

Maharashtra Board Solutions Class 8-Maths

(Practice Set 14.2): Chapter 14- Compound Interest



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Maharashtra Board Solutions Class 8-Maths (Practice Set 14.2): Chapter 14- Compound Interest

Class 8: Maths Chapter 14 solutions. Complete Class 8 Maths Chapter 14 Notes.

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Maharashtra Board 8th Maths Chapter 14, Class 8 Maths Chapter 14 solutions

Question 1. On the construction work of a flyover bridge there were 320 workers initially. The number of workers were increased by 25% every year. Find the number of workers after 2 years.

Solution:

Here, P = Initial number of workers = 320

R = Increase in the number of workers per year = 25%

N = 2 years

A = Number of workers after 2 years

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$$\begin{aligned}A &= P \left[1 + \frac{R}{100} \right]^N \\&= 320 \left[1 + \frac{25}{100} \right]^2 \\&= 320 \left[\frac{100 + 25}{100} \right]^2 \\&= 320 \left[\frac{125}{100} \right]^2 \\&= 320 \left[\frac{25 \times 5}{25 \times 4} \right]^2 \\&= 320 \left[\frac{5}{4} \right]^2 \\&= 320 \left[\frac{25}{16} \right] \\&= 20 \times 25 \\&= 500\end{aligned}$$

∴ The number of workers after 2 years would be 500.

Question 2.

A shepherd has 200 sheep with him. Find the number of sheep with him after 3 years if the increase in number of sheep is 8% every year.

Solution:

Here, P = Present number of sheep = 200

R = Increase in number of sheep per year = 8%

N = 3 years

A = Number of sheep after 3 years

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$$\begin{aligned}A &= P \left[1 + \frac{R}{100} \right]^N \\&= 200 \left[1 + \frac{8}{100} \right]^3 \\&= 200 \left[\frac{100+8}{100} \right]^3 \\&= 200 \left[\frac{108}{100} \right]^3 \\&= 200 \left[\frac{27 \times 4}{25 \times 4} \right]^3 \\&= 200 \left[\frac{27}{25} \right]^3 \\&= 200 \times \frac{27}{25} \times \frac{27}{25} \times \frac{27}{25} \\&= 8 \times 27 \times \frac{27}{25} \times \frac{27}{25}\end{aligned}$$

$$= 0.3225 \times 27 \times 27 \times 27$$

$$= 0.0128 \times 27 \times 27 \times 27$$

$$= 251.9424$$

$$= 252$$

∴ The number of sheeps with the shepherd after 2 years would be 252 (approx).

Question 3.

In a forest there are 40,000 trees. Find the expected number of trees after 3 years if the objective is to increase the number at the rate 5% per year.

Solution:

Here, P = Present number of trees in the forest = 40,000

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R = Increase in the number of trees per year = 5%

N = 3 years

A = Number of trees after 3 years

$$\begin{aligned}A &= P \left[1 + \frac{R}{100} \right]^N \\&= 40000 \left[1 + \frac{5}{100} \right]^3 \\&= 40000 \left[\frac{100+5}{100} \right]^3 \\&= 40000 \left[\frac{105}{100} \right]^3 \\&= 40000 \left[\frac{21 \times 5}{20 \times 5} \right]^3 \\&= 40000 \left[\frac{21}{20} \right]^3 \\&= 40000 \times \frac{21}{20} \times \frac{21}{20} \times \frac{21}{20}\end{aligned}$$

$$= 5 \times 21 \times 21 \times 21$$

$$= 5 \times 9261$$

$$= 46,305$$

∴ The expected number of trees in the forest after 3 years is 46,305.

Question 4.

The cost price of a machine is Rs 2,50,000. If the rate of depreciation is 10% per year, find the depreciation in price of the machine after two years.

Solution:

Here, P = Cost price of machine = Rs 2,50,000

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R = Rate of depreciation per year = 10%

N = 2 years

A = Depreciated price of the machine after 2 years

$$\begin{aligned}A &= P \left[1 + \frac{R}{100} \right]^N \\&= 2,50,000 \left[1 + \frac{(-10)}{100} \right]^2 \\&= 2,50,000 \left[1 - \frac{10}{100} \right]^2 \\&= 2,50,000 \left[\frac{100-10}{100} \right]^2 \\&= 2,50,000 \left[\frac{90}{100} \right]^2 \\&= 2,50,000 \left[\frac{9}{10} \right]^2 \\&= 2,50,000 \left[\frac{81}{100} \right]\end{aligned}$$

$$= 2,500 \times 81$$

$$= \text{Rs } 2,02,500$$

Depreciation in price = Cost price (P) – Depreciated price (A)

$$= 2,50,000 - 2,02,500$$

$$= \text{Rs } 47,500$$

∴ The depreciation in price of the machine after 2 years would be Rs 47,500.

Question 5.

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Find the compound interest if the amount of a certain principal after two years is Rs 4036.80 at the rate of 16 p.c.p.a.

Solution:

Here, A = Rs 4036.80, R = 16 p.c.p.a. and N = 2 years

i. $A = P[1 + \frac{R}{100}]^N$

$$\therefore 4036.80 = P \left[1 + \frac{16}{100} \right]^2$$

$$\therefore 4036.80 = P \left[\frac{100 + 16}{100} \right]^2$$

$$\therefore 4036.80 = P \left[\frac{116}{100} \right]^2$$

$$\therefore 4036.80 = P \left[\frac{29 \times 4}{25 \times 4} \right]^2$$

$$\therefore 4036.80 = P \left[\frac{29}{25} \right]^2$$

$$\therefore 4036.80 = P \times \frac{29}{25} \times \frac{29}{25}$$

$$\therefore \frac{4036.80 \times 25 \times 25}{29 \times 29} = P$$

ii. Interest = Amount (A) – Principal (P)

$$= 4036.80 - 3000$$

$$= \text{Rs } 1036.80$$

$\therefore$ The compound interest after 2 years would be Rs 1036.80.

Question 6.

A loan of Rs 15,000 was taken on compound interest. If the rate of compound interest is 12 p.c.p.a. find the amount to settle the loan after 3 years.

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Solution:

Here, P = Rs 15,000, R = 12 p.c.p.a, and

N = 3 years

$$\begin{aligned} A &= P \left[1 + \frac{R}{100} \right]^N \\ \therefore A &= 15000 \left[1 + \frac{12}{100} \right]^3 \\ &= 15000 \left[\frac{100+12}{100} \right]^3 \\ &= 15000 \left[\frac{112}{100} \right]^3 \\ &= 15000 \left[\frac{28 \times 4}{25 \times 4} \right]^3 \\ &= 15000 \left[\frac{28}{25} \right]^3 \\ &= 15000 \times \frac{28}{25} \times \frac{28}{25} \times \frac{28}{25} \\ &= \frac{24}{25} \times 28 \times 28 \times 28 \\ &= 0.96 \times 21952 \\ &= ₹ 21,073.92 \end{aligned}$$

∴ The amount required to settle the loan after 3 years is Rs 21,073.92.

Question 7.

A principal amounts to Rs 13,924 in 2 years by compound interest at 18 p.c.p.a. Find the principal.

Solution:

Here, A = Rs 13,924, R = 18 p.c.p.a., and N = 2 years

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

$$\therefore 13924 = P \left[1 + \frac{18}{100} \right]^2$$

$$\therefore 13924 = P \left[\frac{100 + 18}{100} \right]^2$$

$$\therefore 13924 = P \left[\frac{118}{100} \right]^2$$

$$\therefore 13924 = P \left[\frac{59 \times 2}{50 \times 2} \right]^2$$

$$\therefore 13924 = P \left[\frac{59}{50} \right]^2$$

$$\therefore 13924 = P \times \frac{59}{50} \times \frac{59}{50}$$

$$\therefore \frac{13924 \times 50 \times 50}{59 \times 59} = P$$

$$\therefore P = \frac{236 \times 50 \times 50}{59 \times 1}$$

$$\therefore P = 4 \times 50 \times 50$$

$$\therefore P = \text{Rs } 10,000$$

$\therefore$ The principal is Rs 10,000.

Question 8.

The population of a suburb is 16,000. Find the rate of increase in the population if the population after two years is 17,640.

Solution:

Here, P = Population of a suburb = 16,000

N = 2 years

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A = Increase in the population after 2 years = 17,640

R = Rate of increase in population

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

$$\therefore 17640 = 16000 \left[1 + \frac{R}{100} \right]^2$$

$$\therefore \frac{17640}{16000} = \left[1 + \frac{R}{100} \right]^2$$

$$\therefore \frac{1764}{1600} = \left[1 + \frac{R}{100} \right]^2$$

$$\therefore \frac{441 \times 4}{400 \times 4} = \left[1 + \frac{R}{100} \right]^2$$

$$\therefore \frac{441}{400} = \left[1 + \frac{R}{100} \right]^2$$

$$\therefore \left[\frac{21}{20} \right]^2 = \left[1 + \frac{R}{100} \right]^2$$

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

...[Taking square root on both sides]

$$\therefore \frac{21}{20} - 1 = \frac{R}{100}$$

$$\therefore \frac{21-20}{20} = \frac{R}{100}$$

$$\therefore \frac{1}{20} = \frac{R}{100}$$

$$\therefore \frac{100}{20} = R$$

$$\therefore 5 = R$$

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i.e., $R = 5\%$

∴ The rate of increase in the population is 5 p.c.p.a.

Question 9.

In how many years Rs 700 will amount to Rs 847 at a compound interest rate of 10 p.c.p.a.

Solution:

Here, $P = \text{Rs } 700$, $R = 10 \text{ p.c.p.a.}$, $A = \text{Rs } 847$

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

$$\therefore 847 = 700 \left[1 + \frac{10}{100} \right]^N$$

$$\therefore 847 = 700 \left[\frac{100+10}{100} \right]^N$$

$$\therefore 847 = 700 \left[\frac{110}{100} \right]^N$$

$$\therefore 847 = 700 \left[\frac{11}{10} \right]^N$$

$$\therefore \frac{847}{700} = \left[\frac{11}{10} \right]^N$$

$$\therefore \frac{121 \times 7}{100 \times 7} = \left[\frac{11}{10} \right]^N$$

$$\therefore \frac{121}{100} = \left[\frac{11}{10} \right]^N$$

$$\therefore \left[\frac{11}{10} \right]^2 = \left[\frac{11}{10} \right]^N$$

$$\therefore N = 2 \quad \dots [\text{If } a^n = a^m, \text{ then } n = m]$$

∴ Rs 700 will amount to Rs 847 in 2 years.

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Question 10.

Find the difference between simple interest and compound interest on Rs 20,000 in 2 years at 8 p.c.p.a.

Solution:

Here, P = Rs 20,000, R = 8 p.c.p.a.,

N = 2 years

i. Simple interest (I)

$$I = \frac{PNR}{100}$$
$$\therefore I = \frac{20,000 \times 2 \times 8}{100} = ₹ 3200$$

Simple interest (I) = Rs 3200

ii. Compound Interest (I):

$$A = P \left[1 + \frac{R}{100} \right]^N$$
$$= 20000 \left[1 + \frac{8}{100} \right]^2$$
$$= 20000 \left[\frac{100 + 8}{100} \right]^2$$
$$= 20000 \left[\frac{108}{100} \right]^2$$
$$= 20000 \left[\frac{27 \times 4}{25 \times 4} \right]^2$$

$$= 20000 \left[\frac{27}{25} \right]^2$$
$$= 20000 \times \frac{27}{25} \times \frac{27}{25}$$

$$= 32 \times 27 \times 27$$

$$= \text{Rs } 23,328$$

Compound interest (I)

= Amount (A) – Principal (P)

$$= 23,328 - 20,000$$

$$= \text{Rs } 3328 \text{ ,..(ii)}$$

iii. Difference

= Compound interest – Simple interest

$$= 3328 - 3200 \dots [\text{Form (i) and (ii)}]$$

$$= \text{Rs } 128$$

∴ The difference between compound interest and simple interest is Rs 128.

[Note: The question is modified as per the answer given in the textbook.]

Intext Questions and Activities

Question 1.

Visit the bank nearer to your house and get the information regarding the different schemes and rates of interests. Make a chart and display in your class. (Textbook pg. no. 90)

Solution:

(Students should attempt this activity at their own.)

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- Chapter 2- Parallel Lines and Transversals (Practice Set 2.3)
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- Chapter 5- Expansion Formulae (Practice Set 5.2)
- Chapter 5- Expansion Formulae (Practice Set 5.3)
- Chapter 5- Expansion Formulae (Practice Set 5.4)
- Chapter 6- Factorisation of Algebraic Expressions (Practice Set 6.1)
- Chapter 6- Factorisation of Algebraic Expressions (Practice Set 6.2)
- Chapter 6- Factorisation of Algebraic Expressions (Practice Set 6.3)
- Chapter 6- Factorisation of Algebraic Expressions (Practice Set 6.4)
- Chapter 7- Variation (Practice Set 7.1)

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- Chapter 7- Variation (Practice Set 7.3)
- Chapter 8- Quadrilateral: Constructions and Types (Practice Set 8.1)
- Chapter 8- Quadrilateral: Constructions and Types (Practice Set 8.2)
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- Chapter 9- Discount and Commission (Practice Set 9.1)
- Chapter 9- Discount and Commission (Practice Set 9.2)
- Chapter 10- Division of Polynomials (Practice Set 10.1)
- Chapter 10- Discount and Commission (Practice Set 10.2)
- Chapter 11- Statistics (Practice Set 11.1)
- Chapter 11- Statistics (Practice Set 11.2)
- Chapter 11- Statistics (Practice Set 11.3)
- Chapter 12- Equations in One Variable (Practice Set 12.1)
- Chapter 12- Equations in One Variable (Practice Set 12.2)
- Chapter 13- Congruence of Triangles (Practice Set 13.1)
- Chapter 13- Congruence of Triangles (Practice Set 13.2)
- Chapter 14- Compound Interest (Practice Set 14.1)
- Chapter 14- Compound Interest (Practice Set 14.2)
- Chapter 15- Area (Practice Set 15.1)
- Chapter 15- Area (Practice Set 15.2)
- Chapter 15- Area (Practice Set 15.3)
- Chapter 15- Area (Practice Set 15.4)
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- Chapter 16- Surface Area and Volume (Practice Set 16.2)
- Chapter 16- Surface Area and Volume (Practice Set 16.3)
- Chapter 17- Factorisation of Algebraic Expressions (Practice Set 17.1)
- Chapter 17- Factorisation of Algebraic Expressions (Practice Set 17.2)

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The Maharashtra State Board of Secondary and Higher Secondary Education or MSBSHSE (Marathi: महाराष्ट्र राज्य माध्यमिक आणि उच्च माध्यमिक शिक्षण मंडळ), is an **autonomous and statutory body established in 1965**. The board was amended in the year 1977 under the provisions of the Maharashtra Act No. 41 of 1965.

The Maharashtra State Board of Secondary & Higher Secondary Education (MSBSHSE), Pune is an independent body of the Maharashtra Government. There are more than 1.4 million students that appear in the examination every year. The Maha State Board conducts the board examination twice a year. This board conducts the examination for SSC and HSC.

The Maharashtra government established the Maharashtra State Bureau of Textbook Production and Curriculum Research, also commonly referred to as Ebalbharati, in 1967 to take up the responsibility of providing quality textbooks to students from all classes studying under the Maharashtra State Board. MSBHSE prepares and updates the curriculum to provide holistic development for students. It is designed to tackle the difficulty in understanding the concepts with simple language with simple illustrations. Every year around 10 lakh students are enrolled in schools that are affiliated with the Maharashtra State Board.

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As of now, the MSCERT and Balbharti are responsible for the syllabus and textbooks of Classes 1 to 8, while Classes 9 and 10 are under the Maharashtra State Board of Secondary and Higher Secondary Education (MSBSHSE).

How many state boards are there in Maharashtra?

The Maharashtra State Board of Secondary & Higher Secondary Education, conducts the HSC and SSC Examinations in the state of Maharashtra through its nine Divisional Boards located at Pune, Mumbai, Aurangabad, Nasik, Kolhapur, Amravati, Latur, Nagpur and Ratnagiri.

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