7 Plant Assets, Natural Resources, & Intangibles

Learning Objective

1. **Measure and account for** the cost of plant assets
2. **Distinguish** a capital expenditure from an immediate expense
3. **Measure and record** depreciation on plant assets
4. **Analyze** the cash flow impact of long-lived asset transactions

7 Plant Assets, Natural Resources, & Intangibles

Learning Objective

1. **Measure and account for** the cost of plant assets

Exhibit 7-1 | Long-Lived Assets and Related Expense Accounts

Asset Account (Balance Sheet)	Related Expense Account (Income Statement)
Plant Assets	
Land	None
Buildings, Machinery, and Equipment	Depreciation Expense
Furniture and Fixtures	Depreciation Expense
Land Improvements	Depreciation Expense
Natural Resources	Depletion Expense (through cost of goods sold)
Intangibles	Amortization Expense

MEASURE AND ACCOUNT FOR THE COST OF PLANT ASSETS

Working rule for measuring the cost of an asset:

> ***The cost of any asset is the sum of all the costs incurred to bring the asset to its intended use***

Cost includes

- Purchase price
- Taxes
- Commissions
- Other amounts paid to make the asset ready for use

Land

Cost of land includes:

- Purchase price (cash plus any note payable given)
- Brokerage commission
- Survey fees
- Legal fees
- Back property taxes that the purchaser pays
- Expenditures for grading and clearing and for removing unwanted buildings

Illustration

FedEx signs a $300,000 note payable to purchase 20 acres of land for a new shipping site. FedEx also pays $10,000 for real estate commission, $8,000 of back property tax, $5,000 for removal of an old building, a $1,000 survey fee, and $260,000 to pave the parking lot—all in cash. **What is FedEx's cost of this land?**

	Land
Purchase price	$300,000
Real estate commission	10,000
Back property tax	8,000
Removal of building	5,000
Survey fee	1,000
Pave parking lot	0
Cost of Land	**$324,000**

Illustration

FedEx signs a $300,000 note payable to purchase 20 acres of land for a new shipping site. FedEx also pays $10,000 for real estate commission, $8,000 of back property tax, $5,000 for removal of an old building, a $1,000 survey fee, and $260,000 to pave the parking lot—all **in cash**.

FedEx records the purchase of the land as follows:

	Account	Debit	Credit

Buildings, Machinery, and Equipment

Cost of constructing a building includes:

- Architectural fees
- Building permits
- Contractors' charges
- Payments for material, labor, and overhead
- Interest on money borrowed to finance construction

Cost of purchasing a building includes:

- Purchase price
- Brokerage commission
- Sales and other taxes paid
- Expenditures to repair and renovate the building for its intended purpose

Buildings, Machinery, and Equipment

Cost of equipment includes:

- Purchase price (less any discounts)
- Transportation from the seller
- Insurance while in transit
- Sales and other taxes
- Purchase commission
- Installation costs
- Expenditures to test the asset before it's placed in service
- Cost of any special platforms

Land Improvements and Leasehold Improvements

Cost of land improvements include:

- Driveways, signs, fences, and sprinkler systems

These costs are subject to decay and should therefore be depreciated

Leasehold improvements

- Improvements to leased property
- Depreciated or amortized over lease term

Lump-Sum (or Basket) Purchases of Assets

- Several assets purchased in a group at one price
- Total cost is allocated based on their market values
- Technique is called the *relative-sales-value method*

Illustration: Suppose FedEx purchases land and a building in Denver. The building sits on two acres of land, and the combined purchase price of land and building is $2,800,000. An appraisal indicates that the land's market value is $300,000 and that the building's market value is $2,700,000.

Illustration

FedEx first figures the ratio of each asset's market value to the total market value. These percentages are then used to determine the cost of each asset:

Asset	Market (Sales) Value		Total Market Value		Percentage of Total Market Value		Total Cost	Cost of Each Asset
Land	$ 300,000	÷	$3,000,000	=	10%	×	$2,800,000	$ 280,000
Building	2,700,000	÷	3,000,000	=	90%	×	$2,800,000	2,520,000
Total	$3,000,000				100%			$2,800,000

LO 1

Illustration

If FedEx pays cash, the entry to record the purchase of the land and building is as follows:

Asset	Market (Sales) Value		Total Market Value		Percentage of Total Market Value		Total Cost	Cost of Each Asset
Land	$ 300,000	÷	$3,000,000	=	10%	×	$2,800,000	$ 280,000
Building	2,700,000	÷	3,000,000	=	90%	×	$2,800,000	2,520,000
Total	$3,000,000				100%			$2,800,000

	Account	Debit	Credit

Stop & Think...

How would FedEx divide a $120,000 lump-sum purchase price for land, building, and equipment with estimated market values of $40,000, $95,000, and $15,000, respectively?

Answer

	Estimated Market Value	Percentage of Total Market Value	×	Total Cost	=	Cost of Each Asset
Land	$ 40,000					
Building	95,000					
Equipment	15,000					
Total	$150,000					

***$40,000/$150,000 = 0.267**

7

Plant Assets, Natural Resources, & Intangibles

Learning Objective

2. **Distinguish** a capital expenditure from an immediate expense

DISTINGUISH A CAPITAL EXPENDITURE FROM AN IMMEDIATE EXPENSE

- **Capital expenditures** increase the asset's capacity or extend its useful life
- *Capitalized*, means the cost is added to an asset account and not expensed immediately

Exhibit 7-2

Record an Asset for Capital Expenditures	Record Repair and Maintenance Expense (Not an Asset) for an Expense
Extraordinary repairs:	Ordinary repairs:
Major engine overhaul	Repair of transmission or other mechanism
Modification of body for new use of truck	Oil change, lubrication, and so on
Addition to storage capacity of truck	Replacement of tires and windshield, or a paint job

7 Plant Assets, Natural Resources, & Intangibles

Learning Objective

3. **Measure and record** depreciation on plant assets

MEASURE AND RECORD DEPRECIATION ON PLANT ASSETS

Depreciation

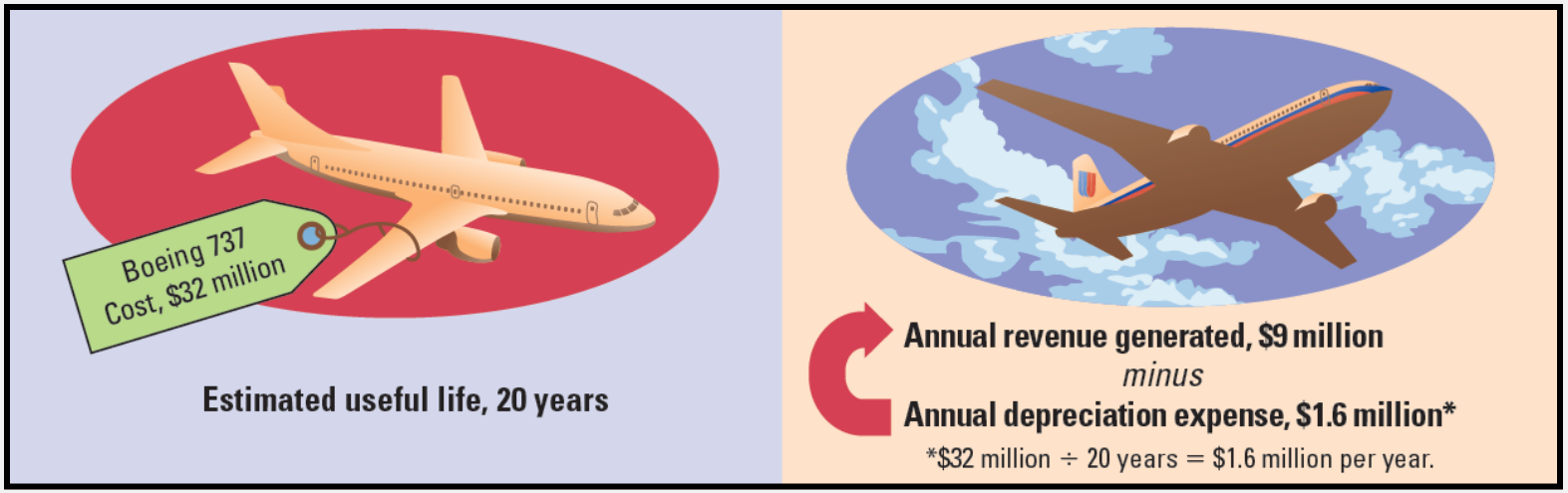
- Process that allocates a plant asset's cost to expense over its life
- Allocates cost against the revenue the asset helps earn each period
- Depreciation expense (not accumulated depreciation) is reported on the income statement
- Land is not depreciated

MEASURE AND RECORD DEPRECIATION ON PLANT ASSETS

Depreciation

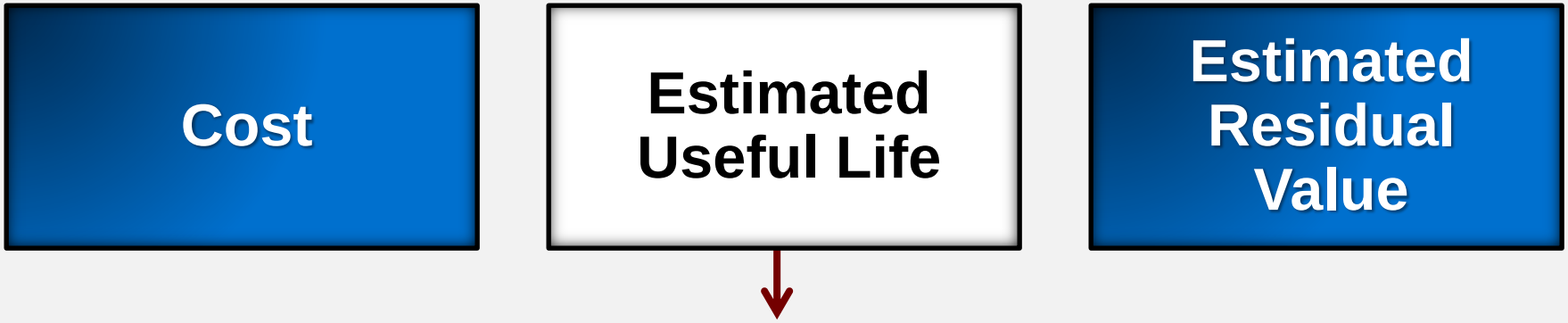
- **Is not** a process of valuation, it is purely a process of apportioning the cost of property, plant, and equipment
- **Does not** mean setting aside cash to replace assets as they wear out, and has absolutely nothing to do with how the cash needed to repurchase the asset is raised.

Exhibit 7-3 | Depreciation: Allocating Costs to Periods in Which Revenues Are Generated



How to Measure Depreciation

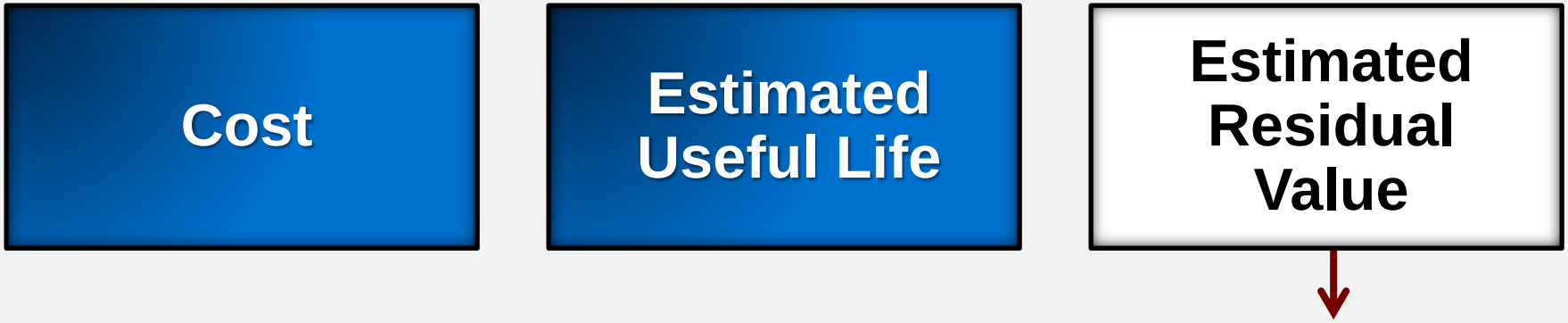
Need to Know Three Things



- Length of service expected from using the asset
- May be expressed in years, units of output, miles, or some other measure

How to Measure Depreciation

Need to Know Three Things



- Also called scrap value or salvage value
- Expected cash value of an asset at the end of its useful life
- **Not** depreciated

Depreciable Cost = Asset's cost - Estimated residual value

Depreciation Methods

Three Main Methods

Straight-line

Units-of-production

Double-declining-balance

Exhibit 7-4 | Depreciation Computation Data

Data Item	Amount
Cost of truck	$41,000
Less: Estimated residual value	(1,000)
Depreciable cost	$40,000
Estimated useful life:	
Years	5 years
Units of production	100,000 units [miles]

Depreciation Methods

Three Main Methods

Straight-line | **Units-of-production** | **Double-declining-balance**

- Equal amount of depreciation assigned to each year (or period)
- Depreciable cost is divided by useful life in years to determine the annual depreciation expense

Straight-line

Exhibit 7-4

Data Item	Amount
Cost of truck	$41,000
Less: Estimated residual value	(1,000)
Depreciable cost	$40,000
Estimated useful life:	
Years	5 years
Units of production	100,000 units [miles]

$$\text{Depreciation expense per year} = \frac{\text{Cost} - \text{Residual value}}{\text{Useful life, in years}}$$

$$= \frac{\qquad\qquad}{\qquad\qquad}$$

$$=$$

LO 3

Straight-line

The entry to record depreciation is

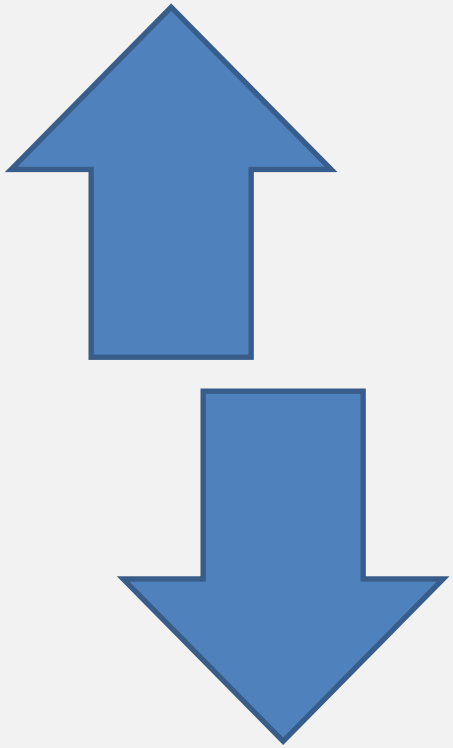
	Account	Debit	Credit
	Depreciation Expense - Truck	**8,000**	
	Accumulated Depreciation - Truck		**8,000**

Exhibit 7-5 | Straight-Line Depreciation Schedule for Truck

	A	B	C	D	E	F	G
1	Date	Cost	Rate*	Depreciable Cost	Yearly Expense	Accum. Deprec.	Book Value
2	1/1/2011	41,000		40,000			41,000
3	12/31/2011		0.2	40,000	8,000	8,000	33,000
4	12/31/2012		0.2	40,000	8,000	16,000	25,000
5	12/31/2013		0.2	40,000	8,000	24,000	17,000
6	12/31/2014		0.2	40,000	8,000	32,000	9,000
7	12/31/2015		0.2	40,000	8,000	40,000	1,000

Depreciation Methods

As an asset is used in operations and depreciated



Accumulated depreciation increases

Book value decreases

Asset's final book value = Residual value

Stop & Think...

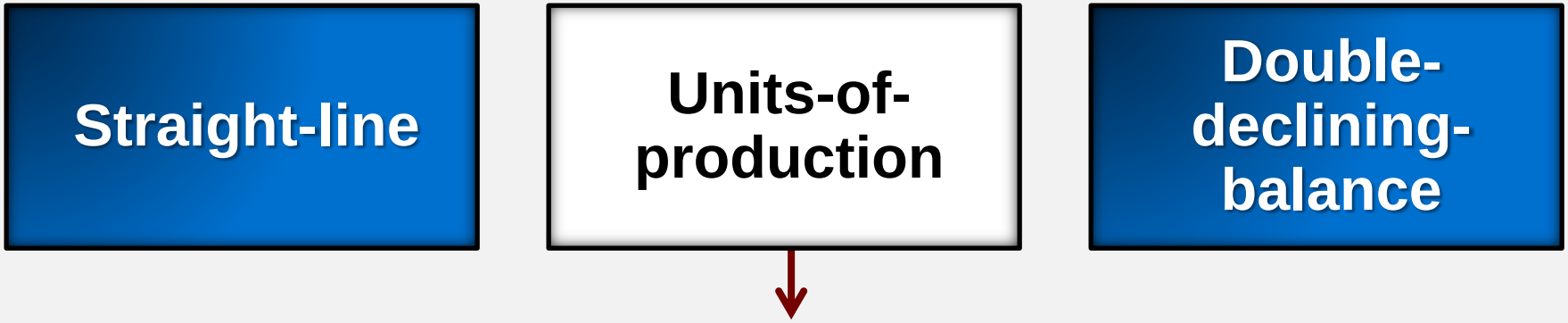
A FedEx sorting machine that cost $10,000 with a useful life of five years and a residual value of $2,000 was purchased on January 1. What is SL depreciation for each year?

Answer

Cost	
Less: Residual value	
Depreciable cost	
Useful life in years	
Depreciation expense per year	

Depreciation Methods

Three Main Methods



- **Fixed amount** of depreciation is assigned to each unit of output, or service, produced by the asset
- Depreciable cost is divided by useful life—in units of production—to determine fixed amount per-unit
- Per-unit depreciation expense is multiplied by number of units produced each period to compute total expense

Units-of-Production

Exhibit 7-4

Data Item	Amount
Cost of truck	$41,000
Less: Estimated residual value	(1,000)
Depreciable cost	$40,000
Estimated useful life:	
Years	5 years
Units of production	100,000 units [miles]

$$\text{Depreciation per unit of output} = \frac{\text{Cost} - \text{Residual value}}{\text{Useful life, in units}}$$

$$= \frac{\qquad\qquad}{\qquad\qquad}$$

$$=$$

Units-of-Production

Assume that FedEx expects to drive the truck 20,000 miles during the first year, 30,000 during the second, 25,000 during the third, 15,000 during the fourth, and 10,000 during the fifth. Exhibit 7-6 shows the UOP depreciation schedule.

Exhibit 7-6 | Units-of-Production (UOP) Depreciation Schedule for Truck

	A	B	C	D	E	F	G
1	Date	Cost	Rate per unit	Number Units	Yearly Expense	Accum. Deprec.	Book Value
2	1/1/2011	41,000					41,000
3	12/31/2011		0.4	20,000	8,000	8,000	33,000
4	12/31/2012		0.4	30,000	12,000	20,000	21,000
5	12/31/2013		0.4	25,000	10,000	30,000	11,000
6	12/31/2014		0.4	15,000	6,000	36,000	5,000
7	12/31/2015		0.4	10,000	4,000	40,000	1,000
8							

UOP depreciation varies with the number of units the asset produces

Units-of-Production

Exhibit 7-6 | Units-of-Production (UOP) Depreciation Schedule for Truck

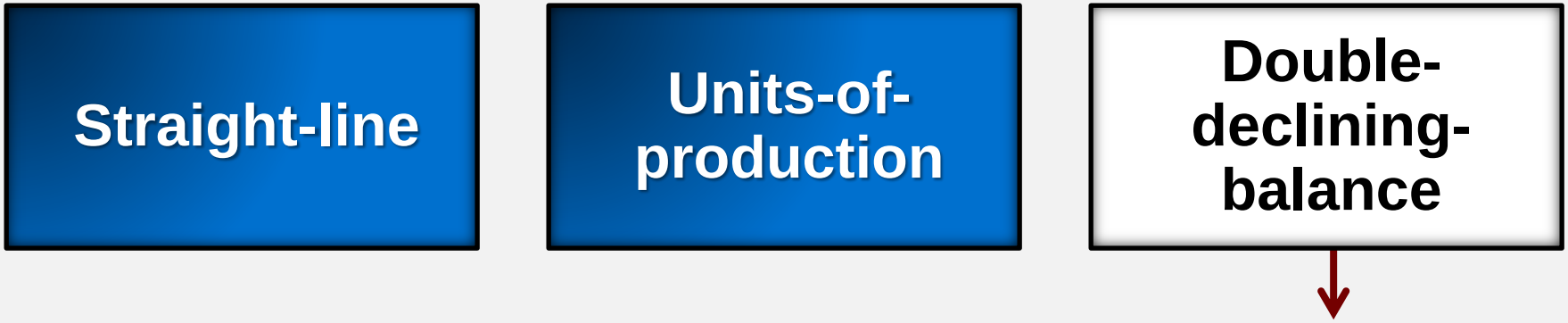
	A	B	C	D	E	F	G
1	Date	Cost	Rate per unit	Number Units	Yearly Expense	Accum. Deprec.	Book Value
2	1/1/2011	41,000					41,000
3	12/31/2011		0.4	20,000	8,000	8,000	33,000
4	12/31/2012		0.4	30,000	12,000	20,000	21,000
5	12/31/2013		0.4	25,000	10,000	30,000	11,000
6	12/31/2014		0.4	15,000	6,000	36,000	5,000
7	12/31/2015		0.4	10,000	4,000	40,000	1,000
8							

The entry to record depreciation is for year ended 12/31/2011 is

	Account	Debit	Credit
	Depreciation Expense - Truck	**8,000**	
	Accumulated Depreciation - Truck		**8,000**

Depreciation Methods

Three Main Methods



- Writes off a larger amount of the asset's cost near the start of its useful life than the straight-line method
- Most frequently used accelerated depreciation method
- Computes annual depreciation by multiplying asset's declining book value at the beginning of the year by a constant percentage two times the straight-line depreciation rate

Double-declining-balance

Exhibit 7-4

Data Item	Amount
Cost of truck	$41,000
Less: Estimated residual value	(1,000)
Depreciable cost	$40,000
Estimated useful life:	
Years	5 years
Units of production	100,000 units [miles]

$$\text{DDB depreciation rate per year} = \frac{1}{\text{Useful life, in years}} \times 2$$

$$= \frac{1}{\quad} \times 2$$

$$=$$

Double-declining-balance

Exhibit 7-7 | Double-Declining-Balance Depreciation Schedule for Truck

	A	B	C	D	E	F
1	Date	Cost	DDB Rate	Yearly Expense	Accum. Deprec.	Book Value
2	1/1/2011	41,000				41,000
3	12/31/2011		0.4	16,400	16,400	24,600
4	12/31/2012		0.4	9,840	26,240	14,760
5	12/31/2013		0.4	5,904	32,144	8,856
6	12/31/2014		0.4	3,542	35,686	5,314
7	12/31/2015		0.4	4,314	40,000	1,000*

For a 5-year asset the DDB rate is 40% (20% × 2)

Double-declining-balance

Exhibit 7-7 | Double-Declining-Balance Depreciation Schedule for Truck

	A	B	C	D	E	F
1	Date	Cost	DDB Rate	Yearly Expense	Accum. Deprec.	Book Value
2	1/1/2011	41,000				41,000
3	12/31/2011		0.4	16,400	16,400	24,600
4	12/31/2012		0.4	9,840	26,240	14,760
5	12/31/2013		0.4	5,904	32,144	8,856
6	12/31/2014		0.4	3,542	35,686	5,314
7	12/31/2015		0.4	4,314	40,000	1,000*

Multiply the rate by the period's beginning asset book value (40% x $41,000 = **$16,400**)

Ignore residual value of asset in computing depreciation, except during last year

Double-declining-balance

Exhibit 7-7 | Double-Declining-Balance Depreciation Schedule for Truck

	A	B	C	D	E	F
1	Date	Cost	DDB Rate	Yearly Expense	Accum. Deprec.	Book Value
2	1/1/2011	41,000				41,000
3	12/31/2011		0.4	16,400	16,400	24,600
4	12/31/2012		0.4	9,840	26,240	14,760
5	12/31/2013		0.4	5,904	32,144	8,856
6	12/31/2014		0.4	3,542	35,686	5,314
7	12/31/2015		0.4	4,314	40,000	1,000*

Final year's depreciation is $4,314—book value, end of year 4 of $5,314 less the $1,000 residual value

* Final-year depreciation is a plug amount needed to reduce asset book value to estimated salvage value

Double-declining-balance

DDB method differs from other methods in two ways:

- First-year depreciation is based on asset's full cost
- Final year depreciation is a **"plug"** amount needed to reduce book value to residual value

Stop & Think...

A FedEx sorting machine that cost $10,000 with a useful life of five years and a residual value of $2,000 was purchased on January 1. What is DDB depreciation each year for the asset?

Answer

Date		Cost		Rate		Annual Expense	Accumulated Depreciation	Book Value
Year 1	$	10,000	x	40%	=			
Year 2		6,000	x	40%	=			
Year 3		3,600	x	40%	=			
Year 4		2,160	x	40%	=			*
Year 5		2,000	x	40%	=			

*The asset is not depreciated below residual value of $2,000.

Comparing Depreciation Methods

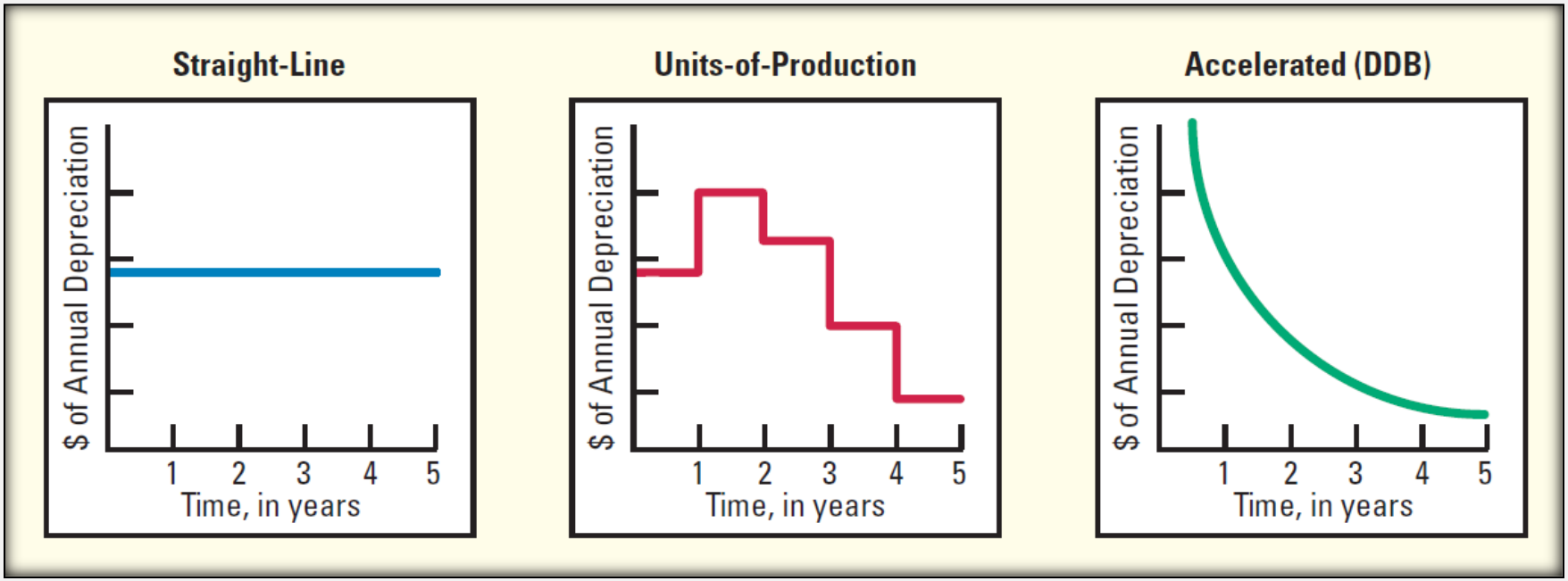
Straight-line	Units-of-production	Double-declining-balance
For a plant asset that generates revenue evenly over time, best meets the expense recognition principle	Best for assets that wear out because of use	Best for assets that generate more revenue early in useful life

Comparing Depreciation Methods

	Amount of Depreciation per Year		
Year	Straight-Line	Units-of-Production	Accelerated Method Double-Declining Balance
1	$ 8,000	$ 8,000	$16,400
2	8,000	12,000	9,840
3	8,000	10,000	5,904
4	8,000	6,000	3,542
5	8,000	4,000	4,314
Total	$40,000	$40,000	$40,000

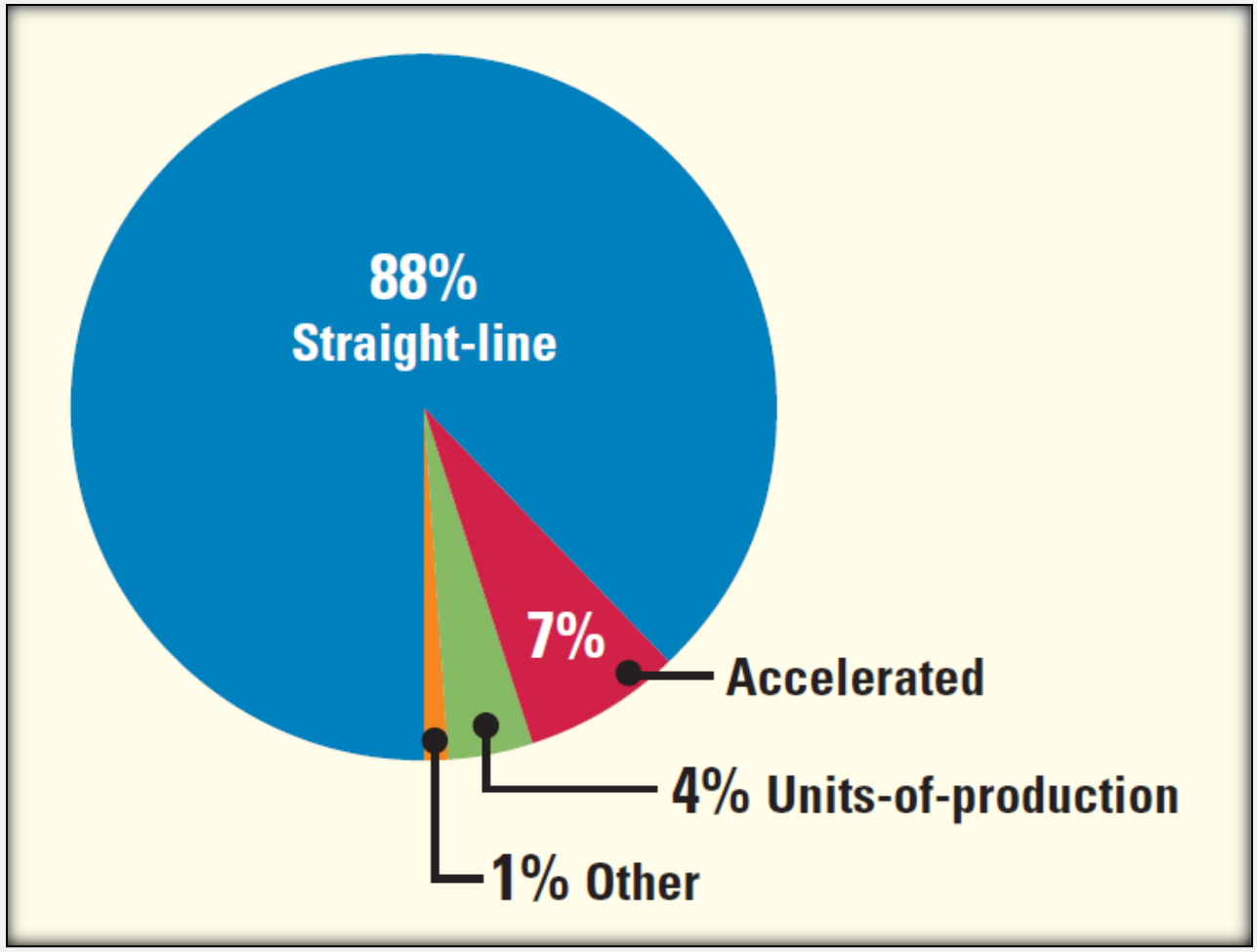
Comparing Depreciation Methods

Exhibit 7-8 | Depreciation Patterns Through Time



Comparing Depreciation Methods

Exhibit 7-9 | Depreciation Methods Used by 600 Companies



Illustration

Ralph's Pizza bought a used Toyota delivery van on January 2, 2014, for $13,000. The useful life of the van is 5 years. At the end of its useful life, Ralph's officials estimated that the van's residual value would be $1,000. **Prepare a schedule** of *depreciation expense* per year for the van using the **straight-line** method.

Illustration: Straight-line Method

Year	Depreciable Cost	x	Rate	=	Annual Expense	Accumulated Depreciation	Book Value
2014	$ 12,000						
2015	12,000						
2016	12,000						
2017	12,000						
2018	12,000						

Illustration

Ralph's Pizza bought a used Toyota delivery van on January 2, 2014, for $13,000. The van was expected to remain in service for five years (100,000 miles). At the end of its useful life, Ralph's officials estimated that the van's residual value would be $1,000. The van traveled 15,000 miles the first year, 30,000 miles the second year, 20,000 miles the third year, 25,000 miles in the fourth year, and 10,000 miles in the fifth year.

Prepare a schedule of *depreciation expense* per year for the van using the **units-of-production** method.

Illustration: Units-of-Production

Year	Miles Driven	x	Rate per Mile	=	Annual Expense	Accumulated Depreciation	Book Value
2014	15,000						
2015	30,000						
2016	20,000						
2017	25,000						
2018	10,000						

Depreciation per unit of output = ——————————— =

Illustration

Ralph's Pizza bought a used Toyota delivery van on January 2, 2014, for $13,000. The useful life of the van is 5 years. At the end of its useful life, Ralph's officials estimated that the van's residual value would be $1,000.

Prepare a schedule of *depreciation expense* per year for the van using the **double-declining-balance** method.

Illustration: Double-Declining Balance

Year	Beginning Book value	x	Declining Balance Rate	=	Annual Expense	Accumulated Depreciation	Book Value
2014							
2015							
2016							
2017							
2018							1,000

*.

Other Issues in Accounting for Plant Assets

Plant assets are complex because

- They have long lives
- Depreciation affects income taxes
- Gains or losses when plant assets sold
- International accounting changes in the future

7

Plant Assets, Natural Resources, & Intangibles

Learning Objective

4. Analyze the cash flow impact of long-lived asset transactions

ANALYZE THE CASH FLOW IMPACT OF LONG-LIVED ASSET TRANSACTIONS

Item	Section	Description
Depreciation	Operating	Added to net income as a reconciling item
Sales of long-lived assets	Investing	Cash proceeds from sales of plant assets (inflow)
Purchase of long-lived assets	Investing	Cash purchases (outflow)

Classwork assignment

- A small delivery van purchased by R&D company on January 1, 2014:
- Cost $ 13,000
- Expected salvage value $ 1,000
- Estimated useful life (years) 5
- Estimated useful life (miles) 100,000
- Miles expected used are:

Year	Units of Activity (Miles)
2014	15,000
2015	30,000
2016	20,000
2017	25,000
2018	10,000

Required:

- Prepare Schedule of Depreciation on the basis of following methods

1. Straight Line Method
2. Units of Output Method
3. Double Declining Balance Method

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