

Agriculture
Compound Interest Quiz

Name Key

1. Suppose you invest \$1500 in an account paying 4.75% annual interest. Find the account balance after 25 yr with the interest compounded the following ways.

a. annually $n=1$ b. semiannually $n=2$ c. quarterly $n=4$ d. monthly $n=12$

annually \$ 4785.66

semiannually \$ 4850.51

quarterly \$ 4884.02

monthly \$ 4906.80

$$A = 1500 \left(1 + \frac{.0475}{2} \right)^{2 \cdot 25}$$

$$A = \$ 4850.51$$

$$A = 1500 \left(1 + \frac{.0475}{12} \right)^{12 \cdot 25}$$

$$A = \$ 4906.80$$

$$P = 1500$$

$$r = 4.75\% = .0475$$

$$t = 25 \text{ yr}$$

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

$$A = 1500 \left(1 + \frac{.0475}{1} \right)^{1 \cdot 25}$$

$$A = \$ 4785.66$$

$$A = 1500 \left(1 + \frac{.0475}{2} \right)^{2 \cdot 25}$$

$$A = \$ 4884.02$$

2. Beth purchased a new combine that cost \$393,820. She traded in her old combine for \$157,461, which she used as a down payment. She took out a loan for the remainder of the cost at 5.75% APR compounded annually over 3 years. What is the down payment? What is the principal? What is the interest paid over the life of the loan?

down payment \$ 157,461

principal \$ 236,359

interest paid \$ 43,161.25

$$\$ 393,820 - \$ 157,461 = 236,359$$

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

$$A = 236,359 \left(1 + \frac{.0575}{1} \right)^{1 \cdot 3}$$

$$A = \$ 279,520.25$$

$$279,520.25 - 236,359$$

$$\$ 43,161.25$$

3. Gene has \$5000 to invest. First Bank offers a 2-year CD that earns 2.49% compounded daily. Citizens Bank offers a 2-year CD earning 2.55% compounded monthly. Which is the better investment for Sue to make?

$$P = 5000$$

First Bank

$$r = .0249$$

$$t = 2$$

$$n = 365$$

$$A = 5000 \left(1 + \frac{.0249}{365} \right)^{365 \cdot 2}$$

$$A = \$5255.30$$

Citizens Bank

$$r = .0255$$

$$t = 2$$

$$n = 12$$

$$A = 5000 \left(1 + \frac{.0255}{12} \right)^{12 \cdot 2}$$

$$A = \$5261.33$$

Citizens Bank — will earn \$6.03 more

4. The deer population on a private hunt farm is increasing at a rate of 1.5% per year. There are 125 deer this year. Write a function that models the deer population. How many deer will there be in 3 years?

$$r = 1.5\% = .015$$

$$a = 125$$

$$x = 3 \text{ yr}$$

$$b = 1 + r = 1 + .015 = 1.015$$

$$y = a b^x$$

$$y = 125 (1.015)^3$$

$$130.7$$

$$\boxed{130 \text{ deer}}$$

5. If the annual rate of inflation averages 2.75% over the next 15 years, the approximate cost C of goods/services during any year in this time frame is given by $C = P(1.0275)^t$ where t is the time in years and P is the present cost. If the price of a gallon of gas is \$2.49, what will be 5 years from now?

$$P = 2.49$$

$$t = 5$$

$$C = ?$$

$$C = 2.49 (1.0275)^5$$

$$\boxed{C = \$2.85}$$