

# BACHELOR of ECONOMICS



**Thammasat University  
Faculty of Economics  
Bachelor of Economics (International Program)**

## AC201 Fundamental Accounting

Semester 1/2016

**Course Package OY 02**

**Topic:**

Reporting and Interpreting Liabilities  
and Time Value of Money Concept

**Session:**

Session OY 02

**Instructor:**

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## REPORTING AND INTERPRETING LIABILITIES AND TIME VALUE OF MONEY CONCEPT

### Chapter Take-Aways

#### **1. Define, measure, and report liabilities.**

Strictly speaking, accountants define liabilities as probable future sacrifices of economic benefits that arise from past transactions. They are classified on the balance sheet as either current or long-term. Current liabilities are short-term obligations that will be paid within the current operating cycle of the business or within one year of the balance sheet date, whichever is longer. Long-term liabilities are all obligations not classified as current.

#### **2. Analyze the accounts payable turnover ratio.**

This ratio is computed by dividing cost of goods sold by accounts payable. It shows how quickly management is paying its trade creditors and is considered to be a measure of liquidity.

#### **3. Report notes payable and explain the time value of money.**

A note payable specifies the amount borrowed, when it must be repaid, and the interest rate associated with the debt. Accountants must report the debt and the interest as it accrues. The time value of money refers to the fact that interest accrues on borrowed money with the passage of time.

#### **4. Report contingent liabilities.**

A contingent liability is a potential liability that has arisen as the result of a past event. Such liabilities are disclosed in a note if the obligation is reasonably possible.

#### **5. Explain the importance of working capital and its impact on cash flows.**

Working capital is used to fund the operating activities of a business. Changes in working capital accounts affect the statement of cash flows. Cash flows from operating activities are increased by decreases in current assets (other than cash) or increases in current liabilities. Cash flows from operating activities are decreased by increases in current assets (other than cash) or decreases in current liabilities.

#### **6. Report long-term liabilities.**

Usually, long-term liabilities will be paid more than one year in the future. Accounting for long-term debt is based on the same concepts used in accounting for short-term debt.

#### **7. Compute present values.**

The present value concept is based on the time value of money. Simply stated, a dollar to be received in the future is worth less than a dollar available today (present value). This concept can be applied either to a single payment or multiple payments called annuities. Either tables or Excel can be used to determine present values.

#### **8. Apply present value concepts to liabilities.**

Accountants use present value concepts to determine the reported amounts of liabilities. A liability involves the payment of some amount at a future date. The reported liability is not the amount of the future payment. Instead, the liability is reported at the amount of the present value of the future payment.

### **Key Ratios**

**Accounts payable turnover** is a measure of how quickly a company pays its creditors. It is computed as follows:

$$\text{Accounts Payable Turnover} = \text{Cost of Goods Sold} \div \text{Average Accounts Payable}$$

### **Finding Financial Information**

#### **Balance Sheet**

##### ***Under Current Liabilities***

Liabilities listed by account title, such as:

- Accounts payable
- Accrued liabilities
- Notes payable
- Current portion of long-term debt

##### ***Under Noncurrent Liabilities***

Liabilities listed by account title, such as:

- Long-term debt
- Deferred taxes
- Bonds

#### **Income Statement**

Liabilities are shown only on the balance sheet, never on the income statement. Transactions affecting liabilities often affect an income statement account. For example, accrued salary compensation affects an income statement account (compensation expense) and a balance sheet account (salaries payable).

#### **Statement of Cash Flows**

##### ***Under Operating Activities (indirect method)***

Net income

- + Increases in most current liabilities
- Decreases in most current liabilities

##### ***Under Financing Activities***

- + Increase in long-term liabilities
- Decreases in long-term liabilities

#### **Notes**

##### ***Under Summary of significant accounting policies***

Description of pertinent information concerning accounting treatment of liabilities. Normally, there is minimal information.

##### ***Under a Separate Note***

If not listed on the balance sheet, a listing of the major classifications of liabilities with information about maturities and interest rates. Information about contingent liabilities is reported in the notes.

**Chapter Outline**

**Notes**

**LO 1 – Define, measure, and report current liabilities.**

I. Liabilities Defined and Classified

- A. Liabilities – Probable debts or obligations that result from past transactions, which will be paid with assets or services
  - 1. When recorded, a liability at its current cash equivalent (i.e., the cash amount a creditor would accept to settle the liability immediately)
  - 2. Classifications of liabilities on the balance sheet:
    - a. Current liabilities – Short-term obligations that will be paid within the current operating cycle of the business or within one year of the balance sheet date, whichever is longer.
    - b. Noncurrent liabilities – All other liabilities
  - 3. Liquidity – Ability to pay current obligations

**LO 2 – Analyze the accounts payable turnover ratio.**

II. Current Liabilities

- A. Accounts Payable (or Trade Accounts Payable)
  - 1. Created when goods and services are provided on credit
  - 2. Trade credit is a relatively inexpensive way to finance the purchase of inventory because interest does not normally accrue on accounts payable
- B. Key Ratio Analysis: Accounts Payable Turnover Ratio
  - 1. Accounts Payable Turnover Ratio =  $\text{Cost of Goods Sold} \div \text{Average Accounts Payable}$
  - 2. Quick Assets – Cash, marketable securities, and accounts receivable
  - 3. Measures how quickly management is paying trade accounts
  - 4. High ratio normally suggests that a company is paying its suppliers in a timely manner
    - a. Might not reflect reality if a company pays some creditors on time but is late with others
    - b. Subject to manipulation; managers could be late in paying creditors during the entire year but catch up at year-end so that the ratio is at an acceptable level
  - 5. Can be stated more conservatively as:  
 $\text{Average Age of Payables} = 365 \text{ Days} \div \text{Turnover Ratio}$
- C. Accrued Liabilities – Expenses that have been incurred but have not been paid at the end of the accounting period
  - 1. Accrued Taxes Payable
    - a. Like individuals, corporations must pay taxes on the income they earn
    - b. Corporate tax rates are graduated; large corporations paying a top federal tax rate of 35%
    - c. Corporations may also pay state and local income taxes and, in some cases, foreign income taxes

2. Accrued Compensation and Related Costs
  - a. At the end of each accounting period, there are usually salaries not yet paid
  - b. Companies must also report the cost of unpaid benefits, including retirement programs, vacation time, and health insurance
  - c. Accrued Vacation Liability
    - i. Starbucks estimates the cost of accrued vacation time to be \$125,000
 

Dr. Compensation Expense	125,000	
		(+E, -SE)
Cr. Accrued Vacation Liability (+L)		125,000

Assets = Liabilities + Stockholders' Equity  
 0 = Accrued Vacation Liability (L) + 125,000 + Compensation Expense (E) - 125,000
    - ii. The vacations are taken
 

Dr. Accrued Vacation Liability (-L)	125,000	
		Cr. Cash (-A)
		125,000

Assets = Liabilities + Stockholders' Equity  
 Cash (A) - 125,000 = Accrued Vacation Liability (L) - 125,000
3. Payroll Taxes
  - a. All payrolls are subject to a variety of taxes, including federal, state, and local income taxes, Social Security taxes, and federal and state unemployment taxes
    - i. Employees pay some; employers pay others
    - ii. Reporting is similar for each type of payroll tax
  - b. Employee Income Taxes
    - i. Employers are required to withhold income taxes for each employee
    - ii. Amount tax withheld is recorded by the employer as a current liability until remitted to government
  - c. Employee and Employer FICA Taxes
    - i. Social Security taxes are required by the Federal Insurance Contributions Act (FICA)
    - ii. FICA taxes are imposed in equal amounts on both the employee and the employer
    - iii. Effective 1/1/10, the Social Security tax rate was 6.2% on the first \$106,800 paid to each employee during the year
    - iv. Separate 1.45% Medicare tax applies to all income
    - v. Total FICA tax rate is 7.65% on wages up to \$106,800 and 1.45% on all wages above \$106,800

- d. Employer Unemployment Taxes
- i. Employers pay unemployment taxes through the Federal Unemployment Tax Act (FUTA) and State Unemployment Tax Acts (SUTA)
  - ii. The SUTA rate and specified amount of wages vary by state
  - iii. FUTA:
    - FUTA federal tax rate is 6.2% percent on taxable wages up to the first \$7,000 for each employee
    - Certain employers may receive a credit for SUTA taxes paid, up to 5.4%
    - For most large employers, FUTA rate is 0.8% of wages up to \$7,000 for each employee

- e. Starbucks accumulated the following information in its records for the first two weeks of June 2015:

Salaries and wages earned	\$1,800,000
Income taxes withheld	275,000
FICA taxes (employees' share)	105,000
FUTA taxes	2,300

- i. First entry records amounts paid to employees or withheld from amounts they have earned:

Dr. Compensation Expense	1,800,000	
(+E, -SE)		
Cr. Liability for Income Taxes Withheld		275,000
(+L)		
FICA Payable (+L)		105,000
Cash (-A)		1,420,000

Assets = Liabilities + Stockholders' Equity  
 Cash (A) - 1,420,000 = Liability for Income Taxes Withheld (L) + 275,000 + FICA Payable (L) + 105,000 + Compensation Expense (E) - 1,800,000

- ii. Second entry records the taxes that employers must pay:

Dr. Compensation Expense	107,300	
(+ E, -SE)		
Cr. FICA Payable (+L)		105,000
FUTA Payable (+L)		2,300

Assets = Liabilities + Stockholders' Equity  
 0 = FICA Payable (L) + 105,000 + FUTA Payable (L) + 2,300 + Compensation Expense (E) - 107,300

**LO 3 – Report notes payable and explain the time value of money.**

D. Notes Payable

1. Notes Payable – Formal written contract that specifies the amount borrowed, repayment date, and the interest rate
2. Formula to calculate interest:  
Interest = Principal × Interest Rate × Time
3. On 11/1/14, Starbucks borrows \$100,000 cash on a one-year, 12% note payable with interest is payable on 3/31/15 and 10/31/15

Dr. Cash (+A)	100,000	
Cr. Note Payable (+L)		100,000

Assets = Liabilities + Stockholders' Equity

Cash (A) + 100,000 = Note Payable (L) + 100,000

4. Interest in the amount of 2,000 (or \$100,000 × 12% × 2/15) is owed as of 12/31/14

Dr. Interest Expense (+E, –SE)	2,000	
Cr. Interest Payable (+L)		2,000

Assets = Liabilities + Stockholders' Equity

0 = Interest Payable (L) + 2,000 + Interest Expense (E) – 2,000

5. On 3/31/15, Starbucks pays \$5,000 in interest (\$2,000 accrued at 12/31/15 + \$3,000 for first 3 months of 2016)

Dr. Interest Expense (+E, –SE)	3,000	
Cr. Interest Payable (–L)	2,000	
Cash (–A)		5,000

Assets = Liabilities + Stockholders' Equity

Cash (A) – 5,000 = Interest Payable (L) – 3,000 + Interest Expense (E) – 2,000

E. Current Portion of Long-Term Debt

1. A company must reclassify its long-term debt as a current liability within a year of its maturity date
2. In some cases, companies will refinance debt when it comes due rather than pay out cash currently on hand
  - a. Under IFRS, the actual refinancing must take place by the balance sheet date
  - b. Under GAAP, the ability to refinance must be in place before the financial statements are issued.

F. Deferred Revenues

1. Deferred Revenues – Revenues that have been collected but not earned; they are liabilities until the goods or services have been provided
2. Under the revenue principle, revenue cannot be recorded until it has been earned
  - a. Deferred revenues are reported as a liability because cash has been collected but the related revenue has not been earned by the end of the accounting period
  - b. These obligations are classified as current or long-term, depending on when they must be satisfied

- E. Estimated Liabilities Reported on the Balance Sheet
1. Some recorded liabilities are based on estimates because the exact amount will not be known until a future date
  2. Warranties
    - a. An estimated liability is created when a company offers a warranty with the products it sells
    - b. The cost of providing future repair work must be estimated and recorded as a liability (and expense) in the period in which the product is sold

**LO 4 – Report contingent liabilities.**

- F. Estimated Liabilities Reported in the Notes
1. Contingent liability – A potential liability that has arisen as the result of a past event; it is not an effective liability until some future event occurs
  2. Whether situation produces a recorded or contingent liability depends on two factors:
    - a. Probability of future economic sacrifice
      - i. Probable—the chance that the future event or events will occur is high
      - ii. Reasonably possible—the chance that the future event or events will occur is more than remote but less than likely
      - iii. Remote—the chance that the future event or events will occur is slight
    - b. Ability of management to estimate the amount of the liability
  3. Possibilities:
    - a. Subject to estimate
      - i. Probable – record as liability
      - ii. Reasonably possible – disclose in note
      - iii. Remote – disclosure not required
    - b. Not subject to estimate
      - i. Probable – disclose in note
      - ii. Reasonably possible – disclose in note
      - iii. Remote – disclosure not required

**LO 5 – Explain the importance of changes in working capital and its impact on cash flows.**

- III. Working Capital Management
- A. Working Capital = Current Assets – Current Liabilities
    1. Business with too little working capital runs risk of not meeting obligations to creditors
    2. Too much working capital may tie up resources in unproductive assets
  - B. Focus on Cash Flows – Working Capital and Cash Flows
    1. A net decrease in current liabilities is subtracted in computing cash flows from operations
    2. A net increase in current liabilities is added in computing cash flows from operations

**LO 6 – Report long-term liabilities.**

III. Long-Term Liabilities

A. Long-Term Liabilities

1. Secured debt – Specific assets are pledged as collateral
2. Unsecured debt – Creditor relies primarily on the borrower’s integrity and general earning power

B. Long-Term Notes Payable and Bonds

1. Private placement – Long-term debt raised directly from financial service organizations
2. Bonds – Publicly traded debt
  - a. Bondholders can sell their bonds to other investors prior to maturity
  - b. Because bonds provide liquidity to investors, they are more likely to lend money to company
3. Generally, accounting for long-term debt is same as for short-term notes payable; liability is recorded when the debt is incurred and interest expense is recorded

C. Lease Liabilities

1. Operating lease – Does not meet any of the four criteria (see below) established by GAAP and does not cause the recording of an asset and liability
  - a. No liability is recorded when operating lease created
  - b. Instead, company records rent expense as it uses the asset
2. Capital lease – Meets at least one of the four criteria established by GAAP; results in an asset and a liability
  - a. Criteria:
    - i. The lease term is 75% or more of the asset’s expected economic life
    - ii. Ownership of the asset is transferred to the lessee at the end of the lease term.
    - iii. The lease contract permits the lessee to purchase the asset at a price that is lower than its fair market value
    - iv. The present value of the lease payments is 90% or more of the fair market value of the asset when the lease is signed
  - b. To record a capital lease, it is necessary to determine the current cash equivalent of the required lease payments
  - c. Starbucks signs a lease for new delivery trucks; the lease is a capital lease with a current cash equivalent of \$250,000

Dr. Leased Equipment (+A)                      250,000  
    Cr. Lease Payable (+L)    250,000  
Assets = Liabilities + Stockholders’ Equity  
Leased Equipment (A) + 250,000 = Lease Payable (L) + 250,000

**LO 7 – Compute present values.**

IV. Present Value Concepts

A. Present Value

1. Present value – Current value of an amount to be received in the future; a future amount discounted for compound interest
2. In a present value problem, you know the dollar amount of a cash flow that will occur in the future and need to determine its value now

B. Present Value of a Single Amount

1. Formula to compute the present value of a single amount:  
Present value =  $1 \div (1 + i)^n \times \text{Amount}$
2. Formula is not difficult to use; however, most analysts use present value tables, calculators, or Excel
3. Today is 1/1/14 and you have the opportunity to receive \$1,000 cash on 12/31/16. At an interest rate of 10% per year, how much is the \$1,000 payment worth today?
  - a. Present value factor – For  $i = 10\%$ ,  $n = 3$ , present value of \$1 is 0.7513
  - b. Present value =  $\$1,000 \times 0.7513 = \$751.30$

C. Present Value of an Annuity

1. Annuity – A series of periodic cash receipts or payments that are equal in amount each interest period
2. You are to receive \$1,000 cash on each December 31, 2014, 2015, and 2016. How much would the sum of these three \$1,000 future amounts be worth on January 1, 2014, assuming an interest rate of 10% per year?
  - a. Present value factor – For  $i = 10\%$ ,  $n = 3$ , present value of an annuity of \$1 is 2.4869
  - b. Present value =  $\$1,000 \times 2.4869 = \$2,486.80$

D. Interest Rates and Interest Periods

1. When interest periods are less than a year, the values of  $n$  and  $i$  must be restated to be consistent with the length of the interest period
2. If compounding is quarterly:
  - a. The interest period is one quarter of a year (i.e., four periods per year), and the quarterly interest rate is one quarter of the annual rate (i.e., 3 percent per quarter)
  - b. 12% interest compounded quarterly for five years requires use of  $n = 20$  and  $i = 3\%$ .

**LO 8 – Apply present value concepts to liabilities.**

- E. Accounting Applications of Present Value
  - 1. Computing the amount of a liability with a single payment
  - 2. Computing the amount of a liability with an annuity
  - 3. Computing the amount of a lease liability
- VI. Chapter Supplement A: Present Value Computations using Excel
  - A. Present Value of a Single Payment
    - 1. Use Excel to compute the present value
    - 2. Enter the present value formula:  $=\text{Payment}/(1+i)^n$
  - B. Present Value of an Annuity
    - 1. Select the function button (fx)
    - 2. In drop down menu, under the Select Category heading, pick "Financial," scroll down under Select Function, and click on "PV"
    - 3. In new drop down box, enter specific information for problem and click "OK"
- VII. Chapter Supplement B: Deferred Taxes
  - A. Deferred Taxes – Reported as a long-term liability
    - 1. Deferred tax items – exist because of timing differences caused by reporting revenues and expenses according to GAAP on a company's income statement and according to the Internal Revenue Code on the tax return
    - 2. Temporary differences – timing differences that cause deferred income taxes and will reverse, or turn around, in the future
    - 3. Deferred tax amounts always reverse themselves
  - B. Example
    - 1. In 2014, Starbucks owned a building that originally cost \$10 million; book value on the balance sheet is \$8.5 million; for tax purposes, book value is \$6.5 million
      - a. The \$2 million difference is caused by using straight-line depreciation for financial reporting and accelerated depreciation for tax purposes
      - b. The company has delayed (or deferred) paying federal income taxes by reporting more depreciation on its tax return than it did on its income statement
      - c. The amount of deferred tax liability is computed by multiplying the timing difference by the corporate tax rate (34%):  
Deferred Tax Liability = \$2 million  $\times$  34% = \$680,000
      - d. If there were no other deferred tax items, a deferred tax liability of \$680,000 is reported on balance sheet

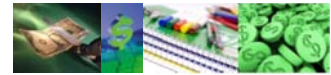
2. At the end of the following year, 2015, the company would compare the tax book value and the GAAP book value of the building
  - a. The tax book value of the building was \$6 million and the GAAP book value was \$8.2 million
  - b. The timing difference is \$2.2 million, resulting in a deferred tax liability of \$748,000 ( $\$2.2 \text{ million} \times 34\%$ )
  - c. The income tax expense reported under GAAP = income tax payment +/ – change in deferred taxes
 

Dr. Income Tax Expense	618,000	
(+E, –SE)		
Cr. Deferred Taxes (+L)		68,000
Income Taxes Payable		550,000
(+L)		

Assets = Liabilities + Stockholders' Equity  
 $0 = \text{Deferred Taxes (L)} + 68,000 + \text{Income Taxes Payable (L)} + 550,000 + \text{Income Tax Expense (E)} - 618,000$

VIII. Chapter Supplement C: Future Value Concepts

- A. Future Value – the sum to which an amount will increase as the result of compound interest
- B. Future Value of a Single Payment
  1. In future value of a single amount problems, you are asked to calculate how much money you will have in the future as the result of investing a certain amount in the present
  2. On 1/1/14, you deposit \$1,000 in a savings account at 10% annual interest, compounded annually. What will the account balance be at the end of 3 years?
    - a. Future value factor – For  $i = 10\%$ ,  $n = 3$ , present value of \$1 is 1.3310
    - b. Future value =  $\$1,000 \times 1.3310 = \$1,331$
- C. Future Value of an Annuity
  1. Annuity – a series of periodic cash receipts or payments that are equal in amount each interest period
  2. At the end of each year for three years, you deposit \$1,000 cash in a savings account at 10% interest per year. You make the first \$1,000 deposit on 12/31/14, the second one on 12/31/15, and the third one on 12/31/16. What will the account balance be at the end of 3 years?
    - a. Future value factor – For  $i = 10\%$ ,  $n = 3$ , present value of annuity of \$1 is 3.3100
    - b. Future value =  $\$1,000 \times 3.3100 = \$3,3100$

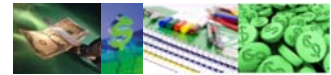


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**REPORTING AND INTERPRETING  
LIABILITIES AND  
TIME VALUE OF MONEY CONCEPT**

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**Capital Structure**

**Capital Structure** -- The acquisition of assets is financed from two sources: **Debt & Equity**. The mix of debt and equity for a company is called the **capital structure**.

Debt

**Debt Financing** -- Sources of Financing Provided by **Creditors**

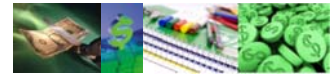
Interest is a legal obligations

Creditors can force bankruptcy

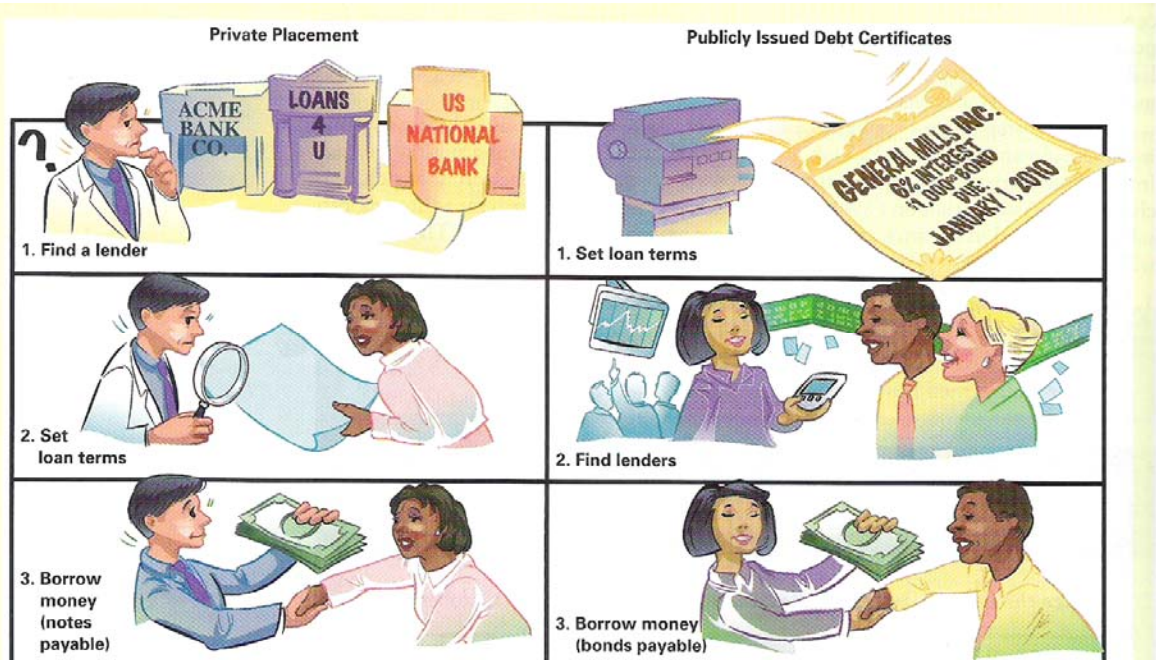
Equity Financing – Sources of Financing Provided by **Owners**

Dividend is a board of directors' discretion

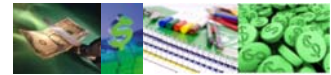
Equity



## Sources of Debt Financing



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## Liabilities - Defined

### **Liabilities:**

Probable debts or obligations of the entity that result from past transactions, which will be paid with assets or services.

**Maturity = 1 year or less**

#### **Current liabilities:**

Short-term obligations that will be paid in cash (or other current assets) within the current operating cycle or one year, whichever is longer.

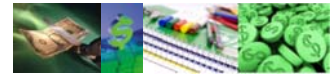
**Maturity > 1 year**

#### **Noncurrent (long-term) liabilities:**

All of the entity's obligations that are not classified as current liabilities.

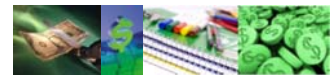
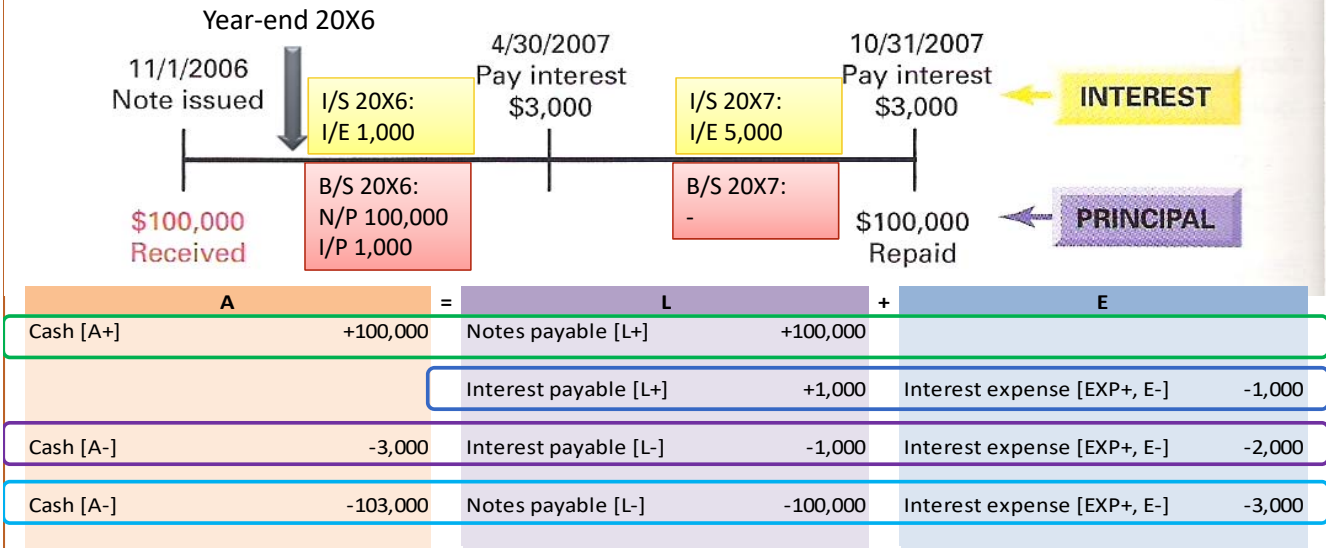


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## Example: Notes Payable

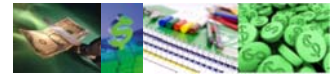
Assume that on November 1, 20X6, Company A negotiates with Bank B to borrow ₱ 100,000 cash on a one-year note. Bank B charges 6% interest per year. Interest payments are to be made in two cash installments, on April 30 and October 31. The principal is to be repaid on the notes' October 31, 20X7, maturity date.



## Time Value of Money

### “Time is money”

- **Time value of money concept** refers to costs or benefits derived from holding or not holding money over time.
  - **Interest** is the cost of using money for a specific period.
    - **Simple interest** is the interest cost for one or more periods **when the principal sum – the amount on which interest is computed – stays the same from period to period.**
    - **Compound interest** is the interest cost for two or more periods **when after each period, the interest earned in that period is added to the amount on which interest is computed in future periods.**

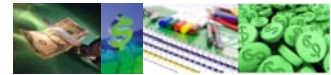


## Simple Interest

### Example of simple interest:

- The Company accepts an 8 percent, 30,000 Baht note due in 90 days. How much will the Company receive at that time?
  - The interest is calculated as follows:
    - Interest = Principal x Rate x Time  
 = 30,000 x 8/100 x 90/365  
 = 591.78 Baht
  - Therefore, the total that the Company will receive is 30,591 Baht, calculated as follows:
    - Total = Principal + Interest  
 = 30,000 + 591.78  
 = 30,591.78 Baht

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## Compound Interest

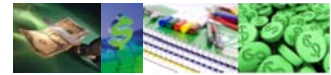
### Example of compound interest:

- The Company deposits 5,000 Baht in an account that pays 6 percent interest. It expects to leave the principal and accumulated interest in the account for three years. How much will the account total at the end of three years?
  - *Assume that the interest is paid at the end of the year and is added to the principal at that time, and that this total in turn earns interest.*
  - The amount at the end of three years is computed as follows:

(1) Year	(2) Principal Amount at Beginning of Year	(3) Annual Amount of Interest (Col. 2 x 6%)	(4) Accumulated Amount at End of Year (Col. 2 + Col. 3)
1	5,000.00	300.00	5,300.00
2	5,300.00	318.00	5,618.00
3	5,618.00	337.08	5,955.08

- At the end of three years, the Company will have 5,955.08 Baht in its account.

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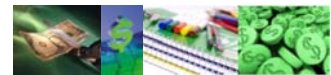


## Future Value

- **Future value is the amount an investment will be worth at a future date if invested at compound interest.**
  - An example of question asking about future value is *“what is the future value of a single sum (5,000 Baht) at compound interest (6 percent) for three years?”*



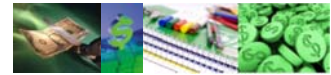
9



## Future Value of a Single Sum (FV)

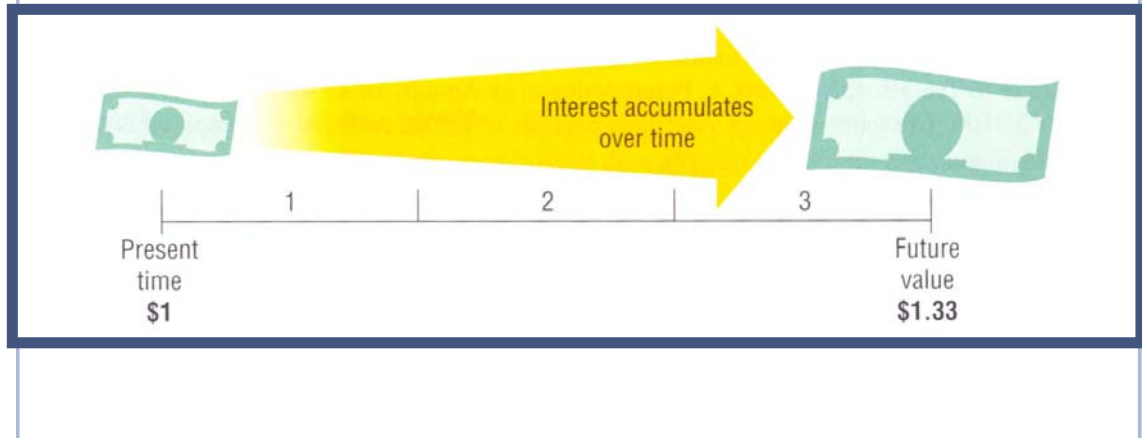
- **In future value of a single amount problems, you will be asked to calculate how much money you will have in the future as the result of investing a certain amount in the present.**
  - If you were to receive a gift of 10,000 Baht, for instance, you might decide to put it in a savings account and use the money as a down payment on a house after you graduate. The future value computation would tell you how much money will be available when you graduate.
    - To solve a future value problem, you need to know three items:
      - Amount to be invested
      - Interest rate (i) the amount will earn
      - Number of periods (n) in which the amount will earn interest

10

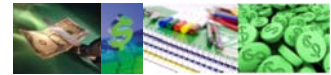


## Future Value of a Single Sum (Cont.)

- Since the future value concept is based on compound interest, the amount of interest for each period is calculated by multiplying the principal plus any interest not paid out in prior periods.
  - Graphically, the calculation of the future value of 1 Baht for three periods and an interest rate of 10 percent may be represented as follows:



11



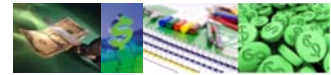
## Future Value of a Single Sum (Cont.)

- Example of Future Value of a Single Sum:**
  - Assume that on January 1, 2009, you deposit 1,000 Baht in a savings account at 10 percent annual interest, compounded annually.
    - At the end of three years, the 1,000 Baht will have increased to 1,331 Baht as follows:

(1) Year	(2) Principal Amount at Beginning of Year	(3) Annual Amount of Interest (Col. 2 x 10%)	(4) Accumulated Amount at End of Year (Col. 2 + Col. 3)
1	1,000.00	100.00	1,100.00
2	1,100.00	110.00	1,210.00
3	1,210.00	121.00	1,331.00

- FV Table
  - FV = PV x FV Factor  
1,331 = 1,000 x 1.3310
- Financial calculator:
  - PV = 1,000, I = 10%, n = 3 → FV = 1,331

12



## BA II Plus™ Calculator



### BA II PLUS™ Calculator

#### TVM and Amortization Worksheet Variables

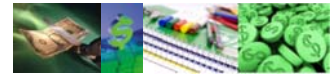
Variable	Key	Display	Type of Variable
Number of periods	<b>N</b>	<b>N</b>	Enter-or-compute
Interest rate per year	<b>I/Y</b>	<b>I/Y</b>	Enter-or-compute
Present value	<b>PV</b>	<b>PV</b>	Enter-or-compute
Payment	<b>PMT</b>	<b>PMT</b>	Enter-or-compute
Future value	<b>FV</b>	<b>FV</b>	Enter-or-compute
Number of payments per year	<b>2nd</b> [P/Y]	<b>P/Y</b>	Enter-only
Number of compounding periods per year	<b>↓</b>	<b>C/Y</b>	Enter-only
End-of-period payments	<b>2nd</b> [BGN]	<b>END</b>	Setting
Beginning-of-period payments	<b>2nd</b> [SET]	<b>BGN</b>	Setting
Starting payment	<b>2nd</b> [AMORT]	<b>P1</b>	Enter-only
Ending payment	<b>↓</b>	<b>P2</b>	Enter-only
Balance	<b>↓</b>	<b>BAL</b>	Auto-compute
Principal paid	<b>↓</b>	<b>PRN</b>	Auto-compute
Interest paid	<b>↓</b>	<b>INT</b>	Auto-compute

#### Resetting the TVM and Amortization Worksheet Variables

- To reset all calculator variables and formats to default values (including TVM and amortization variables), press **2nd** [RESET] [ENTER]:

Variable	Default	Variable	Default
<b>N</b>	0	<b>END/BGN</b>	<b>END</b>
<b>I/Y</b>	0	<b>P1</b>	1
<b>PV</b>	0	<b>P2</b>	1
<b>PMT</b>	0	<b>BAL</b>	0
<b>FV</b>	0	<b>PRN</b>	0
<b>P/Y</b>	1	<b>INT</b>	0
<b>C/Y</b>	1		

- To reset only the TVM variables (**N**, **I/Y**, **PV**, **PMT**, **FV**) to default values, press **2nd** [CLR TVM].
- To reset **P/Y** and **C/Y** to default values, press **2nd** [P/Y] **2nd** [CLR WORK].
- To reset the Amortization worksheet variables (**P1**, **P2**, **BAL**, **PRN**, **INT**) to default values, press **2nd** [CLR WORK] while in the Amortization worksheet.
- To reset **END/BGN** to the default value, press **2nd** [BGN] **2nd** [CLR WORK].

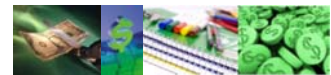


## Future Value of An Annuity (FVA)

- **Ordinary annuity is a series of equal payments made at the end of equal intervals of time, with compound interest of these payments.**
  - The future value of an annuity includes compound interest on each payment from the date of payment to the end of the term of the annuity. Each new payment accumulates less interest than prior payments, only because the number of periods remaining in which to accumulate interest decreases.

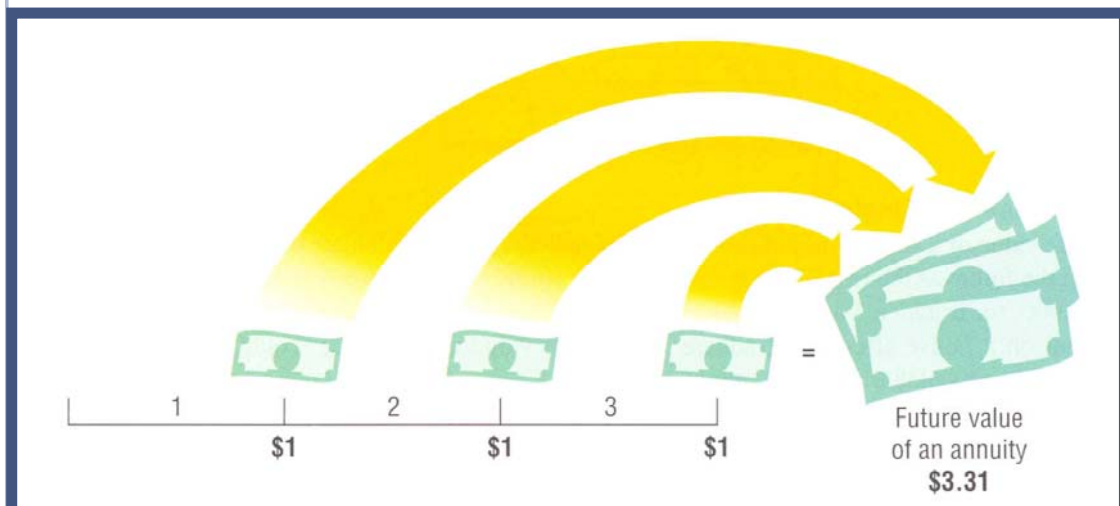


15

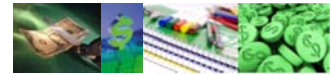


## Future Value of An Annuity (Cont.)

- The future value of annuity of 1 Baht for three periods at 10 percent may be represented graphically as:



16

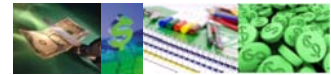


## Future Value of An Annuity (Cont.)

### Example of Future Value of an Annuity:

- Assume that each year for three years, you deposit 1,000 Baht cash in a savings account at 10 percent interest per year. You make the first 1,000 Baht deposit on December 31, 2009, the second one on December 31, 2010, and the third and last one on December 31, 2011.
  - The first 1,000 Baht deposit earns compound interest for two years (for a total principal and interest of 1,210 Baht); the second deposit earns interest for one year (for a total principal and interest of 1,100 Baht). The third deposit earns no interest because it was made on the day that the balance is computed.
  - Thus, the total amount in the savings account at the end of three years is 3,310 Baht (1,210 + 1,100 + 1,000).

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## Future Value of An Annuity (Cont.)

### Compound interest calculation

(1) Year	(2) Principal Amount at Beginning of Year	(3) Annual Amount of Interest (Col. 2 x 10%)	(4) Periodic Payment	(5) Total Amount Accumulated at the End of the Year (Col. 2 + Col.3 + Col. 4)
1	-	-	1,000.00	1,000.00
2	1,000.00	100.00	1,000.00	2,100.00
3	2,100.00	210.00	1,000.00	3,310.00

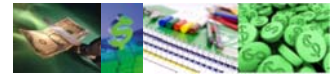
### FV Table

$$\begin{aligned}
 \bullet \text{ FV} &= \text{PMT} \times \text{FVA Factor} \\
 3,310 &= 1,000 \times 3.3100
 \end{aligned}$$

### Financial calculator

$$\bullet \text{ PMT} = 1,000, \text{ I} = 10\%, \text{ n} = 3 \rightarrow \text{FV} = 3,310$$

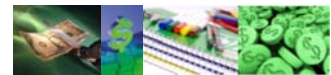
18



## Present Value

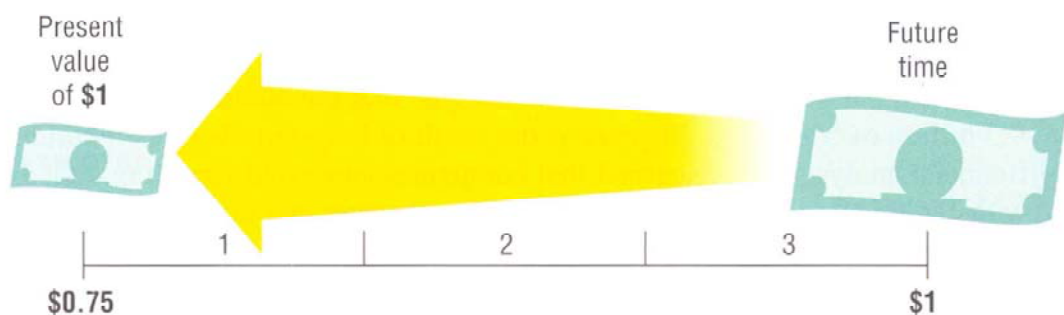
- **Present value** is the amount that must be invested today at a given rate of interest to produce a given future value.
  - The amount to be received in the future (future value) is not worth as much as today as an amount received today (present value).
  - Example:
    - The Company needs 1,000 Baht one year from now. How much does she have to invest today to achieve that goal if the interest rate is 5 percent?
 

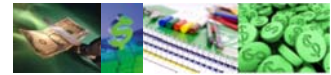
<span style="color: blue;">●</span> Recall:	$PV \times (1 + i)^n$	= FV
	PV	= FV / (1 + i) <sup>n</sup>
Thus,	PV	= 1,000 / (1.05)
	PV	= 952.38 Baht



## Present Value of a Single Sum (PV)

- **Present value of a single sum**
  - The present value of a single amount is the worth to you today of receiving that amount some time in the future.
  - Graphically, the present value of 1 Baht due at the end of the third period with an interest rate of 10 percent can be represented as follows:





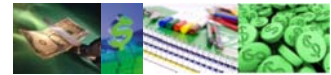
## Present Value of a Single Sum (Cont.)

### Example of Present Value of a Single Sum

- Suppose the Company wants to be sure of having 4,000 Baht at the end of three years. How much must it invest today in a 5 percent savings account to achieve this goal?
  - The calculation is presented as follows:

(1) Year	(2) Amount at the End of Year	÷	(3) Divided by (1 + i)	(4) Present Value at the Beginning of Year (Col. 2 ÷ Col. 3)
1	4,000.00	÷	1.05	3,809.52
2	3,809.52	÷	1.05	3,628.12
3	3,628.12	÷	1.05	3,455.35

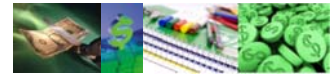
- The Company must invest 3,455.35 Baht today to achieve a value of 4,000 Baht in three years.



## Present Value of a Single Sum (Cont.)

- PV Table
  - $PV = FV \times PV \text{ factor}$   
 $3,455.35 = 4,000 \times 0.8640$
- Financial calculator
  - $FV = 4,000, I = 10\%, n = 3 \rightarrow PV = 3,455.35$

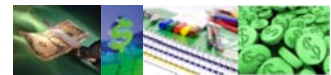




## Present Value of an Annuity (PVA)

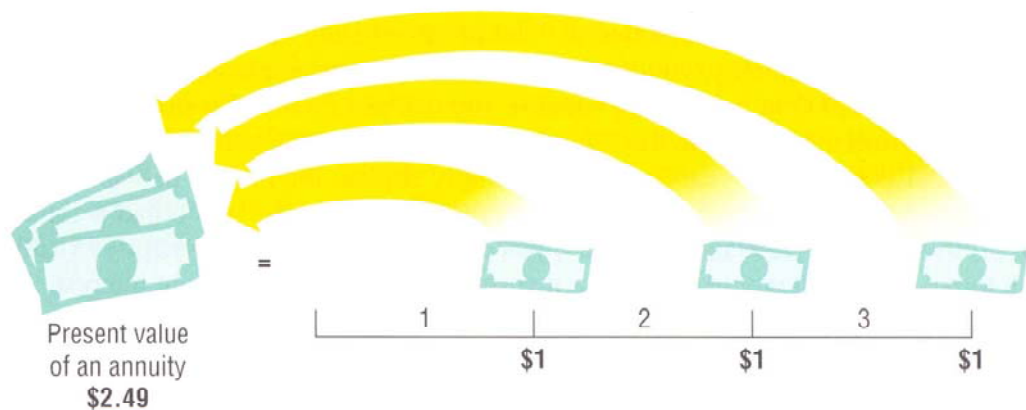
### Present value of an ordinary annuity

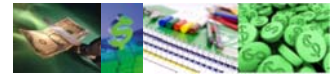
- Recall that an annuity is a series of consecutive payments characterized by
  - An equal dollar amount each interest period.
  - Interest periods of equal length (year, half a year, quarter, or month)
  - An equal interest rate each interest period.
- The present value of an annuity is the value now of a series of equal amounts to be received (or paid out) for some specified number of periods in the future. It is computed by discounting each of the equal periodic amounts.



## Present Value of an Annuity (Cont.)

- The present value of an annuity of 1 Baht for three periods at 10 percent interest may be represented graphically as follows:





## Present Value of an Annuity (Cont.)

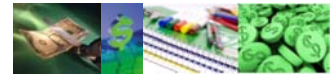
### Example of Present Value of an Annuity:

- The Company has sold a piece of property and is to receive 15,000 Baht in three equal annual payments of 5,000 Baht beginning one year from today. What is the present value of this sale if the current interest rate is 5 percent?

- PV Table

Future Receipt (Annuity)				Present Value Factor		Present Value
Year 1	Year 2	Year 3				
5,000.00			x	0.952	=	฿4,760.00
	5,000.00		x	0.907	=	฿4,535.00
		5,000.00	x	0.864	=	฿4,320.00
						<u>฿13,615.00</u>

25

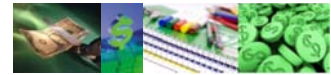


## Present Value of an Annuity (Cont.)

- Or PVA Table
  - $PV = PMT \times PVA \text{ Factor}$
  - $13,615 = 5,000 \times 2.723$
- Financial calculator
  - $PMT = 5,000, I = 5\%, n = 3 \rightarrow PV = 13,615$



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## Using Formulas to Determine FV and PV

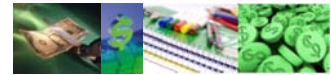
- **Future Value of a Single Sum**

•  $FV = PV \times (1 + i)^n$
- **Future Value of an Annuity**

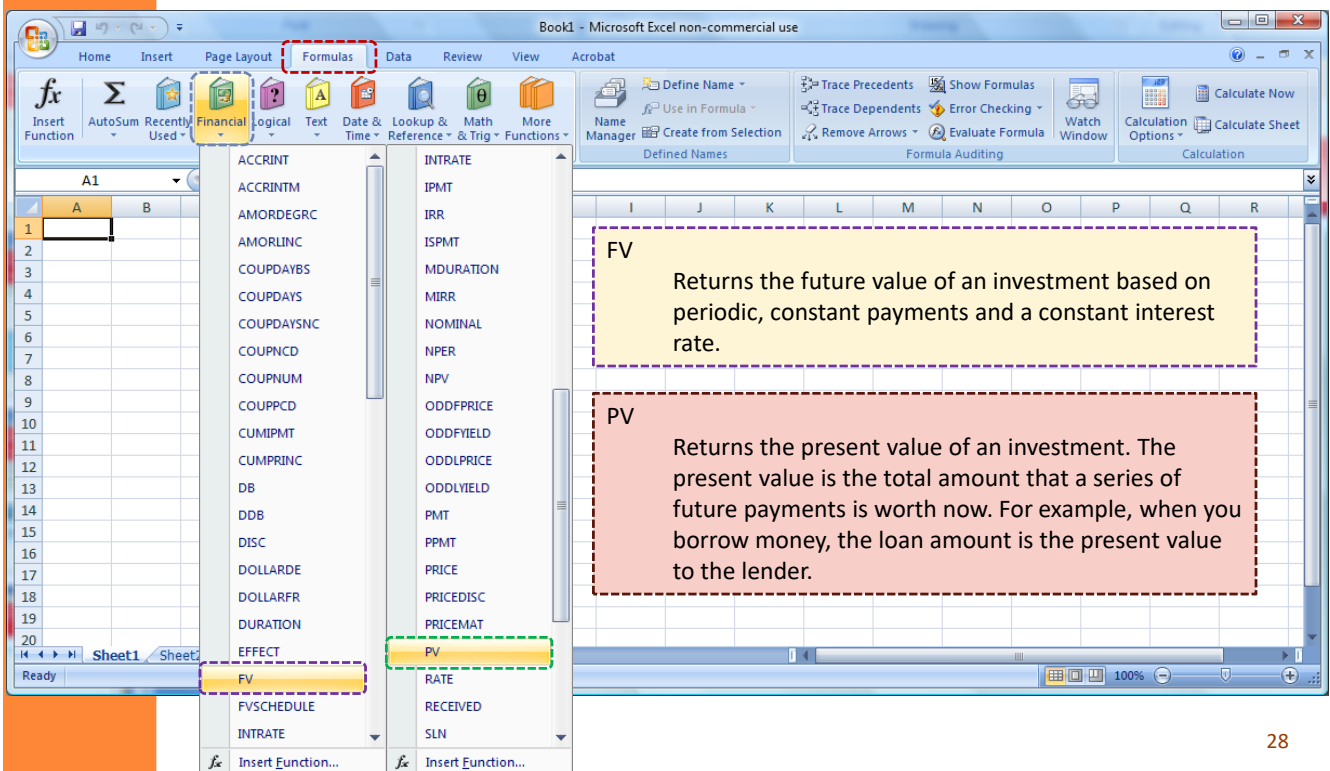
•  $FVA = PMT \left[ \frac{(1 + i)^n - 1}{i} \right]$
- **Present Value of a Single Sum**

•  $PV = FV / (1 + i)^n$
- **Present Value of an Annuity**

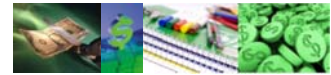
•  $PVA = PMT \left[ \frac{1 - (1 / (1 + i)^n)}{i} \right]$



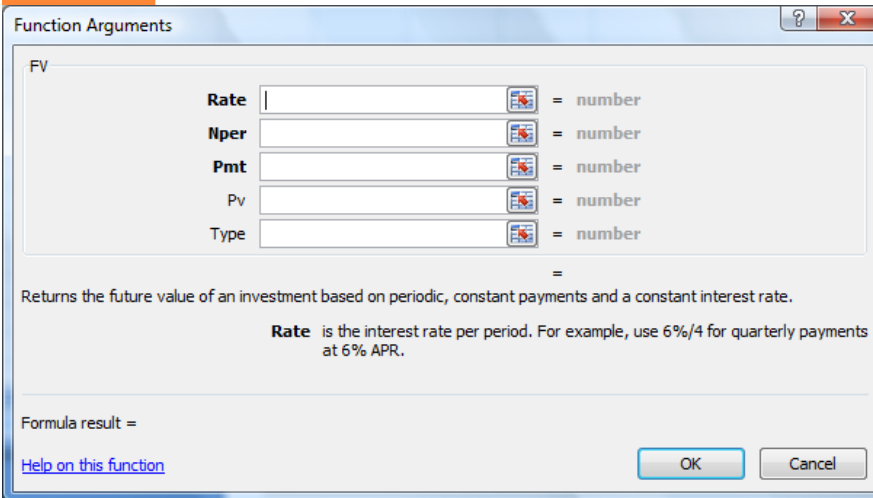
## Using Excel to determine FV and PV



The screenshot shows the Microsoft Excel interface with the 'Formulas' ribbon selected. The 'Financial' group is expanded, showing a list of functions. The 'FV' and 'PV' functions are highlighted with dashed boxes. The 'FV' function is described as: 'Returns the future value of an investment based on periodic, constant payments and a constant interest rate.' The 'PV' function is described as: 'Returns the present value of an investment. The present value is the total amount that a series of future payments is worth now. For example, when you borrow money, the loan amount is the present value to the lender.'



## Future Value Calculation with Excel



Function Arguments

FV

**Rate**  = number

**Nper**  = number

**Pmt**  = number

**Pv**  = number

**Type**  = number

=

Returns the future value of an investment based on periodic, constant payments and a constant interest rate.

**Rate** is the interest rate per period. For example, use 6%/4 for quarterly payments at 6% APR.

Formula result =

[Help on this function](#) OK Cancel

**Rate** is the interest rate per period.

**Nper** is the total number of payment periods in an annuity.

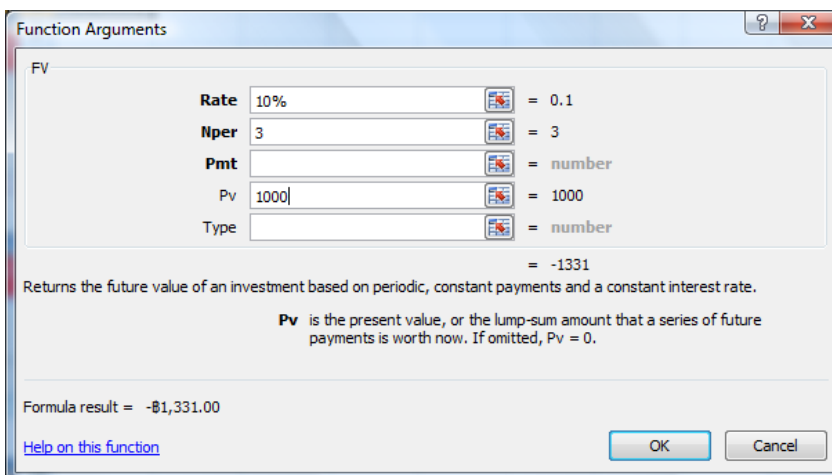
**Pmt** is the payment made each period; it cannot change over the life of the annuity. Typically, pmt contains principal and interest but no other fees or taxes. If pmt is omitted, you must include the pv argument.

**Pv** is the present value, or the lump-sum amount that a series of future payments is worth right now. If pv is omitted, it is assumed to be 0 (zero), and you must include the pmt argument.

**Type** is the number 0 or 1 and indicates when payments are due. If type is omitted, it is assumed to be 0.

### Syntax

FV(rate,nper,pmt,pv,type)



Function Arguments

FV

**Rate** 10% = 0.1

**Nper** 3 = 3

**Pmt**  = number

**Pv** 1000 = 1000

**Type**  = number

= -1331

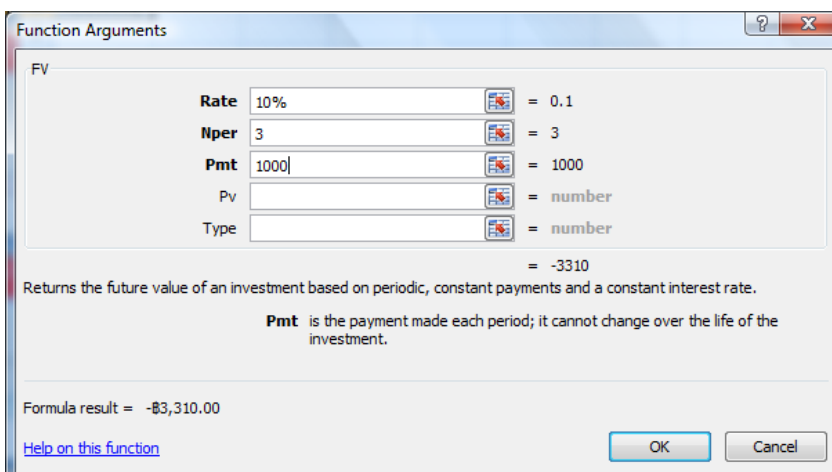
Returns the future value of an investment based on periodic, constant payments and a constant interest rate.

**Pv** is the present value, or the lump-sum amount that a series of future payments is worth now. If omitted, Pv = 0.

Formula result = -\$1,331.00

[Help on this function](#) OK Cancel

### Future Value of a Single Sum



Function Arguments

FV

**Rate** 10% = 0.1

**Nper** 3 = 3

**Pmt** 1000 = 1000

**Pv**  = number

**Type**  = number

= -3310

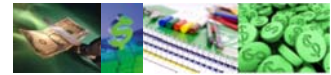
Returns the future value of an investment based on periodic, constant payments and a constant interest rate.

**Pmt** is the payment made each period; it cannot change over the life of the investment.

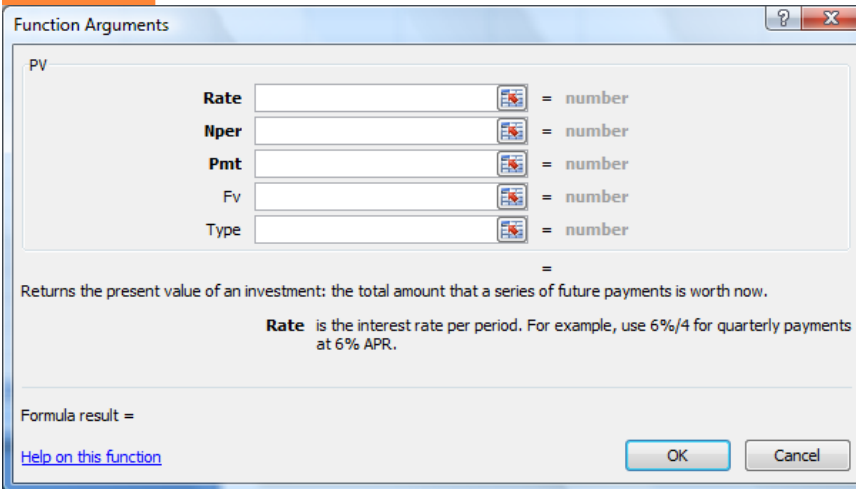
Formula result = -\$3,310.00

[Help on this function](#) OK Cancel

### Future Value of an Annuity



## Present Value Calculation with Excel



Function Arguments

PV

**Rate**  = number

**Nper**  = number

**Pmt**  = number

**Fv**  = number

**Type**  = number

=

Returns the present value of an investment: the total amount that a series of future payments is worth now.

**Rate** is the interest rate per period. For example, use 6%/4 for quarterly payments at 6% APR.

Formula result =

[Help on this function](#) OK Cancel

**Rate** is the interest rate per period.

**Nper** is the total number of payment periods in an annuity.

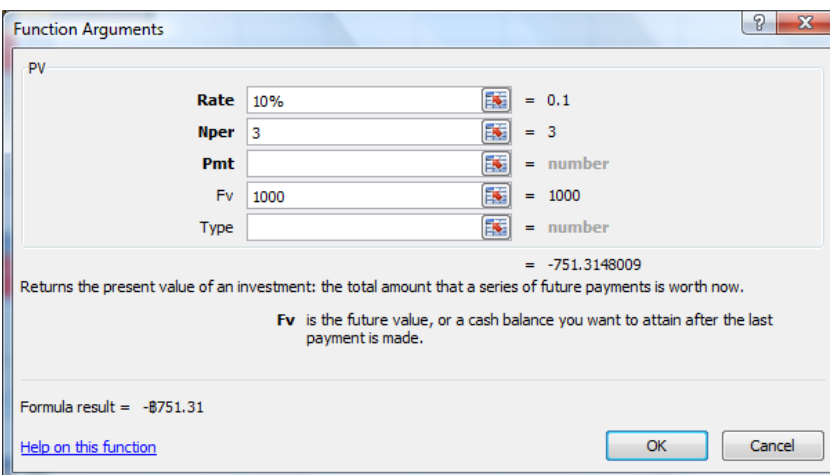
**Pmt** is the payment made each period and cannot change over the life of the annuity. Typically, pmt includes principal and interest but no other fees or taxes. If pmt is omitted, you must include the fv argument.

**Fv** is the future value, or a cash balance you want to attain after the last payment is made. If fv is omitted, it is assumed to be 0 (the future value of a loan, for example, is 0). You could then make a conservative guess at an interest rate and determine how much you must save each month. If fv is omitted, you must include the pmt argument.

**Type** is the number 0 or 1 and indicates when payments are due.

### Syntax

PV(rate,nper,pmt,fv,type)



Function Arguments

PV

**Rate** 10% = 0.1

**Nper** 3 = 3

**Pmt**  = number

**Fv** 1000 = 1000

**Type**  = number

= -751.3148009

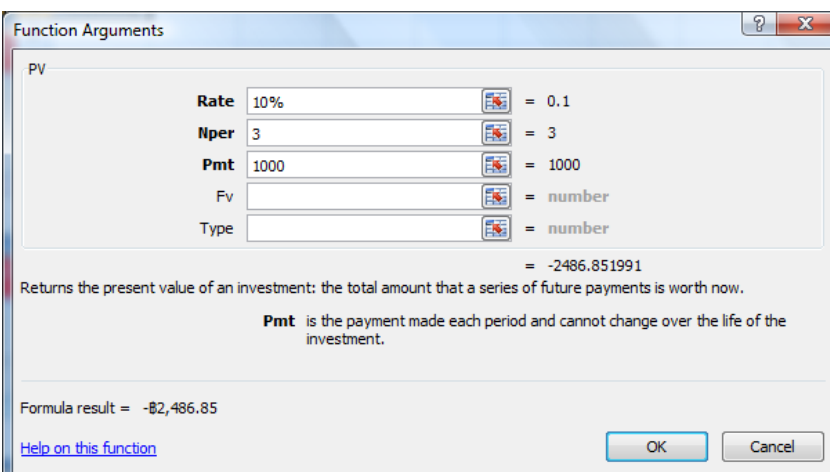
Returns the present value of an investment: the total amount that a series of future payments is worth now.

**Fv** is the future value, or a cash balance you want to attain after the last payment is made.

Formula result = -8751.31

[Help on this function](#) OK Cancel

*Present Value of a Single Sum*



Function Arguments

PV

**Rate** 10% = 0.1

**Nper** 3 = 3

**Pmt** 1000 = 1000

**Fv**  = number

**Type**  = number

= -2486.851991

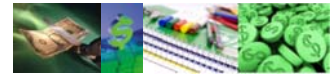
Returns the present value of an investment: the total amount that a series of future payments is worth now.

**Pmt** is the payment made each period and cannot change over the life of the investment.

Formula result = -82,486.85

[Help on this function](#) OK Cancel

*Present Value of an Annuity*



## BA II Plus™ Calculator (Cont.)

### Examples: Computing Value in Savings

These examples show you how to compute the future and present values of a savings account paying 0.5% compounded at the end of each year with a 20-year time frame.

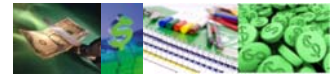
#### Computing Future Value

**Example:** If you open the account with \$5,000, how much will you have after 20 years?

To	Press	Display
Set all variables to defaults.	<b>2nd</b> [RESET] [ENTER]	<b>RST</b> <b>0.00</b>
Enter number of payments.	<b>20</b> [N]	<b>N=</b> <b>20.00</b> <
Enter interest rate.	<b>.5</b> [I/Y]	<b>I/Y=</b> <b>0.50</b> <
Enter beginning balance.	<b>5000</b> [+/-] [PV]	<b>PV=</b> <b>-5,000.00</b> <
Compute future value.	[CPT] [FV]	<b>FV=</b> <b>5,524.48*</b>

**Answer:** The account will be worth \$5,524.48 after 20 years.

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## BA II Plus™ Calculator (Cont.)

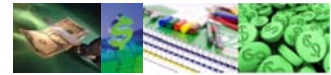
#### Computing Present Value

**Example:** How much money must you deposit to have \$10,000 in 20 years?

To	Press	Display
Enter final balance.	<b>10000</b> [FV]	<b>FV=</b> <b>10,000.00</b> <
Compute present value.	[CPT] [PV]	<b>PV=</b> <b>-9,050.63*</b>

**Answer:** You must deposit \$9,050.63.

34

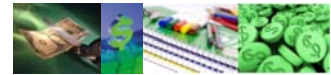
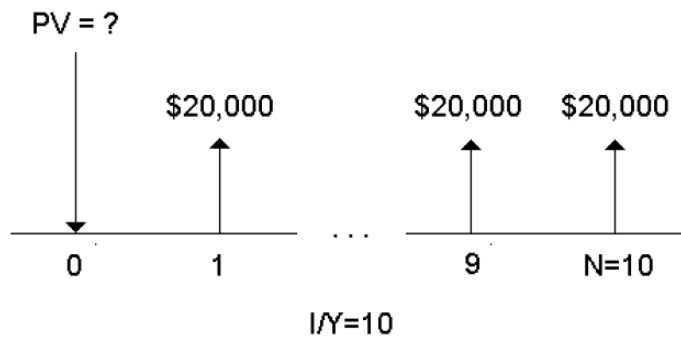


## BA II Plus™ Calculator (Cont.)

### Example: Computing Present Value in Annuities

The Furros Company purchased equipment providing an annual savings of \$20,000 over 10 years. Assuming an annual discount rate of 10%, what is the present value of the savings using an ordinary annuity and an annuity due?

#### Cost Savings for a Present-Value Ordinary Annuity



## BA II Plus™ Calculator (Cont.)

To	Press	Display
Set all variables to defaults.	<b>2nd</b> [RESET] <b>ENTER</b>	<b>RST</b> <b>0.00</b>
Enter number of payments.	<b>10</b> <b>N</b>	<b>N=</b> <b>10.00</b> ◀
Enter interest rate per payment period.	<b>10</b> <b>I/Y</b>	<b>I/Y=</b> <b>10.00</b> ◀
Enter payment.	<b>20000</b> <b>+/-</b> <b>PMT</b>	<b>PMT=</b> <b>-20,000.00</b> ◀
Compute present value (ordinary annuity).	<b>CPT</b> <b>PV</b>	<b>PV=</b> <b>122,891.34*</b>



**Notes payable and Notes receivable**

Information:

Company A issued notes payable to Company B from the borrowing transaction.

Issuance date	Apr. 1, 20X1	Interest rate per year	12%
Maturity date	Mar. 31, 20X3	Interest payment dates - <i>Semiannually</i>	Mar. 31 and Sept. 30
Note term	2 years	Principal	1,000,000

Notes payable - A				Notes receivable - B		
Date	General Journal	Debit	Credit	General Journal	Debit	Credit
04-01-X1						
09-30-X1						
12-31-X1						
03-31-X2						
09-30-X2						
12-31-X2						
03-31-X3						