Compound Interest

The compound interest formula for the amount *A* in an account after *t* years is $P\left(1 + \frac{r}{n}\right)^{nt}$

where *P* is the principal, *r* is the annual interest rate as a decimal, and *n* is the number of times per year that interest is compounded.

Suppose a college savings account is paying 7% annual interest compounded *n* times per year. You will investigate how increasing *n* affect the value of $1000 invested in the account after 18 years.

Rewrite the formula for *A* to represent this problem.

A =

Complete the table. Round $\left(1 + \frac{r}{n}\right)^{nt}$ to five decimal places.

Compounding frequency	***n***	$\left(1 + \frac{r}{n}\right)^{nt}$	**Amount after 18 years**
Annual	1		
Semiannual	2		
Quarterly			
Monthly			
Daily	365		
Hourly			
Every minute	525,600		
Every second			

Now, suppose you live in a magical world that pays 100% annual interest compounded n times per year for one year.

Rewrite the formula for A to represent this problem.

$A =$

Complete the table. Round $\left(1 + \frac{r}{n}\right)^{nt}$ to five decimal places.

Compounding frequency	***n***	$\left(1 + \frac{r}{n}\right)^{nt}$	**Amount after 1 year**
Annual	1		
Semiannual	2		
Quarterly			
Monthly			
Daily	365		
Hourly			
Every minute	525,600		
Every second			

DRAW CONCLUSIONS Use your observations to complete these exercises.

How does increasing the compounding frequency affect

$\left(1 + \frac{r}{n}\right)^{nt}$?

If a bank compounded interest more often than every second, would this make much of a difference? *Explain*.

As n gets larger and larger with more-and-more frequent compounding, the situation becomes what banks call *continuous compounding*. Does it appear from your table that the amount in the account after 1 year with continuous compounding will be greater than the amount with interest compounded every secon