

INFO 7225

MODULE 2

Managerial Accounting (1-6)

Professor Shiaoming Shi

College of Engineering

Northeastern University

1,000

Q3

Q4



LEARNING OBJECTIVES

After completing part a of this module, you should be able to

- Distinguish between financial and managerial accounting;
- Identify the major items in the income statement of various types of firms;
- Determine and recognize the fixed and variable components of costs;
- Identify cost behaviors and apply them to the business environment;
- Explain the concept of contribution margin and apply it to breakeven analysis;
- Distinguish between job order costing and process costing;
- Understand the concepts of activity-based costing;
- Compute the cost of a job using job order costing, process costing, and activity-based costing (ABC).

Financial and Managerial Accounting Comparative

COMMUNICATION THROUGH REPORTING	FINANCIAL ACCOUNTING	MANAGERIAL ACCOUNTING
Users of reports	External users: stockholders, creditors, regulators	Internal users: managers, officers, and other employees
Types of reports	Financial statements: balance sheet, income statement, cash-flow statement, etc.	Internal reports: job cost sheet, cost of goods manufactured, production cost report, etc.
Frequency of reports	Quarterly; annually	As frequently as needed
Purpose of reports	Helps those external users make decisions: credit terms, investment, and other decisions	Assists the internal users in the planning and control decision-making process
Focus of reports	Pertains to company as a whole Uses GAAP structure Composed from a multitude or combination of other more individual data	Pertains to departments, sections of the business Very detailed reporting No GAAP constraints
Nature of reports	Monetary	Monetary and nonmonetary information
Verification of reports	Audited by CPA	No independent audits



Major Cost Behavior Patterns

Costs Incurred for Different Types of Business

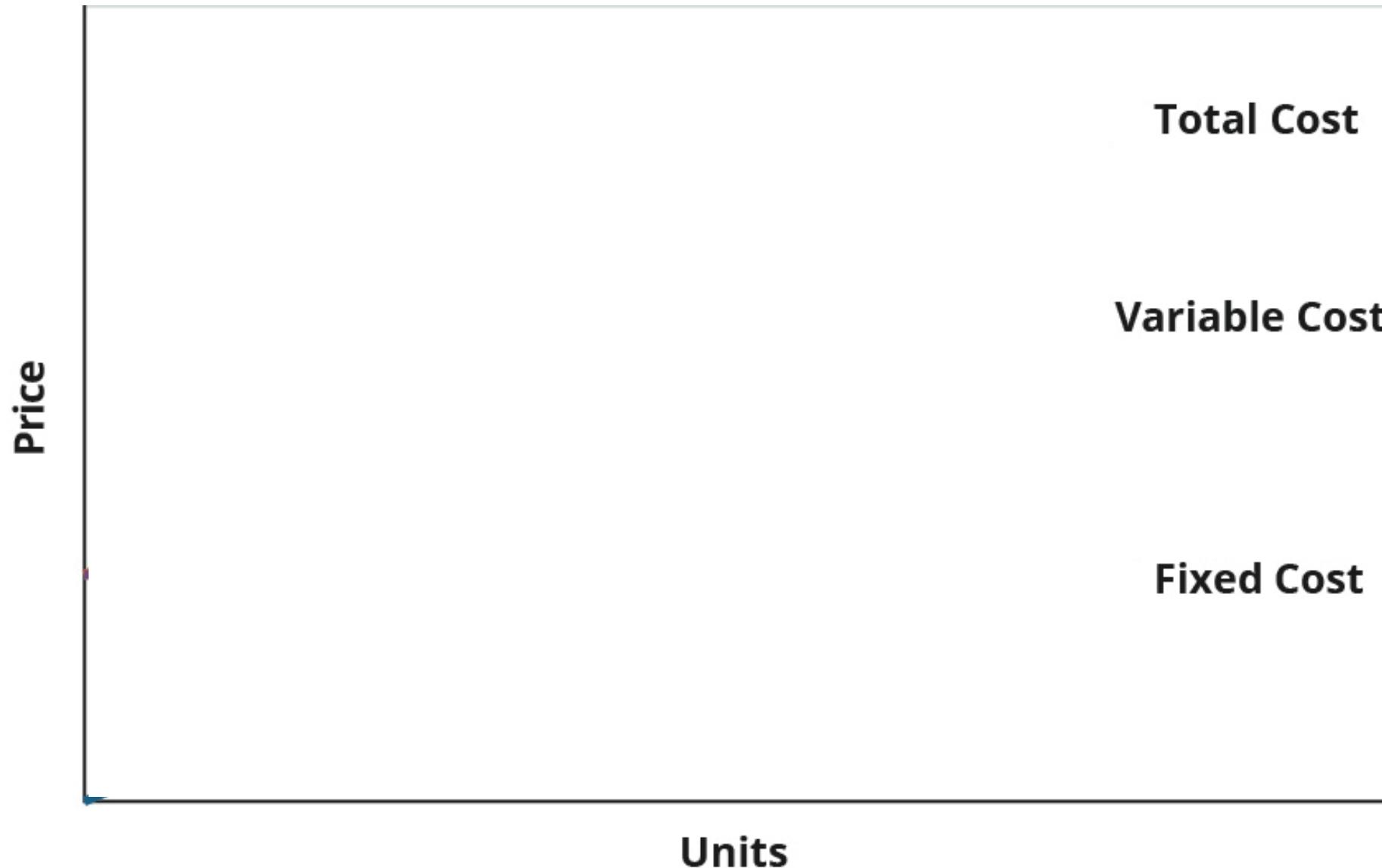
Type of Business	Costs Incurred
Business	<ul style="list-style-type: none">• Direct labor• Plant and equipment• Manufacturing overhead• Raw materials
Business	<ul style="list-style-type: none">• Lease on retail space• Merchandise inventory• Retail sales staff
Business	<ul style="list-style-type: none">• Billing and collections• Computer network equipment• Professional staff

Table 2.1 Some costs, such as raw materials, are unique to a particular type of business. Other costs, such as billing and collections, are common to most businesses, regardless of the type.

Types of Costs

- _____ **costs** are all those associated with the acquisition or production of goods and products.
- _____ **Costs** typically related to a particular time period instead of attached to the production of an asset; treated as an expense in the period incurred (examples include many sales and administrative expenses).
- _____ . The costs which don't vary with changing output. Might include the cost of building a factory, insurance and legal bills. Even if your output changes or you don't produce anything, your fixed costs stay the same. In the above example, fixed costs are always \$1,000.
- _____ . Costs which depend on the output produced. For example, if you produce more cars, you need use more raw materials such as metal.
- _____ **Cost.** Labor might be an example of such cost. If you produce more cars, you need to employ more workers; this is a variable cost. However, even if you didn't produce any cars, you may still need some workers to look after an empty factory.
- _____ **Costs.** The cost of producing an extra unit. If the total cost of 3 units is \$1550, and the total cost of 4 units is \$1900. The marginal cost of the 4th unit is \$_____.

Total Cost as the Sum of Total Fixed Costs and Total Variable Costs



Tony's T-Shirts Cost Options

	Cost	Type of Cost ?	Relevant Range
Lease on Screen-Printing Machine	\$2,000 per month		0–2,000 T-shirts per month
Employee	\$10 per hour		20 shirts per hour
Tony's Salary	\$2,500 per month		N/A
Screen-Printing Ink	\$0.25 per shirt		N/A
Building Rent	\$1,500 per month		2 screen-printing machines and 2 employees

Functions of Cost Equations

Cost Information for Eagle Electronics

Cost Incurred	Fixed or Variable ?	Cost
Lease on manufacturing equipment		\$50,000 per year
Supervisor salary		\$75,000 per year
Direct materials		\$50 per unit
Direct labor		\$20 per unit

1. Determine total fixed costs: \$_____ + \$_____ = \$_____
 2. Determine variable costs per unit: \$__ + \$__ = \$__
 3. Complete the cost equation (# of units = x): $Y = \$\text{_____} + \$\text{__}x$

Example 1

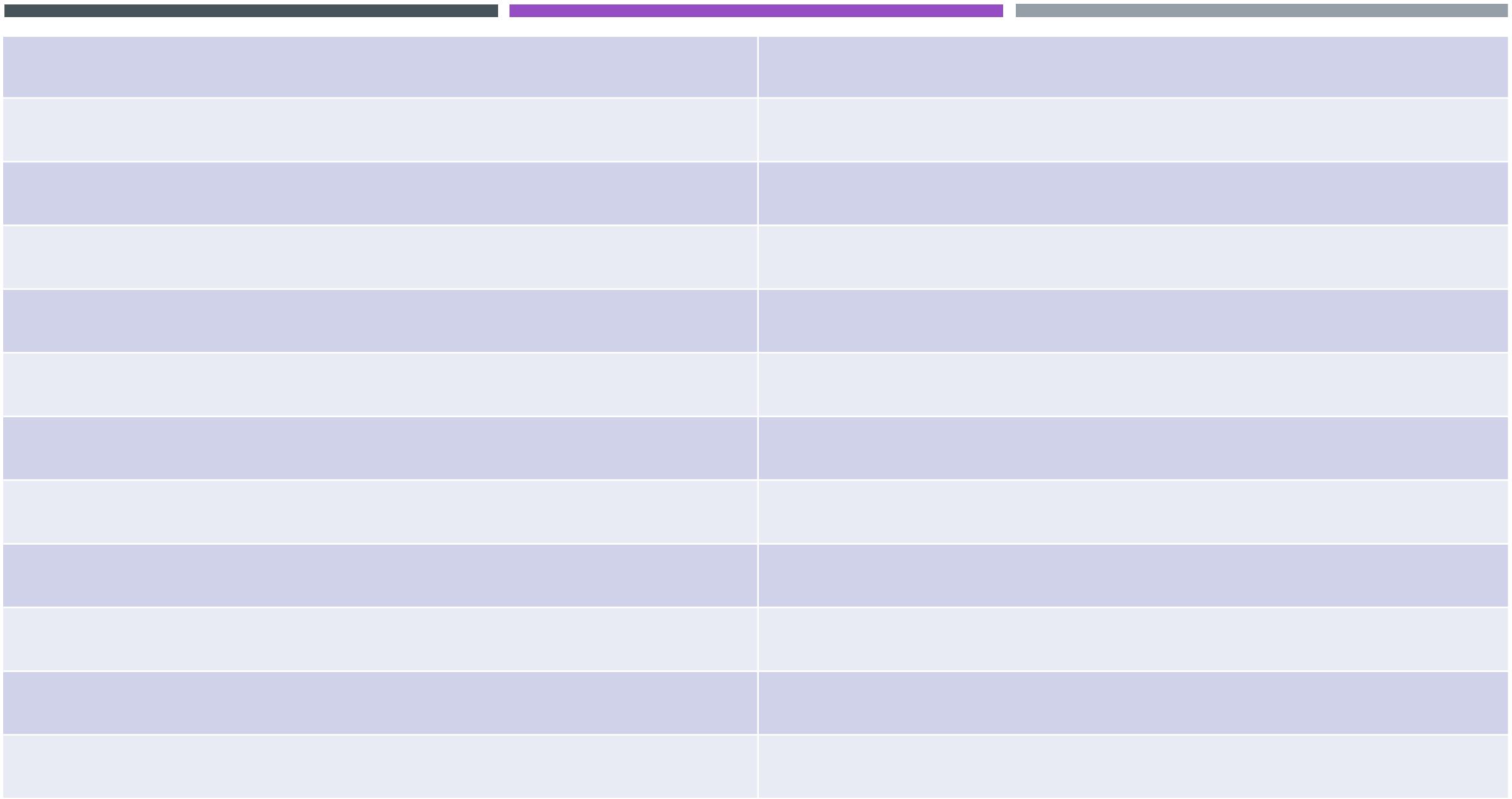
EA8. **LO 2.2** Suppose that a company has fixed costs of \$18 per unit and variable costs \$9 per unit when 15,000 units are produced. What are the fixed costs per unit when 12,000 units are produced?

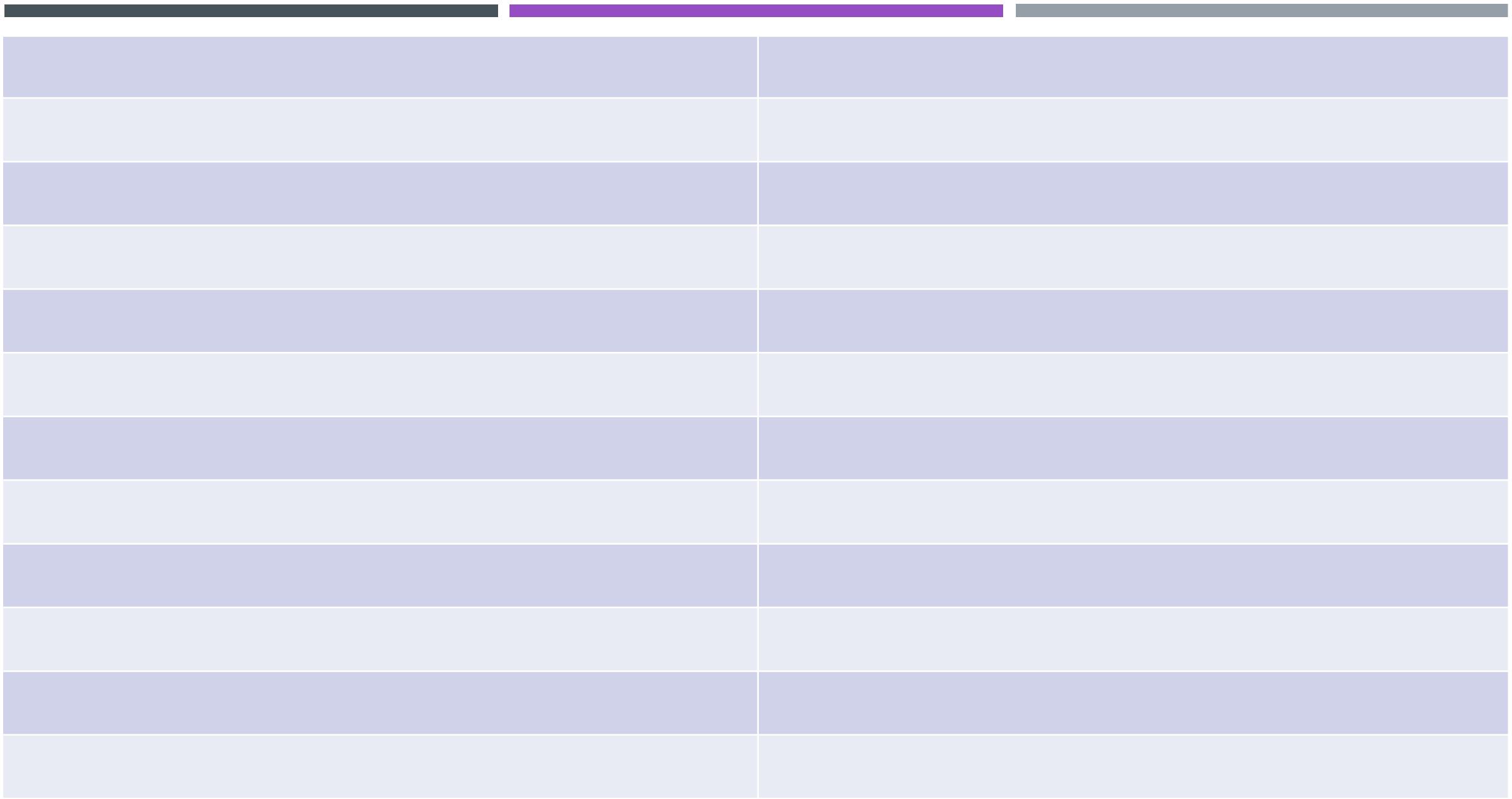
Summary of Fixed and Variable Cost Behaviors

Cost	In Total	Per Unit
Variable Cost	Changes in response to the level of activity	Remains fixed per unit regardless of the level of activity
Fixed Cost	Does not change with the level of activity, within the relevant range, but does change when the relevant range changes	Changes based upon activity within the relevant range: <ul style="list-style-type: none"><li data-bbox="1351 875 2401 923">• Increased activity _____ per-unit cost; ↓<li data-bbox="1351 923 2324 970">• Decreased activity _____ per-unit cost.



Contribution Margin and Break-even Analysis





Example 2

Pertinent information	Contribution margin income statement 100 units sold	Contribution margin income statement 200 units sold
Sales price per unit	\$ 25	Sales revenue \$
Variable costs:		Variable costs per unit $(\$15 + 0.50) \times 100 \text{ units}$
Per shirt cost	15	Contribution margin
Per shirt commission	0.50	Fixed costs
Fixed costs:		Net operating income
Kiosk rental	300	\$
Salary	400	

THINK IT THROUGH (Example 3)

Deciding Between Orders

You are evaluating orders from two new customers, but you will only be able to accept one of the orders without increasing your fixed costs. Management has directed you to choose the one that is most profitable for the company. Customer A is ordering 500 units and is willing to pay \$200 per unit, and these units have a contribution margin of \$60 per unit. Customer B is ordering 1,000 units and is willing to pay \$140 per unit, and these units have a contribution margin ratio of 40%. Which order do you select and why?

	Customer A	Customer B

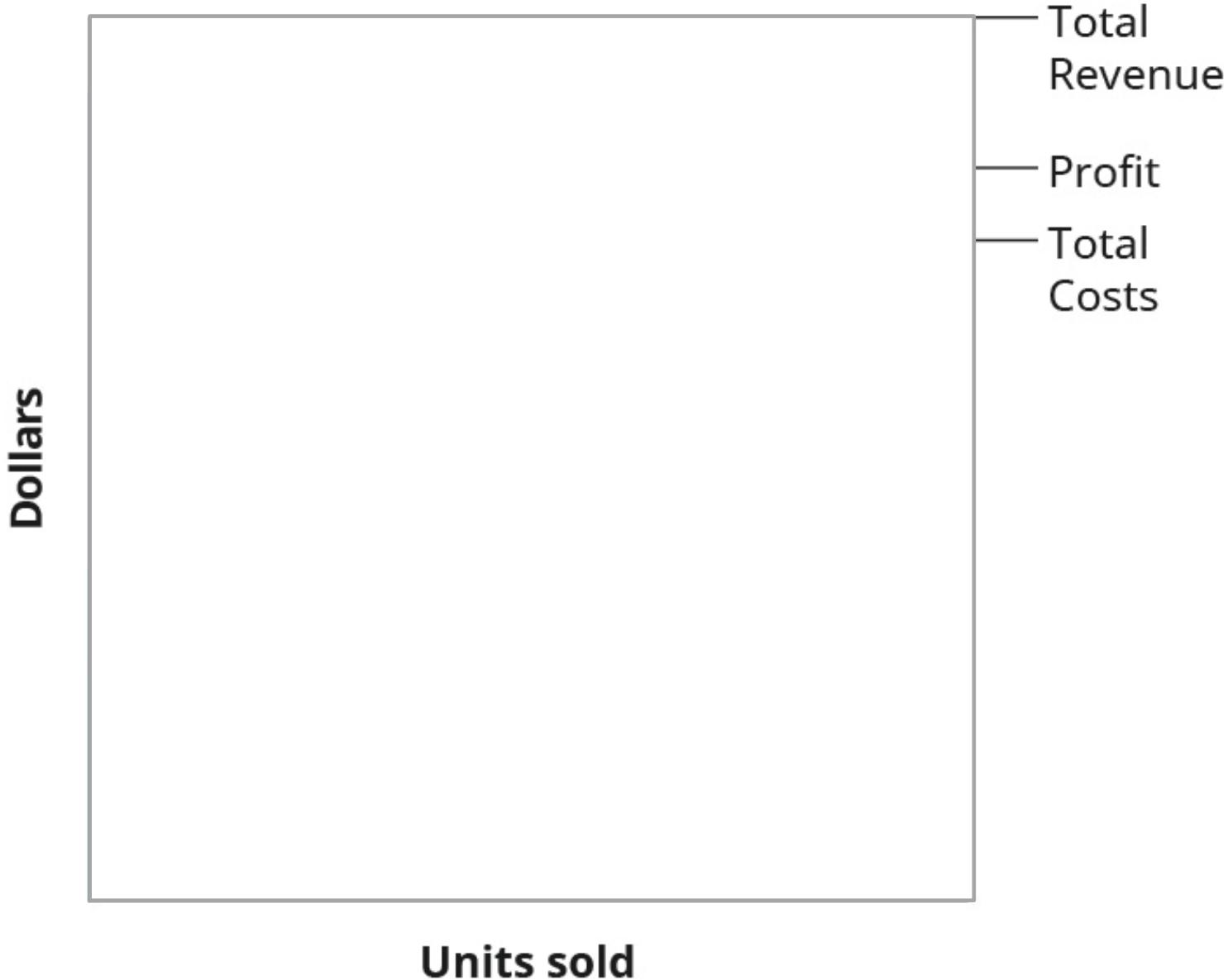


Break-Even Analysis

Break-Even Sensitivity Analysis: Introduction

HICKS MANUFACTURING		
Blue Jay Model		
For Year Ended December 31, 2019		
Sales Price per Unit	\$	100
Variable Cost per Unit		20
Contribution Margin per Unit		80
Total Fixed Cost per Month		\$18,000

Break-Even Point



Example 4a: Break-Even Sensitivity Analysis:

Change in Sales Price

The owner of Back Door has one of her employees conduct a survey of the other coffee shops in the area and finds that they are charging \$0.75 more for espresso drinks. As a result, the owner wants to determine what would happen to operating income if she increased her price by just \$0.50 and sales remained constant, so she performs the following analysis:

Price Change Analysis		
	With Current Price	With New Price
Sales Price per Unit	\$ 3.75	\$ 4.25
Variable Cost per Unit	\$ 1.50	\$ 1.50
Contribution Margin per Unit	\$ 2.25	
Fixed Costs	\$2,475	
Break-even (in units)		
Break-Even (in dollars)		
Contribution Margin Income Statement Current Price versus New Price		
Unit Sales, Expected	1,500	1,500
Sales		
Variable Costs		
Contribution Margin		
Fixed Costs		
Net Income		

Example 4b: Break-Even Sensitivity Analysis:

Change in Fixed Cost

Back Door Café's lease is coming up for renewal. The owner calls the landlord to indicate that she wants to renew her lease for another 5 years. The landlord is happy to hear she will continue renting from him but informs her that the rent will increase \$225 per month. She is not certain that she can afford an additional \$225 per month and tells him she needs to look at her numbers and will call him back. She pulls out her CVP spreadsheet and adjusts her monthly fixed costs upwards by \$225. Assume that the example uses the original \$3.75 per unit sales price. The results of her analysis of the impact of the rent increase on her annual net income are:

Fixed Cost Change Analysis		
	With Current Price	With Increased Fixed Cost
Sales Price per Unit	\$ 3.75	\$ 3.75
Variable Cost per Unit	\$ 1.50	\$ 1.50
Contribution Margin per Unit	\$ 2.25	\$ 2.25
Fixed Costs	\$2,475	\$2,700
Break-even in Units		
Break-even in Dollars		
Monthly Contribution Margin Income Statement Current Fixed Costs versus Increased Fixed Costs		
Unit Sales, Expected	1,500	1,500
Sales		
Variable Costs		
Contribution Margin		
Fixed Costs		
Net Income		

Generalizations Regarding Changes in Break-Even Point from a Change in One Variable

Condition	Result
Sales Price Increases	Break-Even Point _____ (Contribution Margin is _____ Need Fewer Sales to Break Even)
Sales Price Decreases	Break-Even Point _____ (Contribution Margin is _____ Need More Sales to Break Even)
Variable Costs Increase	Break-Even Point _____ (Contribution Margin is _____ Need More Sales to Break Even)
Variable Costs Decrease	Break-Even Point _____ (Contribution Margin is _____ Need Fewer Sales to Break Even)
Fixed Costs Increase	Break-Even Point _____ (Contribution Margin Does Not Change, but Need _____ Sales to Meet Fixed Costs)
Fixed Costs Decrease	Break-Even Point _____ (Contribution Margin Does Not Change, but Need _____ Sales to Meet Fixed Costs)



Cost Accounting: Manufacturing Cost

A General Format for the Income Statement

COGS for a Merchandising Firm or a Manufacturing Firm

PLUM CRAZY	
Cost of Goods Sold	
For the Year Ended December 31, 2017	
Beginning _____	: Inventory
+ Purchases	
Goods Available for Sale	138,500
- Ending _____	: Inventory
Cost of Goods Sold	\$ <u>60,000</u>

KOELLER MANUFACTURING	
Schedule of Cost of Goods Sold	
For the Month Ended March 31, 2017	
Beginning _____	s Inventory
+ Cost of Goods _____	
Goods Available for Sale	160,000
- Ending _____	s Inventory
Cost of Goods Sold	\$ <u>102,000</u>

COMPARISON OF METHODS FOR CALCULATING THE COST OF GOODS SOLD

Koeller Manufacturing



ABC Merchandising



Determining COGS for a Merchandising Firm

KOELLER MANUFACTURING	
Schedule of Cost of Goods Sold	
For the Month Ended March 31, 2017	
Beginning Finished Goods Inventory	\$ 65,000
+ Cost of Goods Manufactured	95,000
	<hr/>
Goods Available for Sale	160,000
- Ending Finished Goods Inventory	58,000
	<hr/>
Cost of Goods Sold	\$102,000

Determining COGS for a Merchandising Firm

KOELLER MANUFACTURING	
Schedule of Cost of Goods Sold	
For the Month Ended March 31, 2017	
Beginning Finished Goods Inventory	\$ 65,000
+ Cost of Goods Manufactured	<u>95,000</u>
Goods Available for Sale	160,000
- Ending Finished Goods Inventory	<u>58,000</u>
Cost of Goods Sold	<u><u>\$102,000</u></u>

KOELLER MANUFACTURING	
Schedule of Cost of Goods Manufactured	
For the Month Ended March 31, 2017	
Work in Process Inventory (beginning balance)	\$ 75,000
Current Manufacturing Costs:	
Direct Material	\$15,000
Direct Labor	25,000
Manufacturing Overhead	<u>23,000</u>
Total Manufacturing Costs	<u>63,000</u>
Total Cost of Work in Process	<u>138,000</u>
- Work in Process, ending balance	43,000
Cost of Goods Manufactured	<u><u>\$ 95,000</u></u>

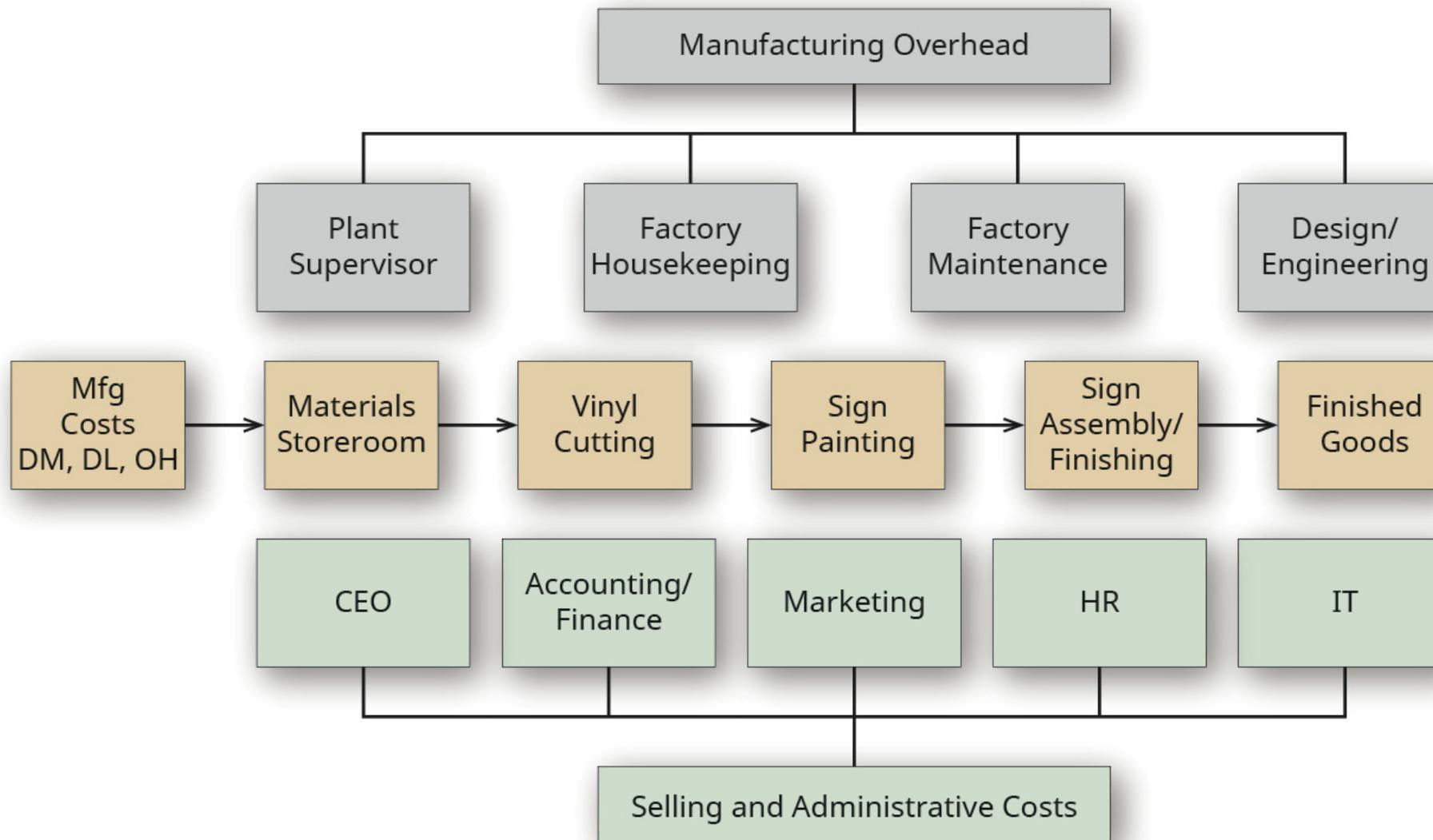
Determining COGS for a Merchandising Firm

KOELLER MANUFACTURING	
Schedule of Cost of Goods Sold	
For the Month Ended March 31, 2017	
Beginning Finished Goods Inventory	\$ 65,000
+ Cost of Goods Manufactured	95,000
	<hr/>
Goods Available for Sale	160,000
- Ending Finished Goods Inventory	58,000
	<hr/>
Cost of Goods Sold	<u>\$102,000</u>

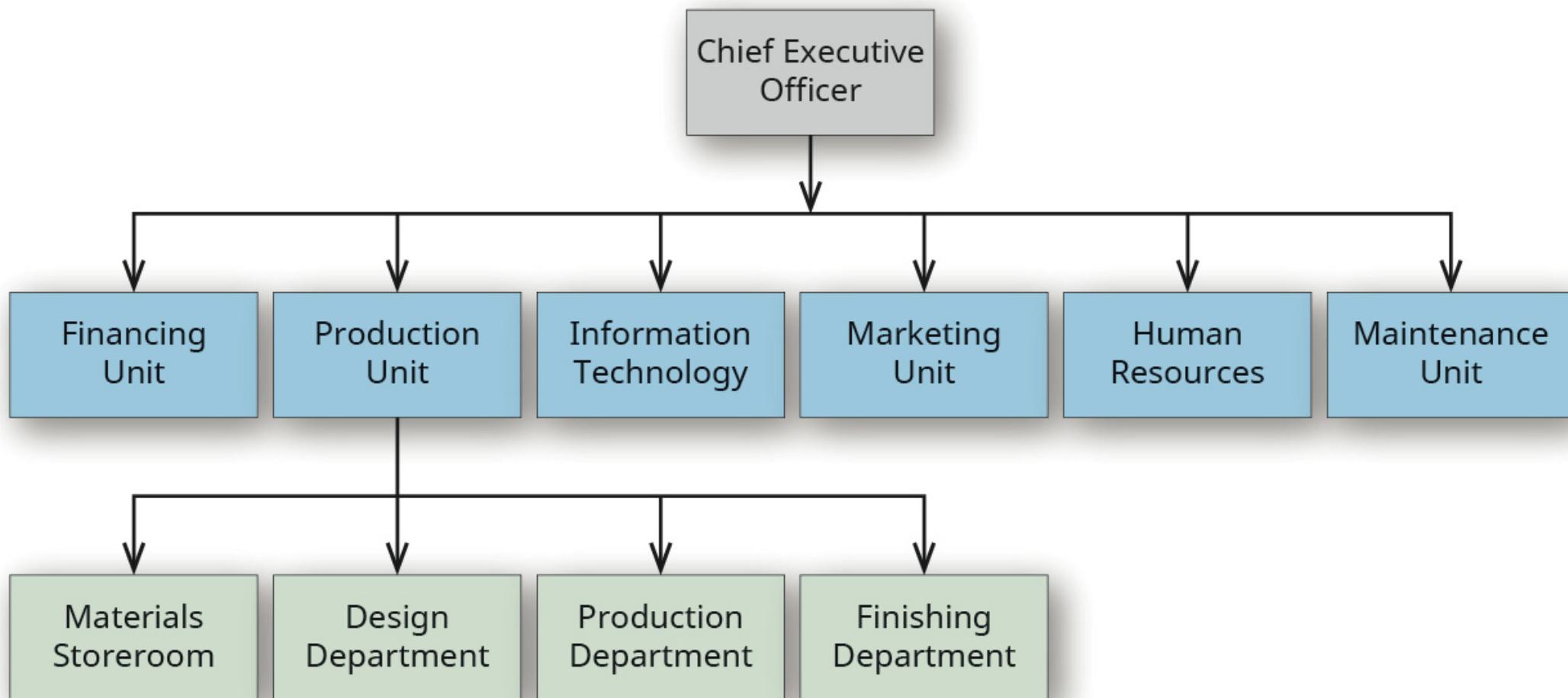
KOELLER MANUFACTURING	
Schedule of Cost of Goods Manufactured	
For the Month Ended March 31, 2017	
Work in Process Inventory (beginning balance)	\$ 75,000
Current Manufacturing Costs:	
Direct Material	\$15,000
Direct Labor	25,000
Manufacturing Overhead	<u>23,000</u>
Total Manufacturing Costs	<u>63,000</u>
Total Cost of Work in Process	<u>138,000</u>
- Work in Process, ending balance	43,000
	<hr/>
Cost of Goods Manufactured	<u>\$ 95,000</u>

Materials Inventory (beginning balance)
+ Net Material Purchases
= Materials Available for Use
- Materials Inventory (ending balance)
= Direct Materials Used in Production

Factory Layout for Dinosaur Vinyl and Manufacturing Costs



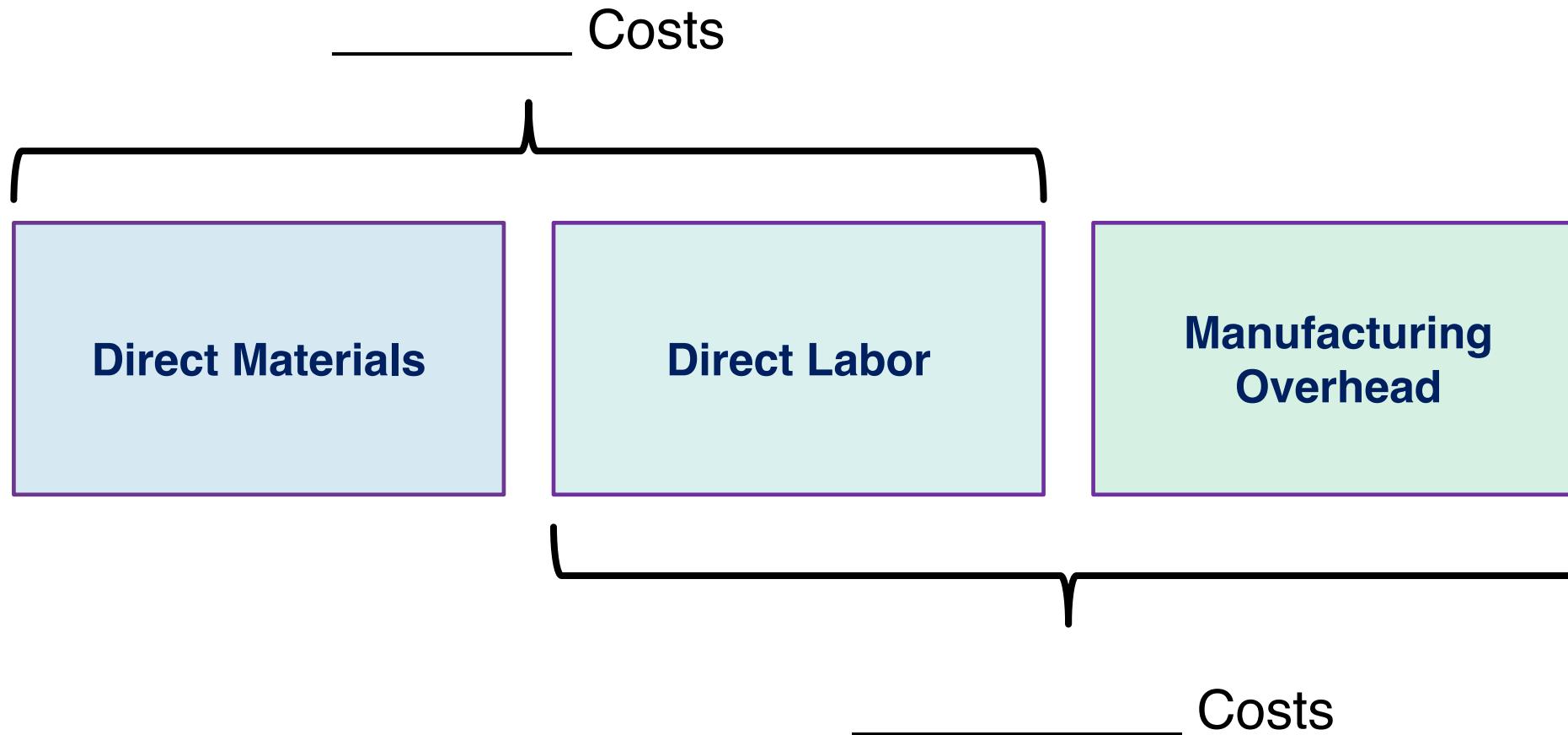
Organizational Chart for a Manufacturing Company



Flow of Materials from Raw Materials to Finished Goods



Manufacturing Costs



Manufacturing Overhead

- Costs that support production but are not direct materials or direct labor are considered overhead.
- Manufacturing overhead has three components:

1) Indirect materials

Materials used in production but not traced to specific products because the net informational value from the time and effort to trace the cost to each individual product produced is impossible or inefficient.

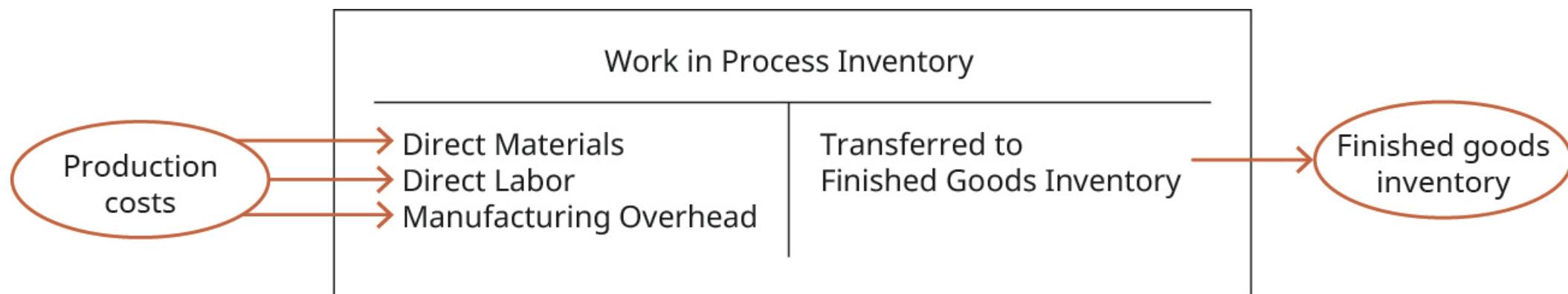
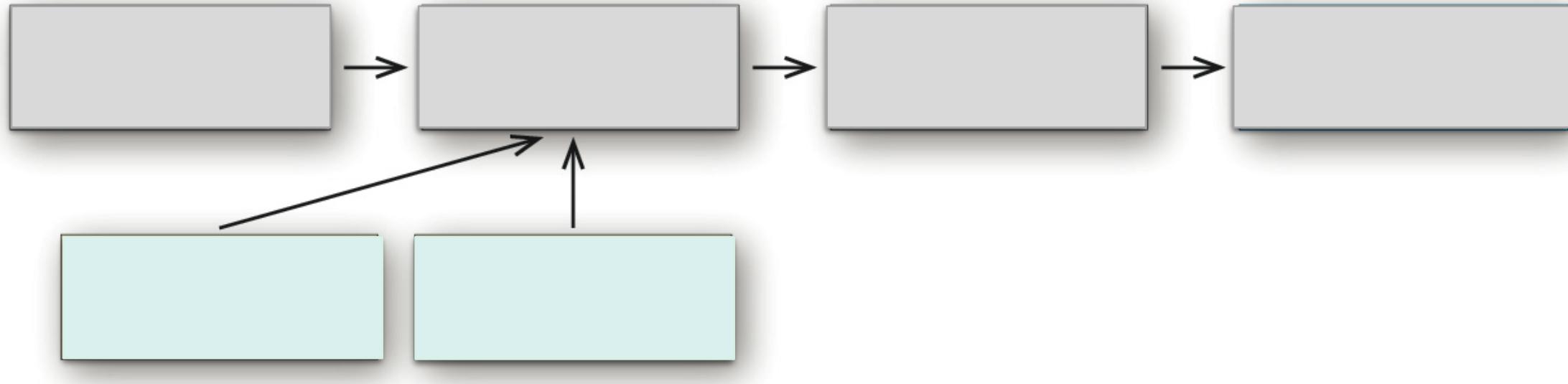
2) Indirect labor

Labor costs of those employees associated with the manufacturing process, but whose contributions are not directly traceable to the final product, and

3) Overhead

Costs that are necessary for production but not efficient to assign to individual product production. Examples of typical overhead costs are insurance, production facility electricity, warehouse rent, and depreciation of equipment.

Flow of Materials from Raw Materials to Finished Goods





Job Order Costing vs. Process Costing

Job Order and Process Cost Systems

	Job Order Cost System	Process Cost System
Product type	Custom order	Mass production
Examples	Signs, buildings, tax returns	Folding tables, toys, buffet restaurants
Cost accumulation	Job lot	Accumulated per process
Work in process inventory	Individual job cost sheets	Separate work in process inventory department
Record keeping	Individual job cost sheets	Production cost report

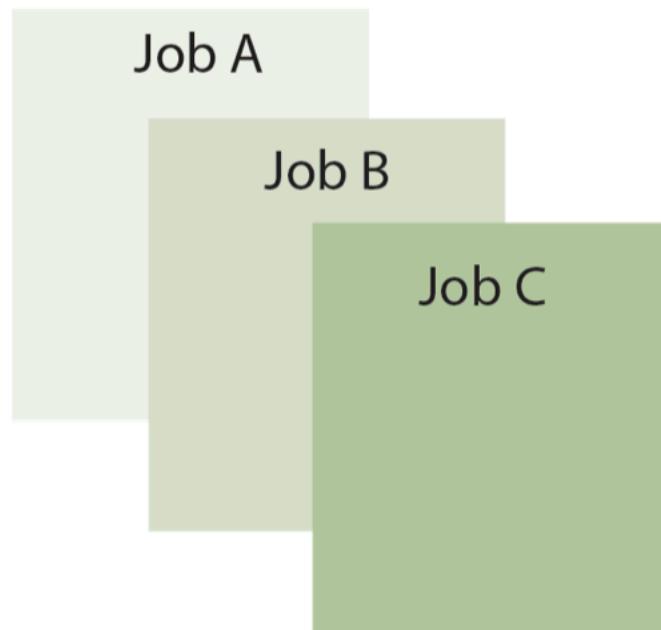
Table 4.1 This table shows some of the differences between job order costing and process costing.

Differences between Job Order Costing and Process Costing

Job Order Costing	Process Costing
Product costs are traced to the product and recorded on each job's individual job cost sheet.	Product costs are traced to departments or processes.
Each department tracks its expenses and adds them to the job cost sheet. As jobs move from one department to another, the job cost sheet moves to the next department as well.	Each department tracks its expenses, the number of units started or transferred in, and the number of units transferred to the next department.
Unit costs are computed using the job cost sheet.	Unit costs are computed using the departmental costs and the equivalent units produced.
Finished goods inventory includes the products completed but not sold, and all incomplete jobs are work in process inventory.	Finished goods inventory is the number of units completed at the per unit cost. Work in process inventory is the cost per unit and the equivalent units remaining to be completed.

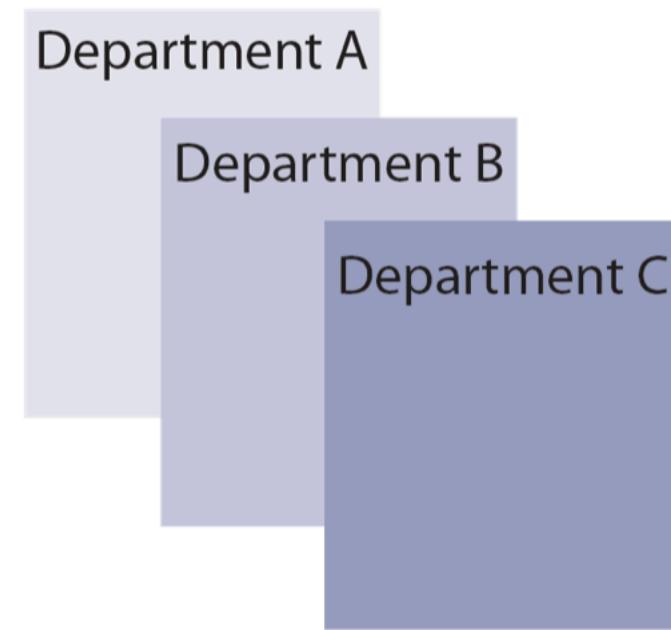
Job Costing Environment

Costs are accumulated
by job on Job Cost Sheets

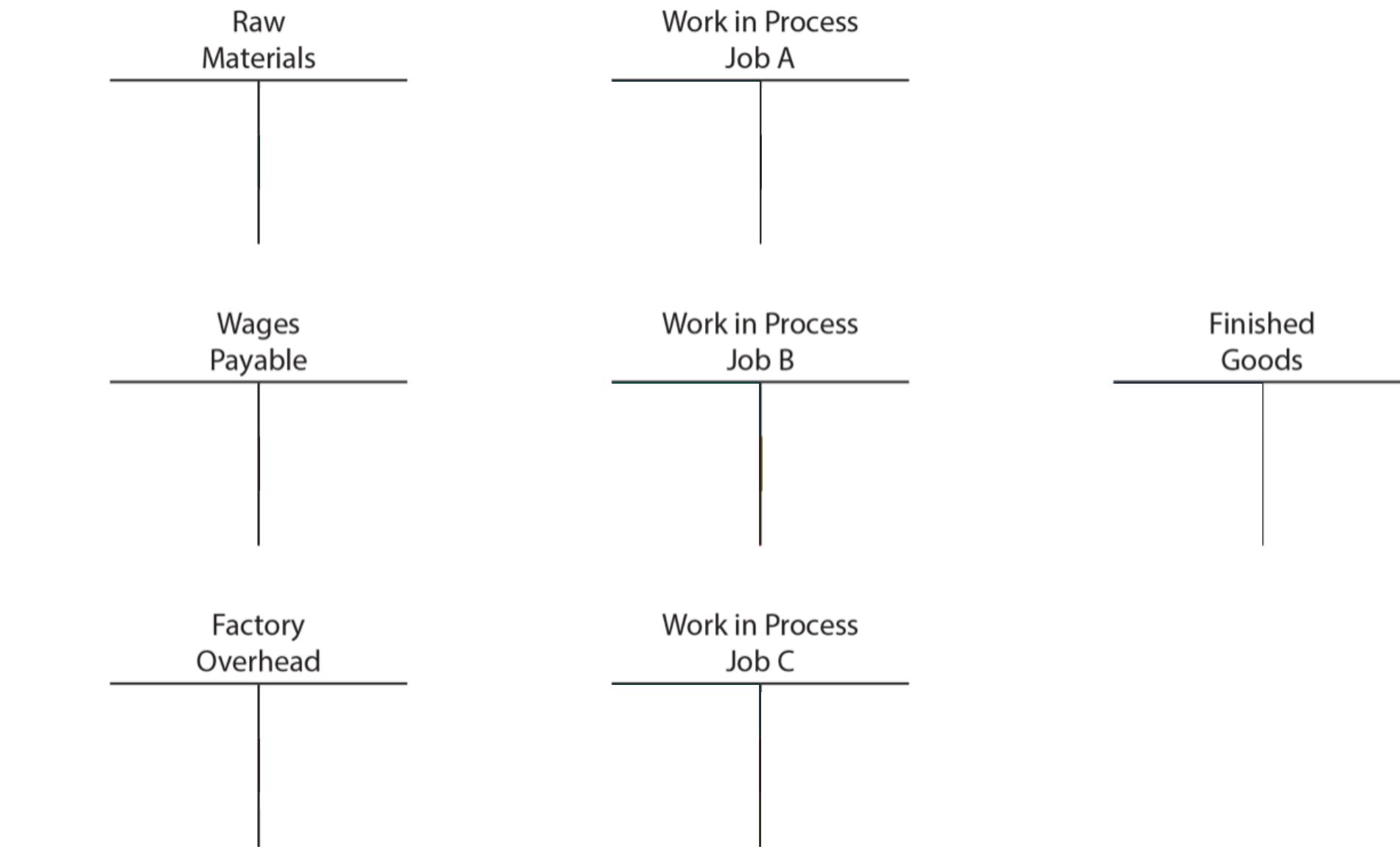


Process Costing Environment

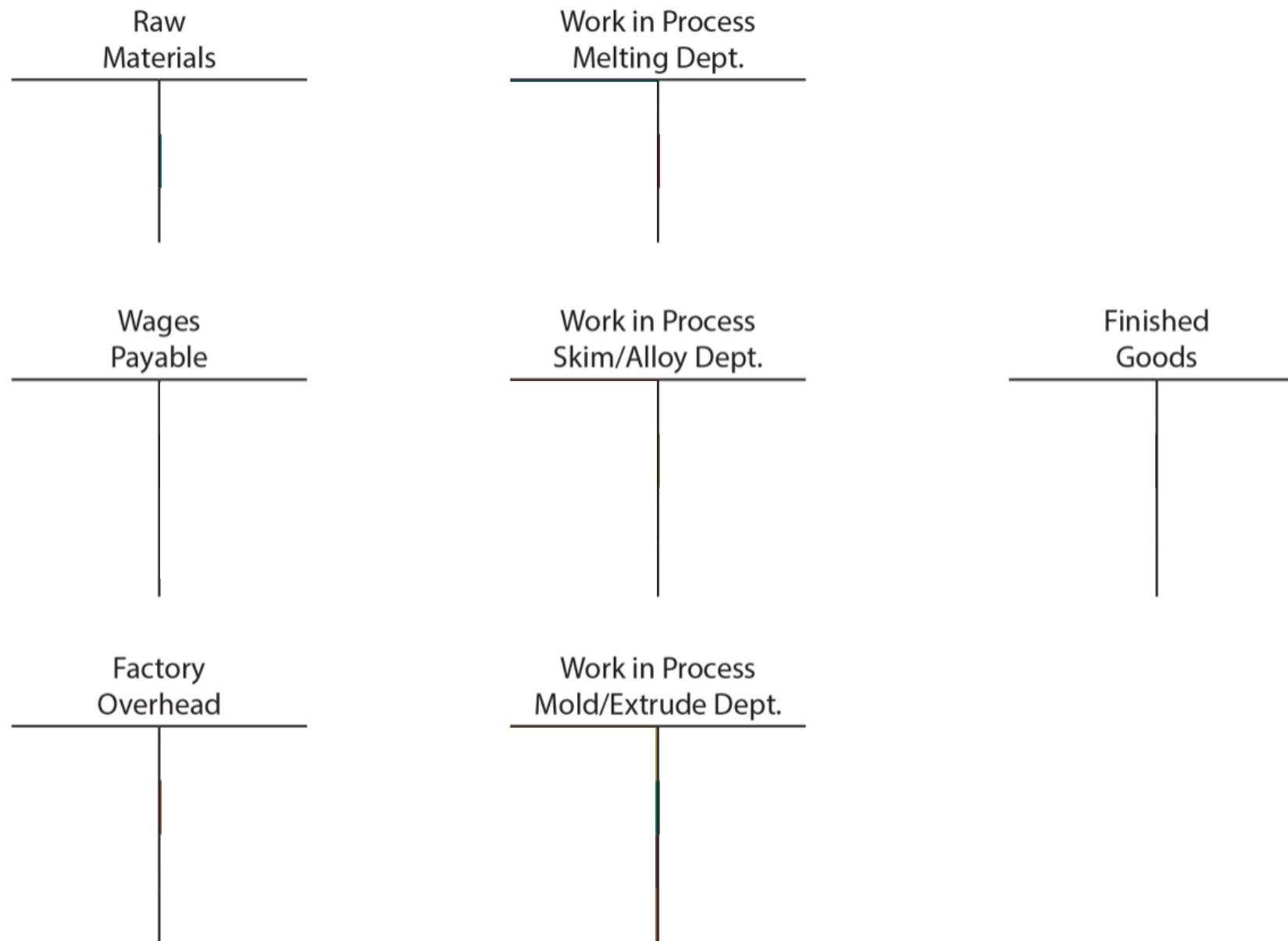
Costs are accumulated by department
on Cost of Production Reports



Job Costing Flows



Process Costing Flows





Job Order Costing

JOB COST SHEET
Dinosaur Vinyl, Inc.

Job No.: 5416

Customer No.: 2501723

Customer: Macs & Cheese

Date Started: Dec. 22, 2018

Units Ordered: 1

Date Completed: Feb. 22, 2019

	Units	Price	Amount
Direct Material			
Vinyl	1	\$300	\$ 300
Black printing ink	2	50	100
Red printing ink	1	60	60
Gold printing ink	1	60	60
Grommets	12	10	120
Framing wood	40	1.5	60
Total Direct Materials			\$ 700
Direct Labor	Hours	Wage Rate	Amount
Material Handler	1	\$ 15	\$ 15
Print Technician	1	15	15
Production Assistants	2	18	36
Total Direct Labor			\$ 66
Manufacturing Overhead	Base Units	Rate	Amount
Direct Labor Cost			
Total Manufacturing Overhead			
Total Job Cost			
Total Revenue			



Job Order Costing: Determining Estimated Overhead Cost

Manufacturing Overhead

- Costs that support production but are not direct materials or direct labor are considered overhead.
- Manufacturing overhead has three components:

1) Indirect materials

Materials used in production but not traced to specific products because the net informational value from the time and effort to trace the cost to each individual product produced is impossible or inefficient.

2) Indirect labor

Labor costs of those employees associated with the manufacturing process, but whose contributions are not directly traceable to the final product, and

3) Overhead

Costs that are necessary for production but not efficient to assign to individual product production. Examples of typical overhead costs are insurance, production facility electricity, warehouse rent, and depreciation of equipment.

Example 5: Computing a Predetermined Overhead Rate

... uses the expenses from the prior two years to estimate the overhead for the upcoming year to be \$250,000:

	Annual Estimate
Indirect labor	\$ 5,000
Indirect materials	20,000
Utilities	75,000
Depreciation	90,000
Insurance	35,000
Interest expense	25,000
	\$250,000

... also used its payroll records to estimate that it will spend \$100,000 on direct labor.

Using the predetermined overhead rate calculation, the overhead rate is:

$$\frac{\text{Estimated (budgeted) Overhead Cost } (\$250,000)}{\text{Expected (budgeted) Level of Activity } (\$100,000)}$$

Example 5: Computing a Predetermined Overhead Rate

... uses the expenses from the prior two years to estimate the overhead for the upcoming year to be \$250,000:

	Annual Estimate
Indirect labor	\$ 5,000
Indirect materials	20,000
Utilities	75,000
Depreciation	90,000
Insurance	35,000
Interest expense	25,000
	<u>\$250,000</u>

... also used its payroll records to estimate that it will spend \$100,000 on direct labor.

Using the predetermined overhead rate calculation, the overhead rate is:

Estimated (budgeted) Overhead Cost (\$250,000)

Expected (budgeted) Level of Activity (\$100,000)

Job Order Costing

JOB COST SHEET Dinosaur Vinyl, Inc.				
Job No.: 5416		Customer No.: 2501723		
Customer: Macs & Cheese		Date Started: Dec. 22, 2018		
Units Ordered: 1		Date Completed: Feb. 22, 2019		
Direct Material		Units	Price	Amount
Vinyl		1	\$300	\$ 300
Black printing ink		2	50	100
Red printing ink		1	60	60
Gold printing ink		1	60	60
Grommets		12	10	120
Framing wood		40	1.5	60
Total Direct Materials				\$ 700
Direct Labor		Hours	Wage Rate	Amount
Material Handler		1	\$ 15	\$ 15
Print Technician		1	15	15
Production Assistants		2	18	36
Total Direct Labor				\$ 66
Manufacturing Overhead		Base Units	Rate	Amount
Direct Labor Cost				
Total Manufacturing Overhead				
Total Job Cost				
Total Revenue				\$2,000

THINK IT THROUGH(Example 6)

Allocating Costs

A manufacturing company has incurred these costs:

Purchase raw materials inventory	\$15,000
Issue raw materials inventory to Job A	3,000
Factory wage expense incurred	23,000
Factory wage allocated to Job A	2,000
Factory wage allocated to overhead	500
Manufacturing overhead incurred	7,500
Manufacturing overhead allocated to Job A	1,000

What is the cost allocated to Job A?



Process Costing

Process Costing

- Process costing is the optimal system for a company to use when the production process results in many similar units.
- It is used when production is continuous or occurs in large batches and it is difficult to trace a particular input cost to a specific individual product.
- In a “Production Cost Report”, the following information is reported:
 - 1) Cost per equivalent unit;
 - 2) Costs to units transferred to finished goods;
 - 3) costs to partially completed units in the work in process (WIP) inventory.
- To prepare a “Production Cost Report”, follow the following four steps:
 1. Determine total units to assign costs;
 2. Compute equivalent units of production;
 3. Determine cost per equivalent unit;
 4. Allocate the costs to units transferred to finished goods and partially completed units in the work in process (WIP) inventory

Equivalent Units (Weighted Average)

- Essentially, the concept of equivalent units involves expressing a given number of partially completed units as a smaller number of fully completed units.
- We do this because it is easier to account for whole units than parts of a unit. We are adding together partially completed units to make a whole unit.
 - For example, if we have __ units ____ of the way complete, we can add them together to make __ equivalent unit (= _____).
 - We can make this calculation easier by multiplying the units by a percentage of complete.

Equivalent Units (Weighted Average)

- Under the weighted average method, equivalent units are calculated based on 2 things:
 - Units completed and transferred out, and
 - Units in ending work in process inventory.
- Units completed and transferred are _____ and will always be ___% complete for equivalent unit calculations for direct materials, direct labor and overhead.
- For units in ending work in process (WIP), we would take the units unfinished x a percent complete. The percent complete can be different for direct materials, direct labor or overhead.

Flow of Materials from Raw Materials to Finished Goods



Flow of Materials from Raw Materials to Finished Goods



Process Costing

Production Cost Report:	Total	DM (\$, % complete, or EU)	CC (\$, % complete, or EU)
1. Total costs incurred:			
Beginning WIP inventory (units and \$)			
Started into production this year (units and \$)			
2. Total equivalent units produced from those costs:			
Completed and transferred out (% complete)			
Completed and transferred out (# of EU)			
Ending WIP inventory (% complete)			
Ending WIP inventory (# of EU)			
Total equivalent units			
3. Costs per equivalent unit			
4a. Value of units completed and transferred out			
4b. Value of ending WIP inventory			

EXAMPLE 7. During the month, Rock City Percussion's shaping department requested \$10,179 in direct material and started into production 8,700 hickory drumsticks of size 5A. There was no beginning inventory in the shaping department, and 7,500 drumsticks were completed in that department and transferred to the finishing department. Wood is the only direct material in the shaping department, and it is added at the beginning of the process, so the work in process (WIP) is considered to be 100% complete with respect to direct materials. At the end of the month, the drumsticks still in the shaping department were estimated to be 35% complete with respect to conversion costs. All materials are added at the beginning of the shaping process.

While beginning the size 5A drumsticks, the shaping department incurred these costs in July:

Direct materials \$10,179; direct labor \$15,176; applied overhead \$7,000; total costs \$32,355 (= DM + DL + MOH).

Prepare a production Cost Report for the shaping department using weighted-average method.

Process Costing

Production Cost Report:	Total	DM (\$, % complete, or EU)	CC (\$, % complete, or EU)
1. Total costs incurred:			
Beginning WIP inventory (units and \$)			
Started into production this year (units and \$)			
2. Total equivalent units produced from those costs:			
Completed and transferred out (% complete)			
Completed and transferred out (# of EU)			
Ending WIP inventory (% complete)			
Ending WIP inventory (# of EU)			
Total equivalent units			
3. Costs per equivalent unit			
4a. Value of units completed and transferred out			
4b. Value of ending WIP inventory			

Production Cost Report for the Shaping Department

Units to account for	Units		
Materials	Conversion	Total	
Beginning work in process			
Units started into production			
Total units to account for			
Work in process completion %			
Units accounted for	Materials	Conversion	Total
Completed and transferred out			
Ending work in process			
Total units to account for			
Costs to account for	Materials	Conversion	Total
Beginning work in process			
Incurred during the period			
Total costs to account for			
Equivalent units			
Cost per equivalent unit			
Value of ending work in process	Materials	Conversion	Total
Completed and transferred			
Total costs			

Production Cost Report for the Shaping Department

Units to account for	Units		
Beginning work in process	—		
Units started into production	<u>8,700</u>		
Total units to account for	<u>8,700</u>		
Work in process completion %	100%	35%	
Units accounted for	Materials Units	Conversion Units	Total
Completed and transferred out	7,500	7,500	7,500
Ending work in process	<u>1,200</u>	<u>420</u>	<u>1,200</u>
Total units to account for	<u>8,700</u>	<u>7,920</u>	<u>8,700</u>
Costs to account for	Materials	Conversion	Total
Beginning work in process	\$ 0	\$ 0	\$ 0
Incurred during the period	<u>\$10,179</u>	<u>\$22,176</u>	<u>\$32,355</u>
Total costs to account for	<u>\$10,179</u>	<u>\$22,176</u>	<u>\$32,355</u>
Equivalent units	8,700	7,920	
Cost per equivalent unit	\$ 1.17	\$ 2.80	\$ 3.97
	Materials	Conversion	Total
Value of ending work in process	\$ 1,404	\$ 1,176	\$ 2,580
Completed and transferred	<u>8,775</u>	<u>21,000</u>	<u>29,775</u>
Total costs	<u>\$10,179</u>	<u>\$22,176</u>	<u>\$32,355</u>

EXAMPLE 8 (Chapter 5, Problem Set A, Problem 5)

Materials are added at the beginning of a production process, and ending work in process inventory is 30% complete with respect to conversion costs. Use the information provided to complete a production cost report using the weighted-average method.

Costs to Account For

Beginning inventory: materials	\$ 10,000
Beginning inventory: conversion	19,000
Direct materials	50,000
Direct labor	75,000
Applied overhead	<u>37,248</u>
Total costs to account for	\$191,248

Units to Account For

Beginning work in process	5,000
Units started into production	20,000
Transferred out	19,000

Process Costing

Production Cost Report:	Total	DM (\$, % complete, or EU)	CC (\$, % complete, or EU)
1. Total costs incurred:			
Beginning WIP inventory (units and \$)			
Started into production this year (units and \$)			
2. Total equivalent units produced from those costs:			
Completed and transferred out (% complete)			
Completed and transferred out (# of EU)			
Ending WIP inventory (% complete)			
Ending WIP inventory (# of EU)			
Total equivalent units			
3. Costs per equivalent unit			
4a. Value of units completed and transferred out			
4b. Value of ending WIP inventory			

EXAMPLE 9 (Chapter 5, Problem Set A, Problem 3)

Pant Risers manufactures bands for self-dressing assistive devices for mobility-impaired individuals. Manufacturing is a one-step process where the bands are cut and sewn. This is the information related to this year's production:

Units to Account For	Units	Materials	Conversion
Beginning WIP inventory	500	500	250
Started	<u>20,500</u>		
To account for	21,000		

Ending inventory was 100% complete as to materials and 70% complete as to conversion, and the total materials cost is \$57,540 and the total conversion cost is \$36,036. Using the weighted-average method, what are the unit costs if the company transferred out 17,000 units? What is the value of the inventory transferred out and the value of the ending WIP inventory?

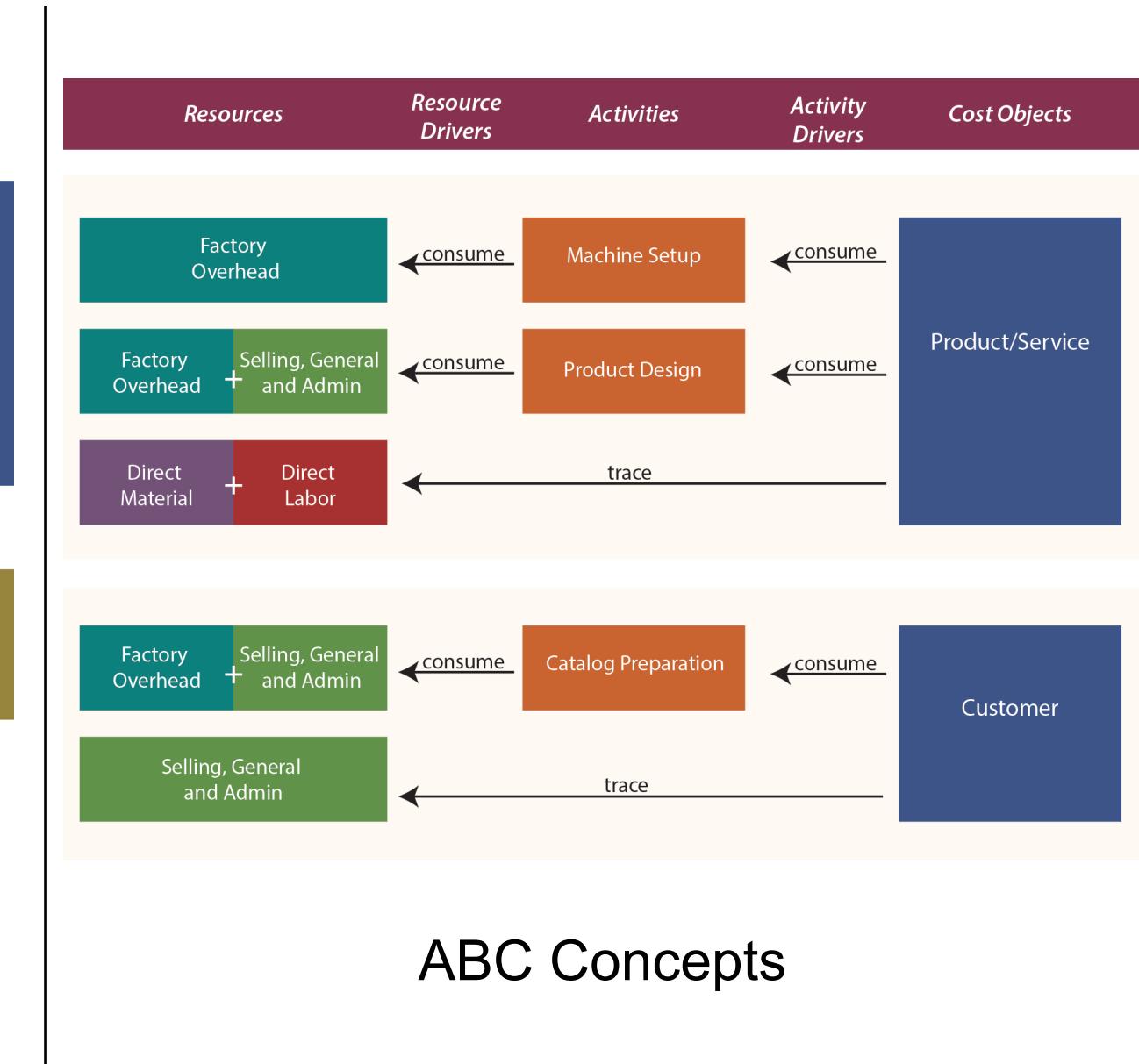
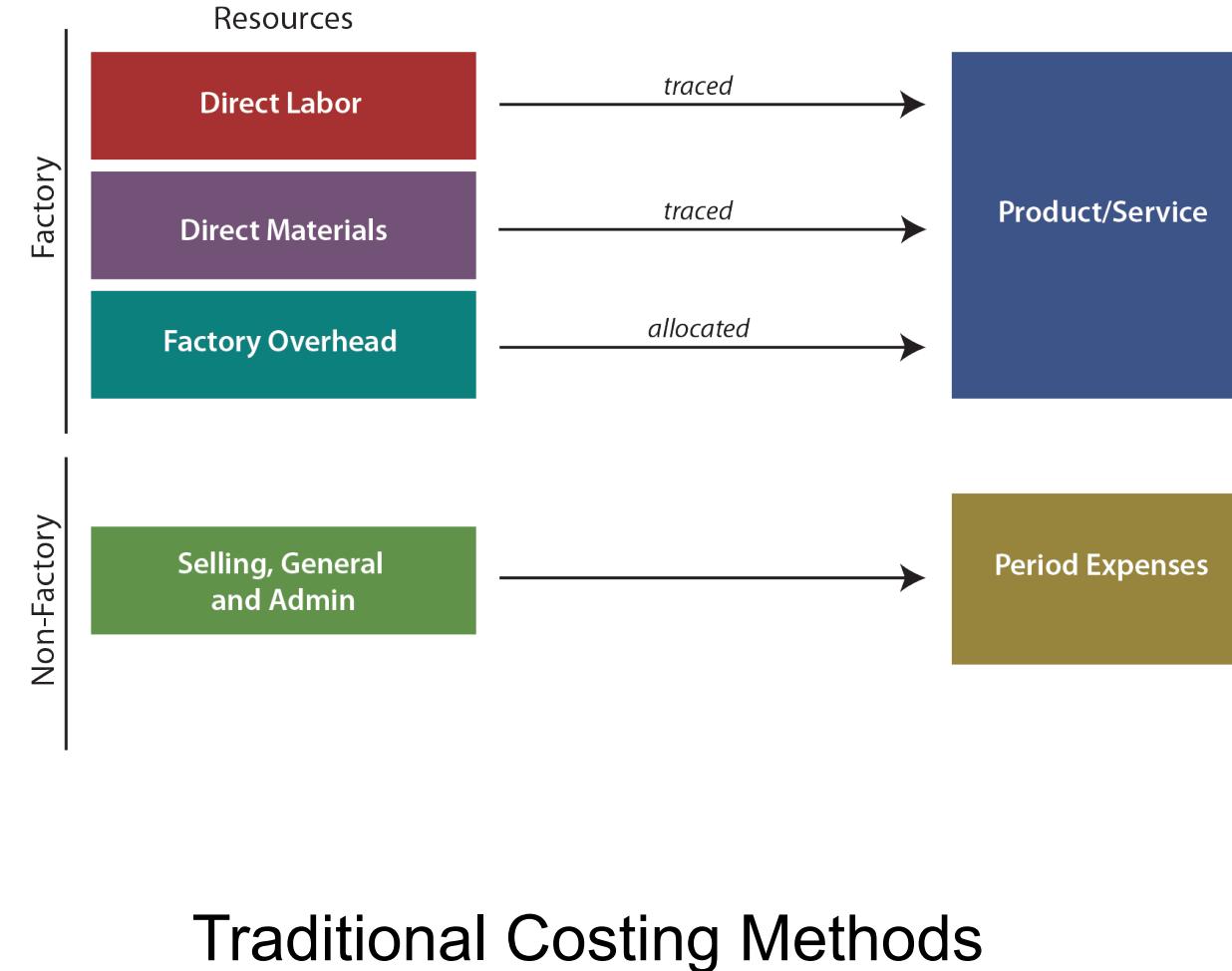
Process Costing

Production Cost Report:	Total	DM (\$, % complete, or EU)	CC (\$, % complete, or EU)
1. Total costs incurred:			
Beginning WIP inventory (units and \$)			
Started into production this year (units and \$)			
2. Total equivalent units produced from those costs:			
Completed and transferred out (% complete)			
Completed and transferred out (# of EU)			
Ending WIP inventory (% complete)			
Ending WIP inventory (# of EU)			
Total equivalent units			
3. Costs per equivalent unit			
4a. Value of units completed and transferred out			
4b. Value of ending WIP inventory			

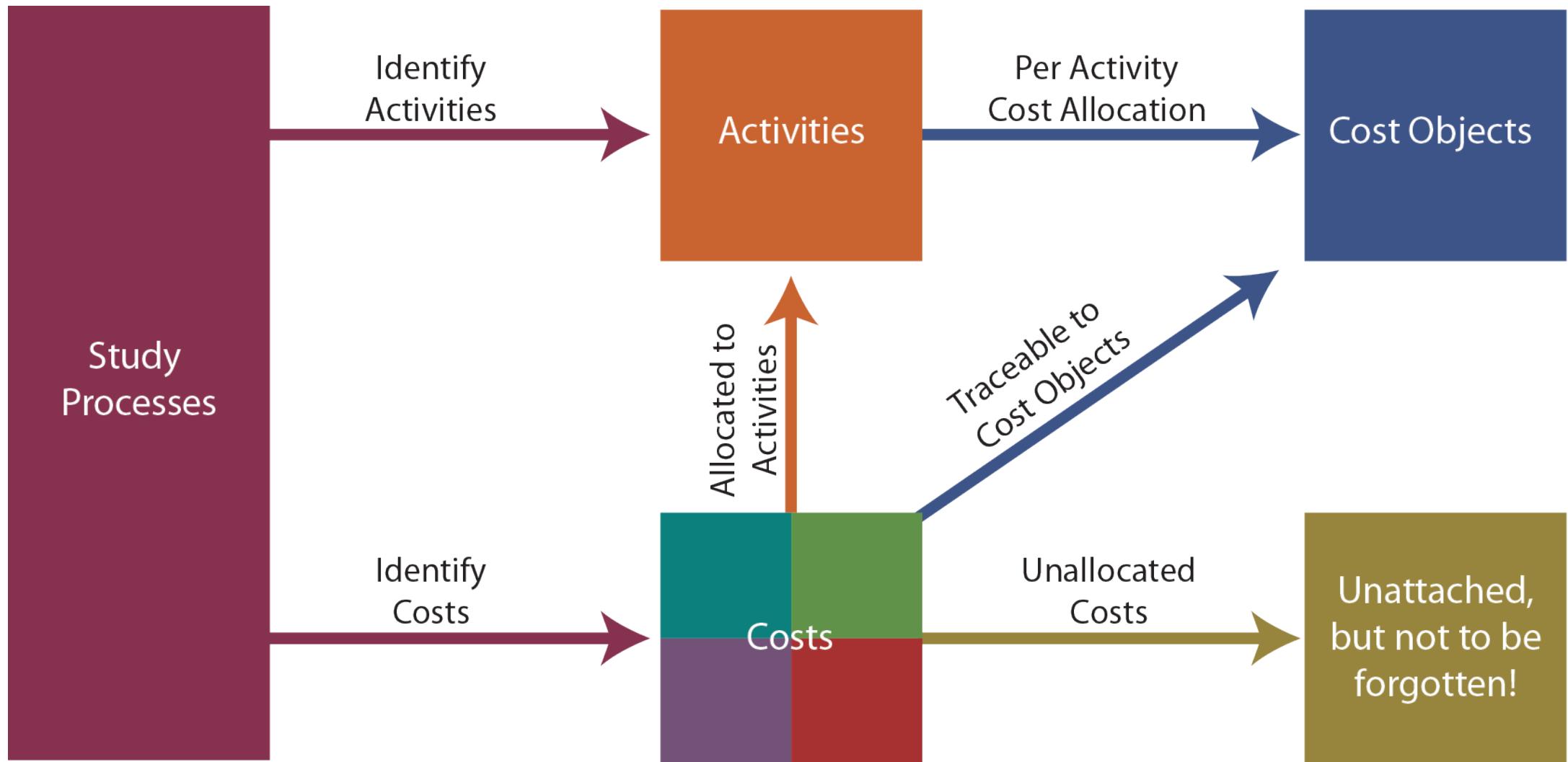


Activity-Based Costing (ABC)

Traditional Costing Methods vs. ABC Concepts



Steps to Develop an ABC System



Example 10

Golf and Music Enthusiast Company (GAME) developed two specialized products. The first product is GLASSESong, a pair of sunglasses with a built-in music player. The other is CAPlayer, a golf cap with a built-in music player having a very short unobtrusive cord from the cap to the speakers.

GAME has been employing **traditional costing methods** and applies factory overhead on the basis of labor costs. The products sell as fast as they can be produced so there is virtually no inventory. For a recent period CAPlayer sold 90,000 units and GLASSESong sold 110,000 units and each unit sells for \$60.

	CAPlayer	GLASSESong		
Direct material	\$3,000,000	\$4,400,000		
Direct labor	700,000	200,000		
Applied factory overhead (300% of direct labor)	<u>2,100,000</u>	<u>600,000</u>		
Product cost	<u>\$5,800,000</u>	<u>\$5,200,000</u>		
CAPlayer cost per unit (\$5,800,000/90,000)	\$64.44			
GLASSESong cost per unit (\$5,200,000/110,000)		\$47.27		
			Revenues	\$12,000,000
			CAPlayer cost	\$5,800,000
			GLASSESong cost	5,200,000
			SG&A	<u>600,000</u>
			Profit	<u>\$ 400,000</u>

Activity-Based Costing (ABC):

Study Processes and Costs | Identify Activities

The consultant's study began with a review of the business, which revealed the following:

1. Product costs were \$11,000,000 and SG&A \$600,000 as shown in the analysis.
2. The core components are the same for each device.
3. GLASSESong requires added material related to polarized lenses and CAPlayer requires added direct labor for sewing.
4. Both devices are produced in batches on the same automated assembly line, at the same pace, and through similar steps.
5. Automated machinery is leased from Rebel Robotics, which bases its rental charges on a "units processed" basis.
6. There is one production line, and it must be "set up" for each production batch.
7. CAPlayers are produced in batches of 900 and GLASSESongs are produced in batches of 110,000.

	CAPlayer	GLASSESong
8. Direct material	\$3,000,000	\$4,400,000
Direct labor	700,000	200,000
Applied factory overhead (300% of direct labor)	<u>2,100,000</u>	<u>600,000</u>
Product cost	<u><u>\$5,800,000</u></u>	<u><u>\$5,200,000</u></u>
CAPlayer cost per unit (\$5,800,000/90,000)	\$64.44	
9. GLASSESong cost per unit (\$5,200,000/110,000)		\$47.27

Cost Analysis	
Direct materials	\$ 7,400,000
Direct labor	900,000
Indirect labor	200,000
Indirect material	100,000
Factory maintenance	150,000
Robotics lease	2,000,000
Insurance	70,000
Other	<u>180,000</u>
Total Product Cost	<u><u>\$11,000,000</u></u>
Management salaries	\$ 430,000
Design and engineering	90,000
Business office rent	20,000
Accounting	<u>60,000</u>
Total SG&A Cost	<u><u>\$ 600,000</u></u>

The consultant's study began with a review of the business, which revealed the following:

1. Product costs were \$11,000,000 and SG&A \$600,000 as shown in the analysis.
2. The core components are the same for each device.
3. GLASSESong requires added material related to polarized lenses and CAPlayer requires added direct labor for sewing.
4. Both devices are produced in batches on the same automated assembly line, at the same pace, and through similar steps.
5. Automated machinery is leased from Rebel Robotics, which bases its rental charges on a "units processed" basis.
6. There is one production line, and it must be "set up" for each production batch.
7. CAPlayers are produced in batches of 900 and GLASSESongs are produced in batches of 550 units. As a result CAPlayer required 100 setups (90,000 units/900 units per setup) and GLASSESong required 200 setups (110,000 units/550 units per setup).
8. A tech support department has been established to help customers download music to their devices. The CAPlayers are sold and supported only through the world's 1,000 most exclusive golf courses. The golf pros at these courses usually call once to learn the product and require no further assistance. The GLASSESong units are sold over the internet, and individual purchasers average one call per unit sold.
9. Both products were designed by an internal development team.

ACTIVITY	LEVEL	METRIC
Robotics	Unit Level	Number of units produced $(90,000 + 110,000 = 200,000)$
Production Setup	Batch Level	Number of setups $(100 + 200 = 300)$
Tech Support	Customer Level	Number of tech support calls $(1,000 + 110,000 = 111,000)$
Product Design	Product Level	Number of products designed $(1 + 1 = 2)$

Activity-Based Costing (ABC):

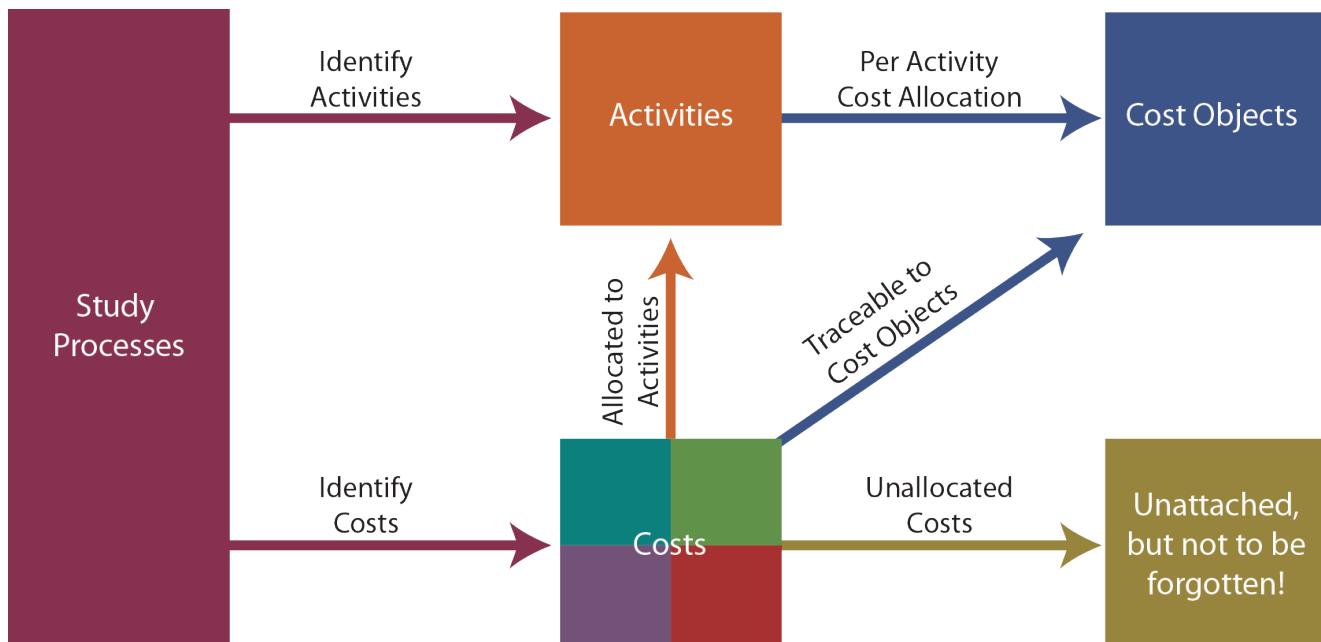
Study Processes and Costs | Identify Activities

Cost Analysis	
Direct materials	\$ 7,400,000
Direct labor	900,000
Indirect labor	200,000
Indirect material	100,000
Factory maintenance	150,000
Robotics lease	2,000,000
Insurance	70,000
Other	<u>180,000</u>
Total Product Cost	<u>\$11,000,000</u>
Management salaries	\$ 430,000
Design and engineering	90,000
Business office rent	20,000
Accounting	<u>60,000</u>
Total SG&A Cost	<u>\$ 600,000</u>

ACTIVITY	LEVEL	METRIC
Robotics	Unit Level	Number of units produced (90,000 + 110,000 = 200,000)
Production Setup	Batch Level	Number of setups (100 + 200 = 300)
Tech Support	Customer Level	Number of tech support calls (1,000 + 110,000 = 111,000)
Product Design	Product Level	Number of products designed (1 + 1 = 2)



	A	B	C	D	E	F	G	H	I	J	K	L
1	Cost Analysis		Activity Cost Pools									
2			Robotics	Production Setup	Tech Support	Product Design	Unallocated					
3	Product Costs											
4	Direct materials	\$7,400,000										
5	Direct labor	900,000										
6	Indirect labor	200,000										
7	Indirect material	100,000										
8	Factory maint.	150,000										
9	Robotics lease	2,000,000										
10	Insurance	70,000										
11	Other	180,000										
12												
13	SG&A											
14	Mgt. salaries	430,000										
15	Design and eng.	90,000										
16	Business off. rent	20,000										
17	Accounting	60,000										
18												





























	A	B	C	D	E	F	G	H	I	J	K	L
1	Cost Analysis		Activity Cost Pools									
2			Robotics		Production Setup		Tech Support		Product Design		Unallocated	
3	Product Costs											
4	Direct materials	\$7,400,000	0%	\$ 0	0%	\$ 0	0%	\$ 0	0%	\$ 0	0%	\$ 0
5	Direct labor	900,000	0%	0	0%	0	0%	0	0%	0	0%	0
6	Indirect labor	200,000	20%	40,000	65%	130,000	10%	20,000	5%	10,000	0%	0
7	Indirect material	100,000	12%	12,000	70%	70,000	10%	10,000	1%	1,000	7%	7,000
8	Factory maint.	150,000	24%	36,000	70%	105,000	0%	0	0%	0	6%	9,000
9	Robotics lease	2,000,000	100%	2,000,000	0%	0	0%	0	0%	0	0%	0
10	Insurance	70,000	30%	21,000	60%	42,000	10%	7,000	0%	0	0%	0
11	Other	180,000	10%	18,000	45%	81,000	5%	9,000	20%	36,000	20%	36,000
12												
13	SG&A											
14	Mgt. salaries	430,000	10%	\$ 43,000	10%	\$ 43,000	10%	\$43,000	30%	\$129,000	40%	\$172,000
15	Design and eng.	90,000	30%	27,000	40%	36,000	10%	9,000	20%	18,000	0%	0
16	Business off. rent	20,000	0%	0	0%	0	20%	4,000	15%	3,000	65%	13,000
17	Accounting	60,000	5%	3,000	5%	3,000	15%	9,000	5%	3,000	70%	42,000
18				\$2,200,000		\$510,000		\$111,000		\$200,000		\$279,000

Determine Per-Activity Rates

	Allocation Rates			
	Robotic Units	Production Setups	Tech Calls	Product Designs
CAPlayer	90,000	100		1
GLASSESong	110,000	200		1
Customers - Golf Courses			1,000	
Customers - Individuals			110,000	
Total Activity Quantity	200,000	300	111,000	2
Per Activity Allocation Rate				
Total Cost (from spreadsheet)	\$2,200,000	\$510,000	\$111,000	\$200,000
Total Activity Quantity	÷ 200,000	÷ 300	÷ 111,000	÷ 2
Activity Cost Per Measure	\$11	\$1700	\$1	\$100,000

Apply Costs to Cost Objects

Product Profitability Analysis				
		CAPlayer	GLASSESong	TOTAL
Direct Material	Traceable	\$3,000,000	\$4,400,000	\$ 7,400,000
Direct Labor	Traceable	700,000	200,000	900,000
Robotics	\$11/unit	990,000	1,210,000	2,200,000
Production Setup	\$1,700/setup	170,000	340,000	510,000
Tech Support	\$1/call	1,000	110,000	111,000
Product Design	\$100,000/design	100,000	100,000	200,000
Total Traceable & Allocated Costs		<u>\$4,961,000</u>	<u>\$6,360,000</u>	<u>\$11,321,000</u>
Unallocated Costs				<u>279,000</u>
Total Costs				<u><u>\$11,600,000</u></u>

Apply Costs to Cost Objects

Product Profitability Analysis				
		CAPlayer	GLASSESong	TOTAL
Direct Material	Traceable	\$3,000,000	\$4,400,000	\$ 7,400,000
Direct Labor	Traceable	700,000	200,000	900,000
Robotics	\$11/unit	990,000	1,210,000	2,200,000
Production Setup	\$1,700/setup	170,000	340,000	510,000
Tech Support	\$1/call	1,000	110,000	111,000
Product Design	\$100,000/design	100,000	100,000	200,000
Total Traceable & Allocated Costs		<u>\$4,961,000</u>	<u>\$6,360,000</u>	<u>\$11,321,000</u>
Unallocated Costs				<u>279,000</u>
Total Costs				<u><u>\$11,600,000</u></u>
Product Revenues		\$5,400,000	\$6,600,000	\$12,000,000
Total Traceable & Allocated Costs		<u>4,961,000</u>	<u>6,360,000</u>	<u>11,321,000</u>
Product Margin		<u>\$ 439,000</u>	<u>\$ 240,000</u>	<u>\$ 679,000</u>
Unallocated Costs				<u>279,000</u>
Entity Profit				<u><u>\$ 400,000</u></u>

Example 10: Traditional Costing Method

Golf and Music Enthusiast Company (GAME) developed two specialized products. The first product is GLASSESong, a pair of sunglasses with a built-in music player. The other is CAPPlayer, a golf cap with a built-in music player having a very short unobtrusive cord from the cap to the speakers.

GAME has been employing **traditional costing methods** and applies factory overhead on the basis of labor costs. The products sell as fast as they can be produced so there is virtually no inventory. For a recent period CAPPlayer sold 90,000 units and GLASSESong sold 110,000 units and each unit sells for \$60.

	CAPPlayer	GLASSESong		
Direct material	\$3,000,000	\$4,400,000		
Direct labor	700,000	200,000		
Applied factory overhead (300% of direct labor)	<u>2,100,000</u>	<u>600,000</u>		
Product cost	<u><u>\$5,800,000</u></u>	<u><u>\$5,200,000</u></u>		
Revenue			Revenues	\$12,000,000
Product margin (traditional costing method)			CAPPlayer cost	\$5,800,000
			GLASSESong cost	5,200,000
			SG&A	<u>600,000</u>
			Profit	<u><u>\$ 400,000</u></u>
Product margin (ABC method)	\$439,000	\$240,000		

SUMMARY

- Contribution margin can be used to calculate how much of every dollar is available to cover _____ and contribute to _____.
- Contribution margin can be expresses on a _____ basis, as a _____, or in _____.
- Break-even analysis is a tool that almost any business can use for _____ and _____ process. It helps to identify a _____ that is necessary before an organization starts to generate a profit.

SUMMARY

- The three components of manufacturing costs are direct material, direct labor, and manufacturing overhead (MOH).
- Job order costing is the optimal costing method for producing _____ goods or when it is easy to identify the cost _____ with the product. MOH is assigned to the individual jobs using the predetermined overhead rate.
- Process costing is the system of accumulating costs within each _____ for large-volume, mass-produced units. Process costing determines the cost per unit through the use of _____.

SUMMARY

- SG&A is treated as a _____ cost in traditional costing systems.
- Traditional methods is optimal when the manufacturing process is labor driven and overhead increases based on traditional activity bases, such as direct labor hours, direct labor dollars, or machine hours.

SUMMARY

- Activity-based costing assigns overhead costs based on several _____ and the _____ that drive costs.
- Activity-based costing is optimal when the manufacturing process is _____ _____ and overhead increased based on various activities the differ for each product.
- Process costing is the system of accumulating costs within each _____ for large-volume, mass-produced units. Process costing determines the cost per unit through the use of _____.



Thank you!