Compound Interest (Day 6–6)

In history, banks calculated interest at the end of each year on the original amount either borrowed or invested (the _____). This type of interest was called _____ _____.

As time went on banks realized that there was another way to compute interest and make even more money. They called this type of interest _____ _____.

To compute compound interest: Banks calculate the interest for the first period, _____ it to the total, then calculate the interest on the _____ total for the next period, and so on.

- Since we are calculating a rate % and it is growing to earn interest, the compound interest formula models the exponential growth equation, $y = ab^x$, just using different letters to represent BANKING terms.

Compound Interest: $A(t) = p(1+r)^t$

- **$A(t)$ = amount earned/owed after t years**
- **P = principal amount borrowed or invested (starting a#)**
- **r = interest rate % (must convert to a decimal)**
- **t = time in years**

1. Sara had invested $800 in a savings account that paid 4.2% interest compounded annually. How much money to the nearest cent was in the account after 4 years, if he left the money untouched?

2. If Bailey invested money 4 years ago with an annual interest rate of 3.275% compounded annually, and it is valued at $11,260, how much money did she initially invest?

3. If the savings in a bank account can be modeled by the function $S(t) = 250(1.045)^t$. Which of the following is true?

   (1) The initial amount deposited was \$250 and the interest earned was 45%

   (2) The initial amount deposited was \$2.50 and the interest earned was 4.5%

   (3) The initial amount deposited was \$250 and the interest earned was 4.5%

   (4) The initial amount deposited was \$2.50 and the interest earned was 45%

4. If \$350 is placed in a savings account that earns 3.5% interest applied once a year, then how much would the savings account be worth after 10 years?

5. Tammy has a balance of \$5,620 in her savings account. She is moving this account to another bank that has advertised an interest rate of 6.5% per year. Which of the following equations would give Tammy's account worth, W, as a function of the number of years, y, it has been gaining interest.

   (1) $W = 5620(.65)^y$ (3) $W = 1.065y + 5620$

   (2) $W = 5620(1.065)^y$ (4) $W = 1.65y + 5620$

Classwork 6–6

1. $325 is borrowed from a bank that charges 4% interest compounded annually. How much is owed after 7 years; 20 years?

2. A youth group has a yard sale to raise money for a charity. The group earns $800 but decided to put its money in the bank for a while. Calculate the amount of money the group will have if:

   a) Cool Bank pays compounded interest at a rate of 4%, but the youth group can only leave the money in for 3 years.

   b) Hot Bank pays compound interest at a rate of 3%, but the youth group can leave the money in for 5 years.

   c) Which bank is the better choice for their respective time restrictions, and how much more money will they receive by choosing this bank?

3. If Piper invested money 7 years ago with an annual interest rate of 1.95% compounded annually, and it is valued at $12,575, how much money, to the nearest cent, did she initially invest?

4. Milton has his money invested in a stock portfolio. The value, $v(x)$, of his portfolio can be modeled with the function $v(x) = 30{,}000(0.78)^x$, where x is the number of years since he made his investment. Which statement describes the rate of change of the value of his portfolio?

   (1) It decreases 78% per year

   (2) It decreases 22% per year

   (3) It increases 78% per year

   (4) It increases 22% per year

5. The cost of airing a commercial on television is modeled by the function $C(n) = 110n + 900$, where n is the number of times the commercial is aired. Based on this model, which statement is true?

   (1) The commercial costs \$0 to produce and \$110 per airing up to \$900.

   (2) The commercial costs \$110 to produce and \$900 each time it is aired.

   (3) The commercial costs \$900 to produce and \$110 each time it is aired.

   (4) The commercial costs \$1010 to produce and can air an unlimited amount.

6. Solve for the solution to the following system graphically:

   $5x - 3y = -4$

   $3x + 2y = 9$