

# PART 3

## Long-Term Investment Decisions

### CHAPTERS IN THIS PART

- 8**      Capital Budgeting Cash Flows
- 9**      Capital Budgeting Techniques
- 10**     Risk and Refinements in Capital Budgeting

### INTEGRATIVE CASE 3: LASTING IMPRESSIONS COMPANY



## CHAPTER 8

### *Capital Budgeting Cash Flows*

#### INSTRUCTOR'S RESOURCES

##### Overview

This chapter prepares the student for the techniques of capital budgeting presented in the next chapter (Chapter 9). The steps in the capital budgeting process are described, beginning with proposal generation and ending with follow-up, and the associated terminology is defined. The special concerns involved in international capital budgeting projects are discussed next. The chapter concludes with the basics of determining relevant after-tax cash flows of a project, from the initial cash outlay to annual cash stream of costs and benefits and terminal cash flow. It also describes the special concerns facing capital budgeting for the multinational company.

##### *PMF DISK*

##### *PMF Tutor: Capital Budgeting Routines*

Chapter topics covered in the tutorial's problems include initial investment, operating cash flow, and terminal cash flow.

##### *PMF Problem Solver: Capital Budgeting*

This module allows the student to compute the initial investment required for a given product as well as the relevant cash flows over the life of the project and terminal cash flow at the end of the project.

##### *PMF Templates*

A spreadsheet template is provided for the following problem:

<u>Problem</u>	<u>Topic</u>
8-16	Incremental operating cash inflows

*Study Guide*

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The following *Study Guide* example is suggested for classroom presentation:

<u>Example</u>	<u>Topic</u>
2	Expansion-type cash flows

## ANSWERS TO REVIEW QUESTIONS

**8-1** *Capital budgeting* is the process used to evaluate and select long-term investments consistent with the goal of owner wealth maximization. Capital expenditures are outlays made by the firm that are expected to produce benefits over the long term (a period greater than one year). Not all capital expenditures are made for fixed assets. An expenditure made for an advertising campaign may have long-term benefits.

**8-2** The primary motives for making capital expenditures include:

- *Expansion* - increasing the productive capacity of the firm, usually through the acquisition of fixed assets.
- *Replacement* - replacing existing assets with new or more advanced assets which provide the same function.
- *Renewal* - rebuilding or overhauling existing assets to improve efficiency.

Other motives include expenditures for non-tangible projects that improve a firm's profitability, such as advertising, research and development, and product development. A firm may also be required by law to undertake pollution control and similar projects.

Expansion and replacement involve the purchase of new assets as compared with renewal, where old assets are upgraded.

- 8-3**
1. *Proposal generation* is the origination of proposed capital projects for the firm by individuals at various levels of the organization.
  2. *Review and analysis* is the formal process of assessing the appropriateness and economic viability of the project in light of the firm's overall objectives. This is done by developing cash flows relevant to the project and evaluating them through capital budgeting techniques. Risk factors are also incorporated into the analysis phase.
  3. *Decision making* is the step where the proposal is compared against predetermined criteria and either accepted or rejected.
  4. *Implementation* of the project begins after the project has been accepted and funding is made available.
  5. *Follow-up* is the post-implementation audit of expected and actual costs and revenues generated from the project to determine if the return on the proposal meets preimplementation projections.

- 8-4**
- a. *Independent projects* have cash flows unrelated to or independent of each other. *Mutually exclusive* projects have the same function as the other projects being considered. Therefore, they compete with one another; accepting one eliminates the others from further consideration.
  - b. Firms under capital rationing have only a fixed amount of dollars available for the capital budget, whereas a firm with unlimited funds may accept all projects with a specified rate of return.
  - c. The *accept-reject approach* evaluates capital expenditures using a predetermined minimum acceptance criterion. If the project meets the criterion, it's accepted and vice versa. With *ranking*, projects are ranked from best to worst based on some predetermined measure, such as rate of return.

### Part 3 Long-Term Investment Decisions

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- d. A *conventional cash flow pattern* consists of an initial outflow followed by a series of inflows. A *nonconventional cash flow pattern* is any pattern in which an initial outlay is not followed by a series of inflows.
- 8-5** Capital budgeting projects should be evaluated using *incremental after-tax cash flows*, since after-tax cash flows are what is available to the firm. When evaluating a project, concern is placed only on added cash flows expected to result from its implementation. Expansion decisions can be treated as replacement decisions in which all cash flows from the old assets are zero. Both expansion and replacement decisions involve purchasing new assets. Replacement decisions are more complex because incremental cash flows deriving from the replacement must be determined.
- 8-6** The three components of cash flow for any project are 1. initial investment, 2. operating cash flows, and 3. terminal cash flows.
- 8-7** *Sunk costs* are costs that have already been incurred and thus the money has already been spent. *Opportunity costs* are cash flows that could be realized from the next best alternative use of an owned asset. Sunk costs are not relevant to the investment decision because they are not incremental. These costs will not change no matter what the final accept/reject decision. Opportunity costs are a relevant cost. These cash flows could be realized if the decision is made not to change the current asset structure but to utilize the owned asset for its alternative purpose.
- 8-8** To minimize long-term currency risk, companies can finance a foreign investment in local capital markets so that the project's revenues and costs are in the local currency rather than dollars. Techniques such as currency futures, forwards, and options market instruments protect against short-term currency risk. Financial and operating strategies that reduce political risk include structuring the investment as a joint venture with a competent and well-connected local partner; and using debt rather than equity financing, since debt service payments are legally enforceable claims while equity returns such as dividends are not.
- 8-9**
- a. The *cost of the new asset* is the purchase price. (Outflow)
  - b. *Installation costs* are any added costs necessary to get an asset into operation. (Outflow)
  - c. *Proceeds from sale of old asset* are cash inflows resulting from the sale of an existing asset, reduced by any removal costs. (Inflow)
  - d. *Tax on sale of old asset* is incurred when the replaced asset is sold due to recaptured depreciation, capital gain, or capital loss. (May be an inflow or an outflow.)
  - e. The *change in net working capital* is the difference between the change in current assets and the change in current liabilities. (May be an inflow or an outflow)
- 8-10** The *book value* of an asset is its strict accounting value.

Book value = Installed cost of asset - Accumulated depreciation

The three key forms of taxable income are 1) capital gain: portion of sale price above initial purchase price, taxed at the ordinary rate; 2) recaptured depreciation: portion of sale price in excess of book value that represents a recovery of previously taken depreciation, taxed at the ordinary rate; and 3) loss on the sale of an asset: amount by which sale price is less than book value, taxed at the ordinary rate and deducted from ordinary income if the asset is depreciable and used in business. If the asset is not

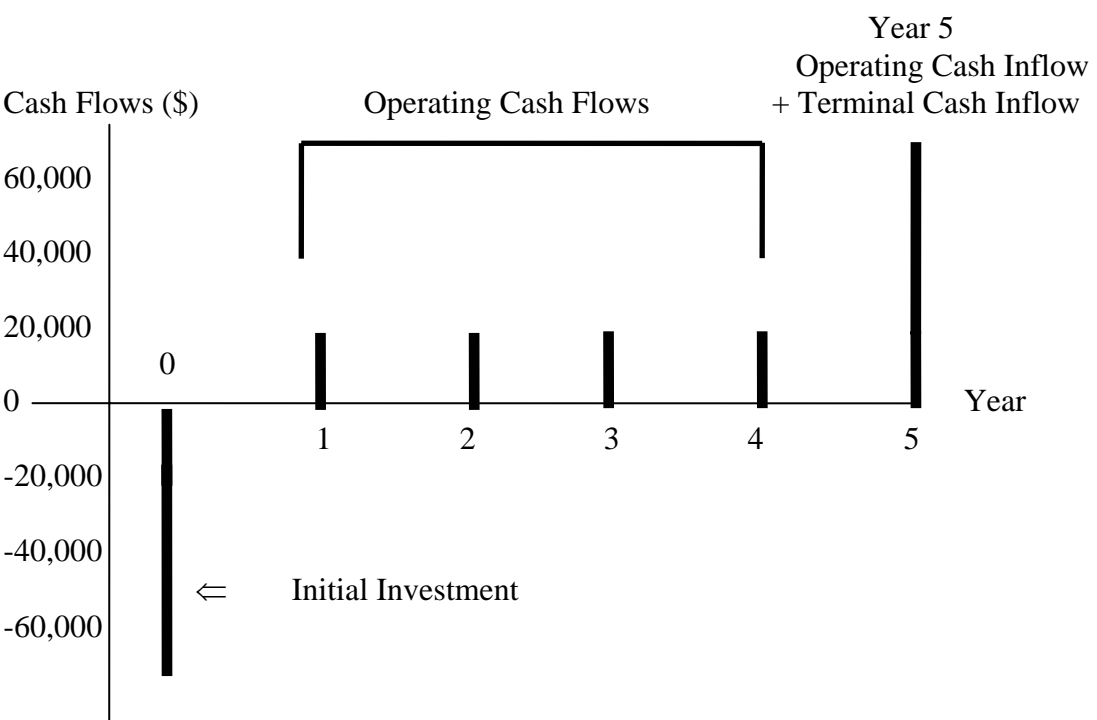
depreciable or is not used in business, it is also taxed at the ordinary rate but is deductible only against capital gains.

- 8-11** The asset may be sold 1) above its initial purchase price, 2) below the initial purchase price but above its book value, 3) at a price equal to its book value, or 4) below book value. In the first case, both capital gains and ordinary taxes arising from depreciation recapture would be required; in the second case, only ordinary taxes from depreciation recapture would be required; in the third case, no taxes would be required; and in the fourth case, a tax credit would occur.
- 8-12** The depreciable value of an asset is the installed cost of a new asset and is based on the depreciable cost of the new project, including installation cost.
- 8-13** Depreciation is used to decrease the firm's total tax liability and then is added back to net profits after taxes to determine cash flow.
- 8-14** To calculate incremental operating cash inflow for both the existing situation and the proposed project, the depreciation on assets is added back to the after-tax profits to get the cash flows associated with each alternative. The difference between the cash flows of the proposed and present situation, the incremental after-tax cash flows, are the relevant operating cash flows used in evaluating the proposed project.
- 8-15** The *terminal cash flow* is the cash flow resulting from termination and liquidation of a project at the end of its economic life. The form of calculating terminal cash flows is shown below:

Terminal Cash Flow Calculation:

$$\begin{aligned}
 &\text{After-tax proceeds from sale of new asset} = \\
 &\quad \text{Proceeds from sale of new asset} \\
 &\quad \pm \text{Tax on sale of new asset} \\
 &- \text{After-tax proceeds from sale of old asset} = \\
 &\quad \text{Proceeds from sale of old asset} \\
 &\quad \pm \text{Tax on sale of old asset} \\
 &\pm \text{Change in net working capital} \\
 &= \text{Terminal cash flow}
 \end{aligned}$$

- 8-16** The *relevant cash flows* necessary for a conventional capital budgeting project are the incremental after-tax cash flows attributable to the proposed project: the initial investment, the operating cash inflows, and the terminal cash flow. The initial investment is the initial outlay required, taking into account the installed cost of the new asset, proceeds from the sale of the old asset, tax on the sale of the old asset, and any change in net working capital. The operating cash inflows are the additional cash flows received as a result of implementing a proposal. Terminal cash flow represents the after-tax cash flows expected to result from the liquidation of the project at the end of its life. These three components represent the positive or negative cash flow impact if the firm implements the project and are depicted in the following diagram.





## SOLUTIONS TO PROBLEMS

Note: The MACRS depreciation percentages used in the following problems appear in Chapter 3, Table 3.2. The percentages are rounded to the nearest integer for ease in calculation.

For simplification, five-year-lived projects with 5 years of cash inflows are used throughout this chapter. Projects with usable lives equal to the number of years cash inflows are also included in the end-of-chapter problems. It is important to recall from Chapter 3 that, under the Tax Reform Act of 1986, MACRS depreciation results in  $n + 1$  years of depreciation for an  $n$ -year class asset. This means that in actual practice projects will typically have at least one year of cash flow beyond their recovery period.

### 8-1 LG 1: Classification of Expenditures

- Operating expenditure
- Capital expenditure
- Capital expenditure
- Operating expenditure
- Capital expenditure
- Capital expenditure
- Capital expenditure
- Operating expenditure

### 8-2 LG 2: Basic Terminology

	<u>Situation A</u>	<u>Situation B</u>	<u>Situation C</u>
a.	mutually exclusive	mutually exclusive	independent
b.	unlimited	unlimited	capital rationing
c.	ranking	accept-reject	ranking
d.	conventionnel	nonconventional	conventionnel (2&4) Nonconventional (1&3)

### 8-3 LG 3: Relevant Cash Flow Pattern Fundamentals

a.	<u>Year</u>		<u>Cash Flow</u>
	Initial investment		(\$120,000)
	1-18	\$25,000 - \$5,000	= \$ 20,000
	0	1	2
	3	16	17
	18		
	-120,000	20,000	20,000
	20,000	20,000	20,000
	20,000	20,000	20,000
	20,000	20,000	20,000
	20,000	20,000	20,000
	20,000	20,000	20,000

<b>b.</b>	Initial investment	$(\$85,000 - \$30,000)$	=	$(\$55,000)$
	1-5		=	$\$ 20,000$
	6	$\$20,000 + \$20,000 - \$10,000$	=	$\$ 30,000$

0	1	2	3	4	5
-----					

c.

Initial investment							
1-5	\$300,000 - \$20,000	=	\$ 280,000				
6	\$300,000 - \$500,000	=	(\$ 200,000)				
7-10	\$300,000 - \$20,000	=	\$ 280,000				

0 1 2 5 6 7 10

-2,000,000 280,000 280,000 ••••• 280,000 -200,000 280,000 •• 280,000

<b>a.</b>	<u>Year</u>	<u>Relevant Cash Flows</u>
	Initial investment	(\$28,000)
	1	4,000
	2	6,000
	3	8,000
	4	10,000
	5	4,000

## 8-5 LG 3: Sunk Costs and Opportunity Costs

**c.**

**Cash Flows**

-\$1,800,000      \$750,000    \$750,000    \$750,000                      \$750,000    \$750,000

+ \$ 250,000

0                      1                      2                      3                      •••••                      9                      10 >

**End of Year**

**a.** Sunk cost - The funds for the tooling had already been expended and would not change, no matter whether the new technology would be acquired or not.

- b. Opportunity cost - The development of the computer programs can be done without additional expenditures on the computers; however, the loss of the cash inflow from the leasing arrangement would be a lost opportunity to the firm.
- c. Opportunity cost - Covol will not have to spend any funds for floor space but the lost cash inflow from the rent would be a cost to the firm.
- d. Sunk cost - The money for the storage facility has already been spent, and no matter what decision the company makes there is no incremental cash flow generated or lost from the storage building.
- e. Opportunity cost - Foregoing the sale of the crane costs the firm \$180,000 of potential cash inflows.

#### 8-7 LG 4: Book Value

Asset	Installed Cost	Accumulated Depreciation	Book Value
A	\$ 950,000	\$ 674,500	\$275,500
B	40,000	13,200	26,800
C	96,000	79,680	16,320
D	350,000	70,000	280,000
E	1,500,000	1,170,000	330,000

#### 8-8 LG 4: Book Value and Taxes on Sale of Assets

- a. Book value = \$80,000 - (.71 x \$80,000)  
= \$23,200

	Capital gain	Tax on capital gain	Depreciation recovery	Tax on recovery	Total tax
Sale price	\$20,000	\$8,000	\$56,800	\$22,720	\$30,720
\$100,000	-0-	-0-	32,800	13,120	13,120
56,000	-0-	-0-	-0-	-0-	-0-
23,200	-0-	-0-	(8,200)	(3,280)	(3,280)
15,000	-0-	-0-			

#### 8-9 LG 4: Tax Calculations

$$\text{Current book value} = \$200,000 - [(.52 \times (\$200,000))] = \$96,000$$

	(a)	(b)	(c)	(d)
Capital gain	\$ 20,000	-0-	-0-	-0-
Recaptured depreciation	104,000	54,000	-0-	(16,000)
Tax on capital gain	\$ 8,000	-0-	-0-	-0-
Tax on depreciation recovery	<u>41,600</u>	<u>21,600</u>	<u>-0-</u>	<u>(6,400)</u>
Total tax	\$ 49,600	\$21,600	\$ -0-	(\$6,400)

#### 8-10 LG 4: Change in Net Working Capital Calculation

- a. Current assets Current liabilities

**Part 3 Long-Term Investment Decisions**

Cash	\$ + 15,000	Accounts payable	\$ + 90,000
Accounts receivable	+ 150,000	Accruals	+ 40,000
Inventory	<u>- 10,000</u>		
Net change	\$ 155,000		\$ 130,000

Net working capital = current assets - current liabilities

$\Delta \text{NWC} = \$155,000 - \$130,000$

$\Delta \text{NWC} = \$ 25,000$

- b.** Analysis of the purchase of a new machine reveals an increase in net working capital. This increase should be treated as an initial outlay and is a cost of acquiring the new machine.
- c.** Yes, in computing the terminal cash flow, the net working capital increase should be reversed.

**8-11 LG 4: Calculating Initial Investment**

- a.** Book value =  $(\$325,000 \times .48) = \$156,000$

- b.**
- |                              |                |
|------------------------------|----------------|
| Sales price of old equipment | \$200,000      |
| Book value of old equipment  | <u>156,000</u> |
| Recapture of depreciation    | \$ 44,000      |

Taxes on recapture of depreciation =  $\$44,000 \times .40 = \$17,600$

After-tax proceeds =  $\$200,000 - \$17,600 = \$182,400$

- c.**
- |                                       |               |
|---------------------------------------|---------------|
| Cost of new machine                   | \$325,000     |
| Less sales price of old machine       | (200,000)     |
| Plus tax on recapture of depreciation | <u>44,000</u> |
| Initial investment                    | \$169,000     |

**8-12 LG 4: Initial Investment–Basic Calculation**

Installed cost of new asset =

Cost of new asset	\$35,000	
+ Installation Costs	<u>5,000</u>	
Total installed cost (depreciable value)		\$40,000

After-tax proceeds from sale of old asset =

Proceeds from sale of old asset	(\$25,000)	
+ Tax on sale of old asset	<u>7,680</u>	
Total after-tax proceeds-old asset		<u>(\$17,320)</u>
Initial investment		<u>\$22,680</u>

$$\text{Book value of existing machine} = \$20,000 \times (1 - (.20 + .32 + .19)) = \$5,800$$

$$\text{Recaptured depreciation} = \$20,000 - \$5,800 = \$14,200$$

$$\text{Capital gain} = \$25,000 - \$20,000 = \$5,000$$

$$\text{Tax on recaptured depreciation} = \$14,200 \times (.40) = \$5,680$$

$$\text{Tax on capital gain} = \$5,000 \times (.40) = \underline{2,000}$$

$$\text{Total tax} = \underline{\underline{\$7,680}}$$

### 8-13 LG 4: Initial investment at Various Sale Prices

	(a)	(b)	(c)	(d)
Installed cost of new asset:				
Cost of new asset	\$24,000	\$24,000	\$24,000	\$24,000
+ Installation cost	<u>2,000</u>	<u>2,000</u>	<u>2,000</u>	<u>2,000</u>
Total installed-cost	\$26,000	\$26,000	\$26,000	\$26,000
After-tax proceeds from sale of old asset				
Proceeds from sale of old asset	(11,000)	(7,000)	(2,900)	(1,500)
+ Tax on sale of old asset*	<u>3,240</u>	<u>1,640</u>	<u>0</u>	<u>(560)</u>
Total after-tax proceeds	<u>(7,760)</u>	<u>(5,360)</u>	<u>(2,900)</u>	<u>(2,060)</u>
Initial investment	\$18,240	\$20,640	\$23,100	\$23,940

$$\text{Book value of existing machine} = \$10,000 \times [1 - (.20 - .32 - .19)] = \$2,900$$

\* Tax Calculations:

- a.** Recaptured depreciation = \$10,000 - \$2,900 = \$7,100  
Capital gain = \$11,000 - \$10,000 = \$1,000
- Tax on ordinary gain = \$7,100 x (.40) = \$2,840  
Tax on capital gain = \$1,000 x (.40) = 400  
Total tax = \$3,240
- b.** Recaptured depreciation = \$7,000 - \$2,900 = \$4,100  
Tax on ordinary gain = \$4,100 x (.40) = \$1,640
- c.** 0 tax liability
- d.** Loss on sale of existing asset = \$1,500 - \$2,900 = (\$1,400)  
Tax benefit = - \$1,400 x (.40) = \$ 560

### 8-14 LG 4: Calculating Initial Investment

a. Book value =  $(\$61,000 \times .31) = \$18,910$

b.	Sales price of old equipment	\$35,000
	Book value of old equipment	<u>18,910</u>
	Recapture of depreciation	\$ 16,090

Taxes on recapture of depreciation =  $\$16,090 \times .40 = \$6,436$

	Sale price of old roaster	\$35,000
	Tax on recapture of depreciation	<u>(6,436)</u>
	After-tax proceeds from sale of old roaster	\$28,564

c.	Changes in current asset accounts	
	Inventory	\$ 50,000
	Accounts receivable	<u>70,000</u>
	Net change	\$120,000

	Changes in current liability accounts	
	Accruals	\$ (20,000)
	Accounts payable	40,000
	Notes payables	<u>15,000</u>
	Net change	\$ 35,000

Change in net working capital \$ 85,000

d.	Cost of new roaster	\$130,000
	Less after-tax proceeds from sale of old roaster	28,564
	Plus change in net working capital	<u>85,000</u>
	Initial investment	<u>\$186,436</u>

### 8-15 LG 4: Depreciation

Depreciation Schedule			
Year	Depreciation Expense		
1	$\$68,000 \times .20$	=	\$13,600
2	$68,000 \times .32$	=	21,760

3	68,000 x .19	=	12,920
4	68,000 x .12	=	8,160
5	68,000 x .12	=	8,160
6	68,000 x .05	=	3,400

**8-16 LG 5: Incremental Operating Cash Inflows**

- a. Incremental profits before tax and depreciation = \$1,200,000 - \$480,000  
= \$720,000 each year

b. Year	(1)	(2)	(3)	(4)	(5)	(6)
PBDT	\$720,000	\$720,000	\$720,000	\$720,000	\$720,000	\$720,000
Depr.	<u>400,000</u>	<u>640,000</u>	<u>380,000</u>	<u>240,000</u>	<u>240,000</u>	<u>100,000</u>
NPBT	320,000	80,000	340,000	480,000	480,000	620,000
Tax	<u>128,000</u>	<u>32,000</u>	<u>136,000</u>	<u>192,000</u>	<u>192,000</u>	<u>248,000</u>
NPAT	192,000	48,000	204,000	288,000	288,000	372,000

- c. Cash Flow \$592,000 \$688,000 \$584,000 \$528,000 \$528,000 \$472,000  
(NPAT + depreciation)

PBDT = Profits before depreciation and taxes

NPBT = Net profits before taxes

NPAT = Net profits after taxes

**8-17 LG 5: Incremental Operating Cash Inflows—Expense Reduction**

Year	(1)	(2)	(3)	(4)	(5)	(6)
Incremental Expense savings	\$16,000	\$16,000	\$16,000	\$16,000	\$16,000	\$0
Incremental profits Before dep. and taxes*	\$16,000	\$16,000	\$16,000	\$16,000	\$16,000	\$0
Depreciation	<u>9,600</u>	<u>15,360</u>	<u>9,120</u>	<u>5,760</u>	<u>5,760</u>	<u>2,400</u>
Net profits Before taxes	6,400	640	6,880	10,240	10,240	-2,400
Taxes	<u>2,560</u>	<u>256</u>	<u>2,752</u>	<u>4,096</u>	<u>4,096</u>	<u>-960</u>
Net profits After taxes	3,840	384	4,128	6,144	6,144	-1,440
Operating cash Inflows**	13,440	15,744	13,248	11,904	11,904	960

\* Incremental profits before depreciation and taxes will increase the same amount as the decrease in expenses.

\*\* Net profits after taxes plus depreciation expense.

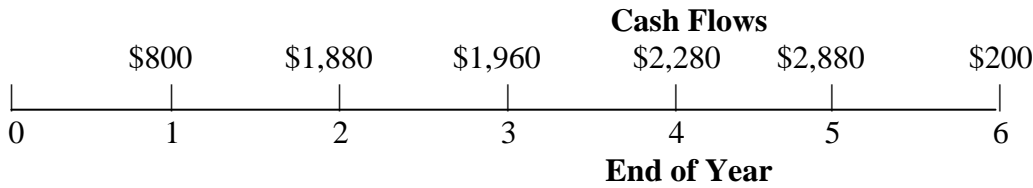
	Profits		(excluding	Depreciation		Net Profits		Net
	Year	Revenue	Cash	and Taxes	Depreciation	Before Taxes	Taxes	After
	Tax	Inflows	depreciation)					
<b>New Lathe</b>								
	1	\$40,000	\$30,000	\$10,000	\$2,000	\$8,000	\$3,200	\$4,800
	2	41,000	30,000	11,000	3,200	7,800	3,120	4,680
	3	42,000	30,000	12,000	1,900	10,100	4,040	6,060
	4	43,000	30,000	13,000	1,200	11,800	4,720	7,080
	5	44,000	30,000	14,000	1,200	12,800	5,120	7,680
	6	-0-	-0-	-0-	500	(500)	(200)	(300)
<b>Old Lathe</b>								
	1-5	\$35,000	\$25,000	\$10,000	-0-	\$10,000	\$4,000	\$6,000

**b. Calculation of Incremental Cash Inflows**

Year	New Lathe	Old Lathe	Incremental Cash Flows
1	\$ 6,800	\$ 6,000	\$ 800
2	7,880	6,000	1,880
3	7,960	6,000	1,960
4	8,280	6,000	2,280
5	8,880	6,000	2,880
6	200	-0-	200



c.



### 8-19 LG 5: Determining Operating Cash Flows

a.

	Year					
	1	2	3	4	5	6
Revenues:(000)						
New buses	\$1,850	\$1,850	\$1,830	\$1,825	\$1,815	\$1,800
Old buses	<u>1,800</u>	<u>1,800</u>	<u>1,790</u>	<u>1,785</u>	<u>1,775</u>	<u>1,750</u>
Incremental revenue	\$ 50	\$ 50	\$ 40	\$ 40	\$ 40	\$ 50
Expenses: (000)						
New buses	\$ 460	\$ 460	\$ 468	\$ 472	\$ 485	\$ 500
Old buses	<u>500</u>	<u>510</u>	<u>520</u>	<u>520</u>	<u>530</u>	<u>535</u>
Incremental expense	\$ (40)	\$ (50)	\$ (52)	\$ (48)	\$ (45)	\$ (35)
Depreciation: (000)						
New buses	\$ 600	\$ 960	\$ 570	\$ 360	\$ 360	\$ 150
Old buses	<u>324</u>	<u>135</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>
Incremental depr.	\$ 276	\$ 825	\$ 570	\$ 360	\$ 360	\$ 150
Incremental depr. tax savings @40%	110	330	228	144	144	60

#### Net Incremental Cash Flows

	Year					
	1	2	3	4	5	6
Cash Flows: (000)						
Revenues	\$ 50	\$ 50	\$ 40	\$ 40	\$ 40	\$ 50
Expenses	40	50	52	48	45	35
Less taxes @40%	(36)	(40)	(37)	(35)	(34)	(34)
Depr. tax savings	<u>110</u>	<u>330</u>	<u>228</u>	<u>144</u>	<u>144</u>	<u>60</u>
Net operating cash inflows	<u>\$ 164</u>	<u>\$ 390</u>	<u>\$ 283</u>	<u>\$ 197</u>	<u>\$ 195</u>	<u>\$ 111</u>

### 8-20 LG 6: Terminal Cash Flows–Various Lives and Sale Prices

a.

After-tax proceeds from sale of new asset =	<u>3-year*</u>	<u>5-year*</u>	<u>7-year*</u>
Proceeds from sale of proposed asset	\$10,000	\$10,000	\$10,000
± Tax on sale of proposed asset*	<u>+ 16,880</u>	<u>- 400</u>	<u>- 4,000</u>

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Total after-tax proceeds-new	\$26,880	\$ 9,600	\$ 6,000
+ Change in net working capital	<u>+ 30,000</u>	<u>+30,000</u>	<u>+ 30,000</u>
Terminal cash flow	\$ 56,800	\$39,600	\$ 36,000

\* (1) Book value of asset =  $[1 - (.20 + .32 + .19) \times (\$180,000)] = \$52,200$

Proceeds from sale = \$10,000

\$10,000 - \$52,200 = (\$42,200) loss

\$42,200  $\times$  (.40) = \$16,880 tax benefit

(2) Book value of asset =  $[1 - (.20 + .32 + .19 + .12 + .12) \times (\$180,000)]$   
= \$9,000

\$10,000 - \$9,000 = \$1,000 recaptured depreciation

\$1,000  $\times$  (.40) = \$400 tax liability

(3) Book value of asset = \$0

\$10,000 - \$0 = \$10,000 recaptured depreciation

\$10,000  $\times$  (.40) = \$4,000 tax liability

- b. If the usable life is less than the normal recovery period, the asset has not been depreciated fully and a tax benefit may be taken on the loss; therefore, the terminal cash flow is higher.

	(1)	(2)
After-tax proceeds from sale of new asset =		
Proceeds from sale of new asset	\$ 9,000	\$170,000
+ Tax on sale of proposed asset*	0	(64,400)
+ Change in net working capital	<u>+ 30,000</u>	<u>+ 30,000</u>
Terminal cash flow	\$ 39,000	\$135,600

\* (1) Book value of the asset =  $\$180,000 \times .05 = \$9,000$ ; no taxes are due

(2) Tax =  $(\$170,000 - \$9,000) \times 0.4 = \$64,400$ .

- d. The higher the sale price, the higher the terminal cash flow.

**8-21 LG 6: Terminal Cash Flow–Replacement Decision**

After-tax proceeds from sale of new asset =			
Proceeds from sale of new machine	\$75,000		
- Tax on sale of new machine <sup>1</sup>	<u>(14,360)</u>		
Total after-tax proceeds-new asset		\$60,640	-
proceeds from sale of old asset			After-tax
Proceeds from sale of old machine	(15,000)		
+ Tax on sale of old machine <sup>2</sup>	<u>6,000</u>		
Total after-tax proceeds-old asset		( 9,000)	
+ Change in net working capital		<u>25,000</u>	

Terminal cash flow

\$76,640

- <sup>1</sup> Book value of new machine at end of year.4:  
[1 - (.20 + .32 + .19 + .12) x (\$230,000)] = \$39,100  
\$75,000 - \$39,100 = \$35,900 recaptured depreciation  
\$35,900 x (.40) = \$14,360 tax liability
- <sup>2</sup> Book value of old machine at end of year 4:  
\$0  
\$15,000 - \$0 = \$15,000 recaptured depreciation  
\$15,000 x (.40) = \$ 6,000 tax benefit

**Part 3 Long-Term Investment Decisions****8-22 LG 4, 5, 6: Relevant Cash Flows for a Marketing Campaign**

Marcus Tube  
Calculation of Relevant Cash Flow  
(\$000)

**Calculation of Net Profits after Taxes and Operating Cash Flow:  
With Marketing Campaign**

	<u>2004</u>	<u>2005</u>	<u>2006</u>	<u>2007</u>	<u>2008</u>
Sales	\$20,500	\$21,000	\$21,500	\$22,500	\$23,500
CGS (@ 80%)	<u>16,400</u>	<u>16,800</u>	<u>17,200</u>	<u>18,000</u>	<u>18,800</u>
Gross Profit	\$ 4,100	\$ 4,200	\$ 4,300	\$ 4,500	\$ 4,700
Less: Operating Expenses					
General and Administrative					
(10% of sales)	\$ 2,050	\$ 2,100	\$ 2,150	\$ 2,250	\$ 2,350
Marketing Campaign	150	150	150	150	150
Depreciation	<u>500</u>	<u>500</u>	<u>500</u>	<u>500</u>	<u>500</u>
Total operating expenses	2,700	2,750	2,800	2,900	3,000
Net profit before taxes	\$1,400	\$1,450	\$1,500	\$1,600	\$1,700
Less: Taxes 40%	<u>560</u>	<u>580</u>	<u>600</u>	<u>640</u>	<u>680</u>
Net profit after taxes	\$ 840	\$ 870	\$ 900	\$ 960	\$1,020
+Depreciation	<u>500</u>	<u>500</u>	<u>500</u>	<u>500</u>	<u>500</u>
Operating CF	\$1,340	\$1,370	\$1,400	\$1,460	\$1,520

**Without Marketing Campaign  
Years 2004 - 2008**

Net profit after taxes	\$ 900
+Depreciation	<u>500</u>
Operating cash flow	\$ 1,400

**Relevant Cash Flow  
(\$000)**

<u>Year</u>	<u>With Marketing Campaign</u>	<u>Without Marketing Campaign</u>	<u>Incremental Cash Flow</u>
2004	\$1,340	\$1,400	\$(60)
2005	1,370	1,400	(30)
2006	1,400	1,400	-0-
2007	1,460	1,400	60
2008	1,520	1,400	120

**8-23 LG 4, 5: Relevant Cash Flows—No Terminal Value**

<b>a.</b>	Installed cost of new asset	
	Cost of new asset	\$76,000
+	Installation costs	<u>4,000</u>

## Chapter 8 Capital Budgeting Cash Flows

Total cost of new asset	\$80,000
- After-tax proceeds from sale of old asset	
Proceeds from sale of old asset	(55,000)
+ Tax on sale of old asset*	<u>16,200</u>
Total proceeds, sale of old asset	<u>(38,800)</u>
Initial investment	<u>\$41,200</u>

\* Book value of old machine:

$$[1 - (.20 + .32 + .19)] \times \$50,000 = \$14,500$$

$$\$55,000 - \$14,500 = \$40,500 \quad \text{gain on asset}$$

$$\$35,500 \text{ recaptured depreciation} \times .40 = \$14,200$$

$$\$5,000 \text{ capital gain} \times .40 = \underline{2,000}$$

$$\text{Total tax on sale of asset} = \underline{\underline{\$16,200}}$$

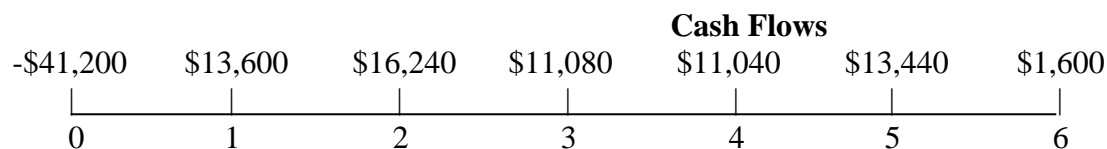
### b. Calculation of Operating Cash Flow

Old Machine						
Year	(1)	(2)	(3)	(4)	(5)	(6)
PBDT	\$14,000	\$16,000	\$20,000	\$18,000	\$14,000	\$ 0
Depreciation	<u>6,000</u>	<u>6,000</u>	<u>2,500</u>	<u>0</u>	<u>0</u>	<u>0</u>
NPBT	\$ 8,000	\$10,000	\$17,500	\$18,000	\$14,000	0
Taxes	<u>3,200</u>	<u>4,000</u>	<u>7,000</u>	<u>7,200</u>	<u>5,600</u>	<u>0</u>
NPAT	\$4,800	\$ 6,000	\$10,500	\$10,800	\$ 8,400	\$ 0
Depreciation	<u>6,000</u>	<u>6,000</u>	<u>2,500</u>	<u>0</u>	<u>0</u>	<u>0</u>
Cash flow	<u>\$10,800</u>	<u>\$12,000</u>	<u>\$13,000</u>	<u>\$10,800</u>	<u>\$ 8,400</u>	<u>\$ 0</u>

New Machine						
Year	(1)	(2)	(3)	(4)	(5)	(6)
PBDT	\$30,000	\$30,000	\$30,000	\$30,000	\$30,000	\$ 0
Depreciation	<u>16,000</u>	<u>25,600</u>	<u>15,200</u>	<u>9,600</u>	<u>9,600</u>	<u>4,000</u>
NPBT	\$14,000	\$ 4,400	\$14,800	\$20,400	\$20,400	-\$4,000
Taxes	<u>5,600</u>	<u>1,760</u>	<u>5,920</u>	<u>8,160</u>	<u>8,160</u>	<u>-1,600</u>
NPAT	\$ 8,400	\$ 2,640	\$ 8,880	\$12,240	\$12,240	-\$2,400
Depreciation	<u>16,000</u>	<u>25,600</u>	<u>15,200</u>	<u>9,600</u>	<u>9,600</u>	<u>4,000</u>
Cash flow	<u>\$24,400</u>	<u>\$28,240</u>	<u>\$24,080</u>	<u>\$21,840</u>	<u>\$21,840</u>	<u>\$1,600</u>

Year	(1)	(2)	(3)	(4)	(5)	(6)
Incremental After-tax Cash flows	\$13,600	\$16,240	\$11,080	\$11,040	\$13,440	\$ 1,600

### c.



8-24 LG 4, 5, 6: Integrative–Determining Relevant Cash Flows

a. Initial investment:

Installed cost of new asset =		
Cost of new asset	\$105,000	
+ Installation costs	<u>5,000</u>	
Total cost of new asset		\$110,000

- After-tax proceeds from sale of old asset =		
Proceeds from sale of old asset	(70,000)	
+ Tax on sale of old asset*	<u>16,480</u>	
Total proceeds from sale of old asset		(53,520)
+ Change in working capital	<u>12,000</u>	
Initial investment		<u>\$68,480</u>

\* Book value of old asset:  
 $[1 - (.20 + .32)] \times \$60,000 = \$28,800$

$\$70,000 - \$28,800 = \$41,200$  gain on sale of asset

$\$31,200$  recaptured depreciation  $\times .40 = \$12,480$   
 $\$10,000$  capital gain  $\times .40 = \underline{4,000}$   
 Total tax of sale of asset =  $\underline{\$16,480}$

b.

Calculation of Operating Cash Inflows

Year	Profits Before Depreciation and Taxes	Depre- ciation	Net Profits Before Taxes	Taxes	Net Profits After Taxes	Operating Cash Inflows
<b>New Grinder</b>						
1	\$43,000	\$22,000	\$21,000	\$ 8,400	\$12,600	\$34,600
2	43,000	35,200	7,800	3,120	4,680	39,880
3	43,000	20,900	22,100	8,840	13,260	34,160
4	43,000	13,200	29,800	11,920	17,880	31,080
5	43,000	13,200	29,800	11,920	17,880	31,080
6	--0-	5,500	-5,500	-2,200	-3,300	2,200
<b>Existing Grinder</b>						
1	\$26,000	\$11,400	\$14,600	\$5,840	\$ 8,760	\$20,160

### Chapter 8 Capital Budgeting Cash Flows

2	24,000	7,200	16,800	6,720	10,080	17,280
3	22,000	7,200	14,800	5,920	8,880	16,080
4	20,000	3,000	17,000	6,800	10,200	13,200
5	18,000	-0-	18,000	7,200	10,800	10,800
6	-0-	-0-	-0-	-0-	-0-	-0-

### Calculation of Incremental Cash Inflows

Year	New Grinder	Existing Grinder	Incremental Operating Cash Flow
1	\$34,600	\$20,160	\$14,440
2	39,880	17,280	22,600
3	34,160	16,080	18,080
4	31,080	13,200	17,880
5	31,080	10,800	20,280
6	2,200	-0-	2,200

**c. Terminal Cash Flow:**

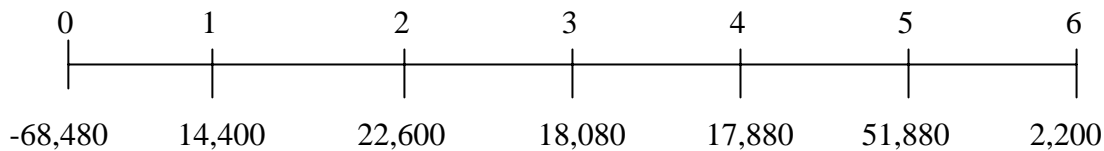
After-tax proceeds from sale of new asset =		
Proceeds from sale of new asset	\$29,000	
- Tax on sale of new asset*	( 9,400)	
Total proceeds from sale of new asset		<u>19,600</u>
- After-tax proceeds from sale of old asset =		
Proceeds from sale of old asset	0	
+ Tax on sale of old asset	<u>0</u>	
Total proceeds from sale of old asset		0
+ Change in net working capital		<u>12,000</u>
Terminal cash flow		<u>\$31,600</u>

\* Book value of asset at end of year 5 = \$ 5,500  
 \$29,000 - \$5,500 = \$23,500 recaptured depreciation  
 \$23,500 x .40 = \$ 9,400

**d. Year 5 Relevant Cash Flow:**

Operating cash flow	\$20,280
Terminal cash flow	<u>31,600</u>
Total inflow	<u>\$51,880</u>

### Part 3 Long-Term Investment Decisions



#### 8-25 LG 4, 5, 6: Integrative–Determining Relevant Cash Flows

a. Initial investment:	A	B
Installed cost of new asset		
Cost of new asset	\$40,000	\$54,000
+ Installation costs	<u>8,000</u>	<u>6,000</u>
Total proceeds, sale of new asset	48,000	60,000
- After-tax proceeds from sale of old asset		
Proceeds from sale of old asset	(18,000)	(18,000)
+ Tax on sale of old asset *	<u>3,488</u>	<u>3,488</u>
Total proceeds, sale of old asset	(14,512)	(14,512)
+ Change in working capital	<u>4,000</u>	<u>6,000</u>
Initial investment	<u>\$37,488</u>	<u>\$51,488</u>
* Book value of old asset:		
[1 - (.20 + .32 + .19)] x (\$32,000) = \$9,280		

#### b. Calculation of Operating Cash Inflows

Year	Profits before Depreciation and Taxes	Depre- ciation	Net Profits Before Taxes	Taxes	Net Profits After Taxes	Operating Cash Inflows
<b>Hoist A</b>						
1	\$21,000	\$ 9,600	\$11,400	\$4,560	\$6,840	\$16,440
2	21,000	15,360	5,640	2,256	3,384	18,744
3	21,000	9,120	11,880	4,752	7,128	16,248
4	21,000	5,760	15,240	6,096	9,144	14,904
5	21,000	5,760	15,240	6,096	9,144	14,904
6	-0-	2,400	-2,400	-960	-1,440	960
<b>Hoist B</b>						
1	\$22,000	\$12,000	\$10,000	\$4,000	\$6,000	18,000
2	24,000	19,200	4,800	1,920	2,880	22,080
3	26,000	11,400	14,600	5,840	8,760	20,160
4	26,000	7,200	18,800	7,520	11,280	18,480
5	26,000	7,200	18,800	7,520	11,280	18,480
6	-0-	3,000	-3,000	-1,200	-1,800	1,200
<b>Existing Hoist</b>						
1	\$14,000	\$3,840	\$10,160	\$4,064	\$6,096	\$9,936
2	14,000	3,840	10,160	4,064	6,096	9,936
3	14,000	1,600	12,400	4,960	7,440	9,040



### Chapter 8 Capital Budgeting Cash Flows

4	14,000	-0-	14,000	5,600	8,400	8,400
5	14,000	--0-	14,000	5,600	8,400	8,400
6	-0-	-0-	-0-	-0-	-0-	-0-

### Calculation of Incremental Cash Inflows

Year	Hoist A	Hoist B	Existing Hoist	Incremental Cash Flow	
				Hoist A	Hoist B
1	\$16,440	\$18,000	\$9,936	\$6,504	\$ 8,064
2	18,744	22,080	9,936	8,808	12,144
3	16,248	20,160	9,040	7,208	11,120
4	14,904	18,480	8,400	6,504	10,080
5	14,904	18,480	8,400	6,504	10,080
6	960	1,200	-0-	960	1,200

**c. Terminal Cash Flow:**

	(A)	(B)
After-tax proceeds form sale of new asset		
Proceeds from sale of new asset	\$12,000	\$20,000
- Tax on sale of new asset <sup>1</sup>	<u>(3,840)</u>	<u>(6,800)</u>
Total proceeds-new asset	8,160	13,200
- After-tax proceeds from sale of old asset		
Proceeds from sale of old asset	(1,000)	(1,000)
+ Tax on sale of old asset <sup>2</sup>	400	400
Total proceeds-old asset	(600)	(600)
+ Change in net working capital	<u>4,000</u>	<u>6,000</u>
Terminal cash flow	<u>\$11,560</u>	<u>\$18,600</u>

<sup>1</sup> Book value of Hoist A at end of year 5 = \$2,400  
\$12,000 - \$2,400 = \$9,600 recaptured depreciation  
\$9,600 x .40 = \$3,840 tax

Book value of Hoist B at end of year 5 = \$3,000  
\$20,000 - \$3,000 = \$17,000 recaptured depreciation  
\$17,000 x .40 = \$6,800 tax

<sup>2</sup> Book value of Existing Hoist at end of year 5 = \$0  
\$1,000 - \$0 = \$1,000 recaptured depreciation  
\$1,000 x .40 = \$400 tax

**Year 5 Relevant Cash Flow - Hoist A:**

Operating cash flow	\$ 6,504
Terminal cash flow	<u>11,560</u>
Total inflow	\$18,064

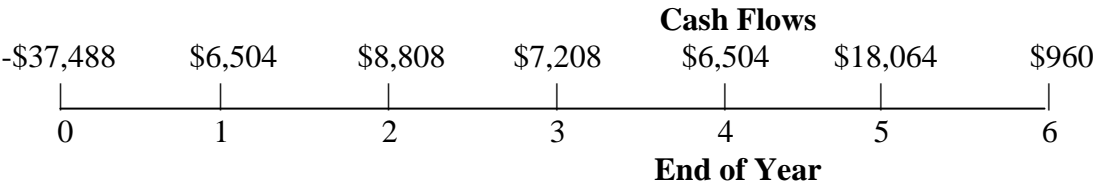
**Part 3 Long-Term Investment Decisions**

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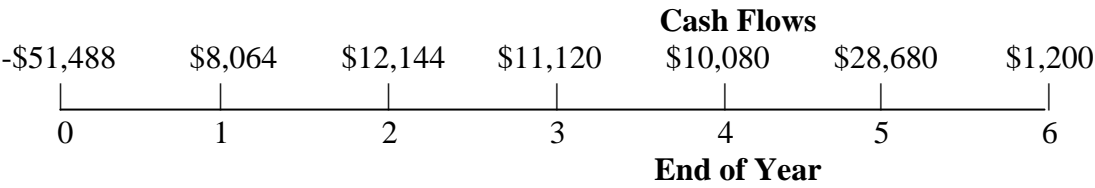
Year 5 Relevant Cash Flow - Hoist B:

Operating cash flow	\$ 10,080
Terminal cash flow	<u>18,600</u>
Total inflow	\$28,680

**d.**  
**Hoist A**



**Hoist B**



**CHAPTER 8 CASE****Determining Relevant Cash Flows for Clark Upholstery Company's Machine Renewal or Replacement Decision**

Clark Upholstery is faced with a decision to either renew its major piece of machinery or to replace the machine. The case tests the students' understanding of the concepts of initial investment and relevant cash flows.

**a. Initial Investment**

	<u>Alternative 1</u>	<u>Alternative 2</u>
Installed cost of new asset		
Cost of asset	\$90,000	\$100,000
+ Installation costs	<u>0</u>	<u>10,000</u>
Total proceeds, sale of new asset	90,000	110,000
- After-tax proceeds from sale of old asset		
Proceeds from sale of old asset	0	(20,000)
+ Tax on sale of old asset*	<u>0</u>	<u>8,000</u>
Total proceeds, sale of old asset	0	(12,000)
+ Change in working capital	<u>15,000</u>	<u>22,000</u>
Initial investment	<u>\$105,000</u>	<u>\$120,000</u>

* Book value of old asset	=	0
\$20,000 - \$0	=	\$20,000 recaptured depreciation
\$20,000 x (.40)	=	\$ 8,000 tax

**b.****Calculation of Operating Cash Inflows**

Year	Profits before Depreciation and Taxes	Depre- ciation	Net Profits Before Taxes	Taxes	Net Profits After Taxes	Operating Cash Inflows
<b>Alternative 1</b>						
1	\$198,500	\$18,000	\$180,500	\$ 72,200	\$108,300	\$126,300
2	290,800	28,800	262,000	104,800	157,200	186,000
3	381,900	17,100	364,800	145,920	218,880	235,980
4	481,900	10,800	471,100	188,440	282,660	293,460
5	581,900	10,800	571,100	228,440	342,660	353,460
6	-0-	4,500	-4,500	-1,800	-2,700	1,800

**Alternative 2**

1	\$235,500	\$22,000	\$213,500	\$85,400	\$128,100	\$150,100
2	335,200	35,200	300,000	120,000	180,000	215,200
3	385,100	20,900	364,200	145,680	218,520	239,420
4	435,100	13,200	421,900	168,760	253,140	266,340
5	551,100	13,200	537,900	215,160	322,740	335,940
6	-0-	5,500	-5,500	-2,200	-3,300	2,200

**Calculation of Incremental Cash Inflows**

Year	Alternative 1	Alternative 2	Existing	<u>Incremental Cash Flow</u>	
				Alt. 1	Alt. 2
1	\$ 126,300	\$150,100	\$100,000	\$26,300	\$50,100
2	186,000	215,200	150,000	36,000	65,200
3	235,980	239,420	200,000	35,980	39,420

**Part 3 Long-Term Investment Decisions**

4	293,460	266,340	250,000	43,460	16,340
5	353,460	335,940	320,000	33,460	15,940
6	1,800	2,200	-0-	1,800	2,200

**c. Terminal Cash Flow:**

	<u>Alternative 1</u>	<u>Alternative 2</u>
After-tax proceeds from		
Sale of new asset =		
Proceeds from sale of new asset	\$8,000	\$25,000
- Tax on sale of new asset <sup>1</sup>	<u>(1,400)</u>	<u>(7,800)</u>
Total proceeds, sale of new asset	6,600	17,200
- After-tax proceeds from sale of old asset =		
Proceeds from sale of old asset	(2,000)	(2,000)
+ Tax on sale of old asset <sup>2</sup>	<u>800</u>	<u>800</u>
Total proceeds, sale of old asset	(1,200)	(1,200)
+ Change in working capital	<u>15,000</u>	<u>22,000</u>
Terminal cash flow	<u>\$20,400</u>	<u>\$38,000</u>

<sup>1</sup> Book value of Alternative 1 at end of year 5: = \$4,500  
 \$8,000 - \$4,500 = \$3,500 recaptured depreciation  
 \$3,500 x (.40) = \$1,400 tax

Book value of Alternative 2 at end of year 5: = \$5,500  
 \$25,000 - \$5,500 = \$19,500 recaptured depreciation  
 \$19,500 x (.40) = \$7,800 tax

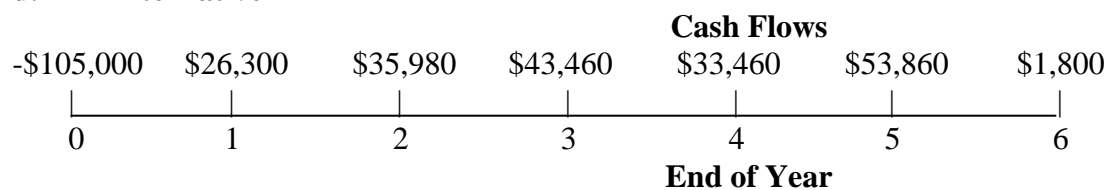
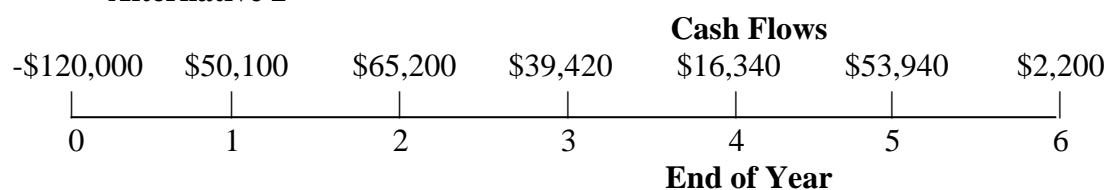
<sup>2</sup> Book value of old asset at end of year 5: = \$0  
 \$2,000 - \$0 = \$2,000 recaptured depreciation  
 \$2,000 x (.40) = \$800 tax

**Alternative 1**

Year 5 Relevant Cash Flow:	Operating Cash Flow:	\$33,460
	Terminal Cash Flow	<u>20,400</u>
	Total Cash Inflow	<u>\$53,860</u>

**Alternative 2**

Year 5 Relevant Cash Flow:	Operating Cash Flow:	\$15,940
	Terminal Cash Flow	<u>38,000</u>
	Total Cash Inflow	<u>\$53,940</u>

**d. Alternative 1****Alternative 2**

- e.** Alternative 2 appears to be slightly better because it has the larger incremental cash flow amounts in the early years.