

# CHAPTER 11

## Depreciation, Impairments, and Depletion

### ASSIGNMENT CLASSIFICATION TABLE

Topics	Questions	Brief			Cases
		Exercises	Exercises	Problems	
1. Depreciation methods; meaning of depreciation; choice of depreciation methods.	1, 2, 3, 4, 5, 6, 14, 20, 21, 22, 23		1, 2, 3, 4, 5, 8, 14, 15	1, 2, 3	1, 2, 3, 4, 5
2. Computation of depreciation.	7, 8, 9, 10, 14	1, 2, 3, 4	1, 2, 3, 4, 5, 6, 7, 10, 14, 15	1, 2, 3, 4, 11, 12	1, 2, 3
3. Depreciation base.	6	5	8, 17	1, 2, 3	3
4. Errors; changes in estimate.	13	7	11, 12, 13, 14	3, 4	3
5. Depreciation of partial periods.	15	3, 4	3, 4, 5, 7, 15	1, 2, 3, 8, 10, 11	
6. Composite method.	11, 12	6	9		2
7. Impairment of value.	16, 17, 18, 19	8	16, 17, 18	9	
8. Depletion.	22, 23, 24, 25, 26, 27	9	19, 20, 21, 22, 23	5, 6, 7	
9. Ratio analysis.	28	10	24		
*10. Tax depreciation (MACRS).	29	11	25, 26	12	

\*This material is covered in an Appendix to the chapter.

## ASSIGNMENT CHARACTERISTICS TABLE

Item	Description	Level of Difficulty	Time (minutes)
E11-1	Depreciation computations—SL, SYD, DDB.	Simple	15-20
E11-2	Depreciation—conceptual understanding.	Moderate	20-25
E11-3	Depreciation computations—SYD, DDB—partial periods.	Simple	15-20
E11-4	Depreciation computations—five methods.	Simple	15-25
E11-5	Depreciation computations—four methods.	Simple	20-25
E11-6	Depreciation computations—five methods, partial periods.	Moderate	25-35
E11-7	Different methods of depreciation.	Simple	20-30
E11-8	Depreciation computation—replacement, non-monetary exchange.	Moderate	20-25
E11-9	Composite depreciation.	Simple	15-20
E11-10	Depreciation computations—SYD.	Simple	10-15
E11-11	Depreciation—change in estimate.	Simple	10-15
E11-12	Depreciation computation—addition, change in estimate.	Simple	20-25
E11-13	Depreciation—replacement, change in estimate.	Simple	15-20
E11-14	Error analysis and depreciation, SL and SYD.	Moderate	20-25
E11-15	Depreciation for fractional periods.	Moderate	25-35
E11-16	Impairment.	Simple	10-15
E11-17	Impairment.	Simple	15-20
E11-18	Impairment.	Simple	15-20
E11-19	Depletion computations—timber.	Simple	15-20
E11-20	Depletion computations—oil.	Simple	10-15
E11-21	Depletion computations—timber.	Simple	15-20
E11-22	Depletion computations—mining.	Simple	15-20
E11-23	Depletion computations—minerals.	Simple	15-20
E11-24	Ratio analysis.	Moderate	15-20
*E11-25	Book versus tax (MACRS) depreciation.	Moderate	20-25
*E11-26	Book versus tax (MACRS) depreciation.	Moderate	15-20
P11-1	Depreciation for partial periods—SL, SYD, and DDB.	Simple	25-30
P11-2	Depreciation for partial periods—SL, Act., SYD, and DDB.	Simple	25-35
P11-3	Depreciation—SYD, Act., SL, and DDB.	Moderate	40-50
P11-4	Depreciation and error analysis.	Complex	45-60
P11-5	Depletion and depreciation—mining.	Moderate	25-30
P11-6	Depletion, timber, and extraordinary loss.	Moderate	25-30
P11-7	Natural resources, timber.	Moderate	25-35
P11-8	Comprehensive fixed asset problem.	Moderate	25-35
P11-9	Impairment.	Moderate	15-25
P11-10	Comprehensive depreciation computations.	Complex	45-60

## ASSIGNMENT CHARACTERISTICS TABLE (Continued)

<b>Item</b>	<b>Description</b>	<b>Level of Difficulty</b>	<b>Time (minutes)</b>
P11-11	Depreciation for partial periods—SL, Act., SYD, and DDB.	Moderate	30-35
*P11-12	Depreciation—SL, DDB, SYD, Act., and MACRS.	Moderate	25-35
C11-1	Depreciation basic concepts.	Moderate	25-35
C11-2	Unit, group, and composite depreciation.	Simple	20-25
C11-3	Depreciation—strike, units-of-production, obsolescence.	Moderate	25-35
C11-4	Depreciation concepts—written component.	Moderate	25-35
C11-5	Depreciation method choice—ethics	Moderate	20-25

# ANSWERS TO QUESTIONS

1. The differences among the terms depreciation, depletion, and amortization are that they imply a cost allocation of different types of assets. Depreciation is employed to indicate that tangible plant assets have decreased in service potential. Where natural resources (wasting assets) such as timber, oil, coal, and lead are involved, the term depletion is used. The expiration of intangible assets such as patents or copyrights is referred to as amortization.
2. The factors relevant in determining the annual depreciation for a depreciable asset are the initial recorded amount (cost), estimated salvage value, estimated useful life, and depreciation method.

Assets are typically recorded at their acquisition cost, which is in most cases objectively determinable. But cost assignments in other cases—"basket purchases" and the selection of an implicit interest rate in asset acquisition under deferred-payment plans—may be quite subjective, involving considerable judgment.

The salvage value is an estimate of an amount potentially realizable when the asset is retired from service. The estimate is based on judgment and is affected by the length of the useful life of the asset.

The useful life is also based on judgment. It involves selecting the "unit" of measure of service life and estimating the number of such units embodied in the asset. Such units may be measured in terms of time periods or in terms of activity (for example, years or machine hours). When selecting the life, one should select the lower (shorter) of the physical life or the economic life. Physical life involves wear and tear and casualties; economic life involves such things as technological obsolescence and inadequacy.

Selecting the depreciation method is generally a judgment decision, but a method may be inherent in the definition adopted for the units of service life, as discussed earlier. For example, if such units are machine hours, the method is a function of the number of machine hours used during each period. A method should be selected that will best measure the portion of services expiring each period. Once a method is selected, it may be objectively applied by using a predetermined, objectively derived formula.

3. Accounting depreciation is defined as an accounting process of allocating the costs of tangible assets to expense in a systematic and rational manner to the periods expected to benefit from the use of the asset. Thus, depreciation is not a matter of valuation but a means of cost allocation.
4. The carrying value of a fixed asset is its cost less accumulated depreciation. If the company estimates that the asset will have an unrealistically long life, periodic depreciation charges, and hence accumulated depreciation, will be lower. As a result the carrying value of the asset will be higher.
5. A change in the amount of annual depreciation recorded does not change the facts about the decline in economic usefulness. It merely changes reported figures. Depreciation in accounting consists of allocating the cost of an asset over its useful life in a systematic and rational manner. Abnormal obsolescence, as suggested by the plant manager, would justify more rapid depreciation, but increasing the depreciation charge would not necessarily result in funds for replacement. It would not increase revenue but simply make reported income lower than it would have been, thus preventing overstatement of net income.

Recording depreciation on the books does not set aside any assets for eventual replacement of the depreciated assets. Fund segregation can be accomplished but it requires additional managerial action. Unless an increase in depreciation is accompanied by an increase in sales price of the product, or unless it affects management's decision on dividend policy, it does not

**Questions Chapter 11 (Continued)**

affect funds. Ordinarily higher depreciation will not lead to higher sales prices and thus to more rapid “recovery” of the cost of the asset, and the economic factors present would have permitted this higher price regardless of the excuse given or the particular rationalization used. The price could have been increased without a higher depreciation charge.

The funds of a firm operating profitably do increase, but these may be used as working capital policy may dictate. The measure of the increase in these funds from operations is not merely net income, but that figure plus charges to operations which did not require working capital, less credits to operations which did not create working capital. The fact that net income alone does not measure the increase in funds from profitable operations leads some non-accountants to the erroneous conclusion that a fund is being created and that the amount of depreciation recorded affects the fund accumulation.

Acceleration of depreciation for purposes of income tax calculation stands in a slightly different category, since this is not merely a matter of recordkeeping. Increased depreciation will tend to postpone tax payments, and thus temporarily increase funds (although the liability for taxes may be the same or even greater in the long run than it would have been) and generate gain to the firm to the extent of the value of use of the extra funds.

6. Assets are retired for one of two reasons: physical factors or economic factors—or a combination of both. Physical factors are the wear and tear, decay, and casualty factors which hinder the asset from performing indefinitely. Economic factors can be interpreted to mean any other constraint that develops to hinder the service life of an asset. Some accountants attempt to classify the economic factors into three groups: inadequacy, supersession, and obsolescence. Inadequacy is defined as a situation where an asset is no longer useful to a given enterprise because the demands of the firm have increased. Supersession is defined as a situation where the replacement of an asset occurs because another asset is more efficient and economical. Obsolescence is the catchall term that encompasses all other situations and is sometimes referred to as the major concept when economic factors are considered.
7. Before the amount of the depreciation charge can be computed, three basic questions must be answered:
  1. What is the depreciation base to be used for the asset?
  2. What is the asset’s useful life?
  3. What method of cost apportionment is best for this asset?

8. Cost	\$600,000	Cost	\$600,000
Depreciation rate	<u>30%*</u>	Depreciation for 2003	<u>(180,000)</u>
Depreciation for 2003	<u>\$180,000</u>	Undepreciated cost in 2004	420,000
2003 Depreciation	\$180,000	Depreciation rate	<u>30%</u>
2004 Depreciation	<u>126,000</u>	Depreciation for 2004	<u>\$126,000</u>
Accumulated depreciation			
at December 31, 2004	<u>\$306,000</u>		

\* $(1 \div 5) \times 150\%$

**Questions Chapter 11 (Continued)**

9. Depreciation base:

Cost	\$120,000	Straight-line, \$105,000 ÷ 20 =	\$5,250
Salvage	<u>(15,000)</u>		
	<u>\$105,000</u>	Units of output, $\frac{\$105,000}{84,000}$ X 20,000 =	\$25,000
		Working hours, $\frac{\$105,000}{42,000}$ X 14,300 =	\$35,750
		Sum-of-the-years'-digits, \$105,000 X 20/210* =	\$10,000
		Declining-balance, \$120,000 X 10% =	\$12,000

$$\frac{*20(20 + 1)}{2} = 210$$

10. From a conceptual point of view, the method which best matches revenue and expenses should be used; in other words, the answer depends on the decline in the service potential of the asset. If the service potential decline is faster in the earlier years, an accelerated method would seem to be more desirable. On the other hand, if the decline is more uniform, perhaps a straight-line approach should be used. Many firms adopt depreciation methods for more pragmatic reasons. Some companies use accelerated methods for tax purposes but straight-line for book purposes because a higher net income figure is shown on the books in the earlier years, but a lower tax is paid to the government. Others attempt to use the same method for tax and accounting purposes because it eliminates some recordkeeping costs. Tax policy sometimes also plays a role.

11. The composite method is appropriate for a company which owns a large number of heterogeneous plant assets and which would find it impractical to keep detailed records for them.

The principal advantage is that it is not necessary to keep detailed records for each plant asset in the group. The principle disadvantage is that after a period of time the book value of the plant assets may not reflect the proper carrying value of the assets. Inasmuch as the accumulated depreciation account is debited or credited for the difference between the cost of the asset and the cash received from the retirement of the asset (i.e., no gain or loss on disposal is recognized), the accumulated depreciation account is self-correcting over time.

12. Cash .....	16,000	
Accumulated Depreciation—Plant Assets .....	34,000	
Plant Assets .....		50,000

No gain or loss is recognized under the composite method.

13. Original estimate: \$2,400,000 ÷ 50 = \$48,000 per year  
 Depreciation to January 1, 2004: \$48,000 X 24 = \$1,152,000  
 Depreciation in 2004 (\$2,400,000 – \$1,152,000) ÷ 15 years = \$83,200

14. No, depreciation does not provide cash; revenues do. The funds for the replacement of the assets come from the revenues; without the revenues no income materializes and no cash inflow results. A separate decision must be made by management to set aside cash to accumulate asset replacement funds. Depreciation is added to net income on the statement of cash flows (indirect method) because it is a noncash expense, not because it is a cash inflow.

## Questions Chapter 11 (Continued)

15. 25% straight-line rate  $\times 2 = 50\%$  double-declining rate  
 $\$6,000 \times 50\% = \$3,000$  Depreciation for first full year.  
 $\$3,000 \times 6/12 = \$1,500$  Depreciation for half a year (first year), 2004  
 $\$4,500 \times 50\% = \$2,250$  Depreciation for 2005.
16. The accounting standards require that if events or changes in circumstances indicate that the carrying amount of such assets may not be recoverable, then the carrying amount of the asset should be assessed. The assessment or review takes the form of a recoverability test that compares the sum of the expected future cash flows from the asset (undiscounted) to the carrying amount. If the cash flows are less than the carrying amount, the asset has been impaired. The impairment loss is measured as the amount by which the carrying amount exceeds the fair value of the asset. The fair value of assets is measured by their market value if an active market for them exists. If no market price is available, the present value of the expected future net cash flows from the asset may be used.
17. Under U.S. GAAP, impairment losses on assets held for use may not be restored.
18. An impairment is deemed to have occurred if, in applying the recoverability test, the carrying amount of the asset exceeds the expected future net cash flows from the asset. In this case, the expected future net cash flows of \$705,000 exceed the carrying amount of the equipment of \$700,000 so that no impairment is assumed to have occurred; thus no measurement of the loss is made or recognized even though the fair value is \$590,000.
19. Impairment losses are reported as part of income from continuing operations, generally in the "Other expenses and losses" section. Impairment losses (and recovery of losses for assets to be disposed of) are similar to other costs that would flow through operations. Thus, gains (recoveries of losses) on assets to be disposed of should be reported as part of income from continuing operations.
20. In a decision to replace or not to replace an asset, the undepreciated cost of the old asset is not a factor to be considered. Therefore, the decision to replace plant assets should not be affected by the amount of depreciation that has been recorded. The relative efficiency of new equipment as compared with that presently in use, the cost of the new facilities, the availability of capital for the new asset, etc., are the factors entering into the decision. Normally, the fact that the asset had been fully depreciated through the use of some accelerated depreciation method, although the asset was still in use, should not cause management to decide to replace the asset. If the new asset under consideration for replacement was not any more efficient than the old, or if it cost a good deal more in relationship to its efficiency, it is illogical for management to replace it merely because all or the major portion of the cost had been charged off for tax and accounting purposes.

If depreciation rates were higher it might be true that a business would be financially more able to replace assets, since during the earlier years of the asset's use a larger portion of its cost would have been charged to expense, and hence during this period a smaller amount of income tax paid. By a sale of the old asset, which might result in a capital gain, and purchase of a new asset, the higher depreciation charge might be continued for tax purposes. However, if the asset were traded in, having taken higher depreciation would result in a lower basis for the new asset.

It should be noted that expansion (not merely replacement) might be encouraged by increased depreciation rates. Management might be encouraged to expand, believing that in the first few years when they are reasonably sure that the expanded facilities will be profitable, they can charge off a substantial portion of the cost as depreciation for tax purposes. Similarly, since a replacement involves additional capital outlays, the tax treatment may have some influence.

Also, because of the inducement to expand or to start new businesses, there may be a tendency in the economy as a whole for the accounting and tax treatment of the cost of plant assets to influence the retirement of old plant assets.

## Questions Chapter 11 (Continued)

It should be noted that to the extent that increased depreciation causes management to alter its decision about replacement, and to the extent it results in capital gains at the time of disposition, it is not matching costs and revenues in the closest possible manner.

21. In lieu of recording depreciation on replacement costs, management might elect to make annual appropriations of retained earnings in contemplation of replacing certain facilities at higher price levels. Such appropriations might help to eliminate misunderstandings as to amounts available for distribution as dividends, higher wages, bonuses, or lower sales prices. The need for these appropriations can be explained by supplementary financial schedules, explanations, and footnotes accompanying the financial statements. (However, neither depreciation charges nor appropriations of retained earnings result in the accumulation of funds for asset replacement. Fund accumulation is a result of profitable operations and appropriate funds management.)
22. (a) Depreciation and cost depletion are similar in the accounting sense in that:
1. The cost of the asset is the starting point from which computation of the amount of the periodic charge to operations is made.
  2. The estimated life is based on economic or productive life.
  3. The accumulated total of past charges to operations is deducted from the original cost of the asset on the balance sheet.
  4. When output methods of computing depreciation charges are used, the formulas are essentially the same as those used in computing depletion charges.
  5. Both represent an apportionment of cost under the process of matching costs with revenue.
  6. Assets subject to either are reported in the same classification on the balance sheet.
  7. Appraisal values are sometimes used for depreciation while discovery values are sometimes used for depletion.
  8. Residual value is properly recognized in computing the charge to operations.
  9. They may be included in inventory if the related asset contributed to the production of the inventory.
  10. The rates may be changed upon revision of the estimated productive life used in the original rate computations.
- (b) Depreciation and cost depletion are dissimilar in the accounting sense in that:
1. Depletion is almost always based on output whereas depreciation is usually based on time.
  2. Many formulas are used in computing depreciation but only one is used to any extent in computing depletion.
  3. Depletion applies to natural resources while depreciation applies to plant and equipment.
  4. Depletion refers to the physical exhaustion or consumption of the asset while depreciation refers to the wear, tear, and obsolescence of the asset.
  5. Under statutes which base the legality of dividends on accumulated earnings, depreciation is usually a required deduction but depletion is usually not a required deduction.
  6. The computation of the depletion rate is usually much less precise than the computation of depreciation rates because of the greater uncertainty in estimating the productive life.
  7. A difference that is temporary in nature arises from the timing of the recognition of depreciation under conventional accounting and under the Internal Revenue Code, and it results in the recording of deferred income taxes. On the other hand, the difference between cost depletion under conventional accounting and its counterpart, percentage depletion, under the Internal Revenue Code is permanent and does not require the recording of deferred income taxes.
23. Cost depletion is the procedure by which the capitalized costs, less residual land values, of a natural resource are systematically charged to operations. The purpose of this procedure is to match the cost of the resource with the revenue it generates. The usual method is to divide the total cost less residual value by the estimated number of recoverable units to arrive at a depletion charge for each unit removed. A change in the estimate of recoverable units will necessitate a revision of the unit charge.

## Questions Chapter 11 (Continued)

Percentage depletion is the procedure, authorized by the Internal Revenue Code, by which a certain percentage of gross income is charged to operations is arriving at taxable income. Percentage depletion is not considered to be a generally accepted accounting principle because it is not related to the cost of the asset and is allowed even though the property is fully depleted under cost depletion accounting. Applicable rates, ranging from 5% to 22% of gross income, are specified for nearly all natural resources. The total amount deductible in a given year may not be less than the amount computed under cost depletion procedures, and it may not exceed 50% of taxable income from the property before the depletion deduction. Cost depletion differs from percentage depletion in that cost depletion is a function of production whereas percentage depletion is a function of income.

Percentage depletion has arisen, in part, from the difficulty of valuing the natural resource or determining the discovery value of the asset and of determining the recoverable units. Although other arguments have been advanced for maintaining percentage depletion, a primary argument is its value in encouraging the search for additional resources. It is deemed to be in the national interest to provide an incentive to the continuing search for natural resources. As noted in the textbook, percentage depletion is no longer permitted for many enterprises.

24. This method does not necessarily measure the proper share of the cost of land to be charged to expense for depletion and, in fact, may ultimately exceed the actual cost of the property.
25. The maximum permissible is the amount of accumulated net income (after depletion) plus the amount of depletion charged. This practice can be justified for companies that expect to extract natural resources and not purchase additional properties. In effect, such companies are distributing gradually to stockholders their original investments.
26. Reserve recognition accounting (RRA) is the method that was proposed by the SEC to account for oil and gas resources. Proponents of this approach argue that oil and gas should be valued at the date of discovery. The value of the reserve still in the ground is estimated and this amount, appropriately discounted, is reported on the balance sheet as "oil deposits."

The costs of exploration incurred each year are deducted from the estimated reserves discovered during the same period with the difference probably being reported as income.

The oil companies are concerned because the valuation issue is extremely tenuous. For example, to properly value the reserves, the following must be estimated: (1) amount of the reserves, (2) future production costs, (3) periods of expected disposal, (4) discount rate, and (5) the selling price.

27. Using full-cost accounting, the cost of unsuccessful ventures as well as those that are successful are capitalized, because a cost of drilling a dry hole is a cost that is needed to find the commercially profitable wells. Successful efforts accounting capitalizes only those costs related to successful projects. They contend that to measure cost and effort accurately for a single property unit, the only measure is in terms of the cost directly related to that unit. In addition, it is argued that full-cost is misleading because capitalizing all costs will make an unsuccessful company over a short period of time show no less income than does one that is successful.
28. Asset turnover ratio:

$$\frac{\$39.2}{\$21.8} = 1.8 \text{ times}$$

Rate of return on assets:

$$\frac{\$1.4}{\$21.8} = 6.4\%$$

## Questions Chapter 11 (Continued)

- \*29. The modified accelerated cost recovery system (MACRS) has been adopted by the Internal Revenue Service. It applies to depreciable assets acquired in 1987 and later. MACRS eliminates the need to determine each asset's useful life. The selection of a depreciation method and a salvage value is also unnecessary under MACRS. The taxpayer determines the recovery deduction for an asset by applying a statutory percentage to the historical cost of the property. MACRS was adopted to permit a faster write-off of tangible assets so as to provide additional tax incentives and to simplify the depreciation process. The simplification should end disputes related to estimated useful life, salvage value, and so on.

# SOLUTIONS TO BRIEF EXERCISES

## BRIEF EXERCISE 11-1

$$2004: \frac{(\$42,000 - \$2,000) \times 23,000}{160,000} = \underline{\$5,750}$$

$$2005: \frac{(\$42,000 - \$2,000) \times 31,000}{160,000} = \underline{\$7,750}$$

## BRIEF EXERCISE 11-2

$$(a) \frac{\$60,000 - \$6,000}{8} = \underline{\$6,750}$$

$$(b) \frac{\$60,000 - \$6,000}{8} \times 4/12 = \underline{\$2,250}$$

## BRIEF EXERCISE 11-3

$$(a) (\$60,000 - \$6,000) \times 8/36 = \underline{\$12,000}$$

$$(b) [(\$60,000 - \$6,000) \times 8/36] \times 9/12 = \underline{\$9,000}$$

## BRIEF EXERCISE 11-4

$$(a) \$60,000 \times 25\% = \underline{\$15,000}$$

$$(b) (\$60,000 \times 25\%) \times 3/12 = \underline{\$3,750}$$

### BRIEF EXERCISE 11-5

Depreciable Base =  $(\$25,000 + \$200 + \$125 + \$500 + \$475) - \$3,000 = \$23,300$ .

### BRIEF EXERCISE 11-6

<u>Asset</u>	<u>Depreciation Expense</u>
A	$(\$70,000 - \$7,000)/10 = \$6,300$
B	$(\$50,000 - \$10,000)/5 = 8,000$
C	$(\$82,000 - \$4,000)/12 = 6,500$
	<u>\$20,800</u>

Composite rate =  $\$20,800/\$202,000 = \underline{10.3\%}$

Composite life =  $\$181,000/\$20,800 = \underline{8.7 \text{ years}}$

### BRIEF EXERCISE 11-7

Annual depreciation expense:  $(\$7,000 - \$1,000)/5 = \underline{\$1,200}$

Book value, 1/1/05:  $\$7,000 - (2 \times \$1,200) = \underline{\$4,600}$

Depreciation expense, 2005:  $(\$4,600 - \$500)/2 = \underline{\$2,050}$

### BRIEF EXERCISE 11-8

Recoverability test:

Future net cash flows (\$500,000) < Carrying amount (\$540,000);  
therefore, the asset has been impaired.

Journal entry:

Loss on Impairment .....	140,000	
Accumulated Depreciation.....		140,000
(\$540,000 – \$400,000)		

### BRIEF EXERCISE 11-9

Inventory .....	72,625	
Accumulated Depletion .....		72,625

$$\frac{\$400,000 + \$100,000 + \$75,000 - \$160,000}{4,000} = \underline{\$103.75 \text{ per ton}}$$

$$700 \times \$103.75 = \underline{\$72,625}$$

### BRIEF EXERCISE 11-10

(a) Asset turnover ratio:

$$\frac{\$6,664}{\frac{\$5,196 + \$5,927}{2}} = 1.20 \text{ times}$$

(b) Profit margin on sales:

$$\frac{\$649}{\$6,664} = 9.74\%$$

(c) Rate of return on asset:

1.  $1.20 \times 9.74\% = 11.7\%$

2.  $\frac{\$649}{\frac{\$5,196 + \$5,927}{2}} = 11.7\%$

**\*BRIEF EXERCISE 11-11**

<b>2005:</b>	<b>\$40,000 X 20%</b>	<b>=</b>	<b>\$ 8,000</b>
<b>2006:</b>	<b>\$40,000 X 32%</b>	<b>=</b>	<b>12,800</b>
<b>2007:</b>	<b>\$40,000 X 19.2%</b>	<b>=</b>	<b>7,680</b>
<b>2008:</b>	<b>\$40,000 X 11.52%</b>	<b>=</b>	<b>4,608</b>
<b>2009:</b>	<b>\$40,000 X 11.52%</b>	<b>=</b>	<b>4,608</b>
<b>2010:</b>	<b>\$40,000 X 5.76%</b>	<b>=</b>	<b><u>2,304</u></b>
			<b><u>\$40,000</u></b>

# SOLUTIONS TO EXERCISES

## EXERCISE 11-1 (15-20 minutes)

- (a) Straight-line method depreciation for each of Years 1 through 3 =

$$\frac{\$469,000 - \$40,000}{12} = \underline{\$35,750}$$

- (b) Sum-of-the-Years'-Digits =  $\frac{12 \times 13}{2} = 78$

$$12/78 \times (\$469,000 - \$40,000) = \underline{\$66,000} \quad \text{depreciation Year 1}$$

$$11/78 \times (\$469,000 - \$40,000) = \underline{\$60,500} \quad \text{depreciation Year 2}$$

$$10/78 \times (\$469,000 - \$40,000) = \underline{\$55,000} \quad \text{depreciation Year 3}$$

- (c) Double-Declining Balance method depreciation rate.  $\frac{100\%}{12} \times 2 = 16.67\%$

$$\$469,000 \times 16.67\% = \underline{\$78,182} \quad \text{depreciation Year 1}$$

$$(\$469,000 - \$78,182) \times 16.67\% = \underline{\$65,149} \quad \text{depreciation Year 2}$$

$$(\$469,000 - \$78,182 - \$65,149) \times 16.67\% = \underline{\$54,289} \quad \text{depreciation Year 3}$$

## EXERCISE 11-2 (20-25 minutes)

- (a) If there is any salvage value and the amount is unknown (as is the case here), the cost would have to be determined by looking at the data for the double-declining balance method.

$$\frac{100\%}{5} = 20\%; 20\% \times 2 = 40\%$$

$$\text{Cost} \times 40\% = \$20,000$$

$$\$20,000 \div .40 = \underline{\$50,000} \quad \text{Cost of asset}$$

## EXERCISE 11-2 (Continued)

- (b) \$50,000 cost [from (a)] – \$45,000 total depreciation = \$5,000 salvage value.
- (c) The highest charge to income for Year 1 will be yielded by the double-declining balance method.
- (d) The highest charge to income for Year 4 will be yielded by the straight-line method.
- (e) The method that produces the highest book value at the end of Year 3 would be the method that yields the lowest accumulated depreciation at the end of Year 3, which is the straight-line method.

### Computations:

St.-line = \$50,000 – (\$9,000 + \$9,000 + \$9,000) = \$23,000 book value, end of Year 3.

S.Y.D. = \$50,000 – (\$15,000 + \$12,000 + \$9,000) = \$14,000 book value, end of Year 3.

D.D.B. = \$50,000 – (\$20,000 + \$12,000 + \$7,200) = \$10,800 book value, end of Year 3.

- (f) The method that will yield the highest gain (or lowest loss) if the asset is sold at the end of Year 3 is the method which will yield the lowest book value at the end of Year 3, which is the double-declining balance method in this case.

## EXERCISE 11-3 (15-20 minutes)

(a) 
$$\frac{20(20 + 1)}{2} = 210$$

$$\frac{3}{4} \times \frac{20}{210} \times (\$711,000 - \$60,000) = \underline{\$46,500} \text{ for 2004}$$

	$\frac{1}{4} \times \frac{20}{210} \times (\$711,000 - \$60,000) =$	$\$15,500$	
+	$\frac{3}{4} \times \frac{19}{210} \times (\$711,000 - \$60,000) =$	$\underline{44,175}$	
		$\underline{\$59,675}$	for 2005

### EXERCISE 11-3 (Continued)

$$(b) \frac{100\%}{20} = 5\%; 5\% \times 2 = 10\%$$

$$3/4 \times 10\% \times \$711,000 = \underline{\$53,325} \text{ for 2004}$$

$$10\% \times (\$711,000 - \$53,325) = \underline{\$65,768} \text{ for 2005}$$

### EXERCISE 11-4 (15-25 minutes)

$$(a) \$315,000 - \$15,000 = \$300,000; \$300,000 \div 10 \text{ yrs.} = \$30,000$$

$$(b) \$300,000 \div 240,000 \text{ units} = \$1.25; 25,500 \text{ units} \times \$1.25 = \$31,875$$

$$(c) \$300,000 \div 25,000 \text{ hours} = \$12.00 \text{ per hr.}; 2,650 \text{ hrs.} \times \$12.00 = \$31,800$$

$$(d) 10 + 9 + 8 + 7 + 6 + 5 + 4 + 3 + 2 + 1 = 55 \text{ OR } \frac{n(n+1)}{2} = \frac{10(11)}{2} = 55$$

$$\frac{10}{55} \times \$300,000 \times 1/3 = \$18,182$$

$$\frac{9}{55} \times \$300,000 \times 2/3 = \underline{32,727}$$

$$\text{Total for 2005} \quad \underline{\underline{\$50,909}}$$

$$(e) \$315,000 \times 20\% \times 1/3 = \$21,000$$

$$[\$315,000 - (\$315,000 \times 20\%)] \times 20\% \times 2/3 = \underline{33,600}$$

$$\text{Total for 2005} \quad \underline{\underline{\$54,600}}$$

[May also be computed as 20% of (\$315,000 – 2/3 of 20% of \$315,000)]

**EXERCISE 11-5 (20-25 minutes)**

(a) 
$$\frac{(\$117,900 - \$12,900)}{5} = \$21,000/\text{yr.} = \$21,000 \times 5/12 = \underline{\underline{\$8,750}}$$

**2004 Depreciation — Straight line = \$8,750**

(b) 
$$\frac{(\$117,900 - \$12,900)}{21,000} = \$5.00/\text{hr.}$$

**2004 Depreciation — Machine Usage = 800 X \$5.00 = \$4,000**

Machine	Year	Total	Allocated to	
			2004	2005
	1	5/15 X \$105,000 = \$35,000	\$14,583*	\$20,417**
	2	4/15 X \$105,000 = \$28,000		11,667***
			<u>\$14,583</u>	<u>\$32,084</u>

\* \$35,000 X 5/12 = \$14,583

\*\* \$35,000 X 7/12 = \$20,417

\*\*\* \$28,000 X 5/12 = \$11,667

**2005 Depreciation — Sum-of-the-Years'-Digits = \$32,084**

(d) **2004 40% X (\$117,900) X 5/12 = \$19,650**

**2005 40% X (\$117,900 – \$19,650) = \$39,300**

**OR**

**1<sup>st</sup> full year (40% X \$117,900) = \$47,160**

**2<sup>nd</sup> full year [40% X (\$117,900 – \$47,160)] = \$28,296**

**2004 Depreciation = 5/12 X \$47,160 = \$19,650**

**2005 Depreciation = 7/12 X \$47,160 = \$27,510**

**5/12 X \$28,296 = 11,790**

**\$39,300**

**EXERCISE 11-6 (20-30 minutes)**

(a) 2003 Straight-line  $\frac{\$212,000 - \$12,000}{8} = \$25,000/\text{year}$

3 months — Depreciation  $\$6,250 = (\$25,000 \times 3/12)$

(b) 2003 Output  $\frac{\$212,000 - \$12,000}{40,000} = \$5.00/\text{output unit}$

1,000 units  $\times \$5.00 = \$5,000$

(c) 2003 Working hours  $\frac{\$212,000 - \$12,000}{20,000} = \$10.00/\text{hour}$

525 hours  $\times \$10.00 = \$5,250$

(d)  $8 + 7 + 6 + 5 + 4 + 3 + 2 + 1 = 36$  OR  $\frac{n(n+1)}{2} = \frac{8(9)}{2} = 36$

Sum-of-the-years'-digits	Total	Allocated to		
		2003	2004	2005
Year 1 $8/36 \times \$200,000 =$	\$44,444	\$11,111	\$33,333	
2 $7/36 \times \$200,000 =$	\$38,889		9,722	\$29,167
3 $6/36 \times \$200,000 =$	\$33,333			8,333
		<u>\$11,111</u>	<u>\$43,055</u>	<u>\$37,500</u>

2005: \$37,500 = (9/12 of 2<sup>nd</sup> year of machine's life plus 3/12 of 3<sup>rd</sup> year of machine's life)

(e) Double-declining balance 2004:  $1/8 \times 2 = 25\%$ .

2003:  $25\% \times \$212,000 \times 3/12 = \underline{\$13,250}$

2004:  $25\% \times (\$212,000 - \$13,250) = \underline{\$49,688}$

OR

1<sup>st</sup> full year  $(25\% \times \$212,000) = \$53,000$

**EXERCISE 11-6 (Continued)**

2<sup>nd</sup> full year [25% X (\$212,000 – \$53,000)] = \$39,750

2003 Depreciation 3/12 X \$53,000 = \$13,250

2004 Depreciation 9/12 X \$53,000 = \$39,750  
 3/12 X \$39,750 = 9,938  
\$49,688

**EXERCISE 11-7 (25-35 minutes)**

**Methods of Depreciation**

<u>Description</u>	<u>Date Purchased</u>	<u>Cost</u>	<u>Salvage</u>	<u>Life</u>	<u>Method</u>	<u>Accum. Depr. to 2004</u>	<u>2005 Depr.</u>
A	03	142,500	16,000	10	(a) SYD	33,350	(b) 19,550
B	02	(c) 79,000	21,000	5	SL	29,000	(d) 11,600
C	01	75,400	23,500	8	DDB	(e) 47,567	(f) 4,333
D	(g) 00	219,000	69,000	5	SYD	70,000	(h) 35,000

**Machine A—Testing the methods**

Straight-Line Method for 2003 \$ 6,325  
 Straight-Line Method for 2004 \$12,650  
 Total Straight Line \$18,975

Double-Declining Balance for 2003 \$14,250 (142,500 X .2 X .5)  
 Double-Declining Balance for 2004 \$25,650  
 Total Double Declining Balance \$39,900

Sum-of-the-years-digits for 2003 \$11,500 [(142,500 – 16,000) X 10/55 X .5]  
 Sum-of-the-years-digits for 2004 \$21,850 (126,500 X 10/55 X 1/2) + (126,500 X 9/55 X .5)  
 Total Sum-of-the-years-digits \$33,350 (126,500 X 9/55 X 1/2) + (126,500 X 8/55 X .5)

Method used must be SYD  
 Using SYD, 2005 Depreciation is \$19,550

## EXERCISE 11-7 (Continued)

### Machine B—Computation of the cost

Asset has been depreciated for 2 1/2 years using the straight-line method.

Annual depreciation is then equal to 29,000 divided by 2.5 or \$11,600.

11,600 times 5 plus the salvage value is equal to the cost.

Cost is \$79,000

Using SL, 2005 Depreciation is \$11,600.

### Machine C—Using the double-declining balance method of depreciation

2001's depreciation is	\$ 9,425	(75,400 X .25 X .5)
2002's depreciation is	\$16,494	
2003's depreciation is	\$12,370	
2004's depreciation is	<u>\$ 9,278</u>	
	<u>\$47,567</u>	

Using DDB, 2005 Depreciation is \$ 4,333.21

### Machine D—Computation of Year Purchased

First Half Year using SYD =	\$25,000	[(219,000 – 69,000) X 5/15 X .5]
Second Year using SYD =	<u>\$45,000</u>	(150,000 X 5/15 X .5) + (150,000 X 4/15 X .5)
	<u>\$70,000</u>	

Thus asset must have been purchased on October 12, 2003

Using SYD, 2005 Depreciation is \$35,000 (150,000 X 4/15 X .5) +  
(150,000 X 3/15 X .5)

## EXERCISE 11-8 (20-25 minutes)

### Old Machine

June 1, 2002	Purchase	\$31,000
	Freight	200
	Installation	<u>500</u>
	Total cost	<u>\$31,700</u>

Annual depreciation charge:  $(\$31,700 - \$2,500) \div 10 = \$2,920$

On June 1, 2003, debit the old machine for \$1,980; the revised total cost is \$33,680 ( $\$31,700 + \$1,980$ ); thus the revised annual depreciation charge is:  $(\$33,680 - \$2,500 - \$2,920) \div 9 = \$3,140$ .

Book value, old machine, June 1, 2006:

$[\$33,680 - \$2,920 - (\$3,140 \times 3)] =$	\$21,340
Fair market value	<u>20,000</u>
Loss on exchange	1,340
Cost of removal	<u>75</u>
Total loss	<u>\$ 1,415</u>

(Note to instructor: The above computation is done to determine whether there is a gain or loss from the exchange of the old machine with the new machine. If there is a gain on the exchange (not the case in this exercise), the gain needs to be deferred and the cost for the new machine should be adjusted accordingly.)

### New Machine

Basis of new machine	Cash paid ( $\$35,000 - \$20,000$ )	\$15,000
	Fair market value of old machine	20,000
	Installation cost	<u>1,500</u>
	Total cost of new machine	<u>\$36,500</u>

Depreciation for the year beginning June 1, 2006 =  $(\$36,500 - \$4,000) \div 10 = \$3,250$ .

**EXERCISE 11-9 (15-20 minutes)**

(a) Asset	Cost	Estimated Scrap	Depreciable Cost	Estimated Life	Depreciation per Year
A	\$40,500	\$ 5,500	\$ 35,000	10	\$ 3,500
B	33,600	4,800	28,800	9	3,200
C	36,000	3,600	32,400	9	3,600
D	19,000	1,500	17,500	7	2,500
E	<u>23,500</u>	<u>2,500</u>	<u>21,000</u>	6	<u>3,500</u>
	<u>\$152,600</u>	<u>\$17,900</u>	<u>\$134,700</u>		<u>\$16,300</u>

Composite life = \$134,700 ÷ \$16,300, or 8.26 years

Composite rate = \$16,300 ÷ \$152,600, or approximately 10.7%

(b)	Depreciation Expense—Plant Assets .....	16,300	
	Accumulated Depreciation—Plant Assets .....		16,300
(c)	Cash .....	4,800	
	Accumulated Depreciation—Plant Assets .....	14,200	
	Plant Assets .....		19,000

**EXERCISE 11-10 (10-15 minutes)**

$$\text{Sum-of-the-years'-digits} = \frac{8 \times 9}{2} = 36$$

Using Y to stand for the years of remaining life:

$$Y/36 \times (\$430,000 - \$70,000) = \$60,000$$

Multiplying both sides by 36:

$$\begin{aligned} \$360,000 \quad Y &= \$2,160,000 \\ Y &= \$2,160,000 \div \$360,000 \\ Y &= 6 \end{aligned}$$

The year in which there are six remaining years of life at the beginning of that given year is 2003.

**EXERCISE 11-11 (10-15 minutes)**

(a) No correcting entry is necessary because changes in estimate are handled in the current and prospective periods.

(b) Revised annual charge

Book value as of 1/1/2005 [ $\$60,000 - (\$7,000 \times 5)$ ] =  $\$25,000$

Remaining useful life, 5 years (10 years – 5 years)

Revised salvage value,  $\$4,500$

$(\$25,000 - \$4,500) \div 5 = \$4,100$

Depreciation Expense—Equipment.....	4,100	
Accumulated Depreciation—Equipment...		4,100

**EXERCISE 11-12 (20-25 minutes)**

(a) 1978-1987— $(\$2,000,000 - \$60,000) \div 40 = \$48,500/\text{yr.}$

(b) 1988-2005—Building $(\$2,000,000 - \$60,000) \div 40 =$	$\$48,500/\text{yr.}$
Addition $(\$500,000 - \$20,000) \div 30 =$	<u><math>16,000/\text{yr.}</math></u>
	<u><math>\\$64,500/\text{yr.}</math></u>

(c) No entry required.

(d) Revised annual depreciation

    Building

Book value: $(\$2,000,000 - \$1,358,000^*)$	$\$642,000$
---------------------------------------------	-------------

Salvage value	<u><math>60,000</math></u>
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$582,000$

Remaining useful life	<u><math>32 \text{ years}</math></u>
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Annual depreciation	<u><u><math>\\$ 18,188</math></u></u>
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**EXERCISE 11-12 (Continued)**

<b>Addition</b>	
Book value: (\$500,000 – \$288,000**)	\$212,000
Salvage value	<u>20,000</u>
	192,000
Remaining useful life	<u>32 years</u>
Annual depreciation	<u>\$ 6,000</u>

\*\$48,500 X 28 years = \$1,358,000

\*\*\$16,000 X 18 years = \$288,000

Annual depreciation expense—building (\$18,188 + \$6,000)     \$24,188

**EXERCISE 11-13 (15-20 minutes)**

(a)   \$2,200,000 ÷ 40 = \$55,000

(b)	Loss on Disposal of Plant Assets .....	80,000	
	Accumulated Depreciation—Building		
	(\$160,000 X 20/40) .....	80,000	
	Building.....		160,000
	Building .....	300,000	
	Cash .....		300,000

**Note:** The most appropriate entry would be to remove the old roof and record a loss on disposal, because the cost of old roof is given. Another alternative would be to debit Accumulated Depreciation on the theory that the replacement extends the useful life of the building. The entry in this case would be as follows:

Accumulated Depreciation—Building.....	300,000	
Cash .....		300,000

As indicated, this approach does not seem as appropriate as the first approach.

**EXERCISE 11-13 (Continued)**

(c) No entry necessary.

(d) (Assume the cost of old roof is removed)

Building (\$2,200,000 – \$160,000 + \$300,000)	\$2,340,000
Accumulated Depreciation (\$55,000 X 20 – \$80,000)	<u>1,020,000</u>
	1,320,000
Remaining useful life	<u>25 years</u>
Depreciation—2005 (\$1,320,000 ÷ 25)	<u>\$ 52,800</u>

OR

(Assume the cost of new roof is debited to accumulated depreciation)

Book value of building prior to the replacement of roof \$2,200,000 – (\$55,000 X 20) =	\$1,100,000
Cost of new roof	<u>300,000</u>
	\$1,400,000
Remaining useful life	<u>25 years</u>
Depreciation—2005 (\$1,400,000 ÷ 25)	<u>\$ 56,000</u>

**EXERCISE 11-14 (20-25 minutes)**

(a) Repair Expense .....	500	
Equipment .....		500

(b) The proper ending balance in the asset account is:

January 1 balance		\$134,750
Add new equipment:		
Purchases	\$32,000	
Freight	700	
Installation	<u>2,700</u>	
		35,400
Less cost of equipment sold		<u>(23,000)</u>
		<u>\$147,150</u>

1. Straight-line: \$147,150 ÷ 10 = \$14,715

**EXERCISE 11-14 (Continued)**

2. Sum-of-the-years'-digits:  $10 + 9 + 8 + 7 + 6 + 5 + 4 + 3 + 2 + 1 = 55$

$$\text{OR } \frac{n(n + 1)}{2} = \frac{10(11)}{2} = 55$$

For equipment purchased in 2003: \$111,750 (\$134,750 – \$23,000) of the cost of equipment purchased in 2003, is still on hand.

8/55 X \$111,750 =	\$16,255
For equipment purchased in 2005: 10/55 X \$35,400 =	<u>6,436</u>
Total	<u>\$22,691</u>

**EXERCISE 11-15 (25-35 minutes)**

(a)	1999	2000-2005 Incl.	2006	Total
1. \$192,000 – \$16,800 = \$175,200 \$175,200 ÷ 12 = \$14,600 per yr. (\$40 per day) 133/365 of \$14,600 = \$ 5,320 2000-2005 Incl. (6 X \$14,600) \$87,600 68/365 of \$14,600 = \$ 2,720				\$ 95,640
2.	0	87,600	14,600	102,200
3.	14,600	87,600	0	102,200
4.	7,300	87,600	7,300	102,200
5. 4/12 of \$14,600 2000-2005 Inc. 3/12 of \$14,600	4,867	87,600	3,650	96,117
6.	0	87,600	0	87,600

(b) The most accurate distribution of cost is given by methods 1 and 5 if it is assumed that straight-line is satisfactory. Reasonable accuracy is normally given by 2, 3, or 4. The simplest of the applications are 6, 2, 3, 4, 5, and 1, in about that order. Methods 2, 3, and 4 combine reasonable accuracy with simplicity of application.

**EXERCISE 11-16 (10-15 minutes)**

(a)	<b>December 31, 2004</b>	
	Loss on Impairment.....	3,200,000
	Accumulated Depreciation—Equipment...	3,200,000

Cost	\$9,000,000
Accumulated depreciation	<u>1,000,000</u>
Carrying amount	8,000,000
Fair value	<u>4,800,000</u>
Loss in impairment	<u><u>\$3,200,000</u></u>

(b)	<b>December 31, 2005</b>	
	Depreciation Expense .....	1,200,000
	Accumulated Depreciation—Equipment...	1,200,000

New carrying amount	\$4,800,000
Useful life	<u>4 years</u>
Depreciation per year	<u><u>\$1,200,000</u></u>

(c) No entry necessary. Restoration of any impairment loss is not permitted.

**EXERCISE 11-17 (15-20 minutes)**

(a)	Loss on Impairment.....	3,220,000
	Accumulated Depreciation—Equipment...	3,220,000

Cost	\$9,000,000
Accumulated depreciation	<u>1,000,000</u>
Carrying amount	8,000,000
Less: Fair value	4,800,000
Plus: Cost of disposal	<u>20,000</u>
Loss on impairment	<u><u>\$3,220,000</u></u>

**EXERCISE 11-17 (Continued)**

(b) No entry necessary. Depreciation not taken on assets intended to be sold.

(c) Accumulated Depreciation—Equipment .....	500,000	
Recovery of Loss on Impairment.....		500,000
Fair value	\$5,300,000	
Less: Cost of disposal	<u>20,000</u>	5,280,000
Carrying amount		<u>4,780,000</u>
Recovery of impairment loss		<u>\$ 500,000</u>

**EXERCISE 11-18 (15-20 minutes)**

(a)	December 31, 2004	
Loss on Impairment .....		270,000
Accumulated Depreciation—Equipment...		270,000

Cost	\$900,000
Accumulated depreciation	<u>400,000</u>
Carrying amount	500,000
Fair value	<u>230,000</u>
Loss in impairment	<u>\$270,000</u>

(b) It may be reported in the other expenses and losses section or it may be highlighted as an unusual item in a separate section. It is not reported as an extraordinary item.

(c) No entry necessary. Restoration of any impairment loss is not permitted.

(d) Management first had to determine whether there was an impairment. To evaluate this step, management does a recoverability test. The recoverability test estimates the future cash flows expected from use of that asset and its eventual disposition. If the sum of the expected future net cash flows (undiscounted) is less than the carrying amount of the asset, an impairment results. If the recoverability test indicates that an impairment has occurred, a loss is computed. The impairment loss is the amount by which the carrying amount of the asset exceeds its fair value.

**EXERCISE 11-19 (15-20 minutes)**

(a) Depreciation Expense:  $\frac{\$84,000}{30 \text{ years}} = \$2,800 \text{ per year}$

**Cost of Timber Sold:  $\$1,400 - \$400 = \$1,000$**

**$\$1,000 \times 9,000 \text{ acres} = \$9,000,000$  of value of timber**

**$(\$9,000,000 \div 3,500,000 \text{ bd. ft.}) \times 700,000 \text{ bd. ft.} = \$1,800,000$**

(b) **Cost of Timber Sold:  $\$9,000,000 - \$1,800,000 = \$7,200,000$**

**$\$7,200,000 + \$100,000 = \$7,300,000$**

**$(\$7,300,000 \div 5,000,000 \text{ bd. ft.}) \times 900,000 \text{ bd. ft.} = \$1,314,000$**

**Note: The spraying costs as well as the costs to maintain the fire lanes and roads are expensed each period and are not part of the depletion base.**

**EXERCISE 11-20 (10-15 minutes)**

**Cost per barrel of oil:**

**Initial payment =  $\frac{\$500,000}{250,000} = \$2.00$**

**Rental =  $\frac{\$31,500}{18,000} = 1.75$**

**Premium, 5% of \$15 = .75**

**Reconditioning of land =  $\frac{\$30,000}{250,000} = \underline{.12}$**

**Total cost per barrel \$4.62**

### EXERCISE 11-21 (15-20 minutes)

(a)  $\$1,300 - \$300 = \$1,000$  per acre for timber

$$\frac{\$1,000 \times 7,000 \text{ acres}}{8,000 \text{ bd. ft.} \times 7,000 \text{ acres}} \times 850,000 \text{ bd. ft.} =$$

$$\frac{\$7,000,000}{56,000,000 \text{ bd. ft.}} \times 850,000 \text{ bd. ft.} = \$106,250.$$

(b)  $\frac{\$78,400}{56,000,000 \text{ bd. ft.}} \times 850,000 \text{ bd. ft.} = \$1,190.$

(c) Capitalize the cost of \$70,000 ( $\$20 \times 3,500$  trees) and adjust depletion the next time timber is harvested.

### EXERCISE 11-22 (15-20 minutes)

Depletion base:  $\$1,190,000 + \$90,000 - \$100,000 + \$200,000 = \$1,380,000$

Depletion rate:  $\$1,380,000 \div 60,000 = \$23/\text{ton}$

(a) Per unit material cost:  $\$23/\text{ton}$

(b) 12/31/04 inventory:  $\$23 \times 8,000 \text{ tons} = \$184,000$

(c) Cost of goods sold 2004:  $\$23 \times 22,000 \text{ tons} = \$506,000$

### EXERCISE 11-23 (15-20 minutes)

(a)  $\frac{\$970,000 + \$170,000 + \$40,000^* - \$100,000}{12,000,000} = .09$  depletion per unit

\*(Note to instructor: The \$40,000 should be depleted because it is a cost of the mine. This cost is incurred to get the land back to its original value of \$100,000.)

2,500,000 units extracted  $\times \$0.09 = \underline{\$225,000}$  depletion for 2004

(b) 2,100,000 units sold  $\times \$0.09 = \underline{\$189,000}$  charged to cost of goods sold for 2004

**EXERCISE 11-24 (15-25 minutes)**

**(a) Asset turnover ratio:**

$$\frac{\$13,234}{\frac{\$14,212 + \$13,362}{2}} = .96 \text{ times}$$

**(b) Rate of return on assets:**

$$\frac{\$76}{\frac{\$14,212 + \$13,362}{2}} = .55\%$$

**(c) Profit margin on sales:**

$$\frac{\$76}{\$13,234} = .57\%$$

**(d) The asset turnover ratio times the profit margin on sales provides the rate of return on assets computed for Eastman Kodak as follows:**

<b>Profit margin on sales</b>	<b>X</b>	<b>Asset Turnover</b>		<b>Return on Assets</b>
.57%	X	.96	=	.55%

**Note the answer .55% is the same as the rate of return on assets computed in (b) above.**

**\*EXERCISE 11-25 (20-25 minutes)**

	<u>2004</u>	<u>2005</u>
(a) Revenues	\$200,000	\$200,000
Operating expenses (excluding depreciation)	130,000	130,000
Depreciation [(\$27,000 – \$6,000) ÷ 7]	<u>3,000</u>	<u>3,000</u>
Income before income taxes	<u>\$ 67,000</u>	<u>\$ 67,000</u>

	<u>2004</u>	<u>2005</u>
(b) Revenues	\$200,000	\$200,000
Operating expenses (excluding depreciation)	130,000	130,000
Depreciation*	<u>5,400</u>	<u>8,640</u>
Taxable income	<u>\$ 64,600</u>	<u>\$ 61,360</u>

\*2004  $\$27,000 \times .20 = \$5,400$

2005  $\$27,000 \times .32 = \$8,640$

(c) Book purposes (\$27,000 – \$6,000)	\$21,000
Tax purposes (entire cost of asset)	\$27,000

(d) Differences will occur for the following reasons:

1. different depreciation methods.
2. half-year convention used for tax purposes.
3. estimated useful life and tax life different.
4. tax system ignores salvage value.

**\*EXERCISE 11-26 (15-20 minutes)**

(a) (1)  $(\$31,000 - \$1,000) \times 1/10 \times 10/12 = \$2,500$  depreciation expense for book purposes.

(2)  $\$31,000 \times 1/5 \times 1/2 = \$3,100$  depreciation for tax purposes.

**\*EXERCISE 11-26 (Continued)**

**(b) (1)  $\$31,000 \times 20\% \times 10/12 = \$5,167$  depreciation expense for book purposes.**

**(2)  $\$31,000 \times 40\% \times 1/2 = \$6,200$  depreciation expense for tax purposes.**

**(c) Differences will occur for the following reasons:**

- 1. half-year convention used for tax purposes.**
- 2. estimated useful life and tax life different.**
- 3. tax system ignores salvage value.**

# TIME AND PURPOSE OF PROBLEMS

**Problem 11-1** (Time 25-30 minutes)

Purpose—to provide the student with an opportunity to compute depreciation expense using a number of different depreciation methods. The problem is complicated because the proper cost of the machine to be depreciated must be determined. For example, purchase discounts and freight charges must be considered. In addition, the student is asked to select a depreciation method that will allocate less depreciation in the early years of the machine's life than in the later years.

**Problem 11-2** (Time 25-35 minutes)

Purpose—to provide the student with an opportunity to compute depreciation expense using the following methods: straight-line, units-of-output, working hours, sum-of-the-years'-digits, and declining balance. The problem is straightforward and provides an excellent review of the basic computational issues involving depreciation methods.

**Problem 11-3** (Time 40-50 minutes)

Purpose—to provide the student with an opportunity to compute depreciation expense using a number of different depreciation methods. Before the proper depreciation expense can be computed, the accounts must be corrected for a number of errors made by the company in its accounting for the assets. An excellent problem for reviewing the proper accounting for plant assets and related depreciation expense.

**Problem 11-4** (Time 45-60 minutes)

Purpose—to provide the student with an opportunity to correct the improper accounting for Semitrucks and determine the proper depreciation expense. The student is required to compute separately the errors arising in determining or entering depreciation or in recording transactions affecting Semitrucks.

**Problem 11-5** (Time 25-30 minutes)

Purpose—to provide the student with a problem involving the computation of estimated depletion and depreciation costs associated with a tract of mineral land. The student must compute depletion and depreciation on a units-of-production basis (tons mined). A portion of the cost of machinery associated with the product must be allocated over different periods. The student may experience some difficulty with this problem.

**Problem 11-6** (Time 25-30 minutes)

Purpose—to provide the student with a problem involving the proper accounting for depletion cost. This problem involves timberland for which a depletion charge must be computed. In addition, a computation of a loss that occurs because of volcanic activity must be determined.

**Problem 11-7** (Time 25-35 minutes)

Purpose—to provide the student with a problem involving depletion and depreciation computations.

**Problem 11-8** (Time 25-35 minutes)

Purpose—to provide the student with a comprehensive problem related to property, plant, and equipment. The student must determine depreciable bases for assets, including capitalized interest, and prepare depreciation entries using various methods of depreciation.

**Problem 11-9** (Time 15-25 minutes)

Purpose—to provide the student with an opportunity to analyze impairments for assets to be used and assets to be disposed of.

**Problem 11-10** (Time 45-60 minutes)

Purpose—to provide the student with an opportunity to solve a complex problem involving a number of plant assets. A number of depreciation computations must be made, specifically straight-line, 150% declining balance, and sum-of-the-years'-digits. In addition, the cost of assets acquired is difficult to determine.

## **Time and Purpose of Problems (Continued)**

### **Problem 11-11 (Time 30-35 minutes)**

Purpose—to provide the student with the opportunity to solve a moderate problem involving a machinery purchase and the depreciation computations using straight-line, activity, sum-of-the-years'-digits, and the double-declining balance methods, first for full periods and then for partial periods.

### **\*Problem 11-12 (Time 25-35 minutes)**

Purpose—to provide the student with an opportunity to compute depreciation expense using a number of different depreciation methods. The purpose of computing the depreciation expense is to determine which method will result in the maximization of net income and which will result in the minimization of net income over a three-year period. An excellent problem for reviewing the fundamentals of depreciation accounting.

# SOLUTIONS TO PROBLEMS

<b>PROBLEM 11-1</b>
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(a) 1. **Depreciable Base Computation:**

Purchase price	\$73,500
Less: Purchase discount (2%)	(1,470)
Freight-in	970
Installation	<u>3,800</u>
	76,800
Less: Salvage value	<u>1,200</u>
Depreciation base	<u><b>\$75,600</b></u>

2004—Straight line:  $(\$75,600 \div 8 \text{ years}) \times 2/3 \text{ year} = \$6,300$

2. **Sum-of-the-years'-digits for 2005**

	Machine Year	Total Depreciation	2004	2005
1	$8/36 \times \$75,600 =$	\$16,800	\$11,200*	\$ 5,600**
2	$7/36 \times \$75,600 =$	\$14,700		<u>9,800***</u>
				<b>\$15,400</b>

\*  $\$16,800 \times 2/3 = \$11,200$

\*\*  $\$16,800 \times 1/3 = \$5,600$

\*\*\*  $\$14,700 \times 2/3 = \$9,800$

3. **Double-declining balance for 2004**

$(\$76,800 \times 25\% \times 2/3) = \$12,800$

(b) **An activity method.**



<b>PROBLEM 11-3</b>
---------------------

(a)	<b>Depreciation Expense—Asset A</b>	<b>2,900</b>	
	<b>Accumulated Depreciation—Asset A</b> (5/55 X [\$35,000 – \$3,100])		<b>2,900</b>
	<b>Accumulated Depreciation—Asset A</b>	<b>26,100</b>	
	<b>Asset A (\$35,000 – \$13,000)</b>		<b>22,000</b>
	<b>Gain on Disposal of Plant Assets</b>		<b>4,100</b>
(b)	<b>Depreciation Expense—Asset B</b>	<b>6,720</b>	
	<b>Accumulated Depreciation—Asset B</b> ([\$51,000 – \$3,000] ÷ 15,000 X 2,100)		<b>6,720</b>
(c)	<b>Depreciation Expense—Asset C</b>	<b>6,000</b>	
	<b>Accumulated Depreciation—Asset C</b> ([\$80,000 – \$15,000 – \$5,000] ÷ 10)		<b>6,000</b>
(d)	<b>Asset E</b>	<b>22,000</b>	
	<b>Retained Earnings</b>		<b>22,000</b>
	<b>Depreciation Expense—Asset E</b>	<b>4,400*</b>	
	<b>Accumulated Depreciation—Asset E</b>		<b>4,400</b>
	*(\$22,000 X .20)		

(a)	Per Company Books			As Adjusted			Net Income Overstated (Understated)
	Semitrucks dr. (cr.)	Acc. Dep. Semitrucks dr. (cr.)	Retained Earnings dr. (cr.)	Semitrucks dr. (cr.)	Acc. Dep., Semitrucks dr. (cr.)	Retained Earnings dr. (cr.)	
1/1/02	\$ 94,000	\$ (30,200)		\$94,000	\$ (30,200)		
7/1/02	15,000			34,000		\$ 2,000 <sup>1</sup>	\$ 2,000
				(30,000)	9,000		
12/31/02		(20,300)	\$20,300		(19,200)	19,200 <sup>2</sup>	(1,100)
12/31/02	<u>109,000</u>	<u>(50,500)</u>	<u>\$20,300</u>	<u>98,000</u>	<u>(40,400)</u>	<u>\$21,200</u>	<u>\$ 900</u>
1/1/03	(3,500)			(18,000)	14,400	\$ 100 <sup>3</sup>	\$ 100
12/31/03		(21,100)	\$21,100		(16,000)	16,000 <sup>4</sup>	(5,100)
12/31/03	<u>105,500</u>	<u>(71,600)</u>	<u>\$21,100</u>	<u>80,000</u>	<u>(42,000)</u>	<u>\$16,100</u>	<u>\$ (5,000)</u>
7/1/04	36,000			36,000			
7/1/04	(2,500)		\$ (700)	(24,000)	14,400	\$ 6,400 <sup>5</sup>	\$ 7,100
12/31/04		(24,450)	24,450		(15,000)	15,000 <sup>6</sup>	(9,450)
12/31/04	<u>139,000</u>	<u>(96,050)</u>	<u>\$23,750</u>	<u>92,000</u>	<u>(42,600)</u>	<u>\$21,400</u>	<u>\$ (2,350)</u>
12/31/05		(27,800)	\$27,800		(14,000)	\$14,000 <sup>7</sup>	\$ (13,800)
12/31/05	<u>\$139,000</u>	<u>\$ (123,850)</u>	<u>\$27,800</u>	<u>\$92,000</u>	<u>\$ (56,600)</u>	<u>\$14,000</u>	<u>\$ (13,800)</u>
Total understatement of income			<u>\$92,950</u>			<u>\$72,700</u>	<u>\$ (20,250)</u>

**PROBLEM 11-4**

<sup>1</sup>Implied fair market value of Truck #3 (\$34,000 – \$15,000)  
 Book value of Truck #3 [\$30,000 – (\$30,000/5 X 1 1/2 yrs.)] = \$30,000 – \$9,000 =  
 Loss on Trade

<sup>2</sup>Truck #1: \$18,000/5 = \$ 3,600  
 Truck #2: \$22,000/5 = 4,400  
 Truck #3: \$30,000/5 X 1/2 = 3,000  
 Truck #4: \$24,000/5 = 4,800  
 Truck #5: \$34,000/5 X 1/2 = 3,400  
 Total \$19,200

**PROBLEM 11-4 (Continued)**

<sup>3</sup> Book value of Truck #1 [ $\$18,000 - (\$18,000/5 \times 4 \text{ yrs.})$ ] =		
\$18,000 – \$14,400		= \$3,600
Cash received on sale		= <u>3,500</u>
Loss on sale		<u>\$ 100</u>

<sup>4</sup> Truck #2:	\$22,000/5	=	\$4,400
Truck #4:	\$24,000/5	=	4,800
Truck #5:	\$34,000/5	=	<u>6,800</u>
Total			<u>\$16,000</u>

<sup>5</sup> Book value of Truck #4 $\$24,000 - [(\$24,000/5 \times 3 \text{ yrs.})]$		= \$9,600
Cash received (\$700 + \$2,500)		= <u>3,200</u>
Loss on disposal		<u>\$6,400</u>

<sup>6</sup> Truck #2:	\$22,000/5 X 1/2	=	\$ 2,200
Truck #4:	\$24,000/5 X 1/2	=	2,400
Truck #5:	\$34,000/5		6,800
Truck #6:	\$36,000/5 X 1/2	=	<u>3,600</u>
Total			<u>\$15,000</u>

<sup>7</sup> Truck #2:	(fully dep.)	=	\$ 0
Truck #5:	\$34,000/5	=	6,800
Truck #6:	\$36,000/5	=	<u>7,200</u>
Total			<u>\$14,000</u>

(b) Compound journal entry December 31, 2005:

Accumulated Depreciation, Semitrucks .....	67,250	
Semitrucks.....		47,000
Retained Earnings .....		6,450
Depreciation Expense 2005 .....		13,800

**PROBLEM 11-4 (Continued)****Summary of Adjustments:**

	<u>Per</u> <u>Books</u>	<u>As</u> <u>Adjusted</u>	<u>Adjustment</u> <u>Dr. or (Cr.)</u>
<b>Semitrucks</b>	<u>\$139,000</u>	<u>\$92,000</u>	<u>\$(47,000)</u>
<b>Accumulated Depreciation</b>	<u>\$123,850</u>	<u>\$56,600</u>	<u>\$ 67,250</u>
<b>Prior Years' Income</b>			
Retained Earnings, 2002	\$ 20,300	\$21,200	\$ 900
Retained Earnings, 2003	21,100	16,100	(5,000)
Retained Earnings, 2004	<u>23,750</u>	<u>21,400</u>	<u>\$ (2,350)</u>
<b>Totals</b>	<u>\$ 65,150</u>	<u>\$58,700</u>	<u>\$ (6,450)</u>
<b>Depreciation Expense, 2005</b>	<u>\$ 27,800</u>	<u>\$14,000</u>	<u>\$(13,800)</u>

<b>PROBLEM 11-5</b>
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(a) Estimated depletion:

Depletion Base	Estimated Yield	Estimated Depletion		
		Per Ton	1 <sup>ST</sup> & 11 <sup>th</sup> Yrs.	Each of Yrs. 2-10 Incl.
\$570,000*	120,000 tons	\$4.75	\$28,500**	\$57,000***

\* (\$600,000 – \$30,000)

\*\* (\$4.75 X 6,000)

\*\*\* (\$4.75 X 12,000)

Estimated depreciation:

Asset	Cost	Per ton Mined	1 <sup>st</sup> Yr.	Yrs. 2-5	6 <sup>th</sup> Yr.	Yrs. 7-10	11 <sup>th</sup> Yr.
Building	\$36,000	\$.30*	\$1,800	\$3,600	\$3,600	\$3,600	\$1,800
Machinery (1/2)	24,000	.20**	1,200	2,400	2,400	2,400	1,200
Machinery (1/2)	24,000	.40***	2,400	4,800	2,400	0	0

\*  $\$36,000 \div 120,000 = \$.30$

\*\*  $\$24,000 \div 120,000 = \$.20$

\*\*\*  $\$24,000 \div (120,000 \times 1/2) = \$.40$

(b) Depletion:  $\$4.75 \times 7,000 \text{ tons} = \underline{\underline{\$33,250}}$

Depreciation:	Building	\$ .30 X 7,000 =	\$2,100
	Machinery	\$ .20 X 7,000 =	1,400
	Machinery	\$ .40 X 7,000 =	<u>2,800</u>
	<b>Total depreciation</b>		<b><u>\$6,300</u></b>

<b>PROBLEM 11-6</b>
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(a)	Original cost	$\$550 \times 3,000 =$	<b>\$1,650,000</b>
	Deduct residual value of land	$\$200 \times 3,000 =$	<u>600,000</u>
			<b>1,050,000</b>

Cost of logging road		<u>150,000</u>
Depletion base		<u><b>\$1,200,000</b></u>

$$\frac{\$1,200,000}{500,000 \text{ ft.}} = \$2.40 \text{ depletion per board foot}$$

(b)	Inventory .....	240,000
	Accumulated Depreciation—Timber .....	240,000

Depletion, 1980:  $20\% \times 500,000 \text{ bd. ft.} = 100,000 \text{ bd. ft.};$   
 $100,000 \text{ bd. ft.} \times \$2.40 = \$240,000$

(c)	Loss of timber (\$1,050,000 – \$210,000)	\$840,000
	Loss of land value	600,000
	Loss of logging roads [(\$150,000 – (20% X \$150,000)]	120,000
	Logging equipment	300,000
	Cost of salvaging timber	700,000
	Less recovery (\$3 X 400,000 bd. ft.)	<u>(1,200,000)</u>
	Extraordinary loss due to the eruption of Mt. St. Helens	<u><b>\$1,360,000</b></u>

<b>PROBLEM 11-7</b>
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Instructors should note the changing depletion base in this problem.

**2005**

**Computation of Depletion Base for 2005**

**Timber**

Cost per acre	\$1,700				
Land Cost	<u>800</u>				
Timber Cost	\$ 900	X	10,000 acres		\$9,000,000
Road Cost					<u>195,000</u>
<b>Total Depletion Base</b>					<b>\$9,195,000</b>

Estimated Depletion for 2005	\$9,195,000	
	X <u>0.07</u>	(472,500/6,750,000)
<b>Depletion Expense for 2005</b>	<b>\$ 643,650</b>	

**Depreciation of Removable Equipment**

Cost	\$ 189,000	
Salvage Value	<u>(9,000)</u>	
<b>Depreciable base (\$180,000/15)</b>	<b>180,000</b>	
<b>Annual Depreciation using SL</b>	<b>\$ 12,000</b>	

Depreciation Expense for 2005	\$ 5000	(5/12 X \$12,000)
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**PROBLEM 11-7 (Continued)**

**2006**

**Depletion Base for 2006**

Base for 2005 **\$9,195,000**

Less Depletion for 2005 **(643,650)**

Plus Seedling Planting Costs **120,000**

**Depletion Base for 2006 \$8,671,350**

**Depletion Base for 2006 \$8,671,350**

**Times X 0.12 (774,000/6,450,000)**

**Depletion for 2006 \$1,040,562**

**Depreciation Expense for 2006 \$ 12,000**

**2007**

**Depletion Base for 2007**

Base for 2006 **\$ 8,671,350**

Less Depletion for 2006 **(1,040,562)**

Plus Seedling Planting Costs **150,000**

**Depletion Base for 2007 \$ 7,780,788**

**Depletion Base for 2007 \$ 7,780,788**

**Times X 10.00% (650,000/6,500,000)**

**Depletion for 2007 \$ 778,079**

**Depreciation Expense for 2007 \$ 12,000**

**PROBLEM 11-8**

- (a) The amounts to be recorded on the books of Selig Sporting Goods Inc. as of December 31, 2004, for each of the properties acquired from Starks Athletic Equipment Company are calculated as follows:

**Cost Allocations to Acquired Properties**

	Appraisal Value	Remaining Purchase Price Allocations	Renovations	Capitalized Interest	Total
(1) Land	\$280,000				\$280,000
(2) Building		\$ 84,000 <sup>1</sup>	\$100,000	\$21,600 <sup>2</sup>	205,600
(3) Machinery		<u>36,000<sup>1</sup></u>			<u>36,000</u>
Totals	<u>\$280,000</u>	<u>\$120,000</u>	<u>\$100,000</u>	<u>\$21,600</u>	<u>\$521,600</u>

**Supporting Calculations**

<sup>1</sup>Balance of purchase price to be allocated.

Total purchase price	\$400,000
Less land appraisal	<u>280,000</u>
Balance to be allocated	<u>\$120,000</u>

	Appraisal Values	Ratios		Allocated Values
Building	\$105,000	105/150 = .70	X \$120,000	\$ 84,000
Machinery	<u>45,000</u>	45/150 = .30	X \$120,000	<u>36,000</u>
Totals	<u>\$150,000</u>	<u>1.00</u>		<u>\$120,000</u>

**PROBLEM 11-8 (Continued)**

**<sup>2</sup>Capitalizable interest.**

<u>Dates of loans in 2004</u>	<u>Amounts</u>		<u>Periods Outstanding</u>		<u>Interest At 12%</u>
1/1	\$ 50,000	X	12/12	X .12	\$ 6,000
4/1	130,000	X	9/12	X .12	11,700
10/1	130,000	X	3/12	X .12	3,900
12/31	<u>190,000</u>	X		X .12	
<b>Totals</b>	<b><u>\$500,000</u></b>				<b><u>\$21,600</u></b>

**Note to instructor: If the interest is allocated between the building and the machinery, \$15,120 ( $\$21,600 \times 105/150$ ) would be allocated to the building and \$6,480 ( $\$21,600 \times 45/150$ ) would be allocated to the machinery.**

**(b) Selig Sporting Goods Inc.'s 2004 depreciation expense, for book purposes, for each of the properties acquired from Starks Athletic Equipment Company is as follows:**

**1. Land: No depreciation.**

**2. Building: Depreciation rate =  $1.50 \times 1/15 = .10$   
 2004 depreciation expense = Cost X Rate X 1/2 year  
 =  $\$205,600 \times .10 \times 1/2$   
 = \$10,280**

**3. Machinery: Depreciation rate =  $2.00 \times 1/5 = .40$   
 2004 depreciation expense = Cost X Rate X 1/2  
 =  $\$36,000 \times .40 \times 1/2$   
 = \$7,200**

**(c) Arguments for the capitalization of interest costs include the following.**

**(1) Diversity of practices among companies and industries called for standardization in practices.**

## **PROBLEM 11-8 (Continued)**

- (2) Total interest costs should be allocated to enterprise assets and operations, just as material, labor, and overhead costs are allocated. That is, under the concept of historical costs, all costs incurred to bring an asset to the condition and location necessary for its intended use should be reflected as a cost of that asset.**

**Arguments against the capitalization of interest include the following:**

- (1) Interest capitalized in a period would tend to be offset by amortization of interest capitalized in prior periods.**
- (2) Interest cost is a cost of financing, not of construction.**

**PROBLEM 11-9**

(a) Carrying value of asset:  $\$8,000,000 - \$2,000,000 = \$6,000,000$ .

Future cash flows ( $\$5,300,000$ ) < Carrying value ( $\$6,000,000$ )

Impairment entry:

Loss on Impairment .....	1,600,000*	
Accumulated Depreciation .....		1,600,000

\* $\$6,000,000 - \$4,400,000$

(b) Depreciation Expense.....	1,100,000**	
Accumulated Depreciation .....		1,100,000

\*\* $(4,400,000 \div 4)$

(c) No depreciation is recorded on impaired assets to be disposed of.  
Recovery of impairment losses are recorded.

Accumulated Depreciation.....	200,000	
Recovery of Impairment Loss ...		200,000

**PROBLEM 11-10**

- (1) **\$82,000**      **Allocated in proportion to appraised values  
(1/10 X \$820,000).**
- (2) **\$738,000**      **Allocated in proportion to appraised values  
(9/10 X \$820,000).**
- (3) **Forty years**      **Cost less salvage (\$738,000 – \$40,000) divided by  
annual depreciation (\$17,450).**
- (4) **\$17,450**      **Same as prior year since it is straight-line depreciation.**
- (5) **\$91,000**      **[Number of shares (2,500) times fair value (\$30)]  
plus demolition cost of existing building (\$16,000).**
- (6) **None**      **No depreciation before use.**
- (7) **\$30,000**      **Fair market value.**
- (8) **\$4,500**      **Cost (\$30,000) times percentage (1/10 X 150%).**
- (9) **\$3,825**      **Cost (\$30,000) less prior year's depreciation (\$4,500)  
equals \$25,500. Multiply \$25,500 times 15%.**
- (10) **\$150,000**      **Total cost (\$164,900) less repairs and maintenance  
(\$14,900).**
- (11) **\$32,000**      **Cost less salvage (\$150,000 – \$6,000) times 8/36.**
- (12) **\$9,333**      **Cost less salvage (\$150,000 – \$6,000) times 7/36 times  
one-third of a year.**

## **PROBLEM 11-10 (Continued)**

- (13) \$52,000**      **Annual payment (\$6,000) times present value of annuity due at 8% for 11 years (7.710) plus down payment (\$5,740). This can be found in an annuity due table since the payments are at the beginning of each year. Alternatively, to convert from an ordinary annuity to an annuity due factor, proceed as follows: For eleven payments use the present value of an ordinary annuity for 11 years (7.139) times 1.08. Multiply this factor (7.710) times \$6,000 annual payment to obtain \$46,260, and then add the \$5,740 down payment.**
- (14) \$2,600**      **Cost (\$52,000) divided by estimated life (20 years).**

<b>PROBLEM 11-11</b>
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(a) (1) **Straight-line Method:**  $\frac{\$77,000 - \$5,000}{5 \text{ years}} = \$14,400 \text{ a year}$

(2) **Activity Method:**  $\frac{\$77,000 - \$5,000}{100,000 \text{ hours}} = \$0.72 \text{ per hour}$

<b>Year</b>	<b>1</b>	20,000 hrs. X \$0.72 =	<b>\$14,400</b>
	<b>2</b>	25,000 hrs. X \$0.72 =	<b>18,000</b>
	<b>3</b>	15,000 hrs. X \$0.72 =	<b>10,800</b>
	<b>4</b>	30,000 hrs. X \$0.72 =	<b>21,600</b>
	<b>5</b>	10,000 hrs. X \$0.72 =	<b>7,200</b>

(3) **Sum-of-the-Years'-Digits:**  $5 + 4 + 3 + 2 + 1 = 15$

<b>Year</b>	<b>1</b>	5/15 X (\$77,000 - \$5,000) =	<b>\$24,000</b>
	<b>2</b>	4/15 X \$72,000 =	<b>19,200</b>
	<b>3</b>	3/15 X \$72,000 =	<b>14,400</b>
	<b>4</b>	2/15 X \$72,000 =	<b>9,600</b>
	<b>5</b>	1/15 X \$72,000 =	<b>4,800</b>

(4) **Double-Declining Balance Method:** Each year is 20% of its total life. Double the rate to 40%.

<b>Year</b>	<b>1</b>	40% X \$77,000 =	<b>\$30,800</b>
	<b>2</b>	40% X (\$77,000 - \$30,800) =	<b>18,480</b>
	<b>3</b>	40% X (\$77,000 - \$49,280) =	<b>11,088</b>
	<b>4</b>	40% X (\$77,000 - \$60,368) =	<b>6,653</b>
	<b>5</b>	Enough to reduce to salvage =	<b>4,979</b>

**PROBLEM 11-11 (Continued)**

**(b) (1) Straight-line Method:**

Year	1	$\frac{\$77,000 - \$5,000}{5 \text{ years}}$	X 9/12 =	\$10,800
	2	Full year		14,400
	3	Full year		14,400
	4	Full year		14,400
	5	Full year		14,400
	6	Full year X 3/12 year =		3,600

**(2) Sum-of-the-Years'-Digits:**

Year 1	$(5/15 \times \$72,000) 9/12 =$		\$18,000
Year 2	$(5/15 \times \$72,000) 3/12 =$	\$ 6,000	
	$(4/15 \times \$72,000) 9/12 =$	<u>14,400</u>	20,400
Year 3	$(4/15 \times \$72,000) 3/12 =$	4,800	
	$(3/15 \times \$72,000) 9/12 =$	<u>10,800</u>	15,600
Year 4	$(3/15 \times \$72,000) 3/12 =$	3,600	
	$(2/15 \times \$72,000) 9/12 =$	<u>7,200</u>	10,800
Year 5	$(2/15 \times \$72,000) 3/12 =$	2,400	
	$(1/15 \times \$72,000) 9/12 =$	<u>3,600</u>	6,000
Year 6	$(1/15 \times \$72,000) 3/12 =$		1,200

**PROBLEM 11-11 (Continued)**

**(3) Double-Declining Balance Method:**

<b>Year</b>	<b>Cost</b>	<b>Accum. Depr. at beg. of year</b>	<b>Book Value at beg. of year</b>	<b>Depr. Expense</b>
1	\$77,000	—	\$77,000	\$23,100
2	77,000	\$23,100	53,900	21,560
3	77,000	44,660	32,340	12,936
4	77,000	57,596	19,404	7,762
5	77,000	65,358	11,642	4,657
6	77,000	70,015	6,985	1,985*

\*to reduce to \$5,000 salvage value.

**\*PROBLEM 11-12**

- (a) The straight-line method would provide the highest total net income for financial reporting over the three years, as it reports the lowest total depreciation expense. These computations are provided below.

Computations of depreciation expense and accumulated depreciation under various assumptions:

- (1) Straight-line:

$$\frac{\$1,100,000 - \$50,000}{5 \text{ years}} = \$210,000$$

Year	Depreciation Expense	Accumulated Depreciation
2002	\$210,000	<u>\$ 210,000</u>
2003	210,000	<u>\$ 420,000</u>
2004	<u>210,000</u>	<u>\$ 630,000</u>
	<u>\$630,000</u>	

- (2) Double-declining balance:

Year	Depreciation Expense	Accumulated Depreciation
2002	\$440,000 (40% X \$1,100,000)	<u>\$ 440,000</u>
2003	264,000 (40% X \$660,000)	<u>\$ 704,000</u>
2004	<u>158,400 (40% X \$396,000)</u>	<u>\$ 862,400</u>
	<u>\$862,400</u>	

- (3) Sum-of-the-years'-digits:

Year	Depreciation Expense	Accumulated Depreciation
2002	\$350,000 (5/15 X \$1,050,000)	<u>\$ 350,000</u>
2003	280,000 (4/15 X \$1,050,000)	<u>\$ 630,000</u>
2004	<u>210,000 (3/15 X \$1,050,000)</u>	<u>\$ 840,000</u>
	<u>\$840,000</u>	

**\*PROBLEM 11-12 (Continued)**

**(4) Units-of-output:**

Year	Depreciation Expense		Accumulated Depreciation
2002	\$252,000	(\$21* X 12,000)	<u>\$ 252,000</u>
2003	231,000	(\$21 X 11,000)	<u>\$ 483,000</u>
2004	<u>210,000</u>	(\$21 X 10,000)	<u>\$ 693,000</u>
	<u>\$693,000</u>		

**\*\$1,050,000 ÷ 50,000 = \$21 per unit**

**(b) General MACRS method:**

	Total Cost		MACRS Rates (%)*		Annual Depreciation	Accumulated Depreciation
2002	\$1,100,000	X	14.29	=	\$157,190	<u>\$157,190</u>
2003	1,100,000	X	24.49	=	269,390	<u>\$426,580</u>
2004	1,100,000	X	17.49	=	<u>192,390</u>	<u>\$618,970</u>
					<u>\$618,970</u>	

**\*Taken from the MACRS rates schedule.**

**Optional straight-line method:**

	Total Cost		Depreciation Rate		Annual Depreciation	Accumulated Depreciation
2002	\$1,100,000	X	(1/7 X 1/2)	=	\$ 78,571	<u>\$ 78,571</u>
2003	1,100,000	X	1/7	=	157,143	<u>\$235,714</u>
2004	1,100,000	X	1/7	=	<u>157,143</u>	<u>\$392,857</u>
					<u>\$392,857</u>	

**The general MACRS method would have higher depreciation expense (\$618,970) than that of the optional straight-line method (\$392,857) for the three-year period ending December 31, 2004. Therefore, the general MACRS method would minimize net income for income tax purposes for this period.**

# TIME AND PURPOSE OF CASES

## **Case 11-1** (Time 25-35 minutes)

Purpose—to provide the student with an understanding of the basic objective of depreciation accounting. In addition, the case involves a reverse sum-of-the-years'-digits situation and the student is to comment on the propriety of such an approach. Finally, the classic issue of whether depreciation provides funds must be considered. The tax effects of depreciation must be considered when this part of the case is examined. An excellent case for covering the traditional issues involving depreciation accounting.

## **Case 11-2** (Time 20-25 minutes)

Purpose—to provide the student with a basic understanding of the difference between the unit and group or composite depreciation methods. The student is required to indicate the arguments for and against these methods and to indicate how retirements are handled.

## **Case 11-3** (Time 25-35 minutes)

Purpose—to provide the student with an understanding of a number of unstructured situations involving depreciation accounting. The first situation considers whether depreciation should be recorded during a strike. The second situation involves the propriety of employing the units of production method in certain situations. The third situation involves the step-up of depreciation charges because properties are to be replaced due to obsolescence. The case is somewhat ambiguous, so cut-and-dried approaches should be discouraged.

## **Case 11-4** (Time 30-40 minutes)

Purpose—to provide the student with an understanding of the objectives of depreciation and the theoretical basis for accelerated depreciation methods.

## **Case 11-5** (Time 20-25 minutes)

Purpose—to provide the student with the opportunity to examine the ethical dimensions of the depreciation method choice.

# SOLUTIONS TO CASES

## CASE 11-1

(a) The purpose of depreciation is to distribute the cost (or other book value) of tangible capital assets, less salvage, over their useful lives in a systematic and rational manner. Under generally accepted accounting principles as presently understood, depreciation accounting is a process of allocation, not of valuation, through which the productive effort (cost) is to be matched with productive accomplishment (revenue) for the period. Depreciation accounting, therefore, is concerned with the timing of the expiration of the cost of tangible plant assets.

(b) The proposed depreciation method is, of course, systematic. Whether it is rational in terms of cost allocation depends on the facts of the case. It produces an increasing depreciation charge, which is usually not justifiable in terms of the benefit from the use of the asset because manufacturers typically prefer to use their new equipment as much as possible and their old equipment only as needed to meet production quotas during periods of peak demand. As a general rule, then, the benefit declines with age. Assuming that the actual operations (including equipment usage) of each year are identical, maintenance and repair costs are likely to be higher in the later years of usage than in the earlier years. Hence the proposed method would couple light depreciation and repair charges in the early years. Reported net income in the early years would be much higher than reported net income in the later years of asset life, an unreasonable and undesirable variation during periods of identical operation.

On the other hand, if the expected level of operations (including equipment usage) in the early years of asset life is expected to be low as compared to that of later years because of slack demand or production policies, the pattern of the depreciation charges of the proposed method approximately parallels expected benefits (and revenues) and hence is reasonable. Although the units-of-production depreciation method is the usual selection to fit this case, the proposed method also conforms to generally accepted accounting principles in this case provided that proper justification is given.

(c) (1) Depreciation charges neither recover nor create funds. Revenue-producing activities are the sources of funds from operations: if revenues exceed out-of-pocket costs during a fiscal period, funds are available to cover other than out-of-pocket costs; if revenues do not exceed out-of-pocket costs, no funds are made available no matter how much, or little, depreciation is charged.

(2) Depreciation may affect funds in two ways. First, depreciation charges affect reported income and hence may affect managerial decisions such as those regarding pricing, product selection, and dividends. For example, the proposed method would result initially in higher reported income than would the straight-line method, consequently stockholders might demand higher dividends in the earlier years than they would otherwise expect.

The straight-line method, by causing a lower reported income during the early years of asset life and thereby reducing the amount of possible dividends in early years as compared with the proposed method, could encourage earlier reinvestments in other profit-earning assets in order to meet increasing demand.

Second, depreciation charges affect reported taxable income and hence affect directly the amount of income taxes payable in the year of deduction.

Using the proposed method for tax purposes would reduce the total tax bill over the life of the assets (1) if the tax rates were increased in future years or (2) if the business were doing poorly now but were to do significantly better in the future. The first condition is political and speculative but the second condition may be applicable to Prophet Manufacturing Company in view of its recent origin and its rapid expansion program. Consequently, more funds might be available for reinvestment in plant assets in years of large deductions if one of the above assumptions were true.

## CASE 11-1 (Continued)

If Prophet is not profitable now, it would not benefit from higher deductions now and should consider an increasing charge method for tax purposes, such as the one proposed. If Prophet is quite profitable now, the president should reconsider his proposal because it will delay the availability of the tax shield provided by depreciation. However, this decision should not affect the decision to use a depreciation method for stockholders' reporting that is systematic and rational in terms of cost allocation under generally accepted accounting principles as presently understood.

## CASE 11-2

(a) (1) The unit method of recording depreciation involves the treatment of plant assets or substantial additions thereto as individual items. The method entails maintaining detailed records of the costs of specific assets and related accumulated depreciation. Computation of depreciation is based on the estimated useful life of the individual asset. The method is distinguished from group and composite-life methods under which the cost and estimated life of the assets are commingled. Depreciation may be recorded by straight-line, accelerated, or other accepted computation methods.

(2) Under the group or composite-life methods, assets are aggregated into accounting units. Such grouping might be horizontal, vertical, or geographical. Horizontal grouping assembles together all assets of similar physical characteristics, such as trucks, presses, returnable containers, etc. A vertical or functional grouping comprises all assets contributing to a common economic function, such as a sugar refinery, a service station, etc. The geographical grouping includes all assets in a district or region, such as telephone poles.

Depreciation under these methods requires development of a weighted-average rate from the assets' depreciable costs and estimated lives. Separate accounts are established for the total cost of each asset grouping and its related accumulated depreciation. The asset grouping should be composed of a large number of units to obtain a reliable average life.

- (b) 1. Arguments **for** the use of the unit method are:
- i. The method is simple in that it does not require involved mathematical computations.
  - ii. The gain or loss on the retirement of a particular asset can be computed.
  - iii. For cost purposes, depreciation on idle equipment can be isolated.
  - iv. The method results in a more accurately computed depreciation provision in any given year, as the total depreciation charge represents the best estimate of the depreciation of each asset and is not the result of averaging the cost over a longer period of time.

Arguments **against** the unit method are:

- i. Considerable additional bookkeeping is necessary to account for each asset and its related depreciation. (The advent of computers reduces the work burden, however.)
  - ii. There is a point of diminishing returns in the accumulation of accounting data under this method, that is, additional accuracy may not justify the additional cost of record-keeping.
  - iii. Under a decentralized financial control system where a measure of the division's efficiency is the rate of return on the gross book value of the investment a division manager might scrap fully or nearly fully depreciated equipment to improve the division's rate of return even though the equipment is still serviceable.
  - iv. There may be reluctance on the part of a division manager to replace equipment not fully depreciated with more efficient equipment because of the effect of the loss on the division's profits in the year of replacement.
2. Arguments **for** the use of the group and composite-life methods are:
- i. The methods require less detailed bookkeeping.
  - ii. The application of depreciation to the whole group tends to average out or offset errors, economic or operating, caused by underdepreciation or overdepreciation.
  - iii. Periodic income is not distorted by gains or losses on disposal of assets.

## CASE 11-2 (Continued)

- iv. A more useful charge to expense is derived from these methods because of their recognition that depreciation estimates are based on averages and that gains and losses on individual assets are of little significance.

Arguments **against** the use of the group and composite-life methods would include:

- i. The methods would conceal faulty estimates for a long period of time.
- ii. When there is an early heavy retirement of assets a debit balance might appear in the accumulated depreciation account and present an accounting problem.
- iii. Information is not available regarding a particular machine for cost-calculation purposes.
- iv. Under a decentralized financial control system where a measure of the division's efficiency is the rate of return on the gross book value of the investment, to improve the division's financial reports a division manager might scrap idle but serviceable equipment or equipment that is not earning a satisfactory return on book value. The company would sustain an actual loss in the amount of the value of the equipment scrapped.
- v. Under the same situation as "iv" above, except that net book value is used, where the assets, although serviceable, are fully or almost fully depreciated, the division manager might hesitate to replace them because of the high rate of return on investment.

(c) Under the unit method, retirements are recorded by removing from the accounts the cost of the asset and its related accumulated depreciation. The difference between the two accounts, adjusted for salvage and disposal costs, if any, is recognized as gain or loss.

Under the group and composite-life methods the cost of the retired asset is removed from the asset account, and the accumulated depreciation account is reduced by the amount of the cost of the retired asset, adjusted for salvage, salvage costs, and removal costs. Accordingly, there is no periodic recognition of gain or loss; the accumulated depreciation account serves as a suspense account for the recognition of gain or loss until the final asset retirement.

## CASE 11-3

*Situation I.* This position relates to the omission of a provision for straight-line depreciation during a strike. The same question could be raised with respect to plant shut-downs for many reasons, such as for a lack of sales or for seasonal business.

The method of depreciation used should be systematic and rational. The annual provision for depreciation should represent a fair estimate of the loss in value arising from wear and usage and also from obsolescence. Each company should analyze its own facts and establish the best method under the circumstances. If the company was employing a straight-line depreciation method, for example, it is inappropriate to stop depreciating the plant asset during the strike.

If the company employs a units-of-production method, however, it would be appropriate not to depreciate the asset during this period. Even in this latter case, however, if the strike were prolonged, it might be desirable to record some depreciation because of the obsolescence factors related to the passage of time.

*Situation II.* (a) Steady demand for the new blenders suggests use of the straight-line method or the units-of-production method, either of which will allocate cost evenly over the life of the machine. Decreasing demand indicates use of an accelerated method (declining-balance or sum-of-the-years'-digits) or the units-of-production method in order to allocate more of the cost to the earlier years of the machine's life. Increasing demand indicates the use of the units-of-production method to charge more of the cost to the later years of the machine's life; an increasing-charge method (annuity or sinking-fund) could be employed, though these methods are seldom used except by utilities.

## CASE 11-3 (Continued)

(b) In determining the depreciation method to be used for the machine, the objective should be to allocate the cost of the machine over its useful life in a systematic and rational manner, so that costs will be matched with the benefits expected to be obtained. In addition to demand, consideration should be given to the items discussed below, their interrelationships, the relative importance of each, and the degree of certainty with which each can be predicted:

The expected pattern of costs of repairs and maintenance should be considered. Costs which vary with use of the machine may suggest the use of the units-of-production method. Costs which are expected to be equal from period to period suggest the use of the straight-line method. If costs are expected to increase with the age of the machine, an accelerated method may be considered reasonable because it will tend to equalize total expenses from period to period.

The operating efficiency of the machine may change with its age. A decrease in operating efficiency may cause increases in such costs as labor and power; if so, an accelerated method is indicated. If operating efficiency is not expected to decline, the straight-line method is indicated.

Another consideration is the expiration of the physical life of the machine. If the machine wears out in relation to the passage of time, the straight-line method is indicated. Within this maximum life, if the usage per period varies, the units-of-production method may be appropriate.

The machine may become obsolete because of technological innovation; it may someday be more efficient to replace the machine even though it is far from worn out. If the probability is high that such obsolescence will occur in the near future, the shortened economic life should be recognized. Within this shortened life, the depreciation method used would be determined by evaluating such consideration as the anticipated periodic usage.

An example of the interrelationship of the items discussed above is the effect of the repairs and maintenance policy on operating efficiency and physical life of the machine. For instance, if only minimal repairs and maintenance are undertaken, efficiency may decrease rapidly and life may be short.

It is possible that different considerations may indicate different depreciation methods for the machine. If so, a choice must be made based on the relative importance of the considerations. For instance, physical life may be less important than the strong chance of technological obsolescence which would result in a shorter economic life.

*Situation III.* Depreciation rates should be adjusted in order that the operating sawmills which are to be replaced will be depreciated to their residual value by the time the new facility becomes available. The step-up in the depreciation rates should be considered as a change in estimate and prior years' financial statements should not be adjusted.

The idle mill should be written off immediately as it appears to have no future service potential.

## CASE 11-4

To: Merton Miller, Supervisor of Canning Room

From: Your name, Accountant

Date: January 22, 2004

Subject: Annual depreciation charge to the canning department

This memo addresses the questions you asked about the depreciation charge against your department. Admittedly this charge of \$469,000 is very high; however, it is not intended to reflect the wear and tear which the machinery has undergone over the last year. Rather, it is a portion of the machines' cost which has been allocated to this period.

Depreciation is frequently thought to reflect an asset's loss in value over time. For financial statement purposes, however, depreciation allocates part of an asset's cost in a systematic way to each period during its useful life. Although there will always be a decline in an asset's value over time, the depreciation charge is not supposed to measure that decline; instead, it is a periodic "charge" for using purchased equipment during any given period. When you consider the effect which the alternative would have on your departmental costs—expensing the total cost for all six machines this year—I'm sure you'll agree that depreciation is more equitable.

You also mentioned that using straight-line depreciation would result in a smaller charge than would the current double-declining balance. This is true during the first years of the equipment's life. Straight-line depreciation expenses even amounts of depreciation for each canning machine's twelve-year life. Thus the straight-line charge for this and all subsequent years would be \$35,750 per machine for total annual depreciation of \$214,500.

During the earlier years of an asset's life, double-declining balance results in higher depreciation charges because it doubles the charge which would have been made under the straight-line method. However, the same percentage depreciation in the first year is applied annually to the asset's declining book value. Therefore, the double-declining balance charge becomes lower than the straight-line charge during the last several years of the asset's life. For this year, as mentioned above, the charge is \$469,000, but in subsequent years this expense will become lower. By the end of the twelfth year, the same amount of depreciation will have been taken regardless of the method used.

The straight-line method would result in fewer charges against your department this year. However, consider this: when the asset is new, additional costs for service and repairs are minimal. Thus a greater part of the asset's cost should be allocated to this optimal portion of the asset's life. After a few years, your department will have to absorb the additional burden of repair and maintenance costs. During that time, wouldn't you rather have a lower depreciation charge?

I hope that this explanation helps clarify any questions which you may have had about depreciation charges to your department.

## CASE 11-5

- (a) The stakeholders are Sheffield's employees, including Williams, current and potential investors and creditors, and upper-level management.
- (b) The ethical issues are honesty and integrity in financial reporting, job security, and the external users' right to know the financial picture.

## CASE 11-5 (Continued)

- (c) Williams should review the estimated useful lives and salvage values of the depreciable assets. Since they are estimates, it is possible that some *should be* changed. Any changes should be based on sound, objective information without concern for the effect on the financial statements (or anyone's job).

(Note: This case can be used with Chapter 22, Accounting Changes and Error Analysis.)

## FINANCIAL REPORTING PROBLEM

- (a) 3M classifies its property, plant, and equipment under four descriptions in its supplemental balance sheet information: Land, Buildings and leasehold improvements, Machinery and equipment, and Construction in progress.**
- (b) 3M’s “depreciation is generally computed using the straight-line method based on estimated useful lives of the assets.”**
- (c) 3M depreciates its assets based on estimated useful lives ranging from 10 to 40 years for buildings and improvements and 3 to 15 years for machinery and equipment.**
- (d) Note 8, supplemental cash flow information reports depreciation of \$916 million in 2001, \$915 million in 2000, and \$822 million was charged to expense in 1999.**
- (e) The statement of cash flows reports the following additions to property, plant, and equipment: 2001, \$980 million; 2000, \$1,115 million; and 1999, \$1,050 million.**

## FINANCIAL STATEMENT ANALYSIS CASE

- (a) McDonald's used the straight-line method for depreciating its property and equipment.**
  
- (b) Depreciation and amortization charges do not increase cash flow from operations. In a cash flow statement, these two items are often added back to net income to arrive at cash flow from operations and therefore some incorrectly conclude these expenses increase cash flow. What affects cash flow from operations are cash revenues and cash expenses. Noncash charges have no effect, except for positive tax savings generated by these charges.**
  
- (c) The schedule of cash flow measures indicates that cash provided by operations is expected to cover capital expenditures over the next few years, even as expansion continues to accelerate. It is obvious that McDonald's believes that cash flow measures are meaningful indicators of growth and financial strength, when evaluated in the context of absolute dollars or percentages.**

## COMPARATIVE ANALYSIS CASE

(a) **Property, plant, and equipment, net of accumulated depreciation:**

<b>Coca-Cola at 12/31/01</b>	<b>\$4,453 million</b>
<b>PepsiCo at 12/29/01</b>	<b>\$6,876 million</b>

**Percent of total assets:**

<b>Coca-Cola (\$4,453 ÷ \$22,417)</b>	<b>19.9%</b>
<b>PepsiCo (\$6,876 ÷ \$21,695)</b>	<b>31.7%</b>

(b) **Coca-Cola and PepsiCo depreciate property, plant, and equipment principally by the straight-line method over the estimated useful lives of the assets. Depreciation expense was reported by Coca-Cola and PepsiCo as follows:**

	<b>Coca-Cola</b>	<b>PepsiCo</b>
2001	\$502 million	\$843 million
2000	465 million	840 million
1999	438 million	873 million

(c) (1) **Asset turnover:**

<b>Coca-Cola</b>	<b>PepsiCo</b>
<b>\$20,092</b>	<b>\$26,935</b>
<b>\$22,417 + \$20,834</b>	<b>\$21,695 + \$20,757</b>
<b>2</b>	<b>2</b>
<b>= .93</b>	<b>= 1.27</b>

## COMPARATIVE ANALYSIS CASE (Continued)

(2) Profit margin:

Coca-Cola	PepsiCo
$\frac{\$3,969}{\$20,092} = 19.75\%$	$\frac{\$2,662}{\$26,935} = 9.88\%$

(3) Rate of return on assets:

Coca-Cola	PepsiCo
$\frac{\$3,969}{\frac{\$22,417 + \$20,834}{2}} = 18.35\%$	$\frac{\$2,662}{\frac{\$21,695 + \$20,757}{2}} = 12.54\%$

With the exception of the asset turnover rate, each of Coca-Cola's ratios is superior to PepsiCo's, especially the profit margin and the return on assets. This is primarily due to PepsiCo's large food business (61% of total sales) which experiences larger investments in property, plant, and equipment and lower margins in the beverage segment. Coca-Cola sales are derived almost entirely from beverages.

- (d) Coca-Cola's capital expenditures were \$769 million in 2001 while PepsiCo's capital expenditures were \$1,324 million in 2001.

Neither Coca-Cola nor PepsiCo reported capitalizing any interest as part of construction costs.

## RESEARCH CASE

- (a) Ebitda is an income subtotal that adds back certain expenses. Specifically, Ebitda stands for “Earnings before interest, taxes, depreciation, and amortization.” Companies report Ebitda because it more closely approximates cash flow from operations. Some companies feel that their financial results are unfairly tainted by accounting rules calling for depreciation when in fact the infrastructure that they were depreciating was holding its value. Other companies, who had been doing acquisitions liked to focus on Ebitda because they could add back goodwill amortization, which before FAS No. 142 was amortized to expense.
- (b) The Worldcom case highlighted the importance of depreciation expense as an operating expense. Worldcom wrongly treated \$3.8 billion in certain operating expenses as capital expenditures. As a result the costs were not immediately expensed, but were subject to depreciation. While the move enhanced current earnings, it has an even more dramatic effect on Ebitda, which also excludes depreciation from the earnings measure. As a result, holders of other Ebitda-oriented stocks ditched them based on the worry that the same Ebitda-enhancing games were going on at these companies.
- (c) The biggest problem appears to be the bias in choosing which non-earnings measure to report. Investors have a growing disdain for alternative measures that exclude a wide range of costs while including all manner of gains. Many believe that net income provides a more reliable picture of a company’s financial performance. In particular, Ebitda is a poor metric for companies with high depreciation and amortization because it results in misleading comparisons to companies with lower depreciation and amortization. Some have criticized Ebitda and other pro-forma metrics because they give companies too much flexibility in deciding how to account for expenses.

## INTERNATIONAL REPORTING CASE

	Nestlé	Tootsie Roll						
(a) (1) ROA	$\frac{\$4,005}{\$52,857} = 7.58\%$	$\frac{\$60,682}{\$413,924} = 14.66\%$						
<table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 15%;"></th> <th style="width: 35%; text-align: center; border-bottom: 1px solid black;">Nestlé</th> <th style="width: 35%; text-align: center; border-bottom: 1px solid black;">Tootsie Roll</th> </tr> </thead> <tbody> <tr> <td style="vertical-align: top;">(2) Profit Margin</td> <td style="text-align: center; vertical-align: middle;"> <math display="block">\frac{\\$4,005}{\\$69,998} = 5.72\%</math> </td> <td style="text-align: center; vertical-align: middle;"> <math display="block">\frac{\\$60,682}{\\$375,594} = 16.16\%</math> </td> </tr> </tbody> </table>				Nestlé	Tootsie Roll	(2) Profit Margin	$\frac{\$4,005}{\$69,998} = 5.72\%$	$\frac{\$60,682}{\$375,594} = 16.16\%$
	Nestlé	Tootsie Roll						
(2) Profit Margin	$\frac{\$4,005}{\$69,998} = 5.72\%$	$\frac{\$60,682}{\$375,594} = 16.16\%$						
(3) Asset Turnover	$\frac{\$69,998}{\$52,857} = 1.32$	$\frac{\$375,594}{\$413,924} = .91$						

Based on ROA, Tootsie Roll is performing better than Nestlé. The main driver for this difference is strong profit margin, which is over two times that of Nestlé. Even though Nestlé has a higher asset turnover (1.32 vs. .91), this results in only a 7.58% ROA when multiplied by the lower profit margin.

### Summary Entry

(b)	Land and Buildings.....	1,550	
	Revaluation Reserve .....		1,550

(c) Relative to U.S. GAAP, an argument can be made that assets and equity are overstated. Note that in the entry in (b) above, the revaluation adjustment increases Nestlé's asset values and equity. To make Nestlé's reported numbers comparable to a U.S. company like Tootsie Roll, you would need to adjust Nestlé's assets and equity numbers downward by the amount of the revaluation reserve.

## INTERNATIONAL REPORTING CASE (Continued)

For example, after adjusting Nestlé's assets downward by the amount of the revaluation reserve, Nestlé's ROA increases to:

$$\frac{\$4,005}{(\$52,857 - \$3,983)} = 8.2\%.$$

This is still lower than Tootsie Roll's ROA but the gap is narrower after adjusting for differences in revaluation.

**Note to instructors:** An alternative way to make Nestlé and Tootsie Roll comparable is to adjust Tootsie Roll's assets to fair values. This approach could be used to discuss the trade-off between relevance and reliability.

## PROFESSIONAL SIMULATION

### Explanation

- (a) The purpose of depreciation is to allocate the cost (or other book value) of tangible capital assets, less salvage, over their useful lives in a systematic and rational manner. Under generally accepted accounting principles as presently understood, depreciation accounting is a process of allocation, not of valuation, through which the productive effort (cost) is to be matched with productive accomplishment (revenue) for the period. Depreciation accounting, therefore, is concerned with the timing of the expiration of the cost of tangible plant assets.
- (b) The factors relevant in determining the annual depreciation for a depreciable asset are the initial recorded amount (cost), estimated salvage value, estimated useful life, and depreciation method.

Assets are typically recorded at their acquisition cost, which is in most cases objectively determinable, But cost assignments in other cases—“basket purchases” and the selection of an implicit interest rate in asset acquisition under deferred-payment plans—may be quite subjective, involving considerable judgment.

The salvage value is an estimate of an amount potentially realizable when the asset is retired from service. The estimate is based on judgment and is affected by the length of the useful life of the asset.

The useful life is also based on judgment. It involves selecting the “unit” of measure of service life and estimating the number of such units embodied in the asset. Such units may be measured in terms of time periods or in terms of activity (for example, years or machine hours). When selecting the life, one should select the lower (shorter) of the physical life or the economic life. Physical life involves wear and tear and casualties; economic life involves such things as technological obsolescence and inadequacy.

## PROFESSIONAL SIMULATION (Continued)

### Measurement

- (a) Compared to the use of an accelerated method, straight-line depreciation would result in the lowest depreciation expense and the highest income. For example, under straight-line depreciation, expense in each year would be:

$$(\$100,000 - \$10,000) / 4 = \$22,500$$

Using the double-declining balance method, depreciation expense in 2003 would be:

$$\$100,000 \times (1/4 \times 2) = \$50,000$$

Depending on the level of use in the first year, use of the units-of-production method could yield an even lower expense in the first year compared to straight-line.

- (b) Over the entire four-year period, all methods will produce the same total depreciation expense. Use of alternative methods only results in differences in timing of the depreciation charges.
- (c) All methods used for financial reporting purposes results in the same cash flow in 2003. That is, a cash outflow of \$100,000 for acquisition of the machine. However, use of an accelerated method for tax purposes, such as MACRS, results in the higher cash flow in 2003. This is because a larger tax deduction can be taken for depreciation expense, which reduces taxable income, resulting in less cash paid for taxes. Note that over the life of the asset, cash flows for taxes are the same regardless of the tax depreciation method used. Use of MACRS simply allows companies to defer tax payments.

### Journal Entry

Cash .....	84,000	
Accumulated Depreciation.....	45,000*	
Gain on Sale of Equipment .....		29,000
Equipment.....		100,000

\*  $(\$100,000 - \$10,000) / 4 = \$22,500$  per year X 2 years (2003, 2004)

