Methods of Depreciation

Depreciation is the reduction in the value of an asset due to usage, passage of time, wear and tear, technological outdating or obsolescence, etc. The estimated value recovered at the end of the asset's serviceable life (trade-in value or scrap value), is referred to as **residual value**. This should not be confused with **book value**, which is the initial cost of an asset less related accumulated depreciation.

There are four main methods for calculating depreciation:

1. **Straight-line Depreciation**: a method of depreciation whereby equal portions of the amount paid for an asset are shown as an expense during each accounting period of the life of the asset. The straight-line depreciation equation is:

   Depreciation expense = (Cost − Residual) / Life (years, months, etc.)

   Example: What is the straight-line depreciation expense for a truck that was purchased for $30,000 with a lifetime of 4 years and has a residual value of $2,000? Prepare a four-year depreciation schedule for the truck.

   Solution:
   Depreciation expense = (30,000 − 2,000) / 4 = $7,000 per year
   The four-year depreciation schedule:

Year	Depr. Expense
1	$7,000
2	$7,000
3	$7,000
4	$7,000
Total	**$28,000**

2. **Units-of-Production Depreciation**: a method of depreciation basing expense on number of units used or produced by the asset during an accounting period to total estimated units to be used or produced during the life of the asset. The units-of-production depreciation equations are:

   Depreciation Rate per unit = (Cost − Residual) / Life in units

   Depreciation Expense = Depr. Rate per unit × Units used

   Example: A truck that was purchased for $30,000 with a residual value of $2,000 and a life of 100,000 miles. During the period of June-Sept, the truck recorded 5,200 miles of use. What is the units-of-production depreciation for the truck during the period?

   Solution: Depreciation Rate per unit = (30,000 – 2,000) / 100,000 = $0.28/mile
   Depreciation = 0.28 x 5,200 = $1,456

3. **Sum-of-Years'-Digits (SYD) Depreciation**: a method of *accelerated depreciation* that allocates larger amounts of depreciation as an expense during the earlier years of the life of

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an asset. This method uses a *reducing fraction* multiplied by the *book value* (cost - residual) of the asset to determine the amount of depreciation expense for each operating period.

a. Computing the reducing fraction: The numerator begins with the asset's life in years in the first year and decreases by 1 each subsequent year. The denominator remains constant and represents 100% of its life in fractional elements. The equation to calculate the denominator is:

The constant denominator = **n (n + 1) / 2**

b. The SYD depreciation equation is:

Depreciation Expense = [SYD fraction × (Cost − Residual)]

Example: What is the SYD four-year depreciation schedule for a truck that was purchased for $30,000 with a lifetime of 4 years and has a residual value of $2,000?

Solution:
The constant denominator = 4 (4 + 1) / 2 = 10

Year	SYD fraction	x	Cost - Residual	=	Depreciation
1	4/10	x	$ 28,000	=	$11,200
2	3/10	x	$ 28,000	=	$8,400
3	2/10	x	$ 28,000	=	$5,600
4	1/10	x	$ 28,000	=	$2,800
Total	**10/10 or 1**		**Total Depr.**	**=**	**$28,000**

4. **Double-Declining-Balance (DDB) Depreciation**: is another method of *accelerated depreciation* that allows greater amounts of depreciation to be expensed in the early years of the life of a depreciable asset. DDB ignores residual value in the calculations. This method uses the *DDB percentage* multiplied by the *book value* (cost – accumulated depreciation) to determine the amount of depreciation expense for each operating period.

a. The equation to calculate DDB percentage is:

DDB % = (100% / Lifetime) × 2

b. The DDB depreciation equation is:

Depreciation Expense = DDB% × Book Value
Book Value = Cost − Accumulated Depreciation

c. The final book value *must be greater than or equal* to the residual value. In case the final book value for the last period is less than the residual value, the depreciation expense value of the last period will need to be changed to ensure that the final book value is equal to the residual value.

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Example: What is the DDB four-year depreciation schedule for a truck that was purchased for $30,000 with a lifetime of 4 years and has a residual value of $2,000?

Solution:
DDB% = 100/4 × 2 = 50%

Year	DDB%	x	Book Value	=	Depr. Expense	Net Book Value
0						$30,000
1	50%	x	$30,000	=	$15,000	15,000
2	50%	x	15,000	=	7,500	7,500
3	50%	x	7,500	=	3,750	3,750
4	50%	x	3,750	=	~~1,875~~	~~1,875~~
					1,750	2,000
Total Accumulated Depr. (expense)				=	$28,000	
Cost – Accum. Depr. = $30,000 - $28,000 = $2,000 (Final book value)						

Practice Problems

1. A restaurant purchased $45,000 of equipment. What is the *yearly* and *monthly* straight-line depreciation expense for the equipment if it has a life time of 10 years and has a residual value of $5,000?

2. A truck purchased for $35,000 has an estimated life of 5 years or 250,000 km and a residual value of $5,000. A total of 53,000 km was driven in the first year and 75,000 km in the second year. Calculate the depreciation rate per unit and the depreciation expense for the first two years, using the Units-of-Production depreciation method.

3. Using the information in question 2 above, calculate the depreciation expense for the first two years using the SYD depreciation method.

4. A restaurant buys a wood-burning stove for $20,000. The stove has a lifetime of 4 years and a residual value of $1,500. Calculate the DDB% and the net book value after the first year of use.

5. A catering company buys a delivery truck for $34,000 for its everyday business. The lifetime of the truck is 5 years and the production life is 200,000 km. The residual value at the end of its lifetime is $4,000. The truck has the following production in five years:

   Year-1: 30,000 km
   Year-2: 40,000 km
   Year-3: 50,000 km
   Year-4: 70,000 km
   Year-5: 10,000 km

   Construct a five-year depreciation schedule using the Units-of-Production and DDB depreciation method.

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Solutions

1. Depr. Expense (yearly) = ($45,000 – $5,000)/ 10 = 40,000/10 = $4,000/year
   Depr. Expense (monthly) = ($45,000 – $5,000) / (10 x12) = 40,000/120 = $333.33/month

2. Depr. Rate per unit = (35,000 – 5,000) / 250,000 = $0.12/km
   Depr. Expense in Year-1 = 0.12 x 53,000 = $6,360
   Depr. Expense in Year-2 = 0.12 x 75,000 = $9,000

3. The constant denominator = 5 (5 + 1) / 2 = 15
   Depr. Expense in Year-1 = 5/15 x 30,000 = $10,000
   Depr. Expense in Year-2 = 4/15 x 30,000 = $8,000

4. DDB% = 100/4 x 2 = 50%
   Depr. Expense in Year-1 = 50% x 20,000 = $10,000
   Net book value in Year-1 = $20,000 - $10,000 = $10,000

5. **Units-of-Depreciation method:**
   Depr. Rate per unit = (34,000 – 4,000) / 200,000 = $0.15/km

Year	Depr. Rate/unit	x	Production	=	Depr. Expense
1	0.15	x	30,000	=	$4,500
2	0.15	x	40,000	=	6,000
3	0.15	x	50,000	=	7,500
4	0.15	x	70,000	=	10,500
5	0.15	x	10,000	=	1,500
		Total Depreciation		**=**	**$30,000**

DDB Depreciation method:
DDB% = 100/5 x 2 = 40%

Year	DDB%	x	Book Value	=	Depr. Expense	Net Book Value
0						$34,000
1	40%	x	34,000	=	$13,600	20,400
2	40%	x	20,400	=	8,160	12,240
3	40%	x	12,240	=	4,896	7,344
4	40%	x	7,344	=	2,937.60	4,406.40
5	40%	x	4,406.40	=	~~1,762.56~~	~~2,643.84~~
					406.40	4,000
Total Accumulated Depr. (expense)				=	$30,000	

Cost – Accum. Depr. = $34,000 - $30,000 = $4,000 (Final book value)

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