

**Agriculture**  
**Compound Interest Worksheet**

Name Key

**Directions:** Using the Compound Interest formula, and the Simple Interest formula, compare the compounded year-end balance with simple interest year-end balance. Show work below.

**Simple Interest:**  $I = Prt$

**Compounded Interest:**  $A = P \left[ 1 + \frac{r}{n} \right]^{nt}$

	PRINCIPAL	INTEREST RATE	# OF COMPOUNDINGS	COMPOUNDED YR-END BALANCE	SIMPLE INTEREST YR-END BALANCE
1.	\$3,000	6%	Semiannually	\$ 3,182.70	\$ 3,180
2.	\$8,000	4.5%	Quarterly	\$ 8,366.12	\$ 8,360
3.	\$7,500	3.5%	Quarterly	\$ 7,765.97	\$ 7,762.50
4.	\$7,500	3.5%	Monthly	\$ 7,766.75	\$ 7,762.50
5.	\$10,000	7%	Semiannually	\$ 10,712.25	\$ 10,700
6.	\$12,450	3.5%	Quarterly	\$ 12,891.50	\$ 12,885.75
7.	\$13,065	11%	Semiannually	\$ 14,541.67	\$ 14,502.15

①  $I = 3000(.06)(1) = 180 + 3000 = 3180$

②  $I = 8000(.045)(1) = 360 + 8000 = 8360$

③  $I = 7500(.035)(1) = 262.50 + 7500 = 7762.50$

⑤  $I = 10000(.07)(1) = 700 + 10000 = 10700$

⑥  $I = 12450(.035)(1) = 435.75 + 12450 = 12885.75$

⑦  $I = 13065(.11)(1) = 1437.15 + 13065 = 14502.15$

④  $A = 7500 \left( 1 + \frac{.035}{12} \right)^{12 \cdot 1}$   
 $A = 7766.75$

⑤  $A = 10000 \left( 1 + \frac{.07}{2} \right)^{2 \cdot 1}$   
 $A = 10712.25$

⑦  $A = 13065 \left( 1 + \frac{.11}{2} \right)^{2 \cdot 1}$   
 $A = 14541.67$

①  $A = 3000 \left( 1 + \frac{.06}{2} \right)^{2 \cdot 1}$   
 $A = 3182.70$

②  $A = 8000 \left( 1 + \frac{.045}{4} \right)^{4 \cdot 1}$   
 $A = 8366.12$

③  $A = 7500 \left( 1 + \frac{.035}{4} \right)^{4 \cdot 1}$   
 $A = 7765.97$

⑥  $A = 12450 \left( 1 + \frac{.035}{4} \right)^{4 \cdot 1}$   
 $A = 12891.50$

8. Bill purchased 350 acres of good farmland at \$3,450 per acre. He paid 25% down and was able to obtain a loan at 3.75% APR compounded annually for 15 years. How much was the down payment? How much was the principal? What was the interest paid after 15 years?

Down payment \$ 301,875

Principal \$ 905,625

Interest paid \$ 667,524.45

$$\$3450 * 350 = \$1,207,500$$

$$1,207,500 * .25 = \$301,875$$

$$1,207,500 - 301,875 = \$905,625$$

$$P = 905,625$$

$$r = 3.75\% = .0375$$

$$n = 1$$

$$t = 15 \text{ yr}$$

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

$$A = 905,625 \left(1 + \frac{.0375}{1}\right)^{1 \cdot 15}$$

$$A = \$1,573,149.45$$

$$1,573,149.45 - 905,625 = \$667,524.45$$

9. Bob replaced a metal roof on this equipment building. The metal roofing and materials cost \$5,648 and labor cost \$2,755. He took out an equity loan to cover the cost at 2.99% for 6 months. What was the principal? What was the interest? What was the amount repaid?

Principal \$ 8403

Interest \$ 124.70

Amount repaid \$ 8527.70

$$5648 + 2755 = 8403$$

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

$$A = 8403 \left(1 + \frac{.0299}{1}\right)^{1 \cdot \frac{1}{2}}$$

$$A = \$8527.70$$

$$8527.70 - 8403 = \$124.70$$

10. Sue has \$2500 to invest in a CD. First Bank offers a 2-year CD that earns 2.35% compounded monthly. Citizens Bank offers a 2-year CD earning 3.5% compounded annually. Which is the better investment for Sue to make?

First Bank

$$P = 2500$$

$$t = 2 \text{ yr}$$

$$r = 2.35\% = .0235$$

$$n = 12$$

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

$$A = 2500 \left(1 + \frac{.0235}{12}\right)^{12 \cdot 2}$$

$$A = \$2620.18$$

Citizens Bank

$$P = 2500$$

$$t = 2 \text{ yr}$$

$$r = 3.5\% = .035$$

$$n = 1$$

$$A = 2500 \left(1 + \frac{.035}{1}\right)^{1 \cdot 2}$$

$$A = \$2678.06$$

Sue will make more \$ on her investment at Citizens Bank

11. The deer population is increasing at a rate of 1.5% per year. There are 24,762 deer this year. Write a function that models the deer population. How many deer will there be in 5 years?

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

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

$$a = 24762$$

$$x = 5 \text{ yr}$$

$$y = ab^x$$

$$y = 24762(1.015)^x$$

$$y = 24762(1.015)^5 = 26675.7$$

$$26,675 \text{ deer}$$

round down  
part of deer

12. The salary for a new employee is \$31,525. The employee receives a  $\frac{1}{2}\%$  raise each year. What is the salary after 5 years?

$$a = \$31525$$

$$r = \frac{1}{2}\% = .005$$

$$x = 5 \text{ yr}$$

$$b = 1 + r = 1 + .005 = 1.005$$

$$y = ab^x$$

$$y = 31525(1.005)^5$$

$$y = \$32,321.05$$

13. A business has revenue of \$45,000 and projects a 12% increase in revenue in future years. What is the projected revenue 5 years from now?

$$a = 45000$$

$$r = 12\% = .12$$

$$b = 1 + r = 1 + .12 = 1.12$$

$$x = 5 \text{ yr}$$

$$y = ab^x$$

$$y = 45000(1.12)^5$$

$$y = \$79,305.38$$

14. A biologist wants to determine how long it takes a given culture to grow bacteria. If the number of bacteria in the culture,  $N$ , is given by the formula,  $N = 8(2)^t$ . Find the number of bacteria grown in 5 hours.

$$t = 5 \text{ hr}$$

$$N = ?$$

$$N = 8(2)^5$$

$$N = 256 \text{ bacteria}$$

15. If the annual rate of inflation averages 4% over the next 10 years, the approximate cost  $C$  of goods/services during any year in this time frame is given by  $C = P(1.04)^t$  where  $t$  is the time in years and  $P$  is the present cost. If the price of an oil change is \$25.95, what will be 10 years from now?

$$C = ?$$

$$P = 25.95$$

$$t = 10 \text{ yr}$$

$$C = 25.95(1.04)^{10}$$

$$C = \$38.41$$