

Lesson 2.07 Continuously Compounding Interest

Students will be able to:

- **Content Objective:** Define & evaluate exponential equations that represent continuously compounded interest.
- **Language Objective:** Write the definition for each variable of the continuous compounding interest formula $A = Pe^{rt}$.



Warm Up

Danielle wants to start a college fund for her son John. She puts \$40,000 into an account that grows at a rate of 2.75% per year, compounded monthly.

- Write a function $C(t)$, that represents the amount of money in the account t years after it was opened, given that no more money is deposited or withdrawn.
- Using your calculator, determine the number of years it will take for the account to reach \$100,000, to the nearest hundredth of a year.



Graphic Organizer

Continuous Compound Interest Formula				
$A(t) = Pe^{rt}$				
A	P	e	r	t

In theory, continuously compounded interest means that an account balance is constantly earning interest. In addition, this interest is being re-fed back into the balance so that it, too, earns interest.



Skill 1: Writing Continuously Compounded Equations

Dominic invested \$25,000 in a savings account that earns a fixed annual interest rate of 3.2% compounded continuously. Write an equation that could be used to calculate the amount of money in Dominic's savings account, $S(t)$, after t years.



Exercise 1: Writing Continuously Compounded Equations

Janet puts \$650 into an account to use for school expenses. The account earns a fixed annual interest rate of 2.7% interest, compounded continuously. Write an equation that represents the total amount of money in Janet's account, $J(x)$, after x years.



Skill 2: Compounded Continuously

Jose invests \$350 in a bank account that promises a fixed nominal rate of 2% continuously compounded.

- How much is the investment worth after 20 years?
- Using a calculator, determine the amount of time it will take for the investment to double.



Exercise 2: Compounded Continuously

Mikaela invests \$4500 in an account that earns a 3.8% fixed nominal interest rate compounded continuously.

- If she withdraws the profit from the investment after 5 years, how much has she earned on this investment?
- Using a calculator, determine the amount of time it will take for the investment to reach \$7,099.88?



Check Point

The function $G(t) = 100e^{-0.024t}$ models the number of grams of a radioactive isotope that remains after t years. On which interval is the sample's average rate of decay the fastest?

- [0,10]
- [5,15]
- [10,20]
- [1,25]



2.07- Problem Set

Name: _____

1. Alicia invests \$6,695 in a retirement account with a fixed annual interest rate of 8% compounded continuously. What will the account balance be after 15 years?
2. Hamid invests \$12,300 in a savings account with a fixed annual interest rate of 6.82% compounded continuously. What will the account balance be after 12 years.
3. Giacomo invests a sum of money in a savings account with a fixed annual interest rate of 2.63% compounded continuously. After 15 years, the balance reaches \$1,912.41. What was the initial investment?
4. Devin invests \$8,589 in a savings account for his son's education with a fixed annual interest rate of 7% compounded continuously. Using a calculator, determine how long will it take for the account balance to reach \$21,337.85?