

## More Compound Interest Problems

$$A = P \left( 1 + \frac{r}{n} \right)^{nt}$$

A = the value of the loan or investment

P = principal

r = interest rate per period  $\rightarrow r = \frac{\% \text{ as decimal}}{n}$

n = number of interest periods per year

(annually = 1, semi-annual = 2, monthly = 12, daily = 365)

t = total number of interest periods for the whole loan

Name \_\_\_\_\_

$$I = A - P$$

I = interest

A = value of loan or investment

P = principal

- 1.) Evan invested \$52 400 at 6% per year compounded annually for 5 years. What is his total value on this investment?

$$P = 52,400$$

$$r = .06$$

$$n = 1$$

$$t = 5$$

$$\begin{aligned} A &= P \left( 1 + \frac{r}{n} \right)^{nt} \\ &= 52,400 \left( 1 + \frac{.06}{1} \right)^{1 \times 5} \\ &= 52,400 (1.06)^5 = 70,123.02 \end{aligned}$$

- 2.) Emily borrowed \$10 400 for 4 years at 12.7% per year and the interest is compounded semi-annually. What is the total she will pay back?

$$P = 10,400$$

$$r = .127$$

$$n = 2$$

$$t = 4$$

$$\begin{aligned} A &= P \left( 1 + \frac{r}{n} \right)^{nt} \\ &= 10,400 \left( 1 + \frac{.127}{2} \right)^{2 \times 4} \\ &= 10,400 (1.0635)^8 \\ &= 17,018.97 \end{aligned}$$

- b.) How much interest did she pay?

$$\begin{aligned} I &= A - P \\ &= 17,018.97 - 10,400 = 6,618.97 \end{aligned}$$

- 3.) Jason invested \$5 300 for 2 years. He earns 2.9% per year and his interest is compounded monthly. What is his total value on this investment?

$$P = 5300$$

$$r = .029$$

$$n = 12$$

$$t = 2$$

$$\begin{aligned} A &= P \left( 1 + \frac{r}{n} \right)^{nt} \\ &= 5300 \left( 1 + \frac{.029}{12} \right)^{12 \times 2} \\ &= 5300 (1.05964) \\ &= \$5616.09 \end{aligned}$$

4.) Dianne invested \$100 at 8.2% per year which is compounded annually for 7 years. How much will her \$100 be worth in 7 years?

$$\begin{aligned}
 P &= \$100 \\
 r &= .082 \\
 n &= 1 \\
 t &= 7 \\
 A &= P \left(1 + \frac{r}{n}\right)^{nt} \\
 &= 100 \left(1 + \frac{.082}{1}\right)^{1 \times 7} \\
 &= \$173.62
 \end{aligned}$$

5.) Bill invested \$18 100 at 13.6% per year compounded quarterly for 7.5 years. How much will his investment be worth after this time?

$$\begin{aligned}
 P &= \$18,100 \\
 r &= .136 \\
 n &= 4 \\
 t &= 7.5 \\
 A &= P \left(1 + \frac{r}{n}\right)^{nt} \\
 &= 18,100 \left(1 + \frac{.136}{4}\right)^{4 \times 7.5} \\
 &= 18,100 (1.527265) \\
 &= \$49,350.86
 \end{aligned}$$

6.) Jennifer invested her allowance of \$270 which gets 15%/a compounded annually for 3 years. How much will she have in 3 years?

$$\begin{aligned}
 P &= \$270 \\
 r &= .15 \\
 n &= 1 \\
 t &= 3 \\
 A &= P \left(1 + \frac{r}{n}\right)^{nt} \\
 &= 270 \left(1 + \frac{.15}{1}\right)^{1 \times 3} \\
 &= 270 (1.52) = \$410.64
 \end{aligned}$$

7.) You gave your friend a short term 2 year loan of \$43,000 at 3%/a compounded annually. How much in total will your friend end up paying you back?

$$\begin{aligned}
 P &= 43,000 \\
 r &= .03 \\
 n &= 1 \\
 t &= 2 \\
 A &= P \left(1 + \frac{r}{n}\right)^{nt} \\
 &= 43,000 \left(1 + \frac{.03}{1}\right)^{1 \times 2} \\
 &= 43,000 (1.0609) \\
 &= \$45,618.70
 \end{aligned}$$

b) How much interest does your friend end up paying?

$$\begin{aligned}
 I &= A - P = 45,618.70 - 43,000 \\
 &= \$2,618.70
 \end{aligned}$$