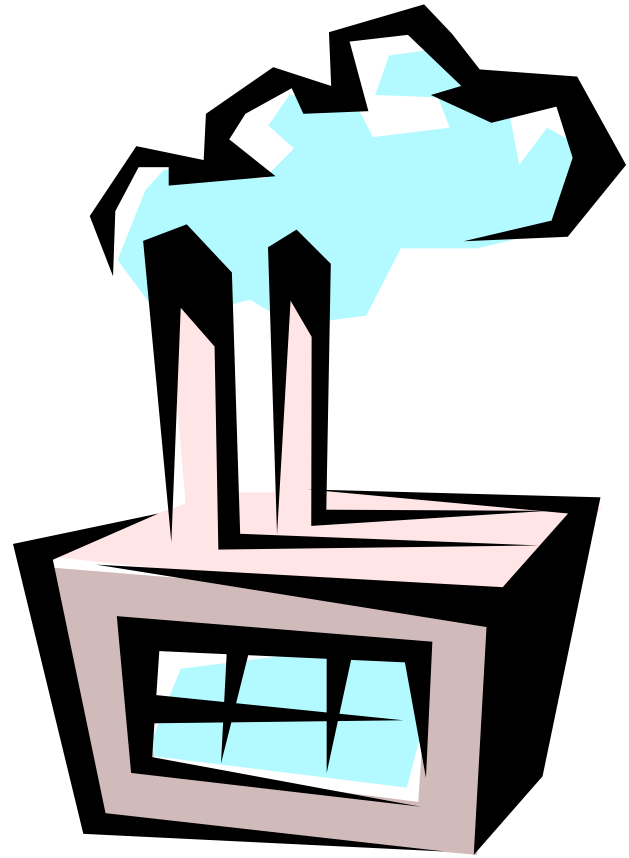


Depreciation

- Asset Depreciation
- Factors Inherent to Asset Depreciation
- Book Depreciation



Depreciation

- **Definition:** Loss of value for a fixed asset
- **Example:** You purchased a car worth \$15,000 at the beginning of year 2000.

End of Year	Market Value	Loss of Value
0	\$15,000	
1	10,000	\$5,000
2	8,000	2,000
3	6,000	2,000
4	5,000	1,000
5	4,000	1,000

Depreciation

Why Do We Need to Consider Depreciation?

Business Expense:
Depreciation is viewed as part of business expenses that reduce taxable income.

Gross Income	-Expenses:
	(Cost of goods sold)
	(Depreciation)
	(operating expenses)
<hr/>	
Taxable Income	
- Income taxes	
<hr/>	
Net income (profit)	

Causes of Depreciation

Physical depreciation:

This happens due to regular wear and tear of operation of an asset.

Functional depreciation:

- This happens due to increased or decreased demand.
- If the demand for the product increases, the existing asset cannot meet that capacity to produce.

Technological depreciation:

This happens due to improved technology available in the market .

Sudden failure:

- This happens due sudden or catastrophic loss in value due to technological characteristics inherent in the asset.
- It also includes loss due to accident or misuse.

Depletion:

- This happens due to consumption of exhaustible natural resources to produce products or services.
- For example, oil, rock, minerals, timber etc. from a site decrease the value of holding.

Factors to Consider in Asset Depreciation

- Depreciable life (how long?)
- Salvage value (disposal value)
- Cost basis (depreciation basis)
- Method of depreciation (how?)

Book Depreciation Methods

- **Purpose:** Used to report net income to stockholders/investors
- **Types of Depreciation Methods:**
 - Straight-Line Method
 - Declining Balance Method
 - Double Declining Balance Method
 - Service Output Method
 - Sinking Fund Method
 - Sum of the Years' Digits Method

Straight – Line (SL) Method

Thus, depreciation for any year in straight line method is,

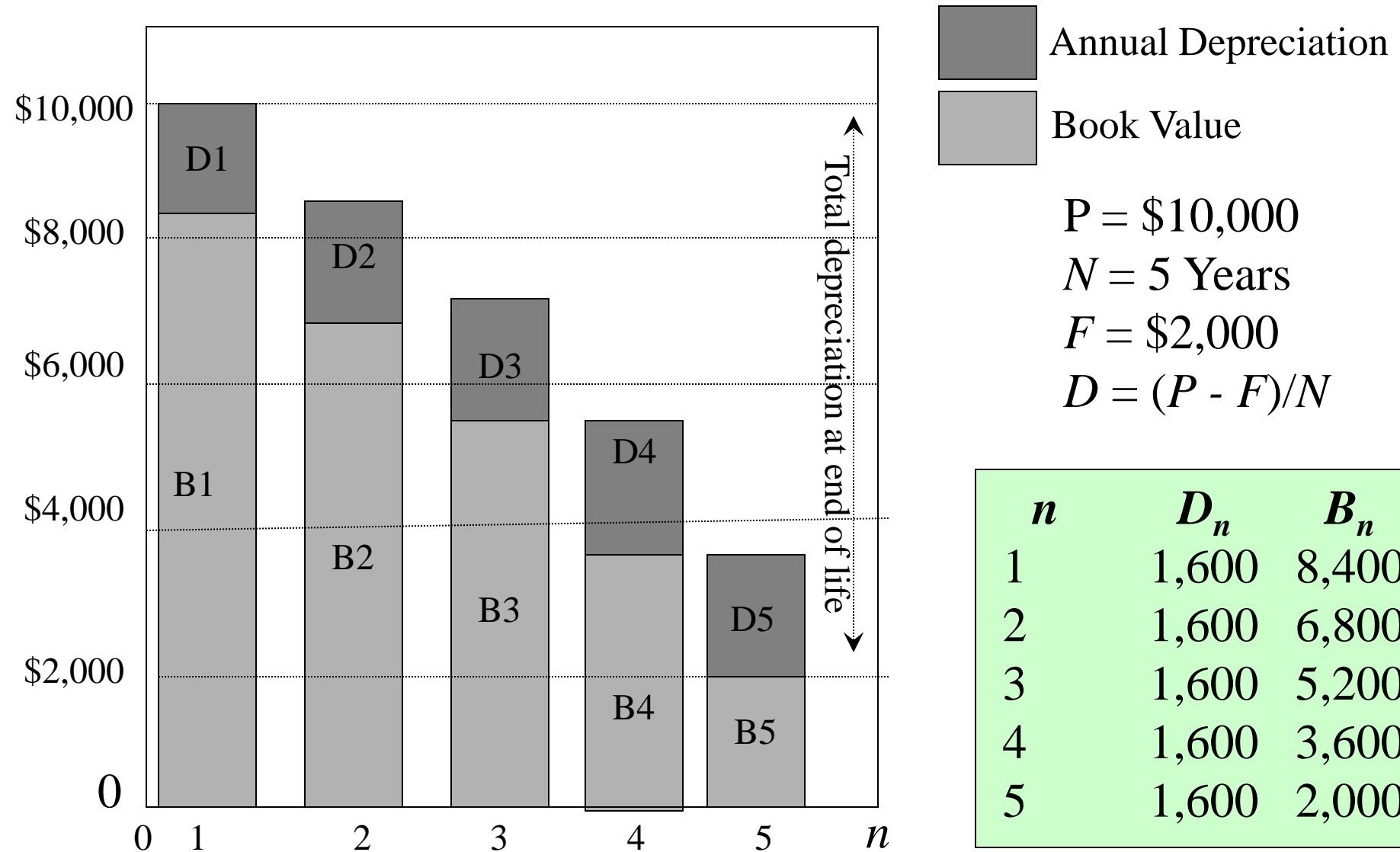
$$D_t = (P-F)/n$$

Book Value, $B_t = P - t (P-F)/n$

year, t		year, t
0	----	P = 5000
1	$(P-F)/n \rightarrow 800$	P- $(P-F)/n = 4200$
2	800	P- $2(P-F)/n = 3400$
3	800	P- $3(P-F)/n = 2600$
4	800	1800
5	800	1000

Thus, Depreciation rate = $1/n$

Example – Straight-Line Method



Numerical

A lathe was purchased for 5 lakhs. It was estimated to have a useful life of 10 years and a salvage value of Rs. 50000. due to unexpected development the lathe was sold in the open market for Rs. 90000 at the end of 8 years of its useful life. Determine how much 'sunk loss' or 'capital gain' has occurred if the asset is being depreciated according to Straight line method.

Solution

Book value at the end of 8 years,

$$\text{Book Value, } B_t = P - t (P-F)/n$$

Given $t=8$ yrs $P=5$ lakhs $F=50000$

$$=500000 - 8 (500000 - 50000) / 10$$

$$=Rs. 1,40,000$$

Book Value > Market price

$$\text{Therefore Sunk Loss} = 1,40,000 - 90,000$$

$$=Rs. 50,000$$

Declining Balance Method

1. This method assumes that an asset decreases in value at a faster rate in the early portion of the service life than in the later portion of its life.
2. By this method fixed percentage is multiplied times the book value of the asset.
3. Hence book value of the asset decreases through time, so does the size of the depreciation charge.

End of Year	Depreciation charge during year t	Book value at the end of year, t
0	-----	$P = B_0$
1	$R \times B_0 = R \times P$	$B_0 - R \times B_0 = (1-R) B_0 = (1-R)P = B_1$
2	$R \times B_1 = R (1-R)P$	$(1-R) B_1 = (1-R)^2 P = B_2$
3	$R \times B_2 = R (1-R)^2 P$	$(1-R) B_2 = (1-R)^3 P = B_3$
•		
•		
•		
t	$R \times B_{t-1} = R (1-R)^{t-1} P$	$(1-R) B_{t-1} = (1-R)^t P = B_t$
•		
•		
•		
n	$R \times B_{n-1} = R (1-R)^{n-1} P$	$(1-R) B_{n-1} = (1-R)^n P = B_n$

Depreciation for previous year, $D_t = R \times B_{t-1}$

Where D_t = depreciation charge for year t

B_{t-1} = Book value for year (t-1)

Expression to determine book value for the year t, $B_t = B_{t-1} - D_t$

Therefore, $B_t = B_{t-1} - R B_{t-1}$

$$B_t = B_{t-1} (1-R)$$

Using this expression it is possible to determine the general expression,

Depreciation at any time t,

$$D_t = R (1-R)^{t-1} P$$

Book value at any time t,

$$B_t = (1-R)^t P$$

$$\text{Therefore, } 1-R = \sqrt[t]{B_t/P}$$

Numerical

1. An asset costs Rs.5000 now and its salvage value is Rs.1000 estimated and an estimated service life of 5 years and a depreciation rate of 30% per year. Determine the depreciation charges for 5 years and its book value on the end of year.

End of Year	Depreciation charge during year t	Book value at the end of year, t
0	0	5000
1	$R * P = 5000 * 0.3 = 1500$	$(1-R)P = 5000 - 1500 = 3500$
2	$R (1-R)P = 3500 * 0.3 = 1050$	$3500 - 1050 = 2450$
3	$2450 * 0.3 = 735$	$2450 - 735 = 1715$
4	$1715 * 0.3 = 515$	$1715 - 515 = 1200$
5	$1200 * 0.3 = 360$	$1200 - 360 = 840$

- An asset was purchased for 2,50,000 Rs. It has an expected life of 10 years and a salvage value of Rs.50000 at the end of 10th year. What will be the undepreciated amount of capital remaining in the asset at the end of 6th year. If the asset is being depreciated according to the declining balance method. Also calculate the depreciation charge for the 8th year.

$$R = 1 - (B_t / P)^{1/t}$$

$$1 - (50000 / 2,50,000)^{(1/10)}$$

$$= 0.1487 = 14.87\%$$

Undreciated amount at the end of 6th

$$B_t = (1 - R)^t P = (1 - 0.1487)^6 \times 250000$$

$$= 95156$$

Depreciate charge during year 8

$$= R (1 - R)^{t-1} \times P$$

$$= 0.1487 (1 - 0.1487)^{(8-1)} \times 250000$$

$$= 12,047$$

Double Declining Balance Method

- In this method the depreciation rate is given as the double the straight line rate that would be allowed for a particular asset being depreciated.
- Depreciation rate = $2 \times 1/n = 2/n$
- Remaining terms are same as Declining Balance method.

Numerical 1

- An asset was purchased 10 years ago for Rs. 5,00,000. it is depreciated according to DDB method for an estimated life of 20 years and a salvage value of Rs. 50,000. calculate its current book value.

Numerical 2

- An asset has a first cost of Rs. 48,000 with an estimated life of 20 years. What is the total accumulated depreciation charge during the first 5 years of the asset life if it is depreciated according to DDM Method?