

ACCOUNTING Equations & Answers

Essential Information for Understanding Key Accounting Principles & Methodologies

Includes Helpful Hints , Useful Tips , Critical Points  & Common Pitfalls 

Balance Sheet

Assets are economic resources, whereas **liabilities** and **stockholders' equity** are sources of financing for the economic resources; liabilities are amounts owed to creditors, whereas the financing provided by the owners of the corporation is stockholders' equity; assets, liabilities, and equity are reported on the **balance sheet**; every balance sheet of a corporation is based on the following equation:

FORMULA Assets = Liabilities + Stockholders' Equity

 Memorizing the balance sheet formula can help when analyzing business transactions; understanding how a transaction impacts the elements of the balance sheet is fundamental to transaction analysis and the practice of accounting

Net worth, calculated for both individuals and business entities, is a measure of wealth; the net worth formula is a derivative of the balance sheet equation

FORMULA Net Worth = Assets – Liabilities

EX: If you own assets worth \$750,000 and have liabilities of \$250,000, then your net worth is \$500,000 (i.e., \$750,000 – \$250,000)

 Since a nonprofit organization does not have owners, the third section of the balance sheet is known as **net assets** (instead of owner's equity or stockholders' equity); a nonprofit's balance sheet is represented by the following accounting equation:

FORMULA Assets = Liabilities + Net Assets

Assets are the resources owned by the business; **current assets** include cash, accounts and notes receivable, inventory, and prepaid expenses; **noncurrent assets** include long-term investments, property and equipment, and intangible assets

FORMULA Assets = Current Assets + Noncurrent Assets

Liabilities are the obligations or claims of the business against the assets of that business; **current liabilities** include accounts payable, notes payable, and accrued liabilities payable; **noncurrent liabilities** include all long-term debts

FORMULA Liabilities = Current Liabilities + Noncurrent Liabilities

 Sometimes firms have obligations that do not show up on the balance sheet; these “**off balance sheet**” liabilities are footnotes to the balance sheet but can be substantial and may someday impact the financial health of the entity

Equity, synonymous with net worth, is the ownership interest in a company; part of equity is **contributed capital**, which includes investments made by stockholders in the company's common and preferred stock; another part is **retained earnings**, which is the net income that has been invested in the entity since the start of its existence

FORMULA Stockholders' Equity = Contributed Capital + Retained Earnings

Changes to the retained earnings balance (i.e., increases or decreases) can happen whenever a company is profitable (net income), is unprofitable (net loss), or pays dividends; net income increases retained earnings and dividends, which are earnings paid to stockholders, and reduces the balance of retained earnings

FORMULA Change in Retained Earnings = Net Income – Dividends

 Net losses reduce retained earnings, as do some prior period adjustments for overstatement of net income; prior period adjustments for understatement of net income increase retained earnings

In a partnership, the equity is called **partners' capital**, which is increased by capital contributions by partners (investment) and net income and decreased when there is a net loss or when partners withdraw capital (drawings)

FORMULA Ending Capital = Beginning Capital + Net Income (or – Net Loss) + Investment – Drawings

EX: If the beginning capital is \$500,000, net income for the year is \$100,000 with no new investments, and the owners draw out \$30,000, then the ending capital will be \$570,000 (i.e., \$500,000 + \$100,000 – \$30,000)

Income Statement & Retained Earnings

The **income statement** contains a formula to calculate net income or net loss; revenues are earned from the sale of goods or services to customers, whereas expenses represent the amount of resources the entity used to earn the revenues; if the revenues are greater than the expenses, then the result of the formula is a positive number (**net income**); if the expenses are greater than the revenues, then the result of the formula is a negative number (**net loss**); the income statement—also known as the statement of income, statement of earnings, statement of operations, or the profit and loss statement (P&L)—contains the following formula:

FORMULA Net Income (or Net Loss) = Revenues – Expenses

Net sales are the true revenue of a business; net sales take into account discounts given to customers for various reasons

FORMULA Net Sales = Gross Sales – Sales Discounts – Credit Card Discounts – Sales Returns and Allowances

WHERE:

Gross Sales = Total sales for a period before subtracting discounts

Sales Discounts = Discounts given because of early payment

Credit Card Discounts = The amount charged by the credit card company (e.g., 3% of sale amount)

Sales Returns and Allowances = A reduction of sales revenue for returns or allowances for unsatisfactory goods

EX: If gross sales are \$1,000,000 with discounts of \$100,000 granted for early payments and returns of \$20,000, then the net sales would be \$880,000 (i.e., \$1,000,000 – \$100,000 – \$20,000)

 Net income is an important concept, as it is the residual amount after expenses for the owners and stockholders; with corporations, **income available to common stockholders** is a more relevant calculation, as it gives a more refined, accurate picture of profitability

FORMULA Income Available to Common Stockholders = Net Income – Dividends on Preferred Stock for the Current Period

Income statements can be presented in various formats; one popular format is the **classified income statement**, which shows the income from operations and the net income for a particular period of time arranged as follows:

+	Net Sales
–	Cost of Goods Sold
=	Gross Margin
–	Operating Expenses
=	Net Operating Income
±	Nonoperating Revenues and/or Expenses and Gains and/or Losses
=	Income before Income Taxes
–	Income Taxes
=	Net Income

The calculation of **net income** is really the result of several formulas, such as gross margin, net operating income, and income before taxes:

FORMULA Gross Margin = Net Sales – Cost of Goods Sold

Net Operating Income = Gross Margin – Operating Expenses

Income before Income Taxes = Net Operating Income + Nonoperating Revenues and/or Gains – Nonoperating Expenses and/or Losses

Net Income = Income before Income Taxes – Income Taxes

EX: If net sales are \$750,000 and the cost of goods sold is \$600,000, then the gross margin is \$150,000 (i.e., \$750,000 – \$600,000), which must cover the operating expenses in order to break even or produce net income

 Gross margin is also called gross profit

An income statement can also be presented in the **contribution margin format**, which is useful to managers for decision-making purposes

FORMULA Net Income = Revenues (or Sales) – Variable Expenses = Contribution Margin – Fixed Expenses

 The contribution margin format can also be used to construct a segment income statement

FORMULA Segment Revenue (or Sales) – Segment Variable Expenses = Contribution Margin – Segment Traceable Fixed Expenses = Segment Margin

 **Traceable fixed expenses** are those expenses that not only are fixed but also can be associated with the segment with a high degree of accuracy

 A **segment** can be a division, product, customer, or territory—that is, any part of a business for which management wants to track profitability

Since a nonprofit's primary purpose is to provide programs that meet certain societal needs, it issues a **statement of activities** (instead of the income statement issued by a for-profit business), which shows the ending balance of net assets

FORMULA Ending Net Assets = Revenues – Expenses + Beginning Net Assets

WHERE:

Revenues = Such things as contributions by donors, membership dues, program fees, money earned from fundraising events, grants, and investment income

Expenses = Program expenses, which are the amounts directly incurred by the nonprofit in carrying out its programs and supporting-services expenses, including management, general, and fundraising expenses

 Nonprofit and governmental agencies practice a form of accounting that is a bit different from GAAP; whereas the annual report is the focus of for-profit companies, the **budget** is the preeminent report for a nonprofit and governmental agency

Earnings per share (EPS) is the amount of current-period earnings that can be associated with a single share of a corporation's common stock; an entity with a simple capital structure (only common stock outstanding) has **basic earnings per share (BEPS)**

FORMULA BEPS =
$$\frac{\text{Income Available to Common Shareholders}}{\text{Weighted-Average Number of Common Shares Outstanding}}$$

WHERE:

Income Available to Common Shareholders = Net Income – Preferred Dividends

The **weighted-average number of common shares outstanding** is determined by keeping track of the portion of the year that a particular balance of shares is outstanding and using those proportions to calculate weights for an average; for example, if 300,000 shares are outstanding for 3 out of 12 months, a 25% weight will be applied to the 300,000 balance

Investors track EPS diligently by watching EPS trends (i.e., growth over time) and how close actual EPS is to the expected EPS

The **statement of retained earnings** shows the increases and decreases that occurred in the retained earnings of a company during a particular period of time; **ending retained earnings** are calculated as follows:

FORMULA Ending Retained Earnings = Beginning Retained Earnings + Net Income – Dividends

EX: If the year starts with a \$500,000 balance in retained earnings, and during the year the company earns \$200,000 in net income and pays the stockholders \$50,000 in the form of a cash dividend, then the ending retained earnings balance will be \$650,000 (i.e., \$500,000 + \$200,000 – \$50,000)

Retained earnings are a type of financing from within the company (as opposed to financing from external sources)

Statement of Cash Flows

The **statement of cash flows** shows the changes in a company's cash position during a particular period of time; the **change in cash** is calculated as follows:

FORMULA Change in Cash = $\pm$ CFO $\pm$ CFI $\pm$ CFF

WHERE:

CFO = Cash flows from operating activities

CFI = Cash flows from investing activities

CFF = Cash flows from financing activities

Cash flows from operating activities (CFO) are part of the statement of cash flows; they are reported along with cash flows from investing activities and cash flows from financial activities

FORMULA CFO = Cash from Customers + Interest + Dividends – Cash to Suppliers and Employees – Interest Paid – Income Taxes Paid

An estimate of CFO can also be made by using information from the company's income statement and balance sheet

FORMULA CFO = Net Income + Depreciation + Amortization + Other Noncash Charges (*income*) – Increase in Net Working Capital (*or* + Decrease in Net Working Capital)

The net working capital formula is Net Working Capital = Current Assets – Current Liabilities

Cash flows from investing activities (CFI) are gains (or losses) from investments in the financial markets and operating subsidiaries and changes resulting from amounts spent on investments in capital assets such as plant and equipment

FORMULA CFI = Sale of Plant and Equipment – Losses from Investment – Investment in Plant and Equipment

When analyzing a company's cash flow statement, users should review all the sections to see what contributes to the change in cash; sometimes a firm may have negative overall cash flow for a given period, but if the company can generate positive cash flow from its business operations, the negative overall cash flow may be a result of large investment expenditures, which is not necessarily a bad thing

Cash flows from financing activities (CFF) measure the flow of cash between a firm and its owners and creditors

FORMULA CFF = Cash Received from Issuing Stock or Debt – Cash Paid as Dividends for Reacquisition of Stock or Payment of Debt

The statement of cash flows reveals the **cash balance at the end of the year**

FORMULA Cash at End of Year = Change in Cash + Cash at Beginning of Year

Once a statement of cash flows has been prepared, the quality of income can be judged; the **quality of income ratio** indicates what portion of income was generated in cash

FORMULA Quality of Income Ratio = $\frac{\text{CFO}}{\text{Net Income}}$

EX: With CFO at \$150,000 and net income of \$300,000, a company's quality of income ratio would be 0.5 or 50% (i.e., \$150,000/\$300,000)

Estimating the cash flow can be done by calculating **earnings before depreciation and amortization (EBDA)**; also called accounting cash flow, EBDA gives a quick glance or rough estimate of cash flow from an entity for a particular period (e.g., month, quarter, year); to calculate EBDA, the primary noncash expenses—depreciation and amortization—are added back to net income to estimate cash flow

FORMULA EBDA = Net Income + Depreciation + Amortization

EX: Even though a company's profits are \$1,000,000, its EBDA should be significantly more; thus, if the firm has \$200,000 of depreciation expense and another \$50,000 of amortization expense, both items would be added back to net income to derive an EBDA of \$1,250,000 (i.e., \$1,000,000 + \$200,000 + \$50,000)

In valuing a company, a modification of EBDA is done to produce another cash flow estimate called **earnings before interest, taxes, depreciation, and amortization (EBITDA)**

FORMULA EBITDA = Net Income + Interest + Depreciation + Amortization

Free cash flow is a quick calculation that helps estimate cash flow beyond what is needed to grow by way of capital expenditures

FORMULA Free Cash Flow = CFO – Capital Expenditures

Accounts

Accountants use a system of debits and credits to keep track of account balances; a **debit** is on the left-hand side of an account, whereas a **credit** is on the right-hand side; if an account is **debited**, it means that an amount has been entered on the left-hand side, whereas a **credited** account has received an amount on the right-hand side; the increase or decrease as a result of debiting or crediting the account depends on the type of account (e.g., asset, liability, equity):

- **Assets:** Debits increase assets, whereas credits decrease assets
- **Liabilities:** Debits decrease liabilities, whereas credits increase liabilities
- **Equity:** Debits decrease equity, whereas credits increase equity

FORMULAS Ending Balance of an Asset Account = Beginning Debit Balance + Debits – Credits

Ending Balance of a Liability Account = Beginning Credit Balance – Debits + Credits

Ending Balance of an Equity Account = Beginning Credit Balance – Debits + Credits

When trying to remember the rules of debits and credits, if you can remember that assets are increased by debits and that liabilities and equities (the right-hand side of the balance sheet formula) are increased with credits, you can then deduce that decreases are the exact opposite (i.e., if assets increase with debits, then assets are decreased with credits)

The **transaction analysis model** is a visual way of understanding the math of double-entry accounting; the left side of an account is the debit side, while the right side is the credit side

Assets		=	Liabilities		+	Stockholders' Equity			
+ Debits	– Credits		– Debits	+ Credits		Contributed Capital		Retained Earnings	
						– Debits	+ Credits	+ Debits	– Credits
						Revenues & Gains		Expenses & Losses	
						– Debits	+ Credits	+ Debits	– Credits

Cash & Receivables**Bank Reconciliation**

Cash on the balance sheet is often simply cash in the checking account; every checking account should be reconciled periodically to ensure that differences between the balances for cash in the company's records and the bank statement can be explained; such a process can identify errors on either the part of the bank or the firm

FORMULAS Reconciled Balance = Ending Cash Balance per Accounting Records + Interest Paid by Bank – NSF Checks $\pm$ Company Errors

Reconciled Balance = Ending Cash Balance per Bank Statement + Deposits in Transit – Outstanding Checks $\pm$ Bank Errors

• **Outstanding checks** are written by the company and recorded in the company's ledger as credits but have not yet cleared the bank

• **Deposits in transit** are deposits sent to the bank that are recorded as debits in the company's ledger account but have not yet been recorded by the bank

• **Bank service charges** are charged by the bank and listed on the bank account statement but not yet recorded in the company's cash ledger

• **NSF checks** (a.k.a. bad checks or bounced checks) are deposited but must be deducted from the company's cash account and recorded as receivables; errors can be made by the bank or the company

Accounts Receivable

Accounts receivable are promises from customers to pay for goods and services that were purchased on credit; the portion of accounts receivable estimated to be uncollectible is called **bad debt expense** or **uncollectible accounts expense**

FORMULA Bad Debt Expense = Credit Sales $\times$ Bad Debt Loss Rate

EX: If a company's credit sales are \$1,000,000 and its bad debt loss rate for the past 5 years has averaged 6%, then its bad debt expense would be \$60,000 (i.e., \$1,000,000 $\times$ 0.06)

The **bad debt loss rate** is calculated as follows:

FORMULA Bad Debt Loss Rate = $\frac{\text{Bad Debt Losses during the Period}}{\text{Total Credit Sales for the Period}}$

EX: If the bad debt losses during the year were \$100,000 and the total credit sales for the same period were \$2,000,000, then the bad debt loss rate would be calculated as follows: \$100,000/\$2,000,000 = 0.05 = 5%

Accounts receivable values on the balance sheet are shown net of an allowance (an estimate) of bad debts; the **allowance for doubtful accounts** is a contra-asset account containing the estimated uncollectible accounts receivable

FORMULA Net Receivables = Accounts Receivable – Allowance for Doubtful Accounts

EX: If the accounts receivable reported on the balance sheet equals \$1,500,000 and the allowance for doubtful accounts

has a credit balance of \$75,000, then the net receivables would be calculated as follows: $\$1,500,000 - \$75,000 = \$1,425,000$

In **estimating bad accounts receivables** (uncollectible accounts expense), all the accounts receivable of a company are grouped by age and the balances are multiplied by an estimated loss percentage

FORMULA Estimated Uncollectible Receivables = Dollar Amount of Receivables in a Particular Age Group $\times$ % Estimated to Be Uncollectible

QuickStudy

Each estimated uncollectible amount is the result of an account receivable amount multiplied by an estimated percentage, which is usually developed based on experience

Aging	Amount	Estimated % Uncollectible	Estimated Amount Uncollectible
Not due yet	\$100,000	2	\$2,000
Up to 90 days past due	\$50,000	10	\$5,000
Over 90 days past due	\$30,000	30	\$9,000
Estimated ending balance in the allowance for doubtful accounts			\$16,000

Inventory

Inventory is primarily accounted for at its cost, which is the price paid or the value given to acquire an asset; however, inventory cost can include many things, such as all the applicable expenditures and charges incurred to bring an item to its existing condition and location, including the cost to manufacture (**absorption costing**) and, in the case of purchased inventory, the following:

FORMULA Cost of Purchased Inventory = Invoice Cost – Purchase Returns and Allowances – Cash Discounts + Buyer's Transportation Costs

WHERE:

Returns = Goods returned to the seller

Allowances = Discounts allowed because the goods are not up to the buyer's expectations

Cash Discounts = Discounts allowed by the vendor (supplier) to induce early payment

EX: If the inventory costs \$1,000 but \$100 of it was returned, a \$27 discount was granted for paying cash early, and the shipping costs totaled \$17, then the cost of the purchased inventory would be \$890 (i.e., $\$1,000 - \$100 - \$27 + \17)

Goods available for sale is a value that is derived as an intermediate step of the cost of goods sold calculation

FORMULA Goods Available for Sale = Beginning Inventory + Purchases

EX: If the inventory at the beginning of the period was \$100,000 and the firm purchased \$125,000 of inventory during the year, the goods available for sale would be \$225,000 (i.e., $\$100,000 + \$125,000$)

There are several ways to value inventory, including LIFO, FIFO, and average cost; **LIFO** stands for "last in, first out" and assumes that the most recent costs are expensed to cost of goods sold, whereas oldest costs remain in inventory; **FIFO** stands for "first in, first out," where the oldest costs are expensed to cost of goods sold, whereas recent costs are reported in ending inventory; with the **average cost method**, an average cost per unit is used to calculate ending inventory and cost of goods sold

Cost of goods sold, reported as an expense on the income statement, is the cost of all items sold during the period (e.g., month, quarter, year) covered by the income statement

FORMULA Cost of Goods Sold = Goods Available for Sale – Ending Inventory

EX: If the goods available for sale during the year were \$500,000 and the year ends with \$30,000 of goods still on the shelves, then the cost of goods sold would be \$470,000 (i.e., $\$500,000 - \$30,000$)

When inventory value is lower than its cost, companies write down the value of the inventory using an approach called **lower of cost or market (LCM) value**; a comparison is made between current replacement values and cost (as determined using specific identification, FIFO, LIFO, or average cost); the smaller value between cost and market value is used to value the inventory

EX: If the cost of the inventory was \$500,000 but its current replacement value is \$400,000, then the inventory will be listed on the balance sheet at \$400,000 and a loss of \$100,000 will be incurred

Property, Plant & Equipment

Property, plant, and equipment (PPE) are also called fixed assets or plant assets, which are long-term assets that provide benefits in the production of goods and services; specific examples of PPE include land, land improvements (e.g., driveways, parking lots, lighting, sewers, sidewalks, and fences), machinery and equipment, and buildings

Cost of land includes all costs of acquiring and preparing the land for its expected use; these costs are capitalized

FORMULA Cost of Land = Price Paid for the Land + Transaction Costs + Site Preparation Costs

WHERE:

Transaction Costs = Surveying costs, legal fees, brokers' commissions, title insurance, escrow fees, etc.

Site Preparation Costs = Clearing, draining, filling, leveling, razing existing buildings, etc.

EX: If a company buys land for \$200,000 and pays fees of \$1,000 for a title search and \$15,000 to clear the land of trees, then the cost of the land is \$216,000 (i.e., $\$200,000 + \$1,000 + \$15,000$)

Any proceeds from preparing the land, such as revenue earned from selling the timber or stone, are deducted from the site preparation costs

The **cost of a building** includes all the costs necessary to purchase or construct a building and should be capitalized

FORMULA Cost of Building = Purchase Price + Costs of Renovation and Preparing the Structure + Cost of Building Permits + Cost of Excavating the Site to Build the Foundation + Materials, Labor, and Overhead Costs of Construction

EX: A building costs a firm \$300,000 to build (excluding the value of the land), and it costs another \$100,000 to prepare the building for occupancy, another \$1,000 for occupancy permits from the town, and \$20,000 to put in a new foundation; the cost of the building will be \$421,000 (i.e., $\$300,000 + \$100,000 + \$1,000 + \$20,000$)

The principles of job costing are used to keep track of the construction costs of a building

The **cost of machinery and equipment** is not only the purchase price but also the following:

FORMULA Cost of Machinery and Equipment = Purchase Price + Sales Tax + Freight-in + Preparation Costs + Reconditioning Costs

WHERE:

Preparation Costs = Cost of installation and any other start-up costs, such as the cost of testing and trial runs to assure proper working condition, etc.

Reconditioning Costs = Costs incurred because the asset is used and must be brought up to the firm's standards

EX: If equipment has a purchase price of \$100,000 in a state with a 6% sales tax (so $\$100,000 \times 0.06 = \$6,000$) and the shipping costs to receive the equipment equal \$1,000, then the cost of the equipment will be \$107,000 (i.e., $\$100,000 + \$6,000 + \$1,000$)

The value of PPE is shown on the balance sheet as the **net book value**

FORMULA Net Book Value = Cost – Accumulated Depreciation

WHERE:

Cost = Historical cost of the PPE

Accumulated Depreciation = Contra-account to PPE; it contains the total amount of depreciation expense taken on the asset since it was first put into service

Depreciation Formulas

Depreciation formulas are used in both accounting and tax to spread out the cost of a fixed asset over its life; there are several methods of depreciation that can be used for both accounting and tax purposes; **straight-line depreciation**, which results in equal amounts of depreciation per period of the useful life of the asset, is the most common

FORMULA Annual Straight-Line Depreciation = (Cost – Residual Value)/Useful Life

EX: If the cost of a machine is \$100,000 and it is estimated that at the end of its 5-year useful life it will be worth \$5,000, then the annual straight-line depreciation expense will be \$19,000 (i.e., $[\$100,000 - \$5,000]/5$)

If depreciation is calculated for partial periods (e.g., one quarter of the year), the straight-line method must be adjusted for the relevant proportion of the year; this is done by multiplying the annual expense by the number of the months expired in the year by 12 months (e.g., for one quarter of the year, it would be annual expense multiplied by $3/12$ or 0.25)

Units of production is a depreciation method that is variable in that it correlates with the use of an asset; in periods where there is greater use, there will be greater amounts of depreciation than in periods where there is less use

FORMULA Depreciation for a Particular Period = [(Cost – Residual Value)/Estimated Total Production] $\times$ Annual Production

EX: If a truck costs \$100,000, with an estimated residual value of \$5,000, and is expected to have a useful life of 100,000 miles, the annual depreciation for a year when the truck is driven 10,000 miles is \$9,500, calculated as follows: $[(\$100,000 - \$5,000)/100,000] \times 10,000$

Units of production is also called **units of activity**; for example, the activity for a truck would be miles driven (which would be the annual production figure in the formula), and the activity for a machine would be the hours it is used

Double-declining balance (DDB) results in accelerated depreciation—that is, more depreciation taken in earlier years than in later years

FORMULA Depreciation in a Particular Period = (Cost – Accumulated Depreciation) $\times$ 2/Useful Life

The DDB method applies twice the straight-line rate on full cost in a declining balance

Notice that the depreciation under the DDB method keys off the net book value (Cost – Accumulated Depreciation), which will always be greater in the early days and lesser in the later life of the asset

Microsoft Excel can calculate the DDB function with the following syntax:

FORMULA DDB(cost,salvage,life,period,factor)

WHERE:

Cost = Initial cost of the asset

Salvage = Value at the end of the depreciation (a.k.a. the salvage value of the asset); this value can be 0

Life = Number of periods over which the asset is being depreciated (a.k.a. the useful life of the asset)

Period = Period for which you want to calculate the depreciation; must use the same units as life

Factor = Rate at which the balance declines; if factor is omitted, it is assumed to be 2

If depreciation is calculated for partial periods (e.g., one quarter of the year), the DDB method must be adjusted for the relevant proportion of the year; this is done by multiplying the annual expense by the number of the months expired in the year by 12 months (e.g., for one quarter of the year, it would be annual expense multiplied by $3/12$ or 0.25)

The **sum-of-the-years'-digits (SYD) method** is another accelerated method of depreciation; this means that more depreciation expense is realized in the earlier years than in the later years

FORMULA Depreciation Expense = (Cost – Residual Value) × Years Remaining/SYD

$$SYD = n(n+1)/2$$

WHERE:

n = Number of years

EX: If a machine costs \$100,000 and has an estimated residual value of \$5,000 to be received at the end of its 5-year life, then the depreciation expense for year 2 would be \$25,333.33, calculated as follows: $(\$100,000 - \$5,000) \times 4/15$; the SYD is 15, which is found as follows: $5(5+1)/2 = (25+5)/2 = 15$

✓ Excel can calculate the SYD function with the following syntax:

FORMULA $SYD(cost, salvage, life, per)$

WHERE:

Cost = Initial cost of the asset

Salvage = Value at the end of the depreciation

Life = Number of periods over which the asset is depreciated

Per = Period; must use the same units as life

A **gain** on the exchange of one asset for another can occur; the gain is impacted by a concept called **boot** (money or an asset added to a trade-in to make it reflect the fair market value of the assets being traded)

FORMULA Gain = Fair Value of Other Assets Received + Boot Received – Carrying Amount of Asset Given Up

WHERE:

Boot = Money or asset added to a trade-in to consummate the deal

EX: A company purchases equipment for \$300,000 and receives a rebate of \$10,000; the company trades in equipment worth \$295,000; the gain is \$15,000 (i.e., $\$300,000 + \$10,000 - \$295,000$)

⚠ The previous formula calculates the **potential gain** on the exchange of assets; the **actual gain** is calculated as follows:

FORMULA Gain to Be Recognized = Potential Gain × Proportion Represented by Boot

WHERE:

Proportion Represented by Boot = Boot Received/(Fair Value of Other Assets Received + Boot Received)

Liabilities

Accounts payable is a popular liability on balance sheets as it represents the amount owed to suppliers for purchases of goods and services on credit; often suppliers offer discounts for purchases on credit if payments are made within a certain time period; **EX:** Credit terms of 2/10, $n/30$ would allow a 2% discount if payment is made within 10 days, with the entire payment (n) due in 30 days

FORMULA Cash Owed on Accounts Payable = Discount × Purchase Price

✓ When using this formula, be sure the discount is reflected in its decimal form; **EX:** A 2% discount on a \$10,000 purchase would be $0.02 \times \$10,000$

When bonds are issued, it is possible that they are issued at a premium or discount

- A **premium** exists when market interest rate < contractual interest rate on the bond (a.k.a. the coupon rate)

- A **discount** exists when market interest rate > contractual interest rate on the bond

○ If market interest rate = contractual interest rate on the bond, then the bond is recorded at face value and no premium or discount is needed

FORMULA Premium = Issue Price – Face Value

WHERE:

Issue Price > Face Value

FORMULA Discount = Issue Price – Face Value

WHERE:

Issue Price < Face Value

Interest expense on a bond must incorporate any discount or premium on the bond

FORMULA Interest Expense on a Bond = Interest Paid (or Payable) + Amortization of Discount (or – Amortization of Premium)

Amortization of bond premium or discount can be found by using straight-line amortization or the effective interest method

FORMULAS *Straight Line:* Straight-Line Amortization of Bond Discount (or Premium) = Bond Discount (or Premium)/Number of Interest Periods

Effective Interest: Amortization Amount = (Carrying Value of Bonds at Beginning of Period × Effective Interest Rate) – (Face Amount of Bonds × Contractual Interest Rate)

The **effective interest rate** is the rate that will discount the bond's future interest payments and its maturity value to the bond's current selling price (i.e., current market price or present value); it is a bond investor's yield to maturity; it is also referred to as the market interest rate; the effective interest rate will likely be different from the stated or contractual rate that appears on the face of the bond

The **contractual interest rate** is the coupon rate promised by the bond issuer; it is a percentage of face value and is used to determine the amount of cash interest the borrower pays and the investor receives

A **defined pension benefit** is a form of deferred payment that is estimated based on the plan benefit formula and relevant future events (e.g., level of future compensation, mortality rates, ages at retirement, and vesting rules); the **projected benefit obligation (PBO)** as of a certain date is the present value of all the benefits to employees for services rendered prior to that date; it is calculated by an actuary and is very complex; however, the PBO at the end of a period is calculated as follows:

FORMULA PBO at End of Period = Beginning PBO + Service Cost + Interest Cost + Prior Service Cost – Benefits Paid ± Changes in PBO

WHERE:

Service Cost = Present value of the future benefits earned by the employees in the current period

Interest Cost = Increase in the PBO resulting from the passage of time

Prior Service Cost = Cost incurred when a plan is amended to grant additional benefits for past service

▶ Liability-related ratios help measure debt burden; ratios such as the current ratio, accounts payable turnover ratio, times-interest-earned ratio, and debt-to-equity ratio all measure the use of debt in a firm (see **Widely Used Accounting Ratios**)

The **interest on a note** accrues over time; it is the function of the amount of the note, the interest rate, and the amount of time the liability is outstanding

FORMULA Interest on a Note = Face Value of Note × Rate × Time

WHERE:

Rate = Annual interest rate on the note

Time = Number of days the note has been outstanding divided by 365

EX: A company has a \$100,000 loan outstanding for 15 days at the end of a year with an annual interest rate of 6%; the accrued interest on the loan would be \$246.57 (i.e., $\$100,000 \times 0.06 \times [15/365]$); the \$246.57 would be an adjusting entry to recognize interest expense (and interest payable) at the year's end

✓ Capitalization refers to Long-Term Debt + Equity; the capitalization of a company is the source of the funds used to acquire long-term assets such as property, plant, and equipment

Widely Used Accounting Ratios

Profitability Ratios

Profitability ratios give an indication of the company's ability to earn income from its equity, its assets, and its managers' abilities

Return on equity (ROE) relates income earned to the investment made by the owners

FORMULA ROE = Net Income/Average Stockholders' Equity

WHERE:

Average Stockholders' Equity = (Beginning Stockholders' Equity + Ending Stockholders' Equity)/2

EX: If net income is \$225,000 and the average stockholder's equity is \$1,500,000, then the ROE is 0.15 or 15% (i.e., $\$225,000/\$1,500,000$)

Return on assets (ROA) compares income to total assets used to earn income

FORMULA ROA = (Net Income + Interest Expense [net of tax])/Average Total Assets

WHERE:

Average Total Assets = (Beginning Total Assets + Ending Total Assets)/2

EX: If the average total assets are \$2,250,000 and the net income is \$225,000, then the ROA is 0.1 or 10% (i.e., $\$225,000/\$2,250,000$)

Earnings per share (EPS) measures return on investment based on the number of shares outstanding as opposed to dollar amounts of investments

FORMULA EPS = Net Income/Average Number of Shares of Common Stock Outstanding

WHERE:

Average Number of Shares of Common Stock Outstanding = (Beginning Number of Shares of Common Stock Outstanding + Ending Number of Shares of Common Stock Outstanding)/2

EX: If the net income for the year is \$225,000, the beginning number of shares is 50,000, and the ending number of shares is 150,000, then the EPS would be \$2.25 (i.e., $\$225,000/100,000$) per share; the average number of shares would be found as follows: $(50,000 + 150,000)/2 = 100,000$

Profit margin measures the percentage of each sales dollar that represents profit

FORMULA Profit Margin = Net Income/Net Sales

EX: If net income is \$100,000 and net sales are \$400,000, then the profit margin would be 0.25 or 25% (i.e., $\$100,000/\$400,000$); this means that, on average, 25% of each sale is net income (profit)

Common stock dividend payout ratio calculates the percentage of net income paid to common shareholders

FORMULA Common Stock Dividend Payout Ratio = Cash Dividends Paid to Common Stockholders/(Net Income before Extraordinary Items – Preferred Dividends)

EX: If the cash dividends were \$100,000 while the net income was \$200,000 (with no extraordinary items or preferred dividends), then the common stock dividend payout ratio would be 0.5 or 50% (i.e., $\$100,000/\$200,000$), meaning that half the profits were paid to the common stockholders in the form of a cash dividend

Book value per common share is a historical cost value

FORMULA Book Value per Common Share = Net Assets Available to Common Shareholders/Common Shares Outstanding

WHERE:

Net Assets Available to Common Shareholders = Assets – Liabilities – Assets Required to Redeem Preferred Shareholders' Share

EX: A company has assets of \$10,000,000, has liabilities of \$2,000,000, and would need assets of \$1,000,000 to redeem the preferred shares; if the book value per common shares outstanding is 300,000, then the book value per common share would be \$23.33 (i.e., $[\$10,000,000 - \$2,000,000 - \$1,000,000]/300,000$)

Activity Ratios

Activity ratios measure the firm's ability to generate revenue and income

Fixed-asset turnover is a measure of operating efficiency; this ratio compares sales volume to a company's investment in fixed assets

FORMULA Fixed-Asset Turnover = Net Sales/Average Net Fixed Assets

EX: If the net sales are \$300,000 for the year, while the net fixed assets at the beginning of the period were \$100,000 and \$150,000 at the end of the period, the fixed-asset turnover would be 2.4 {i.e., $300,000/[(\$100,000 + \$150,000)/2]$ }

Inventory turnover helps evaluate a firm's effectiveness in managing inventory; a high turnover implies that the firm does not hold excessive inventories that could hurt profitability and that the inventory is marketable and doesn't contain significant obsolete goods

FORMULA Inventory Turnover = Cost of Sales/Average Inventory

EX: If the cost of sales during the period is \$400,000, the beginning inventory is \$300,000, and the ending inventory is \$100,000, then the inventory turnover is 2 {i.e., $400,000/[(\$300,000 + \$100,000)/2]$ }

The **accounts receivable turnover** is a ratio that can help management monitor and judge the collection efforts (accounts receivable)

FORMULA Accounts Receivable Turnover = Net Income/Average Accounts Receivable

WHERE:

Average Accounts Receivable = (Beginning Accounts Receivable + Ending Accounts Receivable)/2

EX: If net income is \$600,000, the beginning balance of accounts receivable is \$50,000, and the ending balance is \$150,000, then the accounts receivable turnover is 6 {i.e., $600,000/[(\$50,000 + \$150,000)/2]$ }

✓ The accounts receivable turnover is often calculated in conjunction with the **days sales outstanding (DSO)**; the formula for DSO is Accounts Receivable/Average Daily Credit Sales

The **asset turnover ratio** is the amount of sales generated for every dollar's worth of assets

FORMULA Asset Turnover = Revenue/Average Total Assets

WHERE:

Average Total Assets = (Beginning Total Assets + Ending Total Assets)/2

EX: If revenue is \$3,900,000, the beginning total assets balance is \$600,000, and the ending balance is \$700,000, then the asset turnover is 6 {i.e., $3,900,000/[(\$600,000 + \$700,000)/2]$ }

The **net fixed-asset turnover ratio** is the amount of sales generated for every dollar's worth of net fixed assets

FORMULA Net Fixed-Asset Turnover = Revenues/Net Fixed Assets

WHERE:

Net Fixed Assets (a.k.a. noncurrent assets or PPE) = Assets and property that cannot easily be converted into cash

EX: If revenues are \$1,400,000 and net fixed assets are \$900,000, then the net fixed-asset turnover is 1.55 {i.e., $1,400,000/\$900,000$ }

Liquidity Ratios

Liquidity is the company's ability to meet its currently maturing debts; **cash ratios** compare the amount of cash and cash equivalents to the company's current liabilities

FORMULA Cash Ratio = (Cash + Cash Equivalents)/Current Liabilities

WHERE:

Cash Equivalents = Assets that are very much like cash, such as U.S. savings bonds

EX: If a company holds cash of \$100,000, U.S. savings bonds of \$25,000, and current liabilities of \$300,000, its cash ratio is 0.42 or 42% {i.e., $[\$100,000 + \$25,000]/\$300,000$ }

The **current ratio** measures the relationship between total and current assets and total and current liabilities

FORMULA Current Ratio = Current Assets/Current Liabilities

WHERE:

Current Assets = Cash-like assets that will be converted to cash or will be consumed within the next 12 months

Current Liabilities = Obligations that are due within the next 12 months and will be liquidated with current assets

EX: If the current assets are \$500,000 and the current liabilities are \$300,000, then the company's current ratio is 1.67 {i.e., $500,000/\$300,000$ }

The **quick ratio** is a more conservative test of liquidity than the current ratio

FORMULA Quick Ratio = Quick Assets/Current Liabilities

WHERE:

Quick Assets = Current Assets – Inventory

EX: If the current assets are \$600,000, inventory is \$200,000, and the current liabilities are \$300,000, then the quick ratio is 1.33 {i.e., $[\$600,000 - \$200,000]/\$300,000$ }

Inventory turnover ratio is a measure of both liquidity and operating efficiency

FORMULA Inventory Turnover = Cost of Sales/Inventory

Cost Accounting

Prime costs are the cost of resources that need to be transformed into a finished product and the cost of the labor to help with that conversion

FORMULA Prime Costs = Direct Materials Costs + Direct Manufacturing Labor Costs

• **Direct materials costs** are the costs of materials used to produce the products; they are directly traceable to a specific product and include freight-in, sales tax, and custom duties

• The **direct manufacturing labor costs** are the costs of personnel labor that contributed to the making of the product; these are also directly traceable to the product and include hourly wages and fringe benefits paid to those workers

As the name implies, **conversion costs** are those costs necessary to transform materials into a finished good

FORMULA Conversion Costs = Direct Manufacturing Labor Costs + Manufacturing Overhead Costs

• **Manufacturing overhead costs** are indirect costs that cannot be traced to the cost objects and include such resources as electricity, fuel, supplies, rent, and insurance

Cost of goods manufactured is the cost of the goods brought to completion during a period

FORMULA Cost of Goods Manufactured = Beginning Work-in-Process + Total Manufacturing Costs Incurred during the Period – Ending Work-in-Process Inventory

Cost-Volume-Profit Analysis

Cost-volume-profit (CVP) analysis is a model that helps managers understand relationships among cost of resources, volume of production and sales, and profit; the model focuses on five factors:

- Selling prices
- Sales volume
- Unit variable costs
- Total fixed costs
- Mix of products

CVP is based on the **breakeven-point formula**; net profits at breakeven are equal to zero profits; therefore, the breakeven point is the volume of sales that equate exactly with costs

FORMULA Breakeven Point = $n(\text{Revenues per Unit} - \text{Variable Costs per Unit}) - \text{Fixed Costs} = 0$

WHERE:

n = Number of units needed to break even; solve for n to determine the breakeven point

EX: If fixed costs are \$1,000,000, the selling price for the product is \$20, and the variable cost per unit is \$10, then the firm will break even at sales (n) of 100,000 units, calculated as follows: $n(\$20 - \$10) - \$1,000,000 = 0$; solving for n gives 100,000

The **contribution margin approach** is another way to calculate the breakeven point

FORMULA Breakeven Point = Fixed Costs/Unit Contribution Margin

WHERE:

Unit Contribution Margin = Selling Price – Unit Variable Costs

▶ Total fixed costs do not vary with units sold, whereas total variable costs do change with units sold

EX: If fixed costs are \$1,000,000, the selling price for the product is \$20, and the variable cost per unit is \$15, the breakeven point can be found by dividing \$1,000,000 by the contribution margin of \$5 {i.e., $\$20 - \15 }; the breakeven point is 200,000 units {i.e., $1,000,000/\$5$ }

○ If you know the breakeven point in units, you can calculate the breakeven point in revenues as follows:

FORMULA Breakeven Revenues = Price × Quantity

WHERE:

Quantity = Number of units sold at the breakeven point

EX: If the breakeven point is 200,000 units on a product that sells for \$20, the breakeven point in dollars is \$4,000,000 {i.e., $200,000 \times \$20$ }

Breakeven revenues can also be found using the **contribution margin percentage**:

FORMULA Contribution Margin Percentage = Contribution Margin per Unit/Selling Price

EX: If the contribution margin per unit is \$5 and the selling price is \$20, the contribution margin percentage is 25% {i.e., $\$5/\20 }

With the contribution margin percentage, the breakeven revenues can be found as follows:

FORMULA Breakeven Revenues = Fixed Costs/Contribution Margin Percentage

EX: If the contribution margin percentage is 25% and the fixed costs are \$1,000,000, then the breakeven point in revenues is \$4,000,000 {i.e., $1,000,000/0.25$ }

▶ The breakeven-point formula presented here assumes the following:

- There is only one product
- Units sold and units produced are equal
- Changes in revenues and costs are only driven by changes in the number of products or services sold

• Costs can be separated into two components: fixed costs and variable costs

• Total fixed costs, selling price, and variable cost per unit are fixed

The **actual cost** of a cost object cannot be known until all invoices are received for a period

FORMULA Actual Cost = Actual Direct Cost + Actual Indirect Cost

WHERE:

Actual Direct Cost = Actual Direct Cost Rate × Actual Quantity

Actual Indirect Cost = Actual Indirect Cost Rate × Actual Quantity

Target Operating Income

Although managers are interested in the breakeven point, they might be more interested in how many units to sell to achieve a particular profit, a point called a **target operating income**

FORMULA Quantity of Units Required to Be Sold to Achieve a Target Profit = (Fixed Costs + Target Operating Income)/Contribution Margin per Unit

EX: If a company wants to earn a target profit of \$100,000 when fixed costs are \$1,000,000, the selling price for the product is \$20, and the variable cost per unit is \$15, then the breakeven point is 220,000 units {i.e., $[\$1,000,000 + \$100,000]/[\$20 - \$15]$ }

✓ To incorporate income taxes into this model, you can use the following formula:

FORMULA Target Net Income = Target Operating Income – (Target Operating Income × Income Tax Rate)

EX: If a company has a target operating income of \$100,000 and a 25% tax rate, then its target net income is \$75,000 (i.e., $\$100,000 - [\$100,000 \times 0.25]$)

▶ The breakeven point is often used to judge risk; the difference between the breakeven point and the actual sales of a profitable firm is called the **margin of safety**

FORMULAS Margin of Safety (*dollars*) = Actual Sales – Breakeven Sales

Margin of Safety (*units*) = Sales Quantity – Breakeven Quantity

Margin of Safety (*percentage*) = Margin of Safety in Dollars/Revenue

EX: A company's breakeven point is 20,000 units and \$400,000 in sales; in the most recent period, the actual sales volume was 25,000 units and \$500,000 in sales; the firm's margin of safety percentage is 20% (i.e., $[\$500,000 - \$400,000]/\$500,000$)

✓ Another measure of risk is called the **degree of operating leverage**

FORMULA Degree of Operating Leverage = Contribution Margin/Operating Income

Sales Mix

Sales mix has an impact on the breakeven point; the basic CVP model assumes one product and therefore one contribution margin per unit, but most firms have multiple products (and services) and therefore multiple contribution margins; a sales mix is the relative quantities or proportions that the various products (or services) constitute of the total sales of a company

EX: If a company sells 100 units of A, 500 units of B, and 300 of C, the sales mix is a ratio of 1:5:3 for A, B, and C, respectively; for every 1 unit

of A, there are 5 units of B and 3 units of C in the sales mix; a sales mix ratio is found by setting the lowest volume product equal to 1 and making each of the higher volume products a multiple of the lowest volume product

FORMULA Breakeven Point in Bundles = Fixed Costs/Contribution Margin per Bundle

✓ A **bundle** is a combination of products sold based on the sales mix, so if the mix is 1:5:3, one bundle would consist of 1 unit of A, 5 units of B, and 3 units of C; the **contribution margin per bundle** is found as follows:

FORMULA Contribution Margin per Bundle = $\Sigma(\text{Each Product's Sales Mix Proportion} \times \text{Each Product's Contribution Margin per Unit})$

EX: A company's sales mix for products A and B is 3:1; product A's contribution margin per unit is \$20 and B's is \$15; the contribution margin per bundle is \$75 (i.e., $[3 \times \$20] + [1 \times \$15]$)

Normal Costing

Normal costing is how inventory cost is determined during the period; in manufacturing, it is synonymous with absorption costing, which is required by GAAP

FORMULA Normal Cost = Actual Direct Cost + Budgeted Indirect Cost

WHERE:

Actual Direct Cost = Actual Direct Cost Rate $\times$ Actual Quantity

Budgeted Indirect Cost = Budgeted Indirect Cost Rate $\times$ Actual Quantity

Budgeted Indirect Cost Rate = Budgeted Indirect Costs for the Period/Budgeted Allocation Base

• An **allocation base** is the basis upon which an entity allocates indirect costs; it takes the form of a quantity, such as direct labor hours, direct labor costs, machine hours used, kilowatt-hours consumed, or square footage occupied

• Normal costing in manufacturing is the result of summing actual direct materials, actual direct labor, and applied (estimated) manufacturing overhead

EX: A company sells 100 units of A with an actual direct materials cost of \$10 per unit and an actual direct labor cost per unit of \$5; the company allocates a predetermined rate of \$3 of manufacturing overhead to each direct labor hour; the normal cost for a unit that requires 2 hours of direct labor is \$21 (i.e., $\$10 + \$5 + [2 \times \$3]$)

Standard Costing

Standard costing systems help managers control costs through the use of standards and variance analysis

FORMULAS Standard Cost of Direct Materials or Labor = Budgeted Direct Cost Rate $\times$ Actual Quantity

Standard Cost of Manufacturing Overhead or Indirect Costs = Budgeted Indirect Cost Rate $\times$ Standard Quantity of Inputs Allowed for Actual Output Achieved

EX: The engineering department estimates that under typical conditions it should take 2 hours to manufacture a product, and the human resources department projects that the hourly rate for labor for the upcoming quarter will be \$27; the standard cost of labor for one unit of product is \$54 (i.e., $\$27 \times 2$)

The **selling price variance** arises because there is a difference between an actual selling price and the budgeted selling price

FORMULA Selling Price Variance = (Actual Selling Price – Budgeted Selling Price) $\times$ Actual Units Sold

EX: Product A sells for \$25 per unit although the firm had prepared a sales budget assuming \$27 per unit; with 100,000 units sold, the selling price variance would be \$200,000 unfavorable (i.e., $[\$25 - \$27] \times 100,000$)

Material variances are composed of two other variances: **materials price variance** and **materials quantity variance**

FORMULAS Materials Price Variance = (Actual Quantity Purchased $\times$ Actual Price) – (Actual Quantity Purchased $\times$ Standard Price)

Materials Quantity Variance = (Actual Quantity Used $\times$ Standard Price) – (Standard Quantity Allowed $\times$ Standard Price)

EX: A company uses 125 pounds of material to make 10 units; the standard calls for 10 pounds per unit; the budgeted price for the material was \$5 per pound; the materials quantity variance is \$125 unfavorable (i.e., $[125 \times \$5] - [100 \times \$5]$)

Labor variances are explained by two other variances: **labor rate variance** and **labor hour variance**

FORMULAS Labor Rate Variance = (Actual Hours Worked $\times$ Actual Rate) – (Actual Hours Worked $\times$ Standard Rate)

Labor Hour Variance = (Actual Hours $\times$ Standard Rate) – (Standard Hours $\times$ Standard Rate)

EX: The direct laborers work 200 hours at an hourly rate of \$30, whereas the budget for the year assumed that the laborers would earn \$28 per hour; the labor rate variance is \$400 unfavorable (i.e., $[200 \times \$30] - [200 \times \$28]$)

▶ Every variance must be evaluated as either favorable or unfavorable with regard to its impact on net income; for example, an unfavorable materials price variance of \$1,000 means that because materials cost \$1,000 more than expected (based on standards), then net income was unfavorably affected by \$1,000

Budgeting

A **revenue or sales budget** is the first budget prepared

FORMULA Budgeted Revenue (*or Sales*) = Budgeted Units (*quantity*) $\times$ Budgeted Selling Price

▶ A thorough revenue or sales budget is critical to most other parts of a company's master budget; budgeted revenues drive many other projections, such as those related to production, purchasing, and cash flow

In a manufacturing firm, the budget prepared after the sales budget is the **production budget**

FORMULA Budgeted Production (*units*) = Budgeted Sales (*units*) + Target Ending Finished Goods (*units*) – Beginning Finished Goods (*units*)

EX: The company's budgeted sales are 100,000 units and management wants an ending inventory of finished goods to be at 10,000 units; if the company starts the year with 5,000 units in beginning finished goods inventory, the budgeted production in units will be 105,000 units (i.e., $100,000 + 10,000 - 5,000$)

The **purchases budget** is first done in units and then converted to dollars

FORMULA Purchases of Materials (*units*) = Materials Used in Production (*units*) + Target Ending Inventory of Materials – Beginning Inventory of Materials

EX: The company plans to use 100,000 pounds of material in production this year, and management wants the ending inventory of materials to equal 10,000 pounds when the year ends; if the year begins with 7,000 pounds of material in stock, the purchases budget should be for 103,000 pounds of material (i.e., $100,000 + 10,000 - 7,000$)

✓ Once the budgeted purchases amount in units is known, the cost is found by multiplying quantity (*units*) by estimated price

Overhead budgets are often done in two parts: budgeted variable costs and budgeted fixed costs

FORMULA Overhead Budget = Budgeted Variable Cost + Budgeted Fixed Costs

▶ Budgeting is the planning part, whereas variance analysis is the control aspect of managing (see **Standard Costing** about calculating variances)

Time Value of Money

Time value of money calculations are used in many areas of accounting and finance; these calculations can be done with the aid of Excel (using the FV, PV, and PMT functions), with a financial calculator, or with time value of money tables (factors); these formulas cover the use of time value of money factors

Present Value (PV) of an Amount

FORMULA $PV = FV/(1 + r)^n$

WHERE:

FV = Future value

r = Discount rate per period (interest rate)

n = Number of periods (i.e., years or months)

Future Value (FV) of an Amount

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

WHERE:

PV = Present value

r = Annual interest rate or rate of return

n = Number of periods (i.e., years or months)

○ The PV function in Excel can be used to calculate both the present and future values of a lump sum or an annuity

✓ An **annuity** is an equal stream of cash flows such as the monthly payment on a fixed-rate, 30-year mortgage or the annual payout from a million-dollar lottery winning

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