CHAPTER 6

Relevant Information for Special Decisions

LEARNING OBJECTIVES

After you have mastered the material in this chapter, you will be able to:

1. Identify the characteristics of relevant information.
2. Distinguish between unit-level, batch-level, product-level, and facility-level costs and understand how these costs affect decision making.
3. Make appropriate special order decisions.
4. Make appropriate outsourcing decisions.
5. Make appropriate segment elimination decisions.
6. Make appropriate asset replacement decisions.
7. Explain the conflict between short-term and long-term profitability (Appendix).
8. Make decisions about allocating scarce resources (Appendix).

CHAPTER OPENING

Mary Daniels paid $25,000 to purchase a car that was used in her rental business. After one year the car had a book value of $21,000. Ms. Daniels needs cash and is considering selling the car. After advertising the vehicle for sale, the best offer she received was $19,000. Ms. Daniels really needed the money, but ultimately decided not to sell because she did not want to incur a $2,000 loss ($21,000 market value − $19,000 book value). Did Ms. Daniels make the right decision?

Whether Ms. Daniels will be better off selling the car or keeping it is unknown. However, it is certain that she based her decision on irrelevant data. Ms. Daniels incurred a loss when the market value of the car dropped. She cannot avoid a loss that already exists. Past mistakes should not affect current decisions. The current value of the car is $19,000. Ms. Daniels's decision is whether to take the money or keep the car. The book value of the car is not relevant. This chapter explains how to isolate and focus on the variables that are relevant in the decision-making process.

The Curious Accountant

In July 2009, the authors compared the prices of 10 of the top selling prescription drugs at two large online pharmacies, one in the United States and one in Canada. The analysis showed the Canadian prices for these 10 popular prescription drugs, such as **Lipitor** and **Zocor**, were only 51 percent of prices charged in the United States.

Major pharmaceutical companies have earnings before tax that average around 25 percent of sales, indicating that their costs average around 75 percent of the prices they charge. In other words, it costs approximately $75 to generate $100 of revenue. Given that drugs are sold in Canada for 51 percent of the U.S. sales price, a drug that is sold in the U.S. for $100 would be sold in Canada for only $51.

How can drugs be sold in Canada for less ($51) than cost ($75)? (Answer on page 259.)

RELEVANT INFORMATION

LO 1

Identify the characteristics of relevant information.

How can you avoid irrelevant information when making decisions? Two primary characteristics distinguish relevant from useless information. Specifically, **relevant information** (1) differs among the alternatives and (2) is future oriented.

The first characteristic recognizes that relevant information differs for one or more of the alternatives being considered. Suppose the car Ms. Daniels is considering selling is due for a state required safety inspection. Further assume that the inspection must be completed before the car can be sold or driven. Since the inspection fee must be paid regardless of whether Ms. Daniels keeps or sells the car, it does not differ among the alternatives and therefore is not relevant to her decision. In contrast, assume the car is due for an oil change that can be delayed until after the car is sold. Since Ms. Daniels can avoid the cost of the oil change if she sells the car but must pay for the oil change if she keeps the car, the cost of the oil change differs between the alternatives and is relevant to her decision.

The second characteristic of relevant information is that it impacts the future. "Don't cry over spilt milk." "It's water over the dam." These aphorisms remind people they cannot change the past. With regard to business decisions, the principle means you cannot avoid a cost that has already been incurred. In the Daniels example, the historical cost ($25,000) of the car is not relevant to a decision regarding whether to sell the car today. The current market value of $19,000 is relevant to the decision regarding whether to sell the car today.

It is interesting to note that the two characteristics are merely different views of the same concept because historical information does not differ between the alternatives. In other words, we could say that historical costs are not relevant because they do not differ between alternatives associated with current decisions.

Sunk Cost

Historical costs are frequently called *sunk costs.* Since **sunk costs** have been incurred in past transactions, they cannot be changed and are not relevant for making current decisions. The $25,000 original cost of the car in the Daniels example is a sunk cost.

Why even bother to collect historical information if it is not relevant? Historical information may be useful in predicting the future. A company that earned $5 million last year is more likely to earn $5 million this year than a company that earned $5,000 last year. The predictive capacity is relevant because it provides insight into the future.

Opportunity Costs

An **opportunity cost** is the sacrifice that is incurred in order to obtain an alternative opportunity. For example, in the above case, Ms. Daniels must give up the opportunity to obtain $19,000 in order to keep the car. So, the opportunity cost of owning the car is $19,000. Since this cost differs between the alternatives of owning the car versus selling it and since it affects the present or future, it is relevant to the decision regarding whether to keep or sell the car.

The best offer that Ms. Daniels received for the car was $19,000. Suppose Ms. Daniels also received the less favorable offer of $18,000. Does this mean that the opportunity cost of keeping the car is $37,000 ($18,000 + $19,000)? No. Opportunity costs are not cumulative. Ms. Daniels really has only one opportunity. If she accepts the $19,000 offer, she must reject the $18,000 offer or vice versa. Accountants normally measure opportunity cost as the highest value of the available alternatives. In this case, the opportunity cost of keeping the car is $19,000.

CHECK YOURSELF 6.1

Aqua, Inc., makes statues for use in fountains. On January 1, 2011, the company paid $13,500 for a mold to make a particular type of statue. The mold had an expected useful life of four years and a salvage value of $1,500. On January 1, 2013, the mold had a market value of $3,000 and a salvage value of $1,200. The expected useful life did not change. What is the relevant cost of using the mold during 2013?

Answer The relevant cost of using the mold in 2013 is the opportunity cost [(market value − salvage value) ÷ remaining useful life], in this case, ($3,000 − $1,200) ÷ 2 = $900. The book value of the asset and associated depreciation is based on a sunk cost that cannot be avoided because it has already been incurred and therefore is not relevant to current decisions. In contrast, Aqua could avoid the opportunity cost (market value) by selling the mold.

Relevance Is an Independent Concept

The concept of relevance is independent from the concept of cost behavior. In a given circumstance, **relevant costs** could be either fixed or variable. Consider the following illustration. Executives of Better Bakery Products are debating whether to add a new product, either cakes or pies, to the company's line. Projected costs for the two options follow.

Cost of Cakes		Cost of Pies	
Materials (per unit)	$ 1.50	Materials (per unit)	$ 2.00
Direct labor (per unit)	1.00	Direct labor (per unit)	1.00
Supervisor's salary*	25,000.00	Supervisor's salary*	25,000.00
Franchise fee†	50,000.00	Advertising‡	40,000.00

*It will be necessary to hire a new production supervisor at a cost of $25,000 per year.

†Cakes will be distributed under a nationally advertised label. Better Bakery pays an annual franchise fee for the right to use the product label. Because of the established brand name, Better Bakery will not be required to advertise the product.

‡Better Bakery will market the pies under its own name and will advertise the product in the local market in which the product sells.

Which costs are relevant? Fifty cents per unit of the materials can be avoided by choosing cakes instead of pies. A portion of the materials cost is therefore relevant. Labor costs will be one dollar per unit whether Better Bakery makes cakes or pies.

REALITY BYTES

Determining what price to charge for their company's goods or services is one of the most difficult decisions that business managers make. Charge too much and customers will go elsewhere. Charge less than customers are willing to pay and lose the opportunity to earn profits. This problem is especially difficult when managers are deciding if they should reduce (mark down) the price of aging inventory—for example, flowers that are beginning to wilt, fruit that is beginning to overripen, or clothing that is going out of season.

At first managers may be reluctant to mark down the inventory below its cost because this would cause the company to take a loss on the aging inventory. However, the concept of sunk cost applies here. Since the existing inventory has already been paid for, its cost is sunk. Since the cost is sunk it is not relevant to the decision. Does this mean the merchandise should be sold for any price? Not necessarily. The concept of opportunity cost must also be considered.

If the goods are marked down too far, too quickly, they may be sold for less than is possible. The lost potential revenue is an opportunity cost. To minimize the opportunity cost, the amount of a markdown must be the smallest amount necessary to sell the merchandise. The decision is further complicated by qualitative considerations. If a business develops a reputation for repeated markdowns, customers may hesitate to buy goods, thinking that the price will fall further if they only wait a while. The result is a dilemma as to when and how much to mark down aging inventories.

How do managers address this dilemma? Part of the answer has been the use of technology. For years airlines have used computerized mathematical models to help them decide how many seats on a particular flight should be sold at a discount. More recently, retailers began using this same type of modeling software. Such software allows retailers to take fewer markdowns at more appropriate times, thereby resulting in higher overall gross profit margins.

Labor cost is therefore not relevant. Although both materials and direct labor are variable costs, one is relevant but the other is not.

Since Better Bakery must hire a supervisor under either alternative, the supervisor's salary is not relevant. The franchise fee can be avoided if Better Bakery makes pies and advertising costs can be avoided if it makes cakes. All three of these costs are fixed, but only two are relevant. Finally, all the costs (whether fixed or variable) could be avoided if Better Bakery rejects both products. Whether a cost is fixed or variable has no bearing on its relevance.

Relevance Is Context Sensitive

A particular cost that is relevant in one context may be irrelevant in another. Consider a store that carries men's, women's, and children's clothing. The store manager's salary could not be avoided by eliminating the children's department, but it could be avoided if the entire store were closed. The salary is not relevant to deciding whether to eliminate the children's department but is relevant with respect to deciding to close the store. In one context, the salary is not relevant. In the other context, it is relevant.

Relationship between Relevance and Accuracy

Information need not be exact to be relevant. You may decide to delay purchasing a laptop computer you want if you know its price is going to drop even if you don't know exactly how much the price decrease will be. You know part of the cost can be avoided by waiting; you are just not sure of the amount.

The most useful information is both relevant and precise. Totally inaccurate information is useless. Likewise, irrelevant information is useless regardless of its accuracy.

Quantitative versus Qualitative Characteristics of Decision Making

Relevant information can have both **quantitative** and **qualitative characteristics.** The previous examples focused on quantitative data. Now consider qualitative issues. Suppose you are deciding which of two laptop computers to purchase. Computer A costs $300 more than Computer B. Both computers satisfy your technical requirements; however, Computer A has a more attractive appearance. From a quantitative standpoint, you would select Computer B because you could avoid $300 of cost. However, if the laptop will be used in circumstances where clients need to be impressed, appearance—a qualitative characteristic—may be more important than minimizing cost. You might purchase Computer A even though quantitative factors favor Computer B. Both qualitative and quantitative data are relevant to decision making.

As with quantitative data, qualitative features must *differ* between the alternatives to be relevant. If the two computers were identical in appearance, attractiveness would not be relevant to making the decision.

Differential Revenue and Avoidable Cost

Since relevant revenue *differs* among the alternatives, it is sometimes called **differential revenue.** To illustrate, assume Pecks Department Stores sells men's, women's, and children's clothing and is considering eliminating the children's line. The revenue generated by the children's department is differential (relevant) revenue because Pecks' total revenue would be different if the children's department were eliminated.

Why would Pecks consider eliminating the children's department and thereby lose the differential (relevant) revenue? Pecks may be able to save more by eliminating the cost of operating the department than it loses in differential revenue. Some but not all of the costs associated with operating the children's department can be saved. For example, if Pecks Department Stores eliminates the children's department, the company can eliminate the cost of the department manager's salary but cannot get rid of the salary

of the company president. The costs that stay the same are not relevant. The costs that can be *avoided* by closing the department are relevant. Indeed, relevant costs are frequently called *avoidable costs.*

Avoidable costs are the costs managers can eliminate by making specific choices. In the Pecks example, the cost of the department manager's salary is an avoidable (relevant) cost. The cost of the president's salary is not avoidable and is not relevant to the elimination decision.

RELATIONSHIP OF COST AVOIDANCE TO A COST HIERARCHY

LO 2

Distinguish between unit-level, batch-level, product-level, and facility-level costs and understand how these costs affect decision making.

Classifying costs into one of four hierarchical levels helps identify avoidable costs.[1]

1. *Unit-level costs.* Costs incurred each time a company generates one unit of product are **unit-level costs.**[2] Examples include the cost of direct materials, direct labor, inspections, packaging, shipping, and handling. Incremental (additional) unit-level costs increase *with each additional unit of product generated. Unit-level costs can be avoided by eliminating the production of a single unit of product.*
2. *Batch-level costs.* Many products are generated in batches rather than individual units. For example, a heating and air conditioning technician may service a batch of air conditioners in an apartment complex. Some of the job costs apply only to individual units, and other costs relate to the entire batch. For instance, the labor to service each air conditioner is a unit-level cost, but the cost of driving to the site is a **batch-level cost.**

   Classifying costs as unit- versus batch-level frequently depends on the context rather than the type of cost. For example, shipping and handling costs to send 200 computers to a university are batch-level costs. In contrast, the shipping and handling cost to deliver a single computer to each of a number of individual customers is a unit-level cost. Eliminating a batch of work avoids both batch-level and unit-level costs. Similarly, adding a batch of work increases batch-level and unit-level costs. Increasing the number of units in a particular batch increases unit-level but not batch-level costs. Decreasing the number of units in a batch reduces unit-level costs but not batch-level costs.
3. *Product-level costs.* Costs incurred to support specific products or services are called **product-level costs.** Product-level costs include quality inspection costs, engineering design costs, the costs of obtaining and defending patents, the costs of regulatory compliance, and inventory holding costs such as interest, insurance, maintenance, and storage. *Product-level costs can be avoided by discontinuing a product line.* For example, suppose the Snapper Company makes the engines used in its lawn mowers. Buying engines from an outside supplier instead of making them would allow Snapper to avoid the product-level costs such as legal fees for patents, manufacturing supervisory costs of producing the engines, and the maintenance and inventory costs of holding engine parts.

4. *Facility-level costs.* **Facility-level costs** are incurred to support the entire company. They are not related to any specific product, batch, or unit of product. Because these costs maintain the facility as a whole, they are frequently called *facility-sustaining costs.* Facility-level costs include building rent or depreciation, personnel administration and training, property and real estate taxes, insurance, maintenance, administrative salaries, general selling costs, landscaping, utilities,

[1]R. Cooper and R. S. Kaplan, *The Design of Cost Management Systems* (Englewood Cliffs, NJ: Prentice-Hall, 1991). Our classifications are broader than those typically presented. They encompass service and merchandising companies as well as manufacturing businesses. The original cost hierarchy was developed as a platform for activity-based costing, a topic introduced in the previous chapter. These classifications are equally useful as a tool for identifying avoidable costs.

[2]Recall that we use the term *product* in a generic sense to represent producing goods or services.

and security. Total facility-level costs cannot be avoided unless the entire company is dissolved. However, eliminating a business segment (such as a division, department, or office) may enable a company to avoid some facility-level costs. For example, if a bank eliminates one of its branches, it can avoid the costs of renting, maintaining, and insuring that particular branch building. In general, *segment-level* facility costs can be avoided when a segment is eliminated. In contrast, *corporate-level* facility costs cannot be avoided unless the corporation is eliminated.

Precise distinctions between the various categories are often difficult to draw. One company may incur sales staff salaries as a facility-level cost while another company may pay sales commissions traceable to product lines or even specific units of a product line. Cost classifications cannot be memorized. Classifying specific cost items into the appropriate categories requires thoughtful judgment.

RELEVANT INFORMATION AND SPECIAL DECISIONS

LO 3

Make appropriate special order decisions.

Five types of special decisions are frequently encountered in business practice: (1) special order, (2) outsourcing, (3) segment elimination, (4) asset replacement, and (5) scarce resource allocation. The following sections discuss using relevant information in making the first four types of special decisions. The Appendix to this chapter discusses scarce resource decisions.

Special Order Decisions

Occasionally, a company receives an offer to sell its goods at a price significantly below its normal selling price. The company must make a **special order decision** to accept or reject the offer.

EXHIBIT 6.1

Budgeted Cost for Expected Production of 2,000 Printers

Unit-level costs		
Materials costs (2,000 units × $90)	$180,000	
Labor costs (2,000 units × $82.50)	165,000	
Overhead (2,000 units × $7.50)	15,000	
Total unit-level costs (2,000 × $180)		$360,000
Batch-level costs		
Assembly setup (10 batches × $1,700)	17,000	
Materials handling (10 batches × $500)	5,000	
Total batch-level costs (10 batches × $2,200)		22,000
Product-level costs		
Engineering design	14,000	
Production manager salary	63,300	
Total product-level costs		77,300
Facility-level costs		
Segment-level costs:		
Division manager's salary	85,000	
Administrative costs	12,700	
Allocated—corporate-level costs:		
Company president's salary	43,200	
Building rental	27,300	
General expenses	31,000	
Total facility-level costs		199,200
Total expected cost		$658,500

Cost per unit: $658,500 ÷ 2,000 = $329.25

Quantitative Analysis

Assume Premier Office Products manufactures printers. Premier expects to make and sell 2,000 printers in 10 batches of 200 units per batch during the coming year. Expected production costs are summarized in Exhibit 6.1.

Adding its normal markup to the total cost per unit, Premier set the selling price at $360 per printer.

Suppose Premier receives a *special order* from a new customer for 200 printers. If Premier accepts the order, its expected sales would increase from 2,000 units to 2,200 units. But the special order customer is willing to pay only $250 per printer. This price is well below not only Premier's normal selling price of $360 but also the company's expected per unit cost of $329.25. Should Premier accept or reject the special order? At first glance, it seems Premier should reject the special order because the customer's offer is below the expected cost per unit. Analyzing relevant costs and revenue leads, however, to a different conclusion.

The quantitative analysis follows in three steps.

Step 1. Determine the amount of the relevant (differential) revenue Premier will earn by accepting the special order. Premier's alternatives are (1) to accept or (2) to

Answers to The Curious Accountant

There are several factors that enable drug companies to reduce their prices to certain customers. One significant factor is the issue of relevant cost. Pharmaceutical manufacturers have a substantial amount of fixed cost, such as research and development. For example, in 2008 **Pfizer Inc.** had research and development expenses that were 16.5 percent of sales, while its cost of goods sold expense was almost the same at 16.8 percent of sales. With respect to a special order decision, the research and development costs would not change and therefore would not be relevant. In contrast, the unit-level cost of goods sold would increase and therefore would be relevant. Clearly, relevant costs are significantly less than the total cost. If Canadian prices are based on relevant costs, that is, if drug companies view Canadian sales as a special order opportunity, the lower prices may provide a contribution to profitability even though they are significantly less than the prices charged in the United States.

reject the special order. If Premier accepts the special order, additional revenue will be $50,000 ($250 × 200 units). If Premier rejects the special order, additional revenue will be zero. Since the amount of revenue differs between the alternatives, the $50,000 is relevant.

Step 2. **Determine the amount of the relevant (differential) cost Premier will incur by accepting the special order.** Examine the costs in Exhibit 6.1. If Premier accepts the special order, it will incur additional unit-level costs (materials, labor, and overhead). It will also incur the cost of one additional 200-unit batch. The unit- and batch-level costs are relevant because Premier could avoid them by rejecting the special order. The other costs in Exhibit 6.1 are not relevant because Premier will incur them whether it accepts or rejects the special order.

Step 3. **Accept the special order if the relevant revenue exceeds the relevant (avoidable) cost. Reject the order if relevant cost exceeds relevant revenue.** Exhibit 6.2 summarizes the relevant figures. Since the relevant revenue exceeds the relevant cost, Premier should accept the special order because profitability will increase by $11,800.

EXHIBIT 6.2

Relevant Information for Special Order of 200 Printers

Differential revenue ($250 × 200 units)	$50,000
Avoidable unit-level costs ($180 × 200 units)	(36,000)
Avoidable batch-level costs ($2,200 × 1 batch)	(2,200)
Contribution to income	$11,800

Opportunity Costs

Premier can consider the special order because it has enough excess productive capacity to make the additional units. Suppose Premier has the opportunity to lease its excess capacity (currently unused building and equipment) for $15,000. If Premier uses the excess capacity to make the additional printers, it must forgo the opportunity to

lease the excess capacity to a third party. Sacrificing the potential leasing income represents an opportunity cost of accepting the special order. Adding this opportunity cost to the other relevant costs increases the cost of accepting the special order to $53,200 ($38,200 unit-level and batch-level costs + $15,000 opportunity cost). The avoidable costs would then exceed the differential revenue, resulting in a projected loss of $3,200 ($50,000 differential revenue − $53,200 avoidable costs). Under these circumstances Premier would be better off rejecting the special order and leasing the excess capacity.

Relevance and the Decision Context

Assume Premier does not have the opportunity to lease its excess capacity. Recall the original analysis indicated the company could earn an $11,800 contribution to profit by accepting a special order to sell 200 printers at $250 per unit (see Exhibit 6.2). Because Premier can earn a contribution to profit by selling printers for $250 each, can the company reduce its normal selling price (price charged to existing customers) to $250? The answer is no, as illustrated in Exhibit 6.3.

EXHIBIT 6.3

Projections Based on 2,200 Printers at a Sales Price of $250 per Unit

Revenue ($250 × 2,200 units)		$ 550,000
Unit-level supplies and inspection ($180 × 2,200 units)	$396,000	
Batch-level costs ($2,200 × 11 batches)	24,200	
Product-level costs	77,300	
Facility-level costs	199,200	
Total cost		(696,700)
Projected loss		$(146,700)

If a company is to be profitable, it must ultimately generate revenue in excess of total costs. Although the facility-level and product-level costs are not relevant to the special order decision, they are relevant to the operation of the business as a whole.

Qualitative Characteristics

Should a company ever reject a special order if the relevant revenues exceed the relevant costs? Qualitative characteristics may be even more important than quantitative ones. If Premier's regular customers learn the company sold printers to another buyer at $250 per unit, they may demand reduced prices on future purchases. Exhibit 6.3 shows Premier cannot reduce the price for all customers. Special order customers should therefore come from outside Premier's normal sales territory. In addition, special order customers should be advised that the special price does not apply to repeat business. Cutting off a special order customer who has been permitted to establish a continuing relationship is likely to lead to ill-feelings and harsh words. A business's reputation can depend on how management handles such relationships. Finally, at full capacity, Premier should reject any special orders at reduced prices because filling those orders reduces its ability to satisfy customers who pay full price.

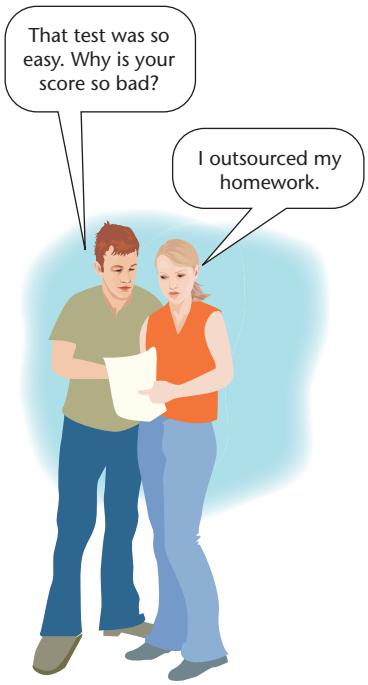
Outsourcing Decisions

LO 4

Make appropriate outsourcing decisions.

Companies can sometimes purchase products they need for less than it would cost to make them. This circumstance explains why automobile manufacturers purchase rather than make many of the parts in their cars or why a caterer might buy gourmet desserts from a specialty company. Buying goods and services from other companies rather than producing them internally is commonly called **outsourcing.**

Quantitative Analysis



Assume Premier Office Products is considering whether to outsource production of the printers it currently makes. A supplier has offered to sell an unlimited supply of printers to Premier for $240 each. The estimated cost of making the printers is $329.25 per unit (see Exhibit 6.1). The data suggest that Premier could save money by outsourcing. Analyzing relevant costs proves this presumption wrong.

A two-step quantitative analysis for the outsourcing decision follows:

Step 1. **Determine the production costs Premier can avoid if it outsources printer production.** A review of Exhibit 6.1 discloses the costs Premier could avoid by outsourcing. If Premier purchases the printers, it can avoid the unit-level costs (materials, labor, overhead), and the batch-level costs (assembly setup, and materials handling). It can also avoid the product-level costs (engineering design costs and production manager salary). Deciding to outsource will not, however, affect the facility-level costs. Because Premier will incur them whether or not it outsources printer production, the facility-level costs are not relevant to the outsourcing decision. Exhibit 6.4 shows the avoidable (relevant) costs of outsourcing.

Step 2. **Compare the avoidable (relevant) production costs with the cost of buying the product and select the lower-cost option.** Because the relevant production cost is less than the purchase price of the printers ($229.65 per unit versus $240.00), the quantitative analysis suggests that Premier should continue to make the printers. Profitability would decline by $20,700 [$459,300 − ($240 × 2,000)] if printer production were outsourced.

Opportunity Costs

Suppose Premier's accountant determines that the space Premier currently uses to manufacture printers could be leased to a third party for $40,000 per year. By using the space to manufacture printers, Premier is *forgoing the opportunity* to earn $40,000. Because this *opportunity cost* can be avoided by purchasing the printers, it is relevant to the outsourcing decision. After adding the opportunity cost to the other relevant costs, the total relevant cost increases to $499,300 ($459,300 + $40,000) and the relevant cost per unit becomes $249.65 ($499,300 ÷ 2,000). Since Premier can purchase printers for $240, it should outsource printer production. It would be better off buying the printers and leasing the manufacturing space.

EXHIBIT 6.4

Relevant Cost for Expected Production for Outsourcing 2,000 Printers

Unit-level costs ($180 × 2,000 units)	$360,000
Batch-level costs ($2,200 × 10 batches)	22,000
Product-level costs	77,300
Total relevant cost	$459,300
Cost per unit: $459,300 ÷ 2,000 = $229.65	

Evaluating the Effect of Growth on the Level of Production

The decision to outsource would change if expected production increased from 2,000 to 3,000 units. Because some of the avoidable costs are fixed relative to the level of production, cost per unit decreases as volume increases. For example, the product-level costs (engineering design, production manager's salary, and opportunity cost) are fixed relative to the level of production. Exhibit 6.5 shows the relevant cost per unit if Premier expects to produce 3,000 printers.

At 3,000 units of production, the relevant cost of making printers is less than the cost of outsourcing ($230.10 versus $240.00). If management believes the company is likely to experience growth in the near future, it should reject

EXHIBIT 6.5

Relevant Cost for Expected Production for Outsourcing 3,000 Printers

Unit-level costs ($180 × 3,000 units)	$540,000
Batch-level costs ($2,200 × 15 batches)	33,000
Product-level costs	77,300
Opportunity cost	40,000
Total relevant cost	$690,300
Cost per unit: $690,300 ÷ 3,000 units = $230.10	

FOCUS ON INTERNATIONAL ISSUES

ARE YOU SURE YOUR GERMAN CAR WAS MADE IN GERMANY?

In recent years there has been much discussion about American companies outsourcing work to other workers in other countries. However, some activities that are seldom outsourced by American companies are routinely outsourced by companies in other countries. In fact, sometimes the "foreign country" who provides the outsourcing is the United States.

Consider an example from the automotive industry. While American automobile companies may use parts that were manufactured in another country, the final assembly of cars they sell in the United States is usually performed in their own plants in the United States or Canada. Japanese auto companies also tend to perform the final assembly of their cars in their own plants, which may be located in another country. In contrast, European car makers are more willing to outsource the final assembly, as well as engineering and parts production, to independent companies. For example, most, if not all BMW X3s are not assembled at a **BMW** plant, but by the employees of **Magna Steyr** in Graz, Austria. This company, by the way, is a subsidiary of **Magna International**, which is a Canadian company. And that Porsche Boxster or Cayman you are hoping to receive as a graduation gift—it almost certainly will be built by **Valmet Automotive** in Finland. In fact, Valmet assembled 22,356 of the 105,162 vehicles that Porsche produced in 2008.

Source: Companies' annual reports.

the outsourcing option. Managers must consider potential growth when making outsourcing decisions.

Qualitative Features

A company that uses **vertical integration** controls the full range of activities from acquiring raw materials to distributing goods and services. Outsourcing reduces the level of vertical integration, passing some of a company's control over its products to outside suppliers. The reliability of the supplier is critical to an outsourcing decision. An unscrupulous supplier may lure an unsuspecting manufacturer into an outsourcing decision using **low-ball pricing.** Once the manufacturer is dependent on the supplier, the supplier raises prices. If a price sounds too good to be true, it probably is too good to be true. Other potential problems include product quality and delivery commitments. If the printers do not work properly or are not delivered on time, Premier's customers will be dissatisfied with Premier, not the supplier. Outsourcing requires that Premier depend on the supplier to deliver quality products at designated prices according to a specified schedule. Any supplier failures will become Premier's failures.

To protect themselves from unscrupulous or incompetent suppliers, many companies establish a select list of reliable **certified suppliers.** These companies seek to become the preferred customers of the suppliers by offering incentives such as guaranteed volume purchases with prompt payments. These incentives motivate the suppliers to ship high-quality products on a timely basis. The purchasing companies recognize that prices ultimately depend on the suppliers' ability to control costs, so the buyers and suppliers work together to minimize costs. For example, buyers may share confidential information about their production plans with suppliers if such information would enable the suppliers to more effectively control costs.

Companies must approach outsourcing decisions cautiously even when relationships with reliable suppliers are ensured. Outsourcing has both internal and external effects. It usually displaces employees. If the supplier experiences difficulties, reestablishing internal production capacity is expensive once a trained workforce has been

released. Loyalty and trust are difficult to build but easy to destroy. In fact, companies must consider not only the employees who will be discharged but also the morale of those who remain. Cost reductions achieved through outsourcing are of little benefit if they are acquired at the expense of low morale and reduced productivity.

In spite of the potential pitfalls outsourcing entails, the vast majority of U.S. businesses engage in some form of it. Such widespread acceptance suggests that most companies believe the benefits achieved through outsourcing exceed the potential shortcomings.

CHECK YOURSELF 6.2

Addison Manufacturing Company pays a production supervisor a salary of $48,000 per year. The supervisor manages the production of sprinkler heads that are used in water irrigation systems. Should the production supervisor's salary be considered a relevant cost to a special order decision? Should the production supervisor's salary be considered a relevant cost to an outsourcing decision?

Answer The production supervisor's salary is not a relevant cost to a special order decision because Addison would pay the salary regardless of whether it accepts or rejects a special order. Since the cost does not differ for the alternatives, it is not relevant. In contrast, the supervisor's salary would be relevant to an outsourcing decision. Addison could dismiss the supervisor if it purchased the sprinkler heads instead of making them. Since the salary could be avoided by purchasing heads instead of making them, the salary is relevant to an outsourcing decision.

Segment Elimination Decisions

LO 5

Make appropriate segment elimination decisions.

Businesses frequently organize their operations into subcomponents called **segments.** Segment data are used to make comparisons among different products, departments, or divisions. For example, in addition to the companywide income statement provided for external users, JCPenney may prepare separate income statements for each retail store for internal users. Executives can then evaluate managerial performance by comparing profitability measures among stores. *Segment reports* can be prepared for products, services, departments, branches, centers, offices, or divisions. These reports normally show segment revenues and costs. The primary objective of segment analysis is to determine whether relevant revenues exceed relevant costs.

Quantitative Analysis

Assume Premier Office Products makes copy equipment and computers as well as printers. Each product line is made in a separate division of the company. Division (segment) operating results for the most recent year are shown in Exhibit 6.6. Initial review of the results suggests the copier division should be eliminated because it is operating at a loss. However, analyzing the relevant revenues and expenses leads to a different conclusion.

A three-step quantitative analysis for the segment elimination decision follows:

Step 1. **Determine the amount of relevant (differential) revenue that pertains to eliminating the copier division.** The alternatives are (1) to eliminate or (2) to continue to operate the copier division. If Premier eliminates the copier line it will lose the $550,000 of revenue the copier division currently produces. If the division continues to operate, Premier will earn the revenue. Since the revenue differs between the alternatives, it is relevant.

Step 2. **Determine the amount of cost Premier can avoid if it eliminates the copier division.** If it eliminates copiers, Premier can avoid the unit-level, batch-level,

EXHIBIT 6.6

Projected Revenues and Costs by Segment

	Copiers	Computers	Printers	Total
Projected revenue	$550,000	$850,000	$720,000	$2,120,000
Projected costs				
Unit-level costs				
Materials costs	(120,000)	(178,000)	(180,000)	(478,000)
Labor costs	(160,000)	(202,000)	(165,000)	(527,000)
Overhead	(30,800)	(20,000)	(15,000)	(65,800)
Batch-level costs				
Assembly setup	(15,000)	(26,000)	(17,000)	(58,000)
Materials handling	(6,000)	(8,000)	(5,000)	(19,000)
Product-level costs				
Engineering design	(10,000)	(12,000)	(14,000)	(36,000)
Production manager salary	(52,000)	(55,800)	(63,300)	(171,100)
Facility-level costs				
Segment level				
Division manager salary	(82,000)	(92,000)	(85,000)	(259,000)
Administrative costs	(12,200)	(13,200)	(12,700)	(38,100)
Allocated—corporate-level				
Company president salary	(34,000)	(46,000)	(43,200)	(123,200)
Building rental	(19,250)	(29,750)	(27,300)	(76,300)
General facility expenses	(31,000)	(31,000)	(31,000)	(93,000)
Projected income (loss)	$ (22,250)	$136,250	$ 61,500	$ 175,500

product-level, and segment-level facility-sustaining costs. The relevant revenue and the avoidable costs are shown in Exhibit 6.7.

Premier will incur the corporate-level facility-sustaining costs whether it eliminates the copier segment or continues to operate it. Since these costs do not differ between the alternatives, they are not relevant to the elimination decision.

Step 3. **If the relevant revenue is less than the avoidable cost, eliminate the segment (division). If not, continue to operate it.** Because operating the segment is contributing $62,000 per year to company profitability (see Exhibit 6.7), Premier should not eliminate the copiers division. Exhibit 6.8 shows Premier's estimated revenues and costs if the computers and printers divisions were operated without the copiers division. Projected company profit declines by $62,000 ($175,500 − $113,500) without the copiers segment, confirming that eliminating it would be detrimental to Premier's profitability.

EXHIBIT 6.7

Relevant Revenue and Cost Data for Copier Segment

Projected revenue	$550,000
Projected costs	
Unit-level costs	
Materials costs	(120,000)
Labor costs	(160,000)
Overhead	(30,800)
Batch-level costs	
Assembly setup	(15,000)
Materials handling	(6,000)
Product-level costs	
Engineering design	(10,000)
Production manager salary	(52,000)
Facility-level costs	
Segment level	
Division manager salary	(82,000)
Administrative costs	(12,200)
Projected income (loss)	$ 62,000

Qualitative Considerations in Decisions to Eliminate Segments

As with other special decisions, management should consider qualitative factors when determining whether to eliminate segments. Employee lives will be disrupted; some employees may be reassigned elsewhere in the company, but others will be discharged. As with outsourcing decisions, reestablishing internal production capacity is difficult once a trained workforce has been released. Furthermore, employees in other segments, suppliers, customers, and investors may believe that the elimination of a segment implies the company as a whole is experiencing financial difficulty. These individuals may lose confidence in the company and seek business contacts with other companies they perceive to be more stable.

EXHIBIT 6.8

Projected Revenues and Costs without Copier Division

	Computers	Printers	Total
Projected revenue	$850,000	$720,000	$1,570,000
Projected costs			
Unit-level costs			
Materials costs	(178,000)	(180,000)	(358,000)
Labor costs	(202,000)	(165,000)	(367,000)
Overhead	(20,000)	(15,000)	(35,000)
Batch-level costs			
Assembly setup	(26,000)	(17,000)	(43,000)
Materials handling	(8,000)	(5,000)	(13,000)
Product-level costs			
Engineering design	(12,000)	(14,000)	(26,000)
Production manager salary	(55,800)	(63,300)	(119,100)
Facility-level costs			
Segment level			
Division manager salary	(92,000)	(85,000)	(177,000)
Administrative costs	(13,200)	(12,700)	(25,900)
Allocated—corporate-level*			
Company president salary	(63,000)	(60,200)	(123,200)
Building rental	(39,375)	(36,925)	(76,300)
General facility expenses	(46,500)	(46,500)	(93,000)
Projected income (loss)	$ 94,125	$ 19,375	$ 113,500

*The corporate-level facility costs that were previously *allocated* to the copier division have been reassigned on the basis of one-half to the computer division and one-half to the printer division.

Management must also consider the fact that sales of different product lines are frequently interdependent. Some customers prefer one-stop shopping; they want to buy all their office equipment from one supplier. If Premier no longer sells copiers, customers may stop buying its computers and printers. Eliminating one segment may reduce sales of other segments.

What will happen to the space Premier used to make the copiers? Suppose Premier decides to make telephone systems in the space it previously used for copiers. The contribution to profit of the telephone business would be an *opportunity cost* of operating the copier segment. As demonstrated in previous examples, adding the opportunity cost to the avoidable costs of operating the copier segment could change the decision.

As with outsourcing, volume changes can affect elimination decisions. Because many costs of operating a segment are fixed, the cost per unit decreases as production increases. Growth can transform a segment that is currently producing real losses into a segment that produces real profits. Managers must consider growth potential when making elimination decisions.

CHECK YOURSELF 6.3

Capital Corporation is considering eliminating one of its operating segments. Capital employed a real estate broker to determine the marketability of the building that houses the segment. The broker obtained three bids for the building: $250,000, $262,000, and $264,000. The book value of the building is $275,000. Based on this information alone, what is the relevant cost of the building?

Answer The book value of the building is a sunk cost that is not relevant. There are three bids for the building, but only one is relevant because Capital could sell the building only once. The relevant cost of the building is the highest opportunity cost, which in this case is $264,000.

Summary of Relationships between Avoidable Costs and the Hierarchy of Business Activity

LO 2

Distinguish between unit-level, batch-level, product-level, and facility-level costs and understand how these costs affect decision making.

A relationship exists between the cost hierarchy and the different types of special decisions just discussed. A special order involves making additional units of an existing product. Deciding to accept a special order affects unit-level and possibly batch-level costs. In contrast, outsourcing a product stops the production of that product. Outsourcing can avoid many product-level as well as unit- and batch-level costs. Finally, if a company eliminates an entire business segment, it can avoid some of the facility-level costs. The more complex the decision level, the more opportunities there are to avoid costs. Moving to a higher category does not mean, however, that all costs at the higher level of activity are avoidable. For example, all product-level costs may not be avoidable if a company chooses to outsource a product. The company may still incur inventory holding costs or advertising costs whether it makes or buys the product. Understanding the relationship between decision type and level of cost hierarchy helps when identifying avoidable costs. The relationships are summarized in Exhibit 6.9. For each type of decision, look for avoidable costs in the categories marked with an X. Remember also that sunk costs cannot be avoided.

EXHIBIT 6.9

Relationship between Decision Type and Level of Cost Hierarchy

Decision Type	Unit level	Batch level	Product level	Facility level
Special order	X	X		
Outsourcing	X	X	X	
Elimination	X	X	X	X

Equipment Replacement Decisions

LO 6

Make appropriate asset replacement decisions.

Equipment may become technologically obsolete long before it fails physically. Managers should base **equipment replacement decisions** on profitability analysis rather than physical deterioration. Assume Premier Office Products is considering replacing an existing machine with a new one. The following table summarizes pertinent information about the two machines:

Old Machine		New Machine	
Original cost	$ 90,000	Cost of the new machine	$29,000
Accumulated depreciation	(33,000)	Salvage value (in 5 years)	4,000
Book value	$ 57,000	Operating expenses ($4,500 × 5 years)	22,500
Market value (now)	$ 14,000		
Salvage value (in 5 years)	2,000		
Annual depreciation expense	11,000		
Operating expenses ($9,000 × 5 years)	45,000		

Quantitative Analysis

First determine what relevant costs Premier will incur if it keeps the *old machine.*

1. The *original cost* ($90,000), *current book value* ($57,000), *accumulated depreciation* ($33,000), and *annual depreciation expense* ($11,000) are different measures of a cost that was incurred in a prior period. They represent irrelevant sunk costs.
2. The $14,000 market value represents the current sacrifice Premier must make if it keeps using the existing machine. In other words, if Premier does not keep the

machine, it can sell it for $14,000. In economic terms, *forgoing the opportunity* to sell the machine costs as much as buying it. The *opportunity cost* is therefore relevant to the replacement decision.

3. The salvage value of the old machine reduces the opportunity cost. Premier can sell the old machine now for $14,000 or use it for five more years and then sell it for $2,000. The opportunity cost of using the old machine for five more years is therefore $12,000 ($14,000 − $2,000).
4. Because the $45,000 ($9,000 × 5) of operating expenses will be incurred if the old machine is used but can be avoided if it is replaced, the operating expenses are relevant costs.

Next, determine what relevant costs will be incurred if Premier purchases and uses the *new machine.*

1. The cost of the new machine represents a future economic sacrifice Premier must incur if it buys the new machine. It is a relevant cost.
2. The salvage value reduces the cost of purchasing the new machine. Part ($4,000) of the $29,000 cost of the new machine will be recovered at the end of five years. The relevant cost of purchasing the new machine is $25,000 ($29,000 − $4,000).
3. The $22,500 ($4,500 × 5) of operating expenses will be incurred if the new machine is purchased; it can be avoided if the new machine is not purchased. The operating expenses are relevant costs.

The relevant costs for the two machines are summarized here:

Old Machine		New Machine	
Opportunity cost	$14,000	Cost of the new machine	$29,000
Salvage value	(2,000)	Salvage value	(4,000)
Operating expenses	45,000	Operating expenses	22,500
Total	$57,000	Total	$47,500

The analysis suggests that Premier should acquire the new machine because buying it produces the lower relevant cost. The $57,000 cost of using the old machine can be *avoided* by incurring the $47,500 cost of acquiring and using the new machine. Over the five-year period, Premier would save $9,500 ($57,000 − $47,500) by purchasing the new machine. One caution: this analysis ignores income tax effects and the time value of money, which are explained later. The discussion in this chapter focuses on identifying and using relevant costs in decision making.

A Look Back <<

Decision making requires managers to choose from alternative courses of action. Successful decision making depends on a manager's ability to identify *relevant information.* Information that is relevant for decision making differs among the alternatives and is future oriented. Relevant revenues are sometimes called *differential revenues* because they differ among the alternatives. Relevant costs are sometimes called *avoidable costs* because they can be eliminated or avoided by choosing a specific course of action.

Costs that do not differ among the alternatives are not avoidable and therefore not relevant. *Sunk costs* are not relevant in decision making because they have been incurred in past transactions and therefore cannot be avoided. *Opportunity costs* are relevant because they represent potential benefits that may or may not be realized, depending on the decision maker's choice. In other words, future benefits that differ

among the alternatives are relevant. Opportunity costs are not recorded in the financial accounting records.

Cost behavior (fixed or variable) is independent from the concept of relevance. Furthermore, a cost that is relevant in one decision context may be irrelevant in another context. Decision making depends on qualitative as well as quantitative information. *Quantitative information refers to information that can be measured using numbers. Qualitative information* is nonquantitative information such as personal preferences or opportunities.

Classifying costs into one of four hierarchical levels facilitates identifying relevant costs. *Unit-level costs* such as materials and labor are incurred each time a single unit of product is made. These costs can be avoided by eliminating the production of a single unit of product. *Batch-level costs* are associated with producing a group of products. Examples include setup costs and inspection costs related to a batch (group) of work rather than a single unit. Eliminating a batch would avoid both batch-level costs and unit-level costs. *Product-level costs* are incurred to support specific products or services (design and regulatory compliance costs). Product-level costs can be avoided by discontinuing a product line. *Facility-level costs,* like the president's salary, are incurred on behalf of the whole company or a segment of the company. In segment elimination decisions, the facility-level costs related to a particular segment being considered for elimination are relevant and avoidable. Those applying to the company as a whole are not avoidable.

Four types of special decisions that are frequently encountered in business are (1) *special orders,* (2) *outsourcing,* (3) *elimination decisions,* and (4) *asset replacement.* The relevant costs in a special order decision are the unit-level and batch-level costs that will be incurred if the special order is accepted. If the differential revenues from the special order exceed the relevant costs, the order should be accepted. Outsourcing decisions determine whether goods and services should be purchased from other companies. The relevant costs are the unit-level, batch-level, and product-level costs that could be avoided if the company outsources the product or service. If these costs are more than the cost to buy and the qualitative characteristics are satisfactory, the company should outsource. Segment-related unit-level, batch-level, product-level, and facility-level costs that can be avoided when a segment is eliminated are relevant. If the segment's avoidable costs exceed its differential revenues, it should be eliminated, assuming favorable qualitative factors. Asset replacement decisions compare the relevant costs of existing equipment with the relevant costs of new equipment to determine whether replacing the old equipment would be profitable.

>> A Look Forward

The next chapter introduces planning and cost control, including how to prepare budgets and projected (pro forma) financial statements. In addition to quantitative aspects, it illustrates the effects of the budgeting process on human behavior.

APPENDIX

Short-Term versus Long-Term Goals

LO 7

Explain the conflict between short-term and long-term profitability.

To examine conflicts between short-term versus long-term goals, we return to the equipment replacement decision made by the management team of Premier Office Products (see page 266 for details). Suppose that the final equipment replacement decision is made by a departmental supervisor who is under significant pressure to maximize profitability. She is told that if profitability declines, she will lose her job. Under these circumstances, the supervisor may choose to keep the old machine even though it is to the company's advantage to purchase the new one. This occurs because the beneficial impact of the new

machine is realized in the second through fifth years. Indeed, replacing the equipment will result in more expense/loss recognition in the first year. To illustrate, study the following information.

Year	First	Second	Third	Fourth	Fifth	Totals
Keep old machine						
Depreciation expense*	$11,000	$11,000	$11,000	$11,000	$11,000	$ 55,000
Operating expense	9,000	9,000	9,000	9,000	9,000	45,000
Total	$20,000	$20,000	$20,000	$20,000	$20,000	$100,000
Replace old machine						
Loss on disposal†	$43,000	$ 0	$ 0	$ 0	$ 0	$ 43,000
Depreciation expense‡	5,000	5,000	5,000	5,000	5,000	25,000
Operating expense	4,500	4,500	4,500	4,500	4,500	22,500
Total	$52,500	$ 9,500	$ 9,500	$ 9,500	$ 9,500	$ 90,500

*($57,000 book value − $2,000 salvage) ÷ 5 years = $11,000

†($57,000 book value − $14,000 market value) = $43,000

‡($29,000 cost − $4,000 salvage) ÷ 5 years = $5,000

This analysis verifies that total cost at the end of the five-year period is $9,500 less if the equipment is replaced ($100,000 − $90,500). Notice, however, that total costs at the end of the first year are higher by $32,500 ($52,500 − $20,000) if the old machine is replaced. A decision maker under significant pressure to report higher profitability may be willing to sacrifice tomorrow's profits to look better today. By emphasizing short-term profitability, she may secure a promotion before the long-term effects of her decision become apparent. Even if she stays in the same position, her boss may be replaced by someone not so demanding in terms of reported profitability. The department supervisor's intent is to survive the moment and let the future take care of itself. Misguided reward systems can be as detrimental as threats of punishment. For example, a manager may choose short-term profitability to obtain a bonus that is based on reported profitability. It is the responsibility of upper-level management to establish policies and procedures that motivate subordinates to perform in ways that maximize the company's long-term profitability.

Decisions Regarding the Allocation of Scarce Resources

LO 8

Make decisions about allocating scarce resources.

Suppose that Premier Office Products makes two types of computers: a high-end network server and an inexpensive personal computer. The relevant sales and variable cost data for each unit follow.

Network Server		Personal Computer	
Sales price	$4,000	Sales price	$1,500
Less: Variable cost	(3,760)	Less: Variable cost	(1,370)
Contribution margin	$ 240	Contribution margin	$ 130

In many circumstances, variable costs act as proxies for *avoidable costs.* For example, by definition, unit-level costs increase and decrease in direct proportion with the number of units of product made and sold. As previously indicated, unit-level costs are avoidable with respect to many special decision scenarios. To the extent that variable costs are proxies for avoidable costs, the contribution margin can be used as a measure of profitability. Other things being equal, higher contribution margins translate into more profitable products. If Premier could sell 1,000 computers, the company would certainly prefer that they be network servers. The contribution to profitability on those machines is almost double the contribution margin on the personal computer.

Even though the contribution margin is higher for network servers, selling personal computers may be more profitable. Why? If Premier can sell considerably more of the personal computers, the volume of activity will make up for the lower margin. In other words, selling three personal computers produces more total margin ($3 \times \$130 = \$390$) than selling one network server ($1 \times \$240$). Many factors could limit the sales of one or both of the products. Factors that limit a business's ability to satisfy the demand for its product are called **constraints.** Suppose that warehouse space is limited (i.e., the warehouse is a scarce resource that constrains sales). Accordingly, Premier cannot warehouse all of the computers that it needs to satisfy its customer orders. If a network server requires considerably more warehouse space than a personal computer, stocking and selling personal computers may be more profitable than stocking and selling network servers. To illustrate, assume that it requires 5 square feet of warehouse space for a network server and 2 square feet for a personal computer. If only 2,100 square feet of warehouse space are available, which computer should Premier stock and sell?

In this case, the warehouse space is considered a scarce resource. The computer that produces the highest contribution margin per unit of scarce resource (i.e., per square foot) is the more profitable product. The per unit computations for each product are shown here.

	Network Server	Personal Computer
Contribution margin per unit (a)	$240	$130
Divide by warehouse space needed to store one unit (b)	÷5	÷2
Contribution margin per square foot of warehouse space (a ÷ b)	$ 48	$ 65

The data suggest that Premier should focus on the personal computer. Even though the personal computer produces a lower contribution margin per product, its contribution margin per scarce resource is higher. The effect on total profitability is shown as follows.

	Network Server	Personal Computer
Amount of available warehouse space in square feet (a)	2,100	2,100
Divided by warehouse space needed to store one unit (b)	÷ 5	÷ 2
Warehouse capacity in number of units (a ÷ b) = (c)	420	1,050
Times contribution margin per unit (d)	× $ 240	× $ 130
Total profit potential (c × d)	$100,800	$136,500

Although the quantitative data suggest that Premier will maximize profitability by limiting its inventory to personal computers, qualitative considerations may force the company to maintain a reasonable sales mix between the two products. For example, a business that buys several personal computers may also need a network server. A customer who cannot obtain both products from Premier may choose to buy nothing at all. Instead, the customer will find a supplier who will satisfy all of his needs. In other words, Premier may still need to stock some servers to offer a competitive product line.

The chairman of the board of directors asked Premier's president why company sales had remained level while the company's chief competitor had experienced significant increases. The president replied, "You cannot sell what you do not have. Our warehouse is too small. We stop production when we fill up the warehouse. The products sell out rapidly, and then we have to wait around for the next batch of computers to be made. When we are out of stock, our customers turn to the competition. We are constrained by the size of the warehouse." In business terms, the warehouse is a **bottleneck.** Its size is limiting the company's ability to produce and sell its products.

Many businesses use a management practice known as the **theory of constraints (TOC)** to increase profitability by managing bottlenecks or constrained resources. TOC's primary objective is to identify the bottlenecks restricting the operations of the business and then to open those bottlenecks through a practice known as **relaxing the constraints.** The effect of applying TOC to the Premier case is apparent via contribution margin analysis. According to the preceding computations, a new server and a new personal computer produce a contribution margin of $48 and $65 per square foot of storage space, respectively. So long as additional warehouse space can be purchased for less than these amounts, Premier can increase its profitability by acquiring the space.

A step-by-step audio-narrated series of slides is provided on the text website at www.mhhe.com/edmonds2011.

SELF-STUDY REVIEW PROBLEM

Flying High, Inc. (FHI), is a division of The Master Toy Company. FHI makes remote-controlled airplanes. During 2011, FHI incurred the following costs in the process of making 5,000 planes:

Unit-level materials costs (5,000 units × $80)	$ 400,000
Unit-level labor costs (5,000 units × $90)	450,000
Unit-level overhead costs (5,000 × $70)	350,000
Depreciation cost on manufacturing equipment*	50,000
Other manufacturing overhead†	140,000
Inventory holding costs	240,000
Allocated portion of The Master Toy Company's facility-level costs	600,000
Total costs	$2,230,000

*The manufacturing equipment, which originally cost $250,000, has a book value of $200,000, a remaining useful life of four years, and a zero salvage value. If the equipment is not used in the production process, it can be leased for $30,000 per year.

†Includes supervisors' salaries and rent for the manufacturing building.

Required

a. FHI uses a cost-plus pricing strategy. FHI sets its price at product cost plus $100. Determine the price that FHI should charge for its remote-controlled airplanes.

b. Assume that a potential customer that operates a chain of high-end toy stores has approached FHI. A buyer for this chain has offered to purchase 1,000 planes from FHI at a price of $275 each. Ignoring qualitative considerations, should FHI accept or reject the order?

c. FHI has the opportunity to purchase the planes from Arland Manufacturing Company for $325 each. Arland maintains adequate inventories so that it can supply its customers with planes on demand. Should FHI accept the opportunity to outsource the making of its planes?

d. When completing this requirement use the sales price computed in Requirement *a*. Use the contribution margin format to prepare an income statement based on historical cost data. Prepare a second income statement that reflects the relevant cost data that Master Toy should consider in a segment elimination decision. Based on a comparison of these two statements, indicate whether Master Toy should eliminate the FHI division.

e. FHI is considering replacing the equipment it currently uses to manufacture its planes. It could purchase replacement equipment for $480,000 that has an expected useful life of four years and a salvage value of $40,000. The new equipment would increase productivity substantially, reducing unit-level labor costs by 20 percent. Assume that FHI would maintain its production and sales at 5,000 planes per year. Prepare a schedule that shows the relevant costs of operating the old equipment versus the costs of operating the new equipment. Should FHI replace the equipment?

Solution to Requirement a

Product Cost for Remote-Controlled Airplanes	
Unit-level materials costs (5,000 units × $80)	$ 400,000
Unit-level labor costs (5,000 units × $90)	450,000
Unit-level overhead costs (5,000 units × $70)	350,000
Depreciation cost on manufacturing equipment	50,000
Other manufacturing overhead	140,000
Total product cost	$1,390,000

The cost per unit is $278 ($1,390,000 ÷ 5,000 units). The sales price per unit is $378 ($278 + $100). Depreciation expense is included because cost-plus pricing is usually based on historical cost rather than relevant cost. To be profitable in the long run, a company must ultimately recover the amount it paid for the equipment (the historical cost of the equipment).

Solution to Requirement b

The incremental (relevant) cost of making 1,000 additional airplanes follows. The depreciation expense is not relevant because it represents a sunk cost. The other manufacturing overhead costs are not relevant because they will be incurred regardless of whether FHI makes the additional planes.

Per Unit Relevant Product Cost for Airplanes	
Unit-level materials costs	$ 80
Unit-level labor costs	90
Unit-level overhead costs	70
Total relevant product cost	$240

Since the relevant (incremental) cost of making the planes is less than the incremental revenue, FHI should accept the special order. Accepting the order will increase profits by $35,000 [($275 incremental revenue − $240 incremental cost) × 1,000 units].

Solution to Requirement c

Distinguish this decision from the special order opportunity discussed in Requirement *b*. That special order (Requirement *b*) decision hinged on the cost of making additional units with the existing production process. In contrast, a make-or-buy decision compares current production with the possibility of making zero units (closing down the entire manufacturing process). If the manufacturing process were shut down, FHI could avoid the unit-level costs, the cost of the lost opportunity to lease the equipment, the other manufacturing overhead costs, and the inventory holding costs. Since the planes can be purchased on demand, there is no need to maintain any inventory. The allocated portion of the facility-level costs is not relevant because it would be incurred regardless of whether FHI manufactured the planes. The relevant cost of making the planes follows.

Relevant Manufacturing Cost for Airplanes	
Unit-level materials costs (5,000 units × $80)	$ 400,000
Unit-level labor costs (5,000 units × $90)	450,000
Unit-level overhead costs (5,000 units × $70)	350,000
Opportunity cost of leasing the equipment	30,000
Other manufacturing overhead costs	140,000
Inventory holding cost	240,000
Total product cost	$1,610,000

The relevant cost per unit is $322 ($1,610,000 ÷ 5,000 units). Since the relevant cost of making the planes ($322) is less than the cost of purchasing them ($325), FHI should continue to make the planes.

Solution to Requirement d

Income Statements

	Historical Cost Data	Relevant Cost Data
Revenue (5,000 units × $378)	$1,890,000	$1,890,000
Less variable costs:		
Unit-level materials costs (5,000 units × $80)	(400,000)	(400,000)
Unit-level labor costs (5,000 units × $90)	(450,000)	(450,000)
Unit-level overhead costs (5,000 units × $70)	(350,000)	(350,000)
Contribution margin	690,000	690,000
Depreciation cost on manufacturing equipment	(50,000)	
Opportunity cost of leasing manufacturing equipment		(30,000)
Other manufacturing overhead costs	(140,000)	(140,000)
Inventory holding costs	(240,000)	(240,000)
Allocated facility-level administrative costs	(600,000)	
Net loss	$ (340,000)	
Contribution to Master Toy's profitability		$ 280,000

Master Toy should not eliminate the segment (FHI). Although it appears to be incurring a loss, the allocated facility-level administrative costs are not relevant because Master Toy would incur these costs regardless of whether it eliminated FHI. Also, the depreciation cost on the manufacturing equipment is not relevant because it is a sunk cost. However, since the company could lease the equipment if the segment were eliminated, the $30,000 potential rental fee represents a relevant opportunity cost. The relevant revenue and cost data show that FHI is contributing $280,000 to the profitability of The Master Toy Company.

Solution to Requirement e

The relevant costs of using the old equipment versus the new equipment are the costs that differ for the two alternatives. In this case relevant costs include the purchase price of the new equipment, the opportunity cost of the old equipment, and the labor costs. These items are summarized in the following table. The data show the total cost over the four-year useful life of the replacement equipment.

Relevant Cost Comparison

	Old Equipment	New Equipment
Opportunity to lease the old equipment ($30,000 × 4 years)	$ 120,000	
Cost of new equipment ($480,000 − $40,000)		$ 440,000
Unit-level labor costs (5,000 units × $90 × 4 years)	1,800,000	
Unit-level labor costs (5,000 units × $90 × 4 years × .80)		1,440,000
Total relevant costs	$1,920,000	$1,880,000

Since the relevant cost of operating the new equipment is less than the cost of operating the old equipment, FHI should replace the equipment.

KEY TERMS

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QUESTIONS

1. Identify the primary qualities of revenues and costs that are relevant for decision making.

2. Are variable costs always relevant? Explain.

3. Identify the four hierarchical levels used to classify costs. When can each of these levels of costs be avoided?

4. Describe the relationship between relevance and accuracy.

5. "It all comes down to the bottom line. The numbers never lie." Do you agree with this conclusion? Explain your position.

6. Carmon Company invested $300,000 in the equity securities of Mann Corporation. The current market value of Carmon's investment in Mann is $250,000. Carmon currently needs funds for operating purposes. Although interest rates are high, Carmon's president has decided to borrow the needed funds instead of selling the investment in Mann. He explains that his company cannot afford to take a $50,000 loss on the Mann stock. Evaluate the president's decision based on this information.

7. What is an opportunity cost? How does it differ from a sunk cost?

8. A local bank advertises that it offers a free noninterest-bearing checking account if the depositor maintains a $500 minimum balance in the account. Is the checking account truly free?

9. A manager is faced with deciding whether to replace machine A or machine B. The original cost of machine A was $20,000 and that of machine B was $30,000. Because the two cost figures differ, they are relevant to the manager's decision. Do you agree? Explain your position.

10. Are all fixed costs unavoidable?

11. Identify two qualitative considerations that could be associated with special order decisions.

12. Which of the following would not be relevant to a make-or-buy decision?

(a) Allocated portion of depreciation expense on existing facilities.

(b) Variable cost of labor used to produce products currently purchased from suppliers.

(c) Warehousing costs for inventory of completed products (inventory levels will be constant regardless of whether products are purchased or produced).

(d) Cost of materials used to produce the items currently purchased from suppliers.

(e) Property taxes on the factory building.

13. What two factors should be considered in deciding how to allocate shelf space in a retail establishment?

14. What level(s) of costs is(are) relevant in special order decisions?

15. Why would a company consider outsourcing products or services?

16. Chris Sutter, the production manager of Satellite Computers, insists that the floppy drives used in the company's upper-end computers be outsourced since they can be purchased from a supplier at a lower cost per unit than the company is presently incurring to produce the drives. Jane Meyers, his assistant, insists that if sales growth continues at the current levels, the company will be able to produce the drives in the near future at a lower cost because of the company's predominately fixed cost structure. Does Ms. Meyers have a legitimate argument? Explain.

17. Identify some qualitative factors that should be considered in addition to quantitative costs in deciding whether to outsource.

18. The managers of Wilcox, Inc., are suggesting that the company president eliminate one of the company's segments that is operating at a loss. Why may this be a hasty decision?

19. Why would a supervisor choose to continue using a more costly old machine instead of replacing it with a less costly new machine?

20. Identify some of the constraints that limit a business's ability to satisfy the demand for its products or services.

MULTIPLE-CHOICE QUESTIONS

Multiple-choice questions are provided on the text website at www.mhhe.com/edmonds2011.

EXERCISES—SERIES A

All applicable Exercises in Series A are available with McGraw-Hill's *Connect Accounting*.

Exercise 6-1A *Distinction between relevance and cost behavior* LO 1

Leah Friend is trying to decide which of two different kinds of candy to sell in her retail candy store. One type is a name brand candy that will practically sell itself. The other candy is cheaper to purchase but does not carry an identifiable brand name. Ms. Friend believes that she will have to incur significant advertising costs to sell this candy. Several cost items for the two types of candy are as follows:

Brandless Candy		Name Brand Candy	
Cost per box	$ 6.00	Cost per box	$ 7.00
Sales commissions per box	1.00	Sales commissions per box	1.00
Rent of display space	1,500.00	Rent of display space	1,500.00
Advertising	3,000.00	Advertising	2,000.00

Required

Identify each cost as being relevant or irrelevant to Ms. Friend's decision and indicate whether it is fixed or variable relative to the number of boxes sold.

Exercise 6-2A *Distinction between relevance and cost behavior* LO 1

Stanley Company makes and sells a single product. Stanley incurred the following costs in its most recent fiscal year.

Cost Items Appearing on the Income Statement

Materials cost ($10 per unit)	Sales commissions (2% of sales)
Company president's salary	Salaries of administrative personnel
Depreciation on manufacturing equipment	Shipping and handling ($0.50 per unit)
Customer billing costs (1% of sales)	Depreciation on office furniture
Rental cost of manufacturing facility	Manufacturing supplies ($0.25 per unit)
Advertising costs ($200,000 per year)	Production supervisor's salary
Labor cost ($8 per unit)	

Stanley could purchase the products that it currently makes. If it purchased the items, the company would continue to sell them using its own logo, advertising program, and sales staff.

Required

Identify each cost as relevant or irrelevant to the outsourcing decision and indicate whether the cost is fixed or variable relative to the number of products manufactured and sold.

Exercise 6-3A *Distinction between avoidable costs and cost behavior* LO 1

Medallion Company makes fine jewelry that it sells to department stores throughout the United States. Medallion is trying to decide which of two bracelets to manufacture. Cost data pertaining to the two choices follow.

	Bracelet A	Bracelet B
Cost of materials per unit	$ 25	$ 32
Cost of labor per unit	32	32
Advertising cost per year	8,000	6,000
Annual depreciation on existing equip.	5,000	4,000

Required

a. Identify the fixed costs and determine the amount of fixed cost for each product.
b. Identify the variable costs and determine the amount of variable cost per unit for each product.
c. Identify the avoidable costs and determine the amount of avoidable cost for each product.

LO 2

Exercise 6-4A *Cost hierarchy*

Costs can be classified into one of four categories including unit-level, batch-level, product-level, or facility-level costs.

Required

Classify each of the items listed below into one of the four categories listed above. The first item has been categorized as an example.

Cost Description	Cost Classification
Salary of company president	Facility-level cost
Research and development cost	
Factory lawn care cost	
Cost of patent	
Startup cost to change color of a product	
Cost of resetting sewing machines to change shirt size	
Real estate tax for the factory	
Direct labor	

LO 2, 3

Exercise 6-5A *Special order decision*

Norman Concrete Company pours concrete slabs for single-family dwellings. Wayne Construction Company, which operates outside Norman's normal sales territory, asks Norman to pour 40 slabs for Wayne's new development of homes. Norman has the capacity to build 300 slabs and is presently working on 250 of them. Wayne is willing to pay only $2,500 per slab. Norman estimates the cost of a typical job to include unit-level materials, $1,000; unit-level labor, $600; and an allocated portion of facility-level overhead, $700.

Required

Should Norman accept or reject the special order to pour 40 slabs for $2,500 each? Support your answer with appropriate computations.

LO 2, 3

Exercise 6-6A *Special order decision*

Issa Company manufactures a personal computer designed for use in schools and markets it under its own label. Issa has the capacity to produce 25,000 units a year but is currently producing and selling only 15,000 units a year. The computer's normal selling price is $1,600 per unit with no volume discounts. The unit-level costs of the computer's production are $600 for direct materials, $300 for direct labor, and $120 for indirect unit-level manufacturing costs. The total product- and facility-level costs incurred by Issa during the year are expected to be $2,100,000 and $800,000, respectively. Assume that Issa receives a special order to produce and sell 3,000 computers at $1,200 each.

Required

Should Issa accept or reject the special order? Support your answer with appropriate computations.

Exercise 6-7A *Identifying qualitative factors for a special order decision* LO 3

Required

Describe the qualitative factors that Issa should consider before accepting the special order described in Exercise 6-6A.

Exercise 6-8A *Using the contribution margin approach for a special order decision* LO 3

Shenyang Company, which produces and sells a small digital clock, bases its pricing strategy on a 35 percent markup on total cost. Based on annual production costs for 10,000 units of product, computations for the sales price per clock follow.

Unit-level costs	$150,000
Fixed costs	50,000
Total cost (a)	200,000
Markup (a × 0.35)	70,000
Total sales (b)	$270,000
Sales price per unit (b ÷ 10,000)	$ 27

Required

a. Shenyang has excess capacity and receives a special order for 4,000 clocks for $17 each. Calculate the contribution margin per unit; based on it, should Shenyang accept the special order?

b. Support your answer by preparing a contribution margin income statement for the special order.

Exercise 6-9A *Outsourcing decision* LO 4

Roaming Bicycle Manufacturing Company currently produces the handlebars used in manufacturing its bicycles, which are high-quality racing bikes with limited sales. Roaming produces and sells only 6,000 bikes each year. Due to the low volume of activity, Roaming is unable to obtain the economies of scale that larger producers achieve. For example, Roaming could buy the handlebars for $35 each; they cost $32 each to make. The following is a detailed breakdown of current production costs.

Item	Unit Cost	Total
Unit-level costs		
Materials	$18	$108,000
Labor	12	72,000
Overhead	3	18,000
Allocated facility-level costs	5	30,000
Total	$38	$228,000

After seeing these figures, Roaming's president remarked that it would be foolish for the company to continue to produce the handlebars at $38 each when it can buy them for $35 each.

Required

Do you agree with the president's conclusion? Support your answer with appropriate computations.

Exercise 6-10A *Establishing price for an outsourcing decision* LO 4

Lunn Company makes and sells lawn mowers for which it currently makes the engines. It has an opportunity to purchase the engines from a reliable manufacturer. The annual costs of making the engines are shown here.

Cost of materials (15,000 Units × $24)	$360,000
Labor (15,000 Units × $26)	390,000
Depreciation on manufacturing equipment*	42,000
Salary of supervisor of engine production	85,000
Rental cost of equipment used to make engines	23,000
Allocated portion of corporate-level facility-sustaining costs	80,000
Total cost to make 15,000 engines	$980,000

*The equipment has a book value of $90,000 but its market value is zero.

Required

a. Determine the maximum price per unit that Lunn would be willing to pay for the engines.

b. Would the price computed in Requirement *a* change if production increased to 18,750 units? Support your answer with appropriate computations.

LO 4

Exercise 6-11A *Outsourcing decision with qualitative factors*

Nadir Corporation which makes and sells 79,400 radios annually, currently purchases the radio speakers it uses for $12 each. Each radio uses one speaker. The company has idle capacity and is considering the possibility of making the speakers that it needs. Nadir estimates that the cost of materials and labor needed to make speakers would be a total of $10 for each speaker. In addition, the costs of supervisory salaries, rent, and other manufacturing costs would be $168,000. Allocated facility-level costs would be $99,600.

Required

a. Determine the change in net income Nadir would experience if it decides to make the speakers.

b. Discuss the qualitative factors that Nadir should consider.

LO 2, 4

Exercise 6-12A *Outsourcing decision affected by opportunity costs*

Pace Electronics currently produces the shipping containers it uses to deliver the electronics products it sells. The monthly cost of producing 9,000 containers follows.

Unit-level materials	$ 6,000
Unit-level labor	6,600
Unit-level overhead	4,200
Product-level costs*	10,800
Allocated facility-level costs	26,400

*One-third of these costs can be avoided by purchasing the containers.

Ace Container Company has offered to sell comparable containers to Pace for $2.70 each.

Required

a. Should Pace continue to make the containers? Support your answer with appropriate computations.

b. Pace could lease the space it currently uses in the manufacturing process. If leasing would produce $10,800 per month, would your answer to Requirement *a* be different? Explain.

LO 6

Exercise 6-13A *Opportunity cost*

Lynch Freight Company owns a truck that cost $30,000. Currently, the truck's book value is $18,000, and its expected remaining useful life is four years. Lynch has the opportunity to purchase for $26,000 a replacement truck that is extremely fuel efficient. Fuel cost for the old truck is expected to be $5,000 per year more than fuel cost for the new truck. The old truck is paid for but, in spite of being in good condition, can be sold for only $12,000.

Required

Should Lynch replace the old truck with the new fuel-efficient model, or should it continue to use the old truck until it wears out? Explain.

Exercise 6-14A *Opportunity costs* LO 1

Steve Denmark owns his own taxi, for which he bought an $18,000 permit to operate two years ago. Mr. Denmark earns $36,000 a year operating as an independent but has the opportunity to sell the taxi and permit for $73,000 and take a position as dispatcher for Sartino Taxi Co. The dispatcher position pays $31,000 a year for a 40-hour week. Driving his own taxi, Mr. Denmark works approximately 55 hours per week. If he sells his business, he will invest the $73,000 and can earn a 10 percent return.

Required

a. Determine the opportunity cost of owning and operating the independent business.

b. Based solely on financial considerations, should Mr. Denmark sell the taxi and accept the position as dispatcher?

c. Discuss the qualitative as well as quantitative factors that Mr. Denmark should consider.

Exercise 6-15A *Segment elimination decision* LO 5

Chamberline Company operates three segments. Income statements for the segments imply that profitability could be improved if Segment A were eliminated.

CHAMBERLINE COMPANY
Income Statements for the Year 2011

Segment	A	B	C
Sales	$162,000	$235,000	$245,000
Cost of goods sold	(121,000)	(92,000)	(95,000)
Sales commissions	(15,000)	(22,000)	(22,000)
Contribution margin	26,000	121,000	128,000
General fixed oper. exp. (allocation of president's salary)	(44,000)	(52,000)	(44,000)
Advertising expense (specific to individual divisions)	(3,000)	(10,000)	0
Net income	$ (21,000)	$ 59,000	$ 84,000

Required

a. Explain the effect on profitability if Segment A is eliminated.

b. Prepare comparative income statements for the company as a whole under two alternatives: (1) the retention of Segment A and (2) the elimination of Segment A.

Exercise 6-16A *Segment elimination decision* LO 5

Baich Transport Company divides its operations into four divisions. A recent income statement for Koslov Division follows.

BAICH TRANSPORT COMPANY
Koslov Division
Income Statement for the Year 2012

Revenue	$ 500,000
Salaries for drivers	(350,000)
Fuel expenses	(50,000)
Insurance	(70,000)
Division-level facility-sustaining costs	(40,000)
Companywide facility-sustaining costs	(130,000)
Net loss	$ (140,000)

Required

a. Should Koslov Division be eliminated? Support your answer by explaining how the division's elimination would affect the net income of the company as a whole. By how much would companywide income increase or decrease?

b. Assume that Koslov Division is able to increase its revenue to $540,000 by raising its prices. Would this change the decision you made in Requirement *a*? Determine the amount of the increase or decrease that would occur in companywide net income if the segment were eliminated if revenue were $540,000.

c. What is the minimum amount of revenue required to justify continuing the operation of Koslov Division?

LO 5

Exercise 6-17A *Identifying avoidable cost of a segment*

Safar Corporation is considering the elimination of one of its segments. The segment incurs the following fixed costs. If the segment is eliminated, the building it uses will be sold.

Advertising expense	$ 80,000
Supervisory salaries	160,000
Allocation of companywide facility-level costs	49,000
Original cost of building	110,000
Book value of building	50,000
Market value of building	80,000
Maintenance costs on equipment	70,000
Real estate taxes on building	6,000

Required

Based on this information, determine the amount of avoidable cost associated with the segment.

LO 6

Exercise 6-18A *Asset replacement decision*

A machine purchased three years ago for $300,000 has a current book value using straight-line depreciation of $175,000; its operating expenses are $30,000 per year. A replacement machine would cost $240,000, have a useful life of nine years, and would require $13,000 per year in operating expenses. It has an expected salvage value of $57,000 after nine years. The current disposal value of the old machine is $70,000; if it is kept 9 more years, its residual value would be $10,000.

Required

Based on this information, should the old machine be replaced? Support your answer.

LO 6

Exercise 6-19A *Asset replacement decision*

Rainger Company is considering replacement of some of its manufacturing equipment. Information regarding the existing equipment and the potential replacement equipment follows.

Existing Equipment		Replacement Equipment	
Cost	$120,000	Cost	$105,000
Operating expenses*	120,000	Operating expenses*	95,000
Salvage value	30,000	Salvage value	20,000
Market value	60,000	Useful life	8 years
Book value	33,000		
Remaining useful life	8 years		

*The amounts shown for operating expenses are the cumulative total of all such expected expenses to be incurred over the useful life of the equipment.

Required

Based on this information, recommend whether to replace the equipment. Support your recommendation with appropriate computations.

LO 6

Exercise 6-20A *Asset replacement decision*

Hardin Company paid $90,000 to purchase a machine on January 1, 2009. During 2011, a technological breakthrough resulted in the development of a new machine that costs $120,000. The old machine costs $45,000 per year to operate, but the new machine could be operated for only

$15,000 per year. The new machine, which will be available for delivery on January 1, 2012, has an expected useful life of four years. The old machine is more durable and is expected to have a remaining useful life of four years. The current market value of the old machine is $30,000. The expected salvage value of both machines is zero.

Required

Based on this information, recommend whether to replace the machine. Support your recommendation with appropriate computations.

Exercise 6-21A *Annual versus cumulative data for replacement decision* LO 6, 7

Because of rapidly advancing technology, Andersen Publications Corporation is considering replacing its existing typesetting machine with leased equipment. The old machine, purchased two years ago, has an expected useful life of six years and is in good condition. Apparently, it will continue to perform as expected for the remaining four years of its expected useful life. A four-year lease for equipment with comparable productivity can be obtained for $14,000 per year. The following data apply to the old machine:

Original cost	$160,000
Accumulated depreciation	55,000
Current market value	74,000
Estimated salvage value	10,000

Required

a. Determine the annual opportunity cost of using the old machine. Based on your computations, recommend whether to replace it.

b. Determine the total cost of the lease over the four-year contract. Based on your computations, recommend whether to replace the old machine.

Appendix

Exercise 6-22A *Scarce resource decision* LO 8

Joyful Novelties has the capacity to produce either 30,000 corncob pipes or 14,000 cornhusk dolls per year. The pipes cost $4 each to produce and sell for $7 each. The dolls sell for $11 each and cost $5 to produce.

Required

Assuming that Joyful Novelties can sell all it produces of either product, should it produce the corncob pipes or the cornhusk dolls? Show computations to support your answer.

PROBLEMS—SERIES A

All applicable Problems in Series A are available with McGraw-Hill's *Connect Accounting*.

Problem 6-23A *Context-sensitive relevance* LO 1

Required

Respond to each requirement independently.

a. Describe two decision-making contexts, one in which unit-level materials costs are avoidable, and the other in which they are unavoidable.

b. Describe two decision-making contexts, one in which batch-level setup costs are avoidable, and the other in which they are unavoidable.

c. Describe two decision-making contexts, one in which advertising costs are avoidable, and the other in which they are unavoidable.

d. Describe two decision-making contexts, one in which rent paid for a building is avoidable, and the other in which it is unavoidable.

e. Describe two decision-making contexts, one in which depreciation on manufacturing equipment is avoidable, and the other in which it is unavoidable.

LO 1

CHECK FIGURES

a. Contribution to profit for Job A: $264,250

b. Contribution to profit: $(3,220)

Problem 6-24A *Context-sensitive relevance*

Chapman Construction Company is a building contractor specializing in small commercial buildings. The company has the opportunity to accept one of two jobs; it cannot accept both because they must be performed at the same time and Chapman does not have the necessary labor force for both jobs. Indeed, it will be necessary to hire a new supervisor if either job is accepted. Furthermore, additional insurance will be required if either job is accepted. The revenue and costs associated with each job follow.

Cost Category	Job A	Job B
Contract price	$800,000	$700,000
Unit-level materials	243,700	223,450
Unit-level labor	249,150	305,000
Unit-level overhead	18,000	12,600
Supervisor's salary	116,670	116,670
Rental equipment costs	24,900	27,300
Depreciation on tools (zero market value)	19,900	19,900
Allocated portion of companywide facility-sustaining costs	10,400	8,600
Insurance cost for job	18,200	18,200

Required

a. Assume that Chapman has decided to accept one of the two jobs. Identify the information relevant to selecting one job versus the other. Recommend which job to accept and support your answer with appropriate computations.

b. Assume that Job A is no longer available. Chapman's choice is to accept or reject Job B alone. Identify the information relevant to this decision. Recommend whether to accept or reject Job B. Support your answer with appropriate computations.

LO 2, 3

CHECK FIGURE

a. Relevant cost per unit: $57

Problem 6-25A *Effect of order quantity on special order decision*

Ellis Quilting Company makes blankets that it markets through a variety of department stores. It makes the blankets in batches of 1,000 units. Ellis made 20,000 blankets during the prior accounting period. The cost of producing the blankets is summarized here.

Materials cost ($25 per unit × 20,000)	$ 500,000
Labor cost ($22 per unit × 20,000)	440,000
Manufacturing supplies ($2 × 20,000)	40,000
Batch-level costs (20 batches at $4,000 per batch)	80,000
Product-level costs	160,000
Facility-level costs	290,000
Total costs	$1,510,000

Cost per unit = $1,510,000 ÷ 20,000 = $75.50

Required

a. Kent Motels has offered to buy a batch of 500 blankets for $56 each. Ellis normal selling price is $90 per unit. Based on the preceding quantitative data, should Ellis accept the special order? Support your answer with appropriate computations.

b. Would your answer to Requirement *a* change if Kent offered to buy a batch of 1,000 blankets for $56 per unit? Support your answer with appropriate computations.

c. Describe the qualitative factors that Ellis Quilting Company should consider before accepting a special order to sell blankets to Kent Motels.

Problem 6-26A *Effects of the level of production on an outsourcing decision*

LO 2, 4

Seymour Chemical Company makes a variety of cosmetic products, one of which is a skin cream designed to reduce the signs of aging. Seymour produces a relatively small amount (15,000 units) of the cream and is considering the purchase of the product from an outside supplier for $4.50 each. If Seymour purchases from the outside supplier, it would continue to sell and distribute the cream under its own brand name. Seymour's accountant constructed the following profitability analysis.

Revenue (15,000 units × $10)	$150,000
Unit-level materials costs (15,000 units × $1.40)	(21,000)
Unit-level labor costs (15,000 units × $0.50)	(7,500)
Unit-level overhead costs (15,000 × $0.10)	(1,500)
Unit-level selling expenses (15,000 × $0.20)	(3,000)
Contribution margin	117,000
Skin cream production supervisor's salary	(44,000)
Allocated portion of facility-level costs	(11,300)
Product-level advertising cost	(34,000)
Contribution to companywide income	$ 27,700

CHECK FIGURE

a. Total relevant cost: $74,000

Required

a. Identify the cost items relevant to the make-or-outsource decision.

b. Should Seymour continue to make the product or buy it from the supplier? Support your answer by determining the change in net income if Seymour buys the cream instead of making it.

c. Suppose that Seymour is able to increase sales by 10,000 units (sales will increase to 25,000 units). At this level of production, should Seymour make or buy the cream? Support your answer by explaining how the increase in production affects the cost per unit.

d. Discuss the qualitative factors that Seymour should consider before deciding to outsource the skin cream. How can Seymour minimize the risk of establishing a relationship with an unreliable supplier?

Problem 6-27A *Outsourcing decision affected by equipment replacement*

LO 2, 4, 6

Jenkins Bike Company (JBC) makes the frames used to build its bicycles. During 2011, JBC made 20,000 frames; the costs incurred follow.

Unit-level materials costs (20,000 units × $45)	$ 900,000
Unit-level labor costs (20,000 units × $51)	1,020,000
Unit-level overhead costs (20,000 × $9)	180,000
Depreciation on manufacturing equipment	90,000
Bike frame production supervisor's salary	70,000
Inventory holding costs	290,000
Allocated portion of facility-level costs	500,000
Total costs	$3,050,000

CHECK FIGURES

a. Avoidable cost per unit: $123.60

b. Avoidable cost per unit with new equipment: $30.90

JBC has an opportunity to purchase frames for $110 each.

Additional Information

1. The manufacturing equipment, which originally cost $550,000, has a book value of $450,000, a remaining useful life of four years, and a zero salvage value. If the equipment is not used to produce bicycle frames, it can be leased for $70,000 per year.

2. JBC has the opportunity to purchase for $910,000 new manufacturing equipment that will have an expected useful life of four years and a salvage value of $70,000. This equipment will increase productivity substantially, reducing unit-level labor costs by 60 percent. Assume that JBC will continue to produce and sell 20,000 frames per year in the future.

3. If JBC outsources the frames, the company can eliminate 80 percent of the inventory holding costs.

Required

a. Determine the avoidable cost per unit of making the bike frames, assuming that JBC is considering the alternatives of making the product using the existing equipment or outsourcing the product to the independent contractor. Based on the quantitative data, should JBC outsource the bike frames? Support your answer with appropriate computations.

b. Assuming that JBC is considering whether to replace the old equipment with the new equipment, determine the avoidable cost per unit to produce the bike frames using the new equipment and the avoidable cost per unit to produce the bike frames using the old equipment. Calculate the impact on profitability if the bike frames were made using the old equipment versus the new equipment.

c. Assuming that JBC is considering whether to either purchase the new equipment or outsource the bike frame, calculate the impact on profitability between the two alternatives.

d. Discuss the qualitative factors that JBC should consider before making a decision to outsource the bike frame. How can JBC minimize the risk of establishing a relationship with an unreliable supplier?

LO 5

eXcel

Problem 6-28A *Eliminating a segment*

CHECK FIGURE
a. Contribution to profit: $14,225

Brandt Boot Co. sells men's, women's, and children's boots. For each type of boot sold, it operates a separate department that has its own manager. The manager of the men's department has a sales staff of nine employees, the manager of the women's department has six employees, and the manager of the children's department has three employees. All departments are housed in a single store. In recent years, the children's department has operated at a net loss and is expected to continue to do so. Last year's income statements follow.

	Men's Department	Women's Department	Children's Department
Sales	$ 600,000	$ 420,000	$160,000
Cost of goods sold	(265,500)	(176,400)	(96,875)
Gross margin	334,500	243,600	63,125
Department manager's salary	(52,000)	(41,000)	(21,000)
Sales commissions	(106,200)	(75,600)	(27,900)
Rent on store lease	(21,000)	(21,000)	(21,000)
Store utilities	(4,000)	(4,000)	(4,000)
Net income (loss)	$ 151,300	$ 102,000	$ (10,775)

Required

a. Determine whether to eliminate the children's department.

b. Confirm the conclusion you reached in Requirement *a* by preparing income statements for the company as a whole with and without the children's department.

c. Eliminating the children's department would increase space available to display men's and women's boots. Suppose management estimates that a wider selection of adult boots would increase the store's net earnings by $32,000. Would this information affect the decision that you made in Requirement *a*? Explain your answer.

LO 5

Problem 6-29A *Effect of activity level and opportunity cost on segment elimination decision*

CHECK FIGURE
a. Contribution to profit: $(32,500)

Levert Manufacturing Co. produces and sells specialized equipment used in the petroleum industry. The company is organized into three separate operating branches: Division A, which manufactures and sells heavy equipment; Division B, which manufactures and sells hand tools; and Division C, which makes and sells electric motors. Each division is housed in a separate manufacturing facility. Company headquarters is located in a separate building. In recent years, Division B has been operating at a net loss and is expected to continue to do so. Income statements for the three divisions for 2010 follow.

	Division A	Division B	Division C
Sales	$ 3,000,000	$ 900,000	$ 3,800,000
Less: Cost of goods sold			
Unit-level manufacturing costs	(1,800,000)	(600,000)	(2,280,000)
Rent on manufacturing facility	(410,000)	(225,000)	(300,000)
Gross margin	790,000	75,000	1,220,000
Less: Operating expenses			
Unit-level selling and admin. expenses	(187,500)	(42,500)	(237,500)
Division-level fixed selling and admin. expenses	(250,000)	(65,000)	(310,000)
Headquarters facility-level costs	(150,000)	(150,000)	(150,000)
Net income (loss)	$ 202,500	$(182,500)	$ 522,500

Required

a. Based on the preceding information, recommend whether to eliminate Division B. Support your answer by preparing companywide income statements before and after eliminating Division B.

b. During 2010, Division B produced and sold 20,000 units of hand tools. Would your recommendation in response to Requirement *a* change if sales and production increase to 30,000 units in 2011? Support your answer by comparing differential revenue and avoidable cost for Division B, assuming that it sells 30,000 units.

c. Suppose that Levert could sublease Division B's manufacturing facility for $475,000. Would you operate the division at a production and sales volume of 30,000 units, or would you close it? Support your answer with appropriate computations.

Problem 6-30A *Comprehensive problem including special order, outsourcing, and segment elimination decisions*

LO 3, 4, 5

eXcel

CHECK FIGURE
a. CM: $3,750

Huffman Corporation makes and sells state-of-the-art electronics products. One of its segments produces The Math Machine, an inexpensive calculator. The company's chief accountant recently prepared the following income statement showing annual revenues and expenses associated with the segment's operating activities. The relevant range for the production and sale of the calculators is between 30,000 and 60,000 units per year.

Revenue (40,000 units × $8)	$320,000
Unit-level variable costs	
Materials cost (40,000 × $2)	(80,000)
Labor cost (40,000 × $1)	(40,000)
Manufacturing overhead (40,000 × $0.50)	(20,000)
Shipping and handling (40,000 × $0.25)	(10,000)
Sales commissions (40,000 × $1)	(40,000)
Contribution margin	130,000
Fixed expenses	
Advertising costs	(20,000)
Salary of production supervisor	(60,000)
Allocated companywide facility-level expenses	(80,000)
Net loss	$ (30,000)

Required (Consider each of the requirements independently.)

a. A large discount store has approached the owner of Huffman about buying 5,000 calculators. It would replace The Math Machine's label with its own logo to avoid affecting Huffman's existing customers. Because the offer was made directly to the owner, no sales commissions on the transaction would be involved, but the discount store is willing to pay only $4.50 per calculator. Based on quantitative factors alone, should Huffman accept the special order? Support your answer with appropriate computations. Specifically, by what amount would the special order increase or decrease profitability?

b. Huffman has an opportunity to buy the 40,000 calculators it currently makes from a reliable competing manufacturer for $4.90 each. The product meets Huffman's quality standards. Huffman could continue to use its own logo, advertising program, and sales force to distribute the products. Should Huffman buy the calculators or continue to make them? Support your answer with appropriate computations. Specifically, how much more or less would it cost to buy the calculators than to make them? Would your answer change if the volume of sales were increased to 60,000 units?

c. Because the calculator division is currently operating at a loss, should it be eliminated from the company's operations? Support your answer with appropriate computations. Specifically, by what amount would the segment's elimination increase or decrease profitability?

Appendix

LO 8

Problem 6-31A *Allocating scarce resources*

CHECK FIGURES

a. Contribution margin per hour: $1 for A and $0.15 for B

The following information applies to the products of Kaito Company.

	Product A	Product B
Selling price per unit	$13	$12
Variable cost per unit	11	9

Required

Identify the product that should be produced or sold under each of the following constraints. Consider each constraint separately.

a. One unit of Product A requires 2 hours of labor to produce, and one unit of Product B requires 4 hours of labor to produce. Due to labor constraints, demand is higher than the company's capacity to make both products.

b. The products are sold to the public in retail stores. The company has limited floor space and cannot stock as many products as it would like. Display space is available for only one of the two products. Expected sales of Product A are 10,000 units and of Product B are 8,000 units.

c. The maximum number of machine hours available is 40,000. Product A uses 2 machine hours, and Product B uses 5 machine hours. The company can sell all the products it produces.

LO 7

eXcel

Problem 6-32A *Conflict between short-term and long-term performance*

CHECK FIGURE

a. Relevant costs: $560,000 for keeping the old machine

Julio Sanchez manages the cutting department of Guzman Timber Company. He purchased a tree-cutting machine on January 1, 2011, for $400,000. The machine had an estimated useful life of five years and zero salvage value, and the cost to operate it is $90,000 per year. Technological developments resulted in the development of a more advanced machine available for purchase on January 1, 2012, that would allow a 25 percent reduction in operating costs. The new machine would cost $240,000 and have a four-year useful life and zero salvage value. The current market value of the old machine on January 1, 2012, is $200,000, and its book value is $320,000 on that date. Straight-line depreciation is used for both machines. The company expects to generate $224,000 of revenue per year from the use of either machine.

Required

a. Recommend whether to replace the old machine on January 1, 2012. Support your answer with appropriate computations.

b. Prepare income statements for four years (2012 through 2015) assuming that the old machine is retained.

c. Prepare income statements for four years (2012 through 2015) assuming that the old machine is replaced.

d. Discuss the potential ethical conflicts that could result from the timing of the loss and expense recognition reported in the two income statements.

EXERCISES—SERIES B

Exercise 6-1B *Distinction between relevance and cost behavior* LO 1

Joe Awad is planning to rent a small shop for a new business. He can sell either sandwiches or donuts. The following costs pertain to the two products.

Sandwiches		Donuts	
Cost per sandwich	$ 2.00	Cost per dozen donuts	$ 1.75
Sales commissions per sandwich	0.05	Sales commissions per dozen donuts	0.07
Monthly shop rental cost	1,000.00	Monthly shop rental cost	1,000.00
Monthly advertising cost	500.00	Monthly advertising cost	300.00

Required

Identify each cost as relevant or irrelevant to Mr. Awad's product decision and indicate whether the cost is fixed or variable relative to the number of units sold.

Exercise 6-2B *Distinction between relevance and cost behavior* LO 1

Gromyko Company makes and sells a toy plane. Gromyko incurred the following costs in its most recent fiscal year:

Cost Items Reported on Income Statement

Sales commissions (1% of sales)
Sales manager's salary
Shipping and handling costs ($0.75 per unit)
Cost of renting the administrative building
Utility costs for the manufacturing plant ($0.25 per unit produced)
Manufacturing plant manager's salary
Materials costs ($4 per unit produced)
Real estate taxes on the manufacturing plant
Depreciation on manufacturing equipment
Packaging cost ($1 per unit produced)
Wages of the plant security guard
Costs of TV commercials
Labor costs ($3 per unit)

Gromyko could purchase the toy planes from a supplier. If it did, the company would continue to sell them using its own logo, advertising program, and sales staff.

Required

Identify each cost as relevant or irrelevant to the outsourcing decision and indicate whether the cost is fixed or variable relative to the number of toy planes manufactured and sold.

Exercise 6-3B *Distinction between avoidable costs and cost behavior* LO 1

Preston Phones, Inc., makes telephones that it sells to department stores throughout the United States. Preston is trying to decide which of two telephone models to manufacture. The company could produce either telephone with its existing machinery. Cost data pertaining to the two choices follow:

	Model 90	Model 30
Materials cost per unit	$ 57	$ 57
Labor cost per unit	46	27
Product design cost	12,000	$7,000
Depreciation on existing manufacturing machinery	3,000	3,000

Required

a. Identify the fixed costs and determine the amount of fixed cost for each model.
b. Identify the variable costs and determine the amount of variable cost for each model.
c. Identify the avoidable costs.

LO 2

Exercise 6-4B *Cost hierarchy*

Costs can be classified into one of four categories including unit-level, batch-level, product-level, or facility-level costs.

Required

Classify each of the items listed below into one of the four categories listed above. The first item has been categorized as an example.

Cost Description	Cost Classification
Wages of factory janitors	Facility-level cost
Machine setup cost for different production jobs	
Direct materials	
Salary of the manager in charge of making a product	
Tires used to assemble a car	
Payroll cost for assembly-line workers	
Electricity bill of the factory	
Product design	

LO 2, 3

Exercise 6-5B *Special order decision*

Ragan Textile Company manufactures high-quality bed sheets and sells them in sets to a well-known retail company for $54 a set. Ragan has sufficient capacity to produce 150,000 sets of sheets annually; the retail company currently purchases 90,000 sets each year. Ragan's unit-level cost is $30 per set and its fixed cost is $810,000 per year. A motel chain has offered to purchase 15,000 sheet sets from Ragan for $40 per set. If Ragan accepts the order, the contract will prohibit the motel chain from reselling the bed sheets.

Required

Should Ragan accept or reject the special order? Support your answer with appropriate computations.

LO 2, 3

Exercise 6-6B *Special order decision*

Mansour Automotive Company manufactures an engine designed for motorcycles and markets the product using its own brand name. Although Mansour has the capacity to produce 40,000 engines annually, it currently produces and sells only 30,000 units per year. The engine normally sells for $500 per unit, with no quantity discounts. The unit-level costs to produce the engine are $200 for direct materials, $150 for direct labor, and $30 for indirect manufacturing costs. Mansour expects total annual product- and facility-level costs to be $540,000 and $750,000, respectively. Assume Mansour receives a special order from a new customer seeking to buy 1,000 engines for $370 each.

Required

Should Mansour accept or reject the special order? Support your answer with appropriate computations.

LO 3

Exercise 6-7B *Identifying qualitative factors for a special order decision*

Required

Describe the qualitative factors that Mansour should consider before making the decision described in Exercise 6-6B.

LO 3

Exercise 6-8B *Using the contribution margin approach for a special order decision*

Winchester Company produces and sells a food processor that it prices at a 25 percent markup on total cost. Based on data pertaining to producing and selling 50,000 food processors, Winchester computes the sales price per food processor as follows:

Unit-level costs	$ 900,000
Fixed costs	640,000
Total cost (a)	$1,540,000
Markup (a × .25)	385,000
Total sales revenue (b)	$1,925,000
Sales price per unit (b ÷ 50,000)	$38.50

Required

a. Winchester receives a special order for 7,000 food processors for $20 each. Winchester has excess capacity. Calculate the contribution margin per unit for the special order. Based on the contribution margin per unit, should Winchester accept the special order?

b. Support your answer by preparing a contribution margin income statement for the special order.

Exercise 6-9B *Making an outsourcing decision* LO 4

Upton Boats Company currently produces a battery used in manufacturing its boats. The company annually manufactures and sells 5,000 units of a particular model of fishing boat. Because of the low volume of activity, Upton is unable to obtain the economies of scale that larger producers achieve. For example, the costs associated with producing the batteries it uses are almost 30 percent more than the cost of purchasing comparable batteries. Upton could buy batteries for $86 each; it costs $110 each to make them. A detailed breakdown of current production costs for the batteries follows:

Item	Unit Cost	Total
Unit-level costs:		
Materials	$ 40	$200,000
Labor	25	125,000
Overhead	5	25,000
Allocated facility-level costs	40	200,000
Total	$110	$550,000

Based on these figures, Upton's president asserted that it would be foolish for the company to continue to produce the batteries at $100 each when it can buy them for $86 each.

Required

Do you agree with the president's conclusion? Support your answer with appropriate computations.

Exercise 6-10B *Establishing a price for an outsourcing decision* LO 4

Romero Corporation makes and sells skateboards. Romero currently makes the 60,000 wheels used annually in its skateboards but has an opportunity to purchase the wheels from a reliable manufacturer. The costs of making the wheels follow.

Annual Costs Associated with Manufacturing Skateboard Wheels

Materials (60,000 units × $5)	$300,000
Labor (60,000 units × $3)	180,000
Depreciation on manufacturing equipment*	24,000
Salary of wheel production supervisor	65,000
Rental cost of equipment used to make wheels	55,000
Allocated portion of corporate-level facility-sustaining costs	33,000
Total cost to make 60,000 wheels	$657,000

*The equipment has a book value of $74,000 but its market value is zero.

Required

a. Determine the maximum price per unit that Romero would be willing to pay for the wheels.

b. Would the price computed in Requirement *a* change if production were increased to 80,000 units? Support your answer with appropriate computations.

LO 4

Exercise 6-11B *Making an outsourcing decision with qualitative factors considered*

Keating Computers currently purchases for $16 each keyboard it uses in the 50,000 computers it makes and sells annually. Each computer uses one keyboard. The company has idle capacity and is considering whether to make the keyboards that it needs. Keating estimates that materials and labor costs for making keyboards would be $10 each. In addition, supervisory salaries, rent, and other manufacturing costs would be $400,000. Allocated facility-level costs would amount to $70,000.

Required

a. Determine the change in net income that Keating would experience if it decides to make the keyboards.

b. Discuss the qualitative factors that Keating should consider.

LO 2, 4

Exercise 6-12B *Outsourcing decision affected by opportunity costs*

Oakey Doors Company currently produces the doorknobs for the doors it makes and sells. The monthly cost of producing 5,000 doorknobs is as follows:

Unit-level materials	$4,000
Unit-level labor	7,500
Unit-level overhead	1,000
Product-level costs*	8,000
Allocated facility-level costs	5,000

*Twenty percent of these costs can be avoided if the doorknobs are purchased.

Venice Company has offered to sell comparable doorknobs to Oakey for $3.80 each.

Required

a. Should Oakey continue to make the doorknobs? Support you answer with appropriate computations.

b. For $6,000 per month, Oakey could lease the manufacturing space to another company. Would this potential cash inflow affect your response to Requirement *a*? Explain.

LO 6

Exercise 6-13B *Asset replacement decision*

Porter Fishing Tours, Inc., owns a boat that originally cost $120,000. Currently, the boat's net book value is $36,000, and its expected remaining useful life is four years. Porter has an opportunity to purchase for $80,000 a replacement boat that is extremely fuel efficient. Fuel costs for the old boat are expected to be $15,000 per year more than fuel costs would be for the replacement boat. Porter could sell the old boat, which is fully paid for and in good condition, for only $32,000.

Required

Should Porter replace the old boat with the new fuel-efficient model, or should it continue to use the old one until it wears out? Explain.

LO 1

Exercise 6-14B *Opportunity costs*

Two years ago, Victor Baldwin bought a truck for $22,000 to offer delivery services. Victor earns $32,000 a year operating as an independent trucker. He has an opportunity to sell his truck for $15,000 and take a position as an instructor in a truck driving school. The instructor position pays $25,000 a year for working 40 hours per week. Driving his truck, Victor works approximately 60 hours per week. If Victor sells his truck, he will invest the proceeds of the sale in bonds that pay a 12 percent return.

Required

a. Determine the opportunity cost of owning and operating the independent delivery business.

b. Based solely on financial considerations, should Victor sell his truck and accept the instructor position?

c. Discuss the qualitative as well as quantitative characteristics that Victor should consider.

Exercise 6-15B *Segment elimination decision* LO 5

Evan Company operates three segments. Income statements for the segments imply that Evan could improve profitability if Segment X is eliminated.

THE EVAN COMPANY
Income Statement
For the Year 2011

Segment	X	Y	Z
Sales	$ 87,000	$210,000	$200,000
Cost of goods sold	(67,000)	(82,000)	(85,000)
Sales commissions	(14,000)	(22,000)	(20,000)
Contribution margin	6,000	106,000	95,000
General fixed oper. exp. (allocation of president's salary)	(20,000)	(20,000)	(20,000)
Advertising expense (specific to individual segments)	(3,000)	(18,000)	0
Net income	$(17,000)	$ 68,000	$ 75,000

Required

a. Explain the effect on Evan's profitability if Segment X is eliminated.

b. Prepare comparative income statements for the company as a whole under the two alternatives: (1) Segment X is retained or (2) Segment X is eliminated.

Exercise 6-16B *Segment elimination decision* LO 5

Jevon Company divides its operations into six divisions. A recent income statement for the Heath Division follows:

Income Statement	
Revenue	$ 700,000
Salaries for employees	(325,000)
Operating expenses	(250,000)
Insurance	(45,000)
Division-level facility-sustaining costs	(90,000)
Companywide facility-sustaining costs	(74,000)
Net loss	$ (84,000)

Required

a. Should Jevon eliminate the Heath Division? Support your answer by explaining how the division's elimination would affect the net income of the company as a whole. By how much would companywide income increase or decrease?

b. Assume that the Heath Division could increase its revenue to $760,000 by raising prices. Would this change the decision you made in response to Requirement *a*? Assuming Jevon's revenue becomes $760,000, determine the amount of the increase or decrease that would occur in companywide net income if the segment were eliminated.

c. What is the minimum amount of revenue the Heath Division must generate to justify its continued operation?

Exercise 6-17B *Identifying avoidable cost of a segment* LO 5

Norton Corporation is considering the elimination of one of its segments. The following fixed costs pertain to the segment. If the segment is eliminated, the building it uses will be sold.

Annual advertising expense	$240,000
Market value of the building	36,000
Annual depreciation on the building	18,000
Annual maintenance costs on equipment	26,000
Annual real estate taxes on the building	8,000
Annual supervisory salaries	72,000
Annual allocation of companywide facility-level costs	30,000
Original cost of the building	75,000
Current book value of the building	54,000

Required

Based on this information, determine the amount of avoidable cost associated with the segment.

LO 6

Exercise 6-18B *Asset replacement decision*

Quigley Electronics purchased a manufacturing plant four years ago for $7,000,000. The plant costs $1,800,000 per year to operate. Its current book value using straight-line depreciation is $5,000,000. Quigley could purchase a replacement plant for $14,000,000 that would have a useful life of 10 years. Because of new technology, the replacement plant would require only $500,000 per year in operating expenses. It would have an expected salvage value of $3,000,000 after 10 years. The current disposal value of the old plant is $1,200,000, and if Quigley keeps it 10 more years, its residual value would be $300,000.

Required

Based on this information, should Quigley replace the old plant? Support your answer with appropriate computations.

LO 6

Exercise 6-19B *Asset replacement decision*

Fenwick Company is considering whether to replace some of its manufacturing equipment. Information pertaining to the existing equipment and the potential replacement equipment follows:

Existing Equipment		Replacement Equipment	
Cost	$45,000	Cost	$42,000
Operating expenses*	48,000	Operating expenses*	8,000
Salvage value	8,000	Salvage value	10,000
Market value	16,000	Useful life	10 years
Book value	21,000		
Remaining useful life	10 years		

*The amounts shown for operating expenses are the cumulative total of all such expenses expected to be incurred over the useful life of the equipment.

Required

Based on this information, recommend whether to replace the equipment. Support your recommendation with appropriate computations.

LO 6

Exercise 6-20B *Asset replacement decision*

Gilchrist Company, a Texas-based corporation, paid $57,000 to purchase an air conditioner on January 1, 2000. During 2010, surging energy costs prompted management to consider replacing the air conditioner with a more energy-efficient model. The new air conditioner would cost $80,000. Electricity for the existing air conditioner costs the company $30,000 per year; the new model would cost only $20,000 per year. The new model, which has an expected useful life of 10 years, would be installed on January 1, 2011. Because the old air conditioner is more durable, Gilchrist estimates it still has a remaining useful life of 10 years even though it has been used. The current market value of the old air conditioner is $27,000. The expected salvage value of both air conditioners is zero.

Required

Based on this information, recommend whether to replace the equipment. Support your recommendation with appropriate computations.

Exercise 6-21B *Annual versus cumulative data for replacement decision* LO 6, 7

Because their three adult children have all at last left home, Paul and Cindy Bender recently moved to a smaller house. Paul owns a riding lawnmower he bought three years ago to take care of the former house's huge yard; it should last another five years. With the new house's smaller yard, Paul thinks he could hire someone to cut his grass for $400 per year. He wonders if this option is financially sound. Relevant information follows.

Riding Lawn Mower	Amount
Original cost	$2,400
Accumulated depreciation	900
Current market value	1,300
Estimated salvage value	0

Required

a. What is the annual opportunity cost of using the riding mower? Based on your computations, recommend whether Paul should sell it and hire a lawn service.

b. Determine the total cost of hiring a lawn service for the next five years. Based on your computations, recommend whether Paul should sell the mower and hire a lawn service.

Appendix

Exercise 6-22B *Scarce resource decision* LO 8

Quantum Technologies has the capacity to annually produce either 50,000 desktop computers or 28,000 laptop computers. Relevant data for each product follow:

	Desktop	Laptop
Sales price	$1,000	$1,800
Variable costs	400	650

Required

Assuming that Quantum can sell all it produces of either product, should the company produce the desktop computers or the laptop computers? Provide computations to support your answer.

PROBLEMS—SERIES B

Problem 6-23B *Context-sensitive relevance* LO 1

Required

Respond to each requirement independently.

a. Describe two decision-making contexts, one in which unit-level labor costs are avoidable, and the other in which they are unavoidable.

b. Describe two decision-making contexts, one in which batch-level shipping costs are avoidable, and the other in which they are unavoidable.

c. Describe two decision-making contexts, one in which administrative costs are avoidable, and the other in which they are unavoidable.

d. Describe two decision-making contexts, one in which the insurance premium paid on a building is avoidable, and the other in which it is unavoidable.

e. Describe two decision-making contexts, one in which amortization of a product patent is avoidable, and the other in which it is unavoidable.

LO 1

Problem 6-24B *Context-sensitive relevance*

Inman Machines Company is evaluating two customer orders from which it can accept only one because of capacity limitations. The data associated with each order follow.

Cost Category	Order A	Order B
Contract price	$900,000	$770,000
Unit-level materials	350,000	286,000
Unit-level labor	324,000	264,800
Unit-level overhead	106,000	98,000
Supervisor's salary	80,000	80,000
Rental equipment costs	20,000	24,000
Depreciation on tools (zero market value)	28,000	28,000
Allocated portion of companywide facility-sustaining costs	8,000	7,200
Insurance coverage	54,000	54,000

Required

a. Assume that Inman has decided to accept one of the two orders. Identify the information relevant to selecting one order versus the other. Recommend which job to accept, and support your answer with appropriate computations.

b. The customer presenting Order A has withdrawn it because of its financial hardship. Under this circumstance, Inman's choice is to accept or reject Order B alone. Identify the information relevant to this decision. Recommend whether to accept or reject Order B. Support your answer with appropriate computations.

LO 2, 3

Problem 6-25B *Effect of order quantity on special order decision*

Lang Company made 100,000 electric drills in batches of 1,000 units each during the prior accounting period. Normally, Lang markets its products through a variety of hardware stores. The following is the summarized cost to produce electric drills.

Materials cost ($8.00 per unit × 100,000)	$ 800,000
Labor cost ($4.00 per unit × 100,000)	400,000
Manufacturing supplies ($0.50 × 100,000)	50,000
Batch-level costs (100 batches at $2,000 per batch)	200,000
Product-level costs	150,000
Facility-level costs	180,000
Total costs	$1,780,000
Cost per unit = $1,780,000 ÷ 100,000 = $17.80	

Required

a. Bypassing Lang's regular distribution channel, Chekhol's Home Maintenance Company, has offered to buy a batch of 500 electric drills for $15.50 each directly from Lang. Lang's normal selling price is $23 per unit. Based on the preceding quantitative data, should Lang accept the special order? Support your answer with appropriate computations.

b. Would your answer to Requirement *a* change if Chekhol's offered to buy a batch of 1,000 electric drills for $14.90 each? Support your answer with appropriate computations.

c. Describe the qualitative factors that Lang should consider before accepting a special order to sell electric drills to Chekhol's.

LO 2, 4

Problem 6-26B *Effects of the level of production on an outsourcing decision*

One of Yamamoto Company's major products is a fuel additive designed to improve fuel efficiency and keep engines clean. Yamamoto, a petrochemical firm, makes and sells 200,000 units of the fuel additive per year. Its management is evaluating the possibility of having an outside supplier manufacture the product for Yamamoto for $2 each. Yamamoto would continue to sell and distribute the fuel additive under its own brand name for either alternative. Yamamoto's accountant constructed the following profitability analysis:

Revenue (100,000 units × $3.50)	$350,000
Unit-level materials costs (100,000 units × $0.80)	(80,000)
Unit-level labor costs (100,000 units × $0.12)	(12,000)
Unit-level overhead costs (100,000 × $0.38)	(38,000)
Unit-level selling expenses (100,000 × $0.20)	(20,000)
Contribution margin	200,000
Fuel additive production supervisor's salary	(80,000)
Allocated portion of facility-level costs	(25,000)
Product-level advertising cost	(40,000)
Contribution to companywide income	$ 55,000

Required

a. Identify the cost items relevant to the make-or-outsource decision.

b. Should Yamamoto continue to make the fuel additive or buy it from the supplier? Support your answer by determining the change in net income if Yamamoto buys the fuel additive instead of making it.

c. Suppose that Yamamoto is able to increase sales by 60,000 units (sales will increase to 160,000 units). At this level of sales, should Yamamoto make or buy the fuel additive? Support your answer by explaining how the increase in production affects the cost per unit.

d. Discuss the qualitative factors that Yamamoto should consider before deciding to outsource the fuel additive. How can Yamamoto minimize the risk of establishing a relationship with an unreliable supplier?

Problem 6-27B *Outsourcing decision affected by equipment replacement* LO 2, 5, 6

During 2011, Vance Toy Company made 10,000 units of Model K, the costs of which follow.

Unit-level materials costs (10,000 units × $10)	$100,000
Unit-level labor costs (10,000 units × $40)	400,000
Unit-level overhead costs (10,000 × $4)	40,000
Depreciation on manufacturing equipment	60,000
Model K production supervisor's salary	60,000
Inventory holding costs	120,000
Allocated portion of facility-level costs	80,000
Total costs	$860,000

An independent contractor has offered to make the same product for Vance for $50 each.

Additional Information:

1. The manufacturing equipment originally cost $420,000 and has a book value of $240,000, a remaining useful life of four years, and a zero salvage value. If the equipment is not used to produce Model K in the production process, it can be leased for $40,000 per year.
2. Vance has the opportunity to purchase for $240,000 new manufacturing equipment that will have an expected useful life of four years and a salvage value of $80,000. This equipment will increase productivity substantially, thereby reducing unit-level labor costs by 20 percent.
3. If Vance discontinues the production of Model K, the company can eliminate 50 percent of its inventory holding cost.

Required

a. Determine the avoidable cost per unit to produce Model K assuming that Vance is considering the alternatives between making the product using the existing equipment and outsourcing the product to the independent contractor. Based on the quantitative data, should Vance outsource Model K? Support your answer with appropriate computations.

b. Assuming that Vance is considering whether to replace the old equipment with the new equipment, determine the avoidable cost per unit to produce Model K using the new equipment and the avoidable cost per unit to produce Model K using the old equipment. Calculate

the impact on profitability if Model K were made using the old equipment versus the new equipment.

c. Assuming that Vance is considering either to purchase the new equipment or to outsource Model K, calculate the impact on profitability between the two alternatives.

d. Discuss the qualitative factors that Vance should consider before making a decision to outsource Model K. How can Vance minimize the risk of establishing a relationship with an unreliable supplier?

LO 5

Problem 6-28B *Eliminating a segment*

Dexier's Grocery Store has three departments, meat, canned food, and produce, each of which has its own manager. All departments are housed in a single store. Recently, the produce department has been suffering a net loss and is expected to continue doing so. Last year's income statements follow.

	Meat Department	Canned Food Department	Produce Department
Sales	$650,000	$590,000	$425,000
Cost of goods sold	(270,000)	(330,000)	(245,000)
Gross margin	380,000	260,000	180,000
Departmental manager's salary	(42,000)	(30,000)	(35,000)
Rent on store lease	(80,000)	(80,000)	(80,000)
Store utilities	(20,000)	(20,000)	(20,000)
Other general expenses	(98,000)	(98,000)	(98,000)
Net income (loss)	$140,000	$ 32,000	$ (53,000)

Required

a. Determine whether to eliminate the produce department.

b. Confirm the conclusion you reached in Requirement *a* by preparing a before and an after income statement, assuming that the produce department is eliminated.

c. Eliminating the produce department would allow the meat department to expand. It could add seafood to its products. Suppose that management estimates that offering seafood would increase the store's net earnings by $160,000. Would this information affect the decision that you made in Requirement *a*? Explain your answer.

LO 2, 5

Problem 6-29B *Effect of activity level and opportunity cost on segment elimination decision*

Aquilar Company has three separate operating branches: Division X, which manufactures utensils; Division Y, which makes plates; and Division Z, which makes cooking pots. Each division operates its own facility. The company's administrative offices are located in a separate building. In recent years, Division Z has experienced a net loss and is expected to continue to do so. Income statements for 2011 follow.

	Division X	Division Y	Division Z
Sales	$1,800,000	$1,400,000	$1,500,000
Less: Cost of goods sold			
Unit-level manufacturing costs	(1,100,000)	(580,000)	(400,000)
Rent on manufacturing facility	(240,000)	(220,000)	(360,000)
Gross margin	460,000	600,000	240,000
Less: Operating expenses			
Unit-level selling and admin. expenses	(60,000)	(45,000)	(90,000)
Division-level fixed selling and admin. expenses	(140,000)	(125,000)	(180,000)
Administrative facility-level costs	(80,000)	(80,000)	(80,000)
Net income (loss)	$ 180,000	$ 350,000	$ (110,000)

Required

a. Based on the preceding information, recommend whether to eliminate Division Z. Support your answer by preparing companywide income statements before and after eliminating Division Z.

b. During 2011, Division Z produced and sold 30,000 units of product. Would your recommendation in Requirement *a* change if sales and production increase to 45,000 units in 2012? Support your answer by comparing differential revenue and avoidable cost for Division Z, assuming that 45,000 units are sold.

c. Suppose that Aquilar could sublease Division Z's manufacturing facility for $740,000. Would you operate the division at a production and sales volume of 45,000 units, or would you close it? Support your answer with appropriate computations.

Problem 6-30B *Comprehensive problem including special order, outsourcing, and segment elimination decisions* LO 2, 3, 4, 5

Emerson Company's electronics division produces an MP3 player. The vice president in charge of the division is evaluating the income statement showing annual revenues and expenses associated with the division's operating activities. The relevant range for the production and sale of the radio/cassette player is between 50,000 and 150,000 units per year.

Income Statement	
Revenue (60,000 units × $30)	$1,800,000
Unit-level variable costs	
Materials cost (60,000 × $15)	(900,000)
Labor cost (60,000 × $8)	(480,000)
Manufacturing overhead (60,000 × $1.50)	(90,000)
Shipping and handling (60,000 × $0.50)	(30,000)
Sales commissions (60,000 × $2)	(120,000)
Contribution margin	180,000
Fixed expenses	
Advertising costs related to the division	(30,000)
Salary of production supervisor	(126,000)
Allocated companywide facility-level expenses	(120,000)
Net loss	$ (96,000)

Required (Consider each of the requirements independently.)

a. An international trading firm has approached top management about buying 30,000 MP3 players for $26.50 each. It would sell the product in a foreign country, so that Emerson's existing customers would not be affected. Because the offer was made directly to top management, no sales commissions on the transaction would be involved. Based on quantitative features alone, should Emerson accept the special order? Support your answer with appropriate computations. Specifically, by what amount would profitability increase or decrease if the special order is accepted?

b. Emerson has an opportunity to buy the 60,000 MP3 players it currently makes from a foreign manufacturer for $26 each. The manufacturer has a good reputation for reliability and quality, and Emerson could continue to use its own logo, advertising program, and sales force to distribute the products. Should Emerson buy the MP3 players or continue to make them? Support your answer with appropriate computations. Specifically, how much more or less would it cost to buy the MP3 players than to make them? Would your answer change if the volume of sales were increased to 140,000 units?

c. Because the electronics division is currently operating at a loss, should it be eliminated from the company's operations? Support your answer with appropriate computations. Specifically, by what amount would the segment's elimination increase or decrease profitability?

Appendix

LO 8

Problem 6-31B *Allocating scarce resources*

Minter Company makes two products, M and N. Product information follows.

	Product M	Product N
Selling price per unit	$69	$84
Variable cost per unit	45	54

Required

Identify the product that should be produced or sold under each of the following constraints. Consider each constraint separately.

a. One unit of Product M requires 3 hours of labor to produce, and one unit of Product N requires 5 hours of labor to produce. Due to labor constraints, demand is higher than the company's capacity to make both products.

b. The products are sold to the public in retail stores. The company has limited floor space and cannot stock as many products as it would like. Display space is available for only one of the two products. Expected sales of Product M are 8,000 units, and expected sales of Product N are 7,000 units.

c. The maximum number of machine hours available is 24,000. Product M uses 4 machine hours, and Product N uses 6 machine hours. The company can sell all the products it produces.

LO 7

Problem 6-32B *Conflict between short-term and long-term performance*

Traywick Construction Components, Inc., purchased a machine on January 1, 2009, for $240,000. The chief engineer estimated the machine's useful life to be six years and its salvage value to be zero. The operating cost of this machine is $120,000 per year. By January 1, 2011, a new machine that requires 30 percent less operating cost than the existing machine has become available for $180,000; it would have a four-year useful life with zero salvage. The current market value of the old machine on January 1, 2011, is $100,000, and its book value is $160,000 on that date. Straight-line depreciation is used for both machines. The company expects to generate $320,000 of revenue per year from the use of either machine.

Required

a. Recommend whether to replace the old machine on January 1, 2011. Support your answer with appropriate computations.

b. Prepare income statements for four years (2011 through 2014) assuming that the old machine is retained.

c. Prepare income statements for four years (2011 through 2014) assuming that the old machine is replaced.

d. Discuss the potential ethical conflicts that could result from the timing of the loss and expense recognition reported in the two income statements.

ANALYZE, THINK, COMMUNICATE

ACT 6-1 Business Application Case *Analyzing inventory reductions at Supervalu*


On January 12, 2010, Supervalu, Inc., announced it was planning to reduce the number of different items it carries in its inventory by as much as 25 percent. Supervalu is one of the largest grocery store companies in the United States. It operates more than 2,400 stores under 14 different brand names, including Albertsons, Farm Fresh, Jewel-Osco, and Save-A-Lot. The company also has a segment that provides third-party supply-chain services.

The planned reduction in inventory items was going to be accomplished more by reducing the number of different package sizes than by reducing entire product brands. The new approach

was also intended to allow the company to get better prices from its vendors and to put more emphasis on its own store brands.

Required

a. Identify some costs savings Supervalu might realize by reducing the number of items it carries in inventory by 25 percent. Be as specific as possible and use your imagination.

b. Consider the additional information presented below, which is hypothetical. All dollar amounts are in thousands; unit amounts are not. Assume that Supervalu decides to eliminate one product line, Sugar-Bits, for one of its segments that currently produces three products. As a result, the following are expected to occur:

(1) The number of units sold for the segment is expected to drop by only 40,000 because of the elimination of Sugar-Bits, since most customers are expected to purchase a Fiber-Treats or Carbo-Crunch product instead. The shift of sales from Sugar-Bits to Fiber-Treats and Carbo-Crunch is expected to be evenly split. In other words, the sales of Fiber-Treats and Carbo-Crunch will each increase by 100,000 units.

(2) Rent is paid for the entire production facility, and the space used by Sugar-Bits cannot be sublet.

(3) Utilities costs are expected to be reduced by $24,000.

(4) The supervisors for Sugar-Bits were all terminated. No new supervisor will be hired for Fiber-Treats or Carbo-Crunch.

(5) The equipment being used to produce Sugar-Bits is also used to produce the other two products. The company believes that as a result of eliminating Sugar-Bits it can eliminate equipment that has a remaining useful life of five years, and a projected salvage value of $20,000. Its current market value is $35,000.

(6) Facility-level costs will continue to be allocated between the product lines based on the number of units produced.

Product-line Earnings Statements
(Dollar amounts are in thousands)

Annual Costs of Operating Each Product Line	Fiber-Treats	Carbo-Crunch	Sugar-Bits	Total
Sales in units	480,000	480,000	240,000	1,200,000
Sales in dollars	$ 480,000	$ 480,000	$ 240,000	$1,200,000
Unit-level costs:				
Cost of production	48,000	48,000	26,400	122,400
Sales commissions	6,000	6,000	2,400	14,400
Shipping and handling	10,800	9,600	4,800	25,200
Miscellaneous	3,600	2,400	2,400	8,400
Total unit-level costs	68,400	66,000	36,000	170,400
Product-level costs:				
Supervisors salaries	4,800	3,600	1,200	9,600
Facility-level costs:				
Rent	48,000	48,000	24,000	120,000
Utilities	60,000	60,000	30,000	150,000
Depreciation on equipment	192,000	192,000	96,000	480,000
Allocated company-wide expenses	12,000	12,000	6,000	30,000
Total facility-level costs	312,000	312,000	156,000	780,000
Total product cost	385,200	381,600	193,200	960,000
Profit on products	$ 94,800	$ 98,400	$ 46,800	$ 240,000

Prepare revised product-line earnings statements based on the elimination of Sugar-Bits. It will be necessary to calculate some per-unit data to accomplish this.

ACT 6-2 Group Assignment *Relevance and cost behavior*

Maccoa Soft, a division of Zayer Software Company, produces and distributes an automated payroll software system. A contribution margin format income statement for Maccoa Soft for the past year follows.

Revenue (12,000 units × $1,200)	$14,400,000
Unit-level variable costs	
Product materials cost (12,000 × $60)	(720,000)
Installation labor cost (12,000 × $200)	(2,400,000)
Manufacturing overhead (12,000 × $2)	(24,000)
Shipping and handling (12,000 × $25)	(300,000)
Sales commissions (12,000 × $300)	(3,600,000)
Nonmanufacturing miscellaneous costs (12,000 × $5)	(60,000)
Contribution margin (12,000 × $608)	7,296,000
Fixed costs	
Research and development	(2,700,000)
Legal fees to ensure product protection	(780,000)
Advertising costs	(1,200,000)
Rental cost of manufacturing facility	(600,000)
Depreciation on production equipment (zero market value)	(300,000)
Other manufacturing costs (salaries, utilities, etc.)	(744,000)
Division-level facility sustaining costs	(1,730,000)
Allocated companywide facility-level costs	(1,650,000)
Net loss	$ (2,408,000)

a. Divide the class into groups and then organize the groups into three sections. Assign Task 1 to the first section, Task 2 to the second section, and Task 3 to the third section. Each task should be considered independently of the others.

Group Tasks

(1) Assume that Maccoa has excess capacity. The sales staff has identified a large franchise company with 200 outlets that is interested in Maccoa's software system but is willing to pay only $800 for each system. Ignoring qualitative considerations, should Maccoa accept the special order?

(2) Maccoa has the opportunity to purchase a comparable payroll system from a competing vendor for $600 per system. Ignoring qualitative considerations, should Maccoa outsource producing the software? Maccoa would continue to sell and install the software if the manufacturing activities were outsourced.

(3) Given that Maccoa is generating a loss, should Zayer eliminate it? Would your answer change if Maccoa could increase sales by 1,000 units?

b. Have a representative from each section explain its respective conclusions. Discuss the following:

(1) Representatives from Section 1 should respond to the following: The analysis related to the special order (Task 1) suggests that all variable costs are always relevant. Is this conclusion valid? Explain your answer.

(2) Representatives from Section 2 should respond to the following: With respect to the outsourcing decision, identify a relevant fixed cost and a nonrelevant fixed cost. Discuss the criteria for determining whether a cost is or is not relevant.

(3) Representatives from Section 3 should respond to the following: Why did the segment elimination decision change when the volume of production and sales increased?

ATC 6-3 Research Assignment *Using real world data from Pfizer*


On September 20, 2008, *The Wall Street Journal* (WSJ) reported that Pfizer was going to discontinue efforts to develop drugs related to the treatment of heart disease, obesity, and bone health. Pfizer wanted to focus its resources on areas it thought would be more profitable (p. B-1). On January 17, 2009, the WSJ reported that Pfizer planned to lay off as many as 2,400 salespersons, which would be one-third of its sales force. As a part of its efforts to reduce costs, Pfizer had

reduced its workforce by 35,000 employees from January 2007 to January 2009 (p. B-5). On July 7, 2009, the WSJ reported that Pfizer, along with other pharmaceutical companies, was increasing its efforts to sell patented durgs (versus generic drugs) to customers in poorer nations. To accomplish this they were offering these customers lower prices. For example, Pfizer sells drugs in Venezuela for 30 percent less than it sells the same drugs in the United States (p. A-1).

Required

a. By stopping the development of drugs related to the treatment of heart disease, obesity, and bone health Pfizer hoped to reduce the amount spend on research and development. Relative to the level of sales, should R&D costs be considered:
- Fixed costs or variable costs
- Marginal costs or not

b. Were the R&D costs that Pfizer had spent in past years to develop drugs related to heart disease relevant to its decision to discontinue their future development? If they were not relevant costs, what kind of cost were they?

c. Explain how Pfizer can afford to sell drugs in Venezuela for 30 percent lower prices than it sells them for in the United States.

d. Obtain Pfizer's annual report for 2008. Pfizer's annual reports can be found at its website: www.pfizer.com. Calculate its operating costs as a percentage of revenue for 2006, 2007, and 2008. (The easiest way to do this is to calculate its "income from continuing operations" as a percentage of revenue, and subtract that amount from 1.0.) Does it appear that Pfizer is accomplishing its goal of reducing its cost? Show supporting computations.

ATC 6-4 Writing Assignment *Relevant versus full cost*

State law permits the State Department of Revenue to collect taxes for municipal governments that operate within the state's jurisdiction and allows private companies to collect taxes for municipalities. To promote fairness and to ensure the financial well-being of the state, the law dictates that the Department of Revenue must charge municipalities a fee for collection services that is above the cost of providing such services but does not define the term *cost*. Until recently, Department of Revenue officials have included a proportionate share of all departmental costs such as depreciation on buildings and equipment, supervisory salaries, and other facility-level overhead costs when determining the cost of providing collection services, a measurement approach known as *full costing*. The full costing approach has led to a pricing structure that places the Department of Revenue at a competitive disadvantage relative to private collection companies. Indeed, highly efficient private companies have been able to consistently underbid the Revenue Department for municipal customers. As a result, it has lost 30 percent of its municipal collection business over the last two years. The inability to be price competitive led the revenue commissioner to hire a consulting firm to evaluate the current practice of determining the cost to provide collection services.

The consulting firm concluded that the cost to provide collection services should be limited to the relevant costs associated with providing those services, defined as the difference between the costs that would be incurred if the services were provided and the costs that would be incurred if the services were not provided. According to this definition, the costs of depreciation, supervisory salaries, and other facility-level overhead costs are not included because they are the same regardless of whether the Department of Revenue provides collection services to municipalities. The Revenue Department adopted the relevant cost approach and immediately reduced the price it charges municipalities to collect their taxes and rapidly recovered the collection business it had lost. Indeed, several of the private collection companies were forced into bankruptcy. The private companies joined together and filed suit against the Revenue Department, charging that the new definition of cost violates the intent of the law.

Required

a. Assume that you are an accountant hired as a consultant for the private companies. Write a brief memo explaining why it is inappropriate to limit the definition of the costs of providing collection services to relevant costs.

b. Assume that you are an accountant hired as a consultant for the Department of Revenue. Write a brief memo explaining why it is appropriate to limit the definition of the costs of providing collection services to relevant costs.

c. Speculate on how the matter will be resolved.

ATC 6-5 Ethical Dilemma *Asset replacement clouded by self-interest*

John Dillworth is in charge of buying property used as building sites for branch offices of the National Bank of Commerce. Mr. Dillworth recently paid $110,000 for a site located in a growing section of the city. Shortly after purchasing this lot, Mr. Dillworth had the opportunity to purchase a more desirable lot at a significantly lower price. The traffic count at the new site is virtually twice that of the old site, but the price of the lot is only $80,000. It was immediately apparent that he had overpaid for the previous purchase. The current market value of the purchased property is only $75,000. Mr. Dillworth believes that it would be in the bank's best interest to buy the new lot, but he does not want to report a loss to his boss, Kelly Fullerton. He knows that Ms. Fullerton will severely reprimand him, even though she has made her share of mistakes. In fact, he is aware of a significant bad loan that Ms. Fullerton recently approved. When confronted with the bad debt by the senior vice president in charge of commercial lending, Ms. Fullerton blamed the decision on one of her former subordinates, Ira Sacks. Ms. Fullerton implied that Mr. Sacks had been dismissed for reckless lending decisions when, in fact, he had been an excellent loan officer with an uncanny ability to assess the creditworthiness of his customers. Indeed, Mr. Sacks had voluntarily resigned to accept a better position.

Required

a. Determine the amount of the loss that would be recognized on the sale of the existing branch site.

b. Identify the type of cost represented by the $110,000 original purchase price of the land. Also identify the type of cost represented by its current market value of $75,000. Indicate which cost is relevant to a decision as to whether the original site should be replaced with the new site.

c. Is Mr. Dillworth's conclusion that the old site should be replaced supported by quantitative analysis? If not, what facts do justify his conclusion?

d. Assuming that Mr. Dillworth is a certified management accountant (CMA), do you believe the failure to replace the land violates any of the standards of ethical conduct in Exhibit 1.15 in Chapter 1? If so, which standards would be violated?

e. Discuss the ethical dilemma that Mr. Dillworth faces within the context of the fraud triangle that was discussed in Chapter 1.

f. Would Mr. Dillworth be subject to criminal penalties under the Sarbanes-Oxley Act? Explain your answer.

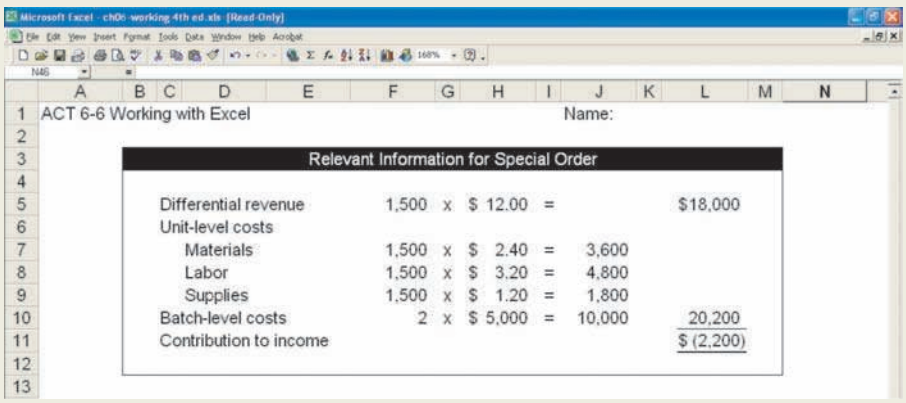
ATC 6-6 Spreadsheet Assignment *Using Excel*

Dorina Company makes cases of canned dog food in batches of 1,000 cases and sells each case for $15. The plant capacity is 50,000 cases; the company currently makes 40,000 cases. DoggieMart has offered to buy 1,500 cases for $12 per case. Because product-level and facility-level costs are unaffected by a special order, they are omitted.

Required

a. Prepare a spreadsheet like the following one to calculate the contribution to income if the special order is accepted. Construct formulas so that the number of cases or the price could be changed and the new contribution would be automatically calculated.

b. Try different order sizes (such as 2,000) or different prices to see the effect on contribution to profit.



	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1	ACT 6-6 Working with Excel									Name:				
2														
3					Relevant Information for Special Order									
4														
5				Differential revenue		1,500	x	$ 12.00	=			$18,000		
6				Unit-level costs										
7				Materials		1,500	x	$ 2.40	=	3,600				
8				Labor		1,500	x	$ 3.20	=	4,800				
9				Supplies		1,500	x	$ 1.20	=	1,800				
10				Batch-level costs		2	x	$ 5,000	=	10,000		20,200		
11				Contribution to income								$ (2,200)		
12														
13														

Spreadsheet Tips

1. The numbers in cells F7 to F9 should be formulas that refer to F5. This allows the number of cases to be changed in cell F5 with the other cells changing automatically.
2. The formula in cell F10 uses a function named ROUNDUP to calculate the even number of batches. The formula should be = ROUNDUP(F5/1000,0) where the zero refers to rounding up to the nearest whole number.

ATC 6-7 Spreadsheet Assignment *Mastering Excel*

Refer to Problem 6-31A.

Required

a. Prepare a spreadsheet to solve Requirements *a*, *b*, and *c* in Problem 6-31A.

b. While constructing formulas for Requirement *a* of Problem 6-31A, include a formula to calculate contribution margin per labor hour.

c. While constructing formulas for Requirement *b* of Problem 6-31A, include formulas to calculate total contribution margin for each product.

d. While constructing formulas for Requirement *c* of Problem 6-31A, include formulas to calculate contribution margin per machine hour and total contribution margin for each product.

COMPREHENSIVE PROBLEM

Use the same transaction data for Magnificent Modems, Inc., as was used in Chapter 1. (See page 52.)

Required

a. One of Magnificent Modems' sales representatives receives a special offer to sell 1,000 modems at a price of $72 each. Should the offer be accepted?

b. Magnificent Modems has the opportunity to purchase the modems that it currently makes. The modems can be purchased at a price of $76 each. Assuming the manufacturing equipment has a zero market value, should Magnificent buy the modems?

c. Assume that Magnificent Modems expects production and sales to grow to 10,000. At this volume of production, should Magnificent buy the modems?