CHAPTER *Two*

Cost Concepts

CHAPTER COMPETENCIES

After studying Chapter 2, you should be able to demonstrate the following competencies:

Competency		Know	Apply
Understand cost classification by behaviour.			
CC1	Define variable and fixed costs.	●	
CC2	Give examples of variable and fixed costs.		●
Understand cost classification by traceability.			
CC3	Define direct and indirect costs.	●	
CC4	Give examples of direct and indirect costs.		●
Understand cost classification by relevance.			
CC5	Define differential costs, opportunity costs, and sunk costs.	●	
CC6	Give examples of differential costs, opportunity costs, and sunk costs.		●
Understand cost classification by function.			
CC7	Distinguish between manufacturing and nonmanufacturing costs.	●	
CC8	Identify and give examples of direct materials, direct labour, and manufacturing overhead costs.	●	●
CC9	Identify and give examples of marketing or selling and administrative costs.	●	●
CC10	Distinguish between product and period costs.	●	
CC11	Give examples of product and period costs.		●
CC12	Explain how costs are classified in financial statements of merchandising and manufacturing companies.	●	
Prepare financial reports.			
CC13	Prepare an income statement.		●
CC14	Prepare a schedule of cost of goods sold.		●
Understand and prepare manufacturing reports.			
CC15	Explain the basic inventory flow equation.	●	
CC16	Prepare a schedule of cost of goods manufactured, including the computation of the cost of direct materials used.		●

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2

DECISION FEATURE
Understanding Costs Important to TELUS

TELUS Corporation, headquartered in Vancouver, is the largest telecommunications company in Western Canada and the second largest in the country, offering a wide range of communication services. In 2006, TELUS's total revenue exceeded $8 billion and total assets exceeded $16 billion. Needless to say, the company's costs also run into the billions with operating expenses exceeding $5 billion. With increasing competitive challenges and slowing revenue growth, especially in its wireline operations, ongoing cost control is important to ensure continued financial success.

In recognition of the importance of cost control, TELUS embarked upon a major operational and capital efficiency program in 2002, which included some elements of the lean business model described in Chapter 1. Although TELUS incurred one-time costs of more than $500 million, management expected that these costs would be more than offset by the recurring annual expected savings in operating expenses of about $550 million, as well as a reduction in capital expenditures. As at the end of the first quarter of 2003, the program generated savings of $245 and $1,100 million, respectively, in operating expenses and capital expenditures.

Large telecommunication companies, such as TELUS, usually have a high proportion of fixed costs due to the infrastructure required to provide services to customers. Automating processes performed by humans usually means a reduction in recurring salary expenses but a corresponding increase in amortization expenses and maintenance costs. Understanding the nature of costs and the implications of alternative cost reduction programs is very important in order to decide which program to implement.

Sources: http://about.telus.com/investors/annualreport2002/english/downloads/annualreport2002.pdf, http://about.telus.com/investors/operation_efficiency.html, and http://about.telus.com/investors/annualreport2005/downloads/telus_2005_financial_review.pdf.

A Look Back

In Chapter 1, we introduced the three main activities of a manager and the need for managerial accounting information. We then compared financial and managerial accounting information. We also addressed some of the challenges faced by management and described the lean business model.

A Look at This Chapter

We define many of the terms that managers use to classify costs. Because these terms are used throughout the text, be sure you are familiar with them.

A Look Ahead

Chapter 3 builds on the introduction to cost behaviour in the previous chapter. We further describe fixed and variable costs, and introduce the concepts of step-variable and mixed costs. Next, we discuss the analysis of mixed costs and cost estimation. We conclude the chapter by introducing the concept of contribution margin.

Costs are incurred by all kinds of organizations: governments (e.g., City of Victoria); hospitals (e.g., Ontario General Hospital); educational institutions (e.g., Brandon University); and merchandising, service, and manufacturing companies (e.g., Canadian Tire, Myers Norris Penny, and Toyota Canada). The costs incurred may be one-time or recurring, and may differ depending on the need. Managers find it useful to classify costs in different ways in order to facilitate their analysis. In general, costs can be classified using four broad categories: behaviour, traceability, relevance, and function. In this chapter, we will discuss each of the cost classification categories.

Cost Classification by Behaviour

KNOW

CC1: Define variable and fixed costs.

Managers often need to understand how costs will behave in response to certain activities; such an understanding is useful for cost estimation, planning, and cost/profitability analysis. For instance, a manager at Air Canada may want to estimate the impact of a 10% increase in passengers on its catering costs. It seems reasonable to assume that an increase in the number of passengers will result in a proportionate increase in catering costs. The airline will have to acquire 10% more food and drinks. Therefore, we will say that catering costs *vary* with respect to the number of passengers. On the other hand, a 10% increase in the number of passengers will not require additional fuel or even additional flight attendants; this means that fuel and flight attendant costs do not vary, or are *fixed*, with respect to the number of passengers.

Cost behaviour is the way a cost will respond to changes in the level of an organization's business activity (such as the number of passengers flying Air Canada). As the level of activity rises or falls, a particular cost may rise or fall, respectively, or may remain constant. For planning purposes, a manager must be able to estimate how different costs will behave with respect to changes in business activity. Classifying costs as variable or fixed helps a manager make such predictions.

Variable Cost

APPLY

CC2: Give examples of variable and fixed costs.

A **variable cost** is one that varies in direct proportion to changes in the level of activity. The activity can be expressed in many ways, such as output (units produced, units sold), miles driven, beds occupied, lines of print, hours worked, and so forth. As an example, consider the KIA car. 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%. This means the total cost of batteries will also go up by 10%.

It is important to note that when we speak of a cost as being variable, we mean the *total* cost rises and falls as the activity level rises and falls. This idea is presented below, assuming that a KIA'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

One interesting aspect of variable cost behaviour is that a variable cost is constant if expressed on a *per-unit* basis. Observe from the tabulation above that the per-unit cost of

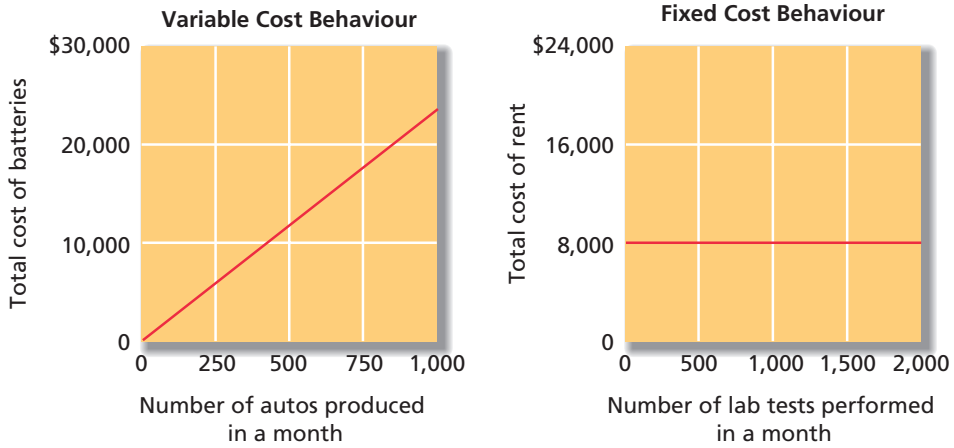


Exhibit 2–1
Variable and Fixed Cost Behaviour

batteries remains constant at $24, even though the total amount of cost involved increases and decreases with activity. The concept of a variable cost is shown in graphical form in Exhibit 2–1.

There are many examples of costs that are variable with respect to the products and services provided by a company. In a merchandising company, variable costs include such items as cost of goods sold, commissions to salespersons, 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. In a manufacturing company, variable costs include such items as materials used in the product, wages of operators, lubricants, supplies, shipping costs, and sales commissions.

The activity causing changes in a variable cost need not be how much output is produced or sold. 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 volume of revenue-generating output—in other words, how many videos are rented, how many patients are treated, and so on.

Food Costs at a Luxury Hotel

IN BUSINESS TODAY

The Sporthotel Theresa (http://www.theresa.at/), owned and operated by the Egger family, is a four-star hotel located in Zell im Zillertal, Austria. The hotel features access to hiking, skiing, biking, and other activities in the Ziller Alps, as well as its own fitness facility and spa.

Three full meals a day are included in the hotel room charge. Breakfast and lunch are served buffet-style, while dinner is a more formal affair with as many as six courses. A sample dinner menu appears below:

Tyrolean cottage cheese with homemade bread

***

Salad bar

***

Broccoli-terrine with saddle of venison and smoked goose-breast

Or

Chicken liver pâté with gorgonzola cheese ravioli and port wine sauce

***

IN BUSINESS TODAY **continued**

Clear vegetable soup with fine vegetable strips

Or

Whey-yoghurt juice

***

Roulade of pork with zucchini, ham, and cheese on pesto ribbon noodles and saffron sauce

Or

Roasted fillet of Irish salmon and prawns with spring vegetables and sesame mash

Or

Fresh white asparagus with scrambled egg, fresh herbs, and parmesan

Or

Steak of Tyrolean organic beef

***

Strawberry terrine with homemade chocolate ice cream

Or

Iced Viennese coffee

The chef, Stefan Egger, believes that food costs are roughly proportional to the number of guests staying at the hotel; that is, they are a variable cost. He must order food two or three days in advance from suppliers, but he adjusts his purchases to the number of guests who are currently staying at the hotel and their consumption patterns. In addition, guests make their selections from the dinner menu early in the day, which helps Stefan plan which foodstuffs will be required for dinner. Consequently, he is able to prepare just enough food so that all guests are satisfied and yet waste is held to a minimum.

Source: Conversation with Stefan Egger, chef at the Sporthotel Theresa.

Fixed Cost

A **fixed cost** is one that remains constant, 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, the fixed costs remain constant in total amount unless influenced by some outside force, such as a price change or a substantial increase in demand leading to an increase in the resource requirement.

Rent is a good example of a fixed cost. Suppose the Hospital for Sick Children in Toronto rents for $8,000 per month a machine 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 in graphical form in Exhibit 2–1.

Very few costs are completely fixed. Most will change if there is a large enough change in activity. For example, suppose that the capacity of the leukemia diagnostic machine at the hospital is 2,000 tests per month. If the hospital 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 Hospital for Sick Children example, the average cost per test will fall as the number of tests performed increases because the $8,000 rental cost will be spread over more tests. Conversely, as the number of tests performed in the hospital declines, the average cost per test will rise, as the $8,000 rental cost is spread over fewer tests. This concept is illustrated in the table below:

Monthly Rental Cost	Number of Tests Performed	Average Cost per Test
$8,000	10	$800
8,000	500	16
8,000	2,000	4

Note that if the hospital performs only 10 tests each month, the rental cost of the equipment will average $800 per test. But if 2,000 tests are performed each month, the average cost will drop to only $4 per test. More will be said later about the problems created for both the accountant and the manager by this variation in unit costs.

Examples of fixed costs include straight-line amortization, insurance, property taxes, rent, supervisory salaries, administrative salaries, and advertising.[1]

A summary of both variable and fixed cost behaviour is presented in Exhibit 2–2.

Exhibit 2–2
Summary of Variable and Fixed Cost Behaviour

	Behaviour of the Cost (within the relevant range)	
Cost	In Total	Per Unit
Variable cost	Total variable cost increases and decreases in proportion to changes in the activity level.	Variable cost remains constant per unit.
Fixed cost	Total fixed cost is not affected by changes in the activity level within the relevant range.	Fixed cost per unit decreases as the activity level rises and increases as the activity level falls.

The Cost of a Call

IN BUSINESS TODAY

On average, the variable cost of physically transporting a telephone call is about 7% of the price a customer pays for the call. It now costs more to bill for the call than to provide it. Then why aren't telephone companies fabulously profitable? In short, they have extremely high fixed costs for equipment, buildings, and personnel. The prices the telephone companies charge to consumers must cover these fixed costs, as well as the relatively small variable costs of completing a particular call for a customer.

Source: Scott Woolley, "Meltdown," *Forbes*, July 3, 2000, pp. 70–71.

[1] *The Canadian Institute of Chartered Accountants (CICA) Handbook* uses the term "amortization"; however, Section 3061.29 states that the term "depreciation" can also be used.

DECISION MAKER

Financial Analyst

You are a financial analyst for several clients who are interested in making investments in stable companies. You become aware of a privately owned airline that has been in business for 20 years and needs to raise $75 million in new capital. When you call one of your clients, she replies that she avoids investing in airlines because of the high proportion of fixed costs in this industry. How would you respond to this statement?

Cost Classification by Traceability

KNOW

CC3: Define direct and indirect costs.

In addition to understanding costs by behaviour, managers also need to know whether costs can be traced to specific cost objects; this helps managers in accurately assigning costs. A **cost object** is anything for which cost data are desired—department, division, product, product line, customer, geographical territory. Costs can be classified as either *direct* or *indirect* based on traceability.

Direct Cost

A **direct cost** is one that pertains to a certain cost object and can be easily and economically traced to that cost object. As an example, the salary of the secretary of the University of Saskatchewan's Accounting department is directly traceable to the department (the desired cost object).

APPLY

CC4: Give examples of direct and indirect costs.

Indirect Cost

An **indirect cost** is one that cannot be easily and conveniently traced to a particular cost object under consideration. For example, Air Canada flies to many different locations. Some costs such as the salaries of the pilots and flight attendants, and fuel costs, can be traced to individual flights and are therefore considered direct costs. However, other costs such as the salaries of the baggage handling staff, ticketing staff, and other office staff, or the expenses incurred in running the airline's marketing and accounting departments cannot be traced to specific flights and therefore are classified as indirect costs. This is because these costs are not driven by any one specific flight; they are incurred as a result of running the airline. *To be traced to a cost object, such as a specific flight, the cost must be caused by the cost object.* The airline's baggage handling, ticketing, and marketing costs are common to multiple flights. A **common cost** is one that is incurred to support a number of cost objects (e.g., different flights), but cannot be traced to individual cost objects.

A particular cost may be classified as direct or indirect depending upon the cost object. For example, although salaries of the baggage handling staff are indirect to individual flights offered by Air Canada, they are direct to the baggage handling department. In the second case, the cost object is the baggage handling department.

Cost Classification by Relevance

KNOW

CC5: Define differential costs, opportunity costs, and sunk costs.

Given the importance of cost information for decision making, managers must be able to identify costs that are relevant for individual decisions. Cost classification by relevance helps in decision making. Only costs that are relevant to individual decisions must be used in the analysis preceding decision making. In general, *differential* and *opportunity* costs are relevant for most decisions, whereas *sunk* costs are irrelevant for any decision.

Differential Cost and Revenue

Decisions involve choosing between alternatives. In business decisions, each alternative will have certain costs and benefits that must be compared with the costs and benefits of the other available alternatives. A difference in costs between any two alternatives is known as a **differential cost.** A difference in revenues between any two alternatives is known as **differential revenue.**

A differential cost is also known as an **incremental cost,** although technically an incremental cost should refer only to an increase in cost from one alternative to another; decreases in cost should be referred to as **decremental costs**. Differential cost is a broader term, encompassing both cost increases (incremental costs) and cost decreases (decremental costs) between alternatives.

The accountant's differential cost concept can be compared to the economist's marginal cost concept. When speaking of changes in cost and revenue, the economist employs the terms *marginal cost* and *marginal revenue.* The revenue that can be obtained from selling one more unit of product is called marginal revenue, and the cost involved in producing one more unit of product is called marginal cost. The economist's marginal concept is basically the same as the accountant's differential concept applied to a single unit of output.

APPLY

CC6: Give examples of differential costs, opportunity costs, and sunk costs.

Differential costs can be either fixed or variable. To illustrate, assume that Nature Way Cosmetics, Inc. is considering changing its marketing method from distribution through retailers to distribution by door-to-door direct sale. Present costs and revenues are compared with projected costs and revenues in the following table:

	Retailer Distribution (current)	Direct Sale Distribution (proposed)	Differential Costs and Revenues
Revenues (V)	$700,000	$800,000	$100,000
Cost of goods sold (V)	350,000	400,000	50,000
Advertising (F)	80,000	45,000	(35,000)
Commissions (V)	–0–	40,000	40,000
Warehouse amortization (F)	50,000	80,000	30,000
Other expenses (F)	60,000	60,000	–0–
Total	540,000	625,000	85,000
Net income	$160,000	$175,000	$ 15,000

V = Variable; F = Fixed.

According to the preceding analysis, the differential revenue is $100,000, and the differential costs total $85,000, leaving a positive differential net income of $15,000 under the proposed marketing plan. The financial analysis suggests that Nature Way Cosmetics should implement the proposed plan. However, before making any changes, management must also consider nonfinancial factors, such as the effect of the new distribution policy on brand image.

In general, only the differences between alternatives are relevant in decisions. Those items that are the same under all alternatives are not affected by the decision and can be ignored. For example, in the Nature Way Cosmetics example, the "Other expenses" category, which is $60,000 under both alternatives, can be ignored because it is not affected by the decision. If it were removed from the calculations, the door-to-door direct selling method would still be preferred by $15,000. This is an extremely important principle in management accounting that we will return to in later chapters.

IN BUSINESS TODAY

The Cost of a Healthier Alternative

In recent years, McDonald's has received growing pressure from critics to address the health implications of its menu. In response, McDonald's announced plans to switch from the partially hydrogenated vegetable oil that it had been using to fry foods to a new soybean oil that would cut trans-fat levels by 48%. After making the announcement, McDonald's came to the realization that the unhealthy oil is much cheaper than the soybean oil and it lasts twice as long. What were the cost implications of this change? A typical McDonald's restaurant uses 500 pounds of the relatively unhealthy oil per week at a cost of about $186. In contrast, the same restaurant would need to use 1,000 pounds of the new soybean oil per week at a cost of about $571. This is a differential cost of $385 per restaurant per week. This may seem like a small amount of money until the calculation is expanded to include 13,000 McDonald's restaurants operating 52 weeks a year. Now, the total tab rises to about $260 million per year.

Source: Matthew Boyle, "Can You Really Make Fast Food Healthy?" *Fortune*, August 9, 2004, pp. 134–139.

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 her $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 Wal-Mart Canada 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 will be the investment income that could have been realized if the securities had been purchased instead.

EXAMPLE 3
Steve is employed with a company that pays him a salary of $30,000 per year. He is thinking about leaving the company and returning to school. Since returning to school would require that he give up his $30,000 salary, the forgone salary would be an opportunity cost of seeking further education.

Opportunity cost is not usually recorded in the accounts of an organization, but it is a cost that must be explicitly considered in every decision a manager makes. Virtually every alternative has some opportunity cost attached to it. In Example 3, for instance, if Steve decides to stay at his job, there still is an opportunity cost involved: it is the greater income that could be realized in future years as a result of returning to school.

YOU DECIDE

Your Decision to Attend Class

When you make the decision to attend class, what are the opportunity costs that are inherent in that decision?

Sunk Cost

A **sunk cost** is one that has already been incurred and that cannot be changed by any decision made now or in the future. Since sunk costs cannot be changed by any decision, they are not differential costs. Therefore, they can and should be ignored when making a decision; in other words, sunk costs are irrelevant.

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 the purchase of the machine may have been unwise, no amount of regret can undo that decision. And, it would be foolish 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 has already been incurred and cannot be a differential cost in any future decision. For this reason, such costs are said to be sunk and should be ignored in decisions.

Cost Classification by Function

Another cost classification is based on function. Before discussing this further, it might be useful to understand that every organization carries out a sequence of activities to fulfill its mission.[2] Such a sequence of activities is known as the **value chain** of that organization.

Acadian Seaplants, located in Dartmouth, Nova Scotia, is a diversified, technology-based manufacturer of natural, specialty fertilizers, crop biostimulants, feed, food, food ingredients, and brewery supplies derived from select species of marine plants. Acadian is a fully integrated company involved in activities ranging from marine plant cultivation and the hand harvesting of pure seaweeds to product and application development, manufacturing, and technical customer support. Acadian's value chain is considerably broad (see Exhibit 2–3). In contrast, some competitors of Acadian may be less integrated—involved only in product and application development or in manufacturing. Such competitors must depend on other organizations for the cultivation and harvesting of seaweeds (front end of the value chain) and customer support (back end of the value chain); their value chains would be narrow.

Cost classification by function consists of associating costs with the type of activity for which that cost is incurred (e.g., manufacturing, marketing, or administration). For a retailer, such as Zellers, costs pertaining to the procurement and stacking of the goods to be sold would be classified as merchandising costs, whereas advertising costs and the costs of the accountants and legal personnel may be classified under selling and administrative costs. Such a distinction is more pronounced for manufacturing companies; we can distinguish between manufacturing and nonmanufacturing costs.

Exhibit 2–3
Acadian Seaplants' Value Chain

[2] The term "activity" was introduced in the section on cost behaviour and was used to denote a cost driver (i.e., something that causes costs to go up or down). However, activity in this section pertains to a series of tasks or steps that are carried out by an organization to fulfil its mission.

Manufacturing Costs

KNOW

CC7: Distinguish between manufacturing and nonmanufacturing costs.

Similar to merchandising companies that must procure the goods they sell, manufacturing companies must produce the goods they sell; we use the term **manufacturing costs** to identify the costs associated with production activity. Typically, there are three types of manufacturing costs; we discuss each of these below as they might pertain to AmbuTech, a division of Winnipeg-based Melet Plastics, Inc., which produces a variety of canes for visually impaired and physically challenged customers.

DIRECT MATERIALS The materials that go into the final product are called **raw materials.** At the least, the raw materials required for one line of AmbuTech's canes would include aluminum for the body of the cane and plastic or wood for the handle.

The term "raw materials" is somewhat misleading because it seems to imply unprocessed natural resources. Actually, raw materials refer to any materials that are used in the final (finished) product of a company. Note, however, that the finished product of one company can be the raw material for another company. For example, AmbuTech might be purchasing "ready to assemble" plastic cane handles from a supplier, rather than producing them in-house. Whether to make the cane handles or buy them from outside can be

IN BUSINESS TODAY — Benetton and the Value Chain

United Colors of Benetton, an Italian apparel company headquartered in Ponzano, is unusual in that it is involved in all activities in the value chain from clothing design through manufacturing, distribution, and ultimate sale to customers in Benetton retail outlets. Most companies are involved in only one or two of these activities. Looking at this company allows us to see how costs are distributed across the entire value chain. A recent income statement from the company contained the following data:

	Millions of Euros	Percentage of Net Sales
Net sales	1,461	100.0%
Cost of sales	814	55.7%
Selling and general and administrative expenses:		
Payroll and related cost	107	7.3
Distribution and transport	23	1.6
Sales commissions	69	4.7
Advertising and promotion	82	5.6
Depreciation and amortization	74	5.1
Other expenses	109	7.5
Total selling and general and administrative expenses	464	31.8%

Even though this company spends large sums on advertising and runs its own shops, the cost of sales is still quite high in relation to the net sales—56% of net sales. And despite the company's lavish advertising campaigns, advertising and promotion costs amounted to only a little over 5% of net sales. (Note: One Euro was worth about Canadian $1.545 at the time of this financial report.)

an important decision which would influence AmbuTech's costs; we will examine such decisions in Chapter 12.

The aluminum sheets and plastic cane handles can also be called **direct materials,** since they become an integral part of the cane. As you can see, the quantity of direct materials required varies proportionately with the number of units produced. Therefore, direct materials is a variable cost with respect to production activity.

In addition to the direct materials, AmbuTech would also be using other **indirect materials** in the manufacturing process (e.g., screws, glue, solder, and other supplies) that are not integral parts of the cane. Indirect materials are relatively insignificant in value, and their costs are either not traceable to, or not worth tracing directly to, the finished product. The cost of indirect materials is included as part of manufacturing overhead, which is discussed later in this section.

APPLY

CC8: Give examples of direct materials, direct labour, and manufacturing overhead costs.

DIRECT LABOUR The term **direct labour** is reserved for those labour costs that can be easily (i.e., physically and conveniently) traced to individual units of product. Direct labour is sometimes called *touch labour*, since direct labour workers typically touch the product while it is being made. In the case of AmbuTech, this would include the wages and benefits of the individuals directly involved in rolling the aluminum sheets to form the body of the canes and those involved in assembling the canes. As you can see, direct labour costs are variable in nature, although this trend is changing.

Labour 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 labour** and treated as part of manufacturing overhead, along with indirect materials. Indirect labour includes the labour 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.

In some industries, major shifts are taking place in the structure of labour costs. Sophisticated automated equipment, run and maintained by skilled indirect workers, is increasingly replacing direct labour. In a few companies, direct labour has become such a minor element of cost that it has disappeared altogether as a separate cost category. More is said in later chapters about this trend and about the impact it is having on cost systems. However, the vast majority of manufacturing and service companies throughout the world continue to recognize direct labour as a separate cost category. In service companies, labour can often be a significant portion of the total cost of providing a service.

MANUFACTURING OVERHEAD In addition to direct materials and direct labour, AmbuTech would also be incurring other costs related to manufacturing. These might include indirect materials and indirect labour (discussed previously), factory maintenance, utilities, property taxes, and amortization on equipment and factory buildings. Such costs are included in a separate category called **manufacturing overhead.** It is important to remember that AmbuTech will incur utility, maintenance, and amortization expenses associated with its selling and administrative functions; however, these costs are *not* recorded as part of manufacturing overhead. Only costs that are associated with the manufacturing function (i.e., operating the factory) are included in the manufacturing overhead category.

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

Manufacturing overhead combined with direct labour is called **conversion cost.** This term stems from the fact that direct labour costs and overhead costs are incurred to convert raw materials into finished products. Direct labour combined with direct materials is called **prime cost.**

Nonmanufacturing Costs

APPLY

CC9: Identify and give examples of marketing or selling and administrative costs.

Generally, nonmanufacturing costs are subclassified into two categories:

- marketing or selling costs
- administrative costs

Marketing or **selling costs** include all costs necessary to secure customer orders and get the finished product or service into the hands of the customer. These costs are often called *order-getting* and *order-filling costs.* Examples of marketing 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, marketing, 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.*

Product Costs Versus Period Costs

Another classification by function that is often used synonymously with manufacturing versus nonmanufacturing costs is that of *product* versus *period* costs. To understand the distinction between the two, we must first refresh our understanding of the matching principle from financial accounting.

KNOW

CC10: Distinguish between product and period costs.

The *matching principle* is based on the accrual concept and states 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 of the costs that are involved in acquiring or making a product. In the case of a merchandising firm, such as Hudson's Bay Company (HBC), product costs would include the costs associated with procuring (or acquiring) the merchandise HBC sells, whereas for a manufacturing company, product costs include direct materials and labour and manufacturing overhead. Product costs are *attached* to goods when they are acquired or produced, and are carried forward to an inventory account which appears on the balance sheet. Consequently, product costs are also known as **inventoriable costs.** HBC's 2006 annual report showed a merchandise inventory balance of about $1.47 billion (21% of revenue).

APPLY

CC11: Give examples of product and period costs.

As and when the goods are sold, the amounts attached to the quantities sold are *expensed* (i.e., matched against sales revenue) and carried forward to the cost of goods sold account, which appears on the income statement. It is important to note that product costs may not be expensed in the period in which they are incurred; instead, the period when the goods are sold is critical for determining when to expense the product costs.

Period Costs

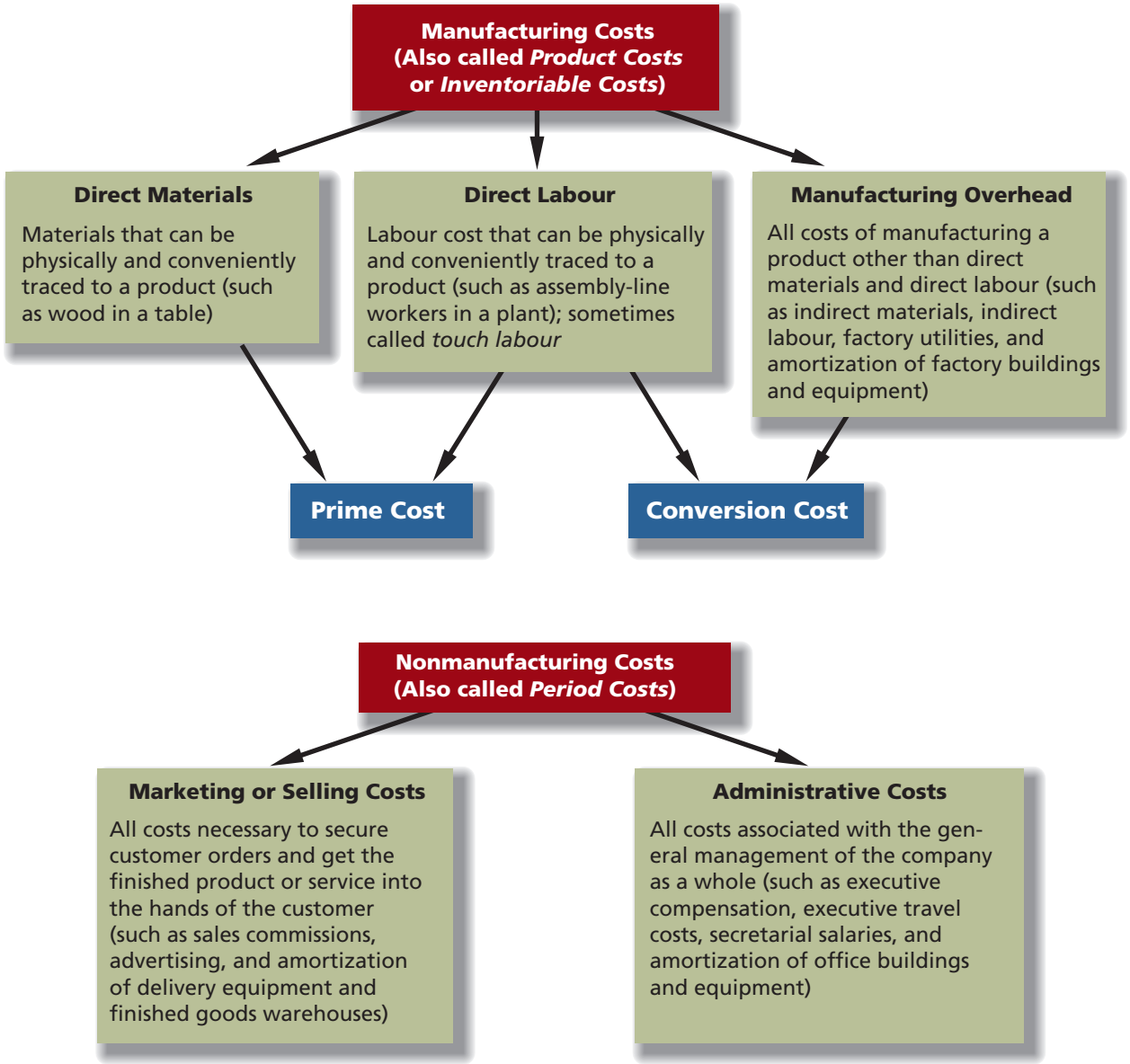
Period costs are all the costs that are not included in product costs. These costs are expensed on the income statement in the period in which they are incurred, using the usual rules of accrual accounting you have already learned in financial accounting.

Period costs are not included as part of the cost of either purchased or manufactured goods. Sales commissions and office rent are good examples of the kind of costs we are talking about. Neither commission nor office rent is included as part of the cost of purchased or manufactured goods. Rather, both items are treated as expenses on the income statement in the period in which they are incurred. Thus, they are said to be period costs.

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

Exhibit 2–4 contains a summary of cost classifications by function.

Exhibit 2–4
Summary of Cost Classifications by Function



Cost Classifications on Financial Statements

KNOW

CC12: Explain how costs are classified in financial statements of merchandising and manufacturing companies.

In your prior accounting training, you learned that firms prepare periodic financial reports for creditors, shareholders, and others to show the financial condition of the firm and the firm's earnings performance over some specified interval.

The financial statements prepared by a *manufacturing* company are more complex than the statements prepared by, say, a *merchandising* company. Manufacturing companies are more complex organizations than merchandising companies because the manufacturing company must produce its goods as well as market them. The production process gives rise to many costs that do not exist in a merchandising company, and somehow these costs must be accounted for on the manufacturing company's financial statements. In this section, we focus our attention on how this accounting is carried out on the balance sheet and in the income statement.

The Balance Sheet

The balance sheet of a manufacturing company is similar to that of a merchandising company. However, the inventory accounts differ between the two types of companies. A merchandising company has only one class of inventory—goods purchased from suppliers that are awaiting resale to customers. In contrast, manufacturing companies have three classes of inventories—*raw materials*, *work in process*, and *finished goods*. Raw materials, as we have noted, are the materials that are used to make a product. **Work in process** consists of units of product that are only partially complete and will require further work before they are ready for sale to a customer. **Finished goods** consist of units of product that have been completed, but have not yet been sold to customers. The overall inventory figure is usually broken down into these three classes of inventories in a footnote to the financial statements.

We will use two companies—Halifax Manufacturing Corporation and Brandon Bookstore—to illustrate the concepts discussed in this section. Halifax Manufacturing Corporation makes precision brass fittings for yachts, and Brandon Bookstore specializes in books about Canadian history.

The footnotes to Halifax Manufacturing Corporation's annual report reveal the following information concerning its inventories:

APPLY

CC13: Prepare an income statement.

CC14: Prepare a schedule of cost of goods sold.

HALIFAX MANUFACTURING CORPORATION
Inventory Accounts

	Beginning Balance	Ending Balance
Raw materials	$ 60,000	$ 50,000
Work in process	90,000	60,000
Finished goods	125,000	175,000
Total inventory accounts	$275,000	$285,000

Halifax Manufacturing Corporation's raw materials inventory would consist largely of brass rods and brass blocks. The work-in-process inventory would consist of partially completed brass fittings, and the finished goods inventory would consist of brass fittings that are ready to be sold to customers.

In contrast, the inventory account at Brandon Bookstore would consist entirely of the costs of books the company has purchased from publishers for resale to the public. In merchandising companies like Brandon, these inventories may be called *merchandise inventory*.

The beginning and ending balances in this account appear as follows:

BRANDON BOOKSTORE
Inventory Accounts

	Beginning Balance	Ending Balance
Merchandise inventory	$100,000	$150,000

The Income Statement

Exhibit 2–5 compares the income statements of Brandon Bookstore and Halifax Manufacturing Corporation. For purposes of illustration, these statements contain more detail about cost of goods sold than you will generally find in published financial statements.

Exhibit 2–5

Comparative Income Statements: Merchandising and Manufacturing Companies

MERCHANDISING COMPANY
Brandon Bookstore

The cost of merchandise inventory purchased from outside suppliers during the period.

Sales		$1,000,000
Cost of goods sold:		
Beginning merchandise inventory	$100,000	
Add: Purchases	650,000	
Goods available for sale	750,000	
Deduct: Ending merchandise inventory	150,000	600,000
Gross margin		400,000
Less: Operating expenses:		
Selling expense	100,000	
Administrative expense	200,000	300,000
Net income		$ 100,000

MANUFACTURING COMPANY
Halifax Manufacturing Corporation

The manufacturing costs associated with the goods that were finished during the period. (See Exhibit 2–7 for details.)

Sales		$1,500,000
Cost of goods sold:		
Beginning finished goods inventory	$125,000	
Add: Cost of goods manufactured	850,000	
Goods available for sale	975,000	
Deduct: Ending finished goods inventory	175,000	800,00
Gross margin		700,000
Less: Operating expenses:		
Selling expense	250,000	
Administrative expense	300,000	550,000
Net income		$ 150,000

At first glance, the income statements of merchandising and manufacturing firms like Brandon Bookstore and Halifax Manufacturing Corporation are very similar. The only apparent difference is in the labels of some of the entries in the computation of the cost of goods sold. In Exhibit 2–5, the computation of cost of goods sold relies on the following basic equation for inventory accounts:

KNOW

CC15: Explain the basic inventory flow equation.

BASIC EQUATION FOR INVENTORY ACCOUNTS

$$\text{Beginning balance} + \text{Additions to inventory} = \text{Withdrawals from inventory} + \text{Ending balance}$$

The preceding equation provides the mathematics for calculating the cost of goods sold in both merchandising and manufacturing organizations. The logic underlying this equation, which applies to any inventory account, is illustrated in Exhibit 2–6A. During a period, additions to the inventory account come through purchases or other means. The sum of the additions to the account and the beginning balance represent the total amount of inventory that is available for use during the period. At the end of the period, some or all of the inventory may have been withdrawn from the inventory account.

To determine the cost of goods sold in a merchandising company like Brandon Bookstore, we only need to know the beginning and ending balances in the merchandise inventory account, and the purchases (see Exhibit 2–6B). Total purchases can be easily determined in a merchandising company by simply adding all purchases from suppliers.

To determine the cost of goods sold in a manufacturing company like Halifax Manufacturing Corporation, we need to know the cost of goods manufactured and the beginning and ending balances in the finished goods inventory account (see Exhibit 2–6B). The **cost of goods manufactured** consists of the manufacturing costs associated with goods that were *finished* during the period. The cost of goods manufactured figure for Halifax Manufacturing Corporation is computed in Exhibit 2–7, which contains a *schedule of cost of goods manufactured.*

Schedule of Cost of Goods Manufactured

APPLY

CC16: Prepare a schedule of cost of goods manufactured, including the computation of the cost of direct materials used.

At first glance, the **schedule of cost of goods manufactured** in Exhibit 2–7 appears complex and perhaps even intimidating. However, it is all quite logical. Notice that the schedule of cost of goods manufactured contains the three elements of product costs that we discussed earlier—direct materials, direct labour, and manufacturing overhead.

The cost of direct materials used is computed by taking into consideration the cost of direct materials in inventory at the start and the end of a period, and the cost of purchases during the period (see the schedule of direct materials used in Exhibit 2–6B). Once the cost of direct materials used is computed, direct labour and manufacturing overhead costs are added, which results in the total manufacturing costs incurred during the period ($820,000 in Exhibit 2–7). This amount, however, is *not* the cost of goods manufactured for the period.

Exhibit 2–6A
Inventory Flows

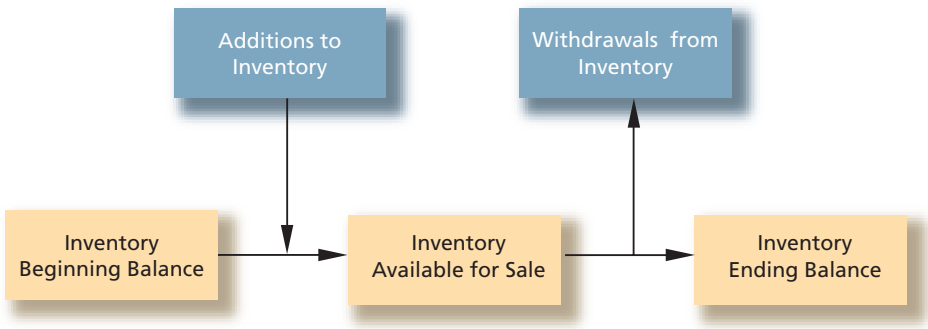


Exhibit 2–6B

Inventory Flows and Cost of Goods Sold

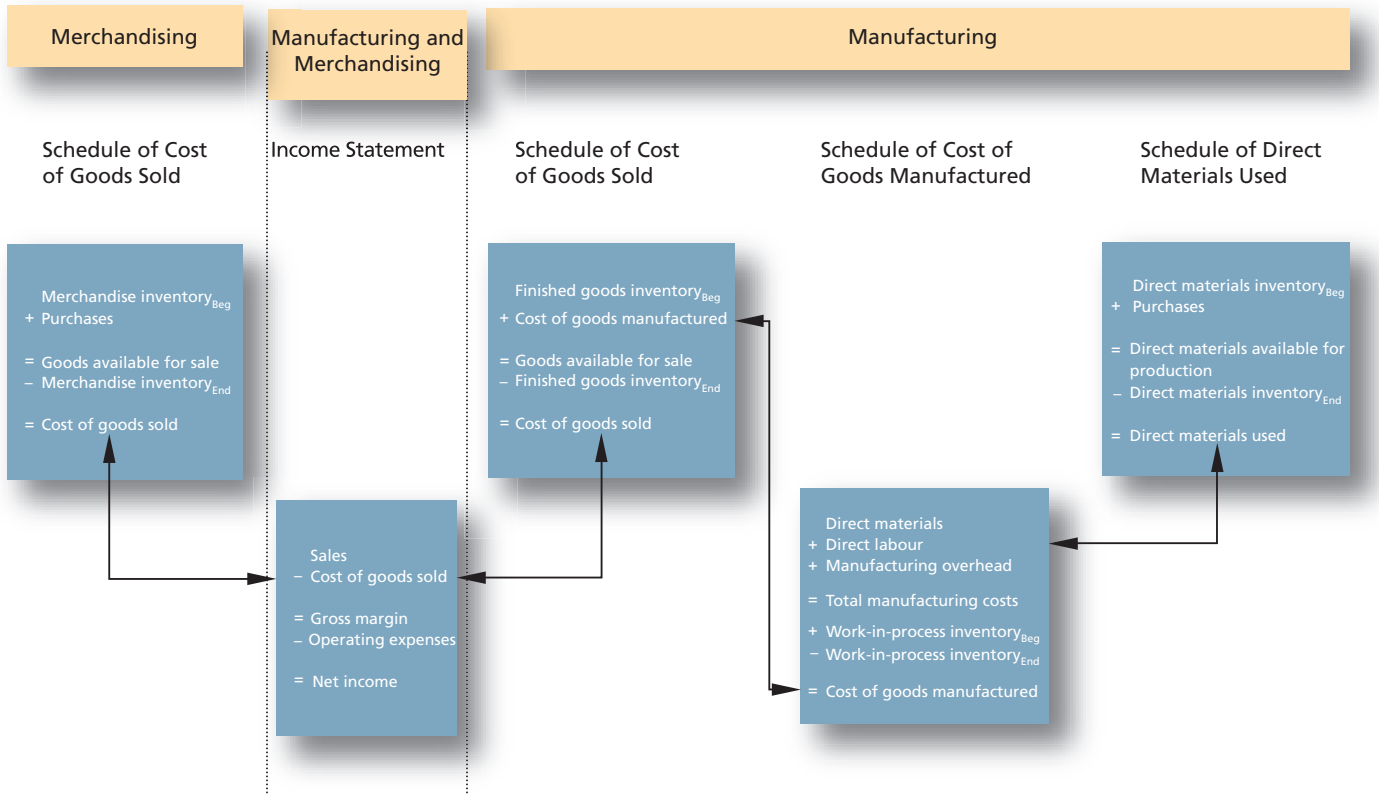


Exhibit 2–7

Schedule of Cost of Goods Manufactured

Direct materials:		
Beginning raw materials inventory*	$ 60,000	
Add: Purchases of raw materials	400,000	
Raw materials available for use	460,000	
Deduct: Ending raw materials inventory		50,000
Raw materials used in production		$410,000
Direct labour		60,000
Manufacturing overhead:		
Insurance, factory	6,000	
Indirect labour	100,000	
Machine rental	50,000	
Utilities, factory	75,000	
Supplies	21,000	
Amortization, factory	90,000	
Property taxes, factory	8,000	
Total overhead costs		350,000
Total manufacturing costs:		820,000
Add: Beginning work-in-process inventory		90,000
		910,000
Deduct: Ending work-in-process inventory		60,000
Cost of goods manufactured		$850,000

Direct Materials

Direct Labour

Manufacturing Overhead

Cost of Goods Manufactured

*We assume in this example that the raw materials inventory account contains only direct materials and that indirect materials are carried in a separate supplies account. Using a supplies account for indirect materials is a common practice among companies. In Chapter 4, we discuss the procedure to be followed if *both* direct and indirect materials are carried in a single account.

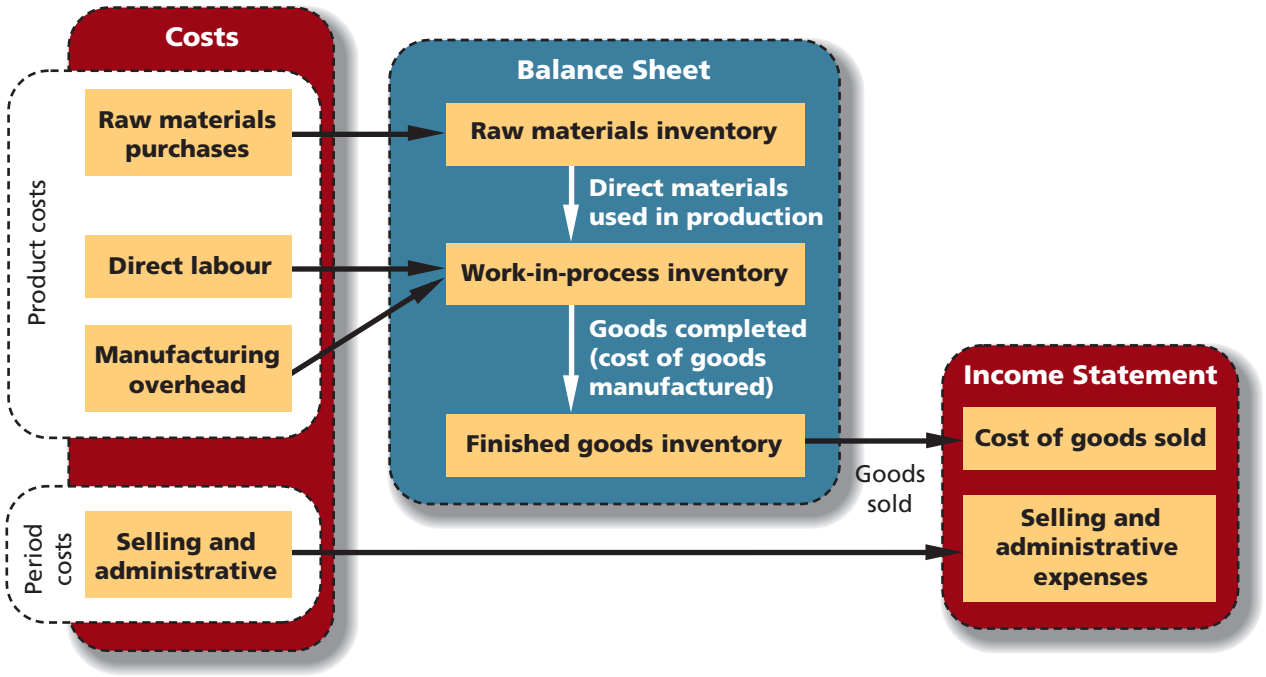
The total units manufactured in any period often include partially completed units carried forward from the previous period (called *beginning work-in-process inventory*); similarly, manufacturing activity in the current period often includes partially completed units that will be carried forward to the next period (called *ending work-in-process inventory*). To compute the cost of goods manufactured, prior period costs associated with the beginning work-in-process inventory must be added to the manufacturing costs, whereas costs associated with the ending work-in-process inventory must be deducted from the manufacturing costs (see the schedule of cost of goods manufactured in Exhibit 2–6B). This adjustment of the costs associated with the beginning and ending work-in-process inventories is also shown at the bottom of Exhibit 2–7, and results in the cost of goods manufactured for the current period amounting to $850,000.

Product Costs—A Closer Look

Previously in the chapter, we defined product costs as those costs that are involved in either the purchase or manufacture of goods. For manufactured goods, we stated that these costs consist of direct materials, direct labour, and manufacturing overhead. To understand product costs more fully, it will be helpful at this point to look briefly at the flow of costs in a manufacturing company. By doing so, we will be able to see how product costs move through the various accounts and affect the balance sheet and the income statement in the course of producing and selling products.

Exhibit 2–8 illustrates the flow of costs in a manufacturing company. Raw materials purchases are recorded in the raw materials inventory account. When raw materials are used in production, their costs are transferred to the work-in-process inventory account as direct materials. Notice that direct labour cost and manufacturing overhead cost are added directly to work in process. Work in process can be viewed most simply as an assembly line where workers are stationed and where products slowly take shape as they move from one end of the assembly line to the other. The direct materials, direct labour, and manufacturing overhead costs added to work in process in Exhibit 2–8 are the costs needed to complete these products as they move along this assembly line.

Exhibit 2–8
Cost Flows and Classifications in a Manufacturing Company



Notice from the exhibit that as goods are completed, their cost is transferred from work in process to finished goods. Here the goods await sale to a customer. As goods are sold, their cost is then transferred from finished goods to cost of goods sold. At this point, the various material, labour, and overhead costs that are required to make the product are finally treated as expenses.

As stated previously, product costs are often called *inventoriable costs* because 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. *This is a key concept, since 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.*

Selling and administrative expenses are not involved in the manufacture of a product. For this reason, they are not treated as product costs but, rather, as period costs that go directly into expense accounts as they are incurred as shown in Exhibit 2–8.

Cost Manager

DECISION MAKER

Your company has recently implemented a just-in-time inventory program, and the company's operations manager questions your method of recording all purchases and production to the inventory account. According to her, the company's goal is zero inventories; therefore, the inventory account should be eliminated from the books. How would you respond?

An Example of Cost Flows

To provide a numerical 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 portion of the year's insurance cost will not become an expense until the goods that are produced during the year are sold—which may not happen until the following year or even later. Until the goods are sold, the $1,500 will remain as part of inventory (either as part of work in process or as part of finished goods), along with the other costs of producing the goods.

By contrast, the $500 of insurance cost that applies to the company's selling and administrative activities will go into an expense account immediately as a charge against the period's revenue.

Product or Period Cost?—Not Just an Academic Distinction

IN BUSINESS TODAY

Whether a cost is considered a product or period cost can have an important impact on a company's financial statements and can create conflicts inside an organization. Consider the following excerpts from a conversation recorded on the Institute of Management Accountants' Ethics Hot Line:

Caller: My problem basically is that my boss, the division general manager, wants me to put costs into inventory that I know should be expensed.

IN BUSINESS TODAY continued

Counsellor: Have you expressed your doubts to your boss?
Caller: Yes, but he is basically a salesman and claims he knows nothing about GAAP. He just wants the "numbers" to back up the good news he keeps telling corporate [headquarters], which is what corporate demands. Also, he asks if I am ready to make the entries that I think are improper. It seems he wants to make it look like my idea all along. Our company had legal problems a few years ago with some government contracts, and it was the lower level people who were "hung out to dry" rather than the higher-ups who were really at fault.
Counsellor: What does he say when you tell him these matters need resolution?
Caller: He just says we need a meeting, but the meetings never solve anything.
Counsellor: Does your company have an ethics hot line?
Caller: Yes, but my boss would view use of the hot line as snitching or even whistle-blowing.
Counsellor: If you might face reprisals for using the hot line, perhaps you should evaluate whether or not you really want to work for a company whose ethical climate is one you are uncomfortable in.
Caller: I have already asked … for a transfer back to the corporate office.

Source: Curtis C. Verschoor, "Using a Hot Line Isn't Whistle-Blowing," *Strategic Finance*, April 1999, pp. 27–28. Used with permission from *Strategic Finance* and the Institute of Management Accountants.

Cost Classification Summary

As explained previously in the chapter, costs can be classified in various ways to meet the information needs of managers; Exhibit 2–9 provides a summary of these different classifications. Indeed, the same cost item may be classified in more than one way. For example, the salary of Holiday Inn's catering department manager is a fixed cost with respect to the number of guests staying the hotel. It is directly traceable to the catering department, but not to the sales department. It is a period cost because the individual's services cannot be *banked*. Finally, it is a relevant cost when deciding whether to eliminate the department and outsource catering. When to use which classification depends on the purpose of the classification. The purposes and corresponding cost classifications are summarized in Exhibit 2–10. You will find it useful to understand the notion of "different costs for different purposes" as you progress through the text.

Exhibit 2–9
Cost Classification Summary

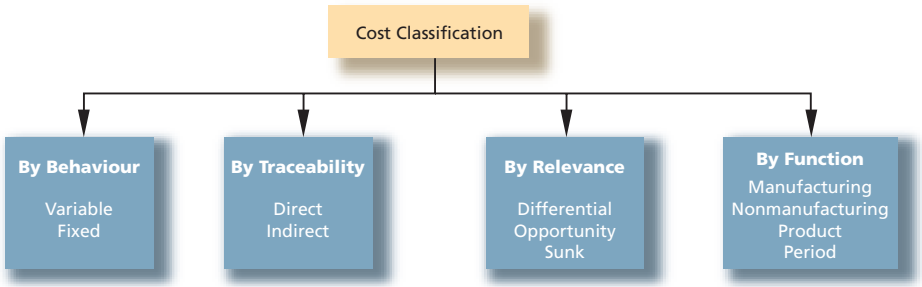


Exhibit 2–10
Cost Classifications for Different Purposes

Purpose of Cost Classification	Cost Classifications

Preparing external financial statements	• Product costs (inventoriable)
	  • Direct materials
	  • Direct labour
	  • Manufacturing overhead
	• Period costs (expensed)
	  • Nonmanufacturing costs
	  • Marketing or selling costs
	  • Administrative costs

Predicting cost behaviour in response to changes in activity	• Variable cost (proportional to activity) • Fixed cost (constant in total)
Assigning costs to cost objects, such as departments or products	• Direct cost (can be easily traced) • Indirect cost (cannot be easily traced; must be allocated)
Making decisions	• Differential cost (differs between alternatives) • Sunk cost (past cost not affecting a decision) • Opportunity cost (forgone benefit)

Application Competency Summary

Application Competency	Deliverable	Source Documents and Key Information	Steps	Knowledge Competency
Compute net income for the period. CC13	*Key Information* Gross margin and net income *Report/Document* Income statement	*Sales ledger* Actual sales revenue *Schedule of cost of goods sold* Actual cost of goods sold (COGS) *Selling, general, and administrative expenses ledgers* Actual selling, general, and administrative expenses	1. Obtain the sales revenues from the sales ledger. 2. Obtain the COGS from the schedule of cost of goods sold. 3. Obtain the selling, general, and administrative expenses from the ledgers. 4. Compute net income as sales revenue *minus* COGS minus selling, general, and administrative expenses.	Manufacturing versus nonmanufacturing costs CC7 Product versus period costs CC10
Compute the COGS for the period. CC14	*Key Information* Cost of goods available for sale and COGS *Report/Document* Schedule of COGS	*Schedule of cost of goods manufactured* Cost of goods manufactured (COGM) *Finished goods inventory ledger* Cost of beginning and ending finished goods inventory	1. Obtain the beginning and ending finished goods inventory amounts from the finished goods inventory ledger. 2. Obtain the COGM from the schedule of the cost of goods manufactured. 3. Compute the COGS as beginning finished goods inventory *plus* COGM *Less* ending finished goods inventory.	Manufacturing versus nonmanufacturing costs CC7 Product versus period costs CC10 Inventory flow equation CC15

continued

Application Competency	Deliverable	Source Documents and Key Information	Steps	Knowledge Competency
Compute the COGM for the period. CC16	*Key Information* Manufacturing costs and the COGM *Report/Document* Schedule of COGM	*Schedule of cost of materials used* Cost of materials used *Direct labour ledger* Cost of direct labour *Various manufacturing overhead ledgers* Cost of manufacturing overhead *Work-in-process inventory ledger* Cost of beginning and ending work-in-process inventory	1. Obtain the cost of direct materials used from the schedule of cost of materials used. 2. Obtain the cost of direct labour from the labour cost ledger. 3. Obtain the cost of manufacturing overhead from the overhead cost ledger. 4. Obtain the beginning and ending work-in-process inventory amounts from the work-in-process inventory ledger. 5. Compute COGM as costs of direct materials used ***plus*** direct labour ***plus*** manufacturing overhead ***plus*** beginning work-in-process inventory ***less*** ending work-in-process inventory	Direct versus indirect costs CC3 Materials, labour, and overhead costs CC7, 8 Inventory flow equation CC15
Compute the cost of direct materials used during the period. CC16	*Key Information* Cost of direct materials used *Report/Document* Schedule of cost of materials used	*Raw materials inventory ledger* Cost of beginning and ending materials inventory *Materials purchases ledgers* Cost of materials purchased	1. Obtain the beginning and ending materials inventory amounts from the materials inventory ledger. 2. Obtain the cost of materials purchased from the cost of materials purchases ledger. 3. Compute the cost of direct materials used as the cost of beginning materials inventory ***plus*** the cost of purchases ***less*** the cost of ending materials inventory.	

Guidance Answers to Decision Maker and You Decide

FINANCIAL ANALYST (p. 30)
Fixed and *variable* are terms used to describe cost behaviour or how a given cost will react or respond to changes in the level of business activity. A fixed cost is a cost that remains constant, in total, regardless of changes in the level of activity. However, on a per-unit basis, a fixed cost varies inversely with changes in activity. The cost structures of a number of industries lean toward fixed costs because of the nature of their operations. Obviously, the cost of airplanes would be fixed, and within some relevant range, such costs would not change if the number of passengers flown changed. This would also be true in other industries, such as trucking and rail transportation. You might suggest that it would be worthwhile to research the

prospects for growth in this industry and for this company. If a downturn in business is not anticipated, a cost structure weighted toward fixed costs should not be used as the primary reason for turning down the investment opportunity. On the other hand, if a period of decline is anticipated, your client's initial impression might be on target.

YOUR DECISION TO ATTEND CLASS (p. 32)
Every alternative has some opportunity cost attached to it. If you brainstormed a bit, you probably came up with a few opportunity costs that accompany your choice to attend class. If you had trouble answering the question, think about what you could be doing instead of attending class.

- You could have been working at a part-time job; you could quantify that cost by multiplying your pay rate by the time you spend in class.
- You could have spent the time studying for another class; the opportunity cost could be measured by the improvement in the grade that would result from spending more time on that class.
- You could have slept in or taken a nap; depending on your level of sleep deprivation, this opportunity cost might be priceless.

COST MANAGER (p. 43)
At a conceptual level, the physical flow of goods remains the same, regardless of the inventory levels maintained by a company (see Exhibit 2–6A). Until such time that the company continues to carry some inventory, it becomes necessary to maintain an inventory account. In a company with "near zero" inventory levels, additions to the inventory account are equal to the withdrawals from the account during a given period. In reality, although the goal of a just-in-time program is zero inventories, companies take a long time before that goal is achieved. Once the company can sustain a "near zero" inventory level, the company may consider eliminating the inventory account. In such a situation, all costs will be treated like period costs and expensed during the period in which they are incurred.

Review Problem 1: Cost Terms

You have been introduced to many new cost terms in this chapter. It will take you some time to learn what each term means and how to properly classify costs in an organization. Consider the following example: Porter Company manufactures furniture, including tables. Selected costs are given below:

1. The tables are made of wood that costs $100 per table.
2. The tables are assembled by workers, at a wage cost of $40 per table.
3. Workers assembling the tables are supervised by a factory supervisor who is paid $25,000 per year.
4. Electrical costs are $2 per machine-hour. Four machine-hours are required to produce a table.
5. The straight-line amortization cost of the machines used to make the tables totals $10,000 per year.
6. The salary of the president of Porter Company is $100,000 per year.
7. Porter Company spends $250,000 per year to advertise its products.
8. Salespersons are paid a commission of $30 for each table sold.
9. Instead of producing the tables, Porter Company could rent its factory space out at a rental income of $50,000 per year.

Required:
Classify these costs according to various cost terms used in the chapter. *Carefully study the classification of each cost*. If you do not understand why a particular cost is classified the way it is, reread the section of the chapter discussing the particular cost term. The terms *variable cost* and *fixed cost* refer to how costs behave with respect to the number of tables produced in a year.

SOLUTION TO REVIEW PROBLEM 1

	To Units of Product Sold		Period (selling and adminis-trative) Cost	Product Cost			To Units of Product Sold			
	Variable Cost	Fixed Cost		Direct Materials	Direct Labour	Manufacturing Overhead	Direct	Indirect	Sunk Cost	Oppor-tunity Cost
1. Wood used in a table ($100 per table)	X			X			X			
2. Labour cost to assemble a table ($40 per table) . . .	X				X		X			
3. Salary of the factory supervisor ($25,000 per year)		X				X		X		
4. Cost of electricity to produce tables ($2 per machine-hour)	X					X		X		
5. Amortization of machines used to produce tables ($10,000 per year)		X				X		X	X*	
6. Salary of the company president ($100,000 per year)		X	X					X		
7. Advertising expense ($250,000 per year)		X	X					X		
8. Commissions paid to sales persons ($30 per table sold)	X		X				X			
9. Rental income forgone on factory space ($50,000 per year)										X†

*This is a sunk cost, since the equipment has already been purchased.

†This is an opportunity cost, since it represents the potential benefit that is lost or sacrificed as a result of using the factory space to produce tables. Opportunity cost is a special category of cost that is not ordinarily recorded in an organization's accounting books. To avoid possible confusion with other costs, we will not attempt to classify this cost in any other way except as an opportunity cost.

Review Problem 2: Schedule of Cost of Goods Manufactured and Income Statement

The following information has been taken from the accounting records of Klear-Seal Company for last year:

Selling expenses	$ 165,000
Raw materials inventory, January 1	120,000
Raw materials inventory, December 31	82,000
Utilities, factory	38,500
Direct labour cost	157,300

Amortization, factory	155,000
Purchases of raw materials	723,000
Sales	2,500,000
Insurance, factory	42,000
Supplies, factory	14,000
Administrative expenses	283,000
Indirect labour	306,000
Maintenance, factory	89,000
Work-in-process inventory, January 1	180,000
Work-in-process inventory, December 31	100,000
Finished goods inventory, January 1	260,000
Finished goods inventory, December 31	210,000

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

Required:

1. Prepare a schedule of cost of goods manufactured, similar to Exhibit 2–7.
2. Compute the cost of goods sold.
3. Using data as needed from parts(1) and (2), prepare an income statement.

SOLUTION TO REVIEW PROBLEM 2

1.

KLEAR-SEAL COMPANY
Schedule of Cost of Goods Manufactured
For the Year Ended December 31

Direct materials:		
Raw materials inventory, January 1	$120,000	
Add: Purchases of raw materials	723,000	
Raw materials available for use	843,000	
Deduct: Raw materials inventory, December 31	82,000	
Raw materials used in production		$ 761,000
Direct labour		157,300
Manufacturing overhead:		
Utilities, factory	38,500	
Amortization, factory	155,000	
Insurance, factory	42,000	
Supplies, factory	14,000	
Indirect labour	306,000	
Maintenance, factory	89,000	
Total overhead costs		644,500
Total manufacturing costs		1,562,800
Add: Work-in-process inventory, January 1		180,000
		1,742,800
Deduct: Work-in-process inventory, December 31		100,000
Cost of goods manufactured		$1,642,800

2.

The cost of goods sold would be computed as follows:

Finished goods inventory, January 1	$ 260,000
Add: Cost of goods manufactured	1,642,800
Goods available for sale	1,902,800
Deduct: Finished goods inventory, December 31	210,000
Cost of goods sold	$1,692,800

3.

KLEAR-SEAL COMPANY
Income Statement
For the Year Ended December 31

Sales		$2,500,000
Less: Cost of goods sold (see above)		1,692,000
Gross margin		807,200
Less: Selling and administrative expenses:		
Selling expenses	$165,000	
Administrative expenses	283,000	
Total expenses		448,000
Net income		$ 359,200

Glossary

Administrative costs All executive, organizational, and clerical costs associated with the general management of an organization, rather than with manufacturing, marketing, or selling. (p. 36)
Common cost A cost that is incurred to support a number of cost objects, but cannot be traced to them individually. For example, the salary and benefit package of the receptionist in a bank is common to all the different services provided by that bank. (p. 30)
Conversion cost Direct labour cost plus manufacturing overhead cost. (p. 35)
Cost behaviour The way in which a cost reacts or responds to changes in the level of business activity. (p. 26)
Cost object Anything for which cost data are desired. Examples of possible cost objects are services, product lines, customers, jobs, and organizational subunits, such as departments or divisions of a company. (p. 30)
Cost of goods manufactured The manufacturing costs associated with the goods that were finished during the period. (p. 40)
Decremental cost A decrease in cost between two alternatives. (p. 31)
Differential cost A difference in cost between any two alternatives. Also see *decremental cost* and *incremental cost.* (p. 31)
Differential revenue The difference in revenue between any two alternatives. (p. 31)
Direct cost A cost that can be easily and conveniently traced to a particular cost object. (p. 30)
Direct labour Those factory labour costs that can be easily traced to individual units of product. Also called *touch labour.* (p. 35)
Direct materials Those materials that become an integral part of a finished product and can be conveniently traced to it. (p. 35)
Finished goods Units of product that have been completed, but have not yet been sold to customers. (p. 38)
Fixed cost A cost that remains constant, in total, regardless of changes in the level of activity within a relevant range. If a fixed cost is expressed on a per-unit basis, it varies inversely with the level of activity. (p. 28)
Incremental cost An increase in cost between two alternatives. Also see *decremental cost* and *differential cost.* (p. 31)
Indirect cost A cost that cannot be easily and conveniently traced to a particular cost object. (p. 30)
Indirect labour The labour costs of janitors, supervisors, materials handlers, and other factory workers that cannot be traced directly to particular products. (p. 35)
Indirect materials Small items of material, such as glue and nails. These items may become an integral part of a finished product but are traceable to the product only at great cost or inconvenience. (p. 35)
Inventoriable cost Cost that can be carried forward to inventory. Synonym for *product costs.* (p. 36)
Manufacturing cost Cost incurred in production during a certain period. Includes *direct materials*, *direct labour*, and *manufacturing overhead*. (p. 34)
Manufacturing overhead All costs associated with manufacturing, except direct materials and direct labour. Synonyms include *indirect manufacturing cost*, *factory overhead*, and *factory burden*. (p. 35)

Marketing or **selling costs** All costs necessary to secure customer orders and get the finished product or service into the hands of the customer. Also called *order-getting* and *order-filling costs*. (p. 36)
Opportunity cost The potential benefit that is given up when one alternative is selected over another. (p. 32)
Period costs All costs not included in product costs, e.g., all selling and administrative expenses. (p. 36)
Prime cost Direct materials cost plus direct labour cost. (p. 35)
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 labour, and manufacturing overhead. Also see *inventoriable costs.* (p. 36)
Raw materials Materials that are used to make a product. (p. 34)
Relevant range The range of activity within which assumptions about variable and fixed cost behaviour are valid. (p. 28)
Schedule of cost of goods manufactured A schedule showing the direct materials, direct labour, and manufacturing overhead costs incurred for a period and assigned to work in process and finished goods. (p. 40)
Sunk cost Any cost that has already been incurred and that cannot be changed by any decision made now or in the future. (p. 33)
Value chain A sequence of major activities undertaken by an organization to fulfil its mission. (p. 33)
Variable cost A cost that varies, in total, in direct proportion to changes in the level of activity. (p. 26)
Work in process Units of product that are only partially complete and will require further work before they are ready for sale to a customer. (p. 38)

Questions

2–1 What is meant by the term *cost behaviour*?
2–2 "A variable cost is a cost that varies per unit of activity, whereas a fixed cost is constant per unit of activity." Do you agree? Explain.
2–3 How do fixed costs create difficulties in costing units of product?
2–4 Give two examples each of variable and fixed costs.
2–5 Fixed costs are inversely proportional to volume. As volume decreases fixed costs increase and as volume increases fixed costs decrease. Do you agree? Explain.
2–6 Why is manufacturing overhead considered an indirect cost of a unit of product?
2–7 Define the following terms: differential cost, opportunity cost, and sunk cost.
2–8 Only variable costs can be differential costs. Do you agree? Explain.
2–9 What are the three major elements of product costs in a manufacturing company?
2–10 Distinguish among the following: (a) direct materials, (b) indirect materials, (c) direct labour, (d) indirect labour, and (e) manufacturing overhead.
2–11 Given:

- Prime costs = PC
- Conversion costs = CC
- Direct materials costs = DM
- Direct labour costs = DL
- Manufacturing overhead costs = MOH

Develop an equation that connects PC and CC.
2–12 Explain the difference between a product cost and a period cost.
2–13 Describe how the income statement of a manufacturing company differs from the income statement of a merchandising company.
2–14 Of what value is the schedule of cost of goods manufactured? How does it tie into the income statement?
2–15 Describe how the inventory accounts of a manufacturing company differ from the inventory account of a merchandising company.
2–16 Why are product costs sometimes called inventoriable costs? Describe the flow of such costs in a manufacturing company from the point of incurrence until they finally become expenses on the income statement.
2–17 Is it possible for such costs as salaries or amortization to end up as assets on the balance sheet? Explain.

Brief Exercises

BRIEF EXERCISE 2–1 Identifying Variable and Fixed Costs (CC1, 2)
Following are a number of costs that are incurred in a variety of organizations.

Required:
Classify each cost as variable or fixed with respect to the number of units of product sold or services provided by the organization by placing an *X* in the appropriate column.

	Cost Behaviour	
Cost Item	Variable	Fixed
1. X-ray film used in the radiology lab at your local hospital		
2. The costs of advertising a Madonna rock concert in Toronto		
3. Amortization on the Planet Hollywood restaurant building in Hong Kong		
4. The electrical costs of running a roller coaster at West Edmonton Mall		
5. Property taxes on your local cinema		
6. Commissions paid to salespersons at Wavelength Electronics		
7. Property insurance on a Coca-Cola bottling plant		
8. The costs of synthetic materials used to make Nike running shoes		
9. The costs of shipping Panasonic televisions to retail stores		
10. The cost of leasing an ultra-scan diagnostic machine at the American Hospital in Paris		

BRIEF EXERCISE 2–2 Identifying Direct and Indirect Costs (CC3, 4)
University Hospital is a full-service hospital that provides everything from major surgery and emergency room care to outpatient clinics.

Required:
For each cost incurred at University Hospital, indicate whether it would most likely be a direct cost or an indirect cost of the specified cost object by placing an *X* in the appropriate column.

Cost	Cost object	Direct Cost	Indirect Cost
Ex. Catered food served to patients	A particular patient	X	
1. The wages of pediatric nurses	The Pediatrics Department		
2. Prescription drugs	A particular patient		
3. Heating the hospital	The Pediatrics Department		
4. The salary of the head of Pediatrics	The Pediatrics Department		
5. The salary of the head of Pediatrics	A particular pediatric patient		
6. Hospital chaplain's salary	A particular patient		
7. Lab tests by outside contractor	A particular patient		
8. Lab tests by outside contractor	A particular department		

BRIEF EXERCISE 2–3 Differential, Opportunity, and Sunk Costs (CC5, 6)
University Hospital's Radiology Department is considering replacing an old inefficient X-ray machine with a state-of-the-art digital X-ray machine. The new machine would provide higher quality X-rays in less time and at a lower cost per X-ray. The new machine would require less power consumption and would use a colour laser printer to produce easily readable X-ray images. Instead of investing the funds in the new X-ray machine, the Laboratory Department is lobbying the hospital's management to buy a new DNA analyzer.

Required:
For each of the following items, indicate by placing an X in the appropriate column whether it should be considered a differential cost, an opportunity cost, or a sunk cost in the decision to replace the old X-ray machine with a new machine. If none of the categories applies for a particular item, leave all columns blank.

Item	Differential Cost	Opportunity Cost	Sunk Cost
Ex. Cost of X-ray film used in the old machine	X		
1. Cost of the old X-ray machine			
2. The salary of the head of the Radiology Department			
3. The salary of the head of the Pediatrics Department			
4. Cost of the new colour laser printer			
5. Rent on the space occupied by the Radiology Department			
6. The cost of maintaining the old machine			
7. Benefits from a new DNA analyzer			
8. Cost of electricity to run the X-ray machines			

BRIEF EXERCISE 2–4 Classifying Manufacturing Costs (CC7, 8, 9)

Your Computer, Inc. assembles custom computers from components supplied by various manufacturers. The company is very small and its assembly shop and retail sales store are housed in a single facility in North Vancouver. Following are some of the costs that are incurred at the company.

Required:

For each cost, indicate whether it would most likely be classified as direct labour, direct materials, manufacturing overhead, marketing and selling, or an administrative cost.

1. The cost of a hard drive installed in a computer
2. The cost of advertising in the *Puget Sound Computer User* newspaper
3. The wages of employees who assemble computers from components
4. Sales commissions paid to the company's salespeople
5. The wages of the assembly shop's supervisor
6. The wages of the company's accountant
7. Amortization on equipment used to test assembled computers before release to customers
8. Rent on the facility

BRIEF EXERCISE 2–5 Identifying Product and Period Costs (CC10, 11)

A product cost is also known as an *inventoriable cost*. Classify the following costs as either product (inventoriable) costs or period (noninventoriable) costs in a manufacturing company:

1. Amortization on salespersons' cars
2. Rent on equipment used in the factory
3. Lubricants used for maintenance of machines
4. Salaries of finished goods warehouse personnel
5. Soap and paper towels used by factory workers at the end of a shift
6. Factory supervisors' salaries
7. Heat, water, and power consumed in the factory
8. Materials used in boxing units of finished product for shipment overseas (Units are not normally boxed.)
9. Advertising outlays
10. Workers' compensation insurance on factory employees
11. Amortization on chairs and tables in the factory lunchroom
12. The salary of the switchboard operator for the company
13. Amortization on a Lear Jet used by the company's executives
14. Rent on rooms at a Florida resort for the annual sales conference
15. Attractively designed box for packaging breakfast cereal

BRIEF EXERCISE 2–6 Constructing an Income Statement (CC13, 14, 15)

Last month CyberGames, a computer game retailer, had total sales of $1,500,000, selling expenses of $215,000, and administrative expenses of $185,000. The company had beginning merchandise inventory of $300,000, purchased additional merchandise inventory for $800,000, and ending merchandise inventory of $200,000.

Required:

Prepare an income statement for the company for the month in good form.

BRIEF EXERCISE 2–7 Prepare a Schedule of Cost of Goods Manufactured (CC15, 16)
Lompac Products manufactures a variety of products in its factory. Data for the most recent month's operations follow:

Beginning raw materials inventory	$ 70,000
Purchases of raw materials	720,000
Ending raw materials inventory	50,000
Direct labour	145,000
Manufacturing overhead	380,000
Beginning work-in-process inventory	110,000
Ending work-in-process inventory	140,000

Required:
Prepare in good form a schedule of cost of goods manufactured for the company for the month.

Exercises

EXERCISE 2–1 Cost Identification (CC1, 2, 5, 6, 7, 8, 9, 10, 11)
Wollogong Group Ltd. of New South Wales, Australia, acquired its factory building about 10 years ago. For several years the company has rented out a small annex attached to the rear of the building. The company has received a rental income of $30,000 per year on this space. The renter's lease will expire soon, and rather than renew the lease, the company has decided to use the space itself to manufacture a new product.

Direct materials cost for the new product will total $80 per unit. To have a place to store finished units of product, the company will rent a small warehouse nearby. The rental cost will be $500 per month. In addition, the company must rent equipment for use in producing the new product; the rental cost will be $4,000 per month. Workers will be hired to manufacture the new product, with direct labour cost amounting to $60 per unit. The space in the annex will continue to be amortized on a straight-line basis, as in prior years. This amortization is $8,000 per year.

Advertising costs for the new product will total $50,000 per year. A supervisor will be hired to oversee production; her salary will be $1,500 per month. Electricity for operating machines will be $1.20 per unit. Costs of shipping the new product to customers will be $9 per unit.

To provide funds to purchase materials, meet payrolls, and so forth, the company will have to liquidate some temporary investments. These investments are presently yielding a return of about $3,000 per year.

Required:
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 Labour	Manufacturing Overhead			

List the different costs associated with the new product decision down the extreme left column (under Name of the Cost). Then place an *X* under each heading that helps describe the type of cost involved. There may be *X*s under several column headings for a single cost. (For example, 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.)

EXERCISE 2–2 Definitions of Cost Terms (CC1, 2, 5, 6, 10, 11)
Following are a number of cost terms introduced in the chapter:

Variable cost	Product cost
Fixed cost	Sunk cost
Prime cost	Conversion cost
Opportunity cost	Period cost

Choose the term or terms that most appropriately describe the cost identified in each of the following situations. A cost term can be used more than once.

1. Lake Company produces a tote bag that is very popular with college students. The cloth going into the manufacture of the tote bag would be called direct materials and classified as a _____ cost. In terms of cost behaviour, the cloth could also be described as a _____ cost.
2. The direct labour cost required to produce the tote bags, combined with the manufacturing overhead cost involved, would be known as _____ cost.
3. The company could have taken the funds that it has invested in production equipment and invested them in interest-bearing securities instead. The interest forgone on the securities would be called _____ cost.
4. Taken together, the direct materials cost and the direct labour cost required to produce tote bags would be called _____ cost.
5. The company used to produce a smaller tote bag that was not very popular. Some three hundred of these smaller bags are stored in one of the company's warehouses. The amount invested in these bags would be called a _____ cost.
6. The tote bags are sold through agents who are paid a commission on each bag sold. These commissions would be classified by Lake Company as a _____ cost. In terms of cost behaviour, commissions would be classified as a _____ cost.
7. Amortization on the equipment used to produce tote bags would be classified by Lake Company as a _____ cost. However, amortization on any equipment used by the company in selling and administrative activities would be classified as a _____ cost. In terms of cost behaviour, amortization would probably be classified as a _____ cost.
8. A _____ cost is also known as an inventoriable cost, since such costs go into the work-in-process inventory account and then into the finished goods inventory account before appearing on the income statement as part of cost of goods sold.
9. The salary of Lake Company's president would be classified as a _____ cost, since the salary will appear on the income statement as an expense in the time period in which it is incurred.
10. Costs can often be classified in several ways. For example, Lake Company pays $5,000 rent each month on its factory building. The rent would be part of manufacturing overhead. In terms of cost behaviour, it would be classified as a _____ cost. The rent can also be classified as a _____ cost and as part of _____ cost.

EXERCISE 2–3 Classification of Variable, Fixed, Direct, and Indirect Costs (CC1, 2, 3, 4)

Various costs are associated with running a communications company dealing with the production of video commercials, as given below:

1. Account manager's salary
2. Rent on building
3. Videos used in the production of commercials
4. Marketing manager's salary
5. Wages of operators involved in editing
6. Amortization of equipment used in editing
7. Amortization on television sets used for viewing videos
8. Insurance on building

Required:

Classify each cost as being either variable or fixed with respect to the number of commercials produced. Also indicate whether each cost would typically be treated as a direct cost or an indirect cost with respect to the number of commercials produced. Prepare your answer sheet as shown below:

	Cost Behaviour		To Number of Commercials Produced	
Cost Item	Variable	Fixed	Direct	Indirect

EXERCISE 2–4 Classification of Variable, Fixed, Period, and Product Costs (CC1, 2, 10, 11)

Following are listed various costs that are found in organizations.

1. Hamburger buns in a McDonald's outlet
2. Advertising by a dental office
3. Apples processed and canned by Del Monte Corporation
4. Shipping canned apples from a Del Monte plant to customers
5. Insurance on a Bausch & Lomb factory producing contact lenses

6. Insurance on IBM's corporate headquarters
7. Salary of a supervisor overseeing production of circuit boards at Hewlett-Packard
8. Commissions paid to Encyclopedia Britannica salespersons
9. Amortization of factory lunchroom facilities at a General Electric plant
10. Steering wheels installed in BMWs

Required:

Classify each cost as being either variable or fixed with respect to the number of units sold. Also classify each cost as either a selling and administrative cost or a product cost. Prepare your answer sheet as shown below.

	Cost Behaviour			
Cost Item	Variable	Fixed	Selling and Administrative Cost	Product Cost

Place an *X* in the appropriate columns to show the proper classification of each cost.

EXERCISE 2–5 Determining Cost of Goods Sold (CC14, 15, 16)

The following cost and inventory data are taken from the accounting records of Mason Company for the year just completed:

Costs incurred:	
Direct labour cost	$ 70,000
Purchases of raw materials	120,000
Indirect labour	30,000
Maintenance, factory equipment	6,000
Advertising expense	90,000
Insurance, factory equipment	900
Sales salaries	50,000
Rent, factory facilities	24,000
Supplies	4,600
Amortization, office equipment	3,500
Amortization, factory equipment	21,000

	Beginning of the Year	End of the Year
Inventories:		
Raw materials	$ 8,000	$16,500
Work in process	10,300	5,150
Finished goods	23,250	38,100

Required:

1. Prepare a schedule of cost of goods manufactured in good form.
2. Prepare the cost of goods sold section of Mason Company's income statement for the year.

EXERCISE 2–6 Cost Flows (CC12)

The Devon Motor Company produces automobiles. During April, the company purchased 8,000 batteries at a cost of $10 per battery. Devon withdrew 7,600 batteries from the storeroom during the month. Of these, 100 were used to replace batteries in autos being used by the company's travelling sales staff. The remaining 7,500 batteries withdrawn from the storeroom were placed in autos being produced by the company. Of the autos in production during April, 90% were completed and transferred from work in process to finished goods. Of the cars completed during the month, 30% were unsold at April 30.

There were no inventories of any type on April 1.

Required:

1. Determine the cost of batteries that would appear in each of the following accounts at April 30:
   a. Raw materials
   b. Work in process
   c. Finished goods.
   d. Cost of goods sold
   e. Selling expense
2. Specify whether each of the previous accounts would appear on the balance sheet or on the income statement at April 30.

EXERCISE 2–7 Cost of Goods Manufactured (CC16)

The following cost information is presented for Phoenix Ltd. for the most recent period:

Cost of direct material used in manufacturing	$92,000
Direct labour costs	25,000
Manufacturing overhead	6,500
Sales commissions @ 8% of sales	32,000
Opening finished goods inventory	9,000
Opening work-in-process inventory	6,000
Ending finished goods inventory	22,000
Ending work-in-process inventory	17,000

What was the cost of goods manufactured for Phoenix?

EXERCISE 2–8 Cost of Goods Manufactured (CC14, 15, 16)

Sage Ltd. had the following results for the month of March:

Sales	$1,700,000
Opening finished goods inventory	30,000
Gross margin	800,000
Ending finished goods inventory	185,000

What was the cost of goods manufactured in March?

Problems

PROBLEM 2–1 Cost Identification (CC1, 2, 7, 8, 10, 11)

CHECK FIGURE
Clay and glaze: variable, direct materials

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 $2,500 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 labour 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 Labour	Manufacturing Overhead			

List the different costs associated with the new company down the extreme left column (under Name of the Cost). Then place an *X* under each heading that helps 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.

2. All of the costs you have listed above, except one, would be differential costs between the alternatives of Staci producing pottery or staying with the aerospace firm. Which cost is *not* differential? Explain.

CHECK FIGURE
Boxes for packaging: variable, direct

PROBLEM 2–2 Cost Classification (CC1, 2, 3, 4, 7, 9)

Following are a number of costs typically found in organizations:

1. Property taxes, factory
2. Boxes used for packaging detergent
3. Salespersons' commissions
4. Supervisor's salary, factory
5. Amortization, executive automobiles
6. Wages of workers assembling computers
7. Packing supplies for out-of-state shipments
8. Insurance, finished goods warehouses
9. Lubricants for machines
10. Advertising costs
11. "Chips" used in producing calculators
12. Shipping costs on merchandise sold
13. Magazine subscriptions, factory lunchroom
14. Thread in a garment factory
15. Billing costs
16. Executive life insurance
17. Ink used in textbook production
18. Fringe benefits, assembly-line workers
19. Yarn used in sweater production
20. Wages of receptionist, executive offices

Required:

Prepare an answer sheet with column headings as shown following. For each cost item, indicate whether it would be variable or fixed with respect to the number of units produced and sold; and then whether it would be a selling cost, an administrative cost, or a manufacturing cost. If it is a manufacturing cost, indicate whether it would typically be treated as a direct cost or an indirect cost with respect to units of product. Three sample answers are provided for illustration.

Cost Item	Variable or Fixed	Selling Cost	Administrative Cost	Manufacturing (Product) Cost	
				Direct	Indirect
Direct labour	V			X	
Executive salaries	F		X		
Factory rent	F				X

PROBLEM 2–3 Cost Identification and Cost Concepts (CC1, 2, 3, 4, 7, 9)

CHECK FIGURE
(1) Total variable cost: $321,000

The Dorilane Company specializes in producing a set of wooden patio furniture consisting of a table and four chairs. The set enjoys great popularity, and the company has ample orders to keep production going at its full capacity of 2,000 sets per year. Annual cost data at full capacity follow:

Factory labour, direct	$118,000
Advertising	50,000
Factory supervision	40,000
Property taxes, factory building	3,500
Sales commissions	80,000
Insurance, factory	2,500
Amortization, office equipment	4,000
Lease cost, factory equipment	12,000
Indirect materials, factory	6,000
Amortization, factory building	10,000
General office supplies (billing)	3,000
General office salaries	60,000
Direct materials used (wood, bolts, etc.)	94,000
Utilities, factory	20,000

Required:

1. Prepare an answer sheet with the column headings shown following. Enter each cost item on your answer sheet, placing the dollar amount under the appropriate headings. As examples, this has been done already for the first two items in the preceding list. Note that each cost item is classified in two ways: first, as variable or fixed, with respect to the number of units produced and sold; and second, as a selling and administrative cost or a product cost. (If the item is a product cost, it should also be classified as being either direct or indirect as shown.)

	Cost Behaviour		Selling and Administrative	Product Cost	
Cost Item	Variable	Fixed	Cost	Direct	Indirect*
Factory labour, direct	$118,000			$118,000	
Advertising		$50,000	$50,000		

*To units of product.

2. Total the dollar amounts in each of the columns in part (1). Compute the average product cost per patio set.
3. Assume that production drops to only 1,000 sets annually. Would you expect the average product cost per patio set to increase, decrease, or remain unchanged? Explain. No computations are necessary.
4. Refer to the original data. The president's brother-in-law has considered making himself a patio set and has priced the necessary materials at a building supply store. The brother-in-law has asked the president if he could purchase a patio set from the Dorilane Company "at cost," and the president agreed to let him do so.
   a. Would you expect any disagreement between the two men over the price the brother-in-law should pay? Explain. What price does the president probably have in mind? The brother-in-law?
   b. Since the company is operating at full capacity, what cost term used in the chapter might be justification for the president to charge the full, regular price to the brother-in-law and still be selling "at cost"?

PROBLEM 2–4 Classification of Salary Cost (CC10, 11)

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 Canada 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 does not 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 income for the year, is the president correct in his statement that it does not matter which way your salary cost is classified? Explain.

CHECK FIGURE
Case 1: Goods available for sale = $19,000

PROBLEM 2–5 Supplying Missing Data (CC14, 15, 16))

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 labour	?	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
Cost of goods manufactured	18,000	14,000	?	?
Sales	30,000	21,000	36,000	40,000
Beginning finished goods inventory	1,000	2,500	?	2,000
Cost of goods manufactured	?	?	?	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 income	$ 4,000	?	$ 5,000	$ 9,000

CHECK FIGURE
(1) COGM: $310,000

PROBLEM 2–6 Preparing Financial Statements for a Manufacturer (CC13, 14, 15, 16)

Swift Company was organized on March 1 of the current year. After five months of startup losses, management had expected to earn a profit during August, the most recent month. 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 labour cost	$ 12,000	
Utilities	15,000	
Direct labour cost	70,000	
Amortization, factory equipment	21,000	
Raw materials purchased	165,000	
Amortization, sales equipment	18,000	

continued

Insurance	4,000	
Rent on facilities	50,000	
Selling and administrative salaries	32,000	
Advertising	75,000	462,000
Net loss		$(12,000)

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:

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

	August 1	August 31
Raw materials	$ 8,000	$13,000
Work in process	16,000	21,000
Finished goods	40,000	60,000

c. 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:

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

CHECK FIGURE
(1) COGM: $290,000

eXcel

PROBLEM 2–7 Financial Statements; Cost Behaviour (CC1, 2, 13, 14, 15, 16)

Various cost and sales data for Meriwell Company for the just completed year follow:

Microsoft Excel - Problem 2-7 screen capture.xls

File Edit View Insert Format Tools Data Window Help

Arial 12 B I U

	A	B	C
1	Finished goods inventory, beginning	$ 20,000	
2	Finished goods inventory, ending	40,000	
3	Amortization, 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 labour	70,000	
13	Indirect labour	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			

Sheet1 Sheet2 Sheet3

Draw AutoShapes

Ready NUM

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 amortization?
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 amortization? (In preparing your answer, assume that direct materials is a variable cost and that amortization is a fixed cost; also assume that amortization is computed on a straight-line basis.)
5. As the manager responsible for production costs, explain to the president any difference in the average cost per unit between parts (3) and (4).

PROBLEM 2–8 Financial Statements; Cost Behaviour (CC1, 2, 13, 14, 15, 16)

CHECK FIGURE
(1) COGM: $690,000

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

Selling and administrative salaries	$110,000
Insurance, factory	8,000
Utilities, factory	45,000
Purchases of raw materials	290,000
Indirect labour	60,000
Direct labour	?
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 totalled $740,000; and the cost of goods sold totalled $660,000.

Required:

1. Prepare a schedule of cost of goods manufactured in good form 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? (In preparing your answer, you may 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 parts (2) and (3).

PROBLEM 2–9 Cost of Goods Manufactured, Sold (CC14, 15, 16)

CHECK FIGURE
(4) $44,600

You have the following information about the activities of Xavier Inc., for 2007:

Sales	$500,000
Factory maintenance	24,000
Indirect labour	19,000
Direct material purchases	98,000

continued

Factory utilities	17,000
Direct materials used in production	95,000
General and administrative expenses	71,200
Beginning work-in-process inventory	26,000
Beginning finished goods inventory	63,000
Ending work-in-process inventory	34,000
Beginning direct materials inventory	13,000
Selling expenses	67,600
Direct labour	83,000
Factory insurance	9,000
Indirect materials	7,600
Amortization — factory	30,000
Cost of goods sold	295,000

Required:
1. What was amount of the ending direct materials inventory?
2. What was the amount of the total manufacturing costs?
3. What was the cost of goods manufactured in 2007?
4. What was the amount of the ending finished goods inventory?

(Adapted © CGA-Canada)

CHECK FIGURE
(2) $57,100

PROBLEM 2–10 Computation of Manufacturing Costs (CC10, 11, 14)
Magnito Ltd. incurred the following costs last year:

Direct materials	$90,000
Direct labour	25,000
Indirect labour	3,000
Indirect materials	4,000

Other operating expenses pertaining to factory operations were as follows:

Utilities	$ 3,500
Maintenance	5,000
Supplies	2,000
Amortization	15,000
Property taxes	3,000

The only inventory was $7,000 of finished goods at year end.

Required:
1. What was the prime cost?
2. What was the conversion cost incurred?
3. What was the cost of goods sold?

(Adapted © CGA-Canada)

CHECK FIGURE
(1) $190,000

PROBLEM 2–11 Manufacturing Costs; Inventory Calculation (CC13, 14, 15, 16)
The following partial income statement information is available for Frodo Products for June 2008:

Sales	$600,000
Beginning finished goods inventory	300,000

continued

Cost of goods manufactured	270,000
Net income	60,000
Nonmanufacturing costs	200,000

Required:

1. What was the value of the ending inventory of finished goods?
2. If the beginning work-in-process inventory was $120,000 and there was no ending work-in-process inventory, what was the total manufacturing cost in June 2008?

(Adapted © CGA-Canada)

Building Your Skills

ANALYTICAL THINKING **(CC13, 14, 15, 16)**

CHECK FIGURE
(1) COGM: $870,000

Visic Company, a manufacturing firm, produces a single product. The following information has been taken from the company's production, sales, and cost records for the just completed year.

eXcel

Production in units	29,000
Sales in units	?
Ending finished goods inventory in units	?
Sales in dollars	$1,300,000
Costs:	
Advertising	105,000
Entertainment and travel	40,000
Direct labour	90,000
Indirect labour	85,000
Raw materials purchased	480,000
Building rent (production uses 80% of the space; administrative and sales offices use the rest)	40,000
Utilities, factory	108,000
Royalty paid for use of production patent, $1.50 per unit produced	?
Maintenance, factory	9,000
Rent for special production equipment, $7,000 per year plus $0.30 per unit produced	?
Selling and administrative salaries	210,000
Other factory overhead costs	6,800
Other selling and administrative expenses	17,000

	Beginning of the Year	End of the Year
Inventories:		
Raw materials	$20,000	$30,000
Work in process	50,000	40,000
Finished goods	–0–	?

The finished goods inventory is being carried at the average unit production cost for the year. The selling price of the product is $50 per unit.

Required:

1. Prepare a schedule of goods manufactured for the year.
2. Compute the following:
   a. The number of units in the finished goods inventory at the end of the year
   b. The cost of the units in the finished goods inventory at the end of the year
3. Prepare an income statement for the year.

CHECK FIGURE
(2) COGM: $780,000

COMMUNICATING IN PRACTICE **(CC10, 11, 12, 13, 14, 15, 16)**

"I was sure that when our battery hit the market it would be an instant success," said Roger Strong, founder and president of Solar Technology, Inc. "But just look at the gusher of red ink for the first quarter. It's obvious that we're better scientists than we are businesspeople." The data to which Roger was referring follow:

SOLAR TECHNOLOGY, INC.
Income Statement
For the Quarter Ended March 31

Sales (32,000 batteries)		$960,000
Less: Operating expenses:		
Selling and administrative salaries	$110,000	
Advertising	90,000	
Maintenance, production	43,000	
Indirect labour cost	120,000	
Cleaning supplies, production	7,000	
Purchases of raw materials	360,000	
Rental cost, facilities	75,000	
Insurance, production	8,000	
Amortization, office equipment	27,000	
Utilities	80,000	
Amortization, production equipment	100,000	
Direct labour cost	70,000	
Travel, salespersons	40,000	
Total operating expenses		1,130,000
Net loss		$(170,000)

"At this rate we'll be out of business within a year," said Cindy Zhang, the company's accountant. "But I've double-checked these figures, so I know they're right."

Solar Technology was organized at the beginning of the current year to produce and market a revolutionary new solar battery. The company's accounting system was set up by Margie Wallace, an experienced accountant who recently left the company to do independent consulting work. The statement above was prepared by Zhang, her assistant.

"We may not last a year if the insurance company doesn't pay the $226,000 it owes us for the 8,000 batteries lost in the warehouse fire last week," said Roger. "The insurance adjuster says our claim is inflated, but he's just trying to pressure us into a lower figure. We have the data to back up our claim, and it will stand up in any court."

On April 3, just after the end of the first quarter, the company's finished goods storage area was swept by fire and all 8,000 unsold batteries were destroyed. (These batteries were part of the 40,000 units completed during the first quarter.) The company's insurance policy states that the company will be reimbursed for the "cost" of any finished batteries destroyed or stolen. Zhang has determined this cost as follows:

$$\frac{\text{Total costs for the quarter, } \$1{,}130{,}000}{\text{Batteries produced during the quarter, } 40{,}000} = \$28.25 \text{ per battery}$$

$$8{,}000 \text{ batteries} \times \$28.25 \text{ per battery} = \$226{,}000$$

The following additional information is available on the company's activities during the quarter ended March 31:

a. Inventories at the beginning and end of the quarter were as follows:

	Beginning of the Quarter	End of the Quarter
Raw materials	–0–	$10,000
Work in process	–0–	50,000
Finished goods	–0–	?

b. 80% of the rental cost for facilities and 90% of the utilities cost relate to manufacturing operations. The remaining amounts relate to selling and administrative activities.

Required:

1. Write a brief memorandum to the president identifying what conceptual errors, if any, were made in preparing the income statement above.
2. Prepare a schedule of cost of goods manufactured for the first quarter.
3. Prepare a corrected income statement for the first quarter. Your statement should show in detail how the cost of goods sold is computed.
4. Do you agree that the insurance company owes Solar Technology, Inc. $226,000? Explain your answer in another brief memorandum to the president.

ETHICS CHALLENGE (CC10, 11)

M. K. Gallant is president of Kranbrack Corporation, a company whose shares are 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 cancelling 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:

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

TEAMWORK IN ACTION (CC1, 2)

Steel production involves a large amount of fixed costs. Since competition is defined primarily in terms of price, steel manufacturers (and many of their manufacturing and service industry counterparts) try to gain a competitive advantage by using economies of scale and investment in technology to increase productivity and drive unit costs lower. Their substantial fixed costs are the result of their size.

Required:

1. The team should discuss and then write descriptions of the definitions of fixed costs and variable costs.
2. Each member of the team should select one of the following types of businesses and perform the following: (a) give examples of fixed costs and variable costs that would be incurred by that type of business, (b) choose a relevant measure of production or service activity for that type of business, and (c) explain the relationship between the production (or service) output and each of the following: total fixed costs, fixed cost per unit, total variable costs, and variable cost per unit.
   a. Steel company
   b. Hospital
   c. University
   d. Auto manufacturer

Each team member should present his or her notes to the other teammates, who should confirm or correct the presentation. Then, work together as a team to complete steps 3 through 6 following.

3. Using the examples of fixed and variable costs for steel companies from (a) above, explain the relationship between production output at a steel company and each of the following: total fixed costs, fixed cost per unit, total variable costs, variable cost per unit, total costs, and average unit cost.
4. With an *X*-axis (horizontal axis) of tonnes produced and a *Y*-axis (vertical axis) of total costs, graph total fixed costs, total variable costs, and total costs against tonnes produced.
5. With an *X*-axis of tonnes produced and a *Y*-axis of unit costs, graph fixed cost per unit, variable cost per unit, and total (or average) cost per unit against tonnes produced.
6. Explain how costs (total and per unit) behave with changes in demand once capacity has been set.

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