Chapter 8[1]

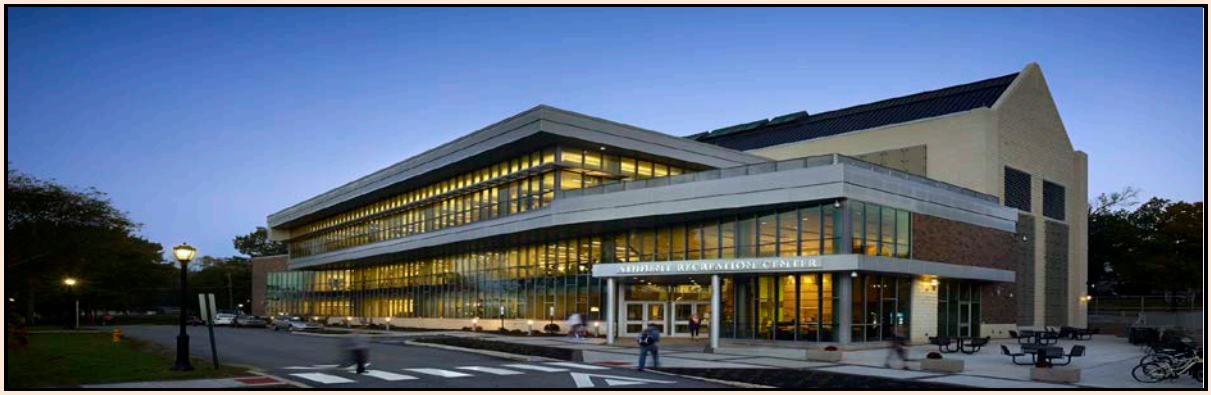
Accounting for Long-Term or Non-Current Assets

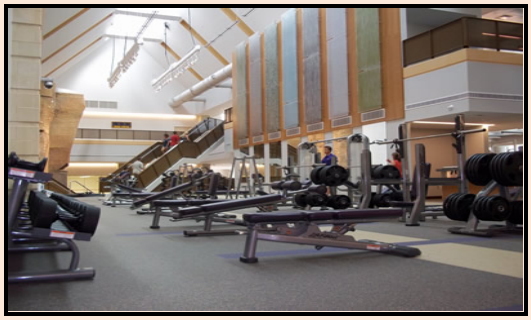
Learning Objectives

- Define property, plant and equipment.
- Explain how cost is determined for land and other long-lived assets.
- Describe how the relative sales value or proportional methods are applied to lump-sum purchases of assets.
- Explain and define depreciation and accumulated depreciation.
- Identify the variables involved in computing depreciation.
- Compute, compare and record straight-line (SL), sum-of-the-year's digits (SYD), double-declining balance (DD B), the modified accelerated cost recovery system (ACRS), and units-of-production methods of depreciation.
- Explain partial year depreciation and changes in estimates.
- Explain how to develop costs for natural resources and depletion.
- Define intangible assets and the costs relevant for their valuation.
- Account for natural resources, including depletion.
- Explain the amortization process.
- Describe the procedure for the valuation of goodwill and how it is amortized.
- Explain accounting issues relating to research and development costs.
- Compute gains and losses on asset disposal.
- List and describe the three fact patterns for asset disposal.

[1] Acknowledgement: An earlier version of this chapter was provided to all 2014 winter term ACC201 students and all accounting faculty on January 13-14, 2014, for review notes, comments, and recommendations for improvement. I appreciate the review notes, comments, and recommendations from the 2014 winter term ACC201 students (n=11) and Professor Robert Derstine. Work on this text began in early 2014. The completion of this text was made possible through a spring 2015 sabbatical from West Chester University.

Some photos of the new (2012) West Chester University student recreation center:





Below are architectural drawings of the new West Chester University College of Business and Public Affairs building ($39 million, 90,000 square-foot & five-stories). Construction is scheduled for completion during 2016.

Property, plant and equipment (PP&E) includes land, buildings, equipment, furniture, and other long-lived assets. A long-lived asset is one with a useful life of more than one accounting period. Other terms used for PP&E include fixed assets (FA). For some firms, PP&E or FA represents the single largest class of assets they own.

Property, plant and equipment or fixed assets are long-term or non-current assets. They are used (and consumed) for ongoing operations, but have useful lives extending over more than one accounting period. This latter characteristic distinguishes them from accounts receivable, inventory, or other short-term or current assets. Land, of course, is included in property, plant and equipment and fixed assets, but unlike buildings or equipment or furniture, does not wear out, experience economic or functional obsolescence, is not a wasting asset, and is not consumed during operations.

Because fixed assets wear out, as they are used (or consumed) during operations, we attempt to match the cost of these assets to the periods over which revenues are generated from their use. We have to attempt to match (*matching principle*) these costs to the periods (*periodicity assumption*) benefitting from their use over lengthy periods of time. We have systematic and rational methods and techniques for matching these costs to the revenues generated from the use of these long-term or non-current assets, but none of them are intended to represent fair market value. They are methods developed from industry (e.g., Chrysler, Ford, GM, and DuPont), where these for-profit firms had to formulate techniques to attempt to measure profits and losses or rates of return from the use of their assets.

Several measures are required to assist firms in computing the depreciable base, or the amount to be depreciated and matched to revenues over the life of the long-lived asset:

1. The cost of the asset must be computed. Cost might, for example, include freight-in and/or the cost of installation for a piece of equipment used in a factory.
2. An estimate of the economic useful life of the asset must be determined. This is usually based on the firm's experience (e.g., 5 years for an automobile).
3. The estimated salvage value at the end of the life of the asset is also required under GAAP and for financial accounting purposes.[2]

The cost of a long-lived asset might be adjusted (increased) for significant improvements to the asset (e.g., replacing an engine or transmission for a truck), while repairs (e.g., oil changes or tune-ups) are expensed when completed.

[2] Salvage values are not computed for income tax purposes under U.S. tax law. Total **cost recovery** is provided for under the U.S. system of income taxation.

The Cost of Long-Lived Assets

Property, plant and equipment or fixed assets are recorded at cost (the cost principle). Cost includes all expenditures necessary to prepare the asset to be placed in operations. For example, cash or early payoff discounts on the purchase of a piece of machinery will reduce its cost, while freight, unpacking, assembly, installation and testing increase the cost of a piece of machinery or equipment. Constructing a base or foundation, modifying or adding electrical outlets would also increase and be added to the cost of the long-lived asset.

Land

The cost of land includes all closing costs (e.g., real estate commissions, title search and insurance fees, and legal and recording fees). An example of the relevant portions of a closing statement for the July 9, 2009, purchase of land[3] follows:

Summary of Borrower's Transactions		**Summary of Seller's Transactions**	
Gross amount due from borrower:		Gross amount due to seller:	
Contract sales price	$13,000.00	Contract sales price	$13,000.00
Settlement charges to borrower	$741.50		
Adjustments for items seller paid in advance:		Adjustments for items paid by seller in advance:	
County taxes 7/9/2009 to 1/1/2010	$256.54	County taxes 7/9/2009 to 1/1/2010	$256.54
2009 School Taxes Due	$542.16		
Gross amount due from borrower:	$14,540.20	Gross amount due to seller:	$13,256.54
Amounts paid by or in behalf of the borrower:		Reduction in amount due to seller:	
Deposit or earnest money	$1,000.00	Settlement charges to seller	$4,085.96
Adjustments for items upaid by seller:		Adjustments for items unpaid by seller:	
School taxes 7/1/2009 to 7/6/2009	$7.43	School taxes 7/1/2009 to 7/6/2009	$7.43
Total paid by/for borrower:	$1,007.43	Total reduction in amount due seller:	$4,093.39
Cash at settlement from/to borrower:		Cash at settlement to/from seller:	
Gross amount due from borrower	$14,540.20	Gross amount due to seller	$13,256.54
Less amount paid by/for borrower	$1,007.43	Less total reduction in amount due seller	$4,093.39
CASH (X) FROM () TO BORROWER	$13,532.77	**CASH () FROM (X) TO SELLER**	$9,163.15

In the above case, a $1,000 deposit was provided for land, while the offer for the purchase was under consideration by the seller. The agreed upon sales price was $13,000. While the closing statement format provides for financing, no loan was associated with the purchase/sale, which was a cash purchase at a total out-of-pocket

[3] This data originates from an unaltered, actual closing statement.

cost of $14,540.20 ($13,532.77 + $1,000.00). The county taxes represent a prepayment of $256.54,[4] as follows:

Deposit or earnest money	$1,000.00
CASH (X) FROM () TO BORROWER	$13,532.77
subtotal	$14,532.77
Less: County taxes 7/9/2009 to 1/1/2010	-$256.54
Equals: Cost of land	$14,276.23

The above table summarizes the information needed to make the journal entries for the two cash payments, where the total historical cost basis of the land is $14,276.23, as follows:

Deposit for Land Offer	**$1,000.00**	
Cash		**$1,000.00**

Land	**$14,276.23**	
Prepaid county taxes	**$256.54**	
Cash		**$13,532.77**
Deposit for land offer		**$1,000.00**

If land is purchased for a building site, the cost of surveying, clearing, grading, and providing for drainage are added to the cost of the land, as are government assessments (for public roads, sewer, and sidewalks). If a structure must be removed from the land, the cost of removal, less any amounts recovered through salvage, is added to the cost of the land. All of these are costs associated with preparing the land for the construction of a building, and are capitalized as part of the cost of the land.

Land Improvements

The cost of improvements to land are accounted for separately, as, unlike land, they have a limited life. Parking lot surfaces, driveways, fences, shrubs and lighting systems are examples of depreciable land improvements.

Buildings

The cost of buildings are accounted for separately, whether purchased as part of the land or constructed. If self-constructed, the firm must develop a systematic and rational methodology for the capitalization of direct materials, direct labor, and overhead associated with construction, and these costs will be capitalized, only to be depreciated once the building is completed and placed in operation or service.

[4] If a property is purchased for back taxes at a sheriff's auction, these taxes, paid on behalf of another party, represent part of the cost of the land or land and building, and are capitalized. They are not deductible property taxes and are not expensed.

Equipment
Equipment costs include all costs necessary to ready these assets for operations. This includes the purchase price, sales taxes, transportation costs, insurance (while in transit), installation, delivery, assembly and testing.

Separate accounts are maintained for land, land improvements, buildings, equipment, and any other long-lived assets (e.g. vehicles and furniture & fixtures). These tend to assist the firm in tracking these assets and recording depreciation, by asset class. Similar classes of assets tend to be depreciated under comparable methods and have very different economic useful lives. For example, a building might be estimated to have an economic useful life of 40 years, but an automobile might be estimated to have an economic useful life of only 5 years.

Account Number	Account Title
150	Land
152	Land Improvements
154	Buildings
156	Automobiles
158	Equipment
160	Furniture & Fixtures

Allocating Costs for Lump-Sum Purchases
A lump-sum, group, bulk or basket purchase requires the allocation of the purchase price to each asset based on its relative sale value or relative market value. This is also referred to as the proportional method.

Assume that the example, from above, involved the purchase of a home in a residential area, to be used as a rental property. The land is a non-wasting asset that does not experience economic or functional obsolescence. The building, however, will wear out, over time, and must be depreciated. Assume that the property was a foreclosure and the cost was $14,276.23. When asked, the appraiser recommends that the property is valued is $60,000, with 25 percent of the cost associated with unimproved land. An allocation or proration or apportionment of the cost is completed, as follows:

	Relative Sales Value			Apportioned Costs
Land	$15,000	25%	$14,276	$3,569
Building	$45,000	75%	$14,276	$10,707
Total	$60,000	100%		$14,276

In the above example, $3,569 of the purchase price is associated with non-depreciable land and $10,707 is subject to depreciation (less any estimated salvage value) over the life of the building.

Depreciation
Depreciation represents a process of allocating costs of long-lived assets to the periods benefitting from their use. It does not represent a fair market or appraised value of these assets, but involves the use of systematic and rational methods developed, by industry, to match expenses with revenues.

Recall that we must have three measures to help us compute and record depreciation expense:

1. Cost
2. Useful life
3. Salvage value

Cost is easily determined, but the useful life and savage value, at the end of the asset's useful life, represent estimates.

Salvage value is also referred to as residual value or scrap value or trade-in value, if the asset is expected to be traded-in at the end of its estimated economic useful life.

The useful life of an asset is the estimated period over which the asset is expected to be useful, in operations, and for the production of revenues and the generation of profits. A firm is likely to use their experience, or the experiences of others in their industry, to estimate the useful life of an asset.

Depreciation Methods
A variety of depreciation methods are used to apportion, allocate or attempt to match (i.e., matching principle) costs of economic or functional obsolescence for long-lived assets to a period (i.e., periodicity assumption). They include, but are not limited, to the following methods:

- Straight-line (SL)
- Sum-of-the-year's digits (SYD)
- 200% or Double-declining balance (DDB)
- Modified accelerated cost recovery system (MACRS)
- Units-of-production or activity

A Common Fact Pattern
Assume that a long-lived asset, an automobile, has a cost of $10,000, a useful life of 5 years, and an estimated salvage value of $1,000, as follows:

	Cost	**$10,000**
Less:	**Salvage**	**$1,000**
Equals:	**Depreciable Base or Cost**	**$9,000**

Straight-Line Depreciation

The straight-line (SL) method of depreciation is easy to apply, where an equal amount of depreciation expense is recorded for each period. This method assumes that (1) the economic usefulness and (2) the repair and maintenance required for the long-lived asset is the same for each period. Using the common fact pattern (above), the below table provides for the computation of annual depreciation for each of the five years:

Period	Depreciation Expense	Book Value	Computational Notes
0		$10,000	
20X1	$1,800	$8,200	$10,000-$1,000=$9,000x20%=$1,800
20X2	$1,800	$6,400	Same as above
20X3	$1,800	$4,600	Same as above
20X4	$1,800	$2,800	Same as above
20X5	$1,800	$1,000	Same as above
Total	$9,000		

Note that under the straight-line method of depreciation, a 5 year asset is depreciated at 20% per year (100% ÷ 5 years = 20%) of the depreciable base for each year. Salvage or residual value at the end of the asset's estimated economic useful life has been estimated at $1,000, providing for a $9,000 depreciable base. Therefore, the below adjusting journal entry would be made to record annual depreciation expense at the end of each of the 5 years:

Depreciation Expense - Automobiles	$1,800	
Accumulated Depreciation - Automobiles		$1,800

Recall that depreciation expense is an expense account and accumulated depreciation is a contra asset account.

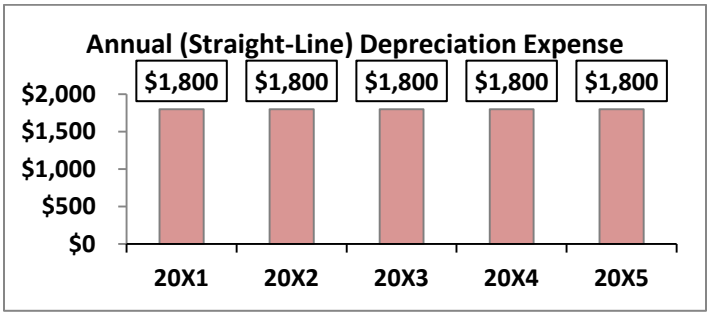
For the below table, each column has been given a letter heading (A through G) to illustrate relevant measures over the life of this automobile, purchased for $10,000, with an estimated salvage value of $1,000, for its entire, 5 year estimated useful life. Cost less salvage equals the depreciable base or cost [A-B]. The depreciable base or cost multiplied by the depreciation rate equals the amount of depreciation expense for each year [CxD]. Historical cost less the amount of accumulated depreciation equals the book value (or net book value or carrying value or net fixed asset value) of the asset at the end of each year [A-F]. Note that the asset is not depreciated below $1,000, its salvage value [B].

Year or Period	A Cost	B Salvage	C [A-B] Depreciable Base or Cost	D Depreciation Rate	E [CxD] Depreciation Expense	F Accumulated Depreciation	G [A-F] Book Value
0	$10,000	$1,000	$9,000	0%	$0	$0	$10,000
20X1	$10,000	$1,000	$9,000	20%	$1,800	$1,800	$8,200
20X2	$10,000	$1,000	$9,000	20%	$1,800	$3,600	$6,400
20X3	$10,000	$1,000	$9,000	20%	$1,800	$5,400	$4,600
20X4	$10,000	$1,000	$9,000	20%	$1,800	$7,200	$2,800
20X5	$10,000	$1,000	$9,000	20%	$1,800	$9,000	$1,000
Total	$10,000	$1,000	$9,000	100%	$9,000		

At the end of each year, the section of the balance sheet representing fixed assets or property, plant and equipment would reflect the historical cost and accumulated depreciation and book value, as follows:

	12/31/20X0	12/31/20X1	12/31/20X2	12/31/20X3	12/31/20X4	12/31/20X5
Property, plant & equipment	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000
Less: Accumulated depreciation	$0	$1,800	$3,600	$5,400	$7,200	$9,000
Property, plant & equipment (net)	$10,000	$8,200	$6,400	$4,600	$2,800	$1,000

The straight-line method is popular, because it is easy to understand and apply. It provides for a fixed amount of depreciation expense to be recorded on the firm's income statement for each year, as the table, below, illustrates:



Sum-of-the-Years' Digits Depreciation

The sum-of-the-years' digits (SYD) method of depreciation is an accelerated technique and results in a decreasing amount of depreciation each period or year, where the denominator in the fraction used to compute annual depreciation expense is the sum-of-the years' digits. Like the straight-line method, salvage value is deducted in arriving at the amount to be depreciated over the estimated economic useful life of the asset. Extending use of the common fact pattern from above to the sum-of-the-year's digits method, the below table provides computations for this accelerated method of depreciation:

Period	Depreciation Expense	Book Value	Computational Notes
0		$10,000	
20X1	$3,000	$8,200	$10,000-$1,000=$9,000x5/15=$3,000
20X2	$2,400	$6,400	$10,000-$1,000=$9,000x4/15=$2,400
20X3	$1,800	$4,600	$10,000-$1,000=$9,000x3/15=$1,800
20X4	$1,200	$2,800	$10,000-$1,000=$9,000x2/15=$1,200
20X5	$600	$1,000	$10,000-$1,000=$9,000x1/15=$ 600
Total	$9,000		15/15

The sum-of-the-year's digits method produces a different result, when compared to the straight-line method. It provides for a decreasing or declining amount of depreciation expense for each year. Alternatively, it provides for "accelerated" depreciation, where depreciation expense is higher in the earlier years of an asset's life and lower in the later years of an assets life.

This (and other accelerated depreciation methods) is probably a technique that is more representative of the economic and functional obsolescence associated with the operation of a long-lived asset, but, like straight-line, you should not assume that this results in a book value equal to the fair market value of a fixed asset at any point in time. No method of depreciation achieves this objective. Instead, view sum-of-the-year's digits (SYD) it as an alternative to straight-line (SL) depreciation, and another systematic and rational method to attempt to match depreciation expense to the periods and revenues generated from long-lived assets.

To arrive at the denominator used for the SYD method begin with the estimated economic useful life, count backwards, and sum the years' digits (e.g., 5, 4, 3, 2, 1 or 5 + 4 + 3 + 2 + 1 = 15).[5] To arrive at the numerator begin with the estimated economic useful life of the asset and count backwards (e.g., 5, 4, 3, 2, and 1). The fraction of 100 percent of the depreciable base to be expensed each year is developed by combining the two (e.g., 5/15, 4/15, 3/15, 2/15, and 1/15).

The following adjusting journal entries would be made at the end of the first through fifth years to record annual depreciation expense under the sum-of-the-year's method:

[5] The following formula will produce the denominator, where n = the estimated economic useful life of the long-lived asset and n(n+1) ÷ 2 or, where n = 5, 5(5+1) ÷ 2 = 30 ÷ 2 = 15.

12/31/20X1	Depreciation Expense – Automobiles	$3,000	
	Accumulated Depreciation - Automobiles		$3,000
12/31/20X2	Depreciation Expense – Automobiles	$2,400	
	Accumulated Depreciation – Automobiles		$2,400
12/31/20X3	Depreciation Expense – Automobiles	$1,800	
	Accumulated Depreciation – Automobiles		$1,800
12/31/20X4	Depreciation Expense – Automobiles	$1,200	
	Accumulated Depreciation – Automobiles		$1,200
12/31/20X5	Depreciation Expense – Automobiles	$600	
	Accumulated Depreciation – Automobiles		$600

Recall that depreciation expense is an expense account, depreciation expense is recorded in the firm's income statement, and accumulated depreciation is a contra asset account and recorded in the firm's balance sheet.

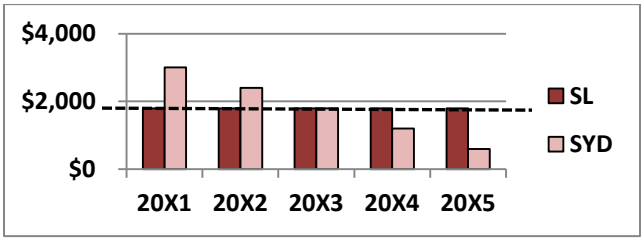
	A	B	C	D	E	F	G
			[A-B]		[CxD]		[A-F]
Year or Period	Cost	Salvage	Depreciable Base or Cost	Depreciation Rate	Depreciation Expense	Accumulated Depreciation	Book Value
0	$10,000	$1,000	$9,000	0	$0	$0	$10,000
20X1	$10,000	$1,000	$9,000	5/15	$3,000	$3,000	$7,000
20X2	$10,000	$1,000	$9,000	4/15	$2,400	$5,400	$4,600
20X3	$10,000	$1,000	$9,000	3/15	$1,800	$7,200	$2,800
20X4	$10,000	$1,000	$9,000	2/15	$1,200	$8,400	$1,600
20X5	$10,000	$1,000	$9,000	1/15	$ 600	$9,000	$1,000
Total	$10,000	$1,000	$9,000	15/15	$9,000		

For the above table, as in the case of the straight-line example, each column has been given a letter heading (A through G) to illustrate relevant measures over the life of this automobile, purchased for $10,000, with an estimated salvage value of $1,000, for its entire, 5 year estimated useful life. Cost less salvage equals the depreciable base or cost [A-B]. The depreciable base or cost multiplied by the depreciation rate/fraction equals the amount of depreciation expense for each year [CxD]. Historical cost less the amount of accumulated depreciation equals the book value (or net book value or carrying value or net fixed asset value) of the asset at the end of each year [A-F]. Note that, as in the case of the straight-line method, the asset is not depreciated below $1,000, its salvage value [B].

At the end of each year, the section of the balance sheet representing fixed assets or property, plant and equipment would reflect the historical cost and accumulated depreciation and book value, under the sum-of-the-year's method, as follows:

	12/31/20X0	12/31/20X1	12/31/20X2	12/31/20X3	12/31/20X4	12/31/20X5
Property, plant & equipment	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000
Less: Accumulated depreciation	$0	$3,000	$5,400	$7,300	$8,400	$9,000
Property, plant & equipment (net)	$10,000	$7,000	$4,600	$2,800	$1,600	$1,000

A Comparison of Straight-Line (SL) and Sum-of-the-Year's Digits (SYD) Methods
Again, the straight-line method is popular, because it is easy to understand and apply. It provides for a fixed amount of depreciation expense to be recorded on the firm's income statement for each year. The sum-of-the-year's digits method is an accelerated method of depreciation. The table, below, provides a comparison of the annual depreciation expense for the SL and SYD methods, where a dashed or broken line is used to more clearly see the difference between these two systematic and rational methods of recording depreciation expense:



The 200% or Double-Declining Balance Depreciation
The 200%[6] or double-declining balance (DDB) method of depreciation, like the sum-of-the-year's digits method (SYD) method, is an accelerated technique. It provides for larger depreciation expenses in the early years of a long-lived asset's life and smaller depreciation expenses in the later years of a long-lived asset's life. DDB is the most commonly used method of accelerated depreciation, and is the foundation for the modified accelerated cost recovery system (MACRS), a method required under U.S. tax law, and discussed in a later section.

Unlike the straight-line (SL) and SYD methods, the DDB method does not, first, reduce the depreciable base by salvage value. However, the DDB method switches from 200% of the SL rate (e.g., 20% under SL multiplied by 200% equals 40%) to the SL method, including a reduction of salvage value, half-way[7] through the estimated economic useful life of the long-lived asset. Salvage value is only considered once the switch to SL depreciation occurs.

The below table continues to use the same fact pattern, a $10,000 automobile with a 5 year life and $1,000 salvage value, but for the DDB method:

[6] Some accelerated methods do not use 200%. Popular alternatives include 125%, 150%, 175%, and so on. However, we traditionally teach the 200% method, assuming that a student can easily adapt to the use of an alternative percentage.
[7] Some introductory financial accounting texts do not strictly adhere to this approach, but it is the approach used under U.S. tax law under MACRS, and the predominant technique for financial accounting.

Period	Depreciation Expense	Book Value	Computational Notes
20X0		$10,000	
20X1	$4,000	$8,200	$10,000x(20%x200%)=$4,000
20X2	$2,400	$6,400	$10,000–4,000=$6,000x(20%x200%)=$2,400
			2 ½ YEARS IS HALF OF THE LIFE OF THE 5 YEAR ASSET SWITCH TO STRAIGHT-LINE DEPRECIATION FOR YEAR 3
20X3	$867	$4,600	$10,000–($4,000+$2,400)=$3,600–$1,000=$2,600÷3=$867
20X4	$867	$2,800	Same as period 3 (rounded)
20X5	$866	$1,000	Same as period 3 (rounded)
Total	$9,000		

Note the switch to straight-line depreciation, beginning with the 3rd year, or nearly half way through the asset's 5 year life. At the end of the 2nd year, the asset has a carrying or book value of $3,600 ($10,000 historical cost less $6,400 in accumulated depreciation). Straight-line depreciation requires that salvage value, first, be deducted, in arriving at the asset's depreciable base. Therefore, $2,600 ($3,600 less $1,000 salvage value) remains to be depreciated over the remaining 3 year life of the automobile.

Below are the adjusting journal entries that would be made, using the DDB method of depreciation:

12/31/20X1	Depreciation Expense – Automobiles	$4,000	
	Accumulated Depreciation - Automobiles		$4,000

12/31/20X2	Depreciation Expense - Automobiles	$2,400	
	Accumulated Depreciation - Automobiles		$2,400

12/31/20X3 & 12/31/20X4	Depreciation Expense - Automobiles	$867	
	Accumulated Depreciation - Automobiles		$867

12/31/20X5	Depreciation Expense - Automobiles	$866	
	Accumulated Depreciation - Automobiles		$866

Again, depreciation expense is an expense account and this expense is recorded in the firm's income statement; accumulated depreciation is a contra asset account and recorded in the firm's balance sheet.

Again, headings are used in the same tabular format (A through G) to illustrate relevant measures over the life of this automobile, purchased for $10,000, with an estimated salvage value of $1,000, for its entire, 5 year estimated useful life, but under the DDB method of depreciation. Cost less salvage equals the depreciable base or cost [A-B]. The depreciable base or cost multiplied by the depreciation rate equals the amount of depreciation expense for each year [CxD]. Historical cost less the amount of accumulated depreciation equals the book value (or net book value or carrying value or net fixed asset value) of the asset at the end of each year [A-F]. Note that the asset is not depreciated below $1,000, its salvage value [B].

	A	B	C	D	E	F	G
			[A-B]		[CxD]		[A-F]
Year or Period	Cost	Salvage	Depreciable Base or Cost	Depreciation Rate	Depreciation Expense	Accumulated Depreciation	Book Value
0	$10,000	$0	$10,000	0	$0	$0	$10,000
20X1	$10,000	$0	$10,000	40%	$4,000	$4,000	$6,000
20X2	$10,000	$0	$6,000	40%	$2,400	$6,400	$3,600
20X3	$10,000	$1,000	$2,600	33 1/3%	$ 867	$7,267	$2,733
20X4	$10,000	$1,000	$1,733	33 1/3%	$ 867	$8,134	$1,866
20X5	$10,000	$1,000	$ 866	33 1/3%	$ 866	$9,000	$1,000
Total	$10,000	$1,000	$9,000		$9,000		

At the end of each year, the section of the balance sheet representing fixed assets or property, plant and equipment would reflect the historical cost and accumulated depreciation and book value, under the 200% or double-declining balance method, as follows:

	12/31/20X0	12/31/20X1	12/31/20X2	12/31/20X3	12/31/20X4	12/31/20X5
Property, plant & equipment	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000
Less: Accumulated depreciation	$0	$4,000	$6,400	$7,267	$8,134	$9,000
Property, plant & equipment (net)	$10,000	$6,000	$3,600	$2,733	$1,866	$1,000

Alternatively, in this case, we could have continued to use the 200% or double-declining balance rate of 40%,[8] but we would have to exercise caution, in the 5th year, to avoid depreciating the asset below salvage value:

	A	B	C	D	E	F	G
			[A-B]		[CxD]		[A-F]
Year or Period	Cost	Salvage	Depreciable Base or Cost	Depreciation Rate	Depreciation Expense	Accumulated Depreciation	Book Value
0	$10,000	$0	$10,000	0	$0	$0	$10,000
20X1	$10,000	$0	$10,000	40%	$4,000	$4,000	$6,000
20X2	$10,000	$0	$6,000	40%	$2,400	$6,400	$3,600
20X3	$10,000	$0	$2,600	40%	$1,440	$7,840	$2,160
20X4	$10,000	$0	$1,733	40%	$ 864	$8,704	$1,296
20X5	$10,000	$1,000	$ 866	Remainder	$ 296	$9,000	$1,000
Total	$10,000	$1,000	$9,000		$9,000		

In this latter case, the section of the balance sheet representing fixed assets or property, plant and equipment would reflect the historical cost and accumulated depreciation and book value, under the 200% or double-declining balance method, as follows:

	12/31/20X0	12/31/20X1	12/31/20X2	12/31/20X3	12/31/20X4	12/31/20X5
Property, plant & equipment	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000
Less: Accumulated depreciation	$0	$4,000	$6,400	$7,840	$8,704	$9,000
Property, plant & equipment (net)	$10,000	$6,000	$3,600	$2,160	$1,296	$1,000

The Modified Accelerated Cost Recovery System – U.S. Tax Law

The modified accelerated cost recovery system (MACRS) is modified ACRS, where ACRS[9] (for assets placed in service from 1982-1986) and MACRS[10] (for assets placed in service after 1986) are both tax-based methods of depreciation, but they are also very similar to the double-declining balance method used for financial accounting purposes. In some cases, the differences between the two are so immaterial and insignificant that a firm will choose to use MACRS for both tax and financial accounting purposes, disclosing this fact in their summary of significant accounting policies.

As the name suggests, both ACRS and MACRS provide for total "cost recovery." There is, therefore, no salvage value to estimate. Therefore, the salvage value of $1,000 in the fact pattern used in this chapter would have been ignored for the purpose of annual depreciation expense computations under ACRS (1982 through 1986) and continues to

[8] Again, this would represent a departure from standard practices, including those employed under the U.S. tax system (MACRS).
[9] Enacted by Congress as part of the Economic Recovery Tax Act of 1981 (ERTA81).
[10] Enacted by Congress as part of the Tax Reform Act of 1986 (TRA86).

be ignored under MACRS, as the total cost is recovered through these depreciation methods.[11]

MACRS maintains mandatory or statutory lives[12] for different classes of assets:

Property Class (in years)	Description
3	small tools, horses and research & development assets
5	automobiles, trucks, computers & peripherals and office machines
7	office furniture & fixtures, oil, agricultural & manufacturing equipment and railroad track
10	railroad cars, mobile homes, boilers and some public utility property
15	roads, shrubs and certain low-income housing
20	waste-water treatment plants & sewer systems
27.5	residential rental property
39	nonresidential rental property

MACRS depreciation provides for a *first year, half year modifying convention*.[13] While 200% or double-declining balance is used and a conversion to straight-line depreciation is applied half-way through the life of the asset (with total "cost recovery" or zero salvage value), only one-half of the first year's depreciation expense is deducted for the first year, and so on.[14] Effectively, this converts a 3-year asset to a 4-year depreciable life, a 5-year asset to a 6-year depreciable life, and a 7-year asset to an 8-year depreciable life, as the following table illustrates for 3-, 5- and 7-year life assets:

[11] Total "cost recovery" (the "CR" in ACRS and MACRS) eliminated taxpayer compliance-related administrative costs arising from arguments between taxpayers and Internal Revenue Service (IRS) agents, where a reduction in salvage value increases the annual depreciation expense (frequently the taxpayer's position, to reduce taxable income and, therefore, income tax) and an increase in salvage value decreases the annual depreciation expense (frequently the IRS agents' position, to increase taxable income and, therefore, income tax). The estimate of salvage value at the end of a long-lived asset was and remains a subjective matter, so total "cost recovery" eliminates the development and use of this subjective measure in the computation of annual depreciation expense.

[12] Statutory or "by statute" or "by law" suggests that, for tax purposes, the actual experience for any particular business or firm is irrelevant. For example, the statutory life for a business use automobile is 5 years, regardless of the actual experiences by the firm.

[13] Mid-quarter and mid-month conventions are required under MACRS in certain cases.

[14] There is an optional straight-line method available for tax purposes, but this involves an "election" for income tax purposes. Salvage value continues to be ignored under this elective alternative.

Year	3-year[15]		5-year[16]		7-year[17]	
1	33.33%	½ year	20.00%	½ year	14.29%	½ year
2	44.45%		32.00%		24.49%	
3	14.81%		19.20%		17.49%	
4	7.41%	½ year	11.52%		12.49%	
5			11.52%		8.93%	
6			5.76%	½ year	8.92%	
7					8.93%	
8					4.46%	½ year
Total	100.00%		100.00%		100.00%	

Using the same fact pattern used throughout this chapter, a $10,000, 5-year asset would be depreciated, under MACRS, but over a 6-year period, as follows:

[15] A 3-year asset would be depreciated at 33.33% under straight-line depreciation. Double-declining balance would increase depreciation expense for the first year to 66.66%, however, because only ½ of the first year's depreciation is deducted in the first year under the *first year, half year modifying convention*, one-half of this 66.66% results in depreciation expense for year 1 and the remainder of the first year's depreciation expense is applied as the first half of depreciation expense for year 2.

[16] A 5-year asset would be depreciated at 20% under straight-line depreciation. Double-declining balance would increase depreciation expense for the first year to 40%, however, because only ½ of the first year's depreciation is deducted in the first year under the *first year, half year modifying convention*, one-half of this 40% results in depreciation expense for year 1 and the remainder of the first year's depreciation expense is applied as the first half of depreciation expense for year 2.

[17] A 7-year asset would be depreciated at 14.29% under straight-line depreciation. Double-declining balance would increase depreciation expense for the first year to 28.58%, however, because only ½ of the first year's depreciation is deducted in the first year under the *first year, half year modifying convention*, one-half of this 28.58% results in depreciation expense for year 1 and the remainder of the first year's depreciation expense is applied as the first half of depreciation expense for year 2.

Year	5-year[18]	
1	$2,000	½ year
2	$3,200	
3	$1,920	
4	$1,152	
5	$1,152	
6	$576	½ year
Total	100.00%	

Generally, MACRS depreciation requires double-declining balance for 3-, 5-, 7-, and 10-year property, 150% declining balance[19] for 15- and 20-year property, and straight-line for 27.5- and 39-year property.

The following table summarizes the depreciation expense under the straight-line (SL), sum-of-the-year's digits (SYD) and double-declining balance (DDB) methods (both with and without a switch to SL after the 2nd year), for financial accounting purposes, and MACRS for tax accounting purposes:

[18] A 5-year asset would be depreciated at 20% under straight-line depreciation. Double-declining balance would increase depreciation expense for the first and second years to 40%, however, because only ½ of the first year's depreciation is deducted in the first year under the *first year, half year modifying convention*, one-half of this 40% results in depreciation expense for year 1 ($2,000) and the remainder of the first year's depreciation expense is applied as the first half of depreciation expense for year 2 ($2,000). The double-declining balance-based depreciation expense for year 2 would be $3,200 (i.e., $10,000 - $4,000 = $6,000 x 40% = $2,400 x ½ = $1,200). Therefore, ½ of double-declining balance-based depreciation expense from year 1 ($4,000 x ½ = $2,000) plus ½ of the double-declining balance-based depreciation expense for year 2 ($2,400 x ½ = $1,200) results in $3,200 ($2,000 + $1,200) for year 2, under MACRS, and so on.

[19] Declining balance (DB) techniques have a long history, and may also include 125% or 175% DB methods. In the case of the 150% DB method and the 5-year asset, for example, the first year's depreciation expense, before the application of any modifying convention, would be 150% of 20% or 30% for the first year, and so on. You can find some very detailed tables and applications of these tax-based depreciation methods at the IRS.GOV website, which contains detailed information beyond the scope intended for this financial accounting text and even many tax textbooks.

Period	SL	SYD	[SL Switch] DDB	[No SL Switch] DDB	MACRS
20X1	$1,800	$3,000	$4,000	$4,000	$2,000
20X2	$1,800	$2,400	$2,400	$2,400	$3,200
20X3	$1,800	$1,800	$867	$1,440	$1,920
20X4	$1,800	$1,200	$867	$864	$1,152
20X5	$1,800	$600	$866	$296	$1,152
20X6	$-0-	$-0-	$-0-	$-0-	$576
Total	$9,000	$9,000	$9,000	$9,000	$10,000

Units-of-Production (or Activity) Method

The straight-line method treats depreciation as though it is a purely fixed expense, without any variation from one period to another period. Alternatively, the units-of-production (activity) method treats depreciation as though it is a purely variable expense, varying with the use of the long-lived asset.

Salvage value is still deducted when arriving at the depreciable base under the units-of-production method of depreciation. This method is most popular with heavy equipment or aircraft, where an odometer-like measurement device tracks the number of miles or operating hours for the machinery. In our automobile case, we will assume that the firm has determined that a business-use automobile has an estimated economic useful life of 75,000 miles. If mileage is 10,000, 25,000, 20,000, 12,000, and 8,000 miles for years one through five, depreciation would be computed, as follows:

	A	B	C	D	E	F	G
			[A-B]		[CxD]		[A-F]
Year or Period	Cost	Salvage	Depreciable Base or Cost	Depreciation Rate	Depreciation Expense	Accumulated Depreciation	Book Value
0	$10,000	$0	$9,000	-0-	$0	$0	$10,000
20X1	$10,000	$1,000	$9,000	10,000/75,000	$1,200	$1,200	$8,800
20X2	$10,000	$1,000	$9,000	25,000/75,000	$3,000	$4,200	$5,800
20X3	$10,000	$1,000	$9,000	20,000/75,000	$2,400	$6,600	$3,400
20X4	$10,000	$1,000	$9,000	12,000/75,000	$1,440	$8,040	$1,960
20X5	$10,000	$1,000	$9,000	8,000/75,000	$ 960	$9,000	$1,000
Total	$10,000	$1,000	$9,000	75,000/75,000	$9,000		

Depreciation – Some Key Points

The following table summarizes some key points relating alternative depreciation methods:

	SL	SYD	Units-of-Production or Activity	DDB	MACRS
Primarily used for	Financial	Financial	Financial	Financial	Tax
Salvage value deducted	Yes	Yes	Yes	Mid-Life	No
Cost behavior	Fixed	Mixed	Variable	Mixed	Mixed

Straight-line (SL), sum-of-the-year's digits (SYD), units-of-production or alternative activity techniques, and double-declining balance (DDB) are used for financial accounting purposes. The modified accelerated cost recovery system (MACRS) is very similar to double-declining balance, but with a first year, half year modifying convention. None-the-less, this tax method of depreciation is used by some firms for financial accounting purposes. They do this when the difference between the DDB and the MACRS is immaterial or insignificant. This is a matter of professional judgment.

Salvage value is deducted in the case of SL, SYD, and units-of-production of activity methods. Salvage value is not deducted in the case of DDB, at least not initially. Even under DDB, long-lived assets are not depreciated below salvage value. Under MACRS, "cost recovery" is complete, in that salvage value is not considered. This is administratively expedient, in that it avoids arguments between taxpayers and Internal Revenue Service agent auditors.

Straight-line is a purely fixed cost. Depreciation expense is the same for every period during the life of the asset. The units-of-production or activity method is purely variable. Depreciation expense varies, perfectly, as the consumption of the long-lived asset occurs. All other methods are mixed – both or neither purely fixed or variable.

Depreciation – Partial Year

Long-lived assets are purchased and placed in service or taken out of service and sold at times other than the beginning or end of a firm's calendar or fiscal year. For this reason, it is important to know how to compute depreciation expense and accumulated depreciation for periods of less than one full year.

Recall the fact pattern used throughout this chapter. An automobile with a 5 year life, a cost of $10,000, and a salvage value of $1,000 is purchased and placed in service on January 1, 20X1. Typically, under straight-line depreciation, we would expense $1,800 per year for five years.

If the firm prepared monthly financial statements, they would expense and accumulate additional depreciation of $150 ($1,800 ÷ 12) per month. If the firm prepared quarterly

financial statements, they would expense and accumulate additional depreciation of $450 ($1,800 ÷ 4) per quarter. If financial statements are to be prepared semi-annually they should expense and accumulate additional depreciation of $900 ($1,800 ÷ 2) every six months.

Depreciation – Changes in Estimates

For financial accounting purposes, the estimated economic useful life of a long-lived asset is an estimate. The salvage value of these long-lived assets also represents an estimate.

The useful life and salvage value for long-lived assets are both estimates. They were always estimates. They were always understood to represent estimates. Therefore, when a change in an estimate occurs, it is not applied retroactively. Instead, new information is used to modify estimates for current and future periods.

For example, using the same example used throughout this chapter, assume that the firm decided, after the second year of asset use, that the automobile will last 6 years, and have a salvage value of $1,500. Recall the straight-line depreciation schedule through the 2nd year:

	A	B	C	D	E	F	G
			[A-B]		[CxD]		[A-F]
Year or Period	Cost	Salvage	Depreciable Base or Cost	Depreciation Rate	Depreciation Expense	Accumulated Depreciation	Book Value
0	$10,000	$1,000	$9,000	0%	$0	$0	$10,000
20X1	$10,000	$1,000	$9,000	20%	$1,800	$1,800	$8,200
20X2	$10,000	$1,000	$9,000	20%	$1,800	$3,600	$6,400

At the beginning of the 3rd year, the automobile has a book value of $6,400 and accumulated depreciation of $3,600. The book value, reduced by the newly computed salvage value of $1,500, is $4,900. This $4,900 will be depreciated over the remaining 4 years, at $1,225 per year. These changes in estimates are reflected in the below table:

	A	B	C	D	E	F	G
			[A-B]		[CxD]		[A-F]
Year or Period	Cost	Salvage	Depreciable Base or Cost	Depreciation Rate	Depreciation Expense	Accumulated Depreciation	Book Value
0	$10,000	$1,000	$9,000	0%	$0	$0	$10,000
20X1	$10,000	$1,000	$9,000	20%	$1,800	$1,800	$8,200
20X2	$10,000	$1,000	$9,000	20%	$1,800	$3,600	$6,400
20X3	$10,000	$1,500	$8,500	25%	$1,225	$4,825	$5,175
20X4	$10,000	$1,500	$8,500	25%	$1,225	$6,050	$3,950
20X5	$10,000	$1,500	$8,500	25%	$1,225	$7,275	$2,725
20X6	$10,000	$1,500	$8,500	25%	$1,225	$8,500	$1,500

Depreciation – A More Fully Developed Chart of Accounts

At the beginning of this chapter, a chart of accounts, restricted to long-lived assets was presented. Below is a more fully developed illustration of a chart of accounts, where accumulated depreciation and depreciation expense accounts have been added:

Account Number	Account Title
150	Land
152	Land Improvements
153	Accumulated Depreciation – Land Improvements
154	Buildings
155	Accumulated Depreciation – Buildings
156	Automobiles
157	Accumulated Depreciation – Automobiles
158	Equipment
159	Accumulated Depreciation – Equipment
160	Furniture & Fixtures
161	Accumulated Depreciation – Furniture & Fixtures
553	Depreciation Expense – Land Improvements
555	Depreciation Expense – Buildings
557	Depreciation Expense – Automobiles
559	Depreciation Expense – Equipment
561	Depreciation Expense – Furniture & Fixtures

Patterns vary, but note that the fixed asset accounts end with an even number and accumulated depreciation or contra asset accounts end with an odd number (e.g., 152 and 153 for land improvements and related accumulated depreciation accounts, respectively). Also note that the expense accounts end with the same two numbers or suffix (e.g., 161 and 561 for accumulated depreciation and depreciation expense, respectively, for the furniture & fixtures accounts). There is no accumulated depreciation or depreciation account to relate to or be associated with the land account.

Property, Plant & Equipment:	
Land	$xxx
Land Improvements	$xxx
Buildings	$xxx
Automobiles	$xxx
Equipment	$xxx
Furniture & Fixtures	$xxx
Property, Plant & Equipment	$xxx
Less: Accumulated Depreciation	($xxx)
Property, Plant & Equipment (net)	$xxx

Additional Expenditures

After acquisition, an asset's operation, maintenance, repairs and improvements might have to be capitalized or expensed. Capitalizing the expenditure will result in a higher net income (or a lower net loss) when compared to expensing. Perhaps the best example of the inappropriate capitalization of expenditures is the WorldCom case, as follows:

> ***WorldCom had taken line costs — mostly fees associated with its use of third-party network services and facilities — and wrongly booked them as capital expenditures.***
>
> ***Such expenses must be immediately recognized in the period incurred, unlike expenditures which can legitimately be capitalized as assets and depreciated over their useful life. WorldCom's misrepresentation of these expenses led to an artificial inflation of its net income and EBITDA (earnings before interest, taxes, depreciation and amortization).***[20]

Capital expenditures (also known as *balance sheet expenditures*) represent additional costs producing benefits extending beyond the current period. Debited to property, plant & equipment or fixed asset accounts (or some other long-lived asset account), these expenditures increase or improve the type or amount of service provided by an asset (e.g., roof replacement, plant expansion, or major overhauls of machinery and equipment).

Revenue expenditures (also known as *income statement expenditures*) represent additional costs that do not materially or significantly extend the life of the long-lived asset or its productive capabilities beyond the current period (e.g., cleaning, repainting, and oil or lubricant changes). These include *ordinary repairs* (e.g., engine tune-ups and tire rotations on an automobile). For example, assume that an oil change for a company car was just completed at a cost of $40, and paid in cash:

[20] Available at <http://knowledge.wharton.upenn.edu/article/what-went-wrong-at-worldcom/>.

Repairs Expense	**$40**	
Cash		**$40**

Betterments and *extraordinary repairs* (also known as *improvements*) are capitalized and not immediately expensed. For example, an addition of square footage to a facility, or expansion, would not be expensed. It would be capitalized and depreciated. In the below case, assume that additional square footage was added to an existing building, at a cost of $50,000, and paid in cash:

Buildings	**$40**	
Cash		**$40**

This separate addition would be depreciated as a separate component, typically, using the same depreciation method and estimated useful life used by the firm for other, comparable assets.

Disposal of Plant Assets

Plant assets might be disposed of in a variety of ways for several reasons. These assets might be (1) discarded, (2) sold, or (3) exchanged. Generally,

1. Record depreciation expense and accumulated depreciation through the date of disposal.
2. Record the removal or extraction of the relevant plant asset(s) and accumulated depreciation balances at the date of disposal.
3. Record cash or other assets received or paid and related to the disposal process.
4. Record any gain or loss associated with the disposal.

Discarding Plant Assets

Firms discard plant assets when no longer useful and without any market value. For example, assume that a firm has an asset with a fully depreciated cost of $10,000, discarded on June 30, 2014:

Accumulated Depreciation – Plant Asset	**$10,000**	
Plant Asset		**$10,000**

In the above case, there is no gain or loss on the fully depreciated asset's disposal.

Assume, now, that the $10,000 asset is not fully depreciated. Assume that the asset, when placed in service, had a 10-year life, used straight-line deprecation, and had no salvage value. With 1 year remaining, the accumulated depreciation account balance was $9,000 on December 31, 2013. An additional $1,000 of depreciation expense was anticipated for the 2014 calendar year, but the asset was disposed of on June 30, 2014. The first step (from (1), above) is to record depreciation expense through June 30, 2014, as follows:

Depreciation Expense	**$500**	
Accumulated Depreciation		**$500**

Computations to determine the gain or loss follow:

	Cost	**$10,000**
Less:	**Salvage**	**$-0-**
Equals:	**Depreciable Base or Cost**	**$10,000**
Divided by:	**10 Year Life**	**÷ 10**
Equals:	**Annual Depreciation Expense**	**$1,000**
Divided by:	**Computation of Semi-Annual Depreciation Expense**	**÷ 2**
Equals:	**Semi-Annual Depreciation Expense**	**$500**

	Cost	**$10,000**
Less:	**Accumulated Depreciation through December 31, 2013**	**$9,000**
Equals:	**Carrying or Book Value at January 1, 2014**	**$1,000**

	Accumulated Depreciation through December 31, 2013	**$9,000**
Add:	**Semi-Annual Depreciation Expense through June 30, 2014**	**+ $500**
Equals:	**Accumulated Depreciation through June 30, 2014**	**$9,500**

	Cost	**$10,000**
Less:	**Accumulated Depreciation through June 30, 2014**	**$9,500**
Equals:	**Carrying or Book Value at June 30, 2014 date of Disposal**	**$500**

	Sales Price	**$-0-**
Less:	**Carrying or Book Value at June 30, 2014 date of Disposal**	**$500**
Equals:	**Loss on June 30, 2014 date of Disposal**	**$500**

The asset had a cost of $10,000. Salvage value was estimated at zero. It had an estimated life of 10 years. Straight-line depreciation was used.

After 9½ years the asset was disposed of. Accumulated depreciation, at the date of disposal, was $9,500. Therefore, at the date of disposal, the asset had a carrying or book value of $500 ($10,000 less $9,500). Since the asset had no economic value at the June 30, 2014, date of disposition, the asset was disposed of at a loss of the entire carrying or book value of $500. The journal entry to record the loss follows:

Accumulated Depreciation	**$9,500**	
Loss on Disposition of Plant Asset	**$500**	
Plant Asset		**$10,000**

The loss of $500 would be reported as an "other expense or loss" in the income statement. The loss on disposition is not part of "operations" or "operating activities."

Selling Plant Assets
Firms also sell plant assets. Using the same fact pattern from above, assume the asset is sold for $1,000 (at a gain or above book value), $500 (no gain or loss or at an amount equal to book value), and for $100 (at a loss or below book value), as follows:

Sale for $1,000 – above carrying or book value
Assume the firm receives $1,000 in cash for sale of the plant asset on June 30, 2014:

	Sales Price	$1,000
Less:	Carrying or Book Value at June 30, 2014 date of Disposal	$500
Equals:	Gain on June 30, 2014 date of Disposal	$500

The appropriate journal entry follows:

Accumulated Depreciation	$9,500	
Cash	$1,000	
Plant Asset		$10,000
Gain on Sale of Plant Asset		$500

Sale for $500 – at carrying or book value
Assume the firm receives $500 in cash for sale of the plant asset on June 30, 2014:

	Sales Price	$500
Less:	Carrying or Book Value at June 30, 2014 date of Disposal	$500
Equals:	Loss on June 30, 2014 date of Disposal	$-0-

The appropriate journal entry follows:

Accumulated Depreciation	$9,500	
Cash	$500	
Plant Asset		$10,000

Sale for $100 – below carrying or book value
Assume the firm receives $100 in cash for sale of the plant asset on June 30, 2014:

	Sales Price	$100
Less:	Carrying or Book Value at June 30, 2014 date of Disposal	$500
Equals:	Loss on June 30, 2014 date of Disposal	$400

The appropriate journal entry follows:

Accumulated Depreciation	**$9,500**	
Loss on Disposition of Plant Asset	**$400**	
Cash	**$100**	
Plant Asset		**$10,000**

Exchanging Plant Assets

Accounting for the exchange of plant assets is more complex – a topic typically covered in intermediate-level financial accounting courses. Exchanges of plant assets are classified into two categories: (1) those exchange with commercial substance and (2) those exchanges without commercial substance.

A single fact pattern will be used to illustrate how gains and losses are handled for transactions with and without commercial substance.

Assume that the asset exchanged cost $20,000. At the date of the exchange, this asset had accumulated depreciation of $12,000. Cash of $5,000 was paid to complete the asset exchange. The carrying or book value of the asset is $8,000. Therefore, the carrying or book value plus the cash are $13,000.

Two alternatives will be developed. In the first case, the market value of the asset received is $15,000, resulting in a gain of $2,000. In the second case, the market value of the asset received is $11,000, resulting in a loss of $2,000.

All of the above information is summarized in the following table:

		GAIN	LOSS
Market Value of Asset Received		$15,000	$11,000
Cost	$20,000		
Accumulated Depreciation	$12,000		
Carrying or Book Value	$8,000		
Cash	$5,000		
Carrying of Book Value of Assets Given	$13,000	$13,000	$13,000
Gain (Loss) on Exchange		$2,000	($2,000)

Keep the following in mind…

- Regardless of other components of the fact pattern, the cost of the old asset is $20,000, so this amount must be credited to the Plant Asset account.
- Regardless of other components of the fact pattern, the accumulated depreciation for the old asset is $12,000, so this amount must be debited to the accumulated depreciation account.
- Regardless of other components of the fact pattern, the cash given up for the exchange is $5,000, so this amount must be credited to the cash account.

Therefore, the only questions follow:

1. What is the gain, if any?
2. What is the loss, if any?
3. What is the carrying or book value of the new plant asset?

Exchanges of Plant Assets – WITH Commercial Substance
An exchange has commercial substance if the firm's future cash flows change as a result of the transaction. In these cases, a gain or loss is recorded based on the difference between the carrying or book value of the asset(s) given up and the fair market value of the asset(s) received.

The journal entry for an exchange of plant assets WITH commercial substance and a gain follows:

Accumulated Depreciation – Old	**$12,000**	
Plant Asset - New	**$15,000**	
Cash		**$5,000**
Plant Asset - Old		**$20,000**
Gain on Sale of Plant Asset		**$2,000**

The journal entry for an exchange of plant assets WITH commercial substance and a loss follows:

Accumulated Depreciation – Old	**$12,000**	
Plant Asset - New	**$13,000**	
Cash		**$5,000**
Plant Asset - Old		**$20,000**

Exchanges of Plant Assets - WITHOUT Commercial Substance
An exchange has no commercial substance if the firm's future cash flows do not change as a result of the transaction. In these cases, a gain or loss is not recorded. The book value of the asset(s) received is based on the carrying or book value of the asset(s) given up, as follows:

Accumulated Depreciation – Old	**$12,000**	
Plant Asset - New	**$13,000**	
Cash		**$5,000**
Plant Asset - Old		**$20,000**

Natural Resources are assets that are consumed when used (e.g., timber, mineral deposits and oil fields). Depletion involves the allocation of a natural resource to the period consumed.

For example, assume that land with mineral rights is purchased for $100,000. The land, a non-wasting asset, is worth $10,000. The geological engineers have estimated that

the coal, a natural resource found, through testing, to be available on the on the land, at 90,000 tons. Therefore, the cost allocated to the mineral reserves is $1 per ton. Assume that only 1 ton of coal is mined in the first month of operations, as follows:

Depletion Expense	**$1,000**	
Accumulated Depletion		**$1,000**

Intangible Assets – Cost and Amortization

Intangible assets lack physical existence and do not include financial instruments. They may be purchased or internally created.

Tangible assets are depreciated over their economic or useful life. Similarly, intangible assets are amortized over their limited life. An intangible asset with an indefinite life is not amortized, just as land is not depreciated.

Patents are granted by the U.S. Government and protect the rights of inventors, encouraging innovation. This exclusive right is for 20 years. When purchased, the cost is capitalized as an asset. Lawsuits to defend patents are also capitalized. Both differ from internal research and development costs incurred to develop a new invention or innovative process with economic value – these costs are expensed.

Assume that a patent is purchased from an external party at a cost of $10,000. Further assume that the patent has a remaining life of 10 years. At the end of each year, the following journal entry would be made to amortize the $10,000 cost and amount debited to the Patent (asset) account when the patent was purchased.

Amortization Expense – Patents	**$1,000**	
Accumulated Amortization – Patents		**$1,000**

Copyrights give the owner an exclusive right to publish and sell musical, literary or artistic work for the life of the creator plus 70 years. Costs are amortized over this or the shorter useful life. Copyright fees, if material or significant in dollar amount, are capitalized and amortized. If immaterial or insignificant, it is charged directly to an expense account.

Franchises and **licenses** represent rights to deliver a product or service under specified conditions. Examples include McDonald's and Pizza Hut. The costs of franchises and licenses are debited to an appropriate asset account and amortized over the life of the contract or agreement. If the life is indefinite, costs are not amortized.

Trademarks and **Trade** (or **Brand) Names** include unique symbols, names and brands to market products. Examples include Pepsi and Burger King. Exclusive use and ownership is established by registering with the U.S. Patent Office. The cost of developing, maintaining, or enhancing value is expensed. However, if purchased, the cost is debited to an asset account and amortized over its expected life. If the life is indefinite, costs are not amortized.

Goodwill is the dollar amount that cannot be identified by the fair market value of the net assets purchased. For example, assume that a firm is purchased for $100,000. The assets had a fair market value of $150,000 and the liabilities had a fair market value of $70,000 on the date of purchase. Therefore, a firm with net assets valued at $80,000 ($100,000 - $80,000) was purchased for $100,000. The difference – $20,000 – is goodwill. The slang term is "blue sky" (i.e., something intangible). Goodwill is an asset, but is not amortized. However, Goodwill must be tested, annually, for impairment in book or carrying value. This topic is covered in greater detail in intermediate and advanced financial accounting courses.
An example follows:

	Cash	$10,000
	Accounts receivable	$1,000
	Inventory	$5,000
	Property, plant & equipment	$15,000
	Total assets	$31,000
Less:	Liabilities	$6,000
Equals:	Net assets	$25,000
Less:	Cost	$30,000
Equals:	Excess of cost (Goodwill)	$(5,000)

In the above case, appraisals result in a value of $25,000 for all net assets of the firm purchased, but the purchase price is $30,000. The $5,000 difference is accounted for as goodwill, an intangible asset.

Leasehold is a term used to describe property rented under a contract. The lessor is the property owner and the lessee is the renter. Monthly payments are debited to a rent expense account. Chapter 10 introduces distinctions between capital and operating leases.

Leasehold Improvements include alterations or modifications to a leased property. They might include partitions (or walls), fixtures, and storefronts. These improvements might represent real or personal property and are amortized over the term of the lease.

Other Intangibles include convents not-to-compete. These are amortized over the life or term specified in the agreement.

Appendix A

Total Asset Turnover

Total asset turnover is really not unlike inventory turnover, covered in the appendix to chapter 5:

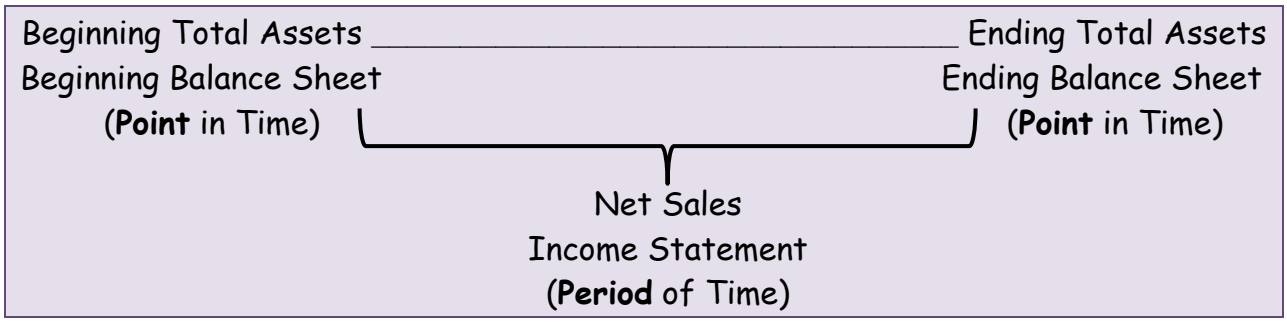
Inventory turnover = Cost of goods sold ÷ Average inventory

It is also comparable to the accounts receivable turnover measure covered in the appendix to chapter 7:

Accounts receivable turnover = Net sales ÷ Average accounts receivable (net)

The difference between these asset components (above) and their turnover rates is that total asset turnover, as the name suggests, includes both of these components and all other assets. As was the case with inventory turnover and accounts receivable turnover, total asset turnover uses the income statement measure in the numerator and the average of the beginning and ending inventory measures in the denominator, as follows:

Total asset turnover = Net sales ÷ Average total assets



Appendix B

The Wild Text:

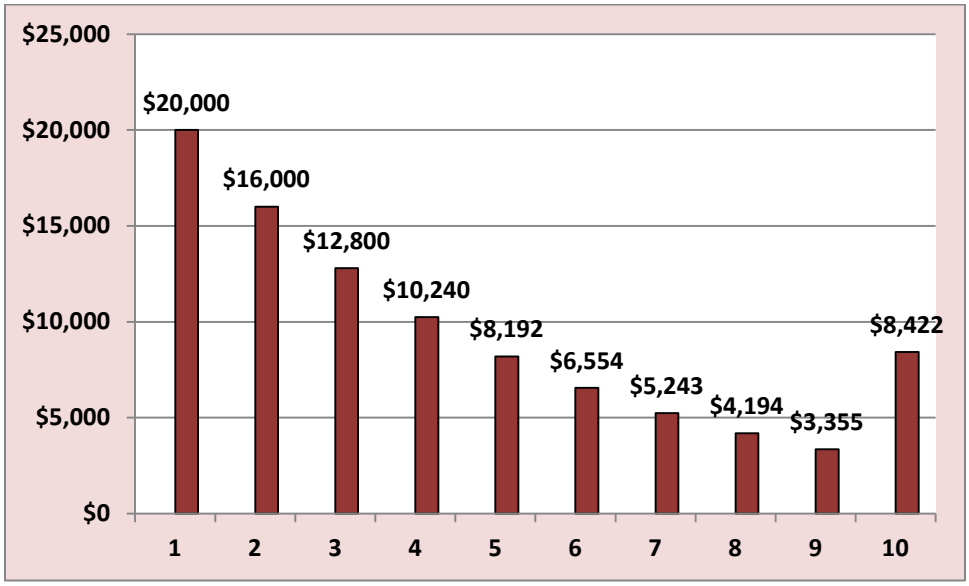
A Methodological Flaw

Some introductory texts contain technically incorrect methodologies, relying on later or intermediate courses to correct them for discipline majors. The below illustrates why the use of 200% or double-declining balance depreciation methods might require a switch to straight-line, as illustrated, correctly, in the case of MACRS, used by the IRS.

Assume that a firm purchased an asset at a cost of $100,000. They estimate a 10 year life and $5,000 salvage. Straight-line over 10 years would result in depreciation of 10 percent of the depreciable base (cost, under double-declining balance) each year. They apply the double-declining balance method, so this 10 percent would be doubled to 20 percent. They do not switch to straight-line depreciation at any point in the asset's life (see Exhibit 8.12 on page 333 of the 3rd edition for a methodologically comparable "plug"). The below table illustrates why the switch to straight-line might be desirable:

	A	B	C	D	E	F	G
			[A-B]		[CxD]		[A-F]
Year or Period	Cost	Salvage	Depreciable Base or Cost	Depreciation Rate	Depreciation Expense	Accumulated Depreciation	Book Value
0	$100,000	$5,000	$100,000	0	$0	$0	$100,000
1	$100,000	$5,000	$100,000	20%	$20,000	$20,000	$80,000
2	$100,000	$5,000	$100,000	20%	$16,000	$36,000	$64,000
3	$100,000	$5,000	$100,000	20%	$12,800	$48,800	$51,200
4	$100,000	$5,000	$100,000	20%	$10,240	$59,040	$40,960
5	$100,000	$5,000	$100,000	20%	$8,192	$67,232	$32,768
6	$100,000	$5,000	$100,000	20%	$6,554	$73,786	$26,214
7	$100,000	$5,000	$100,000	20%	$5,243	$79,028	$20,972
8	$100,000	$5,000	$100,000	20%	$4,194	$83,223	$16,777
9	$100,000	$5,000	$100,000	20%	$3,355	$86,578	$13,422
10	$100,000	$5,000	$100,000	20%	$8,422	$95,000	$5,000
Total					$95,000		

Note the significant "plug" required in the last year to fully depreciate the asset, clearly illustrated in the following graph, where the bars indicate the relative amount of depreciation expense for each year:



Note that depreciation expense is $8,422 in year 10 of the asset's life.

A comparable methodological flaw is contained in text homework exercise 8-5 and 8-13 (3rd edition) 8-4 and 8-8 (4th edition) and, perhaps, some others.