**TVM Calculations**

1. **Future Value (FV)**: If you start with nothing (Starting Principal) and save $1,200 per year for ten years (N) at a 5% rate of return (I/Y), how much money will you have at the end of the ten years (FV)? How much of your own money (Total Principal) will you actually have invested over that time?

$12,000 = Total Principal invested in ten years (1,200/yr). Yes, since there's an interest compounding each year with a total of $3,093.47.

1. **Payment (PMT)**: You want to have $20,000 to buy a new car in five years and you can invest your money at a 5% rate of return. If you start with nothing, how much money will you need to invest each year in order to achieve this goal?  How much of your own money will you actually have invested over that time?

$18,097 = Total principal invested in 5 years, with $3,619.50 contribution at the end of each year.

1. **Rate of Return (I/Y)**: You want to retire 40 years from now with $500,000 saved. If you have nothing saved so far but can invest $2,400 per year ($200 per month), what rate of return will you need in order to achieve this goal? How much of your own money will you actually have invested over that time?

An annual return rate of 7.165% is needed each year to reach $500,000 in 40 years, with a total of $96,000 principal invested, $2,400/yr for 40 years.

1. Play around with this calculator to see what other results you can find. What do you notice about the effect of time? How about the effect of changes in the interest rate/rate of return?

It's amazing how compounding interest work over time! A future value of $500,000 in 40 years with $2,400 annuity requires a fixed 7.165% interest rates each year. An additional of roughly 2% (2.613% more accurately) each year can DOUBLE the future value of $500,000 to $1,000,000! Also, starting 5 years earlier with investing for retirement (45 total years of compounding periods) and an additional 2.613% interest rate (totaling 9.778%) would TRIPLE the future value of $500,000 to $1,600,000. And you only have to invest around $100,000 of total principal. That's amazing!