## Sec. 8.5 - Regular Annuities (payments) - Determining Future Value

Learning Goal:

By the end of today, I will be able to calculate the future amount of a regular set of payments that experience compound interest.

Annuity - a series of equal deposits or payments made at regular intervals;

A simple annuity is an annuity in which the payments coincide with the compounding period, or *conversion* period; (ie. monthly payments will be matched with monthly compounding)

An ordinary annuity is an annuity in which the payments are made at the end of each interval;

Unless otherwise stated, each annuity in this chapter is a simple, ordinary annuity

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We are going to invest $1000.00 a year, at 6% per annum, compounded annually, for 4 years.

Draw a timeline to model this situation.

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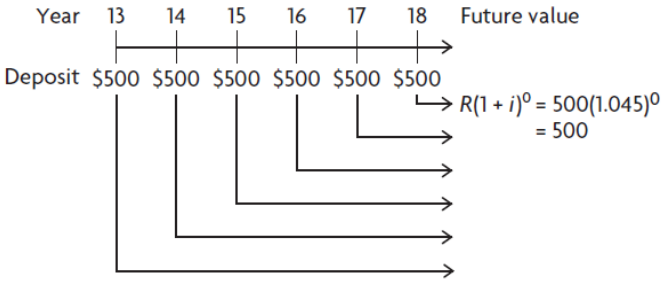
Jessica's grand mother has made a $500.00 deposit into a special savings account on each of her birthdays from the age of 13 to 18. How much will Jessica have in her savings account on her 18th birthday? The account receives an interest rate of 4.5%/a compounded annually.




How much interest did the investments earn?

Why can't the expression A = 5 x [500(1+0.045)$^5$] be used to calculate the total?

Formula Proof

Series Info

$$S_n = \frac{a(r^n - 1)}{(r-1)}$$

a = 500
r = 1.045
n = 6

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## Future Amount Formula for Simple, Ordinary Annuities

$$A = \frac{R[(1+i)^n - 1]}{i}$$

Where "R" is the payment,

"A" is the future amount

"i" is the annual interest rate,

"n" is the total number of payments

Compound periods and payment frequency MUST match; payments happen at the END of the interval for this formula to work.

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Jessica's grand mother has made a $500.00 deposit into a special savings account on each of her birthdays from the age of 13 to 18. How much will Jessica have in her savings account on her 18th birthday? The account receives an interest rate of 4.5%/a compounded annually.

$$A = \frac{R[(1+i)^n - 1]}{i}$$

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Example

Jay deposits $1500 every 3 months for 2 years into a savings account that earns 10%/a compounded quarterly. How much money will have accumulated at the end of 2 years?

$$A = \frac{R[(1+i)^n - 1]}{i}$$

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38 years

$100.00 month

$100 \times 12 \times 38 = 45600$

4% per ann / comp monthly

$$A = \frac{100\left[\left(1+\frac{0.04}{12}\right)^{456}-1\right]}{\left(\frac{0.04}{12}\right)} = \$106{,}820.47$$

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Dollar Cost Averaging

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Homework

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