

## CONCEPT: TIME VALUE OF MONEY EQUATIONS

**PRE-TEST:** It's my money and I want it \_\_\_\_\_. a) Now b) Some other time

• A dollar **today** is worth more than a dollar **tomorrow**. The two main concepts in Time Value of Money (TVM) are:

- ☐ \_\_\_\_\_: Taking current money and earning \_\_\_\_\_ as time passes into the future
- ☐ \_\_\_\_\_: Taking a future sum of money and removing \_\_\_\_\_ to find its value today

• **Timelines** are a helpful tool to visualize the timing of cash flows at different points in time:

**EXAMPLE:** Today, you invest **\$100** at Clutch Bank at a **10%** interest rate for **three years**.

### The Time Value of Money Equation:

$$FV = PV * (1 + r)^n$$

•  $FV =$  \_\_\_\_\_ = The value of a current amount of money at a future date

•  $PV =$  \_\_\_\_\_ = The current value of a sum of money (i.e. the PV of \$1,000 today is \$1,000)

•  $r =$  \_\_\_\_\_ = The \_\_\_\_\_ interest rate expressed as a decimal

•  $n =$  \_\_\_\_\_ = The amount of time passing between the PV and FV

**PRACTICE:** The formula  $FV = PV * (1 + r)^n$  is best used for:

- a) Compounding
- b) Discounting
- c) Rebounding
- d) Converting

**PRACTICE:** You invest \$4,545 in Clutch Bank today earning a juicy 10% annual interest. What is the value of your investment in one year? What is the value of the investment after two years?

- Using a little bit of algebra, we can rearrange the time value of money formula:

$$FV = PV * (1 + r)^n$$

**PRACTICE:** The formula  $PV = \frac{FV}{(1+r)^n}$  is best used for:

- a) Compounding
- b) Discounting
- c) Rebouncing
- d) Converting

**PRACTICE:** You are saving up \$12,000 for a luxurious European vacation two years from now. How much money would you need to invest today at Clutch Bank, earning their juicy 10% annual interest, to have enough for your vacation?

How much would you need to invest today, if instead you could only earn 6% interest?

- The formulas we have used so far are for finding the value of a \_\_\_\_\_ of money.
  - \_\_\_\_\_: Payments of the same amount of money at regular intervals (i.e. annually)
  - The formulas for calculating PV and FV of an annuity are beyond the scope of this course.
    - We use PV and FV tables to find the values of lump-sums and annuities.

**EXAMPLE:** You have reached retirement and have earned a pension that will pay you \$10,000 annually for the next five years. Visualize this information on a timeline.

**PRACTICE:** Today, you purchased a \$1,000 bond that matures in 5 years. The bond pays annual interest of 10%. Visualize these cash flows on a timeline.