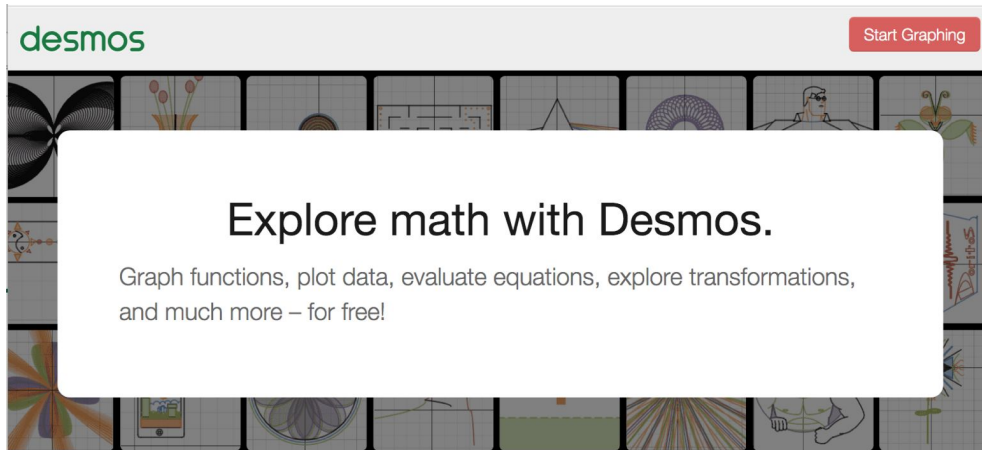


Simple Interest and Compound Interest

Firstly, log onto [desmos.com](https://www.desmos.com) and press the “Start Graphing” Tab in the top right corner. We will use this later in the lesson!!



What is Interest?

- Interest is money being paid a particular rate on the preceding sum of money over a period of time. It is the extra money earned, and is the difference of the Principal and Accumulated amounts
- Examples of things that earn interest
 - Bank accounts
 - Loans
 - Cds

Simple Interest

- Simple Interest is the amount of money earned off of the principal amount only.
 - Formula: $A = P(1+rt)$
 - A= _____
 - P= _____
 - r= _____
 - t= _____

Example #1: Calculate the Accumulated Amount on a \$1000 investment, with a rate of 6.5% over 3 years.

Remember our formula: $A=P(1+rt)$

$A= ??$

$P= 1000$

$r= .065$

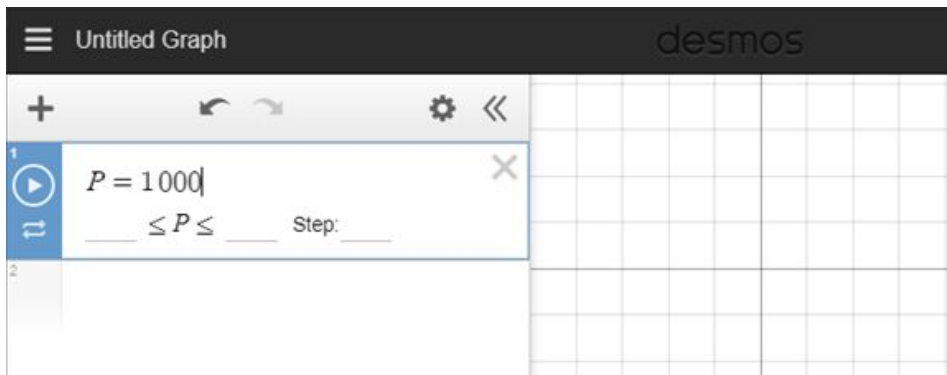
$t= 3$

Now substitute in values $A= \underline{\hspace{2cm}}(1+(\underline{\hspace{1cm}})(\underline{\hspace{1cm}}))$

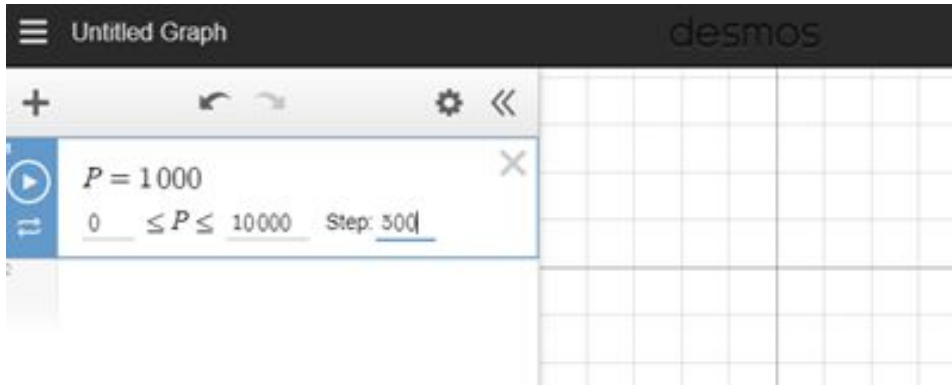
$A=\$ \underline{\hspace{2cm}}$

Let's access Desmos and graphically solve for the Accumulated amount!!!
Reference back to Desmos at this point in time.

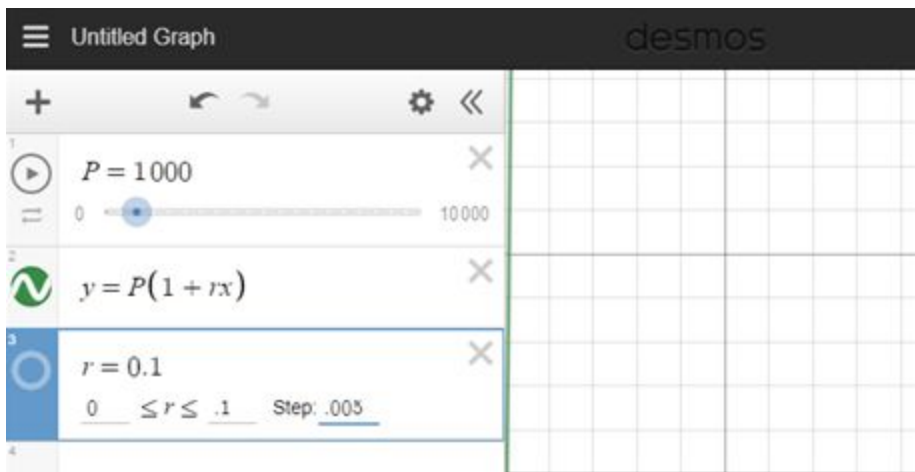
1: Let's Define our principle. To do so, type $P=1000$ into the first bar on the top left hand of the page.



- Notice how underneath the value, something pops up. This is our slider, which can manipulate the equation later on. Let's type 0 for our first value, 10000 for our second value, and 500 for our third value.



2: Enter the formula for simple interest with respect to time and add a slider for r by pressing the tab labeled “r.” {0, .1, .005}



3: Drag the sliders to fit the equation, where P=1000 and r=.065 and scroll out until you see a graph.



4: To calculate the Accumulated Amount at year three, drag on the line until the x value is 3. The y value will represent the Accumulated Amount.

Compound Interest

- Compound Interest is different from Simple Interest in the sense that it doesn't only earn interest on the principal amount, however, it earned interest on both the principal amount and the interest earned in the previous term.
 - Formula: $A = P (1 + r/n)^{nt}$
 - A= Accumulated Amount
 - P= Principal
 - r= interest rate
 - t= time
 - n= _____

Example #2: Jasper decide to start a college fund on his 12th birthday. He plans to invest \$3000 in a bank with a 5.75% interest rate **compounded semi-annually**. He plans to take the money out of the account on his 18th birthday. Calculate the Accumulated amount in the fund when Jasper turns 18 and the amount of interest earned on the investment.

Remember our formula: $A = P (1 + r/n)^{nt}$

A= ??

P= 3000

r= .0575

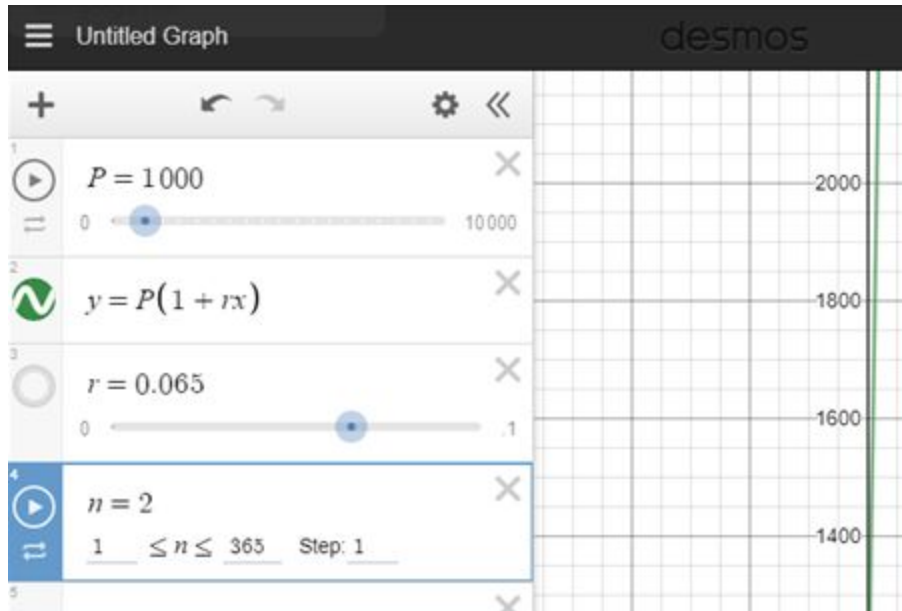
t= 6

n= _____

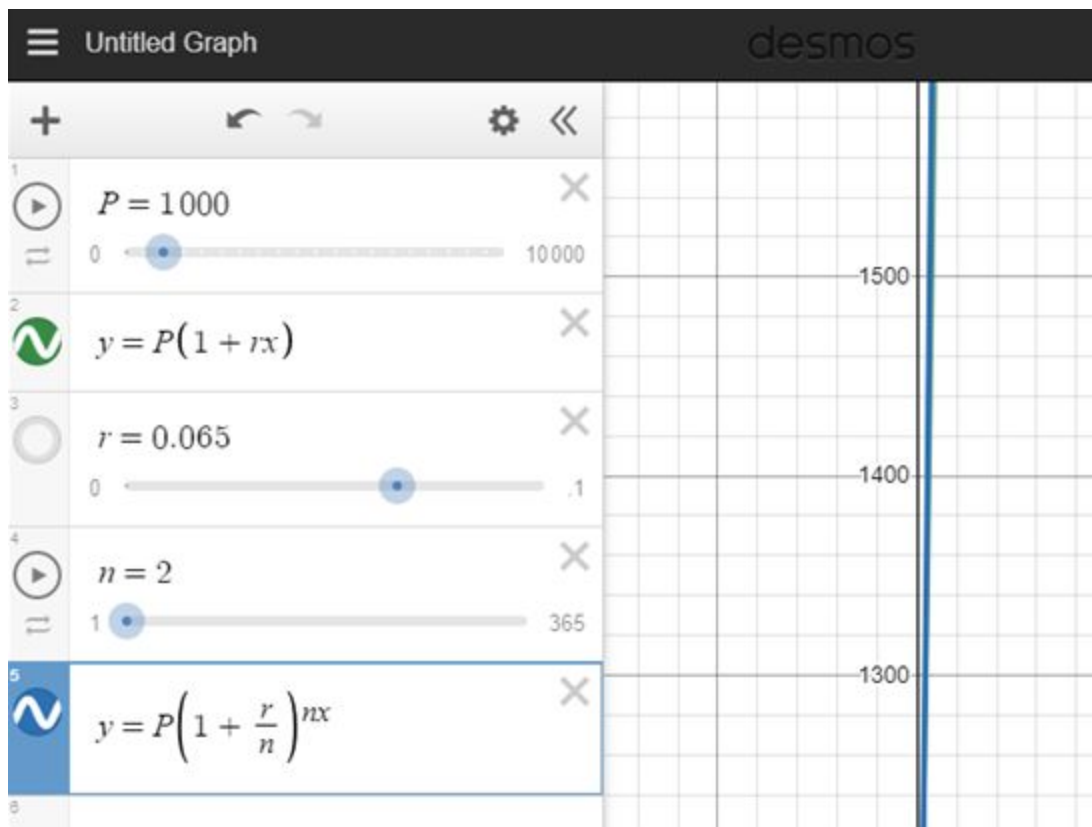
Now substitute in values $A = \underline{\hspace{1cm}} (1 + (\underline{\hspace{1cm}} / \underline{\hspace{1cm}}))^{\underline{\hspace{1cm}}(\underline{\hspace{1cm}})}$

A=\$ _____

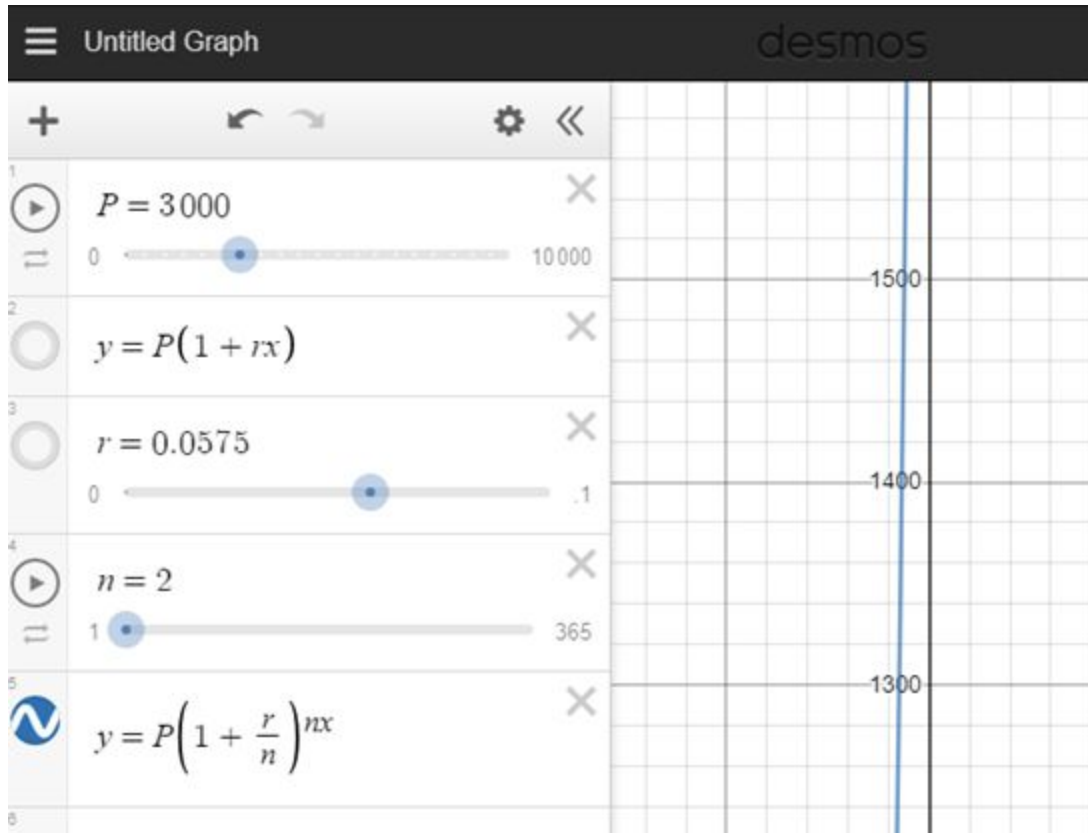
5: In a new box, type $n=2$, and set the sliders for the values $\{1, 365, 1\}$ and in the box labeled r , edit the slider to $\{0, .1, .0025\}$



6: Type in the formula for compound interest in box number 5, as shown below.



7: Adjust your P, r, and n to P=3000, r=.0575, and n=2. Also press the green scribble to clear the previous line so only the blue scribble is showing.



8: To calculate the Accumulated Amount at year three, drag on the line until the x value is 6. The y value will represent the Accumulated Amount.

9: Select the Simple Interest Formula and compare the two formulas by finding year 10 on both of the lines. Set an inequality $\{0 \leq x \leq 10\}$ for each of the functions to help visualize the relationship.

Simple Interest at year 10: _____

Compounded interest at year 10: _____

10: Calculate Interest on Interest: _____

Practice Problems:

1 . Andrea is saving up for a new car. She is wondering which is better, to invest with simple interest or compounded. She is planning on investing \$6500. Both accounts allow for an interest rate of 8%. Andrea will be keeping this money in the bank for 7 years.

- a. Calculate the simple interest
- b. Calculate the compound interest if the account was compounded yearly
- c. Find the Interest on Interest

2 . Joey wants to invest \$3000 in a CD that earns 2.4% compounded monthly over 36 months. How much will he earn at the end of the investment?

3a. How much interest will Suzie earn on a \$1000 investment with an interest rate of 7.5% over 3 years?

3b. Would Suzie earn more if she invests \$950 with the same interest rate and over the same amount of time, but compounded quarterly?

4 . Frank's brother will either give Frank \$6000 in an annuity fund that pays 5% semi annually for 10 years, or give Frank \$10000 in 10 years. Which should Frank choose to receive the most money from his brother?