Algebra 1 Bellwork Monday, March 9, 2015

Compounded Interest is when you earn interest on the interest you've already received.
You can find the amount of money in an account with a given interest rate by using an exponential function: $y = a \cdot b^x$ a = initial amount (principal) b = growth factor (100% + Int rate)
x = # of time periods

1. You invest $20,000 in an account that pays 4.5% interest annually.

a) How much interest will you earn in 1 year?

b) How much interest will you earn in 2 years?

c) How much money will you have in 10 years?

d) How much interest will you have earned in 15 years?

e) To the nearest tenth, how many years will it take for your $20,000 to become $100,000?

2. If the bank pays interest more often then once a year the interest rate used in the exponential function is found by taking the annual interest rate and dividing it by the number of times interest is calculated a year. Example: If interest is compounded(calculated) monthly you would find the monthly interest rate by dividing the annual rate by 12 and the exponent would represent the number of months the money is in the account.
You invest $25,000 in an account that pays 6% annual interest. Find the amount of money will will have after 20 years if the interest is compounded:

a) Annually (once a year).

b) Monthly.

c) Daily.

d) Hourly.

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ANSWERS

Compounded Interest is when you earn interest on the interest you've already received.
You can find the amount of money in an account with a given interest rate by using an exponential function: $y = a \cdot b^x$ a = initial amount (principal) b = growth factor (100% + Int rate)
x = # of time periods

1. You invest $20,000 in an account that pays 4.5% interest annually.

$100 + 4.5 = 104.5$
$b = 1.045$

a) How much interest will you earn in 1 year?

$20{,}000(1.045)^1 = 20{,}900$
$-20{,}000$
$= \$900$ in interest

b) How much interest will you earn in 2 years?

$20{,}000(1.045)^2 = 21{,}840.50$
-20000
$= \$1840.50$ in interest

c) How much money will you have in 10 years?

$20{,}000(1.045)^{10} = \$31{,}059.39$

d) How much interest will you have earned in 15 years?

$20{,}000(1.045)^{15} = \$38{,}705.65$
$-20{,}000$
$\$18{,}705.65$ in interest

e) To the nearest tenth, how many years will it take for your $20,000 to become $100,000?

$100{,}000 = 20{,}000(1.045)^x$
$x = 36.56$ rounds to 36.6 yrs

2. If the bank pays interest more often then once a year the interest rate used in the exponential function is found by taking the annual interest rate and dividing it by the number of times interest is calculated a year. Example: If interest is compounded(calculated) monthly you would find the monthly interest rate by dividing the annual rate by 12 and the exponent would represent the number of months the money is in the account.
You invest $25,000 in an account that pays 6% annual interest. Find the amount of money will will have after 20 years if the interest is compounded:

$100 + 6 = 106\% \rightarrow 1.06$

a) Annually (once a year).

$25{,}000(1.06)^{20}$
$= \$80{,}178.39$

b) Monthly.

$100 + \frac{6}{12} = 100.5 \rightarrow 1.005$
$x = 20(12) = 240$
$25{,}000(1.005)^{240} = \$82{,}755.11$

c) Daily.

$b = \left(100 + \frac{6}{365}\right)/100 \rightarrow 25000\left(\frac{100 + \frac{6}{365}}{100}\right)^{7300} = \$82{,}994.74$
$x = 20(365) = 7300$

d) Hourly. # hrs in a year $= 365 \times 24 = 8760$

$b = \left(100 + \frac{6}{8760}\right)/100 \rightarrow 25{,}000\left(\frac{100 + \frac{6}{8760}}{100}\right)^{175{,}200}$
$= \$83{,}002.58$

$x = 20(365)(24) = 175{,}200$