Name: _____ Date: _____

UNIT 1

Financial Applications of Geometric Sequences and Series

1. James left $3,000 in his bank account for 2 years. During this period, he earned compound interest at 2% per year. Determine the total amount James has in his bank account at the end of 2 years.

Answer:

2. Polly invests $4,848 in Central Bank at a fixed annual interest rate of 5%, compounded twice per year. Calculate the interest earned by Polly after 6 years.

Answer:

3. Sonya invested $2,658 in a property investment with an annual compound interest rate of 9%. Calculate the value of Sonya's investment after 15 years.

Answer:

4. Rose saves $1,500,000 in a bank account earning compound interest at 4% per quarter. Calculate her final savings after 3 years and 9 months.

Answer:

5. Max borrowed $2,500,000 from a bank, with interest compounded monthly. After 2 years, the amount owed became $4,021,093.12. Determine the annual interest rate.

Answer:

6. Jane invested $8,333 in a tech company at a fixed interest rate of 8%, compounded twice per year. Calculate the value of her investment after 12 years.

Answer:

7. Jhony bought a car for $18,000. The value depreciated by 15% each year for the first 3 years. Determine the value of the car at the end of the three years.

Answer:

8. Michael's second mortgage of $31,200 is at a rate of 10.7%, compounded monthly for 8 years. What total amount will Michael have paid for his second mortgage after 8 years?

Answer:

9. Stella invested $350 for 2 years at an interest rate of 9.2%, compounded annually. What will Stella's investment be worth after 2 years?

Answer:

10. Mr. Kimber purchased a car in 2024 for $20,000. Each year, the car depreciates by 5%. Calculate the value of Mr. Kimber's car in 2030.

Answer:

KEY ANSWER

Name: _____ Date: _____

UNIT 1

Financial Applications of Geometric Sequences and Series

1. James left \$3,000 in his bank account for 2 years. During this period, he earned compound interest at 2% per year. Determine the total amount James has in his bank account at the end of 2 years.

$PV = \$3{,}000$

$r = 2\%$ per year

$N = 2$

$k = 1$

$$FV = PV\left(1 + \frac{r}{k}\right)^{k \times N}$$

$$FV = \$3{,}000\left(1 + \frac{2}{100}\right)^{2}$$

$$FV = \$3{,}121.20$$

Answer: $3,121.20

2. Polly invests \$4,848 in Central Bank at a fixed annual interest rate of 5%, compounded twice per year. Calculate the interest earned by Polly after 6 years.

$PV = \$4{,}848$

$r = 5\%$ per year

$N = 6$

$k = 2$

$$FV = PV\left(1 + \frac{r}{k}\right)^{k \times N}$$

$$FV = \$4{,}848\left(1 + \frac{5}{2 \times 100}\right)^{2 \times 6}$$

$$FV = \$6{,}520.02101\ldots$$

$$FV \approx \$6{,}520.02$$

Polly earned $= \$6{,}520.02 - \$4{,}848 = \$1{,}672.02$

Answer: $1,672.02

3. Sonya invested \$2,658 in a property investment with an annual compound interest rate of 9%. Calculate the value of Sonya's investment after 15 years.

$PV = \$2{,}658$

$r = 9\%$ per year

$N = 15$

$k = 1$

$$FV = PV\left(1 + \frac{r}{k}\right)^{k \times N}$$

$$FV = \$2{,}658\left(1 + \frac{9}{100}\right)^{15}$$

$$FV = \$9{,}681.7183\ldots$$

$$FV \approx \$9{,}681.72$$

Answer: \$9,681.72

4. Rose saves \$1,500,000 in a bank account earning compound interest at 4% per quarter. Calculate her final savings after 3 years and 9 months.

$PV = \$1{,}500{,}000$

$r = 4\%$ quarterly compounding

$N = 3.75$

$k = 4$

$$FV = PV\left(1 + \frac{r}{k}\right)^{k \times N}$$

$$FV = \$1{,}500{,}000\left(1 + \frac{4}{100}\right)^{4 \times 3.75}$$

$$FV = \$2{,}701{,}415.2582\ldots$$

$$FV \approx \$2{,}701{,}415.26$$

Since the interest rate is already **per quarter**, we treat it as being **compounded quarterly.**

Answer: \$2,701,415.26

5. Max borrowed \$2,500,000 from a bank, with interest compounded monthly. After 2 years, the amount owed became \$4,021,093.12. Determine the annual interest rate.

$PV = \$2{,}500{,}000$

$FV = \$4{,}021{,}093.12$

$N = 2$ years

$k = 12$

$$FV = PV\left(1 + \frac{r}{k}\right)^{k \times N}$$

$$\$4{,}021{,}093.12 = \$2{,}500{,}000\left(1 + \frac{r}{12}\right)^{12 \times 2}$$

$$\frac{\$4{,}021{,}093.12}{\$2{,}500{,}000} = \left(1 + \frac{r}{12}\right)^{24}$$

$$\left(1 + \frac{r}{12}\right) = 1.608437248^{\frac{1}{24}}$$

$$\frac{r}{12} = 1.02 - 1$$

$$\frac{r}{12} = 0.02$$

$$r = 0.02 \times 12$$

$$r = \frac{24}{100}$$

$r = 24\%$ per year

Answer: 24%

6. Jane invested \$8,333 in a tech company at a fixed interest rate of 8%, compounded twice per year. Calculate the value of her investment after 12 years.

$PV = \$8{,}333$

$r = 8\%$ per year

$N = 12$

$k = 2$

$$FV = PV\left(1 + \frac{r}{k}\right)^{k \times N}$$

$$FV = \$8{,}333\left(1 + \frac{8}{2 \times 100}\right)^{2 \times 12}$$

$$FV = \$21{,}360.0136\ldots$$

$$FV \approx \$21{,}360.01$$

Answer: \$21,360.01

7. Jhony bought a car for \$18,000. The value depreciated by 15% each year for the first 3 years. Determine the value of the car at the end of the three years.

$PV = \$18{,}000$

$r = 15\%$ per year

$N = 3$

$k = 1$

$$FV = PV\left(1 - \frac{r}{k}\right)^{k \times N}$$

$$FV = \$18{,}000\left(1 - \frac{15}{100}\right)^{3}$$

$$FV = \$11{,}054.25$$

Answer: \$11,054.25

8. Michael's second mortgage of \$31,200 is at a rate of 10.7%, compounded monthly for 8 years. What total amount will Michael have paid for his second mortgage after 8 years?

$PV = \$31{,}200$

$r = 10.7\%$ per year

$N = 8$

$k = 12$

$$FV = PV\left(1 + \frac{r}{k}\right)^{k \times N}$$

$$FV = \$31{,}200\left(1 + \frac{10.7}{12 \times 100}\right)^{12 \times 8}$$

$$FV = \$73{,}158.20564\ldots$$

$$FV \approx \$73{,}158.21$$

Answer: \$73,158.21

9. Stella invested $350 for 2 years at an interest rate of 9.2%, compounded annually. What will Stella's investment be worth after 2 years?

$PV = \$350$

$r = 9.2\%$ per year

$N = 2$

$k = 1$

$$FV = PV\left(1 + \frac{r}{k}\right)^{k \times N}$$

$$FV = \$350\left(1 + \frac{9.2}{100}\right)^{2}$$

$$FV = \$417.3624$$

$$FV \approx \$417.36$$

Answer: $417.36

10. Mr. Kimber purchased a car in 2024 for $20,000. Each year, the car depreciates by 5%. Calculate the value of Mr. Kimber's car in 2030.

$PV = \$20{,}000$

$r = 5\%$ per year

$N = 6$

$k = 1$

$$FV = PV\left(1 - \frac{r}{k}\right)^{k \times N}$$

$$FV = \$20{,}000\left(1 - \frac{5}{100}\right)^{6}$$

$$FV = \$14{,}701.8378\ldots$$

$$FV \approx \$14{,}701.84$$

Answer: $14,701.84