

Compound Interest Notes

Name _____ Class Period _____

Consider an initial principal P deposited in an account that pays interest at an annual rate r (expressed as a decimal), compounded n times per year. The amount A in the account after t years can be modeled by this equation:

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

Compounded:

- Yearly: $n = 1$
- Quarterly: $n = 4$
- Monthly: $n = 12$
- Daily: $n = 365$
- Annually: $n = 1$
- Weekly: $n = 52$
- Semiannually: $n = 2$

Examples:

1. You deposit $\$1000$ in an account that pays 4% annual interest. Find the balance after 3 years if the interest is compounded quarterly.

$$A = 1000 \left(1 + \frac{.04}{4} \right)^{3 \cdot 4}$$

$$A = \$1126.83$$

2. You deposit $\$2500$ in an account that pays 3.5% annual interest. Find the balance after 6 years if the interest is compounded monthly.

$$A = 2500 \left(1 + \frac{.035}{12} \right)^{12 \cdot 6}$$

$$A = \$3083.25$$

3. You deposit $\$500$ in an account that pays 8.5% annual interest. Find the balance after 10 years if the interest is compounded semiannually.

$$A = 500 \left(1 + \frac{.085}{2} \right)^{2 \cdot 10}$$

$$A = \$1149.45$$

4. You deposit $\$25000$ in an investment that pays 15% annual interest. Find the balance after 20 years if the interest is compounded annually.

$$A = 25000 \left(1 + \frac{.15}{1} \right)^{20 \cdot 1}$$

$$A = \$409,163.43$$

5. Susie B. Rich won \$75,000 in the lottery. She invests her winnings into an account with a 3% yearly interest rate that compounds monthly.

A. How much money will she have after 1 year?

B. How much money will she have after 5 years?

C. Bank 2 is offering a 3% interest rate and compounds weekly. How much would she have after 1 year?

D. Bank 3 is offering a 2.9% interest rate and compounds weekly. How much would she have after 1 year?

E. Which bank should she invest her money in? What has a bigger impact: compounding or the interest rate?

6. You deposit \$500 in an account that pays 3.25% annual interest compounded monthly. How much will be in the account in 5 years?

7. Parker owes \$5000 on a credit card his parents gave him. The card earns 18% interest compounded monthly. If he does not make a payment on the credit card, how much will he owe at the end of one year? Two years?

8. What will a \$210,000 house cost 10 years from now if the inflation rate over that period averages 3% compounded annually?

9. If an investment company pays 7% compounded monthly, how much should you deposit now to have \$9,000 7 years from now?