

Chapter 12

Depreciation

12-1

Some seed cleaning equipment was purchased in 2009 for \$8,500 and is depreciated by the double declining balance (DDB) method for an expected life of 12 years. What is the book value of the equipment at the end of 2014? Original salvage value was estimated to be \$2,500 at the end of 12 years.

Solution

$$\begin{aligned}\text{Book Value} &= P\left(1 - \frac{2}{N}\right)^n \\ &= 8,500\left(1 - \frac{2}{12}\right)^6 = \$2,846.63\end{aligned}$$

This can be checked by doing the year-by-year computations:

<u>Year</u>		<u>Depreciation</u>
2009	(8,500-0)	= \$1,416.67
2010	(8,500-1,416.67)	= 1,180.56
2011	(8,500-2,597.23)	= 983.80
2012	(8,500-3,581.03)	= 819.83
2013	(8,500-4,400.86)	= 683.19
2014	(8,500-5,084.05)	= <u>569.32</u>
	Σ of depreciation	\$5,653.37

$$\text{Book Value} = 8,500 - 5,653.37 = \$2,846.63$$

12-2

Suds-n-Dogs just purchased new automated wiener handling equipment for \$12,000. The salvage value of the equipment is anticipated to be \$1,200 at the end of its five-year life. Using MACRS, determine the depreciation schedule.

Solution

Three year class is determined.

Year		Depreciation
1	12,000(.3333)	\$3,999.60
2	12,000(.4445)	5,334.00
3	12,000(.1481)	1,777.20
4	12,000(.0741)	889.20

12-3

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An asset will cost \$1,750 when purchased this year. It is further expected to have a salvage value of \$250 at the end of its five year depreciable life. Calculate complete depreciation schedules giving the depreciation charge, $D(n)$, and end-of-year book value, $B(n)$, for straight-line (SL), sum of the years digits (SOYD), double declining balance (DDB), and modified accelerated cost recovery (MACRS) depreciation methods. Assume a MACRS recovery period of 5 years.

Solution

n	SL		SOYD		DDB		MACRS	
	D(n)	B(n)	D(n)	B(n)	D(n)	B(n)	D(n)	B(n)
0		1,750		1,750		1,750		1,750.00
1	300	1,450	500	1,250	700	1,050	350.00	1,400.00
2	300	1,150	400	850	420	630	560.00	840.00
3	300	850	300	550	252	378	336.00	504.00
4	300	550	200	350	128	250	201.60	302.40
5	300	250	100	250	0	250	201.60	100.80
6							100.80	0.00

12-4

Your company is considering the purchase of a second-hand scanning microscope at a cost of \$10,500, with an estimated salvage value of \$500 and a projected useful life of four years. Determine the straight-line (SL), sum of years digits (SOYD), and double declining balance (DDB) depreciation schedules.

Solution

Year	SL	SOYD	DDB
1	2,500	4,000	5,250.00
2	2,500	3,000	2,625.00
3	2,500	2,000	1,312.50
4	2,500	1,000	656.25

12-5

A piece of machinery costs \$5,000 and has an anticipated \$1,000 resale value at the end of its five-year useful life. Compute the depreciation schedule for the machinery by the sum-of-years-digits method.

Solution

$$\text{Sum-of-years-digits} = \frac{n}{2}(n + 1) = \frac{5}{2}(6) = 15$$

$$\begin{aligned}
 1^{\text{st}}\text{-year depreciation} &= \frac{5}{15}(5,000 - 1,000) = \$1,333 \\
 2^{\text{nd}}\text{-year depreciation} &= \frac{4}{15}(5,000 - 1,000) = 1,067 \\
 3^{\text{rd}}\text{-year depreciation} &= \frac{3}{15}(5,000 - 1,000) = 800 \\
 4^{\text{th}}\text{-year depreciation} &= \frac{2}{15}(5,000 - 1,000) = 533 \\
 5^{\text{th}}\text{-year depreciation} &= \frac{1}{15}(5,000 - 1,000) = 267
 \end{aligned}$$

12-6

A new machine costs \$12,000 and has a \$1,200 salvage value after using it for eight years. Prepare a year-by-year depreciation schedule by the double declining balance (DDB) method.

Solution

$$\text{DDB Depreciation} = \frac{2}{N} (P - \sum D)$$

Year	1	2	3	4	5	6	7	8*	Total
Depreciation	3,000	2,250	1,688	1,266	949	712	534	401	\$10,800

*Book value cannot go below declared salvage value. Therefore the full value of year eight's depreciation cannot be taken.

12-7

To meet increased sales, a large dairy is planning to purchase 10 new delivery trucks. Each truck will cost \$18,000. Compute the depreciation schedule for each truck, using the modified accelerated cost recovery system (MACRS) method, if the recovery period is 5 years.

Solution

Year	Depreciation
1	18,000(.20) \$3,600.00
2	18,000(.32) 5,760.00
3	18,000(.192) 3,456.00
4	18,000(.1152) 2,073.60
5	18,000(.1152) 2,073.60
6	18,000(.0576) 1,036.80

12-8

Hoppy Hops, Inc. purchased hop harvesting machinery for \$150,000 four years ago. Due to a change in the method of harvesting the machine was recently sold for \$37,500. Determine the MACRS depreciation schedule for the machinery for the four years of ownership. Assume a five-year property class. What is the recaptured depreciation or loss on the sale of the machinery?

- a. \$2,940

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- b. \$11,580
- c. \$25,920
- d. \$34,560

Solution

<u>Year</u>	<u>MACRS %(FC)</u>	<u>Depreciation</u>
1	.2(150,000)	\$30,000
2	.32(150,000)	48,000
3	.1920(150,000)	28,800
4	(.1152/2)(150,000)	8,640

$$\begin{aligned}\sum \text{Depreciations} &= 30,000 + 48,000 + 28,800 + 8,640 \\ &= \$115,440\end{aligned}$$

$$\begin{aligned}\text{BV}_4 &= 150,000 - 115,440 \\ &= \$34,560\end{aligned}$$

$$\begin{aligned}\text{Recaptured depreciation} &= 37,500 - 34,560 \\ &= \$2,940\end{aligned}$$

The answer is

12-9

A used piece of depreciable property was bought for \$20,000. If it has a useful life of 10 years and a salvage value of \$5,000, how much will it be depreciated in the 9th year, using the 150% declining balance schedule?

Solution

$$\text{Depreciation} = \frac{1.5P}{N} \left(1 - \frac{1.5}{N}\right)^{n-1} = \frac{1.5(20,000)}{10} \left(1 - \frac{1.5}{10}\right)^{9-1} = \$817.50$$

Check BV at end of 8th year

$$\text{BV} = P \left(1 - \frac{1.5}{N}\right)^n = 20,000 \left(1 - \frac{1.5}{10}\right)^8 = \$5,449.80$$

Because the salvage value is \$5,000, you can only depreciate \$449.80 (5,449.80 - 5,000) in the 9th year.

12-10

A front-end loader cost \$70,000 and has a depreciable salvage value of \$10,000 at the end of its 5-year useful life. Compute the depreciation schedule and book value of the tractor using MACRS depreciation.

Solution

Five year recovery period is determined.

Year	Depreciation	Book Value
1	70,000(.20) = \$14,000	70,000 - 14,000 = \$56,000
2	70,000(.32) = 22,400	56,000 - 22,400 = 33,600
3	70,000(.192) = 13,440	33,600 - 13,440 = 20,160
4	70,000(.1152) = 8,064	20,160 - 8,064 = 12,096
5	70,000(.1152) = 8,064	12,096 - 8,064 = 4,032
6	70,000(.0576) = 4,032	4,032 - 4,032 = 0

12-11

An asset is purchased for \$100,000. The asset is depreciated using MACRS depreciation and a five year recovery period. At the end of the third year of use the business changed its product mix and disposed of the asset. The depreciation allowed in the third year is nearest to

- a. \$9,600
- b. \$16,000
- c. \$19,200
- d. \$20,000

Solution

$$D_3 = .192/2(100,000) = \$9,600$$

Disposal before end of MACRS recovery period results in 1/2-yr depreciation in disposal yr

The answer is a.

12-12

A lumber company purchased a tract of timber for \$70,000. The value of the 25,000 trees on the tract was established to be \$50,000. The value of the land was established to be \$20,000. In the first year of operation, the lumber company cut down 5,000 trees. What was the depletion allowance for the year?

Solution

For standing timber only cost depletion (not percentage depletion) is permissible. Five thousand of the trees were harvested therefore $5,000/25,000 = 0.20$ of the tract was depleted. Land is not considered depletable, only the timber, which is valued at a total of \$50,000.

Therefore, the first year's depletion allowance would be $= 0.20(\$50,000) = \$10,000$.

12-13

A pump cost \$1,000 and has a salvage value of \$100 after a life of five years. Using the double declining balance depreciation method, determine:

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- a) The depreciation in the first year.
- b) The book value after five years.
- c) The book value after five years if the salvage was only \$50.

Solution

- a) Rate = $\frac{200\%}{5} = 40\% = .4$
 $1,000(.4) = \$400$
- b) Book Value = $P(1 - \frac{2}{N})^n$
B.V. = max of {salvage value or $1,000(1-.4)^5$ } = max of {100, 77.76} = \$100
- c) B.V. = max of {salvage value or $1,000(1-.4)^5$ } = max of {50, 77.76} = \$77.76

12-14

Two years ago Nuts-2-U Inc. purchased nut-cracking equipment at a total cost of \$80,000. The equipment was depreciated using MACRS with a recovery class of 3 years and an anticipated end of useful life value of \$8,000. The company has decided the equipment is no longer needed and wishes to determine the minimum value they can accept for the equipment that will result in no loss on the sale. The minimum selling price for the equipment is nearest to.

- a. \$17,775
- b. \$24,000
- c. \$35,560
- d. \$40,000

Solution

Disposal before end of MACRS recovery period results in 1/2-yr depreciation in disposal yr

$$\begin{aligned}\sum_{\text{Depreciation Percentages}} &= .3333 + .4445/2 \\ &= .5556\end{aligned}$$

$$\begin{aligned}BV_2 &= 80,000 - .5556(80,000) \\ &= \$35,556\end{aligned}$$

The answer is c.

12-15

Thick Trunk Sawmill purchases a new automated log planer for \$95,000. The asset is depreciated using straight-line depreciation over a useful life of 10 years to a salvage value of \$5,000. The book value at the end of year six is nearest to

- a. \$9,000
- b. \$38,000
- c. \$41,000
- d. \$54,000

Solution

$$D_t = (95,000 - 5,000)/10 \\ = \$9,000/\text{year}$$

$$\sum_{\text{Depreciations}} = 9,000 \times 6 \\ = \$54,000$$

$$BV_6 = 95,000 - 54,000 \\ = \$41,000$$

The answer is c.

12-16

In the production of beer, a final filtration is accomplished by the use of “Kieselguhr” or diatomaceous earth, which is composed of the fossil remains of minute aquatic algae, a few microns in diameter and composed of pure silica. A company has purchased a property for \$840,000 that contains an estimated 60,000 tons. Compute the depreciation charges for the first three years, if a production (or extraction) of 3,000 tons, 5,000 tons, and 6,000 tons are planned for years 1, 2, and 3, respectively. Use the cost-depletion methods, assuming no salvage value for the property.

Solution

Total diatomaceous earth in property = 60,000 tons
 Cost of property = \$480,000

Then, $\frac{\text{depletion allowance}}{\text{tons extracted}} = \frac{\$840,000}{60,000 \text{ tons}} = \$14 / \text{ton}$

<u>Year</u>	<u>Tons Extracted</u>	<u>Depreciation Charge</u>
1	3,000	3,000 × 14 = \$42,000
2	4,000	4,000 × 14 = 56,000
3	5,000	5,000 × 14 = 70,000

12-17

Adventure Airlines recently purchased a new baggage crusher for \$50,000. It is expected to last 14 years and has an estimated salvage value of \$8,000. Determine the depreciation charge on the

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crusher for the third year of its life and the book value at the end of 8 years, using SOYD depreciation.

Solution

SOYD depreciation for 3rd year

$$\text{Sum-of-years-digits} = \frac{n}{2}(n+1) = \frac{14}{2}(14+1) = 105$$

$$\begin{aligned} 3^{\text{rd}}\text{-year depreciation} &= \frac{\text{remaining life at} \\ &\quad \text{beginning of year}}{\sum \text{years digits}} (P - S) \\ &= \frac{12}{105} (50,000 - 8,000) = \$4,800 \end{aligned}$$

Book Value at end of 8 years

$$\begin{aligned} \sum 8 \text{ years of depreciation} &= \frac{14+13+12+11+10+9+8+7}{105} (50,000 - 8,000) \\ &= \frac{84}{105} (42,000) = \$33,600 \end{aligned}$$

$$\text{Book Value} = \text{Cost} - \text{Depreciation to date} = 50,000 - 33,600 = \$16,400$$