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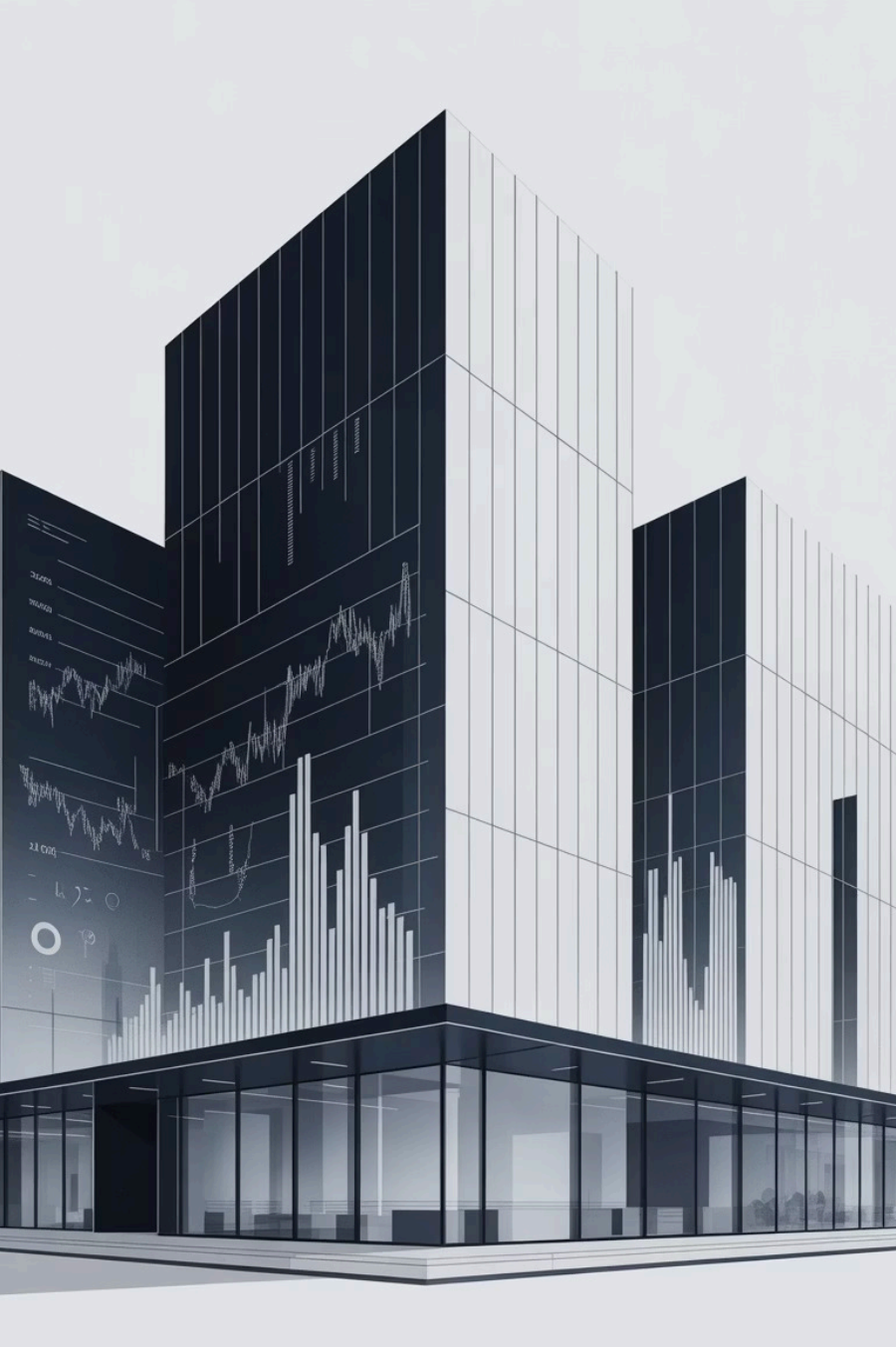
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Understanding Depreciation Methods

Depreciation is a systematic and rational way to allocate the cost of an asset over the periods that will benefit from its use. While multiple methods exist to calculate annual depreciation expense, they differ primarily in timing and the amount recorded each year. Regardless of the method chosen, total accumulated depreciation remains constant across all approaches.

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The Foundation

Core Depreciation Principle

The fundamental equation underlying all depreciation methods is straightforward: accumulated depreciation equals the asset's original cost minus its salvage value. This represents the total amount that will be depreciated over the asset's useful life.

$$\begin{array}{c} \textit{Accumulated} \\ \textit{Depreciation} = \textit{Cost} - \textit{Salvage} \\ \textit{Value} \end{array}$$

This depreciable base remains consistent regardless of which method you choose to allocate the expense across accounting periods.





The Goal of Depreciation



Matching Principle

Provide reasonable, consistent matching of revenue and expense through systematic cost allocation over an asset's estimated useful life.



Timing Differences

Methods create timing differences in recording depreciation expense, though total depreciation over the asset's life remains identical.



Method Changes

Depreciation methods may change if justified, but changes must be applied prospectively, not retroactively.

Accumulated Depreciation Impact

Depreciation is tracked using a contra-account called accumulated depreciation or allowance for depreciation. This account increases over time, directly impacting the asset's net book value.

As accumulated depreciation rises, the net book value of the asset decreases proportionally, reflecting the consumption of the asset's economic benefits over time.



Accumulated Depreciation

Increases each period

Net Book Value

Decreases correspondingly

Straight-Line Depreciation

The straight-line method records an equivalent amount of depreciation expense each period, making it the simplest and most widely used approach. The estimated useful life is typically stated in years or months.

01

Calculate Depreciable Base

Subtract salvage value from original cost

02

Divide by Useful Life

Allocate base evenly across estimated periods

03

Record Annual Expense

Same amount each year until fully depreciated

$$\text{Depreciation} = \frac{\text{Cost} - \text{Salvage Value}}{\text{Estimated Useful Life}}$$

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Straight-Line Example

Scenario

A company purchases equipment for **\$15,000** with a salvage value of **\$3,000** and an estimated useful life of **6 years**.

Calculation

$$\frac{\$15,000 - \$3,000}{6} = \$2,000$$

Annual depreciation: \$2,000

Partial Year Adjustment

If the asset was acquired on April 1 instead of January 1, only a partial year's depreciation is recorded in the first year.

$$\$2,000 \times \frac{9}{12} = \$1,500$$

The first year records **\$1,500** in depreciation expense, representing nine months of use.

Sum-of-the-Years'-Digits Method

This accelerated depreciation method provides higher depreciation expense in early years and lower expense in later years, reflecting assets that lose value more rapidly when new.

1

Calculate Sum

Use the formula to find the denominator

$$S = \frac{N \times (N + 1)}{2}$$

2

Determine Fraction

Remaining life over sum for each year

3

Apply to Base

Multiply fraction by depreciable base

□ **Example:** If useful life (N) = 4 years, then $S = (4 \times 5) \div 2 = 10$. If N = 6 years, then $S = (6 \times 7) \div 2 = 21$.

Sum-of-the-Years'-Digits Example

Given Information

An asset costs **\$18,000**, has a salvage value of **\$3,000**, and an estimated useful life of **5 years**.

Setup

- Cost of asset: \$18,000
- Less: salvage value: (\$3,000)
- Depreciable base: **\$15,000**

$$Sum = \frac{5 \times 6}{2} = 15$$

Annual Depreciation

- Year 1: $5/15 \times \$15,000 =$ **\$5,000**
- Year 2: $4/15 \times \$15,000 =$ **\$4,000**
- Year 3: $3/15 \times \$15,000 =$ **\$3,000**
- Year 4: $2/15 \times \$15,000 =$ **\$2,000**
- Year 5: $1/15 \times \$15,000 =$ **\$1,000**

Total: \$15,000

Financial Statement Impact

Straight-Line Method

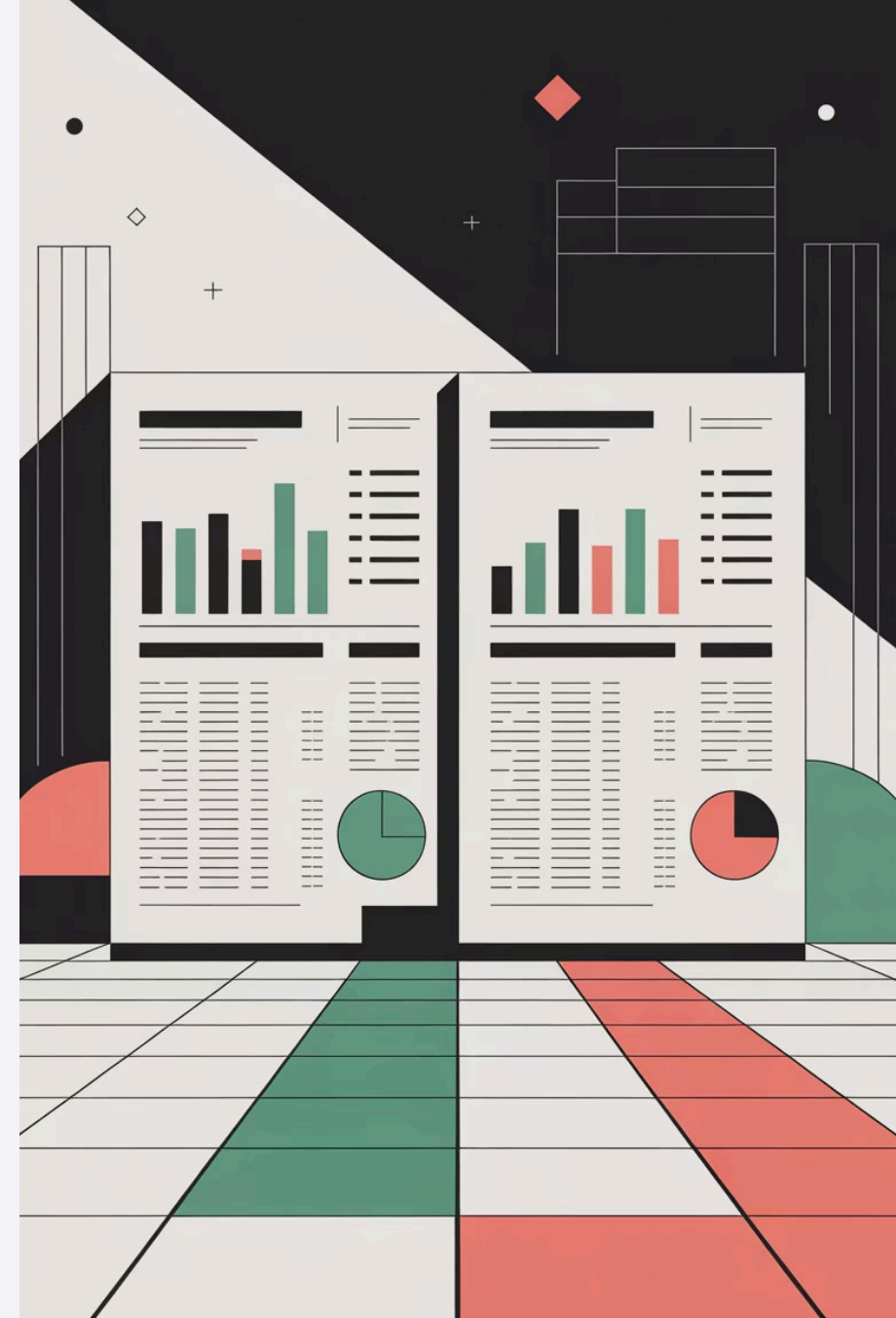
Consistent expense each period results in stable profit patterns and predictable retained earnings growth.

Accelerated Methods

Higher early expenses reduce profits and retained earnings initially, but the effect reverses in later years. Total impact over asset life is identical.

When using accelerated methods like sum-of-the-years'-digits in early years, expense increases while profit and equity decrease compared to straight-line. Eventually, all methods converge to the same total depreciation.

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Units-of-Production Method

The units-of-production method relates annual depreciation to the estimated production capability of an asset. It's particularly useful when service production declines with use rather than time.

This method expresses depreciation as a rate per unit produced or per hour of operation, making it ideal for manufacturing equipment or vehicles.



1

Calculate Rate

$$\frac{\textit{Cost} - \textit{Salvage}}{\textit{Estimated Units}}$$

2

Apply to Usage

$$\textit{Rate} \times \textit{Units Produced}$$

3

Record Expense

Varies with actual production

Units-of-Production Example

Scenario

A delivery vehicle costs **\$45,000**, has a salvage value of **\$5,000**, and is expected to be driven **200,000 miles** over its useful life.

1

Calculate Rate per Mile

$$\frac{\$45,000 - \$5,000}{200,000} = \$0.20$$

*per
mile*

2

Year 1 Usage

Vehicle driven 35,000 miles

$$\$0.20 \times 35,000 = \$7,000$$

3

Year 2 Usage

Vehicle driven 42,000 miles

$$\$0.20 \times 42,000 = \$8,400$$

Depreciation expense varies each year based on actual miles driven, providing a more accurate matching of expense to revenue generation.

Declining Balance Method

The declining balance method is an accelerated depreciation approach where the most common variant is double-declining-balance (DDB). Other percentages like 150% or 125% are also acceptable alternatives.

Double-Declining-Balance

$$DDB = \frac{2}{N}$$

Most aggressive acceleration

150% Declining Balance

$$Rate = \frac{1.5}{N}$$

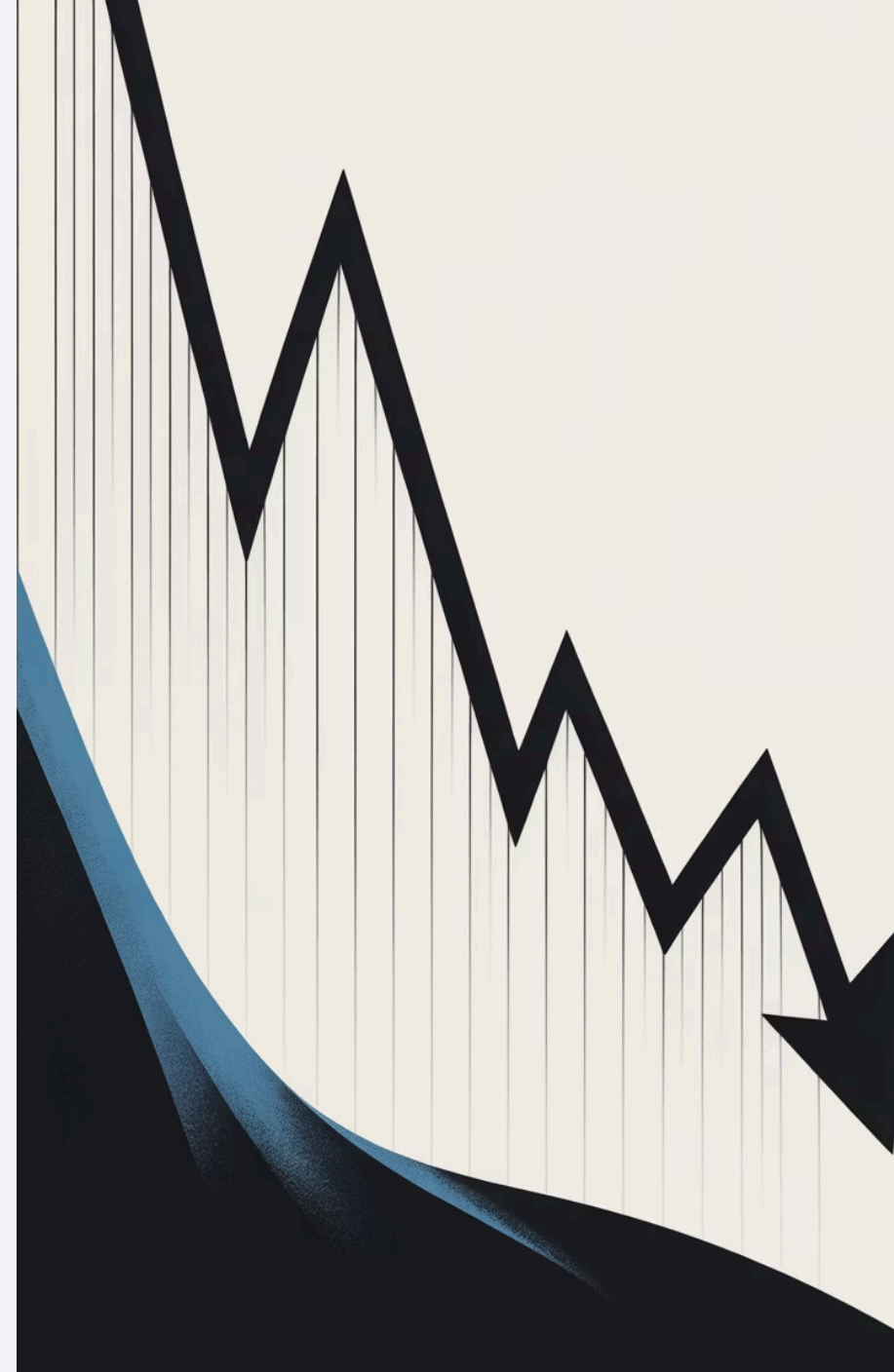
Moderate acceleration

125% Declining Balance

$$Rate = \frac{1.25}{N}$$

Gentle acceleration

Double-declining-balance is particularly useful when an asset is subject to rapid obsolescence, such as technology equipment or vehicles.



Double-Declining-Balance Formula

Key Formula

$$\text{Depreciation} = 2 \times \frac{1}{N} \times (\text{Cost} - \text{Accumulated Depreciation})$$

The formula applies the depreciation rate to the **net book value** (cost minus accumulated depreciation), not the original cost.

Critical Considerations

- No allowance for salvage value in the formula
- Asset cannot be depreciated below salvage value
- Maximum accumulated depreciation = Cost - Salvage value
- Floor net book value = Salvage value

❏ **Important:** While salvage value isn't used in the annual calculation, it establishes the floor below which the asset cannot be depreciated.

Double-Declining-Balance Example

Given Information

An asset costs **\$25,000** with a salvage value of **\$4,000** and an estimated useful life of **8 years**.

01

Maximum Accumulated Depreciation

$$\$25,000 - \$4,000 = \$21,000$$

03

Apply to Net Book Value

Multiply rate by (Cost - Accumulated Depreciation) each year

02

Calculate Constant Rate

$$\frac{2}{8} = 25\%$$

DEPRECIATION SCHEDULE	COST	ACCUMULATED DEPRECIATION	DEPRECIATION EXPENSE	NET BOOK VALUE	CUMULATIVE DEPRECIATION	CUMULATIVE DEPRECIATION	CUMULATIVE DEPRECIATION	CUMULATIVE DEPRECIATION
1	25,000	0	6,250	18,750	6,250	12,500	18,750	25,000
2	25,000	6,250	6,250	12,500	12,500	25,000	31,250	37,500
3	25,000	12,500	6,250	6,250	18,750	31,250	37,500	43,750
4	25,000	18,750	6,250	0	25,000	37,500	43,750	50,000
5	25,000	25,000	6,250	0	31,250	43,750	50,000	56,250
6	25,000	31,250	6,250	0	37,500	50,000	56,250	62,500
7	25,000	37,500	6,250	0	43,750	56,250	62,500	68,750
8	25,000	43,750	6,250	0	50,000	62,500	68,750	75,000

DDB Calculation Table

Continuing the example with a \$25,000 asset, \$4,000 salvage value, 8-year life, and 25% rate:

Year	Beginning NBV	Calculation	Depreciation	Ending NBV
1	\$25,000	$\$25,000 \times 25\%$	\$6,250	\$18,750
2	\$18,750	$\$18,750 \times 25\%$	\$4,688	\$14,062
3	\$14,062	$\$14,062 \times 25\%$	\$3,516	\$10,546
7	\$5,933	$\$5,933 \times 25\%$	\$1,483	\$4,450
8	\$4,450	Plug to salvage	\$450	\$4,000

In the final year, depreciation is adjusted to reach exactly the salvage value, preventing over-depreciation.

Partial-Year Depreciation

Mid-Year Asset Acquisition

When an asset is placed into service during the year rather than on January 1, depreciation must be prorated for the partial year.

Example Scenario

Using the same \$25,000 asset with 25% DDB rate, but placed in service on **July 1** (Year 1):

$$\begin{array}{l} \text{Year} \\ 1 : (\$25,000 - 0) \times 25\% \times \frac{6}{12} = \$3,125 \end{array}$$

$$\begin{array}{l} \text{Year} \\ 2 : (\$25,000 - \$3,125) \times 25\% = \$5,469 \end{array}$$



The first year calculation uses only six months since the asset was acquired halfway through the year. Subsequent years use the full annual rate.



Partial-Year Conventions

Service Date Method

Use the actual date the asset was placed in service for partial-year calculations. This is the default approach unless otherwise specified.

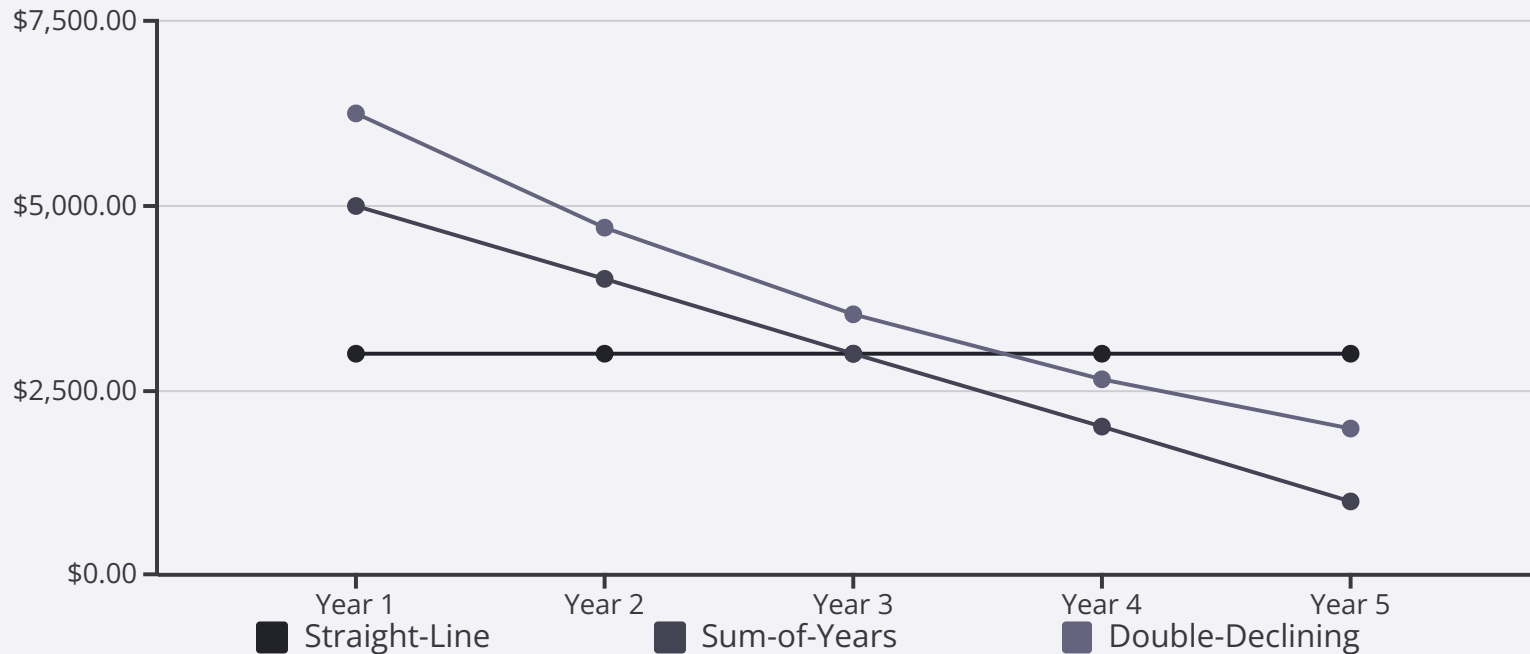
Half-Year Convention

If purchased but not placed in service on January 1, apply half-year depreciation regardless of actual acquisition date within the year.

Full-Year Alternatives

Take full-year depreciation when bought and none when sold, OR take no depreciation when bought and full-year when sold.

Comparing Depreciation Methods



This comparison illustrates how accelerated methods front-load depreciation expense while straight-line maintains consistency. All methods ultimately depreciate the same total amount.

Choosing the Right Method

Straight-Line

Best for assets that provide consistent benefits over time, such as buildings and furniture.
Simple to calculate and widely accepted.

Accelerated Methods

Ideal for assets subject to rapid obsolescence like technology and vehicles. Matches higher early expenses with greater early productivity.

Units-of-Production

Perfect for assets where wear depends on usage rather than time, such as manufacturing equipment and delivery vehicles.

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Key Takeaways

Total Depreciation is Constant

Regardless of method chosen, total accumulated depreciation over an asset's life equals cost minus salvage value. Methods differ only in timing.

Match Method to Asset Type

Select depreciation methods that best reflect how the asset loses value and generates revenue. Consider obsolescence patterns and usage intensity.

Salvage Value Sets the Floor

Assets cannot be depreciated below their estimated salvage value. This floor applies to all methods, even when salvage isn't used in calculations.

Changes Must Be Justified

While depreciation methods can change, such changes require justification and must be applied prospectively to maintain consistency and transparency.