

Answers to Warm-Up Exercises

E11-1. Categorizing a firm's expenditures

Answer: In this case, the tuition reimbursement should be categorized as a capital expenditure since the outlay of funds is expected to produce benefits over a period of time greater than 1 year.

E11-2. Classification of project costs and cash flows

Answer: \$3.5 billion already spent—sunk cost (irrelevant)
\$350 million incremental cash outflow—relevant cash flow
\$15 million per year cash inflow—relevant cash flow
\$450 million for satellites—opportunity cost and relevant cash flow

E11-3. Finding the initial investment

Answer: \$20,000 Purchase price of new machinery
+\$3,000 Installation costs
– \$4,500 After-tax proceeds from sale of old machinery
\$18,500 Initial investment

E11-4. Book value and recaptured depreciation

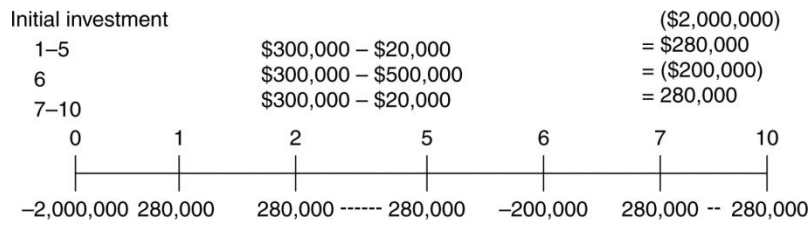
Answer: Book value = $\$175,000 - \$124,250 = \$50,750$
Recaptured depreciation = $\$110,000 - \$50,750 = \$59,250$

E11-5. Initial investment

Answer: Initial investment = purchase price + installation costs – after-tax proceeds from sale of old asset + change in net working capital
 $= \$55,000 + \$7,500 - \$23,750 + \$2,000 = \$40,750$

CAPITAL BUDGETING PROBLEMS: CHAPTER 11

c.



This is a nonconventional cash flow pattern, which has several cash flow series of equal size, which is referred to as an embedded annuity.

P11-3. Expansion versus replacement cash flows

LG 3; Intermediate

a.

Year	Relevant Cash Flows
Initial investment	(\$28,000)
1	4,000
2	6,000
3	8,000
4	10,000
5	4,000

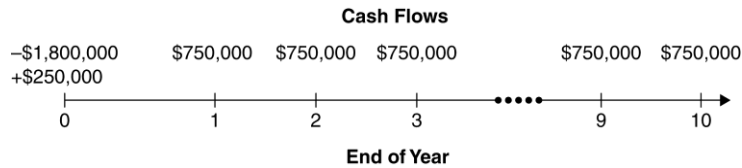
b. An expansion project is simply a replacement decision in which all cash flows from the old asset are zero.

P11-4. Sunk costs and opportunity costs

LG 2; Basic

- a. The \$1,000,000 development costs should not be considered part of the decision to go ahead with the new production. This money has already been spent and cannot be retrieved so it is a sunk cost.
- b. The \$250,000 sale price of the existing line is an opportunity cost. If Masters Golf Products does not proceed with the new line of clubs they will not receive the \$250,000.

c.



P11-5. Sunk costs and opportunity costs

LG 2; Intermediate

- 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—Forgoing the sale of the crane costs the firm \$180,000 of potential cash inflows.

P11-6. Personal finance: Sunk and opportunity cash flows

LG 2; Intermediate

- a. The sunk costs or cash outlays are expenditures that have been made in the past and have no effect on the cash flows relevant to a current situation. The cash outlays done before David and Ann decided to rent out their home would be classified as sunk costs. An opportunity cost or cash flow is one that can be realized from an alternative use of an existing asset. Here, David and Ann have decided to rent out their home, and all the costs associated with getting the home in “rentable” condition would be relevant.
- b. Sunk costs (cash flows):
 - Replace water heater
 - Replace dish washer
 - Miscellaneous repairs and maintenance
 Opportunity costs cash flows:
 - Rental income
 - Advertising
 - House paint and power wash

P11-7. Book value

LG 3; Basic

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

P11-8. Book value and taxes on sale of assets

LG 3, 4; Intermediate

- a. Book value = \$80,000 – (0.71 × \$80,000)
= \$23,200

b.

Sale Price	Capital Gain	Tax on Capital Gain	Depreciation Recovery	Tax on Recovery	Total Tax
\$100,000	\$20,000	\$8,000	\$56,800	\$22,720	\$30,720
56,000	0	0	32,800	13,120	13,120
23,200	0	0	0	0	0
15,000	0	0	(8,200)	(3,280)	(3,280)

P11-9. Tax calculations

LG 3, 4; Intermediate

Current book value = \$200,000 – [(0.52 × (\$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)

P11-10. Change in net working capital calculation

LG 3; Basic

a.

Current Assets		Current Liabilities	
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.

P11-11. Calculating initial investment

LG 3, 4; Intermediate

a. Book value = \$325,000 × (1 – 0.20 – 0.32) = \$325,000 × 0.48 = \$156,000

b. Sales price of old equipment \$200,000

Book value of old equipment 156,000

 Recapture of depreciation \$ 44,000

Taxes on recapture of depreciation = \$44,000 × 0.40 = \$17,600

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

c. Cost of new machine \$ 500,000

Less sales price of old machine (200,000)

Plus tax on recapture of depreciation 17,600

 Initial investment \$ 317,600

P11-12. Initial investment—basic calculation

LG 3, 4; Intermediate

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 \$22,680

Book value of existing machine = $\$20,000 \times (1 - (0.20 + 0.32 + 0.19)) = \$5,800$

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

Capital gain = $\$25,000 - \$20,000 = \$5,000$

Tax on recaptured depreciation = $\$14,200 \times (0.40) = \$5,680$

Tax on capital gain = $\$5,000 \times (0.40) = \underline{2,000}$

Total tax = \$7,680

P11-13. Initial investment at various sale prices

LG 3, 4; Intermediate

	(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

Book value of existing machine = $\$10,000 \times [1 - (0.20 + 0.32 + 0.19)] = \$2,900$

* Tax Calculations:

- a. Recaptured depreciation = $\$10,000 - \$2,900 = \$7,100$
 Capital gain = $\$11,000 - \$10,000 = \$1,000$
 Tax on ordinary gain = $\$7,100 \times (0.40) = \$2,840$
 Tax on capital gain = $\$1,000 \times (0.40) = \underline{400}$
 Total tax = \$3,240
- b. Recaptured depreciation = $\$7,000 - \$2,900 = \$4,100$
 Tax on ordinary gain = $\$4,100 \times (0.40) = \$1,640$
- c. 0 tax liability

CAPITAL BUDGETING PROBLEMS: CHAPTER 11

d. Loss on sale of existing asset = $\$1,500 - \$2,900 = (\$1,400)$
 Tax benefit = $-\$1,400 \times (0.40) = \560

P11-14. Calculating initial investment

LG 3, 4; Challenge

a.	Book value = $(\$60,000 \times 0.31) = \$18,600$	
b.	Sales price of old equipment	\$35,000
	Book value of old equipment	<u>18,600</u>
	Recapture of depreciation	\$16,400
	Taxes on recapture of depreciation = $\$16,400 \times 0.40 = \$6,560$	
	Sale price of old roaster	\$35,000
	Tax on recapture of depreciation	<u>(6,560)</u>
	After-tax proceeds from sale of old roaster	\$28,440
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 payable <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	-28,440
	Plus change in net working capital	<u>85,000</u>
	Initial investment	<u>\$186,560</u>

P11-15. Depreciation

LG 5; Basic

Depreciation Schedule	
Year	Depreciation Expense
1	$\$68,000 \times 0.20 = \$13,600$
2	$68,000 \times 0.32 = 21,760$
3	$68,000 \times 0.19 = 12,920$
4	$68,000 \times 0.12 = 8,160$
5	$68,000 \times 0.12 = 8,160$
6	$68,000 \times 0.05 = 3,400$

P11-16. Incremental operating cash inflows

LG 5; Intermediate

- a. Incremental profits before depreciation and tax = \$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	128,000	32,000	136,000	192,000	192,000	248,000
NPAT	192,000	48,000	204,000	288,000	288,000	372,000

c.

Cash flow	(1)	(2)	(3)	(4)	(5)	(6)
	\$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

P11-17. Personal finance: Incremental operating cash inflows

LG 5; Challenge

**Richard and Linda Thomson
Incremental Operating Cash Flows
Replacement of John Deere Riding Mower**

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Savings from new and improved mower	\$500	\$ 500	\$500	\$500	\$500	—
Annual maintenance cost	120	120	120	120	120	0
Depreciation*	<u>360</u>	<u>576</u>	<u>342</u>	<u>216</u>	<u>216</u>	<u>90</u>
Savings (loss) before taxes	20	(196)	38	164	164	(90)
Taxes (40%)	<u>8</u>	<u>(78)</u>	<u>15</u>	<u>66</u>	<u>66</u>	<u>(36)</u>
Savings (loss) after taxes	12	(118)	23	98	98	(54)
Depreciation	<u>360</u>	<u>576</u>	<u>342</u>	<u>216</u>	<u>216</u>	<u>90</u>
Incremental operating cash flow	<u>\$372</u>	<u>\$ 458</u>	<u>\$365</u>	<u>\$314</u>	<u>\$314</u>	<u>\$ 36</u>

*MACRS Depreciation Schedule

Year	Base	MACRS	Depreciation
Year 1	\$1,800	20.0%	\$360
Year 2	1,800	32.0%	576
Year 3	1,800	19.0%	342
Year 4	1,800	12.0%	216
Year 5	1,800	12.0%	216
Year 6	1,800	5.0%	90

P11-18. Incremental operating cash inflows—expense reduction

LG 5; Intermediate

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	2,560	256	2,752	4,096	4,096	-960
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.

P11-19. Incremental operating cash inflows

LG 5; Intermediate

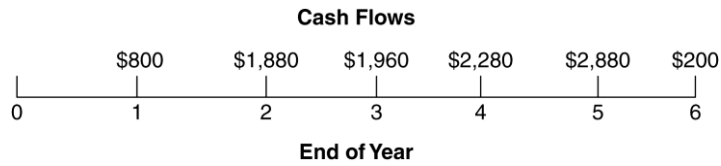
a.

Year	Revenue	Expenses (excluding depreciation and interest)	Profits before Depreciation and Taxes	Depreciation	Net Profits before Taxes	Taxes	Net Profits after Tax	Operating Cash Inflows
New Lathe								
1	\$40,000	\$30,000	\$10,000	\$2,000	\$8,000	\$3,200	\$4,800	\$6,800
2	41,000	30,000	11,000	3,200	7,800	3,120	4,680	7,880
3	42,000	30,000	12,000	1,900	10,100	4,040	6,060	7,960
4	43,000	30,000	13,000	1,200	11,800	4,720	7,080	8,280
5	44,000	30,000	14,000	1,200	12,800	5,120	7,680	8,880
6	0	0	0	500	(500)	(200)	(300)	200
Old Lathe								
1-5	\$35,000	\$25,000	\$10,000	0	\$10,000	\$4,000	\$6,000	\$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.



P11-20. Determining incremental operating cash flows

LG 5; Intermediate

	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						
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>

P11-21. Terminal cash flows—various lives and sale prices

LG 6; Challenge

a.

After-tax proceeds from sale of new asset =	3-Year*	5-Year*	7-Year*
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>
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	\$56,880	\$39,600	\$36,000

CAPITAL BUDGETING PROBLEMS: CHAPTER 11

- *1. Book value of asset = $[1 - (0.20 + 0.32 + 0.19)] \times \$180,000 = \$52,200$
 Proceeds from sale = \$10,000
 $\$10,000 - \$52,200 = (\$42,200)$ loss
 $\$42,200 \times (0.40) = \$16,880$ tax benefit
2. Book value of asset = $[1 - (0.20 + 0.32 + 0.19 + 0.12 + 0.12)] \times \$180,000 = \$9,000$
 $\$10,000 - \$9,000 = \$1,000$ recaptured depreciation
 $\$1,000 \times (0.40) = \400 tax liability
3. Book value of asset = \$0
 $\$10,000 - \$0 = \$10,000$ recaptured depreciation
 $\$10,000 \times (0.40) = \$4,000$ 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.

c.

	(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 = $\$180,000 \times 0.05 = \$9,000$; 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.

P11-22. Terminal cash flow—replacement decision

LG 6; Challenge

After-tax proceeds from sale of new asset =	
Proceeds from sale of new machine	\$75,000
– Tax on sale of new machine ¹	<u>(14,360)</u>
Total after-tax proceeds—new asset	\$60,640
– After-tax proceeds from sale of old asset	
Proceeds from sale of old machine	(15,000)
+ Tax on sale of old machine ²	<u>6,000</u>
Total after-tax proceeds—old asset	(9,000)
+ Change in net working capital	<u>25,000</u>
Terminal cash flow	<u>\$76,640</u>

¹ Book value of new machine at end of year 4:

$$[1 - (0.20 + 0.32 + 0.19 + 0.12) \times (\$230,000)] = \$39,100$$

$$\$75,000 - \$39,100 = \$35,900 \text{ recaptured depreciation}$$

$$\$35,900 \times (0.40) = \$14,360 \text{ tax liability}$$

² Book value of old machine at end of year 4:

$$\$0$$

$$\$15,000 - \$0 = \$15,000 \text{ recaptured depreciation}$$

$$\$15,000 \times (0.40) = \$6,000 \text{ tax benefit}$$

P11-23. Relevant cash flows for a marketing campaign

LG 3, 4, 5, 6; Challenge

Marcus Tube					
Calculation of Relevant Cash Flow					
(\$000)					
Calculation of Net Profits after Taxes and Operating Cash Flow:					
with Marketing Campaign					
	2013	2014	2015	2016	2017
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 2013–2017

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

Relevant Cash Flow

(\$000)

Year	With Marketing Campaign	Without Marketing Campaign	Incremental Cash Flow
2013	\$1,340	\$1,400	\$(60)
2014	1,370	1,400	(30)
2015	1,400	1,400	0
2016	1,460	1,400	60
2017	1,520	1,400	120

P11-24. Relevant cash flows—no terminal value

LG 3, 4, 5; Challenge

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

$[1 - (0.20 + 0.32 + 0.19)] \times \$50,000$	= \$14,500	
$\$55,000 - \$14,500$	= \$40,500	gain on asset
$\$35,500 \text{ recaptured depreciation} \times 0.40$	= \$14,200	
$\$5,000 \text{ capital gain} \times 0.40$	= <u>2,000</u>	
Total tax on sale of asset	= <u>\$16,200</u>	

b.

Calculation of Operating Cash Flow						
Year	(1)	(2)	(3)	(4)	(5)	(6)
Old Machine						
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	<u>0</u>
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	6,000	6,000	2,500	0	0	0
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						
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>
Incremental						
After-tax						
cash flows	\$13,600	\$16,240	\$11,080	\$11,040	\$13,440	\$1,600

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

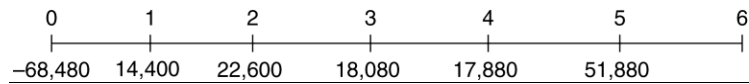
c. Terminal cash flow:

After-tax proceeds from sale of new asset =	
Proceeds from sale of new asset	\$29,000
– Tax on sale of new asset*	<u>(9,400)</u>
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
 $\$23,500 \times 0.40 = \$9,400$

d. Year 5 relevant cash flow:

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



P11-26. Personal finance: Determining relevant cash flows for a cash budget

LG 3, 4, 5, 6; Challenge

Jan and Deana Cash Flow Budget Purchase of Boat					
a. Initial investment					
Total cost of new boat					
				\$(70,000)	
Add: Taxes (6.5%)				<u>(4,550)</u>	
Initial investment				\$(74,550)	
b. Operating cash flows					
		<u>Year 1</u>	<u>Year 2</u>	<u>Year 3</u>	<u>Year 4</u>
Maint. & repair	12 months at \$800	\$(9,600)	\$(9,600)	\$(9,600)	\$(9,600)
Docking fees	12 months at \$500	<u>\$(6,000)</u>	<u>\$(6,000)</u>	<u>\$(6,000)</u>	<u>\$(6,000)</u>
Operating cash flows		\$(15,600)	\$(15,600)	\$(15,600)	\$(15,600)
c. Terminal cash flow—end of year 4					
Proceeds from the sale of boat				\$40,000	
d. Summary of cash flows					
		<u>Cash Flow</u>			
Year zero		\$(74,550)			
End of year 1		\$(15,600)			
End of year 2		\$(15,600)			
End of year 3		\$(15,600)			
End of year 4		\$24,400			
e. The ownership of the boat is virtually just an annual outflow of money. Across the four years, \$96,950 will be spent in excess of the anticipated sales price in year 4. Over the same time period, the disposable income is only \$96,000. Consequently, if the costs exceed the expected disposable income. If cash flows were adjusted for their timing, and noting that the proceeds from the sale of the new boat comes in first at the end of year 4, Jan and Deana are in a position where they will have to increase their disposable income in order to accommodate boat ownership. If a loan is needed, the monthly interest payment would be another burden. However, there is no attempt here to measure satisfaction of ownership.					

P11-27. Integrative—determining relevant cash flows

LG 3, 4, 5, 6; Challenge

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: $[1 - (0.20 + 0.32 + 0.19)] \times (\$32,000) = \$9,280$

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
Hoist A						
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
Hoist 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
Existing Hoist						
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
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 Hoist A	Cash Flow 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

CAPITAL BUDGETING PROBLEMS: CHAPTER 11

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 ¹	<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 ²	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>

¹ Book value of Hoist A at end of year 5 = \$2,400
 $\$12,000 - \$2,400 = \$9,600$ recaptured depreciation
 $\$9,600 \times 0.40 = \$3,840$ tax
 Book value of Hoist B at end of year 5 = \$3,000
 $\$20,000 - \$3,000 = \$17,000$ recaptured depreciation
 $\$17,000 \times 0.40 = \$6,800$ tax

² Book value of existing hoist at end of year 5 = \$0
 $\$1,000 - \$0 = \$1,000$ recaptured depreciation
 $\$1,000 \times 0.40 = \400 tax

Year 5 relevant cash flow—Hoist A:

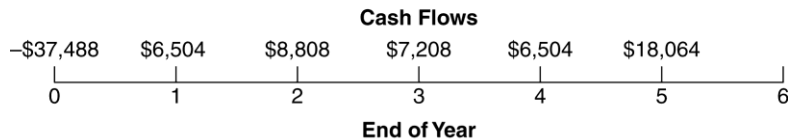
Operating cash flow	\$ 6,504
Terminal cash flow	<u>11,560</u>
Total inflow	\$18,064

Year 5 relevant cash flow—Hoist B:

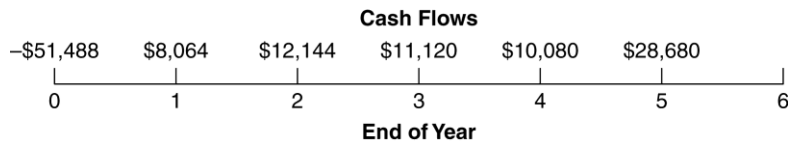
Operating cash flow	\$10,080
Terminal cash flow	<u>18,600</u>
Total inflow	\$28,680

d.

Hoist A



Hoist B



P11-28. Integrative—complete investment decision

LG 1, 2, 3, 4, 5, 6; Challenge

a. Initial investment:

Installed cost of new press =		
Cost of new press		\$2,200,000
– After-tax proceeds from sale of old asset		
Proceeds from sale of existing press	(1,200,000)	
+ Taxes on sale of existing press*	<u>480,000</u>	
Total after-tax proceeds from sale		<u>(720,000)</u>
Initial investment		<u><u>\$1,480,000</u></u>

* Book value = \$0
 \$1,200,000 – \$0 = \$1,200,000 income from sale of existing press
 \$1,200,000 income from sale × (0.40) = \$480,000

b.

Calculation of Operating Cash Flows							
Year	Revenues	Expenses	Depreciation	Net Profits before Taxes	Taxes	Net Profits after Taxes	Cash Flow
1	\$1,600,000	\$800,000	\$440,000	\$360,000	\$144,000	\$216,000	\$656,000
2	1,600,000	800,000	704,000	96,000	38,400	57,600	761,600
3	1,600,000	800,000	418,000	382,000	152,800	229,200	647,200
4	1,600,000	800,000	264,000	536,000	214,400	321,600	585,600
5	1,600,000	800,000	264,000	536,000	214,400	321,600	585,600
6	0	0	110,000	–110,000	–44,000	–66,000	44,000

c. Payback period = 2 years + (\$62,400 ÷ \$647,200) = 2.1 years

d. *PV* of cash inflows:

CF₀ = –\$1,480,000, CF₁ = \$656,000, CF₂ = \$761,600, CF₃ = \$647,200,
 CF₄ = \$585,600, CF₅ = 585,600, CF₆ = \$44,000
 Set I = 11
 Solve for NPV = \$959,152

Year	CF	PVIF_{11%,n}	PV
1	\$656,000	0.901	\$ 591,056
2	761,600	0.812	618,419
3	647,200	0.731	473,103
4	585,600	0.659	385,910
5	585,600	0.593	347,261
6	44,000	0.535	<u>23,540</u>
			<u>\$2,439,289</u>

$$\$0 = \frac{\$656,000}{(1 + \text{IRR})^1} + \frac{\$761,600}{(1 + \text{IRR})^2} + \frac{\$647,200}{(1 + \text{IRR})^3} + \frac{\$585,600}{(1 + \text{IRR})^4} + \frac{\$585,600}{(1 + \text{IRR})^5} + \frac{\$44,000}{(1 + \text{IRR})^6} - \$1,480,000$$

IRR = 35%

Calculator solution: 35.04%

- e. The NPV is a positive \$959,289 and the IRR of 35% is well above the cost of capital of 11%. Based on both decision criteria, the project should be accepted.

P11-29. Integrative—investment decision

LG 1, 2, 3, 4, 5, 6; Challenge

- a. Initial investment:

Installed cost of new asset =	
Cost of the new machine	\$1,200,000
+ Installation costs	<u>150,000</u>
Total cost of new machine	\$1,350,000
– After-tax proceeds from sale of old asset =	
Proceeds from sale of existing machine	(185,000)
– Tax on sale of existing machine*	<u>(79,600)</u>
Total after-tax proceeds from sale	(264,600)
+ Increase in net working capital	<u>25,000</u>
Initial investment	<u>\$1,110,400</u>

*Book value = \$384,000

\$185,000 – \$384,000 = \$199,000 loss from sale of existing press

\$199,000 loss from sale × (0.40) = \$79,600

**Calculation of Operating Cash Flows
New Machine**

Year	Reduction in Operating Costs	Depreciation	Net Profits before Taxes	Taxes	Net Profits after Taxes	Cash Flow
1	\$350,000	\$270,000	\$80,000	\$32,000	\$48,000	\$318,000
2	350,000	432,000	–82,000	–32,800	–49,200	382,800
3	350,000	256,500	93,500	37,400	56,100	312,600
4	350,000	162,000	188,000	75,200	112,800	274,800
5	350,000	162,000	188,000	75,200	112,800	274,800
6	0	67,500	–67,500	–27,000	–40,500	27,000

Existing Machine					
Year	Depreciation	Net Profits before Taxes	Taxes	Net Profits after Taxes	Cash Flow
1	\$152,000	-\$152,000	-\$60,800	\$91,200	\$60,800
2	96,000	-96,000	-38,400	-57,600	38,400
3	96,000	-96,000	-38,400	-57,600	38,400
4	40,000	-40,000	-16,000	-24,000	16,000
5	0	0	0	0	0
6	0	0	0	0	0

Incremental Operating Cash Flows			
Year	New Machine	Existing Machine	Incremental Cash Flow
1	\$318,000	\$60,800	\$257,200
2	382,800	38,400	344,400
3	312,600	38,400	274,200
4	274,800	16,000	258,800
5	274,800	0	274,800
6	27,000	0	27,000

Terminal cash flow:

After-tax proceeds from sale of new asset =	
Proceeds from sale of new asset	\$200,000
– Tax on sale of new asset*	<u>(53,000)</u>
Total proceeds—sale of new asset	\$147,000
– After-tax proceeds from sale of old asset	0
+ Change in net working capital	<u>25,000</u>
Terminal cash flow	<u>\$172,000</u>

*Book value of new machine at the end of year 5 is \$67,500

200,000 – \$67,500 = \$132,500 income from sale of old machine

132,500 × 0.40 = \$53,000 tax liability

- b. $CF_0 = -\$1,110,400$, $CF_1 = 257,200$, $CF_2 = 344,400$, $CF_3 = 274,200$,
 $CF_4 = 258,800$, $CF_5 = 274,800 + 172,000 = 446,800$

Set $I = 9\%$

Solve for NPV = \$100,900.39

c.
$$\$0 = \frac{\$257,200}{(1 + IRR)^1} + \frac{\$344,400}{(1 + IRR)^2} + \frac{\$274,200}{(1 + IRR)^3} + \frac{\$258,800}{(1 + IRR)^4} + \frac{\$446,800}{(1 + IRR)^5} - \$1,110,400$$

IRR = 12.2%

Calculator solution: 12.24%

- d. Since the NPV > 0 and the IRR > cost of capital, the new machine should be purchased.
 e. 12.24%. The criterion is that the IRR must equal or exceed the cost of capital; therefore, 12.24% is the lowest acceptable IRR.

P11-30. Ethics problem

LG 2; Intermediate

The person who came up with the idea for a new investment may have a selfish interest in seeing the project approved, or may simply be emotionally vested in the project. In either case, this individual may have an incentive to make overly optimistic cash flow projections. It is best to have an objective third party be responsible for cash flow projections.