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Ministry of Higher Education and Scientific Research

University of Ferhat Abbas-Setif 1

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Department of Accounting & Finance

Managerial Accounting Lectures

Targeted Audience: Second Year Accounting and Finance Students

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Introduction

This booklet is designed for university students studying managerial accounting. It provides fundamental concepts, methods, and applications to help students develop analytical and decision-making skills in business settings. Each chapter focuses on key managerial accounting topics that are essential for understanding cost behavior, resource allocation, financial decision-making, and performance evaluation.

Managerial accounting plays a critical role in guiding businesses toward efficiency and profitability. Unlike financial accounting, which primarily serves external stakeholders, managerial accounting focuses on internal decision-making processes. This booklet will help students learn how to use financial data effectively to support business strategies, optimize costs, and improve operational performance.

This Managerial Accounting Booklet provides a structured understanding of key accounting concepts essential for internal business decision-making. Chapter 1 introduces managerial accounting, its role in planning, control, and decision-making. Chapter 2 covers inventory management, valuation methods, and their impact on financial performance. Chapter 3 explores support-department cost allocation techniques to distribute costs fairly among departments. Chapter 4 examines the treatment of residuals, scraps, and byproducts in manufacturing. Chapter 5 focuses on variable costs and cost-volume-profit (CVP) analysis, helping businesses understand cost behavior and profitability. Chapter 6 delves into capacity concepts and fixed-cost allocation to optimize resource utilization. Together, these chapters equip students with essential tools for effective financial decision-making and operational efficiency.

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Introduction to Managerial Accounting

1. Chapter 01: Introduction to Managerial accounting

1.1 Definition of managerial accounting:

Management accounting measures, analyzes, and reports financial and nonfinancial information that helps managers to make decisions to fulfill goals of an organization.

Managers use management accounting information to develop, communicate, and implement strategy. They also use management accounting information to coordinate product design, production and marketing decisions and to evaluate performance. Management accounting information and reports do not have to follow set principles or rules. The key questions are always (1) How this information will help managers do their jobs better, and (2) do the benefits of producing this information exceed the cost?

Exhibit 1.1 summarizes the major differences between management accounting and financial accounting.

Exhibit 1.1	**Major differences between Management Accounting and Financial Accounting**	
	Management Accounting	**Financial Accounting**
Purpose of Information	Help managers to make decisions to fulfill an organization's goal	Communicate an organization's financial position to investors, banks, regulators, and other outside parties.
Primary users	Managers of the organization	external users such as Investors, Banks, regulators, and suppliers.
Focus and Emphasis	Future oriented	Past- oriented (reports on 2010 prepared in 2011)
Rules of measurement and reporting	Internal measures and reports do not have to follow GAAP but are based on Cost-benefit analysis	Financial statement must be prepared in accordance with GAAP and be certified by external independent auditors
time span and type of reports	Varies from hourly information to years, with financial and nonfinancial reports on products, departments, and strategies	Annual and quarterly financial reports, primarily on the company as a whole
Behavioral implications	Designed to influence the behavior of managers and other employees	primarily reports economic events but also influences behavior because manager's compensation is often based on reported financial results

performance. The financial data prepared for this purpose are governed by **generally accepted accounting principles** (GAAP) in the USA and **International financial reporting standards** (IFRS) in many other countries. In contrast managerial accounting doesn't need to comply with GAAP and IFRS. Management Acc is free to set its own definition for cost information. Indeed, financial information use for external reporting are often entirely inappropriate for managerial decisions making.

1.2 Introduction to cost concept and terminology:

a. Accountants defines **cost** as a resource sacrificed or forgone to achieve a specific objective. A cost (such as direct materials or advertising) is usually measured as the monetary amount that must be paid to acquire goods and services.

b. **Cost versus expense (التكلفة مقابل المصروف):** it is important to distinguish cost from expense. An expense is a cost charged against revenue in an accounting period. For example, the financial accounting system in Algeria referred as (SCF) considers all accounts of Class 6 as expenses. Hence expenses are deducted from revenue in that accounting period. We incur costs whenever we give up (sacrifice) resources, regardless of whether we account for it as an asset or an expense. (We may even incur costs that the financial accounting system never records as an asset or expense. An example is lost sales). If the cost is recorded as an asset (for example, prepaid rent for an office building), it becomes an expense when the asset has been consumed (the building has been used for a period of time after making the prepayment).

   The focus of Managerial accounting is on costs, not expenses, although the term *cost* and *expense* are sometimes used as synonyms in practice. Usually, we use cost for all managerial purposes.

c. **Opportunity cost:** is the forgone benefit that could have been realized from the best forgone alternative use of resource. For example, many students give up jobs to take the time to earn a college degree. The forgone income is part of the cost of getting a college degree and is the forgone benefit that could be realized from an alternative use of a scarce resource-time.

d. **Cost object**- anything for which a cost measurement is desired (unit of product, service, department, customer, activity)

e. **Sunk cost:** A sunk cost is a cost that has already been incurred and that cannot be changed by any decision made now or in the future. Because sunk costs cannot be changed by any decision, they are not differential costs, and because only differential costs are relevant in decision, sunk cost should be ignored.

Exhibit 1.2 Examples of cost objects at Tesla	
cost Object	**Illustration**
product	Q Tesla model Y vehicle
service	Telephone hot line providing information and assistance
project	R & D project on an electric Tesla truck
customer	The Dubai Road and transport authority (RTA), which is building a large fleet of electric taxis
activity	setting up machines for production equipment
department	accounting and finance department

f. **Actual cost**: a cost that has occurred.

g. **-Budgeted cost**: a predicted cost.

1.3 Final cost or total cost**:**

Includes all costs involved in acquiring (purchasing) or making a product or a service. this cost differs from one economic sector to another in this class we are going to focus on three different economic sectors:

- **Final cost for manufacturing companies:** Manufacturing-sector companies[1] purchase materials and components and convert them into various finished goods or products. Example iphone15, 16.

[1] Manufacturing companies have three classes of inventories- *raw materials, work in process, and finished goods.* **Raw materials** are the materials that are used to make a product**. Work in process** consists of units of product that are only partially complete and will require further work before they are ready for sale. **Finished goods** consists of completed units of product that have not yet been sold to customers.

the total cost for manufacturing companies is calculated by the following formula:

$$\textbf{Final cost} = cost\ of\ goods\ manufatured\ and\ sold + seling\ expenses\ (\ direct\ and\ indirect\ )$$

where:

$$\textbf{Cost of goods manufactured and sold} = Quqntity\ sold * unit\ cost\ of\ goods\ manufactured$$

$$\textbf{cost of goods manufactured} = cost\ of\ raw\ materials\ used + direct\ and\ indirect\ \ manufacturing\ costs$$

$$\textbf{Cost of raw materials purchased} = cost\ of\ purchases + direct\ and\ indirect\ purchasing\ expenses$$

Note: The cost for a manufacturing company if a company has an existing beginning and ending inventory is:

Cost of goods sold in a manufacturing company

Beginning finished goods inventory	+	cost of goods manufactured	=	Cost of goods sold	+	Ending finished goods inventory

- **Final cost for Merchandising companies:** Purchase and then sell tangible products without changing their basic form. This sector includes companies engaged in retailing, distribution, or wholesaling.

The total cost for merchandising companies is calculated by the following formula

$$\textbf{Final cost} = cost\ of\ goods\ manufactured\ and\ sold + \ selling\ expenses\ (\ direct\ and\ indirect)$$

Where:

$$\textbf{Cost of goods sold} = Quantity\ sold * unit\ cost\ of\ purchases$$

$$\textbf{Cost of purchases} = purchases + purchase\ expenses(\ direct\ and\ indirect\ )$$

$$\textbf{purchases} = quantity\ bought * unit\ price$$

Note: The cost of goods sold for a merchandise company if any inventory accounts is:

Cost of goods sold in a manufacturing company

Beginning Merchandise inventory	+	Purchases	=	Cost of goods sold	+	Ending Merchandise inventory

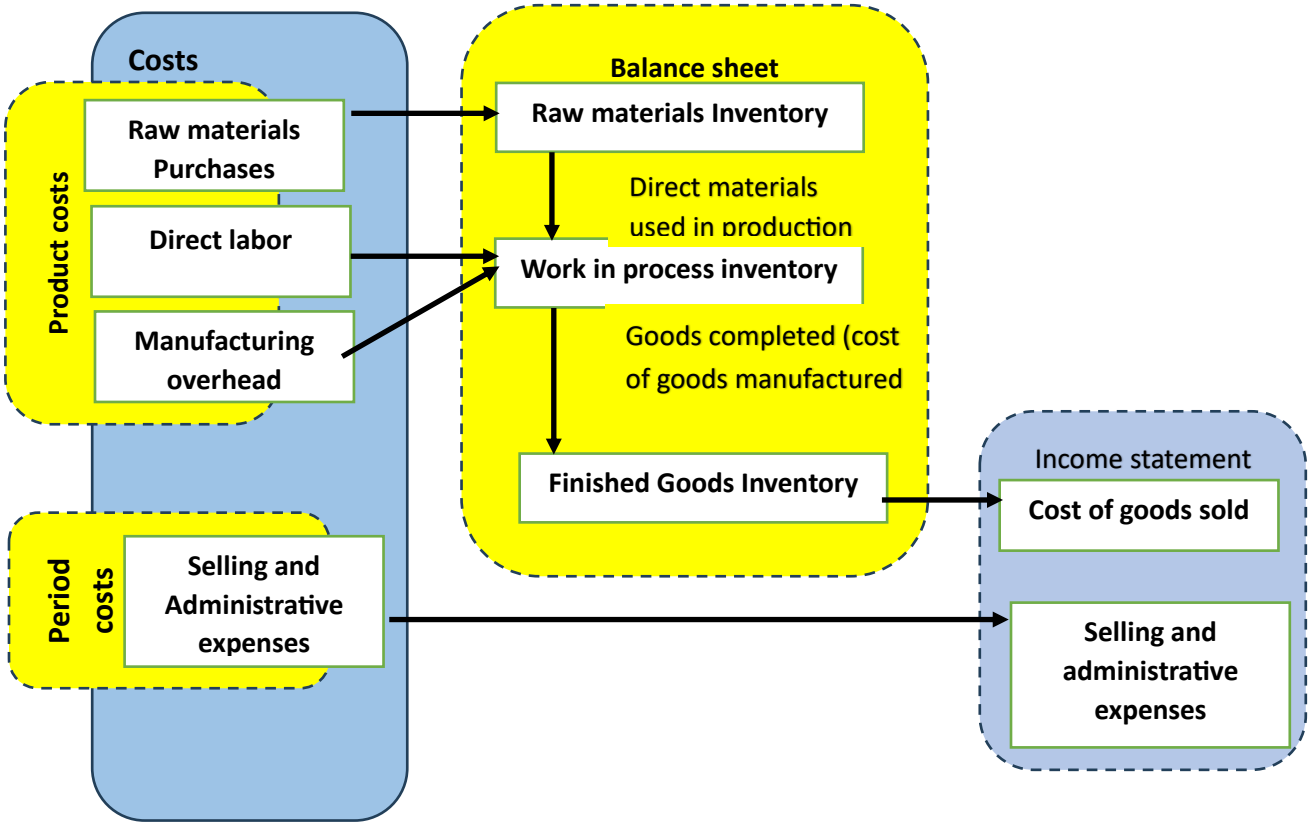
- **Final cost for service companies:** service companies provide services (intangible product), for example, legal advice, or audits- to their customers. Example law firms, accounting firms.

The total cost for service companies is calculated by the following formula:

Final cost $= cost\ of\ service\ +\ selling\ expenses$ ($direct\ and\ indirect$)

- **Cost driver:** a cost driver is a variable, such as the level of activity or volume that causally affects costs over a given of time span. An activity is an event, task, or unit of work with specified purpose- for example, designing products, setting up machines...the level of activity or volume is a cost driver if there is a cause-and-effect relationship. Between a change in the level of activity or volume and a change in the level of total costs

Figure 1-1: Cost flows and classifications in



Example: the following information has been taken from the accounting records of a manufacturing company X for last year:

Selling and administrative expenses	410,000
Raw material inventory, january1	90,000
raw material inventory, December 31	60,000
direct labor cost	150,000
purchases of raw materials	750,000
sales	2,500,000
manufacturing overhead	640,000
work in process inventory, January 1	180,000
work in process inventory, December 31	100,000
finished goods inventory, January 1	260,000
finished goods inventory, December 31	210,000

Management wants these data organized in a better format.

Required:

a. Prepare the total cost materials used, the cost of goods manufactured, then compute the cost of goods manufactured and sold?
b. Calculate the final cost and find the managerial accounting income?
c. Prepare an income statement (financial accounting operating income)?

Solution:

a. First, we are going to compute the total cost of goods manufactured:

The cost of goods manufactured for the year ended December 31		
	amount	
Raw materials inventory, January 1	90 000	
Add: purchases of raw materials	750 000	
Raw material available for use	840 000	
Deduct: raw materials inventory, December 31	60 000	
Raw material used		780 000
Direct labor		150 000
Manufacturing overhead		640 000
Total manufacturing cost		1 570 000
Add: work in process inventory, January 1		180 000
Deduct: work in process inventory, December31		100 000
Cost of goods manufactured		1 650 000

Now we compute the cost of goods manufactured and sold:

Cost of goods manufactured and sold	
Finished goods inventory, January 1	260,000
Add: cost of goods manufactured	1,650,000
Goods available for sale	1,910,000
Deduct: Finished goods inventory, December 31	210,000
Cost of goods manufactured and sold	1,700,000

Finally, we compute the cost accounting net operating income:

Cost accounting net operating income	
Cost of goods sold	1,700,000
Selling and administrative expenses	410,000
Final cost	**2,110,000**
Sales	2,500,000
Cost accounting net operating income	**390,000**

Income statement for the year ended December 31	
sales	2,500,000
cost of goods sold	1,700,000
Gross margin	800,000
selling and administrative expenses	410,000
Net operating income	**390,000**

	Debit		Credit
cost of goods sold (components)			
a/601	780000	a/ 331 EI	100000
a/63 DL	150000	a/355 EI	210000
A/63-68 (except selling expenses for clarification purposes)	640000		
a/331 BI	180000		
a/355 Bi	260000		
Cost of goods manufactured and sold balance			1700000
a/63-68 Selling and administrative expenses			410000
Final cost			2110000

1.4 General cost classifications:

a. classification on financial statements:

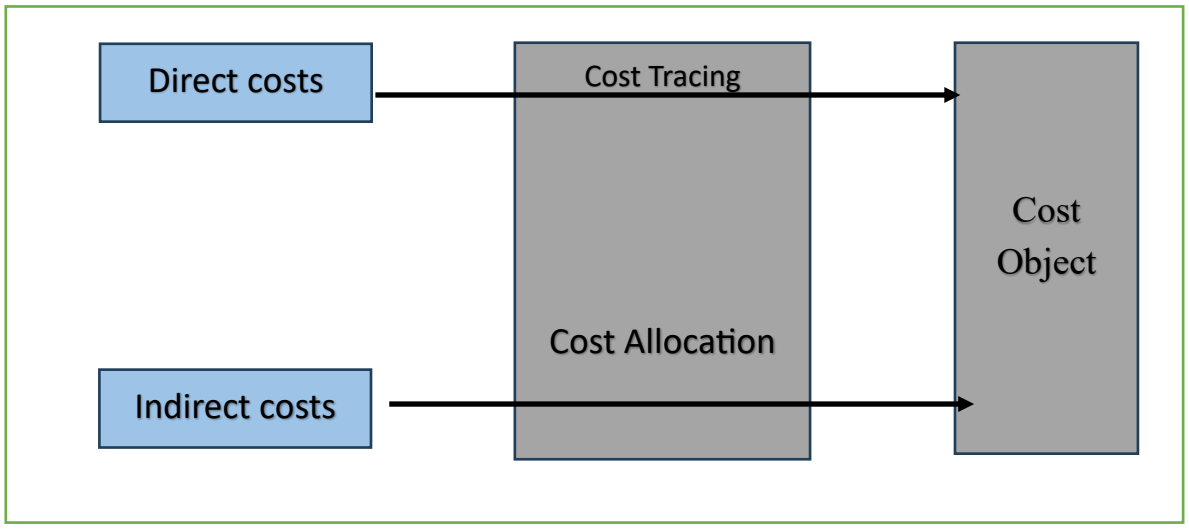
- **Inventoriable Cost:** Product costs are often called inventoriable costs. The reason is that these costs go directly into inventory accounts as they are incurred (first into work in process and then into finished goods), rather than going into expense accounts. Thus, they are termed ***Inventoriable costs***. This is a key concept because such costs can end up on the balance sheet as assets if goods are only partially completed or are unsold at the end of the period.
- **Period costs:** period costs are all costs in the income statement other than cost of goods sold, period costs such as marketing, distributing and customer services, are treated as expenses of the accounting period in which they are incurred.

b. cost assignment classifications:

costs are classified as direct and indirect costs for assignment purposes:

- **Direct costs**: direct costs of a cost object are related to a particular cost object and can be traced to it in an economically (cost-effective) way. For example, the cost of steel or tires is a direct cost of BMW X5s.
- **Indirect costs**: indirect costs of a cost object related to a particular cost object but cannot be traced in a economically (cost-effective) way. For example, the salaries of plant administrators (including the plant manager).

Cost Assignment



c. Cost behavior classifications: Variable costs and fixed costs

- **Variable costs**: a variable cost changes in total in proportion to changes in related level of total activity or volume.
- **Fixed costs**: a fixed costs remain unchanged in total for a given time, despite wide changes in the related level of activity or volume.

d. Cost components: usually we distinguish between three cost components as the following:

- **assigned costs (considered costs):** these are relevant common costs between management accounting and financial accounting, because they are related to a specific product or service, and they can also be classified into two categories:
- assigned costs with the same amount recorded in financial accounting such as direct labor
- assigned costs with different amounts that have been recorded in financial accounting, these variances and adjustments could be positive or negative. For example:

-variances in raw materials used

- variances in amortizations

- variances in depreciation.

1.5 Non-considered expenses

(**excluded costs)**: certain costs are typically excluded from the schedule of final costs of products and services because they do not directly relate to the production of goods or services, or because they are not relevant for internal decision making these costs generally fall under:

- extraordinary costs or expenses (like account /67 extraordinary expenses)
- Non-operating costs
- sunk costs
- purely financial costs.

1.6 Imputed expenses

in cost accounting, theoretical or imputed expenses are hypothetical costs that are not actual cash outflows (not recorded in financial accounting) but are considered to ensure a more accurate and comprehensive evaluation of the company performance or profitability. The most common imputed expenses are:

- **imputed capital interest:** is the cost of using capital, whether it is borrowed or internally generated. Even if the company does not pay interest (uses its own capital), the cost of capital (usually it is the risk-free rate of treasury bonds) is considered.
- **Imputed owner's wages (owner's time):** imputed wage or owner's compensation represents the value of the owner's time; this is often done in non-corporate entities or sole proprietorships. The imputed cost reflects the opportunity cost of the owner' time.
- **Imputed rent:** refers to the cost of using company-owned facilities or property.

In general, we can compute the adjusted expenses or the transition to managerial accounting expenses by the following formula:

$$\textbf{Mangerial accounting expenses} = expenses\ of\ financial\ accounting + Imputed\ expenses - Non\ considered\ expenses$$

1.7 General rules for computing different costs, final cost and income

Cost of raw material purchases:

$$\textbf{Cost of raw materials purchased} = \textit{purchases} + \textit{purchasing expenses (direct and indirect)}$$

- **Manufacturing cost:**

$$\textbf{cost of goods manufactured} = \textit{cost of raw materials used} + \textit{direct and indirect manufacturing costs}$$

- **The final cost:**

$$\textbf{Final cost} = \textit{cost of goods manufactured and sold} + \textit{selling expenses (direct and indirect)}$$

- **Management accounting income:**

$$\textbf{Income} = \textit{sales} - \textit{final cost}$$

Where: sales = quantity sold * unit price

- **Management accounting net income:**

$$\textbf{management accounting net income} = \text{Income} + \text{Imputed expenses} - \text{non-considered expenses}$$

- **Financial accounting income:** we can calculate the financial accounting income by the following steps:

Revenues:

- ✓ Sales = sales of product (1) + sales of product (2) +…. sales of product (n).
- ✓ Changes in finished goods inventory (a/72)

Changes in finished goods inventory = cost of goods available for sale - cost of goods manufactured and sold

Note: cost of goods available for sale = $\textit{beginning finished goods inventory} + \textit{cost of goods manufactured}$

- ✓ Cost of raw materials used:

Cost of raw materials used = cost of raw materials (1)+ cost of raw materials (2)+… cost of raw materials (n)

- **Financial accounting expenses**: we compute financial accounting expense by the following:

Managerial accounting expenses = $financial\ accounting\ expenses + Imputed\ expenses - Non\ considered\ expenses$

Mangerial accounting expenses = $manufacturing\ expenses\ (\ direct\ and\ indirect) + selling\ expenses\ (\ direct\ and\ indirect)$

By substituting in the previous formula, we get:

Financial accounting expenses = $managerial\ accounting\ expenses - Imputed\ expenses + Non\ considered\ expenses$

Finally for computing financial accounting income we add up expenses as well as revenues:

Total revenues = $sales + changes\ in\ finished\ goods\ inventory$

Total expenses = $raw\ materials\ used + total\ financial\ accounting\ expenses$

Financial accounting net income = $total\ revenues - total\ expenses$

Example:

company XYZ produces two products A_1, A_2 using raw materials M_1, M_2. The following data were collected for the month of April 2023:

April Purchases: 3000 Kg of M_1 for DZD 18.5/Kg, 2500 kg of M_2 for DZD 24 /kg.

Consumption and production:

2 To produce 410 Units of $A_1$the company used 840 kg of M_1, and 1250 kg of M_2.

3 To produce 480 units of A_2 the company used 1950 kg of M_1, and 1000 kg of M_2.

Direct manufacturing expenses:

980 hours direct labor for A_1, and 2450 hours for A_2. The cost was 54 /per hour.

Other expenses:

Purchase expenses: DZD 22000 distributed as the following: 12000 for M_1, the rest for M_2.

Manufacturing expenses (indirect): 91625 in which 55325 was for A_2, the rest was for A_1.

Selling and distribution expenses: DZD 15450 in which 9450 was for A_1, the rest for A_2.

Sales: 400 units of A_1 for 520/unit, and 450 units of A_2, for 660 /unit.

Required: compute the following:

1. Cost materials purchased.
2. Cost of goods manufactured.
3. Final cost of goods manufactured and sold.
4. Management accounting net income, given that non-considered expenses were 17850 DZD, and imputed expenses were DZD1980.
5. Financial accounting net operating income.

Solution:

1. Cost of materials purchased:

Cost of raw materials purchased	M_1	M_2
Direct materials purchased 3000*18.5//2500*24	55,500	60,000
Purchase expenses	12,000	10,000
cost of raw materials purchased	67,500	70,000
Units purchased	3,000	2,500
Purchases unit cost	**22.50**	**28.00**

2. Cost of goods manufactured:

Cost of goods manufactured	A_1	A_2
cost of materials used		
840*22.5//1950*22.5	18,900	43,875
1250*28//1000*28	35,000	28,000
Direct labor		
980*54//2450*54	52,920	132,300
indirect manufacturing expenses	36,300	55,325
cost of goods manufactured	**143120**	**259500**
Units produced	410	480
Total manufacturing cost per unit	**349.073**	**540.625**

3. Final cost

final cost	A1	A2
cost of goods manufactured and sold		
400*349.073//450*540.625	139,629.20	243,281.25
selling and distribution expenses	9,450.00	6,000.00
Final cost	**149,079.20**	**249,281.25**

4. Management accounting net operating income:

Management accounting income		
Sales		
400*520//450*660	208000	297000
Final cost	149,079.20	249,281.25
managerial acc income	**58,920.80**	**47,718.75**
	Profit	**106,639.55**

Managerial accounting net operating income:

$$\boldsymbol{Managerial\ accounting\ net\ operating\ income} = Income + Imputed\ expenses - non\ considered\ expenses$$

$$\text{Managerial accounting net operating income} = 106639.55 + 1980 - 17850 = 90769.55$$

5. Financial accounting net operating income:

We have:

$$\textbf{Financial accounting expenses} = managerial\ accounting\ expenses + non\ considered\ expenses - imputed\ expenses$$

$$\textbf{Financial accounting expenses} = (52920 + 36300 + 9450 + 132300 + 55325 + 6000) + 17850 - 1980 = 308165$$

Total revenues		Total expenses	
a/701 Sales	505,000.00	Financial acc expenses	308,165.00
a724 EI	19,709.55	Add: material used	125,775.00
Total Revenues	524,709.55	Total expenses	433,940.00
Profit = 90769.55			

Chapter 01 practice problems:

Exercise 01:

Which of the following cost behavior assumptions is true?

a. Variable costs are constant if expressed on per unit basis?
b. Total variable costs increase as the level of activity increases?
c. The average fixed costs per unit increases as the level of activity increases.
d. Total fixed costs decrease as the level of activity decreases?
e. Ahmed is thinking about leaving his job that pays him a salary of DZD 500000 a year , and return to school. What is the opportunity cost for Ahmed?
f. Opportunity costs are not usually recorded in the accounts of an organization.

Exercise 02:

Foxwood company is a metal and woodcutting manufacturer company, selling products to home construction market, consider the following data for 2011:

- Sandpaper ----------2000
- Materials- handling costs----------70000
- Lubricants and coolants----------5000
- Miscellaneous indirect manufacturing labor----------40000
- Direct manufacturing labor----------300000
- Beginning direct materials inventory Jan 1 2020----------40000
- Ending direct materials inventory Dec 31, 2020---- -------50000
- Finished goods inventory Jan 1, 2020----------100000
- Finished goods inventory Dec 31, 2020----------150000
- Work-in process inventory Jan 1, 2020----------10000
- Work-in process inventory Dec 31, 2020----------14000
- Plant-leasing costs ----------54000
- Depreciation-plant equipment----------36000
- Property taxes on plant equipment----------4000
- Fire insurance on plant equipment ----------3000

- Direct materials purchased----------460000
- Revenues ----------1360000
- Marketing promotions ----------60000
- Marketing salaries ----------100000
- Distribution costs ----------70000
- Customer-service costs----------100000

Required: calculate the following

1- Cost of materials used?
2- Cost of goods manufactured?
3- Cost of goods manufactured and sold?
4- Final cost?
5- Managerial accounting net operating income?
6- Financial accounting net operating income?
7- Income statement?

Exercise 03:

Let us assume that company XY produces two different products A_1 and A_2, by using M_1, M_2.

And the following balances were provided to you.

- Quantity manufactured A_1 1500 units, A_2 2500 $units$
- Goods in process inventory Jan 1, 2022, $A_1 = 3500$, $A_2 = 4500$
- Goods in process inventory Dec 31, 2022, $A_1 = 5000$, $A_2 = 4000$
- Income taxes: 53400
- Indirect labor: 26000 distributed equally between A_1 and A_2.
- Electricity bill 30000, 10000 for A_1 the rest for A_2
- Non-considered Interest expenses 25000.
- Miscellaneous expenses 55000, ¼ assigned to A_1, and ¾ for A_2 .
- property taxes on factory equipment 14000 allocated to A_1 and A_2 using units manufactured.
- Raw materials inventory Jan 1, 2022, $M_1 = 25000$, $M_2 = 35000$
- Raw material Inventory Dec 31, 2022, $M_1 = 52000$, $M_2 = 26000$

- Raw material purchases: M_1 400 $kg\ for$ 226 $per\ kg$, $M_2$800 $kg\ for$ 278.25 $per\ kg$.
- Repair expenses-factory equipment 31000, 40% allocated toA_1 $, and$ 60% $allocated\ to\ A_2$.
- Salaries expenses- supply department: 150000 assigned to M_1 and M_2 on quantity purchased base.
- Sales A_1 1200 $units$ for 525/ unit, A_2 2000 units for 500/unit.
- Advertising expense: 85000 allocated equally between A_1 and A_2 .
- Amortization expense- factory patents: 16000 allocated to A_1 and A_2 on quantity manufactured base.
- Distribution expense 28000 allocated to A_1 and A_2 based on quantity sold.
- Imputed expenses 20000.
- Depreciation expense-office equipment 37000 allocated to A_1 and A_2 on quantity sold base.
- Depreciation expense- factory building 133000 allocated to A_1 and A_2 on quantity sold base.
- Depreciation expense- factory equipment 78000 allocated to A_1 and A_2 on quantity produced base.
- Direct labor 250000 allocated to A_1 and A_2 on quantity manufactured base.
- Factory insurance 62000, allocated to A_1 and A_2 based on quantity manufactured.
- Factory supervision 74000 allocated to A_1 and A_2 based on units sold.
- Factory supplies used 21000 allocated to A_1 and A_2 based on sales.
- Factory utilities 115000 allocated to A_1 and A_2 on quantity manufactured base.
- Finished goods inventory Jan 1, 2022, A_1 5000 and A_2 10000.
- Finished goods inventory Dec 31, 2022, A_1 4500, A_2 8000.

Requirements: Compute the following

- Cost of materials purchased.
- Cost of goods manufactured? Then compute the cost of goods manufactured and sold?
- Final cost.
- Managerial accounting net operating income and net income.
- Financial accounting net operating income and net income.

Chapter 02: Introduction to Inventories

Chapter 02: Introduction to Inventories

Introduction to inventories:

Measuring and Analyzing the flow of inventory costs are important. If all inventory purchased or manufactured during the period is sold, then the cost of goods sold (COGS) is equal to the cost of the goods purchased or manufactured. However, when inventory remains at the end of period (the usual case) companies must distinguish the cost of the inventories that are sold (reported as cost of goods sold in the income statement) from the cost of the inventories that remain as an asset on the balance sheet.

2.1 Definition of inventories:

Inventories are the accounting of items, component parts and raw materials that a company either uses in production or sells.

The Financial Accounting System (FAS or SCF) in Algeria has defined and distinguished between inventories in Class 3 as the following:

a/ 30 Merchandise inventory: are goods that a company purchased and then sold without changing their basics form.

a/ **31 raw materials**: this account includes two elements

- **Raw materials**: are the goods that a company purchases to convert them into various finished goods and products.
- **Other components:** are the goods that a company needs in the process of manufacturing (usually the company doesn't intend to sell or convert supplies into finished products)

a/32 Other supplies: are the goods that a company needs in the process of manufacturing without any direct relationship between these supplies and the finished goods.

a/33 work in-process: consists of units of product that are only partially complete and will require further work before they are ready for sale to customers.

a/34 service in process: consists of services that are partially completed and will require further work to be completed.

a/35 Finished Goods Inventory: consist of completed units of product that have not yet been sold to a customer.

a/36 inventories from dismantling assets: these inventories come from dismantling an asset partially or fully to

a/37 other inventories (goods in transit): these are inventories that have been shipped by the supplier but haven't been received by a company yet, usually by the end of the accounting period.

Companies have a choice when it comes to determining the cost of goods sold and the cost of the inventory remaining on the balance sheet. To understand this, consider the following example:

Summary Inventory records			
Inventory available on Jan 1	500 Units	@ 100 per unit	50,000
Inventory purchased during the period	200 Units	@ 150 per unit	30,000
Total cost of goods available for sale	700 Units		80,000
Inventory sold during the period	450 Units	@ 250 per unit	112,500

This company began the period with 500 units of inventory that were purchased or manufactured for 50000 (100 each). During the period the company purchased and/or manufactured an additional 200 units costing 30000. The total costs available for sale for this period equals 80000. The company sold 450 units during the period for 250 per unit for total sales of 112500. Accordingly, the company must remove the cost of the 450 units sold from the inventory account on the balance sheet. And match this cost against revenues generated from the sale .

An important question is which costs should management remove from the balance sheet and report as a cost of goods sold in the income statement? Two inventory costing methods (weighted average, FIFO) can be used to value a company inventory according to (SCF).

2.2 First-In, First-Out (FIFO):

- The FIFO inventory costing method transfers costs from inventory in the order that they were initially recorded. That is, FIFO assumes that the first costs recorded in inventory (first-in) are the first costs transferred from inventory (first-out) applying FIFO to the previous data, means that the costs of the 450 units come from beginning inventory, which consists of 500 units costing 100 each. The company's cost of goods sold and gross profit, using FIFO, is computed as follows:

Sales	112500
cost of goods sold (450 @ 100 each)	45000
Gross profit	67,500
The cost of ending inventory (50 @ 100)+(200@15)	35000

The cost remaining in inventory and reported on the year-end balance sheet is 35 000

2.3 Weighted average cost:

The weighted average cost method computes the cost of goods sold as an average of the cost to purchase or manufacture of all the inventories that were available for sale during the period.

Sales (450 units @ 250)	112500
cost of goods sold (weighted average0 $= \frac{(500*100)+(200*100)}{700} = \frac{80000}{700} = 114.286$	**51429**
Gross profit	61,071
cost of Ending inventory $= (700 - 450) * 114.286$	**28,571**

To calculate the weighted average cost of 114.286 per unit, the company divides the total cost of goods available for sale by the number of units available for sale (80000/700 units).

The cost remaining in inventory and reported on the year end (ending of the accounting period) balance sheet is 28751. (80000-51429= 28571) or (700-450)* 114.826 =28571.

2.4 Financial Statement Effects of Inventory Costing:

The table below describes the financial statement effects of different inventory costing methods.

- **Income statement effects:**

Income effects from inventory costing method			
	Sales	Cost of Goods Sold	Gross Profit
FIFO	112,500	45,000	67,500
Weighted average cost	112,500	51,429	61,071

Recall that inventory costs rose during this period from 100 per unit to 150 per unit. The higher gross profit reported under FIFO method arises because FIFO matches older, lower-cost inventory against current selling prices. To generalize: in an inflationary environment, FIFO yields higher gross profit Than do weighted average cost method.

- **Balance sheet Effects:**

Balance Sheet Effects from Inventory Costing Method	
	Ending Inventory Cost
FIFO	35,000
Weighted average cost	28,571

2.5 Weighted average cost after each input:

The weighted average cost after each input computes the cost of goods or materials available after each input (most companies usually use the weighted average cost of all inventories available instead of using weighted average cost after each input). The table below explain how the cost of goods sold and ending inventory cost are calculated using weighted average cost:

Assume that company XY the following data for the month of January:

- Inventory balance at Jan 1…….1300 units @ 150 each
- Material purchased Jan 10 …….1700 units @ 180 each
- Materials used Jan 15 …… 1200 units
- Materials purchased Jan 18……900 units @ 200
- Materials used Jan 28…….1500 units

Required: Compute the cost of materials used for the month and the cost of ending inventory balance on the month end using weighted average cost after each input:

Solution:

	Inputs			Outputs			Inventory		
	Quantity	unit cost	amount	Quantity	unit cost	amount	Quantity	unit cost	amount
Beginning Inventory Jan 01	1,300	150	195,000				1,300	150	195,000
purchase Jan 10	1,700	180	306,000				3,000	167	501,000
Materials used Jan 15				1,200	167	200,400	1,800	167	300,600
purchase jan 18	900	200	180,000				2,700	178	480,600
sold Jan 28				1,500	178	267,000			
Ending Inventory Jan 31							1,200	178	213,600
Total				2,700		467,400			

Example:

During the month of February, the inventory data of finished goods for Soummam company were provided to you:

- Beginning inventory Feb 1, 16000 units 160 each
- Materials purchased Feb 03, 12000 units 162 each.
- Materials used Feb 07, 17000 units.
- Materials purchased Feb 10, 8000 units 175 each.
- Materials used Feb 15, 14000 units.
- Materials used Feb 20, 3000 units.
- Materials purchased on Feb 24, 18000 units, 200 each.
- Materials used Feb 28, 12000 units.

Requirements:

1- Compute the cost of materials used and the cost of the inventory for the month-end balance. Using two different method Weighted average cost and FIFO?

Solution:

1- Weighted average method:

	Inputs			Outputs			Inventory		
	Quantity	unit cost	amount	Quantity	unit cost	amount	Quantity	unit cost	amount
Beginning Inventory Feb 01	16,000	160	2,560,000				16,000	160	2,560,000
purchase Feb 3	12,000	162	1,944,000				28,000		4,504,000
Materials used Feb 7				17,000	176	2,992,000	11,000		1,512,000
Materials purchased Feb 10	8,000	175	1,400,000				19,000		2,912,000
Materials used Feb 15				14,000	176	2,464,000	5,000		448,000
Materials used Feb 20				2,000	176	352,000	3,000		96,000
Materials purchased Feb 24	18,000	200	3,600,000				21,000		3,696,000
Materials used Feb 28				12,000	176	2,112,000	9,000		1,584,000
Ending Inventory Feb 28							**9,000**		1,584,000
Total	54,000	176	9,504,000	**45,000**		**7,920,000**			

Weighted average cost

$$= \frac{\textbf{\textit{Materials available for use (Beginning Inventory + all purchased}}}{\textbf{\textit{Quantity available for use or sale (Beginning Inventory Units + all quantity purchased)}}}$$

2- FIFO

	Inputs			Outputs			Inventory		
	Quantity	unit cost	amount	Quantity	unit cost	amount	Quantity	unit cost	amount
Beginning Inventory Feb 01	16,000	160	2,560,000				16,000	160	2,560,000
purchase Feb 3	12,000	162	1,944,000				12,000	162	1,944,000
Materials used Feb 7				16,000	160	2,560,000			
				1,000	162	162,000	11,000	162	1,782,000
Materials purchased Feb 10	8,000	175	1,400,000				11,000	162	1,782,000
							8,000	175	1,400,000
Materials used Feb 15				11,000	162	1,782,000			
				3,000	175	525,000	5,000	175	875,000
Materials used Feb 20				2,000	175	350,000	3,000	175	525,000
Materials purchased Feb 24	18,000	200	3,600,000				3,000	175	525,000
							18,000	200	3,600,000
Materials used Feb 28				3,000	175	525,000	9,000	200	1,800,000
				9,000	200	1,800,000			
Ending Inventory Feb 28							**9,000**	200	1,800,000
Total	54,000		9,504,000	**45,000**		**7,704,000**			

2.6 Accounting for inventory variances:

- Inventory variances analysis is a critical process used by businesses to identify and understand the discrepancies between the recorded inventory and the physical inventory. It is not just about recognizing the variance but understanding its root and causes. impacts and ways to mitigate it in future.
- **Reasons for inventory variances:**

  Inventory variances can arise due to different reasons, some of the company's control and others not.
- **Human Error**: one of the most common causes of inventory variance is human error , this can range from mistyping a number during data entry to miscounting products during the count of physical inventory. These errors might be unintentional, can accumulate over time.

- **Theft**: both internal and external, theft can lead to significant inventory discrepancies, without proper security measures, business may find their actual inventory levels don't align with their records.
- **Damaged goods**
- **Misplacement**
- **Supplier issues.**

2.7 Calculating Inventory variances:

The basic formula to determine inventory variance is:

$$Inventory\ variance = physical\ inventory\ count\ - recorded\ count$$

When actual count is $>$ $than\ recorded\ count$ that is a surplus that must be added to managerial accounting income.

When Actual count inventory $<$ than recorded count inventory that is a deficit that must be deducted from managerial accounting income.

Usually, companies use Inventory card templates for inventory variances as the following:

	Inputs				**outputs**		
	Q	**UC/UP**	**amount**		**Q**	**Uc/up**	**amount**
beginning inventory				output: cost of materials used/ product sold			
input				Ending inventory			
Total				**Total**			

Note that: the following formula is used to determine the cost of inventory:

Beginning inventory + inputs = Cost of outputs + Ending inventory

Example:

The beginning inventory of raw materials M for a company was 6000 kg for a total of DZD 151200. During the current period a company purchased 3000 kg/ 240 each. Purchase expenses were 27000. The company used 4750 kg.

The physical inventory was 4220 kg.

Required:

Prepare the inventory card template for raw material M, using the weighted average method.

Solution:

1. Calculating the cost of material purchased:

	Q	UC/	amount
Materials purchased	3,000	240	720,000
purchase expenses			27,000
cost of materials purchased			**747,000**

2. Inventory card template:

	Q	UC/UP	amount		Q	Uc (weighted)	amount
beginning inventory	6,000	252	1,512,000	cost of materials used	4750	251	1,192,250
Materials purchased	3,000	249	747,000	Ending inventory (physical)	4220	251	1,059,220
				Deficit	30	251	7,530
Total	**9,000**	**251**	**2,259,000**	**Total**	**9000**		**2,259,000**

2.8 Inventory variances adjustments:

Adjustments of inventory variances are necessary for both managerial accounting and financial accounting:

a. **Adjustments for managerial accounting:** the adjustment is calculated as the following:

Managerial Acc net income = managerial accounting gross income+ imputed expenses -nonconsidred (+) or (-) net inventory variances

Where:

net inventory variances = inventory surplus – inventory deficit

b. **Adjustments for financial accounting:** the adjustment is calculated as the following:
   - **a/601 raw materials**: we add the inventory variance (deficit) and deduct inventory (surplus).
   - **a/72 changes in finished goods inventory**: we add the inventory (surplus) and deduct inventory (deficit)

Chapter 02 Practice Problems

Exercise 01:

A Tech, manufacturing company, uses **perpetual inventory accounting** and applies **IFRS** for financial reporting. The company has the following inventory transactions for its key raw material in January 2025:

Date	Activity	Units	Unit Cost
Jan 1	Beginning Inventory	200	15.00
Jan 5	Purchase	300	16.00
Jan 10	Sale	400	? (Selling price per unit is 25)
Jan 15	Purchase	250	17.00
Jan 20	Sale	200	?

Requirements:

1. Calculate the ending inventory and the cost of goods sold (COGS) under both:
    - FIFO (First-In, First-Out)
    - Weighted Average Cost (WAC)
2. Analyze the impact on financial statements (Gross Profit, Net Income) under both methods.
3. IFRS Perspective:
    - Which method is preferable under IFRS?

Exercise 02:

ABC Retailer produces and sells electronic gadgets. At the end of **March 2025**, they conduct a physical inventory count to verify stock accuracy and variances of product (A). According to the company's accounting system: Inventory per accounting records 10,000 units for 100 each.

Let us assume the following scenarios:

- Actual physical inventory count: 9,800 units
- Actual physical inventory count: 10,200 units

- Actual physical inventory count: 10,000 units

Required:

- Compute the inventory variances for each scenario and provide the journal entry (adjustment) needed for each case?

Exercise 03:

A manufacturing company produces Product A_1 and A_2 using two raw materials (M_1 and M_2).

- Raw Material Purchases
- Material M_1

Date	Activity	Units	Unit Cost
Jan 1	Beginning Inventory	500	10
Jan 5	Purchase	300	11
Jan 15	Purchase	400	12
Total Purchased		700	

- Material M_2

Date	Activity	Units	Unit Cost
Jan 1	Beginning Inventory	400	8
Jan 8	Purchase	250	9
Jan 18	Purchase	300	10
Total Purchased		550	

Each product (Total) requires the following raw materials, direct labor and overhead expenses.

Product	M_1 Used (Units)	M_2 Used (Units)	Direct Labor	Manufacturing Overhead
A_1	250	200	10,000	7,500
A_2	200	150	8,000	6,000

Note the company uses raw materials for A_1, then A_2

Physical inventory counts found discrepancies in raw materials:

Material		Physical Inventory (units)
M_1		730
M_2		580

Beginning Inventory for Finished Goods A1 and A2

Product	Beginning Inventory (Units)	Cost per Unit
A_1	50	12.
A_2	40	11.
Total	90	-

Ending Inventory for Finished Goods

Product	Ending Inventory (Accounting)	Ending Inventory (Physical)
A_1	80	78
A_2	60	63

Revenue from Sales

A_1: 220 units sold @ 150 each

A_2: 180 units sold @ 140 each

Required:

1. Compute the cost of materials purchased?
2. Prepare the inventory card template for $M_1, and\ M_2$ using FIFO Method?
3. Compute the cost of finished goods manufactured?
4. Prepare the inventory card template for $A_1\ , and\ A_2$ using FIFO method?
5. Compute the final cost? Managerial accounting gross income? And net income if imputed expenses are 24000 and non-considered expenses are 80000?
6. Compute financial accounting net income?

Chapter 02- ……..……..Introduction to Inventories

Exercise 04:

A manufacturing company produces Product A_1 and A_2 using two raw materials (M_1 and M_2).

Raw Material Purchases

- Material M_1

Date	Activity	Units	Unit Cost
Jan 1	Beginning Inventory	500	10
Jan 5	Purchase	300	11
Jan 15	Purchase	400	12
Total Purchased		700	

- Material M_2

Date	Activity	Units	Unit Cost
Jan 1	Beginning Inventory	400	8
Jan 8	Purchase	250	9
Jan 18	Purchase	300	10
Total Purchased		550	

Each product (Total) requires the following raw materials, direct labor and overhead expenses.

Product	M_1 Used (Units)	M_2 Used (Units)	Direct Labor	Manufacturing Overhead
A_1	250	200	10,000	7,500
A_2	200	150	8,000	6,000

Chapter 02- ……..……..Introduction to Inventories

Physical inventory counts found discrepancies in raw materials:

Material		Physical Inventory (units)
M_1		730
M_2		580

Beginning Inventory for Finished Goods A1 and A2

Product	Beginning Inventory (Units)	Cost per Unit
A_1	50	12.
A_2	40	11.
Total	90	-

Ending Inventory for Finished Goods

Product	Ending Inventory (Accounting)	Ending Inventory (Physical)
A_1	80	78
A_2	60	63

Revenue from Sales

A_1: 220 units sold 150 each

A_2: 180 units sold @ 140 each

Required:

1. Compute the cost of materials purchased?
2. Prepare the inventory card template for $M_1, and\ M_2$ using weighted average cost method for all inputs method?
3. Compute the cost of finished goods manufactured?
4. Prepare the inventory card template for $A_1\ , and\ A_2$ using weighted average method?
5. Compute the final cost? Managerial accounting gross income? And net income if imputed expenses are 24000 and non-considered expenses are 80000?
6. Compute financial accounting net income (reconcile both net income)?

Chapter 03:
Support Department Cost Allocation Method

Chapter 03: Support-Department Cost Allocation Method

How a company allocates its overhead and internal support costs- costs related to marketing, advertising, accounting, and purchasing- among its various production departments or projects, can have a big impact on how profitable those departments or projects are.

While the allocation won't affect the firm's profit as a whole, if the allocation is not done properly, it can make some departments (and their mangers) look better or worse than they should profit-wise.

In this lecture, we examine the special cost allocation problem that arises when two or more of the support departments whose costs are being allocated provide reciprocal support to each other as well as to operating departments, requiring three steps process:

1. **Step A**: trace or allocate each cost to various support and operating departments.
2. **Step B**: Allocate plant or corporate-level administration costs to other support departments and operating departments.
3. **Step C**: Allocate support department costs to operating departments.

Before we break down these 3 steps we need to tackle the concept of allocation base.

3.1 Allocation base:

An allocation base has a direct cause-and effect relation with the cost incurred. That ideal is unlikely to be met. At a minimum, however, an allocation base needs to be measured for each cost object before it can be used to allocate the manufacturing overhead. To do the allocation, we need to determine the cost per ***predetermined overhead rate*** for manufacturing overhead.

$$\boldsymbol{cost\ of\ overhead\ rate} = \frac{\text{overhead of cost object (department)}}{\text{Allocation base}}$$

Example:

Let us assume that the manufacturing overhead of a company is 200 000. The allocation base is direct labor. 5000 direct-labor hours have incurred.

Calculate the cost of overhead rate?

Solution:

$$\boldsymbol{cost\ of\ overhead\ rate} = \frac{200000}{5000} = 40\ per\ direct\ labor$$

3.2 Choosing among allocation bases:

As we said earlier, the allocation base we choose ideally reflects direct cause-and-effect relation between overhead costs incurred and the activity presented by the allocation base. To do that we can analyze the overhead accounts to determine which allocation base seems to be most highly related to overhead. For example, if a large portion of the overhead accounts are employees related and affected by the wage rate (or seniority) of the employees, direct labor cost would be the better allocation base. If the costs are largely determined by the labor activity regardless of the seniority or skills of the employees, direct labor-hours would be the better choice.

Another approach is to estimate the correlation between overhead cost and activity using statistical analysis. There is no single, obviously 'right' choice in this case because by definition, there is no direct relation between activity and overhead cost that is economically feasible to measure. If such a direct relation existed, we would not classify these costs as overhead.

3.3 Allocating costs of Multiple support department

3.3.1 Step A: trace or allocate each cost (accounts of class 6) to various support and operating departments:

In this step costs are traced and allocated to different support departments and operating departments, usually we get these costs (accounts of class 6) from financial accounting.

Let us consider the following example for a company XYZ that has three support departments and three operating departments.

First, we get different costs by nature from financial accounting then we allocate these costs to all support and operating departments.

Costs by nature	Total
Plant's manager salary	101333
Maintenance	220,000
External services	140,000
supervision salaries	200,000
Taxes	80,000
Depreciation	180,000
Rent, Utilities and insurance	160,000
Total manufacturing overhead	**1,081,333**

As we have highlighted in step A, costs are traced and allocated to various support and operating departments, in our example step A for company XYZ would be as the following:

	Support Departments			Operating Departments			
Costs By Nature	Plant administration Department	Engineering And Production Control Department	Materials management Department	Machining Department	Assembly Department	Distribution Department	Total
Plant's manager salary	142000						142000
Maintenance		15%	15%	30%	35%	5%	220000
External services		2	1	2	2	3	140000
supervision salaries		30%	15%	25%	25%	5%	200000
Taxes		10%	10%	15%	15%	50%	80,000
Depreciation	1	1	1	3	3	1	180,000
Rent, Utilities and Insurance	$200m^2$	$1000m^2$	$1200m^2$	$3500m^2$	$2500m^2$	$1600m^2$	160,000
Total manufacturing overhead							1,122,000

This allocation (step A) is called ***Initial Allocation*** of costs to support and operating departments. Recall that tracing is the process of associating costs to cost objects based on cause-effect relationship.

Step A	Support Departments			Operating Departments			
Costs by nature	**Plant administration Department**	**Engineering And Production Control Department**	**Materials management Department**	**Machining Department**	**Assembly Department**	**Distribution Department**	**Total**
Plant's manager salary	142,000						**142,000**
Maintenance		33,000	33,000	66,000	77,000	11,000	**220,000**
External services		28,000	14,000	28,000	28,000	42,000	**140,000**
Supervision salaries		60,000	30,000	50,000	50,000	10,000	**200,000**
Taxes		8,000	8,000	12,000	12,000	40,000	**80,000**
Depreciation	18,000	18,000	18,000	54,000	54,000	18,000	**180,000**
Rent, Utilities and insurance	32,00	16,000	19,200	56,000	40,000	25,600	**160,000**
Total manufacturing overhead	**163,200**	**163,000**	**122,200**	**266,00**	**261,000**	**146,600**	**1,122,000**

3.3.2 Step B: Allocate plant or corporate-level administration costs to other support departments and operating departments

In step B plant and corporate level administration costs are allocated to other support and operating departments. In this example costs associated with the plant administration department must be allocated to other departments in the manufacturing organization. Because the role of plant administration is to support the supervision in each department, its costs are allocated based on each operating department's relative share of supervision salaries.

for the Engineering and materials management departments the allocation will be 97000 and 20000 respectively.

For operating departments

The allocation rate is calculated as the following:

$$plant\ administration\ allocation\ rate = \frac{163200 - (97000 + 20000)}{(50000 + 50000 + 10000)} = 0.42$$

For the machining department the allocation would be $0.42 * 50000 = 21000$

For the assembly department the allocation would be $0.42 * 50000 = 21000$

For the distribution department the allocation would be $0.42 * 10000 = 4200$

Step A	Support Departments			Operating Departments			
Costs by nature	**Plant Adm Dep**	**Engineering And Production Control Department**	**Materials management Dep**	**Machining Department**	**Assembly Department**	**Distribution Dep**	**Total**
Plant's manager salary	142,000						**142,000**
Maintenance		33,000	33,000	66,000	77,000	11,000	**220,000**
External services		28,000	14,000	28,000	28,000	42,000	**140,000**
Supervision salaries		60,000	30,000	50,000	50,000	10,000	**200,000**
Taxes		8,000	8,000	12,000	12,000	40,000	**80,000**
Depreciation	18,000	18,000	18,000	54,000	54,000	18,000	**180,000**
Rent, Utilities and insurance	3,200.00	16,000	19,200	56,000	40,000	25,600	**160,000**
Total manufacturing overhead	**163,200.00**	**163,000.0**	**122,200**	**266,000**	**261,000**	**146,600**	**1,122,000**
Step B Allocation of Plant Adm	-163,200	97,000	20,000	21,000	21,000	4,200	
	0	**260,000**	**142,200**	**287,000**	**282,000**	**150,800**	**1,122,000**

The allocation adjusted amounts at the bottom of the schedule are now used as the basis for allocating service department overhead costs to the operating departments in the next step, step C, of the allocation process.

3.3.3 Step C, Allocate support department costs to operating departments:

There are three methods that we can use to allocate costs from the support department to operating departments.

Note: that the total costs of the Engineering and production control department will be allocated to different operating departments on the basis of engineering salaries. While the costs of materials management department are allocated on the basis of total overhead costs of operating departments.

3.3.3.1 Step C: Direct Method:

Step C- Direct Method	Support Departments		Operating Departments			
Costs by nature	**Engineering And Production Control Department**	**Materials management Department**	**Machining Department**	**Assembly Department**	**Distribution Department**	**Total**
Overhead costs	**260,000**	**142,200**	**287,000**	**282,000**	**150,800**	**1,122,000**
Allocation of Eng, Pro cont and Dist dep(5/11, 5/11, 1/11)	(260,000)		118,182	118,182	23,636	
Allocation of Materials dep allocated based on total overhead costs of operating dep		(142,200)	56,698	55,710	29,791	
	0	**0**	**461,880**	**455,892**	**204,228**	**1,122,000**

Allocation base for Eng Department =

$$(50000 + 50000 + 10000) = 110000/\frac{50000}{110000} = \frac{5}{11}$$

$$\frac{10000}{110000} = \frac{1}{11}$$

Allocation base for Materials management department:

$$(287000 + 282000 + 150800) = 719800$$

$$Machining\ dep = \frac{287}{719.8}$$

$$Assembly\ dep = \frac{282}{719.8}$$

$$Distribution\ dep = \frac{150.8}{719.8}$$

Now that the three step allocation process is complete, total overhead for the machining Depart, assembly and distribution departments are, 461880, 455892, and 204228 respectively.

3.3.3.2 Step C: Step-Down Method:

Step C- Step-Down Method	Support Departments		Operating Departments			
Costs by nature	**Engineering And Production Control Department**	**Materials management Department**	**Machining Dep**	**Assembly Dep**	**Distribution Department**	**Total**
Overhead costs	260,000	142,200	**287,000**	**282,000**	**150,800**	**1,122,000**
Allocation of Eng, Pro cont and Dist dep(3/14,5/14, 5/14, 1/14)	-260,000	55,714	92,857	92,857	18,571	
	0	**197,914**	**379,857**	**374,857**	**169,371**	
Allocation of Materials dep allocated based on total overhead costs of operating dep		-197,914	78,913	77,538	41,464	
		0	**458,770**	**452,395**	**210,835**	**1,122,000**

The step-down method allocates support department costs to other support departments and to operating departments in a sequential manner that partially recognizes the mutual services provided among all support departments. The sequence or order in which costs are allocated is typically done by starting with the support departments that provides the most support to the other support departments.

3.3.3.3 Step C: Reciprocal Method:

The reciprocal method allocates support-department costs to operating departments by fully recognizing the mutual services provided among all support departments. the reciprocal method can be implemented by formulating and solving linear equations via three step process.

- **Step 1:**is to express support department costs and reciprocal relationships in the form of linear equations.
- **Step 2:** solve the set of linear equations to obtain the complete reciprocated costs of each support department.
- **Step 3:** Allocate the complete reciprocal costs of each support department to all other departments (both support departments and operating departments) on the basis of the usage percentages (based on total units of service provided to all departments

Step C-Reciprocal Method	Support Departments		Operating Departments			
Costs by nature	**Engineering And Production Control Department**	**Materials management Department**	**Machining Department**	**Assembly Department**	**Distribution Department**	**Total**
Overhead costs	**260,000**	**142,200**	**287,000**	**282,000**	**150,800**	**1,122,000**
Engi dep allocation %		50%	30%	10%	10%	
Materials dep %	40%		16%	24%	20%	

Let assume that x= total cost of Engineering and production control department

And y = total cost of Materials and management department

$$x = 260000 + 0.4y \ldots\ldots (1)$$

$$y = 142200 + 0.5x \ldots\ldots (2)$$

If we substitute equation (2) in equation (1) then solve for x:

$$x = 260000 + 0.4(142200 + 0.5x)$$

$$x = 260000 + 56880 + 0.2x$$

$$0.8x = 316880$$

$$x = 396100$$

$$y = 142200 + 0.5(396100) = 340250$$

Step C-Reciprocal Method	Support Departments		Operating Departments			
Costs by nature	**Engineering And Production Control Department**	**Materials management Department**	**Machining Department**	**Assembly Department**	**Distribution Department**	**Total**
Overhead costs	**260,000**	**142,200**	**287,000**	**282,000**	**150,800**	**1,122,000**
Engi dep allocation %	-396,100	198,050	118,830	39,610	39,610	
Materials dep %	136,100	-340,250	54,440	81,660	68,050	
Total	**0**	**0**	**460,270**	**403,270**	**258,460**	**1,122,000**

3.4 Intermediate Product:

the product or service transferred between subunits of an organization is called an intermediate product. This product may either be further worked on by the receiving subunit or, if transferred from production to marketing, sold to an external customer.

3.4.1 Calculating The Cost Of Intermediate Product (transfer price)

There are three broad categories of methods for determining the cost of Intermediate products, However, we are going to focus on the (transfer prices) method.

> Cost-based transfer price: Internal prices are equal to variable production costs and fixed costs or the full cost of production, in other words the cost of production will be calculated the same way as we do for finished goods using the following formula:

$$\textbf{the cost of intermediate product} = the\ cost\ of\ materials\ used + manufacaturing\ \ costs\ (direct + indirect)$$

Once the company has calculated the cost incurred to produce intermediate products or services, this cost will be added to the cost of producing finished goods as the following:

$$\textbf{Cost of finished goods} \quad = cost\ of\ materials\ used + \ cost\ of\ Intermediate\ product + manufacaturing\ \ costs\ (direct + indirect)$$

Example:

Company EL Izdihar produces two finished products A_1 , A_2, and Intermediate product C in two different departments. Intermediate product C is produced in department 01 using M_1, M_2.while finished products A_1 , A_2, are produced in Department 02, using intermediate product C and materials M_1, M_2.

The following date are provided to you for the month of September 2022.

1. Purchases:

- Raw materials M_1, 8000 kg for 40 each.
- Raw materials M_2, 10000 kg for 80 each.
- Purchase expenses 10% of total purchases.

2. Production and consumption:

- Department 01 produced: 1000 units of product (C), using 2000 kg of M_1, and 4000 kg of M_2.
- Department 02: produced 500 units of finished product A_1 , using 500 units of intermediate products (C), and 1500 kg of M_1, 1800 kg of M_2.
- Department 02: Produced 400 units of finished product A_2 , using 400 units of intermediate products (C), and 1200 kg of M_1, 1500 kg of M_2.
- The total manufacturing costs are 453360, in which 88800 is allocated to intermediate product C , 138560 for A_1 , and the rest for A_2 .

3. Sales:

- 400 units of finished product A_1 , for 1500 each.
- 350 units of finished product A_2 , for 1600 each.
- Total distribution costs are 150000 allocated to A_1 , A_2 on the basis of quantity sold.

Required:

1. Compute the cost of materials purchased.
2. Compute the cost of intermediate product C.
3. Compute the cost of finished goods A_1 , A_2 .
4. Compute the final cost and find management accounting Income?

Solution:

1. **Cost of materials purchased**

cost of Materials purchased	M1	M2
purchase 8000*40//10000*80	320000	800000
Purchase expenses 320000*0.1//800000*0.1	32000	80000
total cost of materials purchased	**352000**	**880000**
quantity purchased	8000	10000
Unit cost	**44**	**88**

2. **Cost of Intermediate product:**

Cost of Intermediate product	**C**
cost of materials used	88,000
M1: 2000*44//M2: 4000*88	352,000
Manufacturing costs	88,800
Cost of intermediate product	**528,800**
Quantity	1,000
Unit cost	**529**

3. **Cost of goods manufactured:**

Cost of goods Manufactured	**A1**	**A2**
cost of materials used M1: 1500*44//1200*44	66,000	52,800
M2: 1800*88//1500*88	158,400	132,000
Intermediate product 500*529//400/529	19,200	28,800
Manufacturing costs	138,560	226,000
Cost of goods manufactured	**382,160**	**439,600**
Quantity	500	400
Unit cost	**764.32**	**1099**

4. **Final cost:**

Final Cost	**A1**	**A2**
cost of goods manufactured and sold A1: 400*764.32//350*1099	305,728	384,650
Distribution cost	80,000	70,000
150000*400/750//150000*350/750		
Final Cost	**385,728**	**454,650**
sales	600,000	560,000
400*1500//350*1600		
Management Income	**214,272**	**105,350**
Total Income	**319,622**	

3.5 Work in process:

It consists of units of product or service that are only partially completed and will require further work to be completed. The cost of work in process will be recorded in account/33 or a/34 work in process inventory in financial accounting. However, the cost of work in process or the accuracy of the completion estimate depends on the care, skill and experience of the estimator.

Estimating the degree of completion is usually easier for direct material costs than for conversion costs, because the quantity of direct materials in partially completed units can be measured more accurately. In contrast the conversion sequence usually consists of a number of operations, each for a specified period of time, at various steps in the production process. It is a challenge for management accountants to make this estimate accurately. Sometimes the concept of ***equivalent units*** (we will explain this notion in greater detail in another advanced class of management accounting) is used to determine the cost of work in process inventory.

3.5.1 Treatment of work in process inventory

The treatment of work in process inventory cost is mainly related to the Beginning and Ending work in process inventory.

- For the cost of the Beginning work in process is considered as an expense that must be added to the cost of finished goods manufacture.
- In contrast we subtract the cost of Ending work in process from the cost of finished goods manufactured to calculate the cost of fully completed units only for the period.

$$\textbf{Cost of goods manufactured} = Beginning\ work\ in\ process + cost\ of\ goods\ manufctured\ incurred\ for\ the\ period - Ending\ work\ in\ process$$

Chapter 03 Practice Problems

Exercise 01:

The manufacturing overhead expenses for a company for the month of March 2024 were provided to you:

Financial Account (class 06)	**Total Cost**	**Allocation Basis**	**Total Units (Base)**
Salaries	250,000	Number of Employees	100
Rent & Utilities	100,000	Floor Area Used (m²)	10,000
Depreciation of Machines	80,000	Machine Usage (Hours)	8,000
IT Equipment & Software	50,000	Direct Assignment to IT	-
Maintenance Supplies	50,000	Direct Assignment to Maintenance	-

The number of allocation rate units for each department is as follows:

Financial Account	Allocation Basis	Total Cost	Maintenance	IT Services	Assembly	Finishing
Salaries	Number of Employees	**250,000**	15	15	40	30
Rent & Utilities	Floor Area (m²)	**100,000**	1500	1500	4000	3000
Depreciation of Machines	Machine Usage (Hours)	**80,000**	500	500	4000	3000
IT Equipment & Software	Direct to IT Services	**50,000**		100%		
Maintenance Supplies	Direct to Maintenance	**50,000**	100%			
Total Cost Before Step-Down		**530,000**				

Note: the supporting departments Maintenance and IT services are allocated to operating departments as follows:

Supporting departments	Allocation Basis	Assembly	Finishing
Maintenance Allocation	Machine Hours	4000	3000
IT Services Allocation	Number of Employees	40	60

Required:

- Calculate the allocation rates
- Prepare the table of manufacturing overhead using direct method?

Assume the supporting department are allocated as follows:

Supporting departments	Allocation Basis	IT services	Assembly	Finishing
Maintenance Allocation	Machine Hours	500	4000	3000
IT Services Allocation	Number of Employees		40	60

- Prepare the table of manufacturing overhead using the step-down method?

Exercise 02:

If the manufacturing overhead expenses of **Company A** for the month of May were provided as follows:

Category	Adm	Maint	Supply	Dept 01	Dept 02	Distribution
Initial Allocation (DZD)	16,530	42,600	35,630	58,290	40,800	10,550
Allocation from Administration	-	10%	10%	40%	30%	10%
Allocation from Maintenance	10%	-	10%	40%	40%	0%
Overhead Allocation Basis	-	-	Kg purchased	Kg materials used	Direct labor hours	100 DZD of sales

Given Data:

- ✓ Purchases: 16,880 kg of raw materials.
- ✓ Cost of materials used for the month: 281,900 DZD (14,095 kg used by Department 01).
- ✓ Direct costs: 5,415 hours for Department 02 at 50 DZD per hour.
- ✓ Imputed expenses: 45,000 DZD.
- ✓ Non-considered expenses: 25,000 DZD.
- ✓ Sales: 575,000 DZD.

Required:

- Prepare the table of manufacturing overhead?
- Compute the total financial accounting expenses?

Exercise 03:

Company XY produces finished products A_1, A_2, and ½ Intermediate product B using raw materials M_1, M_2, and M_3 in two departments. For November 2022, the following data were provided:

Production:

- A_1: Each unit consumes 1.5 kg of M_1, 2.5 kg of M_2, and 0.08 units of B.
- A_2: Each unit consumes 2 kg of M_1, 2 kg of M_2, and 0.08 units of B.
- B: Each unit consumes 1.2 kg of M_3.

Direct Manufacturing Costs

- A_1: 140,000 DZD
- A_2: 230,000 DZD
- B: 60,000 DZD

Beginning Inventory

Material/Product	Quantity	Total Cost (DZD)	Cost per Unit (DZD)
M_1	500 kg	105,000	210
M_2	320 kg	42,240	132
M_3	20 kg	9,000	450
A_1	100 units	115,000	1,150
A_2	20 units	43,600	2,180
B	20 units	9,000	450

Purchases

Material	Quantity	Price per kg (DZD)	Total Cost (DZD)
M_1	1,700 kg	215	365,500
M_2	2,800 kg	130	364,000
M_3	110 kg	440	48,400

Quantity Produced

Product	Units Produced
A_1	400
A_2	600
B	80

Sales

Product	Units Sold	Selling Price per Unit (DZD)
A_1	450	2,000
A_2	580	2,500

Manufacturing overhead expenses were provided to you in the following table, given that imputed expenses 45000 and non-considered costs are 25000

Category	Admin	Maint	Supply	Dept 1	Dept 02	Distribution
Initial Allocation (DZD)	16,530	42,600	35,630	58,290	40,800	10,550
Reciprocal Allocation of Overheads			-	-	-	-
Allocation from Administration	-	10%	10%	40%	30%	10%
Allocation from Maintenance	10%	-	10%	40%	40%	-
overhead unit			Kg purchased	Direct labor hours	Quantity produced	Quantity sold

Physical Ending Inventory

Material/Product	Ending Quantity
M_1	205 kg
M_2	798 kg
M_3	25 kg
A_1	48 units
A_2	43 units
B	20 units

Additional Information

- Direct Labor Hours Used in Department 01:
  - A_1: 300 hours
  - A_2: 750 hours
- Weighted Average Method is used for inventory valuation.

Required:

- Prepare the table of manufacturing overhead expenses?
- Compute management accounting gross income?
- Prepare inventory cards for $M_1, M_2, B, A_1, A_2,$

- Compute management accounting net income?
- Compute the financial accounting net income?

Chapter 04:
Residuals Scrap and Byproduct

Chapter 04: Residuals, Scrap and Byproducts

4.1 Residuals and Scrap

Residuals, Scrap or waste refer to residual materials that result from manufacturing process, these residuals could be units of production that do not meet the specifications required by customers or waste materials, the company can throw away these residuals (because of incorrect cuts or defective materials) reused them as direct materials or sold them as scrap.

Residuals and Scrap are common to all manufacturing companies, managers focus their attention on ways to reduce residuals and scrap and to use it more profitably, especially when the value of residuals and Scrap is high.

4.2 Cost treatment of residuals and scrap

In general, we discuss three cases of residuals and Scrap costs:

a. **residuals and scrap that will be thrown away**: In this case residuals and scrap have no value, and they don't influence the cost of products and services, but the company usually bears expenses (transportation for example) to throw away these residuals and scrap.
The formula used to calculate the cost of finished goods in this case is:

$$\textbf{Cost of intermediate or finished goods} = manufacturing\ costs\ (direct\ and\ indirect) + \ diposal\ \ cost\ of\ scrap$$

b. **residuals and scrap that will be reused:** In this case the residuals and scrap could be treated separately as" unique products" or could be integrated into the manufacturing process, therefore the cost treatment of these kind of residuals and scrap depends on the

Cost of intermediate or finished goods= manufacturing cost for the period – cost of residuals and scrap reused

Cost of residuals and scrap = Initial costs + conversion costs

c. **Residuals and scrap that will be sold:** in case residuals and scrap are sold, they will be treated as revenues that can reduce the cost of finished goods, therefore the cost of these residuals and scrap will be deducted from the cost of finished goods and products.

Cost of finished goods = manufacturing costs (direct and indirect)- cost of producing residuals and scrap

Cost of producing residuals and scrap = selling price –distribution expenses and margins – cost of conversion

Example:

IRAMA company produces only one finished product x, during the manufacturing process the company will get the following:

C_1: Scrap that will be thrown away

C_2: Scrap that will be sold

C_3: Scrap that will be reused

During the month the manufacturing department consumed the following:

- 28000 kg of raw materials for a total of 160000.
- 300 kg of manufacturing supplies for a total of 22400.
- 1200 kg of C_3 for 4 per kg
- Direct labor 100000
- Indirect manufacturing overhead 31840

During the month the company produces 25000 kg of finished goods x, 1200 kg of C_1, 500 kg of C_2, and 1250 kg of C_3.

Cost of C_1 disposal is 160

C_2: will be sold in the market for 1.6 per kg given that scrap

$C_2 = selling\ price - (distribution\ expenses + profit\ margin)$

Note: Distribution expenses and profit margin are equal to 40% of the selling price.

C_3: will be reused, recall that its price in the market is 4/kg.

Required: compute the cost of finished product x only.

Solution:

	treatment	Amount
C_1: thrown away	add disposal cost	160
C_2: sold	deduct the cost of scrap (500*1.6)*0.6	480
C_3: reused	deduct the cost of scrap (1250*4)	5000

Cost of finished product	
Raw materials used	160000
manufacturing supplies	22400
Direct labor	100000
manufacturing overhead	31840
C1 Scrap disposal	160
C2 scrap sold	-480
C3 scrap reused	-5000
scrap reused for finished product (1200*4)	4800
Cost of finished product	**313720**
Quantity	25000
Unit cost	**12.55**

Example 02:

Company Izdihar produces 500 units of finished goods using a total of 125000 of raw materials and 225000, 50000 direct labor and manufacturing overhead respectively. During the Quality inspection the inspector found 20 defective units, the company spent 60 DZD per unit for the defects then sold them for 750/ each assuming 8% profit margins and distribution expenses.

1. What is the cost of rework?
2. What is the cost of finished goods?

Solution:

1. **Cost of rework:**

Rework (20*750)	15000
Margin and distribution exp (15000*0.08)	-1200
Cost of conversion (60*20)	-1200
Cost of rework	**12600**

2.

Cost of finished product	
Raw materials used	125000
Direct labor	225000
manufacturing overhead	50000
cost of rework	-12600
Cost of finished product	**387400**

4.3 Byproduct (joint product, derivative product…)

Producing ethanol requires a significant amount of corn, but not all of that corn winds up in the ethanol that gets blended into gasoline and sold at service station, the residues from corn creates a secondary products including distillers (dried grain and gluten), this separation point, where outputs become distinctly identifiable is called split-off point.

Treatment of byproduct:

Accountants refer to these secondary products as byproducts, Ethanol byproducts like animal feed and gluten are accounted for by deducting the profit margin + distribution expenses from the selling price then, deducting other manufacturing expenses to get the cost of byproduct, this cost in turn will be deducted from the cost of finished goods manufactured to get the cost of main product.

Cost of main product = manufacturing cost of the period - cost of by product

Cost of by product = selling price -profit margins and distribution expenses- other manufacturing costs

Example:

Company Costco produces finished product (A) which is the main product and byproduct C, the company recorded the following expenses:

- Raw materials: 874500.
- Direct labor: 225000
- Manufacturing overhead: 70000

The company produces 7000 units of (A) and 7600 units of (C).

Other conversion steps were added to the byproduct (c), so it can be sold in the market, the conversion costs recorded are:

- Direct Labor: 33000 DZD
- Manufacturing 4500 DZD
- Byproduct (c) sold for 30 per unit assuming profit margin and distribution costs are 25% from the selling price.

Required:

What is the cost of the main product (A) only?

Solution:

Cost of finished product +by product	
Raw materials used	874,500
Direct labor	225,000
manufacturing overhead	700,000
Cost of finished product + byproduct	**1,799,500**

Cost of by product	
Selling price (7600*30)	228,000
Deduct: Margin and distribution expenses (228000*0.25)	-57,000
Deduct: Direct labor	-33,000
manufacturing overhead	-4,500
Cost of byproduct	**133,500**

Cost of Main product A	
Cost of finished product +byproduct	**1,799,500**
Cost of byproduct	133,500
Cost of main product A	**1,666,000**

Chapter 04 Practice Problems

Exercise 01:

A manufacturing company produces finished product (A), and byproduct (B). In Department (1) preparation department where raw materials M_1, M_2 are treated according to the following percentages:

1 kg of M_1 for 2kg of M_2, waste and scrap C_1 will be sold, waste and scrap C_2 is considered as an expense for the company as it will be thrown away.

The ½ intermediate product (E) produced at department (1) and will be redirected immediately to department (2). The byproduct is treated in department (3) so it can be sold in the market. And the following data is provided to you:

1. Table of manufacturing overhead:

	Adm	Maintenance	Supplies	Supply	Dep 01	Dep02	Dep 03	Dist
Initial allocation	96000	100200	53400	73125	122120	176280	53100	34140
Allocation of Adm	0	1	2	3	3	4	2	5
Allocation of Maintenance	-	-	1	2	1	1	1	4
Allocation of supplies	-	2	-	1	3	2	1	1

expenses of the supply department are allocated as the following: 1/3 for M_1, 2/3 for M_2.

Distribution expenses will be allocated for product (A) and (B) as the data below indicates.

2. Beginning inventory:
   - $M_1 = 8500\ kg\ for\ a\ total\ 56905.$
   - $M_2 = 16000\ kg\ for\ a\ total\ of\ \ 76400.$
   - $finished\ goods\ product\ (A) = 600\ units\ for\ total\ of\ 83282.$
3. Purchases:
   - M_1: 27500 kg for a total of 158300.
   - M_2: $54000\ for\ a\ total\ 189350.$
4. Direct labor:
   - Department (1): 93780 DZD, Department (2) 45000, Department (3) 15400.

5. Sales:
   - Finished Product (A): 5200 units for 220 each.
6. Ending inventory:
   - M_1: 5880 kg
   - M_2: 9760 kg
   - $product\ (A)$: 790 kg

Data related to departments:

Department (1): a total of 18 kg of M_1 and M_2 is processed to produce 1 unit of the ½ intermediate product (E). C_1 is sold for 30300 DZD the sale of C_1 resulted in 2229.5 of expenses, these expenses won't be considered in distribution department, the difference is considered the cost of producing C_1. C_2 Scrap generates expenses of 3768.5.

The company produced 5000 units of the ½ intermediate product (E).

Department 02: there is, a Beginning work in process of 144000 and an Ending work of process of 100000 the company produced 5400 units of finished product (A).

Department 03: the byproduct (B) is treated and sold for 120000 DZD. The sale of byproduct won't generate any profit or losses.

Indirect distribution expenses for the byproduct (B) is 18940 DZD.

Note: the company uses the weighted average method to value its inventory.

Required:

1- Find management accounting income?
2- Find financial accounting income?

Exercise 02:

A company produces finished product (A) and byproduct (B).

- Department 01 treats materials M1 and M2 to produce intermediate product (E), generating scrap C_1 (sold) and scrap C_2 (disposed).

- Department 02 uses intermediate product (E) to produce finished product (A) and byproduct (B).
- Department 03 treats byproduct (B) to make it marketable.

the manufacturing overhead table is as follows

	Adm	Maint	Supply	Dept 01	Dept 02	Dept 03	Distribution
Initial Allocation	83,130	129,000	135,200	268,500	215,000	94,300	59,750
Allocation of Adm	-	10	10	40	30	10	
Allocation of Maintenance	10	-	10	40	40	-	

Supply indirect expenses will be allocated 2/5 to M1 and 3/5 to M2

Inventory Data

Item	Beginning Inventory	Ending Inventory
M1	4,500 kg for 135,000	2,100 kg
M2	8,200 kg for 131,500	3,150 kg
Intermediate Product (E)	1,200 units for 360,000	600 units
Finished Product (A)	950 units for 450,000	600 units

Purchases

- M1: 14,200 kg for 355,400 DZD
- M2: 27,800 kg for 365,100 DZD

Direct Labor

- Department 01: 3,300 hours
- Department 02: 2,300 hours
- Department 03: 550 hours
- Each hour costs 40 DZD for all departments.

Sales

- 4,300 units of Product (A) for 515 DZD each.

Additional Information

Department 01

- Consumes 16,500 kg of M1 and 33,000 kg of M2 to produce Intermediate Product (E).
- Scrap C_1 sold for 48,500 DZD.
- Scrap C_2 disposal expenses: 6,400 DZD.
- Total Intermediate Product (E) produced: 4,200 units.

Department 02

- Beginning Work in Process: 81,500 DZD.
- Ending Work in Process: 89,300 DZD.
- Consumes 4,800 units of (E) to produce 4,000 units of (A).

Department 03

- Processes byproduct (B).
- Cost of Byproduct (B) at Split-Off Point: 59,500 DZD. Assume the byproduct (B) will not generate any profit or loss for the company

Notes:

3. The company uses **FIFO** for inventory valuation.

Required:

1. Prepare the manufacturing overhead table.
2. Compute the cost of materials purchased.
3. Calculate the cost of intermediate product (E).
4. Determine the cost of finished goods manufactured (A + B).
5. Find the cost of finished goods (A) only.
6. Compute the final cost and management accounting income**.**

Chapter 05:
Variable Cost and Cost-Volume-Profit Analysis Method

Chapter 05: Variable Costs and Cost-Volume-Profit Analysis Method

5.1 Cost Behavior

Understanding how costs behave is valuable technical skill. Managers look to management accountants to help them identify cost drivers, estimate cost relationships, and determine the fixed and variable components of costs.

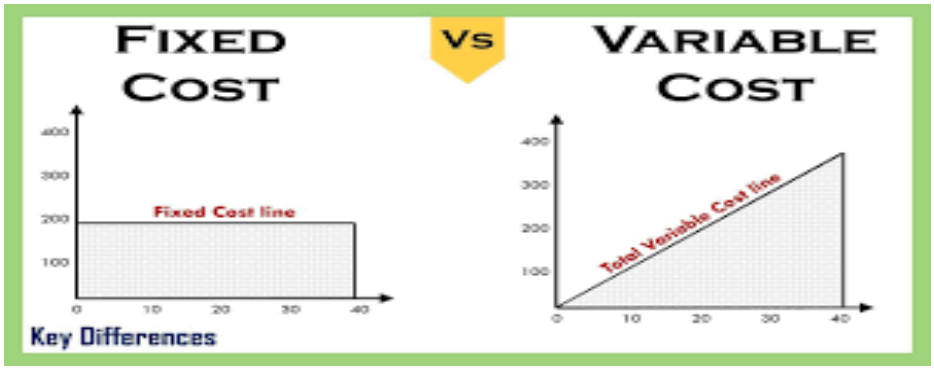
Suppose a company decides to change the volume of a company's activity, in this case several questions one might ask:

- How much will our costs increase?
- How much our cots will decrease?

To answer these questions, we need to understand which costs are **variable costs**, and which costs are **fixed costs.** Costs are defined as variable or fixed with respect to a specific activity and for a given time period.

a. **Variable costs:** changes in total in proportion to changes in the related level of activity or volume. If the activity is producing finished goods variable costs typically include direct materials, direct labor and other direct manufacturing overhead.
b. **Fixed costs:** remain unchanged in total for a given time period, despite wide changes in the related level of total activity or volume.

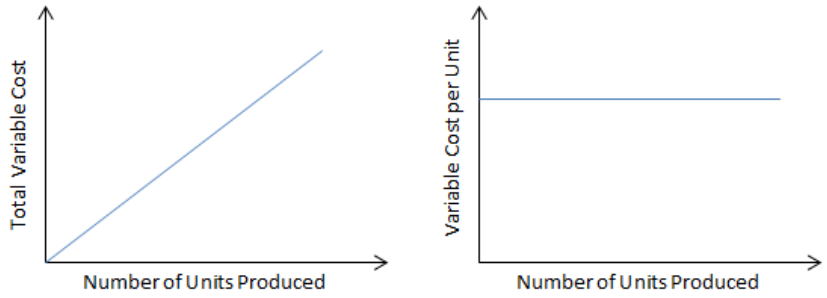
Figure 5.1 Total variable costs Vs Total fixed costs



It is important to understand the way in which variable and fixed costs behave on a per unit basis. In general variable cost per unit remains the same as the level of activity changes, in

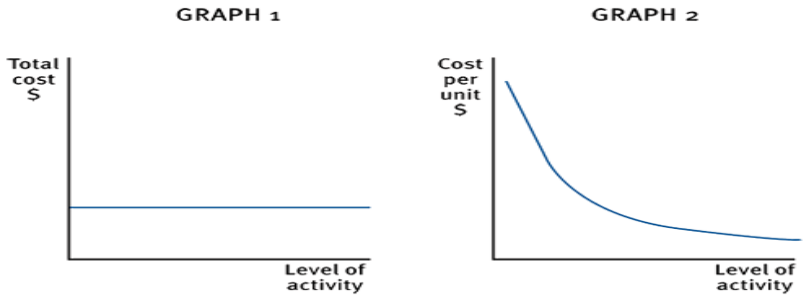
contrast fixed cost per unit decreased as the level of activity increases and vice versa, because the fixed costs are allocated over an increasing or decreasing number of units produced.

Figure 5.2: Variable costs per unit graph shape:



As we can see the total number of variable costs increase as the total of activity increases, in contrast the variable cost per unit remains the same despite changes in the activity level.

Figure 5.3: Fixed costs per unit graph shape:

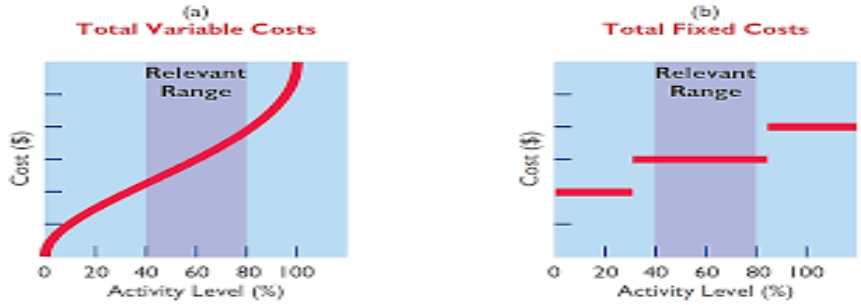


As we can see the total fixed costs remain the same as the level of activity changes, but fixed costs per unit decrease as the level of activity increases.

Cost driver: is a variable or any factor that causes changes (either way increase or decrease) in the total costs over a given time span.

Relevant range: activity levels within which a given total fixed costs or unit variable cost will be unchanged.

Figure 5.4 Total variable costs Vs Total fixed costs



5.2 Cost Function

Managers usually need to develop an accurate picture of cost behavior through cost functions.

A cost function is a mathematical description of how changes with changes in the level of an activity relating to that cost.

A cost function can be plotted on graph where the horizontal axis (x-axis) measures the level of an activity such as quantity produced, and the vertical axis (y-axis) measures the amount of costs associated with the level of that activity.

Basic assumptions:

a. Variation in the level of a single activity (cost driver) explains the variation in the related total costs.
b. Cost behavior is approximated by a linear cost function within the relevant range.

5.2.1 variable cost function:

as we have introduced above variable costs are defined as costs that change in direct proportion to changes in cost driver in the relevant range.

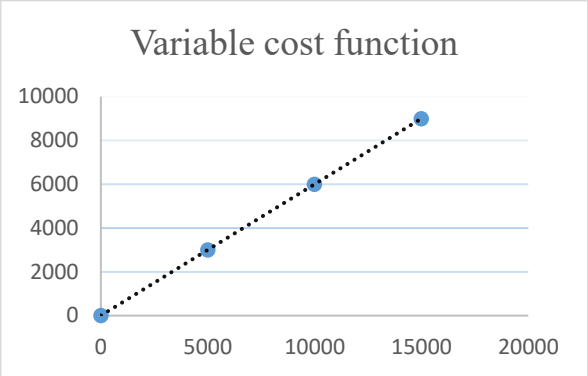
$$y = ax$$

Let us assume that a company (XYZ) produces a finished product in which total variable costs change in proportion to the number of hours. Let us assume that variable cost per an hour is 0.6 DZD, we can write the variable cost function as:

$$y = 0.6x$$

Where x : *represents the number of hours. And y measures the cost of the number of hours consumed. 0.6 represents the slope coefficient, is the amount by which total costs changes when a one-unit change occurs. The slope coefficient= rise/run*

x	y
0	0
5000	3000
10000	6000
15000	9000



5.2.2 Fixed Cost Function:

As we have seen previously fixed costs remain the same over the relevant range.

$$y = b$$

Let us assume that company (XYZ) from our previous example has total fixed costs of 40000 DZD. Thus:

$$y = 40000$$

The fixed cost of 40000 is called the intercept (constant)

5.2.3 Total cost function:

The total cost are mixed costs that include both variable costs and fixed costs.

$$y = ax + b$$

$$y = 0.6x + 40000$$

Figure 5.4 Mixed costs

5.3 Cost- Volume-Profit Analysis

Managers use cost-volume-profit (CVP) analysis to study and understand the behavior and relationship among:

- Revenues
- Costs
- Income

as changes occur in the units sold, the selling price, the variable cost per unit, or the fixed costs of a product. Using CVP, managers can not only quantify various decision alternatives, they can also assess the sensitivity of their assumptions and the results they are expected to yield.

5.3.1 Purpose of CVP analysis:

- Identify the problem and uncertainties.
- Obtain information
- Make predictions about the future.
- Make decisions by choosing among alternatives.
- Implement the decision, evaluate performance, and learn

5.3.2 Contribution Margin

Contribution margin is equal to total revenue minus total variable costs, that is:

Contribution margin $= Total\ revenues - Total\ variable\ costs$

Let us assume that XYZ company had Total revenue of 220000 and total variable costs of 84000. The company's contribution margin will be:

$$220000 - 84000 = 136000$$

The contribution margin represents the portion of total revenue that is available to cover or contribute to fixed costs and provide a profit.

- **Contribution margin per unit**
  Contribution margin can also be calculated on per-unit basis:

$$\textbf{Contribution Margin Per Unit} = Selling\ price\ per\ unit - Variable\ costs\ per\ unit$$

Assume in our previous example that the company XYZ sold 1000 units. What is the unit contribution margin?

$$220 - 84 = 136$$

- **Total contribution margin:**

Contribution margin per unit can also be used to calculate the total contribution margin by multiplying the unit contribution margin of 136 by the quantity sold.

- **Contribution margin ratio:**

The contribution margin ratio identifies the portion of each sale that remains after variable costs are covered and is calculated as the following:

$$\textbf{Contribution margin ration} = Total\ Contribution\ Margin \div Total\ Revenues$$

In our example the contribution margin ratio equals:

$$Contribution\ margin\ ration = 136000 \div 220000 = 61.8\%$$

$$or\ contribution\ margin\ ratio = 136 \div 220 = 61.8\%$$

- **Contribution margin income statement:**

Contribution margin income statement organizes costs into variable and fixed and highlights a company's contribution margin, the income statement usually presented in total, per unit basis and includes the contribution margin ratio.

Contribution Margin Income Statement		
	Total	Unit
Revenues	220,000	220
variable costs	84,000	84
Contribution margin	136,000	136
fixed costs	92,000	
Operating income	44,000	

5.4 CVP Relationships

To make a good decision managers must understand the relationship between the previous equations and the structure of the contribution margin. In general there are three methods or ways to deeply understand CVP relationships:

- The equation method.
- The contribution margin method.
- The graph method.

5.4.1Equation method:

The equation method as well as the contribution margin are commonly used and the most useful one. The equation method is expressed as the following:

$$Revenues - variable\ costs - fixed\ costs = operating\ income$$

How are revenues calculated

$$Revenues = selling\ price\ (SP) \times Quantity\ sold\ (Q)$$

The variable costs are calculated as:

$$Variable\ costs = variable\ costs\ per\ unit\ (VCU) \times Quantity\ sold\ (Q)$$

Thus,

$$\left[\begin{pmatrix}Selling\\Price\end{pmatrix} \times \begin{pmatrix}Quantity\\Solde\end{pmatrix}\right] - \left[\begin{pmatrix}Variable\ cost\\per\ Unit\end{pmatrix} \times \begin{pmatrix}Quantity\\Sold\end{pmatrix}\right] - \begin{pmatrix}Fixed\\costs\end{pmatrix} = \begin{pmatrix}Operating\\Income\end{pmatrix}$$ ….Equation 01

The equation (01) becomes the basis for calculating operating income for different quantities of units sold.

For example, if the company XYZ sells 2000 units the operating income is:

$$[(220) \times (2000)] - [(84) \times (2000)] - (92000) = 180000$$

5.4.2 Contribution Margin Method

Rearranging equation 01:

$$\left[\begin{pmatrix}Selling\\Price\end{pmatrix} - \begin{pmatrix}Variable\ cost\\per\ unit\end{pmatrix} \times \begin{pmatrix}Quantity\\Sold\end{pmatrix}\right] - \begin{pmatrix}Fixed\\Costs\end{pmatrix} = \begin{matrix}Operating\\Income\end{matrix}$$

$$\left[\begin{pmatrix}Contribution\\Margin\end{pmatrix} \times \begin{pmatrix}Quantity\\Sold\end{pmatrix}\right] - \begin{pmatrix}Fixed\\Costs\end{pmatrix} = \begin{matrix}Operating\\Income\end{matrix} \quad \text{……..Equation 02}$$

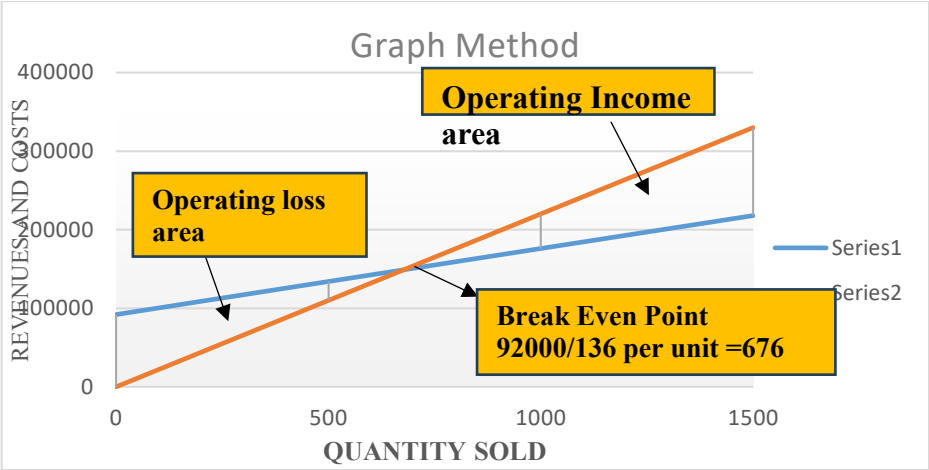
In our example the contribution margin per unit is 136 if the company XYZ sells 2000 unit the operating income is:

$$Operating\ income = (136\ \times 2000) - 92000 = 180000$$

Equation 02 expresses the basic idea we described earlier-each unit sold helps XYZ recover 136 (in contribution margin) of the 92000 in fixed costs.

5.4.3 Graph Method

In the graph method, we represent total costs and total revenues graphically. To illustrate, we will construct a Cost Volume Profit graph using XYZ company's data. We will use the x horizontal axis to plot units sold and the "Y" or vertical axis to plot DZD revenues and costs.



5.5 Breakeven point:

The breakeven point (BEP) is that quantity of output sold at which total revenue equals total costs (variable + fixed costs).

The breakeven point can be calculated using the previous formula (equation 01) of Equation Method as the following:

$$\left[\binom{Selling}{Price} \times (Q)\right] - \left[\binom{Variable\ cost}{per\ Unit} \times (Q)\right] - \binom{Fixed}{costs} = Operating\ income$$

Setting operating income equal to 0 DZD and denoting the quantity of output units must be sold by Q.

$$[(220) \times Q] - [(84) \times Q] - (92000) = 0$$

$$136Q = 92000 \Rightarrow Q = 676\ Units.$$

If the XYZ company sells fewer than 676 units the company will incur a loss, if it sells 676 units the company will break even, and if it sells more than 676 units XYZ will make profit.

- **Breakeven point (using contribution margin method):**

The breakeven point can be calculated using the contribution method (equation 02)

$$\left[\binom{Contribution}{Margin} \times Q\right] - \binom{Fixed}{Costs} = 0$$

$$Q = \frac{Fixed\ costs}{contribution\ margin\ per\ unit}$$

$$[136 \times Q] - (92000) = 0 \Rrightarrow Q = \frac{92000}{136}$$

- **Breakeven point (using contribution margin ratio)**

In practice companies usually calculate breakeven point directly in terms of revenues using contribution margin ratio, recall in our example contribution margin ratio equals 61.81%, that is 61.8% of each dinar of revenues, or 0.618 DZD, is contribution margin.

To calculate the breakeven point, fixed costs are divided by the contribution margin.

$$\text{Breakeven revenues} = \frac{fixed\ costs}{contribution\ margin\ \%}$$

In our example $\text{Breakeven revenues} = \frac{92000}{0.6181} = 148824$

5.6 Target Operating Income:

Target operating income or target profit is an essential goal for mature companies. Target profit can be calculated by asking the following question:

How many units must xyz sell to earn an operating income of specific value?

To answer the previous question, we need to set the targeted operating income of the equation method (equation 01) to specific value and then solve for Q as the following:

$$\left[\binom{Selling}{Price} \times (Q)\right] - \left[\binom{Variable\ cost}{per\ Unit} \times (Q)\right] - \binom{Fixed}{costs} = Target\ income$$

We denoted Q the unknown quantity of units XYZ must sell to earn a desired level of profit.

Let us assume that company XYZ is targeting a profit of 26592. How many units must xyz sell to achieve 26592 profits?

$$[(220) \times (Q)] - [(84) \times (Q)] - (92000) = 26592$$

$$136Q = 118592 \Rrightarrow Q = 872\ units$$

- **Target profit (using contribution method)**

The contribution margin method or equation 02 can be used to calculated the targeted sales volume required to achieve the desired level of profit.

$$\left[\begin{pmatrix} Contribution \\ margin\ \ per\ unit \end{pmatrix} \times (Q)\right] - \begin{pmatrix} Fixed \\ costs \end{pmatrix} = Target\ operating\ income$$

$$Q = \frac{Fixed\ costs + target\ operating\ income}{Contribution\ Margin\ Per\ Unit}$$

$$Q = \frac{92000+26592}{136} = 872\ units$$

- **Target profit (using contribution margin ratio)**

The contribution margin ratio also can be used to calculate the required level of revenues needed to obtain a desired level of profit.

$$Rvenues\ needed = \frac{Fixed\ costs + target\ \ operating\ profit}{Contribution\ Margin\ ratio}$$

$$Rvenues\ needed = \frac{92000+26592}{0.6181} = 191840$$

5.7 Target Net Income and Income Taxes

Net income is operating income plus nonoperating revenues (such as interest revenue) minus nonoperating costs (such as interest cost) minus income taxes. For simplicity throughout this lecture, we assume nonoperating revenues and costs = 0. Thus:

$$\textbf{Net Income} = operating\ Income - Income\ Taxes$$

In the previous CVP analysis we have ignored the effect of income taxes, in many companies, the income targets for managers is expressed in terms of net income. That's because top management wants subordinate managers to take into consideration the effects their decisions have on operating income after income taxes.

$$Target\ net\ income = \begin{pmatrix} Target \\ operating\ income \end{pmatrix} - \begin{pmatrix} Target \\ Operating\ income \end{pmatrix} \times tax\ rate$$

$$Target\ net\ income = \begin{pmatrix} Target \\ operating\ income \end{pmatrix} \times (1 - taxe\ rate)$$

$$Target\ operating\ \ income = \frac{Target\ net\ income}{(1 - taxe\ rate)}$$

Let us assume that the tax rate for xyz is 25% using the equation above what is the target operating income if the selling price is 220 VCU= 84 and fixed costs = 92000 and the target net income is 19940.

$$Target\ operating\ \ income = \frac{19940}{(1 - 0.25)} = 26592$$

5.8 Margin of safety:

Margin of safety is the excess of projected (or actual), sales over break-even sales level. This tells managers the margin between current sales and the breakeven point.

$$\boldsymbol{Margin\ of\ safety} = revenues\ (budgeted\ or\ actual) - Breakeven\ revenues$$

$$\boldsymbol{Margin\ of\ safety}\ (\boldsymbol{in\ units} = sales\ Q\ (budgeted\ or\ actual) - Breakeven\ Qauntity$$

Chapter 05 practice problems:

Exercise 01:

Cevital company owns and operates 06 UNO stores, and you are given the following data for 2023:

Financial Data	Amount (DZD)
Revenues	12,500,000
Fixed Costs	1,650,000
Variable Costs	9,500,000

Required:

1. Compute the operating income for the following cases:

a. A 12% increase in the contribution margin, holding revenues constant?

b. A 12% decrease in contribution margin, holding revenues constant?

c. A 4% increase in fixed costs?

d. A 4% decrease in fixed costs?

e. An 8% increase in units sold.

f. An 8% decrease in units sold.

g. A 12% increase in fixed costs and a 12% increase in units sold.

h. A 4% increase in fixed costs, and 4% decrease in variable costs.

2. Which of the following yields the highest operating income? Explain why.

Exercise 02:

Let us assume that xy company has the following data for the year 2023:

Sales	100,000
Variable costs	62,500
Fixed costs	26,250

Requirements:

1- Find the operating income?
2- Find the breakeven point using (the formula method and Graph method)

Exercise 03:

Just for kids jeans company. sells blue jeans wholesale to major retailers across the country. Each pair of jeans has a selling price of 580 dzd, with 402 in variable costs of goods sold, the company has fixed manufacturing costs of 17.400.000 and fixed marketing costs of 336.000 Sales commissions are paid to wholesale sales representatives at 10% of revenues. The company has an income tax rate of 20%.

Requirements:

1. How many jeans must just for kids sell in order to break even?
2. How many pairs of jeans must the company sell in order to reach a target operating income of 3.984.000.
3. How many jeans must the company sell in order to reach a target net income of 3.984.000
4. How many jeans would the company have to sell to earn the net income in question 03 (consider each requirement independently):
   a. The contribution margin increases by 12%.
   b. the selling price increases to 590 dzd.
   c. The company outsources manufacturing to an overseas company, increasing variable costs per unit by 10 dzd. And saving 80% of fixed costs.

Exercise 04:

Suppose IRAMA Company's breakeven point is 1,500,000 DZD. Fixed costs are 900,000 DZD.

Requirements:

1. Compute the contribution margin %?
2. Compute the selling price if the variable costs are 15 DZD per unit?

3. Suppose 95,000 units are sold. Compute the margin of safety in units and in DZD?

Exercise 05:

XYZ Company sells a product for 80 DZD per unit. The variable cost per unit is 50 DZD, and total fixed costs for the period are 200,000 DZD.

Requirements:

1. Compute the contribution margin per unit and the contribution margin ratio.
2. Determine the break-even point in units and in DZD.

Exercise 06:

A company has fixed costs of 600,000 DZD. Each unit sells for 200 DZD and incurs a variable cost of 130 DZD per unit.

Requirements:

1. Calculate the break-even point in units.
2. How many units must be sold to earn a target profit of 240,000 DZD?

Exercise 07:

A company sells 5,000 units of a product at 150 DZD per unit. The variable cost per unit is 90 DZD, and fixed costs are 250,000 DZD.

Requirements:

1. Compute the margin of safety in units and in DZD.
2. If sales decrease by 15%, what will be the new operating income?

Chapter 06: Capacity Concepts and Fixed-Capacity Analysis (Rational Allocation of Fixed Costs)

Chapter 06: Capacity Concepts and Fixed-Capacity Analysis (rational allocation).

Determine the 'right' amount of spending, or the appropriate level of capacity, is one of the most strategic and most difficult decisions managers face. Because having too much capacity means the company is overestimating costs and has unused capacity. Having too little capacity means the company might underestimate the demand and the demand from customers may be unfilled.

6.1 Capacity Levels

One way to deal with this problem is to use the capacity rate of fixed costs. There are at least four capacity levels used at the base or the denominator:

a. **The actual activity:** which is the volume actually produced for the period.
b. **Theoretical capacity:** is the level of capacity based on producing at full efficiency all the time
c. **Practical capacity:** is the volume that could be produced allowing for expected breaks and expected maintenance and downtime.
d. **Normal capacity**: is the level of capacity utilization that satisfies average customer demand over a period of time (Long-run expected volume) that includes seasonal, cyclical, and trend factors.

Example:

Let us assume that company XYZ has fixed costs of 1.080.000 for 2022. This lump-sum is incurred to provide the capacity to produce telescopes. The amounts include, among other costs, leasing costs for the facility and the compensation of the facility managers. Find the fixed manufacturing cost rate for 2022, for each of the four capacity-level concepts.

Solution:

Denominator-level capacity concept	Fixed costs per year	Capacity levels per unit	Fixed costs per unit
(1)	(2)	(3)	4=2/3
Theoretical capacity	1,080,000	18,000	**60**
Practical capacity	1,080,000	12,000	**90**
Normal capacity	1,080,000	10,000	**108**
Actual capacity	1,080,000	8,000	**135**

The significant difference in cost rates (from 60 to 135) arises because of the large differences in capacity levels under the different capacity concepts.

If the actual variable manufacturing cost is 200 per unit. The total manufacturing cost per unit for alternative capacity -level concepts is as follows.

Denominator-level capacity concept	Actual variable costs per unit	fixed costs per unit	total manufacturing cost per unit
(1)	(2)	(3)	4=2+3
Theoretical capacity	200	60	**260**
Practical capacity	200	90	**290**
Normal capacity	200	108	**308**
Actual capacity	200	135	**335**

Because different denominator-level capacity concepts yield different fixed manufacturing costs per unit, the company must decide which capacity level to use. The company is not required to use the same capacity-level concept, for management planning and control, external reporting to shareholders, and income tax purposes.

6.2 Choosing capacity level:

As we have seen, managers use different capacity levels (different denominators) and calculate different fixed manufacturing costs per unit. Now we are going to discuss the problems with and effects of different capacity level for different purposes, including: (a) product costing and capacity management, (b) pricing, (c) performance evaluation, (d) external reporting …

Product Pricing:

Data from normal costing or standard costing are often used to calculate product cost, for our previous example the xyz company might use the theoretical capacity results but that would result in unrealistic small, fixed costs per unit, because it is based on an idealistic and unattainable level of capacity.

Most companies rarely use theoretical capacity and use normal capacity in the denominator to calculate actual or budgeted (standard) fixed cost per unit.

Throughout this class we are going to use normal capacity in the denominator to calculate the allocation fixed cost rate.

$$Fixed\ cost\ allocation\ rate = \frac{Actual\ capacity}{Normal\ capacity}$$

In our example:

$$Fixed\ cost\ allocation\ rate = \frac{8000}{10.000} = 0.8$$

When company xyz uses the normal capacity level, we notice that there is some unused capacity because in this case the amount of fixed costs that the company would calculate is:

$$1.080.000 \times 0.8 = 864.000$$

In this case the amount of unused capacity is $1.080.000 - 864.000 = 216.000$

Managers should pay attention toward managing unused capacity, by designing a new product for example to fill unused capacity.

6.3 Using fixed cost allocation rate to prepare manufacturing overhead table

Example:

Company xyz has two supporting centers, an equipment management center and resources management center, and two operating departments, department 01 and department 02.

During the month of October manufacturing overhead costs were as follows:

Manufacturing Supplies: 300.000 v

Salaries: 200.000 v and 400.000 F.

manufacturing supplies costs are allocated to different centers as follows:

- Manufacturing Supplies: 50.000 allocated to equipment management, 100.000 allocated to resources management, 80.000 allocated to department 01 and 70.000 allocated to department 02.
- Salaries: 10% allocated to equipment management, 20% allocated to resources management, 40% allocated to department 01 and 30% to department 02.

Supporting centers are allocated to operating department as the following:

- Equipment 40% to department 01 and 60% to department 02.
- Resources management 25% to department 01 and 75% to department 02.

Requirements:

- Prepare manufacturing overhead table given that fixed cost allocation rates for Equipment management, resources management, department 01 and department 02 are: 80%, 60%, 80% and 20% respectively.

Solution

				Supporting Department				**Operating Department**			
	Amount			Equipment		resources		Department 01		Department 02	
	Total	V	F	V	F	V	F	V	F	V	F
Manf supplies	300,000	300,000		50,000		100,000		80,000		70,000	
salaries	600,000	200,000	400,000	20,000	40,000	40,000	80,000	80,000	160,000	60,000	120,000
∑	**900,000**	**500,000**	**400,000**	**70,000**	**40,000**	**140,000**	**80,000**	**160,000**	**160,000**	**130,000**	**120,000**
fixed cost allocation rate				0.8		0.6		0.8		1.2	
Fixed cost allocation					32,000		48,000		128,000		144,000
unused capacity					8,000		32,000		32,000		-24,000
∑ of Initial Allocation (V+F)				102,000		188,000		288,000		274,000	
Allocation of Equipement				-102000				40800		61200	
Allocation of resources						-188000		47000		141000	
∑				**0**		**0**		**375,800**		**476,200**	

Chapter 06 Practice problems

Exercise 01:

A factory produces two products (A and B) using a shared manufacturing facility with fixed costs of 900,000 DZD. The factory's capacity data is as follows:

Capacity Concept	Machine Hours Available
Theoretical Capacity	50,000 hours
Practical Capacity	45,000 hours
Normal Capacity	40,000 hours
Actual Capacity	35,000 hours

Required:

1- Find the fixed manufacturing cost rate for 2022, for each of the four capacity-level concepts?

2- Explain which capacity concept is best for cost allocation and why?

Exercise 02:

Company xyz normal capacity is 2500 units, the total fixed costs were 15.000, variable cost per unit was 4. For the month of February xyz company produced 2400 units. Given that xyz sold 2200 units for 15 each and the beginning inventory was 0.

- Find management accounting income using both methods normal costing and capacity-level (Rational allocation), the imputed and the non-considered expenses were 2500 dzd and 1200 respectively.
- Find financial acc net income?

Exercise 03:

The following manufacturing overhead table is provided to you:

				Supporting dep	**Operating departments**		
	Amount			Administration	supply	production	distribution
Expenses	Total	V	F				
61	40000	40%	60%	20%	30%	20%	30%
62	38000	30%	70%	30%	10%	30%	40%
63	120000	20%	80%	10%	20%	50%	20%
64	25,000	60%	40%	20%	10%		70%
66	10,000	80%	20%	30%	20%	40%	10%
68	80,000	90%	10%		30%	40%	30%
∑	**313,000**			10000			
Normal capacity					**3,000**	**1,500**	**1,300**
Actual capacity				10000	3,000	1650	1,040
Allocation of Administration					10%	50%	40%

Required:

- Prepare manufacturing overhead table.

Chapter 07: Answers to even numbered practice problems

1. Answers to even numbered practice problems: Chapter 01

Exercise 02 Solution:

1. **Cost of material used:**

The cost of materials used	
Add: Beginning materials inventory Jan 1 2011	40,000
Direct materials purchased	460,000
cost of materials available for use	**500,000**
Deduct: Ending materials inventory Dec 31 2011	50,000
Cost of materials used	**450,000**

2. **Cost of goods manufactured:**

Cost of goods manufactured				
cost of materials used			450,000	(V)
Direct labor			300,000	(V)
Indirect manufacturing costs				
sandpaper	2,000	(V)		
materials handling costs	70,000	(V)		
lubricants and coolants	5,000	(V)		
Miscellaneous indirect manufacturing labor	40,000	(V)		
plant leasing costs	54,000	(F)		
Depreciation -plant equipment	36,000	(F)		
property taxes on plant equipment	4,000	(F)		
fire insurance on plant equipment	3,000	(F)		
Total of Indirect manufacturing overhead costs			214,000	
Add: beginning work in process inventory Jan 2020			10,000	
Deduct: Ending work in process inventory Dec 31 2020			14,000	
Cost of goods manufactured			**960,000**	

3. **Cost of goods manufactured and sold**

Cost of goods manufactured and sold	
cost of goods manufactured	960,000
Add: Beginning finished goods inventory Jan 1 2020	100,000
Deduct Ending finished goods inventory Dec 1 2020	150,000
Cost of goods manufactured and sold (to income statement)	**910,000**

4. Final cost:

Final cost	
cost of goods manufactured and sold	910,000
Marketing promotions	60,000
Marketing salaries	100,000
Distribution costs	70,000
customer service costs	100,000
Final cost:	**1,240,000**

5. Managerial accounting Income:

Managerial accounting income	
Revenues	1,360,000
Final cost	1,240,000
Managerial accounting income (profit)	**120,000**

6. Financial accounting net operating Income

Revenues		Expenses	
sales	1,360,000	a/601 raw materials used	450,000
a/723 EI	14,000	a/ 63 direct labor	300,000
a/724EI	150,000	a/63-68 other expenses	214,000
		a/63-68 selling and administrative expenses	330,000
		a/723 BI	10,000
		a/724 BI	100,000
Total revenues	1,524,000	Total expenses	$1,404,000

Financial accounting net operating income

$Total\ revenues - total\ expenses = 1524000 - 1404000 =$ **120,000**

7. Income statement:

Income statement	
Sales	1,360,000
Cost of goods manufactured and sold	910000
Gross margin	**450,000**
selling and administrative expenses	330000
Financial accounting Net oprating income	**120,000**

Cost of goods manufactured and sold = cost of materials used+ direct labor+ manufacturing overhead

2. Answers to even numbered Practice Problems: Chapter 02

Exercise 02 solution:

Inventory variance scenario 01:

Scenario 01	**Units**	**cost/U**	**Total**
Ending accounting inventory	10,000	100	1,000,000
physical Inventory	9,800	100	980,000
Inventory variance deficit	- 200	100	-20,000

Journal entry

a/72 changes in finished goods inventory	20,000	
a/35 finished goods inventory		20,000

Inventory deficit

Inventory variance scenario 02:

Scenario 02	**Units**	**cost/U**	**Total**
Ending accounting inventory	10,000	100	1,000,000
physical Inventory	10,200	100	1,020,000
Inventory variance surplus	200	100	20,000

Journal entry

a/35 finished goods inventory	20,000	
a/72 changes in finished goods inventory		20,000

Inventory surplus

Inventory variance scenario 03:

Scenario 03	**Units**	**cost/U**	**Total**
Ending accounting invenotry	10,000	100	1,000,000
physical Inventory	10,000	100	1,000,000
Inventory variance	0	100	0

No adjustment journal entry is required for scenario 3

Exercise 04 Solution:

1- Cost of materials purchased.

Cost of material purchased	**M1**	**M2**
purchases		
300*11//250*9	3300	2250
400*12//300*10	4800	3000
Beginning inventory		
500*10//400*8	5000	3200
Total	13100	8450
Quantity	1200	950
Unit cost	**10.9167**	**8.894737**

2. Inventory card template for $M1, and\ M2$ using weighted average cost method for all inputs method

M1	**Inputs**				**outputs**		
	Q	**UC/UP**	**amount**		**Q**	**Uc (weighted)**	**amount**
beginning inventory	500	10	5,000	cost of materials used	450	10.92	4,912.50
Materials purchased	700	12	8,100	Ending inventory (physical)	730	10.92	7,969.17
				Inventory variance Add deficit	20	10.92	218
Total	**1,200**	**10.92**	**13,100**	**Total**	**1200**	**10.92**	**13,100**

M2	**Inputs**				**outputs**		
	Q	**UC/UP**	**amount**		**Q**	**Uc (weighted)**	**amount**
beginning inventory	400	8	3,200	cost of materials used	350	8.89	3,113.16
Materials purchased	550	10	5,250	Ending inventory (physical)	580	8.89	5,158.95
				Inventory variance Add deficit	20	8.89	177.895
Total	**950**	**8.89**	**8,450**	**Total**	**950**	**8.89**	**8,450**

3- Cost of finished goods manufactured.

Cost of goods manufactured	**A1**	**A2**
cost of material used		
M1: 250*10.92//200*10.92	2,729.17	2,183.33
M2: 200*8.89//150*8.89	1,778.95	1,334.21
Direct labor	10,000.00	8,000.00
Manufacturing overhead	7,500.00	6,000.00
Cost of goods manufactured	22,008.11	17,517.54
Beginning inventory	600.00	440.00
Total cost	22,608.11	17,957.54
Quantity	300.00	240.00
unit cost	**75.36**	**74.82**

4. inventory card template for $A1$,and $A2$ using weighted average method

A1	**Inputs**			**label**	**outputs**		
	Q	**UC/UP**	**amount**		**Q**	**Uc (weighted)**	**amount**
beginning inventory	50.00	12.00	600.00	Cost of goods manufactured and sold	220.00	75.36	16,579.28
Quantity produced	250.00	88.03	22,008.11	Ending inventory (physical)	78.00	75.36	5,878.11
				Add: Deficit	2.00	75.36	150.72
Total	**300.00**	**75.36**	**22,608.11**	**Total**	**300.00**	**75.36**	**22,608.11**

A2	Inputs			label	outputs		
	Q	UC/UP	amount		Q	Uc (weighted)	amount
beginning inventory	40.00	11.00	440.00	Cost of goods manufactured and sold	180.00	74.82	13,468.16
Quantity produced	200.00	87.59	17,517.54	Ending inventory (physical)	63.00	74.82	4,713.86
				Deduct surplus:	-3.00	74.82	-224.47
Total	**240.00**	**74.82**	**17,957.54**	**Total**	**240.00**	**74.82**	**17,957.54**

5- Final cost, Managerial accounting gross income, And net income.

Final Cost	**A1**	**A2**
Cost of goods manufactured and sold		
220*75.36//180*74.82	16579.28	13468.158
Final cost	16579.28	13468.158

Managerial acc net income	**A1**	**A2**
Sales		
220*150//180*140	33,000.00	25,200.00
Final cost	16,579.28	13,468.16
Managerial accounting gross income	16,420.72	11,731.84
Managerial accounting total gross income		28,152.56
Add: Imputed expenses		24,000.00
deduct: non-considered exp		-80,000.00
Inventory variances (net)		-322.48
Managerial accounting Net income		**-28,169.92**

Financial accounting income			
Class 06	**Amount**	**Class 07**	**Amount**
a/601 cost of material used	8,025.66	Revenues	58200
a/63 Direct labor	18,000.00	a/724 finished goods ending Acc inventory	10,518.22
a/602-68 manufacturing expenses	13,500.00	Inventory variance surplus	224.47
a/72 finished goods beginning inventory	1,040.00		
Inventory variances deficit	546.95		
deduct imputed expenses	-24000		
Add non considered expenses	80000		
Total expenses	**97,112.61**	**Total revenues**	**68,942.69**
Financial accounting income			**-28,169.92**

3. Answers to Even numbered practice problem: Chapter 03

Exercise 02: solution

1. Table of Manufacturing overhead costs

	Adm	Maintenance	supply	Dep 01	Dep 02	Distribution
Initial allocation	16,530	42,600	35,630	58,290	40,800	10,550
Allocation of Adm	(21000)	2,100	2,100	8,400	6,300	2,100
Allocation of Maintenance	4,470	(44700)	4,470	17,880	17,880	
Total	**0**	**0**	**42,200**	**84,570**	**64,980**	**12,650**
Overhead unit			Kg purchased	kg materials used	direct labor hours	100 DZD of sales
Quantity of overhead			16,880	14,095	5,415	5,750
Overhead rate			**2.50**	**6.00**	**12.00**	**2.20**

x	21000
y	44700

2. **Financial Accounting expenses:**

$$\boldsymbol{Finacia\ Acc\ exp} = Management\ Acc\ costs - imputed\ exp + nonconsidered\ expenses$$

Financial Acc expenses			
Management acc costs			757,050
	Materials used	281900	
	Direct labor	270750	
	Indirect costs	204,400	
Deduct: imputed expenses			-45000
Add: non-considered expenses			25000
Financial Acc expenses			**737,050**

4. Answers to Even numbered practice problems: Chapter 04

Exercise 02 Solution:

1- Manufacturing overhead table:

	Adm	Maint	Supply	Dept 01	Dept 02	Dept 03	Distribution
Initial Allocation	83,130	129,000	135,200	268,500	215,000	94,300	59,750
Allocation of Adm	-	10	10	40	30	10	
Allocation of Maintenance	10	-	10	40	40	-	
allocation of Adm	-97,000	9700	9700	38800	29100	9700	
Allocation of Maintenance	13870	-138,700	13870	55480	55480		
Total II	0	0	158,770	362,780	299,580	104,000	59,750

x	97000
y	138700

2- Cost of materials purchased

Cost of materials purchased	**M1**	**M2**
Purchases	355,400.00	365,100.00
Indirect supply expenses	63,508.00	95,262.00
158770*2/5//158770*3/5		
Cost of purchases	418,908.00	460,362.00
Quantity	14,200.00	27,800.00
Unit cost	29.50056338	16.559784
Beginning inventory	**135,000.00**	**131,500.00**
Quantity	4,500.00	8,200.00
Unit cost	30.00	16.04

3- Cost of intermediate product (E).

Cost of Intermediate product	**E**
cost of materials used	
M1: 4500*30	135,000
M1: 12000*29.5	35,401
M2: 8200*16.04	131,500
M2: 24800*16.55	410,682.65
Direct labor 3300*40	13,200.00
Indirect expenses Dept 1	362,780.00
Scrap C2 thrown away	6,400.00
Scrap sold C1	-48,500.00
cost of goods manufactured	**1,046,463**
Quantity produced	4,200.00
Unit cost	**249.16**
Beginning inventory	360,000.00
Quantity	1,200.00
Unit cost	**300.00**

4- cost of finished goods manufactured (A + B).

Cost of finished goods (A+B)	**A**
Cost of intermediate product used	
1200*300	360,000
3600*249.16	896,969
Direct labor	92,000
Indirect Labor	299,580
Add: Beginning work in process	81,500.00
Deduct: Ending work in process	-89,300.00
cost of finished goods manufactured (A+B)	**1,640,749**

5- cost of finished goods (A) only.

Cost of Finished Goods (A) only	**A**
cost of finished goods manufactured (A+B)	1,640,749
Cost of Byproduct at the split-off point (department 2)	-59,500
Cost of Finished Goods (A) only	**1,581,249**
Quantity	4,000.00
Unit cost	**395.31**
Beginning Inventory	450,000.00
Quantity	950.00
Unit cost	**473.68**

Cost of the byproduct	**B**
Cost of Byproduct at the split-off point (department 2)	59,500
Department 03	104,000
Direct labor 550*40	22,000
Total	**185,500**

6- Final cost and management accounting income

Final cost	A	B
cost of finished goods manufactured and sold		
950*473.68	450,000	185,500
3350*395.31	1,324,296	
Distribution exp	59,750	0
Final cost	**1,834,046**	**185,500**
sales 4300*515	2,214,500	185500
Management acc income	**380,454**	0
Net inventory variance deficit	-20,231.70	
Management Acc net Income	**360,222.63**	

5. Answers to even numbered practice problems: chapter 05

Exercise 02 solution:

1- Operating income

Sales	100,000
variable costs	62,500
Contribution margin	37,500
fixed costs	26,250
Operating income	11,250

2. breakeven point:

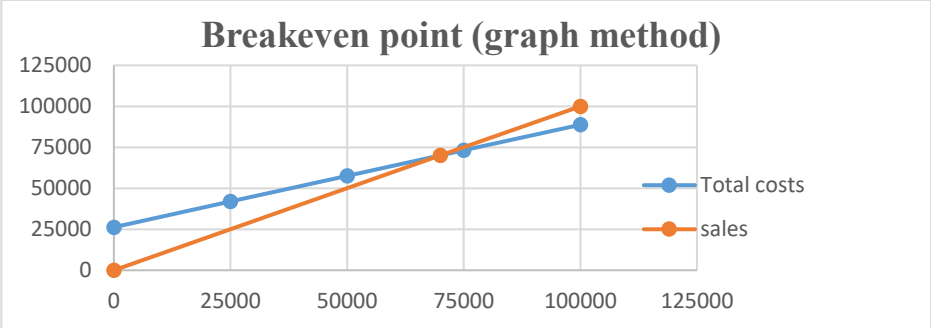
$$breakeven\ point = \frac{fixed\ costs}{\%\ contribution\ margin}$$

$$breakeven\ point = \frac{26250}{(\frac{37500}{100000})} = \frac{26250}{0.375} = 70000$$

Breakeven point (graph method):

We can use the following formulas:

$y = 0.625\ x + 26250$ and y=100000

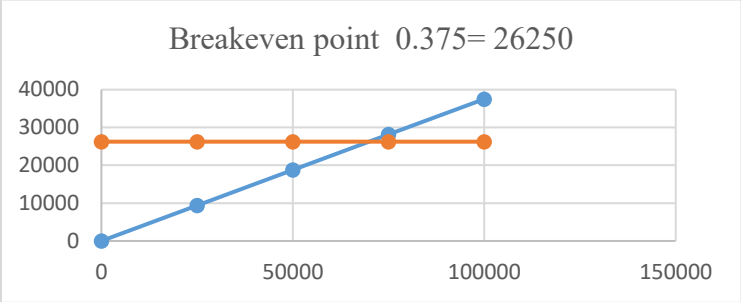


$y = 0.375\ x$ where y represents contribution margin and x represents sales.

$$y = 26250$$

The breakeven point occurs at:

$0.375\ x = 26250$



Exercise 04 solution:

1. Contribution margin %

$$contribution\ margin = \frac{fixed\ cots}{breakeven\ point} = \frac{900{,}000}{1{,}500{,}000} = 0.6 = 60\%$$

2. Selling price

$$selling\ price = variable\ cost\ per\ unit/(1 - 0.6)$$

$$selling\ price = \frac{12}{0.4} = 30$$

3. Margin of safety in units:

$$Margin\ of\ safety\ (in\ units) = quantity\ sold - breakeven\ point\ (quantity)$$

$$Margin\ of\ safety\ (in\ units) = 95000 - \left(\frac{1500{,}000}{30}\right) = 95000 - 50000 = 45000\ units$$

$$Margin\ of\ safety = 45000 * 30 = 1{,}350{,}000$$

Exercise 06 solution:

1- Breakeven point

$$breakeven\ point = \frac{fixed\ costs}{\%\ contribution\ margin}$$

$$breakeven\ point = \frac{600{,}000}{(200-130)/200} = 1{,}714{,}286.71$$

2- Units sold to earn 240,000 target profit

$$\left[\binom{Selling}{Price} \times (Q)\right] - \left[\binom{Variable\ cost}{per\ Unit} \times (Q)\right] - \binom{Fixed}{costs} = Target\ income$$

$$[(200) \times (Q)] - [(130) \times (Q)] - (600{,}000) = 240{,}000$$

$$[200Q] - [130Q] = 840{,}000$$

$$70Q = 840{,}000 \Rightarrow Q = 12000\ units$$

6. Answers to even numbered practice problems: chapter 06

Exercise 02 solution:

1. management acc net income

cost of manufacturing	Normal costing	capacity- level costing
variable costs	9600	9600
2400*4		
fixed costs	15000	14400
15000*1//15000*2400/2500		
costs of goods manufactured	24600	24000
quantity	2400	2400
unit cost	10.25	10.00
costs of goods manufactured and sold		
2200*10.25//2200*10	22550	22000
sales	33000	33000
management acc income	**10450**	**11000**
imputed expenses	2500	2500
non-considered exp	-1200	-1200
unused capacity		-600
inventory variance (200*10.25-(200*10))		50
management acc net income	**11750**	**11750**

2.

	normal costing		capacity-level costing	
financial acc net income	class 6	class 7	class 6	class 7
variable costs	9600	33000	9600	33000
fixed costs	15000	2050	14400	2000
imputed expenses	-2500		-2500	
non considered exp	1200		1200	
unused capacity	0		600	
Inventory variance				50
total	23300	35050	23300	35050
financial acc net income	**11750**		**11750**	

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