

Chapter 6

Depreciation

Introduction

Depreciation is the loss or decline in value of an asset through use and passage of time. Buildings, equipments, and other assets depreciate through age, obsolescence, decay, decrease in efficiency and inadequacy.

The basic principle of business is that the capital invested must be kept intact, and a replacement or depreciation fund to provide for losses due to depreciation should be set up. This fund is used to provide for the replacement of an asset when the asset can no longer be used for the purpose for which it was purchased, it is said to be worth *scrap value* or *salvage* or *trade-in-value*.

The difference between the original cost and the scrap value is called the *wearing value* or *total depreciation* of the asset, while the difference between the original cost and amount of depreciation on a given date is called the *book value*. As an asset depreciates, it is carried at a decreasing book value. The depreciation allowance each year off sets the decrease in book value and at all times the book value plus the total accumulated depreciation should equal the cost of the asset. In general, depreciation charges are on an annual basis.

The following notation will be used in our discussion of depreciation.

O	=	Original cost
S	=	Scrap or salvage value
W	=	Wearing Value
n	=	Useful or economic life of an asset in years
R	=	Periodic depreciation
BV	=	Book Value
r	=	Rate of depreciation

There are many methods of determining the depreciation of various assets. Probably the following are the most common and serviceable methods.

1. Straight-Line-Method or Age-Life-Method (SLM)
2. Declining-Balance-Method or Constant-Percent-Method (DBM)
3. Sum-of-the-Years-Digit-Method or Reducing –Fraction-Method (SYD)
4. Unit-Product-Method or Working-Hour-Method (UPM)
5. Sinking-Fund-Method (SFM)
6. Annuity Method (AM)

6.1 Straight-Line-Method or Age-Life-Method (SLM)

This is the simplest method of allowing for depreciation and it is the most commonly used method adequately accurate for practical purposes. It spreads depreciation evenly over the useful life of the asset. It assumes that depreciation is in proportion to time.

The formula for the periodic depreciation is:

$$R = \frac{W}{n} \quad W = O - S$$

Illustrative Examples:

1. A steel cabinet, which cost P 18,500, is expected to last 12 years, and at that time will have a trade-in-value of P 500. Find the annual depreciation charge.

Given: $O = P\ 18,500$ $S = P\ 500$ $n = 12$

Solution:

$$\begin{aligned} W &= O - S \\ &= P\ 18,500 - P\ 500 \\ &= \underline{P\ 18,000} \end{aligned}$$

$$\begin{aligned} R &= W \div n \\ &= P\ 18,000 \div 12 \\ &= \underline{P\ 1,500} \end{aligned}$$

2. An item, which cost P 9,300 and after 5 years has a scrap value of P 400. What is the annual depreciation? What percent of the cost is the yearly depreciation?

Given: $O = P\ 9,300$ $S = P\ 400$ $n = 5$

$$\begin{aligned}\text{Solution: } W &= O - S \\ &= P 9,300 - P 400 \\ &= \underline{P 8,900}\end{aligned}$$

$$\begin{aligned}R &= W \div n \\ &= P 8,900 \div 5 \\ &= \underline{P 1,780}\end{aligned}$$

$$\begin{aligned}R &= R \div O \\ &= P 1,780 \div P 9,300 \\ &= \underline{19.14\%}\end{aligned}$$

3. A machine, which costs P 25,000 and after 6 years has a salvage value of P 900. Determine the yearly depreciation and prepare a depreciation schedule.

$$\text{Given: } O = P 25,000 \quad S = P 900 \quad n = 6$$

Solution:

$$\begin{aligned}W &= O - S \\ &= P 25,000 - P 900 \\ &= \underline{P 24,100}\end{aligned}$$

$$\begin{aligned}R &= W \div n \\ &= P 24,100 \div 6 \\ &= \underline{P 4,016.67}\end{aligned}$$

Depreciation Schedule:

Year	Annual Depreciation	Accumulated Depreciation	Book Value
0	0	0	P 25,000.00
1	P 4,016.67	P 4,016.67	20,983.33
2	4,016.67	8,033.34	16,966.66
3	4,016.67	12,050.01	12,949.99
4	4,016.67	16,066.68	8,933.32
5	4,016.67	20,083.35	4,916.65
6	4,016.67	24,100.02*	899.98*

*rounding error

Note: The accumulated depreciation charge plus the book value always equals the original cost.

Straight-Line-Method (SLM)

Exercise 6.1

Solve each of the following:

1. Find the annual depreciation and prepare a depreciation schedule for each of the following:

Asset	Eco. Life	Orig. Cost	Scrap Value
a. Stereo Set	5	P 30,500	P 1,500
b. Sala Set	4	P 68,000	P 2,000
c. Flat TV Set	6	P 55,000	P 3,500

2. A ceiling fan costs P 2,700 has an economic life of 3 years and has a scrap value of P 50.
 - a. what is the annual depreciation?
 - b. what percent of the cost is the yearly depreciation?
3. A machine costs a company P 125,000. It is estimated to last 10 years with a salvage value of P 5,000. Find the yearly depreciation and prepare a depreciation schedule.
4. An item costing P 5,400 depreciates to P 500 in 8 years. What is the annual depreciation?
5. A P 9,200 item depreciates to P 450 in 8 years. What is the yearly depreciation?
6. A adding machine costs P 3,050 has an estimated life of 4 years and has a salvage value of P 80. Find the annual depreciation charge and the rate of depreciation.
7. A home entertainment set, which costs P 185,000, is expected to last 8 years and at that time will have a trade-in-value of P 4,500. Find the yearly depreciation charge and prepare a depreciation table.
8. Find the yearly depreciation charges for each of the following:

Asset	Eco. Life	Orig. Cost	Scrap Value
a. Kitchen Set	5 years	P 35,000	P 1,700
b. Sala Set	8 years	P 42,000	P 2,000
c. Electric Fan	2 years	P 1,200	P 25
9. A machine depreciates from an original cost of P 29,500 to a scrap value of P 700 in 9 years. Find the annual depreciation and construct a depreciation table.
10. An office equipment costing P 75,000 depreciates to P 8,000 in 10 years. What is the annual depreciation and prepare a depreciation schedule?

6.2 Declining-Balance-Method or Constant-Percent-Method (DBM)

This method shows that an asset depreciates by the same percent of the book value. This means that every year the depreciation charge is a fixed percentage of the preceding book value. This method has a property of bearing the largest peso depreciation during the early years and the depreciation charge becomes progressively smaller as the number of years increases.

Let us work on the following examples to show how this is done.

Illustrative Examples:

1. An item, which costs P 7,500, depreciates by 7% each year. Construct a depreciation table for 7 years.

Given: $O = P\ 7,500$ $r = 7\% = .07$

Depreciation Table

Year	Annual Depreciation	Total Depreciation	Book Value
0	0	0	P 7,500.00
1	P 525.00	P 525.00	6,975.00
2	488.25	1,013.25	6,486.75
3	454.07	1,467.32	6,032.68
4	422.29	1,889.61	5,610.39
5	392.73	2,282.34	5,217.66
6	365.24	2,647.58	4,852.42
7	339.67	2,987.25	4,512.75

Note: The total depreciation plus the book value is equal to the original cost.

2. Set up a depreciation schedule for a machine which cost P 25,000 and depreciates 15% of its value each year and find the book value at the end of 10 years.

Given: $O = P\ 25,000$ $r = 15\% = .15$

Depreciation Schedule

Year	Annual Depreciation	Total Depreciation	Book Value
0	0	0	P 25,000.00
1	P 3,750.00	P 3,750.00	21,250.00
2	3,187.50	6,937.50	18,062.50
3	2,709.38	9,646.88	15,353.12
4	2,302.97	11,949.85	13,050.15
5	1,957.52	13,907.37	11,092.63
6	1,663.89	15,571.26	9,428.74
7	1,414.31	16,985.57	8,014.43
8	1,202.16	18,187.73	6,812.27
9	1,021.84	19,209.57	5,790.43
10	868.56	20,078.13	4,921.87

Declining-Balance-Method or Constant-Percent-Method (DBM)

Exercise 6.2

Solve each of the following:

1. Make out a depreciation table for 5 years for each of the following:

Asset	Cost	Rate
a. Kitchen Utensil	P 1,500	9%
b. Wall Clock	P 2,200	12%
c. Lady Shoes	P 1,800	15%

2. An item, which costs P 15,500, depreciates by 19% of its value each year. Make out a depreciation table for the first 4 years and find the book value at the end of 6 years.
3. Find the book value at the end of 7 years for an item cost P 14,700 and depreciates by 15% of its value each year. Construct a depreciation schedule.
4. A certain type of machine loses 20% of its value every year. It cost the company P 16,500 originally. Construct a schedule showing the annual depreciation the total depreciation and the book value at the end of each year for 6 years.
5. A refrigerator that costs P 18,800 depreciates by 18% of its value each year. Construct a depreciation table for the first 4 years and find the book value at the end of 7 years.
6. Construct a depreciation schedule for each of the following for a period of 5 years.

Asset	Rate	Cost
a. Desk Fan	12%	P 1,200
b. Ceiling Fan	15%	P 2,100
c. Wall Fan	18%	P 2,300

7. Set up a depreciation schedule for an item, which cost the company P 18,800 and losses 20% of its value every year. Find the book value at the end of 8 years.
8. A machine depreciates by 25% each year. The original cost is P 18,100. Make out a schedule showing the annual depreciation, the total depreciation and book value at the end of each year for 6 years.
9. Find the book value at the end of 7 years of an item that costs P 17,700 and depreciates by 7% of its value every year. Make out a depreciation table.
10. Set up a depreciation table for a typewriter which cost P 9,900 and depreciates by 18% of its value each year and find the book value at the end of 8 years.

6.3 Sum-of-the-Years-Digit-Method (SYD)

The sum-of-the-years-digit-method or reducing-fraction-method follows the same principle as the declining balance method. That is, the depreciation allowances are larger during the early years of the useful life of the asset and become progressively increases. Most of the cost is recovered early in the life of the asset.

The depreciation each year is a fraction of the wearing value. The common denominator of the fraction is obtained by numbering the years of useful life and adding as illustrated below.

Assuming that the economic life of an asset is 5 years, the denominator = $1 + 2 + 3 + 4 + 5 = 15$. The numerator for the first year is the bigger year and each year is reduced by 1, and to find the total number of digits we apply:

$$\begin{aligned}\text{Total} &= \frac{n(n+1)}{2} \\ &= \frac{5(5+1)}{2} \\ &= \frac{5(6)}{2} \\ &= \frac{30}{2} \\ &= 15\end{aligned}$$

Let us work on the following to illustrate the application of the above.

Illustrative Examples:

1. An item that costs P 1,200 has a salvage value of P 80 after a useful life of 5 years. What is the 3rd year depreciation?

Given: $O = \text{P } 1,200$ $S = \text{P } 80$ $n = 5 \text{ years}$

Solution:

$$\begin{aligned}W &= O - S && \text{Total digits} = 15 \\ &= \text{P } 1,200 - \text{P } 80 \\ &= \underline{\text{P } 1,120}\end{aligned}$$

$$\begin{aligned}3^{\text{rd}} \text{ yrs dep.} &= \text{P } 1,120 (3 \div 15) \\ &= \underline{\text{P } 224}\end{aligned}$$

2. An asset valued at P 8,800 with a trade-in-value of P 500 has an estimated life of 8 years. Find the yearly depreciation and make out a depreciation table.

Given: $O = P\ 8,800$ $S = P\ 500$ $n = 8\ \text{yrs.}$

Solution:

$$\begin{aligned} W &= O - S \\ &= P\ 8,800 - P\ 500 \\ &= P\ 8,300 \end{aligned} \qquad \begin{aligned} \text{total digits} &= \frac{n(n+1)}{2} \\ &= \frac{8(8+1)}{2} \\ &= 36 \end{aligned}$$

Annual Depreciation

Year	Wearing Value	Annual Depreciation
1	P 8,300 ($8 \div 36$)	P 1,844.44
2	8,300 ($7 \div 36$)	1,613.89
3	8,300 ($6 \div 36$)	1,383.33
4	8,300 ($5 \div 36$)	1,152.78
5	8,300 ($4 \div 36$)	922.22
6	8,300 ($3 \div 36$)	691.67
7	8,300 ($2 \div 36$)	461.11
8	8,300 ($1 \div 36$)	230.56

Depreciation Table

Year	Annual Depreciation	Total Depreciation	Book Value
0	0	0	P 8,800.00
1	P 1,844.44	P 1,844.44	6,955.56
2	1,613.89	3,458.33	5,341.67
3	1,383.33	4,841.66	3,958.34
4	1,152.78	5,994.44	2,805.56
5	922.22	6,916.66	1,883.34
6	691.67	7,608.33	1,191.67
7	461.11	8,069.44	730.56
8	230.56	8,300.00	500.00

3. A machine costing P 15,000 has a scrap value of P 800 after a useful life of 6 years. Find the annual depreciation and construct a depreciation schedule.

Given: $O = P\ 15,000$ $S = P\ 800$ $n = 6\ \text{yrs.}$

Solution:

$$\begin{aligned} W &= O - S \\ &= P\ 15,000 - P\ 800 \end{aligned} \qquad \begin{aligned} \text{Total digits} &= \frac{6(6+1)}{2} \end{aligned}$$

$$= \underline{\text{P } 14,200}$$

$$= 21$$

Annual Depreciation

Year	Wearing Value	Annual Depreciation
1	P 14,200 (6 ÷ 21)	P 4,057.14
2	14,200 (5 ÷ 21)	3,380.95
3	14,200 (4 ÷ 21)	2,704.76
4	14,200 (3 ÷ 21)	2,028.57
5	14,200 (2 ÷ 21)	1,352.38
6	14,200 (1 ÷ 21)	676.19

Depreciation Table

Year	Annual Depreciation	Total Depreciation	Book Value
0	0	0	P 15,000.00
1	P 4,057.14	P 4,057.14	10,942.86
2	3,380.95	7,438.09	7,561.91
3	2,704.76	10,142.85	4,857.15
4	2,028.57	12,171.42	2,828.58
5	1,352.38	13,523.80	1,476.20
6	676.19	14,199.99*	800.01*

*rounding error

Again we notice from the above table, that the sum of the book value and total depreciation is equal to the original cost.

Sum of the Year Digit Method (SYD)

Exercise 6.3

Solve each of the following:

1. A filing cabinet valued at P 7,500 depreciates to P 450 after useful life of 9 years. Find the 5th and 8th year depreciation.
2. Construct a depreciation table for the first four years for the following assets.

Asset	Cost	Scrap Value	Eco. Life
a. White Board	P 2,400	P 250	5 years
b. Study Table	P 3,800	P 110	7 years
c. Table Lamp	P 1,100	0	4 years

- d. Calculator P 980 P 50 6 years
3. Compute the depreciation charges for the first five years of an item, which cost P 25,000 and a salvage value of P 1,000 after a useful life of 10 years.
 4. Construct a depreciation table for an asset costing P 18,500 with an economic life of 7 years and a salvage value of P 430.
 5. A table lamp costs P 2,200 with a trade-in-value of P 60 and economic life of 4 years. Find the yearly depreciation.
 6. Set up a depreciation schedule for an asset costing P 10,500 with scrap value of P 770 after a useful life of 8 years.
 7. Construct a depreciation table for the first five years for the following assets.

Asset	Cost	Scrap Value	Eco. Life
a. Computer Set	P 28,000	P 700	4 years
b. Stereo Set	P 45,000	P 1,500	8 years
c. Sala Set	P 25,000	P 200	6 years
d. Kitchen Set	P 18,500	P 150	7 years

8. An item whose original cost is P 3,300 has a useful life of 9 years with a salvage value of P 200. Find the 4th and 7th year depreciation respectively.
9. A washing machine costs P 9,500 has an estimated life of 5 years with a scrap value of P 300. Find the yearly depreciation.
10. A machine costs P 12,500 with a trade-in-value of P 350 and economic life of 5 years. Find the annual depreciation.

6.4 Unit-Product-Method or Working-Hours-Method (UPM)

This method is based on the number of hours an asset is used or the number of units it produces. This method allows for more depreciation during a busy period of an asset.

Except in rare cases this method is inapplicable because the total operating hours and units produced cannot be estimated with any degree of accuracy.

Let us work on the following to illustrate the above.

Illustrative Examples:

1. A machine costs P 7,500 has a salvage value of P 600. It is estimated that the machine can produce 25,000 units. This machine has been run as follows:

1 st year	- 2,800 units
2 nd year	- 3,200 units
3 rd year	- 4,100 units
4 th year	- 5,500 units
5 th year	- 2,500 units

Prepare a depreciation table.

Given: $O = P\ 7,500$ $S = P\ 600$ $n = 25,000$ units

Solution:

$$\begin{aligned}
 W &= O - S \\
 &= P\ 7,500 - P\ 600 \\
 &= \underline{P\ 6,900}
 \end{aligned}$$

Annual Depreciation

1 st year	P 6,900 (2,800 ÷ 25,000)	= P 772.80
2 nd year	6,900 (3,200 ÷ 25,000)	= 883.20
3 rd year	6,900 (4,100 ÷ 25,000)	= 1,131.60
4 th year	6,900 (5,500 ÷ 25,000)	= 1,518.00
5 th year	6,900 (2,500 ÷ 25,000)	= 690.00

Depreciation Table

Year	Yearly Depreciation	Total Depreciation	Book Value
0	0	0	P 7,500.00
1	P 772.80	P 772.80	6,727.20
2	883.20	1,656.00	5,844.00
3	1,131.60	2,787.60	4,712.40
4	1,518.00	4,305.60	3,194.40
5	690.00	4,995.60	2,504.40

Again we note that the sum of the book value and total depreciation is equal to the original cost.

2. A printing press machine cost P 12,800 depreciates to P 1,200. This type of machine has an estimated operating life of 35,500 hours and run as follows:

1 st year	3,400 hours
2 nd year	3,800 hours
3 rd year	4,350 hours
4 th year	5,160 hours
5 th year	4,995 hours
6 th year	7,200 hours
7 th year	1,500 hours

Prepare a depreciation table.

Given: $O = P\ 12,800$ $S = P\ 1,200$ $n = 35,500$

Solution:

$$\begin{aligned} W &= O - S \\ &= P\ 12,800 - P\ 1,200 \\ &= \underline{P\ 11,600} \end{aligned}$$

Annual Depreciation

1 st year	P 11,600 (3,400 ÷ 35,500)	= P 1,110.99
2 nd year	11,600 (3,800 ÷ 35,500)	= 1,241.69
3 rd year	11,600 (4,350 ÷ 35,500)	= 1,421.41
4 th year	11,600 (5,160 ÷ 35,500)	= 1,686.08
5 th year	11,600 (4,995 ÷ 35,500)	= 1,632.17
6 th year	11,600 (7,200 ÷ 35,500)	= 2,352.68
7 th year	11,600 (1,500 ÷ 35,500)	= 490.14

Depreciation Schedule

Year	Yearly Depreciation	Total Depreciation	Book Value
0	0	0	P 12,800.00
1	P 1,110.99	P 1,110.99	11,689.01
2	1,241.69	2,352.68	10,447.32
3	1,421.41	3,774.09	9,025.91
4	1,686.08	5,460.17	7,339.83
5	1,632.17	7,092.34	5,707.66
6	2,352.68	9,445.02	3,354.98
7	490.14	9,935.16	2,864.84