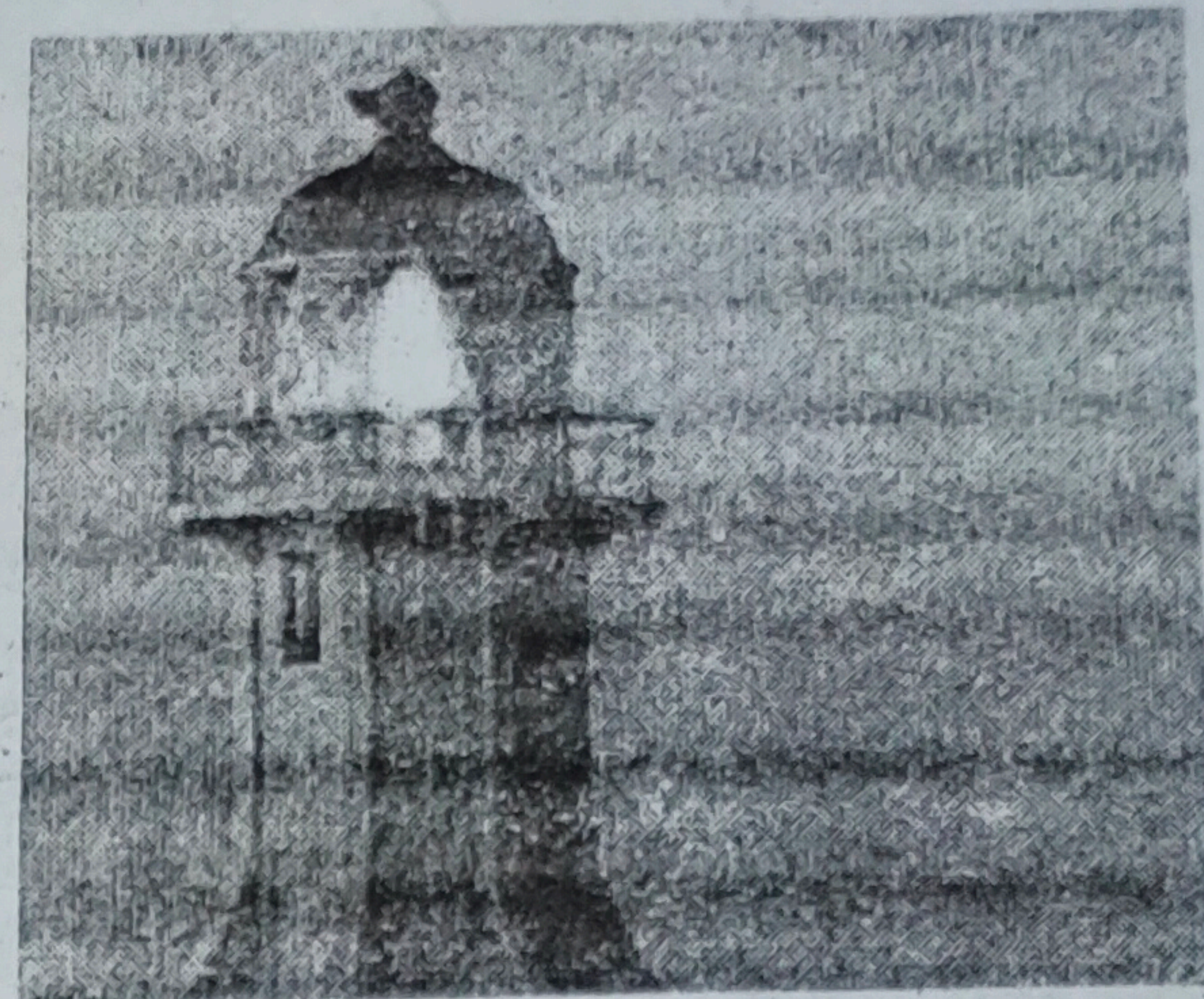


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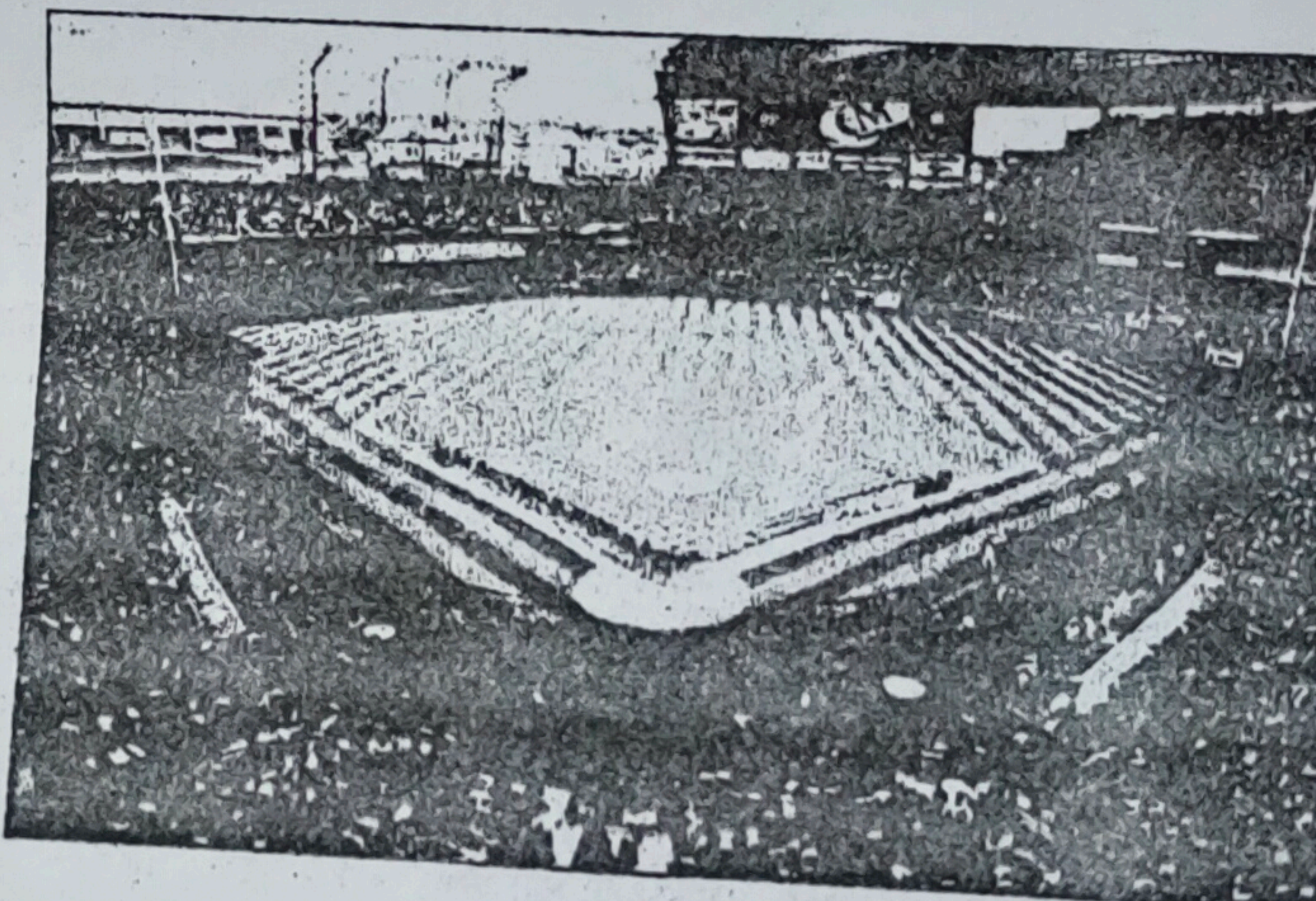
Learning Objectives

After studying Chapter 2, you should be able to:

- L01** Identify and give examples of each of the three basic manufacturing cost categories.
- L02** Distinguish between product costs and period costs and give examples of each.
- L03** Prepare an income statement including calculation of the cost of goods sold.
- L04** Prepare a schedule of cost of goods manufactured.
- L05** Understand the differences between variable costs and fixed costs.
- L06** Understand the differences between direct and indirect costs.
- L07** Define and give examples of cost classifications used in making decisions: differential costs, opportunity costs, and sunk costs.
- L08** (Appendix 2A) Properly account for labor costs associated with idle time, overtime, and fringe benefits.
- L09** (Appendix 2B) Identify the four types of quality costs and explain how they interact.
- L010** (Appendix 2B) Prepare and interpret a quality cost report.

Cost Terms, Concepts, and Classifications

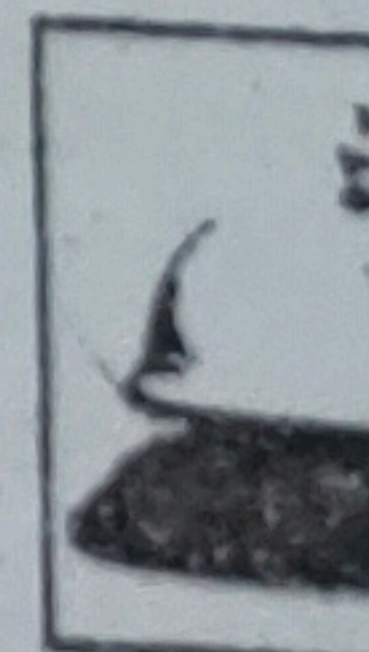
Costs Add Up



Understanding costs and how they behave is critical in business. Labor Ready is a company based in Tacoma, Washington, that fills temporary manual labor jobs throughout the United States, Canada, and the UK—issuing over 6 million paychecks each year to more than half a million laborers. For example, food vendors at the Seattle Mariners' Safeco Field hire Labor Ready workers to serve soft drinks and food at baseball games. Employers are charged about \$11 per hour for this service. Since Labor Ready pays its workers only about \$6.50 per hour and offers no fringe benefits and has no national competitors, this business would appear to be a gold mine generating about \$4.50 per hour in profit. However, the company must maintain 687 hiring offices, each employing a permanent staff of four to five persons. Those costs, together with payroll taxes, workmen's compensation insurance, and other administrative costs, result in a margin of only about 5%, or a little over 50¢ per hour. ■

Source: Catie Golding, "Short-Term Work, Long-Term Profits," *Washington CEO*, January 2000, pp. 10-12.

BUSINESS FOCUS



✓

As explained in Chapter 1, the work of management focuses on (1) planning, which includes setting objectives and outlining how to attain these objectives; and (2) control, which includes the steps taken to ensure that objectives are realized. To carry out these planning and control responsibilities, managers need *information* about the organization. This information often relates to the *costs* of the organization.

In managerial accounting, the term *cost* is used in many different ways. The reason is that there are many types of costs, and these costs are classified differently according to the immediate needs of management. For example, managers may want cost data to prepare external financial reports, to prepare planning budgets, or to make decisions. Each different use of cost data demands a different classification and definition of costs. For example, the preparation of external financial reports requires the use of historical cost data, whereas decision making may require predictions about future costs.

In this chapter, we discuss many of the possible uses of cost data and how costs are defined and classified for each use. Our first task is to explain how costs are classified for the purpose of preparing external financial reports—particularly in manufacturing companies. To set the stage for this discussion, we begin the chapter by defining some terms commonly used in manufacturing.

General Cost Classifications

All types of organizations incur costs—governmental, not-for-profit, manufacturing, retail, and service. Generally, the kinds of costs that are incurred and the way in which these costs are classified depend on the type of organization. For this reason, we will consider in our discussion the cost characteristics of a variety of organizations—manufacturing, merchandising, and service.

Our initial focus in this chapter is on manufacturing companies, since their basic activities include most of the activities found in other types of organizations. Manufacturing companies such as Texas Instruments, Ford, and DuPont are involved in acquiring raw materials, producing finished goods, marketing, distributing, billing, and almost every other business activity. Therefore, an understanding of costs in a manufacturing company can be very helpful in understanding costs in other types of organizations.

In this chapter, we introduce cost concepts that apply to diverse organizations including fast-food outlets such as Kentucky Fried Chicken, Pizza Hut, and Taco Bell; movie studios such as Disney, Paramount, and United Artists; consulting firms such as Accenture and McKinsey; and your local hospital. The exact terms used in these industries may not be the same as those used in manufacturing, but the same basic concepts apply. With some slight modifications, these basic concepts also apply to merchandising companies such as Wal-Mart, The Gap, 7-Eleven, Nordstrom, and Tower Records. With that in mind, let's begin our discussion of manufacturing costs.

Manufacturing Costs

Most manufacturing companies separate manufacturing costs into three broad categories: direct materials, direct labor, and manufacturing overhead. A discussion of each of these categories follows.

✓ **Direct Materials** The materials that go into the final product are called **raw materials**. This term is somewhat misleading, since it seems to imply unprocessed natural resources like wood pulp or iron ore. Actually, raw materials refer to any materials that are used in the final product; and the finished product of one company can become the raw materials of

Topic Tackler



2-1



LEARNING OBJECTIVE 1
Identify and give examples of each of the three basic manufacturing cost categories.

another company. For example, the plastics produced by Du Pont are a raw material used by Compaq Computer in its personal computers. One study of 37 manufacturing industries found that materials costs averaged about 55% of sales revenues.¹

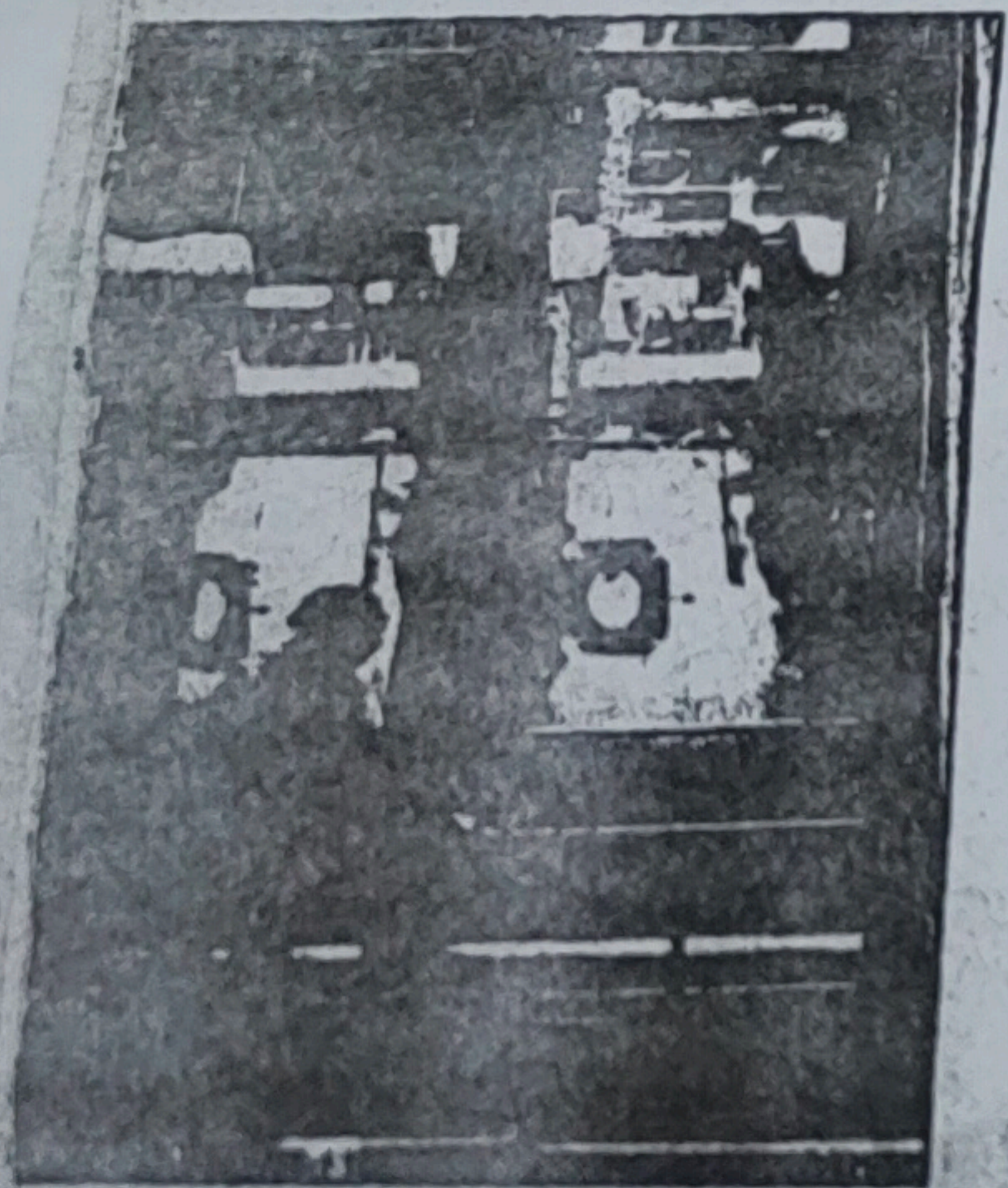
Raw materials may include both *direct* and *indirect materials*. **Direct materials** are those materials that become an integral part of the finished product and whose costs can be conveniently traced to the finished product. This would include, for example, the seats that Airbus purchases from subcontractors to install in its commercial aircraft and the tiny electric motor Panasonic uses in its DVD players.

Sometimes it isn't worth the effort to trace the costs of relatively insignificant materials to end products. Such minor items would include the solder used to make electrical connections in a Sony TV or the glue used to assemble an Ethan Allen chair. Materials such as solder and glue are called **indirect materials** and are included as part of manufacturing overhead, which is discussed later in this section.

Direct Labor **Direct labor** consists of labor costs that can be easily (i.e., physically and conveniently) traced to individual units of product. Direct labor is sometimes called *touch labor*, since direct labor workers typically touch the product while it is being made. Examples of direct labor include assembly-line workers at Toyota, carpenters at the home builder Kaufman and Broad, and electricians who install equipment on aircraft at Bombardier Learjet.

Labor costs that cannot be physically traced to the creation of products, or that can be traced only at great cost and inconvenience, are termed **indirect labor**. Just like indirect materials, indirect labor is treated as part of manufacturing overhead. Indirect labor includes the labor costs of janitors, supervisors, materials handlers, and night security guards. Although the efforts of these workers are essential to production, it would be either impractical or impossible to accurately trace their costs to specific units of product. Hence, such labor costs are treated as indirect labor.

IN BUSINESS



IS SENDING JOBS OVERSEAS ALWAYS A GOOD IDEA?

In recent years, many companies have sent jobs from high labor-cost countries such as the United States to lower labor-cost countries such as India and China. But is chasing labor cost savings always the right thing to do? In manufacturing, the answer is no. Typically, total direct labor costs are around 7% to 15% of cost of goods sold. Since direct labor is such a small part of overall costs, the labor savings realized by "offshoring" jobs can easily be overshadowed by a decline in supply chain efficiency that occurs simply because production facilities are located farther from the ultimate customers. The increase in inventory carrying costs and obsolescence costs coupled with slower response to customer orders, not to mention foreign currency exchange risks, can more than offset the benefits of employing geographically dispersed low-cost labor.

One manufacturer of casual wear in Los Angeles, California, understands the value of keeping jobs close to home in order to maintain a tightly knit supply chain. The company can fill orders for as many as 160,000 units in 24 hours. In fact, the company carries less than 30 days' inventory and is considering fabricating clothing only after orders are received from customers rather than attempting to forecast what items will sell and making them in advance. How would they do this? The company's entire supply chain—including weaving, dyeing, and sewing—is located in downtown Los Angeles, eliminating shipping delays.

Source: Robert Sternfels and Ronald Ritter, "When Offshoring Doesn't Make Sense," *The Wall Street Journal*, October 19, 2004, p. B8.

¹ Germain Boer and Debra Jeter, "What's New About Modern Manufacturing? Empirical Evidence on Manufacturing Cost Changes," *Journal of Management Accounting Research*, volume 5, pp. 61-83.

Major shifts have taken place and continue to take place in the structure of labor costs in some industries. Sophisticated automated equipment, run and maintained by skilled indirect workers, is increasingly replacing direct labor. Indeed, direct labor averages only about 10% of sales revenues in manufacturing. In some companies, direct labor has become such a minor element of cost that it has disappeared altogether as a separate cost category. Nevertheless, the vast majority of manufacturing and service companies throughout the world continue to recognize direct labor as a separate cost category.

Manufacturing Overhead Manufacturing overhead, the third element of manufacturing cost, includes all costs of manufacturing except direct materials and direct labor. Manufacturing overhead includes items such as indirect materials; indirect labor; maintenance and repairs on production equipment; and heat and light, property taxes, depreciation, and insurance on manufacturing facilities. A company also incurs costs for heat and light, property taxes, insurance, depreciation, and so forth, associated with its selling and administrative functions, but these costs are not included as part of manufacturing overhead. Only those costs associated with *operating the factory* are included in manufacturing overhead. Across large numbers of manufacturing companies, manufacturing overhead averages about 16% of sales revenues.²

Various names are used for manufacturing overhead, such as *indirect manufacturing cost*, *factory overhead*, and *factory burden*. All of these terms are synonyms for *manufacturing overhead*.

Nonmanufacturing Costs

Nonmanufacturing costs are often divided into two categories: (1) *selling costs* and (2) *administrative costs*. **Selling costs** include all costs that are incurred to secure customer orders and get the finished product to the customer. These costs are sometimes called *order-getting* and *order-filling* costs. Examples of selling costs include advertising, shipping, sales travel, sales commissions, sales salaries, and costs of finished goods warehouses.

Administrative costs include all executive, organizational, and clerical costs associated with the *general management* of an organization rather than with manufacturing or selling. Examples of administrative costs include executive compensation, general accounting, secretarial, public relations, and similar costs involved in the overall, general administration of the organization *as a whole*.

Nonmanufacturing costs are also often called selling, general, and administrative (SG&A) costs.

Product Costs versus Period Costs

In addition to classifying costs as manufacturing or nonmanufacturing costs, there are other ways to look at costs. For instance, they can also be classified as either *product costs* or *period costs*. To understand the difference between product costs and period costs, we must first discuss the matching principle from financial accounting.

Generally, costs are recognized as expenses on the income statement in the period that benefits from the cost. For example, if a company pays for liability insurance in advance for

LEARNING OBJECTIVE 2
Distinguish between product costs and period costs and give examples of each.

² J. Miller, A. DeMeyer, and J. Nakane, *Benchmarking Global Manufacturing* (Homewood, IL: Richard D. Irwin), Chapter 2. The Boer and Jeter article cited on the previous page contains a similar finding concerning the magnitude of manufacturing overhead.

two years, the entire amount is not considered an expense of the year in which the payment is made. Instead, one-half of the cost would be recognized as an expense each year. The reason is that both years—not just the first year—benefit from the insurance payment. The unexpensed portion of the insurance payment is carried on the balance sheet as an asset called prepaid insurance.

The *matching principle* is based on the *accrual* concept that *costs incurred to generate a particular revenue should be recognized as expenses in the same period that the revenue is recognized*. This means that if a cost is incurred to acquire or make something that will eventually be sold, then the cost should be recognized as an expense only when the sale takes place—that is, when the benefit occurs. Such costs are called *product costs*.

Product Costs

For financial accounting purposes, **product costs** include all costs involved in acquiring or making a product. In the case of manufactured goods, these costs consist of direct materials, direct labor, and manufacturing overhead. Product costs “attach” to units of product as the goods are purchased or manufactured, and they remain attached as the goods go into inventory awaiting sale. Product costs are initially assigned to an inventory account on the balance sheet. When the goods are sold, the costs are released from inventory as expenses (typically called cost of goods sold) and matched against sales revenue. Since product costs are initially assigned to inventories, they are also known as **inventoriable costs**.

We want to emphasize that product costs are not necessarily treated as expenses in the period in which they are incurred. Rather, as explained above, they are treated as expenses in the period in which the related products *are sold*. This means that a product cost such as direct materials or direct labor might be incurred during one period but not recorded as an expense until a following period when the completed product is sold.

Period Costs

Period costs are all the costs that are not product costs. For example, sales commissions and the rental costs of administrative offices are period costs. Period costs are not included as part of the cost of either purchased or manufactured goods; instead, period costs are expensed on the income statement in the period in which they are incurred using the usual rules of accrual accounting. Keep in mind that the period in which a cost is incurred is not necessarily the period in which cash changes hands. For example, as discussed earlier, the costs of liability insurance are spread across the periods that benefit from the insurance—regardless of the period in which the insurance premium is paid.

As suggested above, *all selling and administrative expenses are considered to be period costs*. Advertising, executive salaries, sales commissions, public relations, and other nonmanufacturing costs discussed earlier are all examples of period costs. They will appear on the income statement as expenses in the period in which they are incurred.

Prime Cost and Conversion Cost

Two more cost categories are often used in discussions of manufacturing costs—**prime cost** and **conversion cost**. These terms are quite easy to define. **Prime cost** is the sum of direct materials cost and direct labor cost. **Conversion cost** is the sum of direct labor cost and manufacturing overhead cost. The term *conversion cost* is used to describe direct labor and manufacturing overhead because these costs are incurred to convert materials into the finished product.

Exhibit 2-1 (page 44) contains a summary of the cost terms that we have introduced so far.

Inventoriable Costs

As stated earlier, 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 a period. To illustrate this point, refer again to Exhibit 2-5. At the end of the period, the materials, labor, and overhead costs that are associated with the units in the Work in Process and Finished Goods inventory accounts will appear on the balance sheet as assets. As explained earlier, these costs will not become expenses until the goods are completed and sold.

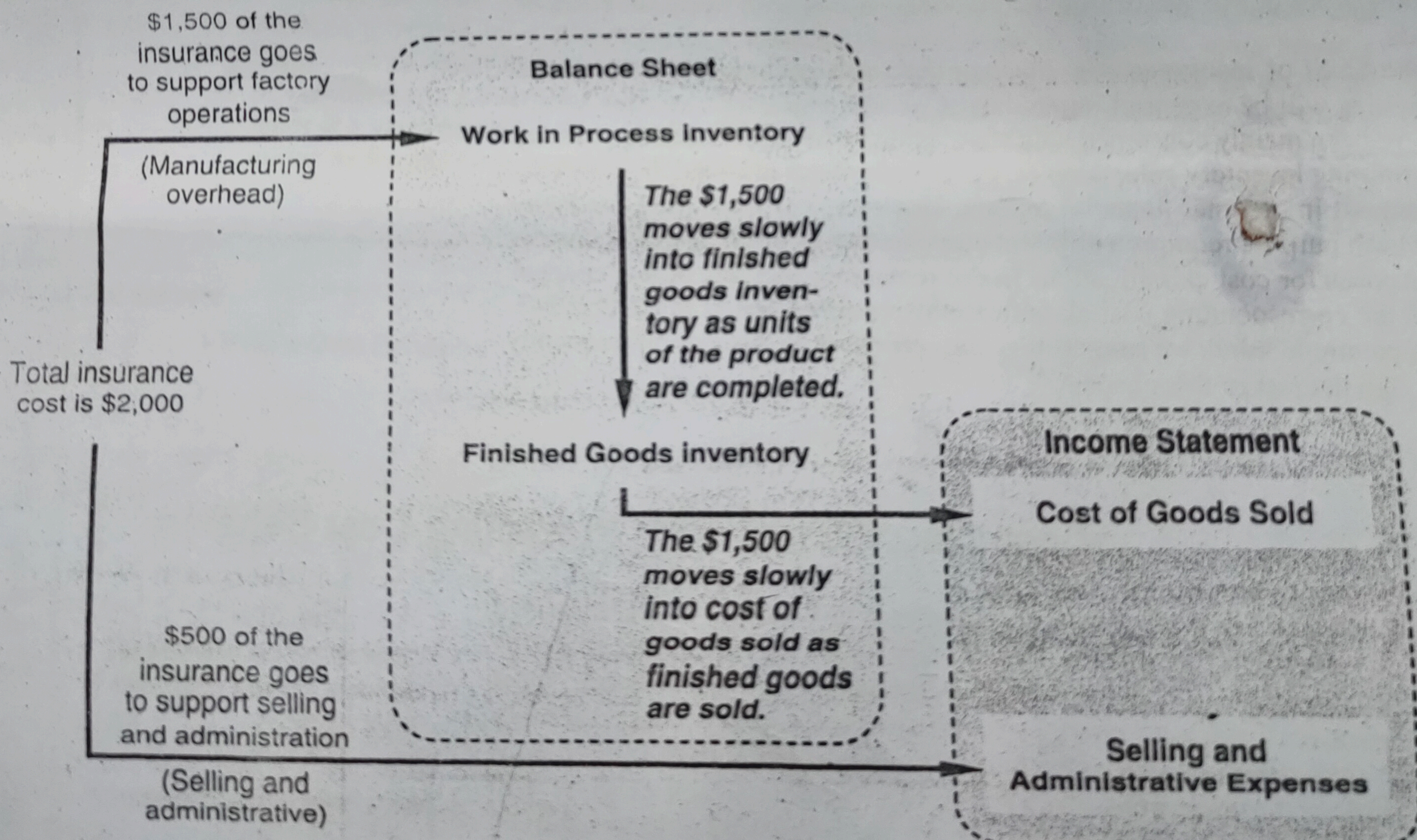
Selling and administrative expenses are not involved in making a product. For this reason, they are not treated as product costs but rather as period costs that are expensed as they are incurred, as shown in Exhibit 2-5.

An Example of Cost Flows

To provide an example of cost flows in a manufacturing company, assume that a company's annual insurance cost is \$2,000. Three-fourths of this amount (\$1,500) applies to factory operations, and one-fourth (\$500) applies to selling and administrative activities. Therefore, \$1,500 of the \$2,000 insurance cost would be a product (inventoriable) cost and would be added to the cost of the goods produced during the year. This concept is illustrated in Exhibit 2-6, where \$1,500 of insurance cost is added to Work in Process.

EXHIBIT 2-6

An Example of Cost Flows in a Manufacturing Company



Variable Cost

A **variable cost** is a cost that varies, in total, in direct proportion to changes in the level of activity. The activity can be expressed in many ways, such as units produced, units sold, miles driven, beds occupied, lines of print, hours worked, and so forth. A good example of a variable cost is direct materials. The cost of direct materials used during a period will vary, in total, in direct proportion to the number of units that are produced. To illustrate this idea, consider the Saturn Division of GM. Each auto requires one battery. As the output of autos increases and decreases, the number of batteries used will increase and decrease proportionately. If auto production goes up 10%, then the number of batteries used will also go up 10%. The concept of a variable cost is shown graphically in Exhibit 2-8.

The graph on the left-hand side of Exhibit 2-8 illustrates that the *total* variable cost rises and falls as the activity level rises and falls. This idea is presented below, assuming that a Saturn's battery costs \$24:

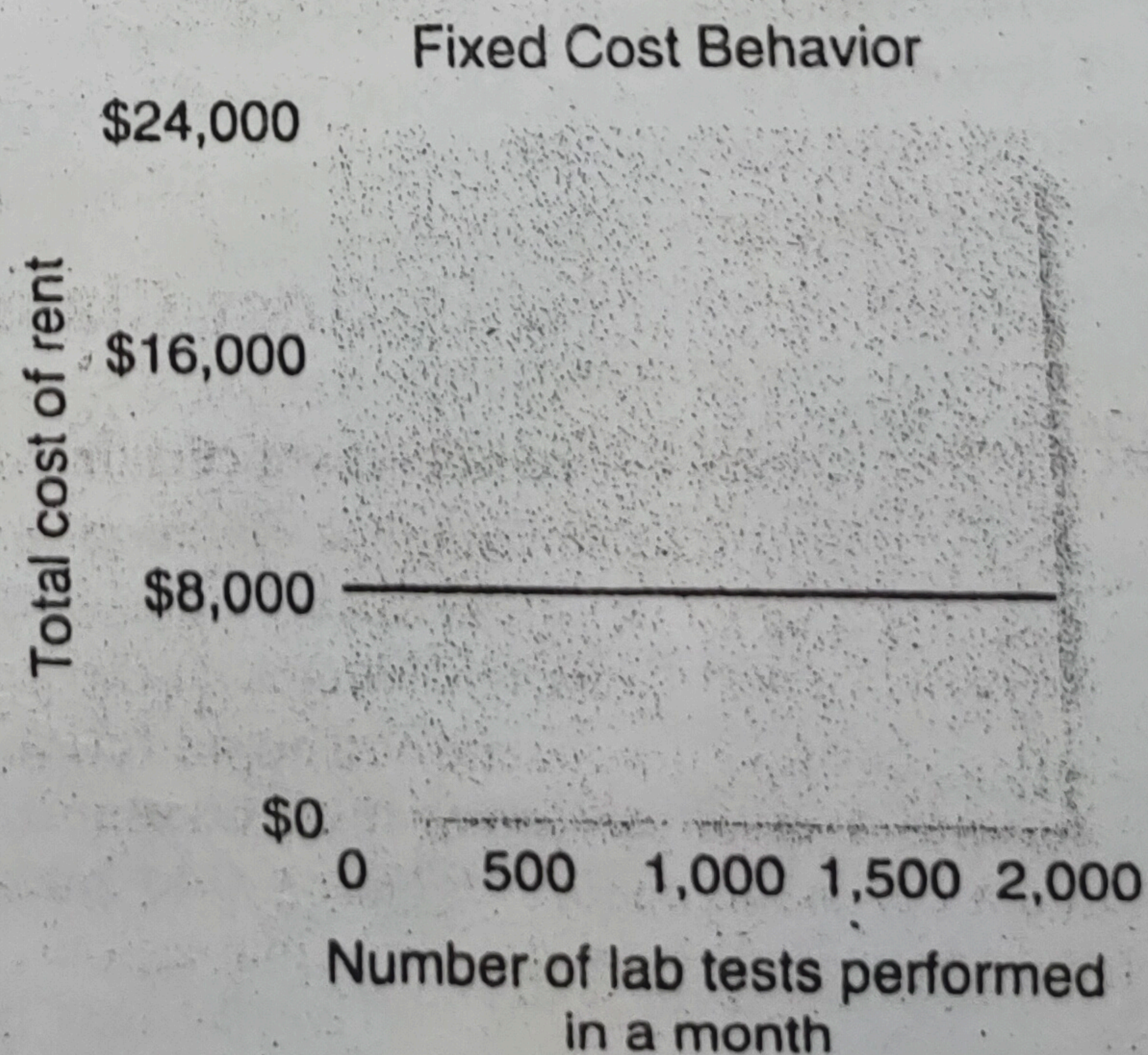
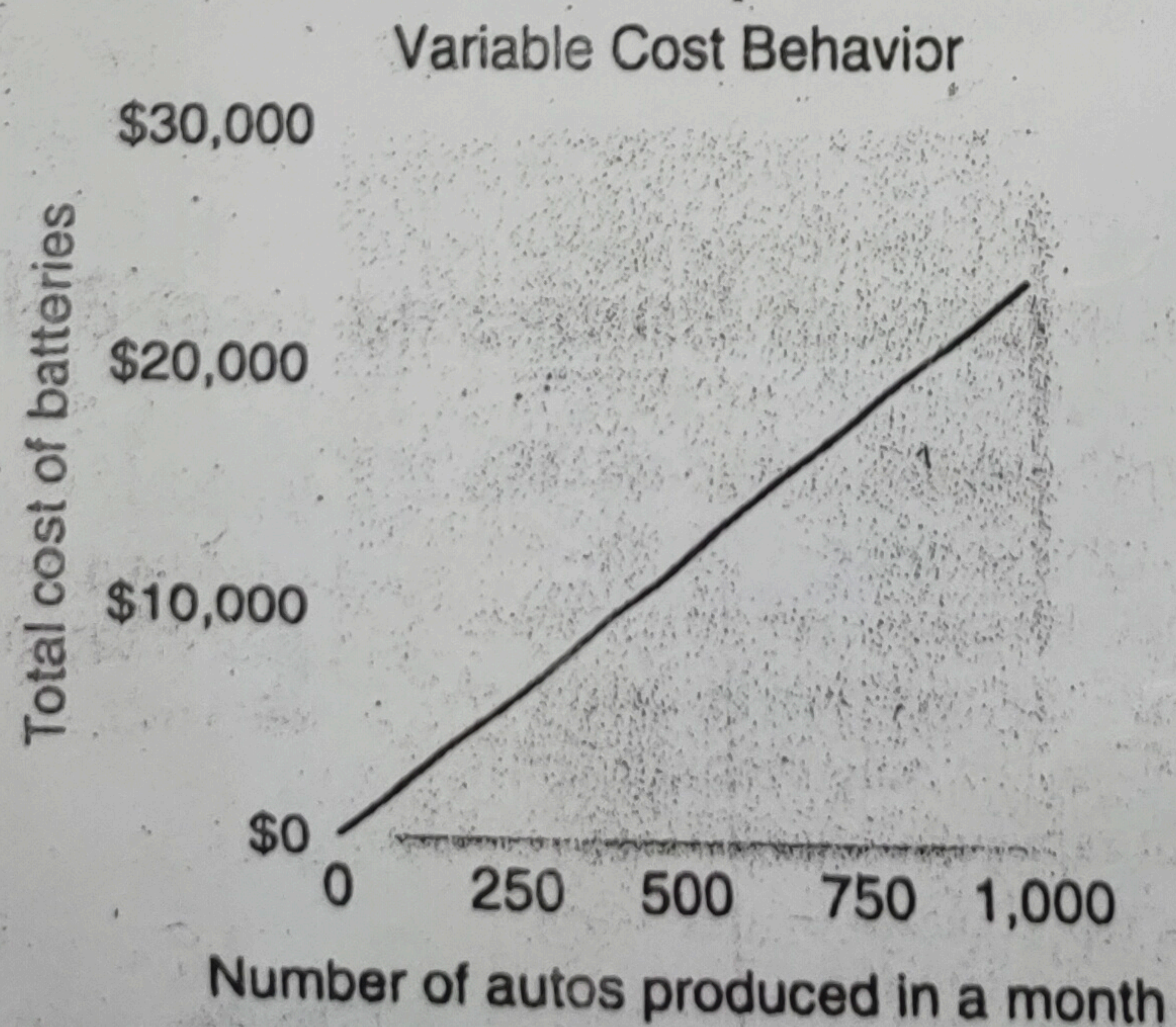
Number of Autos Produced	Cost per Battery	Total Variable Cost— Batteries
1	\$24	\$24
500	\$24	\$12,000
1,000	\$24	\$24,000

While total variable costs change as the activity level changes, it is important to note that a variable cost is constant if expressed on a *per unit* basis. For example, the per unit cost of batteries remains constant at \$24 even though the total cost of the batteries increases and decreases with activity.

There are many examples of costs that are variable with respect to the products and services provided by a company. In a manufacturing company, variable costs include items such as direct materials, shipping costs, and sales commissions and some elements of manufacturing overhead such as lubricants. We will also usually assume that direct labor is a variable cost, although direct labor may act more like a fixed cost in some situations as we shall see in a later chapter. In a merchandising company, the variable costs

EXHIBIT 2-8

Variable and Fixed Cost Behavior



of carrying and selling products include items such as cost of goods sold, sales commissions, and billing costs. In a hospital, the variable costs of providing health care services to patients would include the costs of the supplies, drugs, meals, and perhaps nursing services.

When we say that a cost is variable, we ordinarily mean that it is variable with respect to the amount of goods or services the organization produces. However, costs can be variable with respect to other things. For example, the wages paid to employees at a Blockbuster Video outlet will depend on the number of hours the store is open and not strictly on the number of videos rented. In this case, we would say that wage costs are variable with respect to the hours of operation. Nevertheless, when we say that a cost is variable, we ordinarily mean it is variable with respect to the amount of goods and services produced. This could be how many Jeep Cherokees are produced, how many videos are rented, how many patients are treated, and so on.

BROWN IS THINKING GREEN

United Parcel Service (UPS) truck drivers travel more than 1.3 billion miles annually to deliver more than 4.5 billion packages. Therefore, it should come as no surprise that fuel is a huge variable cost for the company. Even if UPS can shave just a penny of cost from each mile driven, the savings can be enormous. This explains why UPS is so excited about swapping its old diesel powered trucks for diesel-electric hybrid vehicles, which have the potential to cut fuel costs by 50%. Beyond the savings for UPS, the environment would also benefit from the switch since hybrid vehicles cut emissions by 90%. As UPS television commercials ask, "What can Brown do for you?" Thanks to diesel-electric technology, the answer is that Brown can help make the air you breathe a little bit cleaner.

Source: Charles Haddad and Christine Tierney, "FedEx and Brown Are Going Green," *BusinessWeek*, August 4, 2003, pp. 60-62.

IN BUSINESS



Fixed Cost

A **fixed cost** is a cost that remains constant, in total, regardless of changes in the level of activity. Unlike variable costs, fixed costs are not affected by changes in activity. Consequently, as the activity level rises and falls, total fixed costs remain constant unless influenced by some outside force, such as a price change. Rent is a good example of a fixed cost. Suppose the Mayo Clinic rents a machine for \$8,000 per month that tests blood samples for the presence of leukemia cells. The \$8,000 monthly rental cost will be incurred regardless of the number of tests that may be performed during the month. The concept of a fixed cost is shown graphically on the right-hand side of Exhibit 2-8.

Very few costs are completely fixed. Most will change if activity changes enough. For example, suppose that the capacity of the leukemia diagnostic machine at the Mayo Clinic is 2,000 tests per month. If the clinic wishes to perform more than 2,000 tests in a month, it would be necessary to rent an additional machine, which would cause a jump in the fixed costs. When we say a cost is fixed, we mean it is fixed within some *relevant range*. The **relevant range** is the range of activity within which the assumptions about variable and fixed costs are valid. For example, the assumption that the rent for diagnostic machines is \$8,000 per month is valid within the relevant range of 0 to 2,000 tests per month.

Fixed costs can create confusion if they are expressed on a per unit basis. This is because the average fixed cost per unit increases and decreases *inversely* with changes in activity. In the Mayo Clinic, for example, the average cost per test will fall as the number

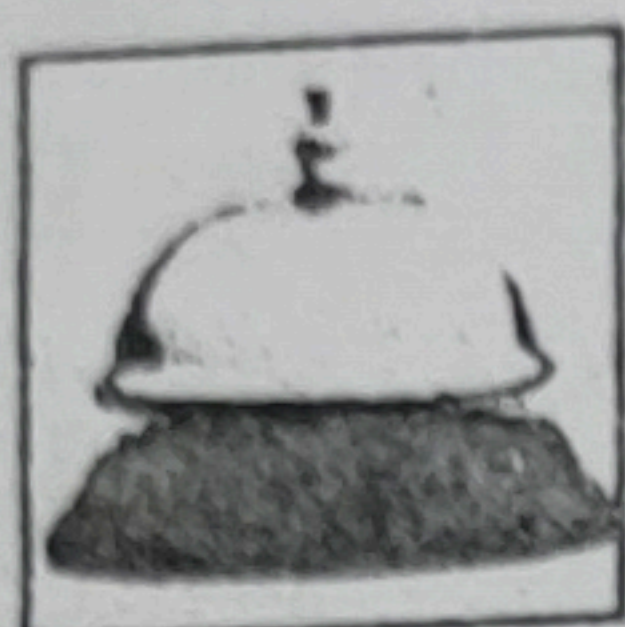


Opportunity Cost

Opportunity cost is the potential benefit that is given up when one alternative is selected over another. To illustrate this important concept, consider the following examples:

Example 1 Vicki has a part-time job that pays \$200 per week while attending college. She would like to spend a week at the beach during spring break, and her employer has agreed to give her the time off, but without pay. The \$200 in lost wages would be an opportunity cost of taking the week off to be at the beach.

Example 2 Suppose that Neiman Marcus is considering investing a large sum of money in land that may be a site for a future store. Rather than invest the funds in land, the company could invest the funds in high-grade securities. If the land is acquired, the opportunity cost is the investment income that could have been realized by purchasing the securities instead.



Example 3 Steve is employed by a company that pays him a salary of \$38,000 per year. He is thinking about leaving the company and returning to school. Since returning to school would require that he give up his \$38,000 salary, the forgone salary would be an opportunity cost of seeking further education.

Opportunity costs are not usually found in the accounting records of an organization, but they are costs that must be explicitly considered in every decision a manager makes. Virtually every alternative involves an opportunity cost. In Example 3 above, for instance, the higher income that could be realized in future years as a result of returning to school is an opportunity cost of staying in his present job.

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 a decision, sunk costs can and should be ignored.

To illustrate a sunk cost, assume that a company paid \$50,000 several years ago for a special-purpose machine. The machine was used to make a product that is now obsolete and is no longer being sold. Even though in hindsight purchasing the machine may have been unwise, the \$50,000 cost has already been incurred and cannot be undone. And it would be folly to continue making the obsolete product in a misguided attempt to "recover" the original cost of the machine. In short, the \$50,000 originally paid for the machine is a sunk cost that should be ignored in current decisions.

IN BUSINESS

THE SUNK COST TRAP

Hal Arkes, a psychologist at Ohio University, asked 61 college students to assume they had mistakenly purchased tickets for both a \$50 and a \$100 ski trip for the same weekend. They could go on only one of the ski trips and would have to throw away the unused ticket. He further asked them to assume that they would actually have more fun on the \$50 trip. Most of the students reported that they would go on the less enjoyable \$100 trip. The larger cost mattered more to the students than having more fun. However, the sunk costs of the tickets should have been totally irrelevant in this decision. No matter which trip was selected, the actual total cost was \$150—the cost of both tickets. And since this cost does not differ between the alternatives, should be ignored. Like these students, most people have a great deal of difficulty ignoring sunk costs when making decisions.

Source: John Gourville and Dilip Soman, "Pricing and the Psychology of Consumption," *Harvard Business Review* September 2002, pp. 92–93.

Management wants these data organized in a better format so that financial statements can be prepared for the year.

Required:

1. Prepare a schedule of cost of goods manufactured as in Exhibit 2-4.
2. Compute the cost of goods sold as in Exhibit 2-2.
3. Prepare an income statement.

Solution to Review Problem 2

1.

Klear-Seal Corporation Schedule of Cost of Goods Manufactured For the Year Ended December 31

Direct materials:		
Raw materials inventory, January 1	\$ 90,000	
Add: Purchases of raw materials	750,000	
Raw materials available for use	840,000	
Deduct: Raw materials inventory, December 31	60,000	
Raw materials used in production		\$ 780,000
Direct labor		150,000
Manufacturing overhead:		
Utilities, factory	36,000	
Depreciation, factory	162,000	
Insurance, factory	40,000	
Supplies, factory	15,000	
Indirect labor	300,000	
Maintenance, factory	87,000	
Total manufacturing overhead cost		640,000
Total manufacturing cost		1,570,000
Add: Work in process inventory, January 1		180,000
		1,750,000
Deduct: Work in process inventory, December 31		100,000
Cost of goods manufactured		<u>\$1,650,000</u>

2. The cost of goods sold would be computed as follows:

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 sold	<u>\$1,700,000</u>

3.

Klear-Seal Corporation Income Statement For the Year Ended December 31

Sales	\$2,500,000
Cost of goods sold (above)	<u>1,700,000</u>
Gross margin	800,000
Selling and administrative expenses:	
Selling expenses	\$140,000
Administrative expenses	<u>270,000</u>
	410,000
Net operating income	<u>\$ 390,000</u>

Glossary

- Administrative costs** All executive, organizational, and clerical costs associated with the general management of an organization rather than with manufacturing or selling. (p. 41)
- Common cost** A cost that is incurred to support a number of cost objects but that cannot be traced to them individually. For example, the wage cost of the pilot of a 747 airliner is a common cost of all of the passengers on the aircraft. Without the pilot, there would be no flight and no passengers. But no part of the pilot's wage is caused by any one passenger taking the flight. (p. 56)
- Conversion cost** Direct labor cost plus manufacturing overhead cost. (p. 42)
- Cost behavior** The way in which a cost reacts to changes in the level of activity. (p. 51)
- Cost object** Anything for which cost data are desired. Examples of cost objects are products, customers, jobs, and parts of the organization such as departments or divisions. (p. 55)
- Cost of goods manufactured** The manufacturing costs associated with the goods that were finished during the period. (p. 47)
- Differential cost** A difference in cost between two alternatives. Also see *Incremental cost*. (p. 56)
- Differential revenue** The difference in revenue between two alternatives. (p. 56)
- Direct cost** A cost that can be easily and conveniently traced to a specified cost object. (p. 55)
- Direct labor** Factory labor costs that can be easily traced to individual units of product. Also called *touch labor*. (p. 40)
- Direct materials** Materials that become an integral part of a finished product and whose costs can be conveniently traced to it. (p. 40)
- Finished goods** Units of product that have been completed but not yet sold to customers. (p. 45)
- Fixed cost** A cost that remains constant, in total, regardless of changes in the level of activity within the relevant range. If a fixed cost is expressed on a per unit basis, it varies inversely with the level of activity. (p. 53)
- Incremental cost** An increase in cost between two alternatives. Also see *Differential cost*. (p. 56)
- Indirect cost** A cost that cannot be easily and conveniently traced to a specified cost object. (p. 56)
- Indirect labor** The labor costs of janitors, supervisors, materials handlers, and other factory workers that cannot be conveniently traced to particular products. (p. 40)
- Indirect materials** Small items of material such as glue and nails that may be an integral part of a finished product, but whose costs cannot be easily or conveniently traced to it. (p. 40)
- Inventoriable costs** Synonym for *product costs*. (p. 42)
- Manufacturing overhead** All manufacturing costs except direct materials and direct labor. (p. 41)
- Opportunity cost** The potential benefit that is given up when one alternative is selected over another. (p. 58)
- Period costs** Costs that are taken directly to the income statement as expenses in the period in which they are incurred or accrued. (p. 42)
- Prime cost** Direct materials cost plus direct labor cost. (p. 42)
- Product costs** All costs that are involved in acquiring or making a product. In the case of manufactured goods, these costs consist of direct materials, direct labor, and manufacturing overhead. Also see *Inventoriable costs*. (p. 42)
- Raw materials** Any materials that go into the final product. (pp. 39, 45)
- Relevant range** The range of activity within which assumptions about variable and fixed cost behavior are valid. (p. 53)
- Schedule of cost of goods manufactured** A schedule showing the direct materials, direct labor, and manufacturing overhead costs incurred during a period and the portion of those costs that are assigned to Work in Process and Finished Goods. (p. 47)
- Selling costs** All costs that are incurred to secure customer orders and get the finished product or service into the hands of the customer. (p. 41)
- Sunk cost** A cost that has already been incurred and that cannot be changed by any decision made now or in the future. (p. 58)
- Variable cost** A cost that varies, in total, in direct proportion to changes in the level of activity. A variable cost is constant per unit. (p. 52)
- Work in process** Units of product that are only partially complete. (p. 45)

PROBLEM 2-18 (Appendix 2B) Quality Cost Report [LO9, LO10]

In response to intensive foreign competition, the management of Florex Company has attempted over the past year to improve the quality of its products. A statistical process control system has been installed and other steps have been taken to decrease the amount of warranty and other field costs, which have been trending upward over the past several years. Costs relating to quality and quality control over the last two years are given below:

	Costs (in thousands)	
	This Year	Last Year
A Inspection	\$900	\$750
P Quality engineering	\$570	\$420
A Depreciation of test equipment	\$240	\$210
I Rework labor	\$1,500	\$1,050
P Statistical process control	\$180	\$0
E Cost of field servicing	\$900	\$1,200
A Supplies used in testing	\$60	\$30
P Systems development	\$750	\$480
E Warranty repairs	\$1,050	\$3,600
I Net cost of scrap	\$1,125	\$630
A Product testing	\$1,200	\$810
E Product recalls	\$750	\$2,100
I Disposal of defective products	\$975	\$720

Sales have been flat over the past few years, at \$75,000,000 per year. A great deal of money has been spent in the effort to upgrade quality, and management is anxious to see whether or not the effort has been effective.

Required:

1. Prepare a quality cost report that contains data for both this year and last year. Carry percentage computations to two decimal places.
2. Prepare a bar graph showing the distribution of the various quality costs by category.
3. Prepare a written evaluation to accompany the reports you have prepared in (1) and (2) above. This evaluation should discuss the distribution of quality costs in the company, changes in this distribution that you see taking place, the reasons for changes in costs in the various categories, and any other information that would be of value to management.

PROBLEM 2-19 Schedule of Cost of Goods Manufactured; Income Statement; Cost Behavior [LO1, LO2, LO3, LO4, LO5]

Various cost and sales data for Meriwell Company for the just completed year appear in the worksheet below:

Microsoft Excel - Problem 2-19 screen capture.xls				
File Edit View Insert Format Tools Data Window Help				
Arial 12				
D22				
	A	B	C	D
1	Finished goods inventory, beginning	\$20,000		
2	Finished goods inventory, ending	\$40,000		
3	Depreciation, factory	\$27,000		
4	Administrative expenses	\$110,000		
5	Utilities, factory	\$8,000		
6	Maintenance, factory	\$40,000		
7	Supplies, factory	\$11,000		
8	Insurance, factory	\$4,000		
9	Purchases of raw materials	\$125,000		
10	Raw materials inventory, beginning	\$9,000		
11	Raw materials inventory, ending	\$6,000		
12	Direct labor	\$70,000		
13	Indirect labor	\$15,000		
14	Work in process inventory, beginning	\$17,000		
15	Work in process inventory, ending	\$30,000		
16	Sales	\$500,000		
17	Selling expenses	\$80,000		
18				

Chapter 2
PROBLEM 2-18 (Appendix 2B) Quality Cost Report [LO9, LO10]

In response to intensive foreign competition, the management of Florex Company has attempted over the past year to improve the quality of its products. A statistical process control system has been installed and other steps have been taken to decrease the amount of warranty and other field costs, which have been trending upward over the past several years. Costs relating to quality and quality control over the last two years are given below:

	Costs (in thousands)	
	This Year	Last Year
A Inspection	\$900	\$750
P Quality engineering	\$570	\$420
A Depreciation of test equipment	\$240	\$210
I Rework labor	\$1,500	\$1,050
P Statistical process control	\$180	\$0
E Cost of field servicing	\$900	\$1,200
A Supplies used in testing	\$60	\$30
P Systems development	\$750	\$480
E Warranty repairs	\$1,050	\$3,600
I Net cost of scrap	\$1,125	\$630
A Product testing	\$1,200	\$810
E Product recalls	\$750	\$2,100
I Disposal of defective products	\$975	\$720

Sales have been flat over the past few years, at \$75,000,000 per year. A great deal of money has been spent in the effort to upgrade quality, and management is anxious to see whether or not the effort has been effective.

Required:

1. Prepare a quality cost report that contains data for both this year and last year. Carry percentage computations to two decimal places.
2. Prepare a bar graph showing the distribution of the various quality costs by category.
3. Prepare a written evaluation to accompany the reports you have prepared in (1) and (2) above. This evaluation should discuss the distribution of quality costs in the company, changes in this distribution that you see taking place, the reasons for changes in costs in the various categories, and any other information that would be of value to management.

eXcel

PROBLEM 2-19 Schedule of Cost of Goods Manufactured; Income Statement; Cost Behavior [LO1, LO2, LO3, LO4, LO5]

Various cost and sales data for Meriwell Company for the just completed year appear in the worksheet below:

Microsoft Excel - Problem 2-19 screen capture.xls				
File Edit View Insert Format Tools Data Window Help				
Arial 12				
D22				
	A	B	C	D
1	Finished goods inventory, beginning	\$20,000		
2	Finished goods inventory, ending	\$40,000		
3	Depreciation, factory	\$27,000		
4	Administrative expenses	\$110,000		
5	Utilities, factory	\$8,000		
6	Maintenance, factory	\$40,000		
7	Supplies, factory	\$11,000		
8	Insurance, factory	\$4,000		
9	Purchases of raw materials	\$125,000		
10	Raw materials inventory, beginning	\$9,000		
11	Raw materials inventory, ending	\$6,000		
12	Direct labor	\$70,000		
13	Indirect labor	\$15,000		
14	Work in process inventory, beginning	\$17,000		
15	Work in process inventory, ending	\$30,000		
16	Sales	\$500,000		
17	Selling expenses	\$80,000		
18				

Required:

1. Prepare a schedule of cost of goods manufactured.
2. Prepare an income statement.
3. Assume that the company produced the equivalent of 10,000 units of product during the year just completed. What was the average cost per unit for direct materials? What was the average cost per unit for factory depreciation?
4. Assume that the company expects to produce 15,000 units of product during the coming year. What average cost per unit and what total cost would you expect the company to incur for direct materials at this level of activity? For factory depreciation? (In preparing your answer, assume that direct materials is a variable cost and that depreciation is a fixed cost; also assume that depreciation is computed on a straight-line basis.)
5. As the manager responsible for production costs, explain to the president any difference in the average costs per unit between (3) and (4) above.

PROBLEM 2-20 Classification of Salary Cost as a Period or Product Cost [LO2]

You have just been hired by Ogden Company to fill a new position that was created in response to rapid growth in sales. It is your responsibility to coordinate shipments of finished goods from the factory to distribution warehouses located in various parts of the United States so that goods will be available as orders are received from customers.

The company is unsure how to classify your annual salary in its cost records. The company's cost analyst says that your salary should be classified as a manufacturing (product) cost; the controller says that it should be classified as a selling expense; and the president says that it doesn't matter which way your salary cost is classified.

Required:

1. Which viewpoint is correct? Why?
2. From the point of view of the reported net operating income for the year, is the president correct in his statement that it doesn't matter which way your salary cost is classified? Explain.

PROBLEM 2-21 Classification of Various Costs [LO1, LO2, LO5, LO7]

Staci Valek began dabbling in pottery several years ago as a hobby. Her work is quite creative, and it has been so popular with friends and others that she has decided to quit her job with an aerospace firm and manufacture pottery full time. The salary from Staci's aerospace job is \$3,800 per month.

Staci will rent a small building near her home to use as a place for manufacturing the pottery. The rent will be \$500 per month. She estimates that the cost of clay and glaze will be \$2 for each finished piece of pottery. She will hire workers to produce the pottery at a labor rate of \$8 per pot. To sell her pots, Staci feels that she must advertise heavily in the local area. An advertising agency states that it will handle all advertising for a fee of \$600 per month. Staci's brother will sell the pots; he will be paid a commission of \$4 for each pot sold. Equipment needed to manufacture the pots will be rented at a cost of \$300 per month.

Staci has already paid the legal and filing fees associated with incorporating her business in the state. These fees amounted to \$500. A small room has been located in a tourist area that Staci will use as a sales office. The rent will be \$250 per month. A phone installed in the room for taking orders will cost \$40 per month. In addition, a recording device will be attached to the phone for taking after-hours messages.

Staci has some money in savings that is earning interest of \$1,200 per year. These savings will be withdrawn and used to get the business going. For the time being, Staci does not intend to draw any salary from the new company.

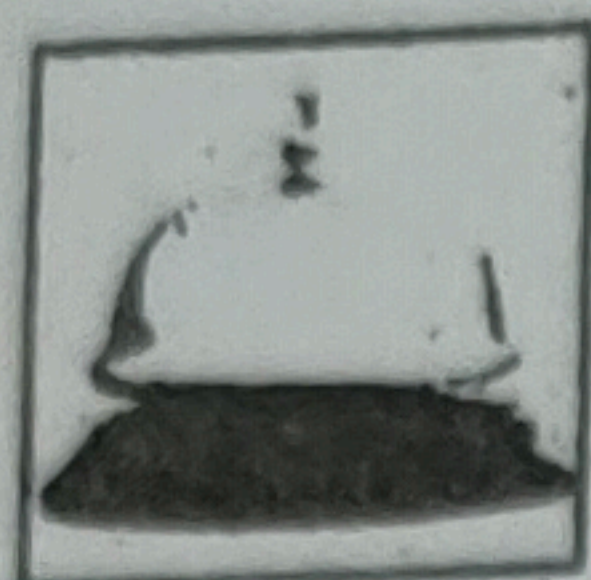
Required:

1. Prepare an answer sheet with the following column headings:

Name of the Cost	Variable Cost	Fixed Cost	Product Cost			Period (Selling and Administrative) Cost	Opportunity Cost	Sunk Cost
			Direct Materials	Direct Labor	Manufacturing Overhead			

List the different costs associated with the new company down the extreme left column (under Name of Cost). Then place an X under each heading that helps to describe the type of cost involved. There may be X's under several column headings for a single cost. (That is, a cost may be a fixed cost, a period cost, and a sunk cost; you would place an X under each of these column headings opposite the cost.)

Under the Variable Cost column, list only those costs that would be variable with respect to the number of units of pottery that are produced and sold.



PROBLEM 2-24 Variable and Fixed Costs; Subtleties of Direct and Indirect Costs [LO5, LO6]

Madison Seniors Care Center is a nonprofit organization that provides a variety of health services to the elderly. The center is organized into a number of departments, one of which is the meals-on-wheels program that delivers hot meals to seniors in their homes on a daily basis. Below are listed a number of costs of the center and the meals-on-wheels program.

example The cost of groceries used in meal preparation.

- The cost of leasing the meals-on-wheels van.
- The cost of incidental supplies such as salt, pepper, napkins, and so on.
- The cost of gasoline consumed by the meals-on-wheels van.
- The rent on the facility that houses Madison Seniors Care Center, including the meals-on-wheels program.
- The salary of the part-time manager of the meals-on-wheels program.
- Depreciation on the kitchen equipment used in the meals-on-wheels program.
- The hourly wages of the caregiver who drives the van and delivers the meals.
- The costs of complying with health safety regulations in the kitchen.
- The costs of mailing letters soliciting donations to the meals-on-wheels program.

Required:

For each cost listed above, indicate whether it is a direct or indirect cost of the meals-on-wheels program, whether it is a direct or indirect cost of particular seniors served by the program, and whether it is variable or fixed with respect to the number of seniors served. Use the below form for your answer.

Item	Description	Direct or Indirect Cost of the Meals-on-Wheels Program		Direct or Indirect Cost of Particular Seniors Served by the Meals-on-Wheels Program		Variable or Fixed with Respect to the Number of Seniors Served by the Meals-on-Wheels Program	
		Direct	Indirect	Direct	Indirect	Variable	Fixed
example	The cost of groceries used in meal preparation	X		X		X	

Excel



PROBLEM 2-25 Schedule of Cost of Goods Manufactured; Income Statement [LO1, LO2, LO3, LO4]

Swift Company was organized on March 1 of the current year. After five months of start-up losses, management had expected to earn a profit during August. Management was disappointed, however, when the income statement for August also showed a loss. August's income statement follows:

Swift Company Income Statement For the Month Ended August 31

Sales		\$450,000
Less operating expenses:		
Indirect labor cost	\$ 12,000	
Utilities	15,000	
Direct labor cost	70,000	
Depreciation, factory equipment	21,000	
Raw materials purchased	165,000	
Depreciation, sales equipment	18,000	
Insurance	4,000	
Rent on facilities	50,000	
Selling and administrative salaries	32,000	
Advertising	75,000	
Net operating loss		<u>462,000</u>
		<u><u>\$(12,000)</u></u>

After seeing the \$12,000 loss for August, Swift's president stated, "I was sure we'd be profitable within six months, but our six months are up and this loss for August is even worse than July's. I think it's time to start looking for someone to buy out the company's assets—if we don't, within a few months there won't be any assets to sell. By the way, I don't see any reason to look for a new controller. We'll just limp along with Sam for the time being."

The company's controller resigned a month ago. Sam, a new assistant in the controller's office, prepared the income statement above. Sam has had little experience in manufacturing operations. Additional information about the company follows:

- Some 60% of the utilities cost and 75% of the insurance apply to factory operations. The remaining amounts apply to selling and administrative activities.
- Inventory balances at the beginning and end of August were:

	August 1	August 30
Raw materials	\$ 8,000	\$13,000
Work in process	\$16,000	\$21,000
Finished goods	\$40,000	\$60,000

- Only 80% of the rent on facilities applies to factory operations; the remainder applies to selling and administrative activities.

The president has asked you to check over the income statement and make a recommendation as to whether the company should look for a buyer for its assets.

Required:

- As one step in gathering data for a recommendation to the president, prepare a schedule of cost of goods manufactured for August.
- As a second step, prepare a new income statement for August.
- Based on your statements prepared in (1) and (2) above, would you recommend that the company look for a buyer?

PROBLEM 2-26 Ethics and the Manager [LO2]

M. K. Gallant is president of Kranbrack Corporation, a company whose stock is traded on a national exchange. In a meeting with investment analysts at the beginning of the year, Gallant had predicted that the company's earnings would grow by 20% this year. Unfortunately, sales have been less than expected for the year, and Gallant concluded within two weeks of the end of the fiscal year that it would be impossible to ultimately report an increase in earnings as large as predicted unless some drastic action was taken. Accordingly, Gallant has ordered that wherever possible, expenditures should be postponed to the new year—including canceling or postponing orders with suppliers, delaying planned maintenance and training, and cutting back on end-of-year advertising and travel. Additionally, Gallant ordered the company's controller to carefully scrutinize all costs that are currently classified as period costs and reclassify as many as possible as product costs. The company is expected to have substantial inventories of work in process and finished goods at the end of the year.

Required:

- Why would reclassifying period costs as product costs increase this period's reported earnings?
- Do you believe Gallant's actions are ethical? Why or why not?

PROBLEM 2-27 Schedule of Cost of Goods Manufactured; Income Statement; Cost Behavior [LO1, LO2, LO3, LO4, LO5]

Selected account balances for the year ended December 31 are provided below for Superior Company:

Selling and administrative salaries	\$110,000
Insurance, factory	\$8,000
Utilities, factory	\$45,000
Purchases of raw materials	\$290,000
Indirect labor	\$60,000
Direct labor	?
Advertising expense	\$80,000
Cleaning supplies, factory	\$7,000
Sales commissions	\$50,000
Rent, factory building	\$120,000
Maintenance, factory	\$30,000

Inventory balances at the beginning and end of the year were as follows:

	Beginning of the Year	End of the Year
Raw materials	\$40,000	\$10,000
Work in process	?	\$35,000
Finished goods	\$50,000	?

The total manufacturing costs for the year were \$683,000; the goods available for sale totaled \$740,000; and the cost of goods sold totaled \$660,000.

Required:

1. Prepare a schedule of cost of goods manufactured and the cost of goods sold section of the company's income statement for the year.
2. Assume that the dollar amounts given above are for the equivalent of 40,000 units produced during the year. Compute the average cost per unit for direct materials used and the average cost per unit for rent on the factory building.
3. Assume that in the following year the company expects to produce 50,000 units. What average cost per unit and total cost would you expect to be incurred for direct materials? For rent on the factory building? (Assume that direct materials is a variable cost and that rent is a fixed cost.)
4. As the manager in charge of production costs, explain to the president the reason for any difference in average cost per unit between (2) and (3) above.

PROBLEM 2-28 Working with Incomplete Data from the Income Statement and Schedule of Cost of Goods Manufactured [LO3, LO4]

Supply the missing data in the following cases. Each case is independent of the others.

	Case			
	1	2	3	4
Direct materials	\$4,500	\$6,000	\$5,000	\$3,000
Direct labor	?	\$3,000	\$7,000	\$4,000
Manufacturing overhead	\$5,000	\$4,000	?	\$9,000
Total manufacturing costs	\$18,500	?	\$20,000	?
Beginning work in process inventory	\$2,500	?	\$3,000	?
Ending work in process inventory	?	\$1,000	\$4,000	\$3,000
Sales	\$30,000	\$21,000	\$36,000	\$40,000
Beginning finished goods inventory	\$1,000	\$2,500	?	\$2,000
Cost of goods manufactured	\$18,000	\$14,000	?	\$17,500
Goods available for sale	?	?	?	?
Ending finished goods inventory	?	\$1,500	\$4,000	\$3,500
Cost of goods sold	\$17,000	?	\$18,500	?
Gross margin	\$13,000	?	\$17,500	?
Operating expenses	?	\$3,500	?	?
Net operating income	\$4,000	?	\$5,000	\$9,000

Excel

PROBLEM 2-29 Income Statement; Schedule of Cost of Goods Manufactured [LO1, LO2, LO3, LO4]
Visic Corporation, a manufacturing company, produces a single product. The following information has been taken from the company's production, sales, and cost records for the just completed year.

Production in units	29,000
Sales in units	21,500
Ending finished goods inventory in units	
Sales in dollars	\$1,300,000
Costs:	
Advertising	\$105,000
Entertainment and travel	\$40,000
Direct labor	\$90,000
Indirect labor	\$85,000
Raw materials purchased	\$480,000