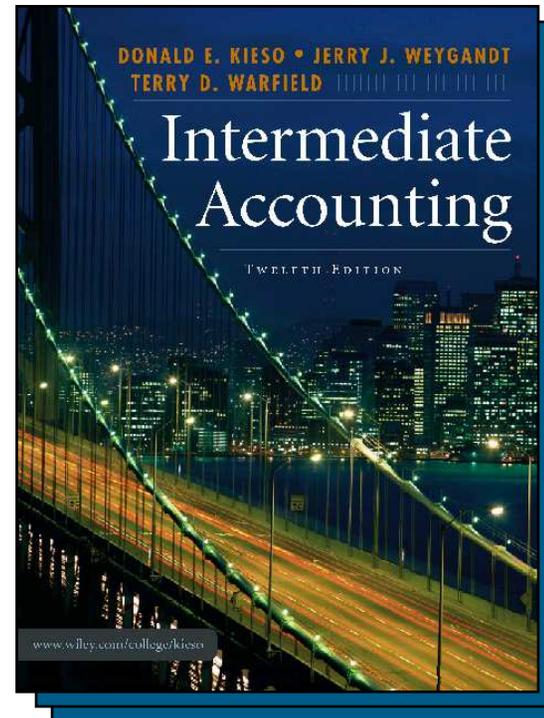


Property, Plant, and Equipment: Cost Allocation and Impairment

Chapter 11

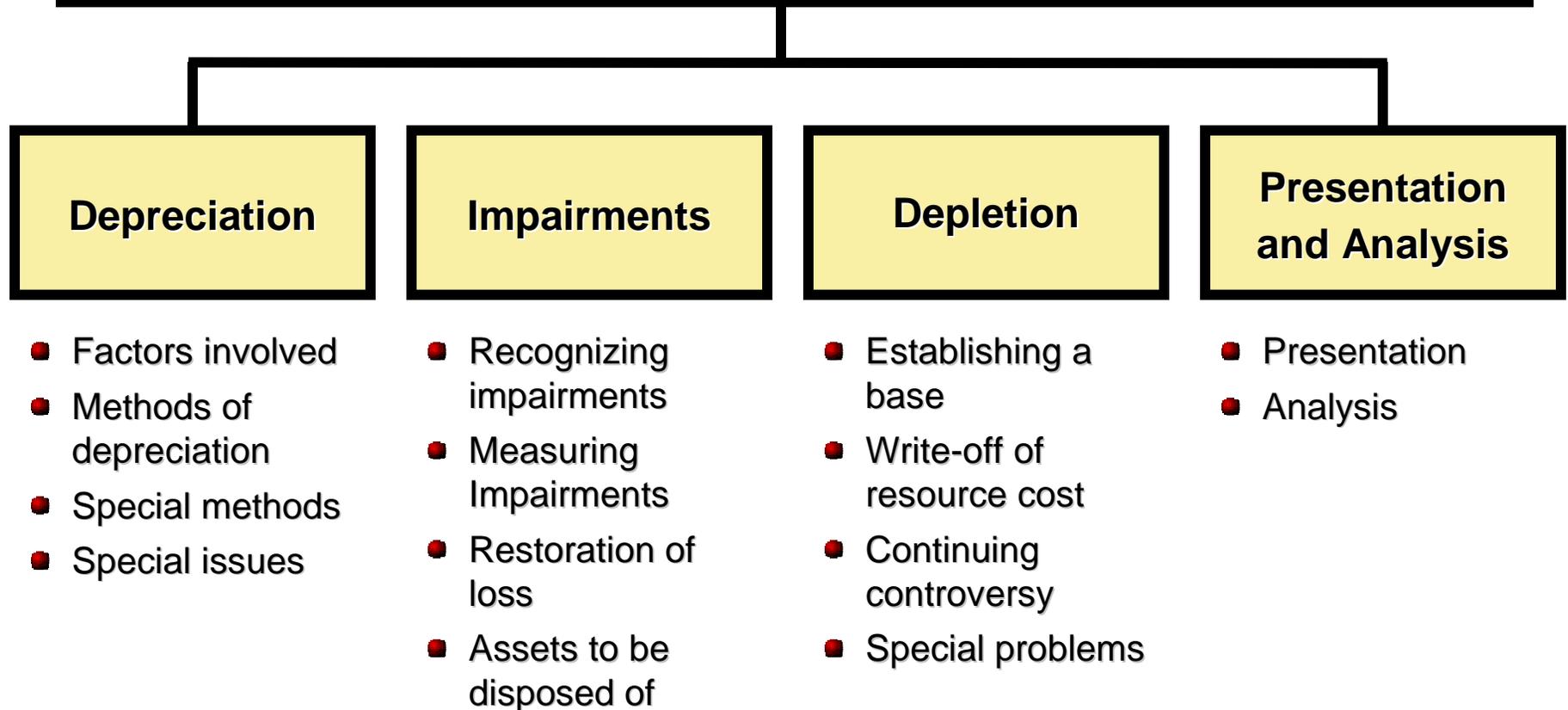
Intermediate Accounting
12th Edition
Kieso, Weygandt, and Warfield



Learning Objectives

1. Explain the concept of depreciation.
2. Identify the factors involved in the depreciation process.
3. Compare activity, straight-line, and decreasing-charge methods of depreciation.
4. Explain special depreciation methods.
5. Explain the accounting issues related to asset impairment.
6. Explain the accounting procedures for depletion of natural resources.
7. Explain how to report and analyze property, plant, equipment, and natural resources.

Depreciation, Impairments, and Depletion



Depreciation - Method of Cost Allocation

Depreciation is the accounting process of allocating the cost of **tangible assets to expense** in a systematic and rational manner to those periods expected to benefit from the use of the asset.

Allocating costs of long-term assets:

- Fixed assets = Depreciation expense
- Intangibles = Amortization expense
- Natural resources = Depletion expense

Depreciation - Method of Cost Allocation

Factors Involved in the Depreciation Process

Three basic questions:

- (1) What depreciable base is to be used?
- (2) What is the asset's useful life?
- (3) What method of cost allocation is best?

Depreciation - Method of Cost Allocation

Methods of Depreciation

The profession requires the method employed be "systematic and rational." Examples include:

- (1) Activity method (units of use or production).
- (2) Straight-line method.
- (3) Sum-of-the-years'-digits. } Accelerated methods
- (4) Declining-balance method. }
- (5) Group and composite methods. } Special methods
- (6) Hybrid or combination methods. }

Depreciation - Method of Cost Allocation

Exercise (Depreciation Computations—Four Methods) Robert Parish Corporation purchased a new machine for its assembly process on September 30, 2007. The cost of this machine was \$117,900. The company estimated that the machine would have a salvage value of \$12,900 at the end of its service life. Its life is estimated at 5 years and its working hours are estimated at 1,000 hours. Year-end is December 31.

Instructions: Compute the depreciation expense under the following methods.

- (a) Straight-line depreciation.
- (b) Activity method.
- (c) Sum-of-the-years'-digits.
- (d) Double-declining balance.

Depreciation - Method of Cost Allocation

Exercise (Straight-line Method)

Year	Depreciable Base		Years		Annual Expense		Partial Year		Current Year Expense	Accum. Deprec.
2007	\$ 105,000	/	5	=	\$ 21,000	x	3/12	=	\$ 5,250	\$ 5,250
2008	105,000	/	5	=	21,000				21,000	26,250
2009	105,000	/	5	=	21,000				21,000	47,250
2010	105,000	/	5	=	21,000				21,000	68,250
2011	105,000	/	5	=	21,000				21,000	89,250
2012	105,000	/	5	=	21,000	x	9/12	=	15,750	105,000
									<u>\$ 105,000</u>	

Journal entry:

2007	Depreciation expense	5,250
	Accumulated depreciation	5,250

Depreciation - Method of Cost Allocation

Exercise (Activity Method)

(\$105,000 / 1,000 hours = \$105 per hour)

Year	(Given) Hours Used		Rate per Hours	=	Annual Expense	Partial Year	Current Year Expense	Accum. Deprec.
2007	200	x	\$105	=	\$ 21,000		\$ 21,000	\$ 21,000
2008	150	x	105	=	15,750		15,750	36,750
2009	250	x	105	=	26,250		26,250	63,000
2010	300	x	105	=	31,500		31,500	94,500
2011	100	x	105	=	10,500		10,500	105,000
	<u>1,000</u>						<u>\$ 105,000</u>	

Journal entry:

2007	Depreciation expense	21,000	
	Accumulated depreciation		21,000

Depreciation - Method of Cost Allocation

Exercise (Sum-of-the-years'-digits Method)

Year	Depreciable Base		Years		Annual Expense	Partial Year	Current Year Expense	Accum. Deprec.
2007	\$ 105,000	x	5/15	=	\$ 35,000	x 3/12	\$ 8,750	\$ 8,750
2008	105,000	x	4.75/15	=	33,250		33,250	42,000
2009	105,000	x	3.75/15	=	26,250		26,250	68,250
2010	105,000	x	2.75/15	=	19,250		19,250	87,500
2011	105,000	x	1.75/15	=	12,250		12,250	99,750
2012	105,000	x	.75/15	=	5,250		5,250	105,000
							<u>\$ 105,000</u>	

Journal entry:

2007	Depreciation expense	8,750
	Accumulated depreciation	8,750

Depreciation - Method of Cost Allocation

Exercise (Double-Declining Balance Method)

Year	Depreciable Base	Rate per Year	Annual Expense	Partial Year	Current Year Expense	Accum. Deprec.
2007	\$ 117,900	x 40%	= \$ 47,160	x 3/12	= \$ 11,790	\$ 11,790
2008	106,110	x 40%	= 33,602		33,602	45,392
2009	72,509	x 40%	= 18,127		18,127	63,519
2010	54,381	x 40%	= 9,970		9,970	73,489
2011	44,411	x 40%	= 5,181		5,181	78,670
2012	39,230	x 40%	= 1,962	Plug	26,330	105,000
					<u>\$ 105,000</u>	

Journal entry:

2007	Depreciation expense	11,790
	Accumulated depreciation	11,790

Depreciation - Method of Cost Allocation

Special Depreciation Methods

The choice of method depends on the nature of the assets involved:

- **Group method** used when the assets are similar in nature and have approximately the same useful lives.
- **Composite approach** used when the assets are dissimilar and have different lives.
- Companies are also free to develop tailor-made depreciation methods, provided the method results in the allocation of an asset's cost in a systematic and rational manner (**Hybrid or Combination Methods**).

Depreciation - Method of Cost Allocation

Special Depreciation Issues

- (1) How should companies compute depreciation for partial periods?
 - Companies normally compute depreciation on the basis of the nearest full month.
- (2) Does depreciation provide for the replacement of assets?
 - Funds for the replacement of the assets come from the revenues
- (3) How should companies handle revisions in depreciation rates?

Depreciation - Method of Cost Allocation

Changes in Depreciation Rate

- Accounted for in the period of change and future periods (*Change in Estimate*)
- Not handled retrospectively
- Not considered errors or extraordinary items

Change in Estimate Example

Arcadia HS, purchased equipment for \$510,000 which was estimated to have a useful life of 10 years with a salvage value of \$10,000 at the end of that time. Depreciation has been recorded for 7 years on a straight-line basis. In 2005 (year 8), it is determined that the total estimated life should be 15 years with a salvage value of \$5,000 at the end of that time.

Questions:

- What is the journal entry to correct the prior years' depreciation?
- Calculate the depreciation expense for 2005.

**No Entry
Required**



Change in Estimate Example

After 7 years

Equipment cost	\$510,000	
Salvage value	- 10,000	
Depreciable base	<u>500,000</u>	
Useful life (original)	<u>10 years</u>	
Annual depreciation	<u><u>\$ 50,000</u></u>	× 7 years = \$350,000

First, establish NBV at date of change in estimate.

Balance Sheet (Dec. 31, 2004)

Fixed Assets:

Equipment	\$510,000
Accumulated depreciation	<u>350,000</u>
Net book value (NBV)	<u>\$160,000</u>

Change in Estimate Example

After 7 years

Net book value	\$160,000
Salvage value (new)	<u>5,000</u>
Depreciable base	155,000
Useful life remaining	<u>8 years</u>
Annual depreciation	<u><u>\$ 19,375</u></u>

Depreciation
Expense calculation
for 2005.

Journal entry for 2005

Depreciation expense	19,375	
Accumulated depreciation		19,375

Impairments

When the carrying amount of an asset is not recoverable, a company records a write-off referred to as an **impairment**.

Events leading to an impairment:

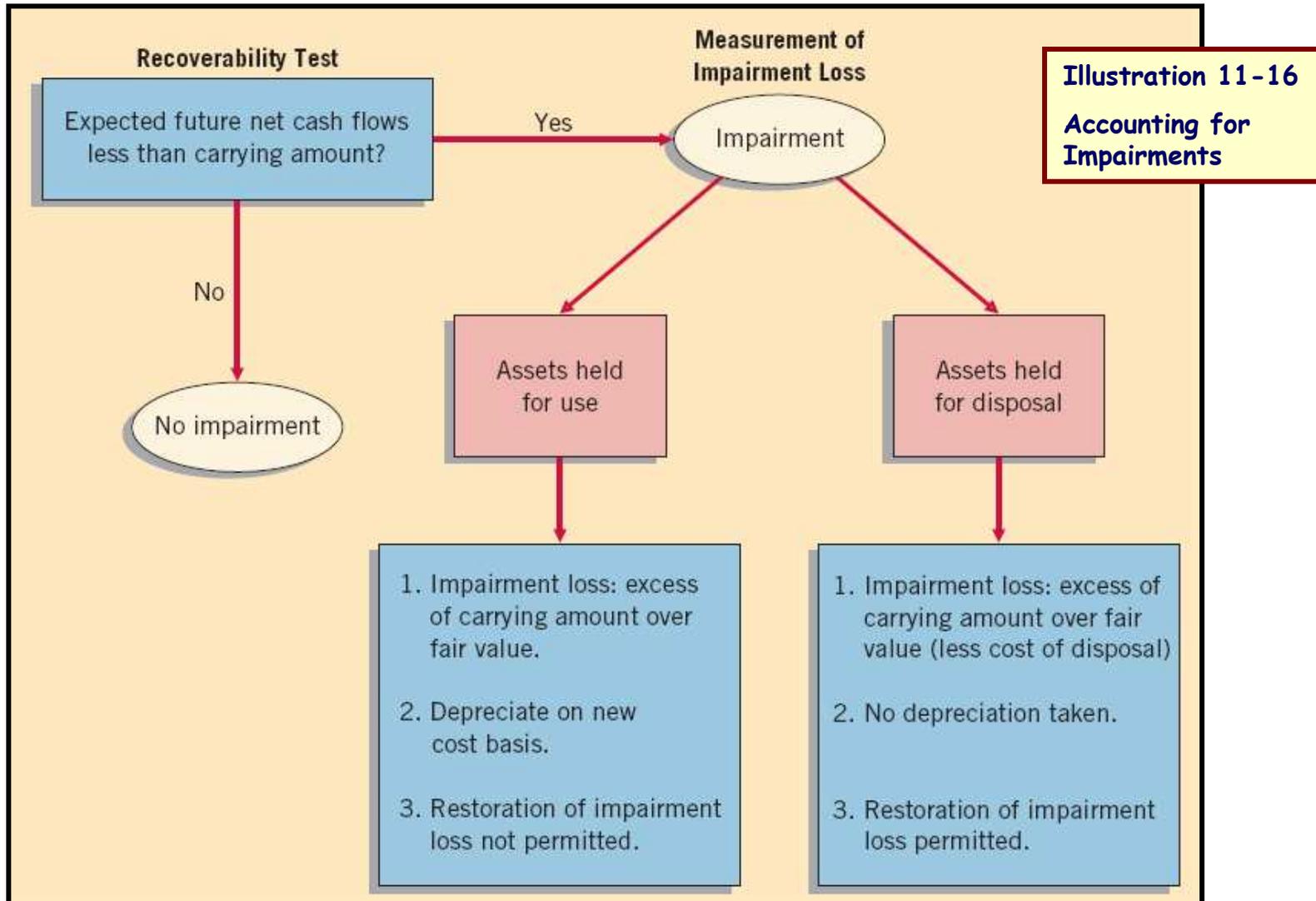
- a. Decrease in the market value of an asset.
- b. Change in the manner in which an asset is used.
- c. Adverse change in legal factors or in the business climate.
- d. An accumulation of costs in excess of the amount originally expected to acquire or construct an asset.
- e. A projection or forecast that demonstrates continuing losses associated with an asset.

Impairments

Measuring Impairments

1. Review events for possible impairment.
2. If the review indicates impairment, apply the recoverability test. If the sum of the expected future net cash flows from the long-lived asset is less than the carrying amount of the asset, an impairment has occurred.
3. Assuming an impairment, the impairment loss is the amount by which the carrying amount of the asset exceeds the fair value of the asset. The fair value is the market value or the present value of expected future net cash flows.

Impairments



Impairments

E11-16 (Impairment) Presented below is information related to equipment owned by Suarez Company at December 31, 2007. Assume that Suarez will continue to use this asset in the future. As of December 31, 2007, the equipment has a remaining useful life of 4 years.

Cost	\$ 9,000,000
Accumulated depreciation to date	1,000,000
Expected future net cash flows	7,000,000
Fair value	4,800,000

Instructions:

- Prepare the journal entry (if any) to record the impairment of the asset at December 31, 2007.
- Prepare the journal entry to record depreciation expense for 2008.
- The fair value of the equipment at December 31, 2008, is \$5,100,000. Prepare the journal entry (if any) necessary to record this increase in fair value.

Impairments

(a).	Cost	\$9,000,000
	Accumulated depreciation	1,000,000
	Carrying amount	<u>8,000,000</u>
	Fair value	<u>4,800,000</u>
	Loss on impairment	<u><u>\$3,200,000</u></u>

12/31/07

Loss on impairment	3,200,000	
Accumulated depreciation		3,200,000

Impairments

(b).	Net carrying amount	\$4,800,000
	Useful life	4 years
	Depreciation per year	<u>\$1,200,000</u>

12/31/08

Depreciation expense	1,200,000	
Accumulated depreciation		1,200,000

(c). Restoration of any impairment loss is not permitted.

Depletion

Natural resources, often called wasting assets, include petroleum, minerals, and timber.

They have two main features:

1. complete removal (consumption) of the asset, and
2. replacement of the asset only by an act of nature.

Depletion is the process of allocating the cost of natural resources.

Depletion

Establishing a Depletion Base

Computation of the depletion base involves four factors:

- (1) Acquisition cost of the deposit,
- (2) Exploration costs,
- (3) Development costs, and
- (4) Restoration costs.

Depletion

Write-off of Resource Cost

Normally, companies compute depletion on a **units-of-production method** (an activity approach). Thus, depletion is a function of the number of units extracted during the period.

Calculation:

$$\frac{\text{Total cost} - \text{Salvage value}}{\text{Total estimated units available}} = \text{Depletion cost per unit}$$
$$\text{Units extracted} \times \text{Cost per unit} = \text{Depletion}$$

Depletion

E11-19 (Depletion Computations—Timber) Stanislaw Timber Company owns 9,000 acres of timberland purchased in 1996 at a cost of \$1,400 per acre. At the time of purchase the land without the timber was valued at \$400 per acre. In 1997, Stanislaw built fire lanes and roads, with a life of 30 years, at a cost of \$84,000. Every year Stanislaw sprays to prevent disease at a cost of \$3,000 per year and spends \$7,000 to maintain the fire lanes and roads. During 1998, Stanislaw selectively logged and sold 700,000 board feet of timber, of the estimated 3,500,000 board feet. In 1999, Stanislaw planted new seedlings to replace the trees cut at a cost of \$100,000.

Instructions:

Determine the depreciation expense and the cost of timber sold related to depletion for 1998.

Depletion

E11-19 (Depletion Computations—Timber)

Depreciation Expense:

Fire lanes and roads	\$ 84,000
Useful life	30
Depreciation expense per year	<u>\$ 2,800</u>

Depletion

E11-19 (Depletion Computations—Timber)

Depletion:

Cost of timberland per acre	\$	1,400
Cost of land per acre		(400)
		<hr/>
Cost of timber only per acre	\$	1,000
Total acres		9,000
		<hr/>
Value of timber	\$	9,000,000
Estimated total board feet		3,500,000
		<hr/>
Cost per board foot	\$	2.57
Board feet of timber sold		700,000
		<hr/>
Cost of timber sold related to depletion	\$	<u>1,800,000</u>

Depletion

Continuing Controversy

- Oil and Gas Industry:
- Full cost concept
- Successful efforts concept

Special Problems in Depletion Accounting

1. Difficulty of estimating recoverable reserves.
2. Problems of discovery value.
3. Tax aspects of natural resources.
4. Accounting for liquidating dividends.

Presentation and Analysis

Presentation of Property, Plant, Equipment, and Natural Resources

Depreciating assets, use Accumulated Depreciation.

Depleting assets may include use of Accumulated Depletion account, or the direct reduction of asset.

Disclosures

- Basis of valuation (cost)
- Pledges, liens, and other commitments
- Depreciation expense for the period.
- Balances of major classes of depreciable assets.
- Accumulated depreciation.
- A description of the depreciation methods used.

Presentation and Analysis

Rate of Return on Assets measures a firm's success in using assets to generate earnings.

$$\begin{aligned} \text{ROA} &= \frac{\text{Net Income}}{\text{Average Total Assets}} \\ 6.56\% &= \frac{\$56,200}{(\$1,030,400 + 682,400) / 2} \end{aligned}$$

Presentation and Analysis

The analyst obtains further insight into the behavior of ROA by **disaggregating** it into components of profit margin on sales and asset turnover as follows:

$$\begin{array}{ccccc} \boxed{\text{Rate of Return}} & & & & \boxed{\text{Asset}} \\ \boxed{\text{on Assets}} & = & \boxed{\text{Profit Margin}} & \times & \boxed{\text{Turnover}} \\ & & \boxed{\text{on Sales}} & & \\ \hline \text{Net Income} & & \text{Net Income} & & \text{Sales} \\ \hline \text{Average Total Assets} & = & \text{Sales} & \times & \text{Average Total Assets} \end{array}$$

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Presentation and Analysis

The **profit margin on sales** is a measure of the ability of a firm to generate operating income from a particular level of sales.

$$\begin{array}{rcc} \boxed{\text{Rate of Return}} & = & \boxed{\text{Profit Margin}} & \times & \boxed{\text{Asset}} \\ \boxed{\text{on Assets}} & & \boxed{\text{on Sales}} & & \boxed{\text{Turnover}} \\ \hline \text{Net Income} & = & \text{Net Income} & \times & \text{Sales} \\ \hline \text{Average Total Assets} & = & \text{Sales} & \times & \text{Average Total Assets} \end{array}$$

$$\boxed{6.56\%} = \boxed{18.73\%} \times \boxed{.3503}$$

Presentation and Analysis

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Differences in the profit margin on sales (from year to year) can be studied by analyzing individual revenues and expenses.

Presentation and Analysis

The **assets turnover** is a measure of a firm's ability to generate sales from a particular investment in assets.

$$\begin{array}{rcc} \boxed{\text{Rate of Return}} & = & \boxed{\text{Profit Margin}} \times \boxed{\text{Asset}} \\ \boxed{\text{on Assets}} & & \boxed{\text{on Sales}} \quad \boxed{\text{Turnover}} \\ \hline \text{Net Income} & = & \text{Net Income} \times \text{Sales} \\ \hline \text{Average Total Assets} & & \text{Average Total Assets} \end{array}$$

$$\boxed{6.56\%} = \boxed{18.73\%} \times \boxed{.3503}$$

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