CHAPTER 9

Plant and Intangible Assets

After studying this chapter, you should be able to:

Learning Objectives

LO9-1 Determine the cost of plant assets.

LO9-2 Distinguish between capital expenditures and revenue expenditures.

LO9-3 Compute depreciation by the straight-line and declining-balance methods.

LO9-4 Account for depreciation using methods other than straight-line or declining-balance.

LO9-5 Account for the disposal of plant assets.

LO9-6 Explain the nature of intangible assets, including goodwill.

LO9-7 Account for the depletion of natural resources.

LO9-8 Explain the cash effects of transactions involving plant assets.

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UNITED PARCEL SERVICE

What kind of plant and intangible assets would you expect United Parcel Service (UPS) to have? Probably the first thing you would think of is vehicles, primarily trucks, because you see UPS trucks on the streets and highways virtually every day. In addition, UPS has a very large investment in aircraft. In fact, property, plant, and equipment make up over 50 percent of UPS's total assets ($18,281 of $35,471 million), according to the company's recent consolidated balance sheet. Of the $18,281 million, aircraft, vehicles, and plant equipment are the largest types of asset.

How do the amount of plant assets and percentage of plant assets to total assets for **UPS** compare with other companies? These amounts vary considerably from company to company as evidenced by the following examples.

Ford Motor Company—$30,126 million or 14 percent of total assets Kimberly-Clark—$7,359 million or 47 percent of total assets Carnival Corporation—$32,773 million or 83 percent of total assets.

Plant assets are important for companies such as United Parcel Service, Ford Motor Company, Kimberly-Clark, and Carnival Corporation to be successful in their daily operations. The types and amount of plant assets used by a particular company depend on the nature of the company and its operations. Virtually all companies need some types of plant assets to operate efficiently and be successful. In addition, some companies require certain intangible assets to do business. Intangibles are rights and privileges that have been developed or acquired, such as trade names and patents; these may be just as important to a business as its equipment, buildings, and land. ■

In earlier chapters, we introduced the idea of plant assets and depreciation and stressed the importance of such assets to the successful functioning of any business. In this chapter, we explore in greater depth the accounting issues surrounding plant assets and discuss intangible assets. Together, plant and intangible assets make up significant elements of corporate balance sheets because they represent major investments of resources. The future of many business enterprises depends on their investment in plant and intangible assets.

PLANT ASSETS AS A "STREAM OF FUTURE SERVICES"

Plant assets represent a bundle of future services and, thus, can be thought of as long-term prepaid expenses. Ownership of a delivery truck, for example, may provide 100,000 miles of transportation. The cost of the truck is entered in an asset account, which represents the *advance purchase* of these transportation services. Similarly, a building represents the advance purchase of many years of housing services. As the years go by, these services are utilized by the business, and the cost of the plant asset gradually is transferred to depreciation expense to reflect the cost of using the asset to generate revenue.

MAJOR CATEGORIES OF PLANT ASSETS

Plant and equipment items may be classified into the following groups:

1. **Tangible plant assets.** The term *tangible* refers to an asset's physical characteristics, as exemplified by land, a building, or a machine. This category may be further separated into two distinct classifications:
   a. *Property subject to depreciation.* Included are plant assets of limited useful life such as buildings and office equipment.
   b. *Land.* Generally, the only plant asset not subject to depreciation is land, which has an unlimited term of existence and whose usefulness does not decline over time.
2. **Intangible assets.** The term *intangible assets* is used to describe assets that are used in the operation of the business but have no physical qualities and are noncurrent. Examples include patents, copyrights, trademarks, franchises, and goodwill. Current assets such as accounts receivable or prepaid rent are not included in the intangible classification, even though they also have value and are lacking in physical substance.
3. **Natural resources.** A site acquired for the purpose of extracting or removing some valuable resource such as oil, minerals, or timber is classified as a *natural resource,* not as land. This type of plant asset is gradually converted into *inventory* as the natural resource is extracted from the site.

ACCOUNTABLE EVENTS IN THE LIVES OF PLANT ASSETS

For all categories of plant assets, there are three primary accountable events: (1) acquisition, (2) with the exception of land, allocation of the acquisition cost to expense over the asset's useful life (depreciation), and (3) sale or disposal.

Acquisitions of Plant Assets

LO9-1

LEARNING OBJECTIVE
Determine the cost of plant assets.

The cost of a plant asset includes all expenditures that are reasonable and necessary for getting the asset to the desired location and ready for use. In addition to the basic cost of the asset, other incidental costs may be included in the cost assigned to a plant asset. These include, for example, sales taxes on the purchase price, delivery costs, and installation costs.

Only reasonable and necessary costs should be included. Assume, for example, that a machine is dropped and damaged while it is being unloaded. The cost of repairing this damage should be recognized as an expense of the current period, *not* added to the cost of the machine. Although it is necessary to repair the machine, it was not necessary to drop it—and that's what brought about the need for the repairs.

Companies often purchase plant assets on an installment plan or by issuing a note payable. Interest charges after the asset is ready for use are recorded as interest expense, not as part

of the cost of the asset. But if a company constructs a plant asset for its own use, the interest charges during the construction period are considered part of the asset's cost.

DETERMINING COST: AN EXAMPLE

The concept of including in the cost of a plant asset the incidental charges necessary to put the asset in use is illustrated by the following example. A factory in Mississippi orders a machine from a Colorado tool manufacturer at a list price of $10,000. Payment will be made in 48 monthly installments of $250, which include $2,000 in interest charges. Sales taxes of $600 must be paid, as well as freight charges of $1,350. Installation and other set-up costs amount to $500. The cost of this machine to be established in the Machinery account of the purchasing company is computed as follows.

List price*	$10,000
Sales taxes	600
Transportation charges	1,350
Cost of installation and set-up	500
Total	$12,450

A=1-LOE All reasonable and necessary costs are capitalized

*Each control account is supported by a subsidiary ledger providing information about the cost, annual depreciation, and book value of each asset (or group of similar assets).

SOME SPECIAL CONSIDERATIONS

Land When land is purchased, various incidental costs may be incurred in addition to the purchase price. These additional costs may include commissions to real estate brokers, escrow fees, legal fees for examining and insuring the title, delinquent taxes paid by the purchaser, and fees for surveying, draining, clearing, and grading the property. All these expenditures become part of the cost of the land.

Sometimes land purchased as a building site has a building on it that is not suitable for the buyer's use. In this case, the only useful asset being acquired is the land. Therefore, the entire purchase price is charged to the Land account, as well as the costs of tearing down and removing the unusable building.

Land Improvements Improvements to real estate such as driveways, fences, parking lots, landscaping, and sprinkler systems have limited lives separate from the land and are subject to depreciation. For this reason, they should be recorded in a separate account entitled Land Improvements.

Buildings Buildings are sometimes purchased with the intention of remodeling them prior to placing them in use. Costs incurred under these circumstances are charged to the Buildings account. After the building has been placed in use, however, ordinary repairs are considered to be maintenance expense when incurred.

Equipment When equipment is purchased, all of the sales taxes, delivery costs, and costs of getting the equipment in good operating order are treated as part of the cost of the equipment. Once the equipment has been placed in operation, maintenance costs (including interest, insurance, and property taxes) are treated as expenses of the current period.

Allocation of a Lump-Sum Purchase Several different types of plant assets may be purchased at one time. Separate asset accounts are maintained for each type of plant asset, such as land, buildings, and equipment.[1]

When land and buildings (and perhaps other assets) are purchased for a lump sum, the purchase price must be allocated among the types of assets acquired. An appraisal may be

[1] Each control account is supported by a subsidiary ledger providing information about the cost, annual depreciation, and book value of each asset (or group of similar assets).

needed for this purpose. Assume, for example, that Exercise-for-Health, Inc., purchases a complete fitness center from Golden Health Spas. Exercise-for-Health purchases the entire facility at a bargain price of $800,000. The allocation of this cost on the basis of an appraisal is illustrated as follows.

A=L+OE **Total cost is allocated in proportion to appraised values**

	Value per Appraisal	Percentage of Total Appraised Value	Allocation of $800,000 Cost
Land	$ 250,000	25%	$200,000
Land improvements	50,000	5	40,000
Building	300,000	30	240,000
Equipment	400,000	40	320,000
Total	$1,000,000	100%	$800,000

Assuming that Exercise-for-Health purchased this facility for cash, the journal entry to record this acquisition would be as follows.

A=L+OE **The journal entry allocating the total cost**

Land	200,000	
Land Improvements	40,000	
Building	240,000	
Equipment	320,000	
Cash		800,000
To record purchase of fitness center from Golden Health Spas for cash.		

YOUR TURN

You as the New Facility Manager for Exercise-for-Health

Assume you have been hired as manager of the new Golden Health Spas facility that was recently purchased by Exercise-for-Health. One of your responsibilities as manager is to show that the facility is profitable. In fact, your contract specifies a bonus for you if the profits are at least 10 percent above the budgeted amount each year. In a recent conversation with the appraiser, it became clear to you that some of the items classified as land in the appraisal were really building improvements. No one at Exercise-for-Health is aware of this misclassification. As a result, the appraised value for the building asset account should be $350,000 instead of $300,000. When budgeted profits for the Golden Health Spas facility are computed each year, a charge for depreciation on the building is deducted in determining the amount of profit. What impact does the improper appraisal have on your ability to achieve the bonus? What should you do?

(See our comments in Connect.)

LO9-2

LEARNING OBJECTIVE
Distinguish between capital expenditures and revenue expenditures.

CAPITAL EXPENDITURES AND REVENUE EXPENDITURES

Expenditures for the purchase or expansion of plant assets are called **capital expenditures** and are recorded in asset accounts. Accountants often use the word **capitalize** to mean charging an expenditure to an asset account rather than to an expense account. Expenditures for

ordinary repairs, maintenance, fuel, and other items necessary to the ownership and use of plant and equipment are called **revenue expenditures** and are recorded in expense accounts. The charge to an expense account is based on the assumption that the benefits from the expenditure will be used up in the current period, and therefore the cost should be deducted from the revenue of the period in determining the net income. Charging an expenditure directly to an expense account is often called "expensing" the item.

A business may purchase many small items that will benefit several accounting periods but that have a relatively low cost. Examples of such items include auto batteries, hand tools, wastebaskets, and pencil sharpeners. Such items are theoretically capital expenditures, but if they are recorded as assets in the accounting records, it will be necessary to compute and record the related depreciation expense in future periods. We have previously mentioned the idea that the extra work involved in developing more precise accounting information should be weighed against the benefits that result. For reasons of convenience and economy, expenditures that are not material in dollar amount are treated in the accounting records as expenses of the current period.

In brief, any material expenditure that will benefit several accounting periods is considered a *capital expenditure.* Any expenditure that will benefit only the current period or that is not material in amount is treated as a *revenue expenditure.*

Many companies develop formal policies defining capital and revenue expenditures as a guide toward consistent accounting practice from year to year. These policy statements often set a minimum dollar amount (such as $500) for expenditures that are to be capitalized, regardless of the expected useful life of the asset.

Depreciation

We first introduced the concept of depreciation in Chapter 4. Now we expand that discussion to address such topics as residual values and alternative depreciation methods.

ALLOCATING THE COST OF PLANT AND EQUIPMENT OVER THE YEARS OF USE

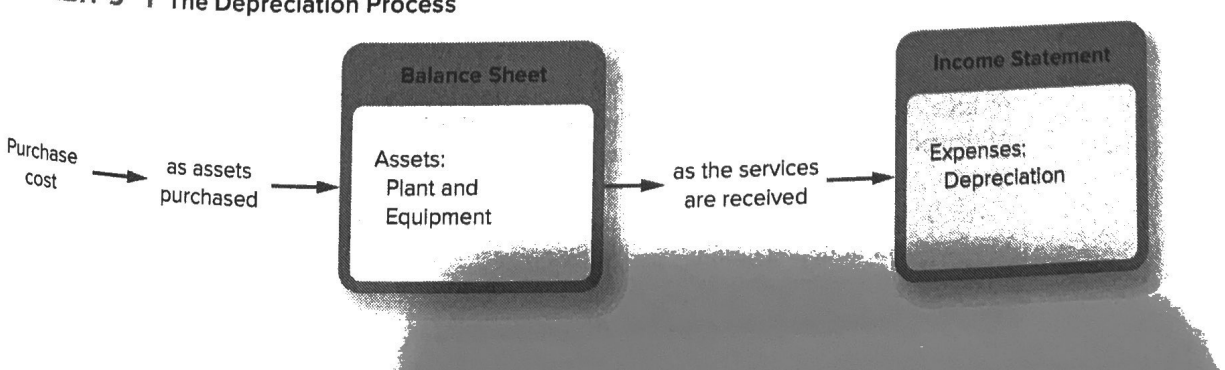
Tangible plant assets, with the exception of land, are of use to a company for only a limited number of years. **Depreciation,** as the term is used in accounting, is the allocation of the cost of a tangible plant asset to expense in the periods in which services are received from the asset. The basic purpose of depreciation is to offset the revenue of an accounting period with the costs of the goods and services being consumed that are required to generate that revenue. (See Exhibit 9–1.)

A=L+LOE **Depreciation: a process of allocating the cost of an asset to expense over the asset's useful life**

Earlier in this chapter, we described a delivery truck as a stream of transportation services to be received over the years that the truck is owned and used. The cost of the truck initially is added to an asset account, because the purchase of these transportation services will benefit several future accounting periods. As these services are received, however, the cost of the truck gradually is removed from the balance sheet and becomes an expense, through the process of depreciation.

The journal entry to record depreciation expense consists of a debit to Depreciation Expense and a credit to Accumulated Depreciation. The credit portion of the entry removes

EXHIBIT 9–1 The Depreciation Process



from the balance sheet that portion of the asset's cost estimated to have been used up during the current period. The debit portion of the entry allocates this expired cost to expense.

Separate Depreciation Expense and Accumulated Depreciation accounts are maintained for different types of depreciable assets, such as factory buildings, delivery equipment, and office equipment. These separate accounts help accountants to measure separately the costs of different business activities, such as manufacturing, sales, and administration.

Depreciation Is Not a Process of Valuation Depreciation is a process of cost allocation, not a process of asset valuation. Accounting records do not attempt to show the current market values of plant assets. The market value of a building, for example, may increase during some accounting periods within the building's useful life. The recognition of depreciation expense continues, however, without regard to such temporary increases in market value. Accountants recognize that the building will render useful services only for a limited number of years and that the full cost of the building should be systematically allocated to expense during these years.

Depreciation differs from most other expenses in that it does not depend on cash payments at or near the time the expense is recorded. For this reason, depreciation often is called a non-cash expense. Bear in mind, however, that large cash payments usually are required at the time depreciable assets are purchased.

Book Value Plant assets are shown in the balance sheet at their book values (or *carrying values*). The **book value** of a plant asset is its cost minus the related accumulated depreciation. Accumulated Depreciation is a contra-asset account, representing that portion of the asset's cost that has already been allocated to expense. Book value represents the portion of the asset's cost that remains to be allocated to expense in future periods.

CAUSES OF DEPRECIATION

The need to systematically spread or allocate plant asset costs over multiple accounting periods arises from two major causes: (1) physical deterioration and (2) obsolescence.

Physical Deterioration Physical deterioration of a plant asset results from use, as well as from exposure to sun, wind, and other climatic factors. When a plant asset has been carefully maintained, it is not uncommon for the owner to claim that the asset is as "good as new." Such statements are not literally true. Although a good repair policy may lengthen the useful life of a machine, every machine eventually reaches the point at which it must be discarded. Making repairs does not eliminate the need for recognition of depreciation.

Obsolescence The term *obsolescence* refers to the process of an asset's becoming out of date as a result of improved, more efficient assets becoming available. An airplane, for example, may become obsolete even though it is in excellent physical condition; it becomes obsolete because better planes of superior design and performance become available.

METHODS OF COMPUTING DEPRECIATION

LO9-3

LEARNING OBJECTIVE
Compute depreciation by the straight-line and declining-balance methods.

In Chapter 4, we computed depreciation only by the **straight-line depreciation** method. Companies actually may use several depreciation methods. Generally accepted accounting principles require only that a depreciation method result in a rational and systematic allocation of cost over the asset's useful life. The straight-line method is the most commonly used depreciation method for financial reporting purposes.

The straight-line method allocates an equal portion of depreciation expense to each period of the asset's expected useful life. Most of the other depreciation methods are various forms of accelerated depreciation. The term **accelerated depreciation** means that larger amounts of depreciation are recognized in the early years of the asset's life, and the amount of depreciation gradually diminishes during the useful life of the asset. Over the entire life of the asset, however, both the straight-line method and accelerated methods recognize the same total amount of depreciation.

The differences between the straight-line method and accelerated methods are illustrated in Exhibit 9–2.

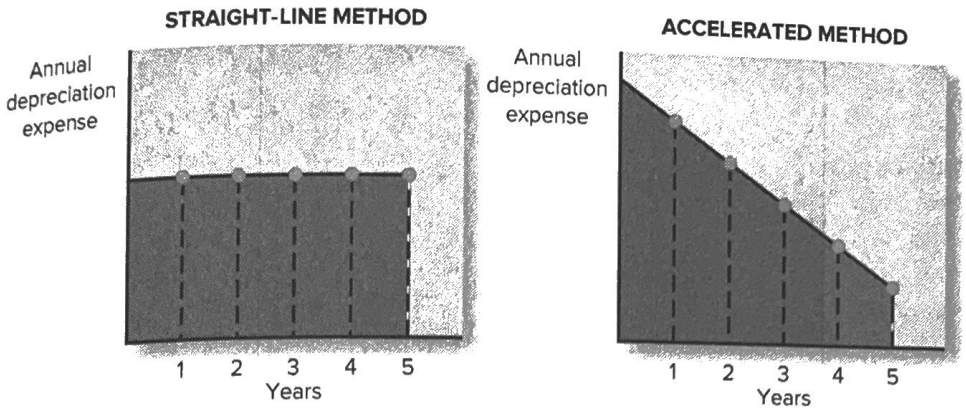
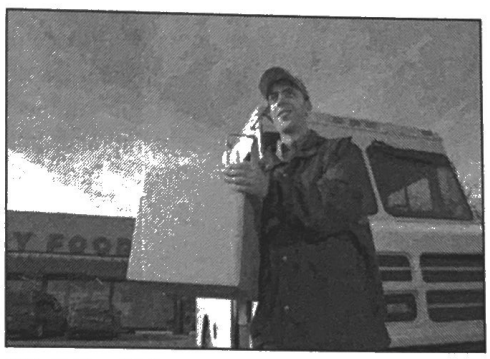


EXHIBIT 9–2
Straight-Line and Accelerated Depreciation Methods

A=L+LOE Both methods recognize the same total depreciation

There are several accelerated methods, each producing slightly different results. Different depreciation methods may be used for different assets. The depreciation methods in use should be disclosed in notes accompanying the financial statements.

In this section, we illustrate and explain straight-line depreciation and one variation of the most widely used accelerated method, which is called *fixed-percentage-of-declining-balance,* or simply the declining-balance method. Other depreciation methods are discussed briefly in the section that follows.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Data for Our Illustrations Our illustrations of depreciation methods are based on the following data: On January 2, S&G Wholesale Grocery acquires a new delivery truck. The data and estimates needed for the computation of the annual depreciation expense are as follows.

Cost	$17,000
Estimated residual value	$ 2,000
Estimated useful life	5 years

THE STRAIGHT-LINE METHOD

Under the straight-line method, an equal portion of the asset's cost is recognized as depreciation expense in each year of the asset's useful life. Annual depreciation expense is computed by deducting the estimated **residual value** (or **salvage value**) from the cost of the asset and dividing the remaining depreciable cost by the years of estimated useful life. Using the data in our example, the annual straight-line depreciation is computed as follows.

$$\frac{\text{Cost} - \text{Residual Value}}{\text{Years of Useful Life}} = \frac{\$17{,}000 - \$2{,}000}{5 \text{ years}} = \$3{,}000 \text{ per year}$$

A=L+LOE Computing depreciation by the straight-line method

In Exhibit 9–3, the schedule summarizes the effects of straight-line depreciation over the entire life of the asset.

(We present several depreciation schedules in this chapter. In each schedule we highlight in red those features that we want to emphasize.)

The term *book value* in Exhibit 9–3 is the amount of the depreciable cost of the asset that has not yet been recognized as depreciation expense at a point in time. For example, book value at the end of the third year after depreciation for that year has been recognized is $8,000, computed as follows.

Cost	$ 17,000
Accumulated depreciation at end of third year ($3,000 × 3 years)	(9,000)
Book value	$ 8,000

EXHIBIT 9–3
Straight-Line Depreciation Schedule

A-1-LO6 Constant annual depreciation expense

Depreciation Schedule: Straight-Line Method

Year	Computation	Depreciation Expense	Accumulated Depreciation	Book Value
				$17,000
First	$15,000 × ⅕	$ 3,000	$ 3,000	14,000
Second	15,000 × ⅕	3,000	6,000	11,000
Third	15,000 × ⅕	3,000	9,000	8,000
Fourth	15,000 × ⅕	3,000	12,000	5,000
Fifth	15,000 × ⅕	3,000	15,000	2,000
Total		$15,000		

The book value (cost less accumulated depreciation) is presented as an asset in the statement of financial position (balance sheet).

Notice that the depreciation expense over the life of the truck totals $15,000—the cost of the truck minus the estimated residual value. The residual value is *not* part of the cost "used up" in business operations. Instead, the residual value is expected to be recovered in cash upon disposal of the asset.

In practice, residual values may be ignored if they are not expected to be material in amount. Office equipment, furniture, fixtures, and special-purpose equipment seldom are considered to have significant residual values. Assets such as vehicles, aircraft, and construction equipment, in contrast, often do have residual values that are material in amount.

Often it is convenient to state the portion of an asset's depreciable cost that will be written off during the year as a percentage, called the *depreciation rate.* When straight-line depreciation is in use, the depreciation rate is simply 1 divided by the life (in years) of the asset. The delivery truck in our example has an estimated life of five years, so the depreciation expense each year is ⅕, or 20 percent, of the depreciable amount. Similarly, an asset with a 10-year life has a depreciation rate of 1/10 or 10 percent; and an asset with an 8-year life, a depreciation rate of ⅛, or 12½ percent.

Depreciation for Fractional Periods When an asset is acquired during an accounting period, it is not necessary to compute depreciation expense to the nearest day or week. In fact, such a computation would give a misleading impression of great precision. Since depreciation is based on an estimated useful life of many years, the depreciation applicable to any one year is only an approximation.

One widely used method of computing depreciation for part of a year is to round the calculation to the nearest whole month. In our example, S&G acquired the delivery truck on January 2. Therefore, we computed a full year's depreciation for the year of acquisition. Assume, however, that the truck had been acquired later in the year on October 1. The truck would have been in use for only three months (or 3/12) of the first year. In this case, depreciation expense for the first year would be only $750, or 3/12 of a full year's depreciation ($3,000 × 3/12 = $750).

Another widely used approach, called the **half-year convention,** is to record one-half year's depreciation on all assets acquired during the year. This approach is based on the assumption that the actual purchase dates of many assets will average out to approximately midyear. The half-year convention is widely used for assets such as office equipment, automobiles, and machinery. To complete the depreciation process for an asset by the half-year convention, a one-half year's depreciation is also taken in the last year of the asset's life.

Assume that S&G Wholesale Grocery uses straight-line depreciation with the half-year convention. In Exhibit 9–4, we summarize depreciation on the $17,000 delivery truck with the five-year life.

When the half-year convention is in use, we ignore the date on which the asset was actually purchased. We simply recognize one-half year's depreciation in both the first year and the last year of the depreciation schedule. Notice that our depreciation schedule now includes depreciation expense in the sixth year. Taking only a partial year's depreciation in the first year always extends the recognition of depreciation into one additional year.

EXHIBIT 9–4
Straight-Line Depreciation Schedule

Depreciation Schedule
Straight-Line Method with Half-Year Convention

Year	Computation	Depreciation Expense	Accumulated Depreciation	Book Value
				$17,000
First	$15,000 × 1/5 × 1/2	$ 1,500	$ 1,500	15,500
Second	15,000 × 1/5	3,000	4,500	12,500
Third	15,000 × 1/5	3,000	7,500	9,500
Fourth	15,000 × 1/5	3,000	10,500	6,500
Fifth	15,000 × 1/5	3,000	13,500	3,500
Sixth	15,000 × 1/5 × 1/2	1,500	15,000	2,000
Total		$15,000		

The half-year convention enables us to treat similar assets acquired at different dates during the year as a single group. For example, assume that an insurance company purchases hundreds of desktop computers throughout the current year at a total cost of $600,000. The company depreciates these computers by the straight-line method, assuming a three-year life and no residual value. Using the half-year convention, the depreciation expense for the first year on all of the computers purchased during the year may be computed as follows: $600,000 ÷ 3 years × 6/12 = $100,000. For each of the next two years, depreciation expense would be $200,000 ($600,000 ÷ 3 years), then $100,000 depreciation would be recognized in the fourth and final year.

THE DECLINING-BALANCE METHOD

The most widely used accelerated depreciation method is called **fixed-percentage-of-declining-balance depreciation**. However, the method is used primarily in income tax returns, rather than financial statements.[2]

Under the declining-balance method, an accelerated depreciation rate is computed as a specified percentage of the straight-line depreciation rate. Annual depreciation expense then is computed by applying this accelerated depreciation rate to the undepreciated cost (book value) of the asset. This computation may be summarized as follows.

$$\text{Depreciation Expense} = \text{Remaining Book Value} \times \text{Accelerated Depreciation Rate}$$

The accelerated depreciation rate remains constant throughout the life of the asset. Hence, the rate represents the "fixed-percentage" described in the name of this depreciation method. The book value (cost minus accumulated depreciation) decreases every year and represents the "declining-balance."

Thus far, we have described the accelerated depreciation rate as a specified percentage of the straight-line rate. Most often, this specified percentage is 200 percent, meaning that the accelerated rate is exactly twice the straight-line rate. As a result, the declining-balance method of depreciation often is called *double-declining-balance* (or 200 percent declining-balance). Tax rules, however, often specify a lower percentage, such as 150 percent of the straight-line rate. This version of the declining-balance method may be described as 150 percent declining-balance.[3]

[2] In 1986, Congress adopted an accelerated method of depreciation called the *Modified Accelerated Cost Recovery System* (or MACRS). Companies may use straight-line depreciation for federal income tax purposes, but most prefer to use MACRS because of its favorable income tax consequences. MACRS is the *only* accelerated depreciation method that may be used in federal income tax returns.

[3] The higher the specified percentage of the straight-line rate, the more accelerated this depreciation becomes. Experience and tradition have established 200 percent of the straight-line rate as the maximum level. For federal income tax purposes, MACRS (see footnote 2) is based upon a 200 percent declining-balance for some assets, and a 150 percent declining-balance for others. The 150 percent declining-balance slows down the rates at which taxpayers may depreciate specific types of assets in their income tax returns.

Double-Declining-Balance To illustrate the double-declining-balance method, consider our example of the $17,000 delivery truck. The estimated useful life is five years; therefore, the straight-line depreciation rate is 20 percent (1 ÷ 5 years). Doubling this straight-line rate indicates an accelerated depreciation rate of 40 percent. Each year, we will recognize as depreciation expense 40 percent of the truck's book value, as we show in Exhibit 9–5.

EXHIBIT 9–5
200% Declining-Balance Depreciation Schedule

Depreciation Schedule: 200% Declining-Balance Method

Year	Computation	Depreciation Expense	Accumulated Depreciation	Book Value
				$17,000
First	$17,000 × 40%	$ 6,800	$ 6,800	10,200
Second	10,200 × 40%	4,080	10,880	6,120
Third	6,120 × 40%	2,448	13,328	3,672
Fourth	3,672 × 40%	1,469	14,797	2,203
Fifth	2,203 – $2,000	203	15,000	2,000
Total		$15,000		

As with the straight-line method illustrated earlier, the asset's book value is computed by subtracting depreciation recognized to date from the asset's cost. For example, from Exhibit 9–5, the book value of the asset at the end of the third year is computed as follows.

Cost	$ 17,000
Accumulated depreciation at end of third year ($6,800 + $4,080 + $2,448)	(13,328)
Book value	$ 3,672

Recall that book value at the end of the third year by the straight-line method was $8,000. The difference between that figure and the $3,672 computed here is due to the more rapid depreciation recognized by the declining-balance method compared with the straight-line method.

Notice that the estimated residual value of the delivery truck does not enter into the computation of depreciation expense until the end. This is because the declining-balance method provides an "automatic" residual value. As long as each year's depreciation expense is equal to only a portion of the undepreciated cost of the asset, the asset will never be entirely written off. However, if the asset has a significant residual value, depreciation should stop at this point. Since our delivery truck has an estimated residual value of $2,000, the depreciation expense for the fifth year is limited to $203, rather than the $881 indicated by taking 40 percent of the remaining book value (40% × $2,203 = $881). With the last year's depreciation expense limited in this manner, the book value of the truck at the end of the fifth year is exactly equal to its $2,000 estimated residual value.

In Exhibit 9–5 we computed a full year's depreciation in the first year because the asset was acquired on January 2. But if the half-year convention were in use, depreciation in the first year would be reduced by half, to $3,400. The depreciation in the second year would be ($17,000 – $3,400) × 40%, or $5,440.

150 Percent Declining-Balance Now assume that we decide to depreciate this truck using 150 percent of the straight-line rate. In this case, the depreciation rate will be 30 percent, instead of 40 percent (a 20% straight-line rate × 150% = 30%). This depreciation schedule is in Exhibit 9–6.

Notice that we switched to straight-line depreciation in the last two years. The undepreciated cost of the truck at the end of year 3 was $5,831. To depreciate the truck to an estimated residual value of $2,000 at the end of year 5, $3,831 in depreciation expense must be recognized over the next two years. At this point, larger depreciation charges can be recognized if we simply allocate this $3,831 by the straight-line method, rather than continuing to compute 30 percent of the remaining book value. (In our table, we round the allocation of this amount to the nearest dollar.)

EXHIBIT 9–6
150% Declining-Balance Depreciation Schedule

Depreciation Schedule: 150% Declining-Balance Method

Year	Computation	Depreciation Expense	Accumulated Depreciation	Book Value
				$17,000
First	$17,000 × 30%	$ 5,100	$ 5,100	11,900
Second	11,900 × 30%	3,570	8,670	8,330
Third	8,330 × 30%	2,499	11,169	5,831
Fourth	(5,831 – 2,000) ÷ 2	1,916*	13,085	3,915*
Fifth	3,915 – 2,000	1,915*	15,000	2,000*
Total		$15,000		

*Switched to the straight-line method for Years 4 and 5.

Allocating the remaining book value over the remaining life by the straight-line method does *not* represent a change in depreciation methods. Rather, a switch to straight-line when this will result in larger depreciation is an accepted part of the declining-balance method.

WHICH DEPRECIATION METHODS DO MOST BUSINESSES USE?

Many businesses use the straight-line method of depreciation in their financial statements and accelerated methods in their income tax returns. The reasons for these choices are easy to understand.

Accelerated depreciation methods result in higher charges to depreciation expense early in the asset's life and, therefore, lower reported net income than straight-line depreciation. Most publicly owned companies want to appear as profitable as possible—certainly as profitable as their competitors. Therefore, the majority of publicly owned companies use straight-line depreciation in their financial statements.

For income tax purposes, it's a different story. Management wants to report the lowest possible taxable income in the company's income tax returns. Accelerated depreciation methods can substantially reduce both taxable income and tax payments for a period of years.[4]

Accounting principles and income tax laws both permit companies to use different depreciation methods in their financial statements and their income tax returns. Therefore, many companies use straight-line depreciation in their financial statements and accelerated methods (variations of the declining-balance method) in their income tax returns.

The Differences in Depreciation Methods: Are They "Real"? Using the straight-line depreciation method will cause a company to report higher profits than would be reported if an accelerated method were in use in the early years of the asset's life. But is the company really better off than if it had used an accelerated method? The answer is no! Depreciation—no matter how it is computed—is only an estimate. The amount of this estimate has no effect on the actual financial strength of the business. Thus, a business that uses an accelerated depreciation method in its financial statements is simply measuring its net income more conservatively than a business that uses straight-line. However, the benefits of using an accelerated method for income tax purposes are real because the amount of depreciation claimed affects the amount of taxes owed. Lower income taxes translate directly into increased cash availability in the early years of the asset's life.

In the preceding chapter, we made the point that if a company chooses to use LIFO in its income tax return, it *must* use LIFO in its financial statements. No similar requirement exists for depreciation methods. A company may use an accelerated method in its income tax returns and the straight-line method in its financial statements—and most companies do.

[4] For a growing business, the use of accelerated depreciation in income tax returns may reduce taxable income every year. This is because a growing business may always have more assets in the early years of its recovery periods than in the later years.

FINANCIAL STATEMENT DISCLOSURES

A company must disclose in the accounting policy note to its financial statements the methods used to depreciate plant assets. Readers of the statements should recognize that accelerated depreciation methods transfer the costs of plant assets to expense more quickly than the straight-line method. Accelerated methods result in more conservative (lower) balance sheet amounts of plant assets and lower amounts of net income in the early years of an asset's life. These differences eventually reverse as assets move through their life cycles.

Estimates of Useful Life and Residual Value Estimating the useful lives and residual values of plant assets is the *responsibility of management.* These estimates usually are based on the company's past experience with similar assets, but they also reflect the company's current circumstances and management's future plans. The estimated lives of similar assets may vary from one company to another.

The estimated lives of plant assets affect the amount of net income reported each period. The longer the estimated useful life, the smaller the amount of cost transferred each period to depreciation expense and the larger the amount of reported net income. Bear in mind, however, that all large corporations are audited annually by a firm of independent public accountants. One of the responsibilities of these auditors is to determine that management's estimates of the useful lives of plant assets are reasonable under the circumstances.

Automobiles typically are depreciated over relatively short estimated lives—say, from three to five years. Other types of equipment are generally depreciated over a period of 5 to 15 years. Buildings are usually depreciated over longer lives—perhaps 30 to 50 years for a new building and 15 years or more for a building acquired used.

The Principle of Consistency The consistent application of accounting methods is a fundamental concept underlying generally accepted accounting principles. With respect to depreciation methods, this means that a company does not change from year to year the method used in computing the depreciation expense for a given plant asset. However, management may use different methods in computing depreciation for different assets. For example, a common practice is to depreciate vehicles and equipment by an accelerated method and buildings by the straight-line method. Also, as we have stressed repeatedly, a company may—and often must—use different depreciation methods in its financial statements and income tax returns.

Revision of Estimated Useful Lives What should be done if, after a few years of using a plant asset, management decides that the asset actually is going to last for a longer or shorter period than was originally estimated? When this situation arises, a *revised estimate* of useful life should be made and the periodic depreciation expense decreased or increased accordingly.

The procedure for changing the depreciation schedule is to spread the remaining undepreciated cost of the asset over the years of remaining useful life. This change affects only the amount of depreciation expense that will be recorded in the current and future periods. The financial statements of past periods are *not* revised to reflect changes in the estimated useful lives of depreciable assets.

To illustrate, assume that a company acquires a $10,000 asset estimated to have a five-year useful life and no residual value. Under the straight-line method, the annual depreciation expense is $2,000. At the end of the third year, accumulated depreciation is $6,000, and the asset has an undepreciated cost (or book value) of $4,000.

At the beginning of the fourth year, management decides that the asset will last for five more years. The revised estimate of useful life is, therefore, a total of eight years. The depreciation expense to be recognized for the fourth year and for each of the remaining years is $800, computed as follows.

Undepreciated cost at end of third year ($10,000 – $6,000)	$4,000
Revised estimate of remaining years of useful life	5 years
Revised amount of annual depreciation expense ($4,000 ÷ 5)	$ 800

THE IMPAIRMENT OF PLANT ASSETS

A company may determine that it cannot reasonably expect to recover the carrying amount of certain plant assets, either through use or through sale. For example, a computer manufacturer may have paid a high price to acquire specialized production equipment. If new technology renders the equipment obsolete, however, it may become apparent that the equipment is worth less than the amount it is carried in the accounting records.

If the carrying amount of an asset cannot be recovered through future use or sale, the asset should be written down to its fair value and an **impairment loss** recognized.

CASE IN POINT

A recent balance sheet of JCPenney includes $5,148 million of property and equipment. This represents approximately 49 percent of the company's reported assets. A note to the financial statements indicates that the company evaluates long-lived assets, such as store property and equipment and other corporate assets, for impairment whenever events or changes in circumstances indicate that the carrying amount of those assets may not be recoverable. Factors that may trigger an impairment review include significant underperformance relative to historical or projected operating results, significant changes in the manner of use of the assets, and changes in the company's overall business strategies. The amount of the impairment loss represents the excess of the carrying value (i.e., book value) of the asset over its fair value.

Other Depreciation Methods

LO9-4

LEARNING OBJECTIVE
Account for depreciation using methods other than straight-line or declining-balance.

Most companies that prepare financial statements in conformity with generally accepted accounting principles use the straight-line method of depreciation. However, any rational and systematic method is acceptable, as long as costs are allocated to expense in a reasonable manner. Several other methods are discussed here.

THE UNITS-OF-OUTPUT METHOD

Under the **units-of-output** method, depreciation is based on some measure of output rather than on the passage of time. When depreciation is based on units of output, more depreciation is recognized in the periods in which the assets are most heavily used.

To illustrate this method, consider Marpole Company's delivery truck, which cost $35,000 and has an estimated salvage value of $5,000. Assume that Marpole's management plans to retire this truck after it has been driven 60,000 miles. The depreciation rate per mile of operation is 50 cents, computed as follows.

$$\frac{\text{Cost} - \text{Residual Value}}{\text{Estimated Units of Output (Miles)}} = \text{Cost per Unit of Output (Mile)}$$

$$\frac{\$35{,}000 - \$5{,}000}{60{,}000 \text{ miles}} = \$0.50 \text{ Depreciation per Mile}$$

At the end of each year, the amount of depreciation to be recorded is determined by multiplying the 50-cent rate by the number of miles the truck was actually driven during the year. After the truck has gone 60,000 miles, it is fully depreciated, and the depreciation process is stopped. For example if the truck is driven 17,000 miles in a year, $8,500 depreciation expense is recognized (17,000 miles × $0.50 = $8,500).

This method provides an excellent matching of expense with revenue when the total units of output can be determined with reasonable accuracy. This method is used only for assets such as vehicles and certain types of machinery whose use can be measured in miles, machine hours, or some other measure of use. Assets such as buildings, computers, and furniture do not have well-defined "units of output" and ordinarily do not use this method.

In many cases, units-of-output becomes an accelerated method. Often assets are used more extensively in the earlier years of their useful lives than in the later years.

MACRS

Most businesses use **MACRS** (Modified Accelerated Cost Recovery System) in their federal income tax returns. Some small businesses also use this method in their financial statements, so they do not have to compute depreciation in several different ways. MACRS is based on the declining-balance method, but should be considered for use in financial statements only if the designated "recovery periods" and the assumption of no salvage value are reasonable. For publicly traded companies, the use of MACRS in financial statements is usually not considered to be in conformity with generally accepted accounting principles.

SUM-OF-THE-YEARS' DIGITS

Sum-of-the-years' digits, or SYD, is a form of accelerated depreciation. It generally produces results that lie between the double-declining-balance and 150 percent declining-balance methods.

SYD is a traditional topic that is included in many accounting textbooks. But it is the most complex of the accelerated methods—especially when partial years are involved. SYD is rarely used in today's business world. Because of its complexity, it is even less frequently used in small businesses. SYD is seldom used for income tax purposes, because tax laws usually define allowable depreciation rates in terms of the declining-balance method. For these reasons, we defer coverage of the mechanics of this method to later accounting courses.

DECELERATED DEPRECIATION METHODS

Depreciation methods exist that recognize less depreciation expense in the early years of an asset's useful life and more in the later years. Such methods may achieve a reasonable matching of depreciation expense and revenue when the plant asset is expected to become increasingly productive over time. Utility companies, for example, may use these methods for new power plants that will be more fully utilized as the population of the area increases.

These depreciation methods are rarely used; thus we defer coverage to later accounting courses.

DEPRECIATION METHODS IN USE: A SURVEY

For many years, the American Institute of Certified Public Accountants (AICPA) has conducted a survey of a large number of publicly owned companies to determine the accounting methods most widely used in financial statements. The number of methods in use exceeds the number of companies because some companies use different depreciation methods for different types of assets.

A=L+OE **Straight-line is clearly the method most widely used in financial statements**

For many consecutive years, the straight-line method has been consistently and by far the most widely used method of depreciation in financial statements. In fact, in most years the straight-line method accounts for approximately 90 percent of the depreciation methods used by these companies. Other methods covered in this chapter—units-of-output and various accelerated methods—are used relatively infrequently in the financial statements of these companies.

Keep in mind this survey indicates only the depreciation methods used in financial statements. In income tax returns, most companies use accelerated depreciation methods such as MACRS.

Disposal of Plant and Equipment

LO9-5

LEARNING OBJECTIVE
Account for the disposal of plant assets.

When depreciable assets are disposed of at any date other than the end of the year, an entry should be made to update depreciation to the date of disposal. If the half-year convention is in use, six months' depreciation should be recorded on all assets disposed of during the year. In other cases, depreciation may be calculated to the nearest whole month based on the date of the disposal. In the following illustrations of the disposal of items of plant and equipment, it is assumed that any necessary entries for fractional-period depreciation already have been recorded.

As units of plant and equipment wear out or become obsolete, they must be scrapped, sold, or traded in on new equipment. Upon the disposal or retirement of a depreciable asset, the cost of the property is removed from the asset account, and the accumulated depreciation is removed from the related contra-asset account. Assume, for example, that office equipment purchased