

Name: Key

Date: _____

Compounded "n" times a year

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

Compounded	n
Annually	1
Semi-Annually	2
Quarterly	4
Monthly	12
Weekly	52
Daily	365

Compounded Continuously

$$A = Pe^{rt}$$

Example 1

Cobb County teachers got a windfall in the summer of 2006. All teachers got an extra check that summer to change the pay period of all teachers. All of the teachers got to make the decision of what to do with this money. A group of math teachers got together to find out how to make their money for the most for them. These teachers got \$2500. How much money would the teachers have if they...

A) Put it in the bank and earned 4% interest yearly for 10 years. $n=1$

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

$$A = 2500 \left(1 + \frac{.04}{1} \right)^{1 \cdot 10}$$

$$A = \$3,700.61$$

B) Put the money in a CD that earned 4% monthly for 10 years. $n=12$

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

$$A = 2500 \left(1 + \frac{.04}{12} \right)^{12 \cdot 10}$$

$$A = \$3,727.08$$

C) Put the money in a special money market account that earned 4% continuously for 10 years.

$$A = Pe^{rt}$$

$$A = 2,500e^{.04 \cdot 10}$$

$$A = \$3,729.56$$

D) How long would it take the teachers to double their initial investment using the CD at 4% that earned interest monthly? $n=12$, $5,000$

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

$$5,000 = 2,500 \left(1 + \frac{.04}{12} \right)^{12 \cdot t}$$

$$2 = \left(1.0033 \right)^{12t}$$

$$\frac{\log 2}{\log 1.0033} = 12t$$

$$t = 17.358 \text{ years}$$

store as x!

E) How long would it take the teachers to double their initial investment using the money market that earned 4% continuously? $5,000$

$$A = Pe^{rt}$$

$$5,000 = 2,500e^{.04t}$$

$$2 = e^{.04t}$$

$$\ln 2 = \ln e^{.04t}$$

$$\ln 2 = .04t$$

$$\frac{\ln 2}{.04} = \frac{.04t}{.04}$$

$$t = 17.329 \text{ years}$$

1. You deposit \$2000 in an account that earns 5% annual interest. Find the balance after five years if the interest is compounded

a. Annually

$$\boxed{\$ 2,552.56}$$

b. Quarterly

$$\boxed{\$ 2,564.07}$$

c. Monthly

$$\boxed{\$ 2,566.72}$$

d. Continuously

$$\boxed{\$ 2,568.05}$$

2. A customer purchases a television set for \$800 using a credit card. The interest is charged on any unpaid balance at the rate of 18% per year compounded monthly.

a. If the customer makes no payment for one year, how much is owed at the end of the year?

$$\boxed{A = \$ 956.49}$$

b. How long will it take the customer's credit card to reach \$1000 balance (3 decimals)?

$$\boxed{t = 1.249 \text{ years}}$$

3. If you deposited \$1000 into a savings account earning 6% annual interest compounded quarterly,

a. How much money do you have at the end of 3 years?

$$\boxed{A = \$ 1,195.62}$$

b. What if it was compounded continuously?

$$\boxed{A = \$ 1,197.22}$$

c. How long will it take for you to double your investment compounding continuously (3 decimals)?

$$\boxed{t = 11.552 \text{ years}}$$

4. A local bank advertises two special savings accounts. You have \$500 and you want to decide which offer is the best investment if you are investing for one year.

a. One account offers 4.9% compounded daily. Write a formula and find the balance of this account at the end of one year.

$$\boxed{A = 500 \left(1 + \frac{.049}{365}\right)^{365t}}$$

$$\boxed{\$ 525.11}$$

b. The other account offers 5% compounded quarterly. Write a formula and find the balance of this account at the end of one year.

$$\boxed{A = 500 \left(1 + \frac{.05}{4}\right)^{4t}}$$

$$\boxed{\$ 525.47}$$

c. Explain which account is the best investment and by how much.

$\boxed{\text{Account offer 2 b/c you get } 36 \text{¢ more}}$