Annuities / Future Value

Learning Goals - defining an annuity

- understand how annuities work
- use the annuity formula to solve real life problems

Annuity - series of payments or deposits made at requiar intervals

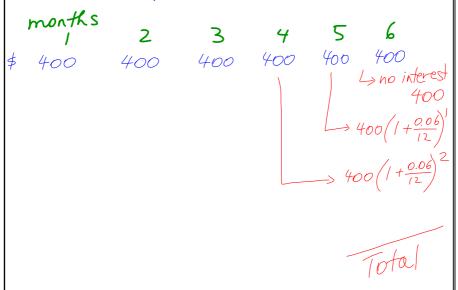
Simple Annuity - payment interval is the <u>Same</u> as the compounding period

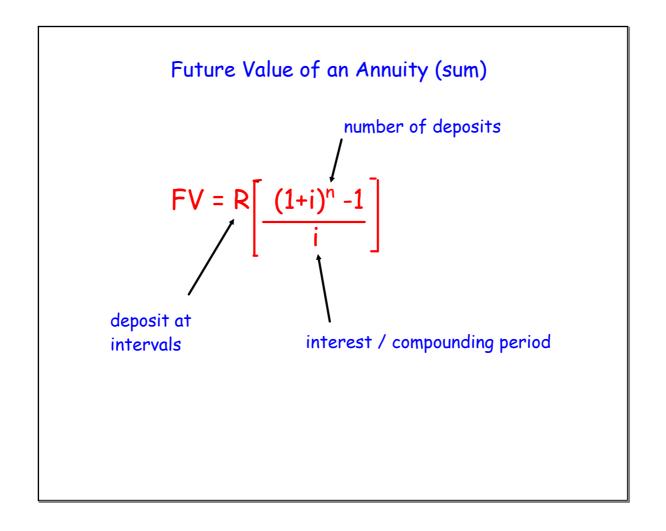
Ordinary Annuity - payment/deposit is made at the <u>END</u> of each interval

Matthew deposits \$400 every month for 6 months. The money earns 6% interest per year, compounded monthly.

a. How much money will he deposit in total?

b. How much money will he have at the end of 6 months?





$$FV = 400 \left[\frac{\left(1 + \frac{0.06}{12}\right)^6 - 1}{\frac{0.06}{12}} \right]$$

$$= 2430.20$$

Thomas and Emily are saving up for retirement.

Thomas deposits \$1000/year for 40 years. Emily deposits \$2000/year for 20 years.

Both earn 8% interest per year compounded annually.

Who has a better retirement plan?

Thomas
$$FV = 1000 \left[\frac{\left(1 + \frac{0.08}{1}\right)^{40} - 1}{\frac{0.08}{1}} \right]$$

$$= 259056.52$$
Emily

Emily
$$FV = 2000 \left[\frac{(1+0.08)^{20}-1}{0.08} \right]$$

$$= 91523.93$$

$$\therefore Thomas has more $$$$

$$\therefore Investing for a longer time is better.$$

On the Boards...

Ashley deposits \$500 every 6 months for 5 years. She gets an interest rate of 4% compounded semi-annually. How much money will she have at the end of 5 years?

$$FV = 500 \left[\frac{\left(1 + \frac{0.04}{2}\right)^{10} - 1}{\frac{0.04}{2}} \right]$$

$$= 5474.86$$

1. Agnes starts an Education Savings Plan for her granddaughter. She deposits \$200 every 3 months starting when the baby is 3 months old. Her interest is 5% compounded quarterly. How much money will accumulate by the time she is 18 years old?

$$FV = 200 \left[\frac{1 + \frac{0.05}{4}}{\frac{0.05}{4}} - 1 \right]$$

$$= 23/34,72$$

- 1. Shannon deposits \$3600 for 3 years at an interest rate of 6% compounded quarterly. Her friend Katie will deposit \$100 at the end of each month for 3 years at 5% interest compounded monthly.
 - 1. Who will have more money?
 - 2. By how much?

Shannon
$$A = P(1+i)$$

$$= 3600(1 + \frac{0.06}{4})^{2}$$

$$= 3875.33$$

$$= 4304.23$$

$$= 3875.33$$

$$\therefore Shannon has more money by $428.90$$

Seatwork

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