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Answer the questions

- (1) Population of a town increases by 2% every year. If current population of the town is 20000. Find the population of town after 2 years.
- (2) At the rate of 5% per annum compounded annually, how long would it take for a sum of \$ 20000 to compound to \$ 22050.
- (3) Find compound interest on \$20000 for 2 years and 3 months at 40% per annum compounded annually.
- (4) Number of employees in a organization increases by 10% every year. If there are 6000 employees in the organization, find the number of employees in organization after 2 years.

Choose correct answer(s) from given choice

- (5) Find compound interest on \$80000 for 2 years at 20% per annum compounded annually.

a. \$31680	b. \$35200
c. \$35213	d. \$38720

Fill in the blanks

- (6) The compound interest on \$3000 for 6 months at 10% per annum compounded half yearly = \$.
- (7) Thomas bought a farm at \$400000. If its value appreciates at the rate of 10% per annum, the value of farm after 2 years = \$.
- (8) John borrowed \$ 3000 from a bank at the interest rate of 20% per annum compounded annually. The amount payable to bank after 2 years = \$.



Answers

(1) 20808

Step 1

Since population increases by 2% annually, we can use compound interest formula where current population can be considered as principal.

Step 2

Current population or principal, $P = 20000$

Rate, R by which population increases every year = 2%

Time, $n = 2$ years

Step 3

Population of the town after 2 years or Amount = $P \left[1 + \frac{R}{100} \right]^n$

$$= 20000 \left[1 + \frac{2}{100} \right]^2$$

$$= 20000 \times 1.0404$$

$$= 20808$$

Step 4

Therefore, the population of the town after 2 years will be **20808**.

(2) Two years

Step 1

Let the time be n years.

Step 2

According to the question,

Principal, $P = \$20000$

Rate, $R = 5\%$

Amount = \$22050

Step 3

Let's find the time.

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

$$\Rightarrow 22050 = 20000 \left(1 + \frac{5}{100} \right)^n$$

$$\Rightarrow \frac{22050}{20000} = \left(\frac{105}{100} \right)^n$$

$$\Rightarrow \left(\frac{105}{100} \right)^2 = \left(\frac{105}{100} \right)^n$$

$$\Rightarrow n = 2$$

Step 4

Therefore, in **2 years**, \$20000 will become \$22050 at 5% per annum compounded annually.

(3) \$23120

Step 1

Principal, P = \$ 20000

Rate, R = 40%

Time, n = 2 yearss and 3 months = $2 \frac{3}{12}$ years**Step 2**

For first 2 years, interest can be calculated using compound interest formula,

$$\text{Amount} = P \left[1 + \frac{R}{100} \right]^n$$

$$\text{Amount} = 20000 \left[1 + \frac{40}{100} \right]^2$$

$$= 20000 \times 1.96$$

$$= \$39200$$

Step 3

Since interest is compounded annually only, interest for remaining 3 month should be calculated as simple interest on a principal of \$39200,

$$\text{Amount after simple Interest for 3 months} = 39200 \left[1 + \frac{(3/12)40}{100} \right]$$

$$\Rightarrow = 39200 \times 1.1$$

$$\Rightarrow = \$43120$$

Step 4

Total interest = Amount - Principal

$$43120 - 20000$$

$$= \$23120$$

Step 5Therefore, the total compound interest is **\$23120**.

(4) 7260**Step 1**

It is given that number of employees increases at a compounding rate of 10% yearly.

Step 2

Number of employees in the organization (P) = 6000

Yearly compounding rate (R) = 10%

Time (n) = 2 years

Step 3

Using compound interest formula,

$$\text{Number of employees after 2 years} = P\left(1 + \frac{R}{100}\right)^n$$

$$= 6000\left(1 + \frac{10}{100}\right)^2$$

$$= 6000 \times (1.1)^2$$

$$= 6000 \times 1.21$$

$$= 7260$$

Step 4

Therefore, the number of employees in the organization after 2 years is **7260**.

(5) b. \$35200

Step 1

We have been asked to find the compound interest on \$80000 for 2 years at 20% per annum compounded annually.

Step 2

Principal, P = \$80000

Rate, R = 20%

Time, n = 2 years

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

$$= 80000\left(1 + \frac{20}{100}\right)^2$$

$$= 80000(1.2)^2$$

$$= 80000 \times 1.44$$

$$= \$115200$$

Step 3

Compound interest = Amount - Principal

$$= 115200 - 80000$$

$$= 35200$$

Step 4

Therefore, the compound interest is **\$35200**.

(6)

150

Step 1

We have been asked to find the compound interest on \$3000 for 6 months at 10% per annum compounded half yearly.

Step 2

Principal, P = \$3000

Number of terms, n = Number of half years in 6 months = 1

Interest Rate per annum = 10%, Interest Rate per term of half year, R = $10\% \div 2 = 5\%$

Step 3

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

$$= 3000 \left(1 + \frac{5}{100} \right)^1$$

$$= 3000 \times 1.05$$

$$= \$3150$$

Step 4

Compound Interest = Amount - Principal

$$= 3150 - 3000$$

$$= \$150$$

Step 5

Therefore, the compound interest is **\$150**.

(7)

484000

Step 1

We have been asked to find the value of the farm after 2 years.

Step 2

Principal, P = \$400000

Rate, R = 10%

Time, n = 2 years

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

$$= 400000 \left(1 + \frac{10}{100} \right)^2$$

$$= 400000 \times 1.21$$

$$= 484000$$

Step 3

Therefore, the value of farm after the 2 years is **\$484000**.

(8)

4320

Step 1

We have been asked to find the amount payable to the bank after 2 years.

Step 2

Principal, $P = \$3000$

Rate, $R = 20\%$

Time, $n = 2$ years

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

$$= 3000\left(1 + \frac{20}{100}\right)^2$$

$$= 3000 \times 1.44$$

$$= 4320$$

Step 3

Therefore, the amount payable to the bank after 2 years is **\$4320**.