rate of } 10\% = \frac{21780 \times 10 \times 1}{100} = \text{Rs. } 1,089$$

Total amount for $2\frac{1}{2}$ years

$$= \text{Rs. } 21,780 + \text{Rs. } 1,089 = \text{Rs. } 22,869$$

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

$$= \text{Rs. } 22869 - \text{Rs. } 18000 = \text{Rs. } 4,869$$

(c) Here, Principal (P) = Rs. 62500, Time (n) = $1\frac{1}{2} = \frac{3}{2}$ years = 3 years (compounded half yearly)

Rate of interest (R) = 8% = 4% (compounded half yearly)

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

$$= 62500 \left(1 + \frac{4}{100}\right)^2$$

$$= 62500 \left(1 + \frac{1}{25}\right)^3$$

$$= 62500 \left(\frac{26}{25}\right)^3$$

$$= 62500 \times \frac{26}{25} \times \frac{26}{25} \times \frac{26}{25}$$

$$= \text{Rs. } 70,304$$

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

$$= \text{Rs. } 70304 - \text{Rs. } 62500 = \text{Rs. } 7,804$$

(d) Here, Principal (P) = Rs. 8000, Time (n) = 1 years = 2 years(compounded half yearly)

$$\text{Rate of interest (R)} = 9\% = \frac{9}{2}\% \text{ (compounded half yearly)}$$

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

$$= 8000 \left(1 + \frac{9}{2 \times 100}\right)^2$$

$$= 8000 \left(1 + \frac{9}{200}\right)^2$$

$$= 8000 \left(\frac{209}{200} \right)^2$$

$$= 8000 \times \frac{209}{200} \times \frac{209}{200}$$

$$= \text{Rs. } 8,736.20$$

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

$$= \text{Rs. } 8736.20 - \text{Rs. } 8000$$

$$= \text{Rs. } 736.20$$

(e) Here, Principal (P) = Rs. 10,000, Time (n) = 1 years = 2 years (compounded half yearly)

Rate of interest (R) = 8% = 4% (compounded half yearly)

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

$$= 10000 \left(1 + \frac{4}{100} \right)^2$$

$$= 10000 \left(1 + \frac{1}{25} \right)^2$$

$$= 10000 \left(\frac{26}{25} \right)^2$$

$$= 10000 \times \frac{26}{25} \times \frac{26}{25}$$

$$= \text{Rs. } 10,816$$

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

$$= \text{Rs. } 10,816 - \text{Rs. } 10,000 = \text{Rs. } 816$$

2. Kamala borrowed Rs.26,400 from a Bank to buy a scooter at a rate of 15% p.a. compounded yearly. What amount will she pay at the end of 2 years and 4 months to clear the loan?

(Hint: Find A for 2 years with interest is compounded yearly and then find SI on the 2nd year amount for $\frac{4}{12}$ years).

Ans. Here, Principal (P) = Rs. 26,400, Time(n) = 2 years 4 months, Rate of interest (R) = 15% p.a.

$$\begin{aligned}\text{Amount for 2 years (A)} &= P \left(1 + \frac{R}{100}\right)^n \\&= 26400 \left(1 + \frac{15}{100}\right)^2 = 26400 \left(1 + \frac{3}{20}\right)^2 \\&= 26400 \left(\frac{23}{20}\right)^2 = 26400 \times \frac{23}{20} \times \frac{23}{20} \\&= \text{Rs. } 34,914\end{aligned}$$

$$\text{Interest for 4 months} = \frac{4}{12} = \frac{1}{3} \text{ years at the rate of } 15\% = \frac{34914 \times 15 \times 1}{100}$$

$$= \text{Rs. } 1745.70$$

$$\therefore \text{Total amount} = \text{Rs. } 34,914 + \text{Rs. } 1,745.70$$

$$= \text{Rs. } 36,659.70$$

3. Fabina borrows Rs.12,500 per annum for 3 years at simple interest and Radha borrows the same amount for the same time period at 10% per annum, compounded annually. Who pays more interest and by how much?

Ans. Here, Principal (P) = Rs.12,500, Time (T) = 3 years, Rate of interest (R)

= 12% p.a.

$$\text{Simple Interest for Fabina} = \frac{P \times R \times T}{100}$$

$$= \frac{12500 \times 12 \times 3}{100} = \text{Rs. 4,500}$$

Amount for Radha, P = Rs. 12,500, R = 10% and $n = 3$ years

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

$$= 12500 \left(1 + \frac{10}{100} \right)^3 = 12500 \left(1 + \frac{1}{10} \right)^3$$

$$= 12500 \left(\frac{11}{10} \right)^3 = 12500 \times \frac{11}{10} \times \frac{11}{10} \times \frac{11}{10}$$

$$= \text{Rs. 16,637.50}$$

$$\therefore \text{C.I. for Radha} = A - P$$

$$= \text{Rs. 16,637.50} - \text{Rs. 12,500} = \text{Rs. 4,137.50}$$

Thus, Fabina pays more interest

$$= \text{Rs. 4,500} - \text{Rs. 4,137.50} = \text{Rs. 362.50}$$

4. I borrow Rs. 12,000 from Jamshed at 6% per annum simple interest for 2 years. Had I borrowed this sum at 6% per annum compound interest, what extra amount would I have to pay?

Ans. Here, Principal (P) = Rs. 12,000, Time (T) = 2 years, Rate of interest (R) = 6% p.a.

$$\text{Simple Interest} = \frac{P \times R \times T}{100}$$

$$= \frac{12000 \times 6 \times 2}{100} = \text{Rs. } 1,440$$

Had he borrowed this sum at 6% p.a., then

$$\text{Compound Interest} = P \left(1 + \frac{R}{100} \right)^n - P$$

$$= 12000 \left(1 + \frac{6}{100} \right)^2 - 12000$$

$$= 12000 \left(1 + \frac{3}{50} \right)^2 - 12000$$

$$= 12000 \left(\frac{53}{50} \right)^2 - 12000$$

$$= 12000 \times \frac{53}{50} \times \frac{53}{50} - 12000$$

$$= \text{Rs. } 13,483.20 - \text{Rs. } 12,000$$

$$= \text{Rs. } 1,483.20$$

Difference in both interests

$$= \text{Rs. } 1,483.20 - \text{Rs. } 1,440.00 = \text{Rs. } 43.20$$

Thus, the extra amount to be paid is Rs.43.20

5. Vasudevan invested Rs.60,000 at an interest rate of 12% per annum compounded half yearly. What amount would he get:

(i) after 6 months?

(ii) after 1 year?

Ans. (i) Here, Principal (P) = Rs. 60,000,

Time (n) = 6 months = 1 year(compounded half yearly)

Rate of interest (R) = 12% = 6% (compounded half yearly)

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

$$= 60000 \left(1 + \frac{6}{100}\right)^1$$

$$= 60000 \left(1 + \frac{3}{50}\right)^1$$

$$= 60000 \left(\frac{53}{50}\right)^1$$

$$= 60000 \times \frac{53}{50}$$

$$= \text{Rs. } 63,600$$

After 6 months Vasudevan would get amount Rs. 63,600.

(ii) Here, Principal (P) = Rs. 60,000,

Time (n) = 1 year = 2 year(compounded half yearly)

Rate of interest (R) = 12% = 6% (compounded half yearly)

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

$$= 60000 \left(1 + \frac{6}{100}\right)^2$$

$$= 60000 \left(1 + \frac{3}{50}\right)^2$$

$$\begin{aligned} &= 60000 \left(\frac{53}{50} \right)^2 \\ &= 60000 \times \frac{53}{50} \times \frac{53}{50} \\ &= \text{Rs. } 67,416 \end{aligned}$$

After 1 year Vasudevan would get amount Rs. 67,416.

6. Arif took a loan of Rs.80,000 from a bank. If the rate of interest is 10% per annum, find the difference in amounts he would be paying after $1\frac{1}{2}$ years if the interest is:

(i) compounded annually.

(ii) compounded half yearly.

Ans. (i) Here, Principal (P) = Rs. 80,000, Time (n) = $1\frac{1}{2}$ years, Rate of interest (R) = 10%

$$\text{Amount for 1 year (A)} = P \left(1 + \frac{R}{100} \right)^n$$

$$= 80000 \left(1 + \frac{10}{100} \right)^1$$

$$= 80000 \left(1 + \frac{1}{10} \right)^1$$

$$= 80000 \left(\frac{11}{10} \right)^1$$

$$= \text{Rs. } 88,000$$

$$\text{Interest for } \frac{1}{2} \text{ year} = \frac{88000 \times 10 \times 1}{100 \times 2}$$

= Rs. 4,400

Total amount = Rs. 88,000 + Rs. 4,400 = Rs. 92,400

(ii) Here, Principal (P) = Rs.80,000,

Time (n) = $1\frac{1}{2}$ year = $\frac{3}{2}$ years (compounded half yearly)

Rate of interest (R) = 10% = 5% (compounded half yearly)

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

$$= 80000 \left(1 + \frac{5}{100}\right)^3$$

$$= 80000 \left(1 + \frac{1}{20}\right)^3$$

$$= 80000 \left(\frac{21}{20}\right)^3$$

$$= 80000 \times \frac{21}{20} \times \frac{21}{20} \times \frac{21}{20}$$

= Rs. 92,610

Difference in amounts

= Rs. 92,610 – Rs. 92,400 = Rs. 210

7. Maria invested Rs.8,000 in a business. She would be paid interest at 5% per annum compounded annually. Find:

(i) The amount credited against her name at the end of the second year.

(ii) The interest for the third year.

Ans. (i) Here, Principal (P) = Rs. 8000, Rate of Interest (R) = 5%, Time (n) = 2 years

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

$$= 8000 \left(1 + \frac{5}{100} \right)^2$$

$$= 8000 \left(1 + \frac{1}{20} \right)^2$$

$$= 8000 \left(\frac{21}{20} \right)^2$$

$$= 8000 \times \frac{21}{20} \times \frac{21}{20}$$

$$= \text{Rs. } 8,820$$

(ii) Here, Principal (P) = Rs. 8000, Rate of Interest (R) = 5%, Time (n) = 3 years

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

$$= 8000 \left(1 + \frac{5}{100} \right)^3$$

$$= 8000 \left(1 + \frac{1}{20} \right)^3$$

$$= 8000 \left(\frac{21}{20} \right)^3$$

$$= 8000 \times \frac{21}{20} \times \frac{21}{20} \times \frac{21}{20}$$

$$= \text{Rs. } 9,261$$

$$\text{Interest for 3rd year} = A - P$$

$$= \text{Rs. } 9,261 - \text{Rs. } 8,820 = \text{Rs. } 441$$

8. Find the amount and the compound interest on Rs.10,000 for $1\frac{1}{2}$ years at 10% per annum, compounded half yearly.

Would this interest be more than the interest he would get if it was compounded annually?

Ans. Here, Principal (P) = Rs. 10000, Rate of Interest (R) = 10% = 5% (compounded half yearly)

$$\text{Time (n)} = 1\frac{1}{2} \text{ years} = 3 \text{ years (compounded half yearly)}$$

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

$$= 10000 \left(1 + \frac{5}{100} \right)^3$$

$$= 10000 \left(1 + \frac{1}{20} \right)^3$$

$$= 10000 \left(\frac{21}{20} \right)^3$$

$$= 10000 \times \frac{21}{20} \times \frac{21}{20} \times \frac{21}{20}$$

$$= \text{Rs. } 11,576.25$$

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

$$= \text{Rs. } 11,576.25 - \text{Rs. } 10,000 = \text{Rs. } 1,576.25$$

If it is compounded annually, then

Here, Principal (P) = Rs. 10000, Rate of Interest (R) = 10%, Time (n) = $1\frac{1}{2}$ years

$$\text{Amount (A) for 1 year} = P \left(1 + \frac{R}{100}\right)^n$$

$$= 10000 \left(1 + \frac{10}{100}\right)^1$$

$$= 10000 \left(1 + \frac{1}{10}\right)^1$$

$$= 10000 \left(\frac{11}{10}\right)^1$$

$$= 10000 \times \frac{11}{10}$$

$$= \text{Rs. } 11,000$$

$$\text{Interest for } \frac{1}{2} \text{ year} = \frac{11000 \times 1 \times 10}{2 \times 100} = \text{Rs. } 550$$

$$\therefore \text{Total amount} = \text{Rs. } 11,000 + \text{Rs. } 550$$

$$= \text{Rs. } 11,550$$

$$\text{Now, C.I.} = A - P = \text{Rs. } 11,550 - \text{Rs. } 10,000$$

$$= \text{Rs. } 1,550$$

Yes, interest Rs. 1,576.25 is more than Rs. 1,550.

9. Find the amount which Ram will get on Rs.4,096, if he gave it for 18 months at $12\frac{1}{2}\%$

per annum, interest being compounded half yearly.

Ans. Here, Principal (P) = Rs. 4096,

$$\text{Rate of Interest (R)} = 12\frac{1}{2} = \frac{25}{2} \%$$

$$= \frac{25}{4} \% \text{ (compounded half yearly)}$$

$$\text{Time (n)} = 18 \text{ months} = 1\frac{1}{2} \text{ years} = 3 \text{ years (compounded half yearly)}$$

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

$$= 4096 \left(1 + \frac{25}{4 \times 100}\right)^3$$

$$= 4096 \left(1 + \frac{1}{4 \times 4}\right)^3$$

$$= 4096 \left(\frac{17}{16}\right)^3$$

$$= 4096 \times \frac{17}{16} \times \frac{17}{16} \times \frac{17}{16}$$

$$= \text{Rs. } 4,913$$

10. The population of a place increased to 54,000 in 2003 at a rate of 5% per annum.

(i) Find the population in 2001.

(ii) What would be its population in 2005?

Ans. (i) Here, A_{2003} = Rs. 54,000, R = 5%, n = 2 years

Population would be less in 2001 than 2003 in two years.

Here population is increasing.

$$\therefore A_{2003} = P_{2001} \left(1 + \frac{R}{100}\right)^n$$

$$\Rightarrow 54000 = P_{2001} \left(1 + \frac{5}{100}\right)^2$$

$$\Rightarrow 54000 = P_{2001} \left(1 + \frac{1}{20}\right)^2$$

$$\Rightarrow 54000 = P_{2001} \left(\frac{21}{20}\right)^2$$

$$\Rightarrow 54000 = P_{2001} \times \frac{21}{20} \times \frac{21}{20}$$

$$\Rightarrow P_{2001} = \frac{54000 \times 20 \times 20}{21 \times 21}$$

$$= 48,979.5$$

$$\Rightarrow P_{2001} = 48,980 \text{ (approx.)}$$

(ii) According to question, population is increasing. Therefore population in 2005,

$$A_{2005} = P \left(1 + \frac{R}{100}\right)^n$$

$$= 54000 \left(1 + \frac{5}{100}\right)^2$$

$$= 54000 \left(1 + \frac{1}{20}\right)^2$$

$$\begin{aligned} &= 54000 \left(\frac{21}{20} \right)^2 \\ &= 54000 \times \frac{21}{20} \times \frac{21}{20} \\ &= 59,535 \end{aligned}$$

Hence population in 2005 would be 59,535.

11. In a laboratory, the count of bacteria in a certain experiment was increasing at the rate of 2.5% per hour. Find the bacteria at the end of 2 hours if the count was initially 5,06,000.

Ans. Here, Principal (P) = 5,06,000, Rate of Interest (R) = 2.5%, Time (n) = 2 hours

After 2 hours, number of bacteria,

$$\begin{aligned} \text{Amount (A)} &= P \left(1 + \frac{R}{100} \right)^n \\ &= 506000 \left(1 + \frac{2.5}{100} \right)^2 \\ &= 506000 \left(1 + \frac{25}{1000} \right)^2 \\ &= 506000 \left(1 + \frac{1}{40} \right)^2 \\ &= 506000 \left(\frac{41}{40} \right)^2 \\ &= 506000 \times \frac{41}{40} \times \frac{41}{40} \end{aligned}$$

$$= 5,31,616.25$$

Hence, number of bacteria after two hours are 531616 (approx.).

12. A scooter was bought at Rs.42,000. Its value depreciated at the rate of 8% per annum. Find its value after one year.

Ans. Here, Principal (P) = Rs. 42,000, Rate of Interest (R) = 8%, Time (n) = 1 years

$$\text{Amount (A)} = P \left(1 - \frac{R}{100}\right)^n$$

$$= 42000 \left(1 - \frac{8}{100}\right)^1$$

$$= 42000 \left(1 + \frac{2}{25}\right)^1$$

$$= 42000 \left(\frac{27}{25}\right)^1$$

$$= 42000 \times \frac{27}{25}$$

$$= \text{Rs. } 38,640$$

Hence, the value of scooter after one year is Rs. 38,640.