CHAPTER 26

Incremental Analysis and Capital Budgeting

ASSIGNMENT CLASSIFICATION TABLE

Study Objectives	Questions	Brief Exercises	Exercises	A Problems	B Problems
1. Identify the steps in management's decision-making process.	1, 2	1	1		
2. Describe the concept of incremental analysis.	3, 4	2	1		
3. Identify the relevant costs in accepting an order at a special price.	5	3	2, 3	1A	1B
4. Identify the relevant costs in a make-or-buy decision.	6, 7	4	4	2A	2B
5. Give the decision rule for whether to sell or process materials further.	8	5	5, 6		
6. Identify the factors to consider in retaining or replacing equipment.	9	6	7		
7. Explain the relevant factors in whether to eliminate an unprofitable segment.	10	7	8, 9	3A	3B
8. Determine which products to make and sell when resources are limited.	11	8	10		
9. Contrast annual rate of return and cash payback in capital budgeting.	12, 13, 14, 15, 16	9, 10	11, 12, 13	4A, 5A	4B, 5B

ASSIGNMENT CLASSIFICATION TABLE (Continued)

Study Objectives	Questions	Brief Exercises	Exercises	A Problems	B Problems
10. Distinguish between the net present value and internal rate of return methods.	17, 18, 19, 20	11, 12, 13	12, 13, 14, 15	4A, 5A, 6A	4B, 5B, 6B

ASSIGNMENT CHARACTERISTICS TABLE

Problem Number	Description	Difficulty Level	Time Allotted (min.)
1A	Make incremental analysis for special order, and identify nonfinancial factors in decision.	Simple	20–30
2A	Make incremental analysis related to make or buy; consider opportunity cost, and identify nonfinancial factors.	Moderate	30–40
3A	Compute contribution margin, and prepare incremental analysis concerning elimination of divisions.	Moderate	30–40
4A	Compute annual rate of return, cash payback, and net present value.	Moderate	30–40
5A	Compute annual rate of return, cash payback, and net present value.	Complex	30–40
6A	Compute net present value and internal rate of return.	Moderate	20–30
1B	Make incremental analysis for special order, and identify nonfinancial factors in decision.	Simple	20–30
2B	Make incremental analysis related to make or buy; consider opportunity cost, and identify nonfinancial factors.	Moderate	30–40
3B	Compute contribution margin, and prepare incremental analysis concerning elimination of divisions.	Moderate	30–40
4B	Compute annual rate of return, cash payback, and net present value.	Moderate	30–40
5B	Compute annual rate of return, cash payback, and net Present value.	Complex	30–40
6B	Compute net present value and internal rate of return.	Moderate	20–30

Correlation Chart between Bloom's Taxonomy, Study Objectives and End-of-Chapter Exercises and Problems

Study Objective	Knowledge	Comprehension	Application	Analysis	Synthesis	Evaluation
1. Identify the steps in management's decision-making process.	BE26-1	Q26-1 E26-1 Q26-2				
2. Describe the concept of incremental analysis.		Q26-3 E26-1 Q26-4		BE26-2		
3. Identify the relevant costs in accepting an order at a special price.		Q26-5		BE26-3		E26-2 P26-1A E26-3 P26-1B
4. Identify the relevant costs in a make-or-buy decision.		Q26-6 Q26-7		BE26-4		E26-4 P26-2B P26-2A
5. Give the decision rule for whether to sell or process materials further.	Q26-8			BE26-5		E26-5 E26-6
6. Identify the factors to consider in retaining or replacing equipment.		Q26-9		BE26-6		E26-7
7. Explain the relevant factors in whether to eliminate an unprofitable segment.		Q26-10		BE26-7		E26-8 P26-3A E26-9 P26-3B
8. Determine which products to make and sell when resources are limited.	Q26-11		BE26-8			E26-10
9. Contrast annual rate of return and cash payback in capital budgeting.	Q26-13	Q26-12 Q26-16 Q26-14 Q26-15	BE26-9 E26-13 BE26-10 E26-11			E26-12 P26-4B P26-4A P26-5B P26-5A
10. Distinguish between the net present value and internal rate of return methods.	Q26-18 Q26-19 Q26-20	Q26-17	BE26-12 E26-13			BE26-11 P26-5A BE26-13 P26-6A E26-12 P26-4B E26-14 P26-5B E26-15 P26-6B P26-4A
Broadening Your Perspective			Exploring the Web Decision Making Across the Organization	Decision Making Across the Organization Real-World Focus	All About You Activity	Managerial Analysis Decision Making Across the Organization Communication Ethics Case

ANSWERS TO QUESTIONS

1. The following steps are frequently involved in management's decision-making process:
(a) Identify the problem and assign responsibility.
(b) Determine and evaluate possible courses of action.
(c) Make a decision.
(d) Review results of the decision.

2. Your roommate is incorrect. Accounting contributes to the decision-making process at only two points: (1) prior to the decision, accounting provides relevant revenue and cost data for each course of action, and (2) following the decision, internal reports are prepared to show the actual effect of the decision on net income.

3. Disagree. Incremental analysis involves the identification of financial data that change under alternative courses of action.

4. In incremental analysis, the important point to consider is whether costs will differ (change) between the two alternatives. As a result, (1) variable costs may change under the alternative courses of action and (2) fixed costs may not change.

5. The relevant data in deciding whether to accept an order at a special price are the incremental revenues to be obtained compared to the incremental costs of filling the special order.

6. The manufacturing costs that are relevant in the make-or-buy decision are those that will change if the parts are purchased.

7. Opportunity cost may be defined as the potential benefit that may be obtained by following an alternative course of action. Opportunity cost is relevant in a make-or-buy decision when the facilities used to make the part can be used to generate additional income.

8. The decision rule in a decision to sell a product or to process it further is: Process further as long as the incremental revenue from the additional processing exceeds the incremental processing costs.

9. A sunk cost is a cost that cannot be changed by any present or future decision. Sunk costs, therefore, are not relevant in a decision to retain or replace equipment.

10. Net income will be lower if an unprofitable product line is eliminated when the product line is producing a positive contribution margin and its fixed costs cannot be avoided or reduced.

11. Contribution margin per unit of limited resource is determined by dividing the contribution margin per unit of the product by the number of units of the limited resource required to produce one unit of the product.

12. The screening of proposed capital expenditures may be done by a capital budgeting committee which submits its findings to the officers of the company. The officers, in turn, select the projects they believe to be the most worthy of funding and submit them to the board of directors. The directors ultimately approve the capital expenditure budget for the year.

13. The formula for the annual rate of return technique is: Annual net income ÷ average investment.

14. Cost of capital is the rate of return that management expects to pay on all borrowed and equity funds. The decision rule is: A project is acceptable if its rate of return is greater than or equal to management's minimum rate of return (which often is its cost of capital), and the project is unacceptable when the rate of return is less than the minimum rate of return.

15. Pete is not correct. The formula for the cash payback technique is: Cost of the capital investment ÷ net annual cash flows. The formula for the annual rate of return is: Expected annual net income ÷ average investment.

16. The cash payback technique is relatively easy to compute and understand. However, it should not ordinarily be the only basis for the capital budgeting decision because it ignores the profitability of the investment and the time value of money.

17. The two tables are:
(1) Table 1 is the present value of a single future amount. This table is used when a project has uneven cash payments over its useful life.
(2) Table 2 is the present value of a series of future cash flows. This table is used when a project has equal cash payments occurring at equal intervals of time over its useful life.

18. The decision rule is: Accept the project when net present value is zero or positive; reject the project when net present value is negative.

19. The steps are:
(a) Compute the rate of return factor by dividing Capital Investment by Net Annual Cash Flows.
(b) Use the factor and the present value of an annuity of 1 table to find the internal rate of return.

20. Under the internal rate of return method, the objective is to find the rate that will make the present value of the expected annual cash inflows equal the present value of the proposed capital expenditure. The decision rule under the internal rate of return method is: Accept the project when the internal rate of return is equal to or greater than the required rate of return, and reject the project when the internal rate of return is less than the required rate.

SOLUTIONS TO BRIEF EXERCISES

BRIEF EXERCISE 26-1

The correct order is:

1. **Identify the problem and assign responsibility.**
2. **Determine and evaluate possible courses of action.**
3. **Make a decision.**
4. **Review results of the decision.**

BRIEF EXERCISE 26-2

	Alternative A	Alternative B	Net Income Increase (Decrease)
Sales	$150,000	$180,000	$ 30,000
Costs	100,000	120,000	(20,000)
Net income	$ 50,000	$ 60,000	$ 10,000

Alternative B is better than Alternative A.

BRIEF EXERCISE 26-3

	Reject Order	Accept Order	Net Income Increase (Decrease)
Revenues	$0	$92,000	$ 92,000
Costs—Variable manufacturing	0	80,000	(80,000)
Shipping	0	4,000	(4,000)
Net income	$0	$ 8,000	$ 8,000

The special order should be accepted.

BRIEF EXERCISE 26-4

	Make	Buy	Net Income Increase (Decrease)
Variable manufacturing costs	$50,000	$ 0	$ 50,000
Fixed manufacturing costs	30,000	30,000	0
Purchase price		53,000	(53,000)
Total annual cost	$80,000	$83,000	$ (3,000)

The decision should be to continue to make the part.

BRIEF EXERCISE 26-5

	Sell	Process Further	Net Income Increase (Decrease)
Sales per unit	$60.00	$72.00	$ 12.00
Cost per unit			
Variable	30.00	38.00	(8.00)
Fixed	10.00	10.00	0
Total	40.00	48.00	(8.00)
Net income per unit	$20.00	$24.00	$ 4.00

The bookcases should be processed further because the incremental revenues exceed incremental costs by $4.00 per unit.

BRIEF EXERCISE 26-6

	Retain Equipment	Replace Equipment	Net 4-Year Income Increase (Decrease)
Variable manufacturing costs	$2,400,000	$1,760,000	$ 640,000*
New machine cost		200,000	(200,000)
Total	$2,400,000	$1,960,000	$ 440,000

***$160,000 X 4**

The old factory machine should be replaced.

BRIEF EXERCISE 26-7

	Continue	Eliminate	Net Income Increase (Decrease)
Sales	$200,000	0	$(200,000)
Variable expenses	180,000	0	180,000
Contribution margin	20,000	0	(20,000)
Fixed expenses	40,000	$ 34,000	6,000
Net income	$ (20,000)	$(34,000)	$ (14,000)

The Eagle product line should be continued because $20,000 of contribution margin will not be realized if the line is eliminated. This sum is greater than the $6,000 saving of fixed costs.

BRIEF EXERCISE 26-8

	Product A	Product B
Contribution margin per unit (a)	$11	$12
Machine hours required (b)	2	2.5
Contribution margin per unit of limited resource [(a) ÷ (b)]	$5.50	$4.80

BRIEF EXERCISE 26-9

$300,000 ÷ ($10,000 + $30,000) = 7.5 years

BRIEF EXERCISE 26-10

The annual rate of return is calculated by dividing expected annual income by the average investment. The company's expected annual income is:

$130,000 – $80,000 = $50,000

Its average investment is:

$$\frac{\$490,000 + \$10,000}{2} = \$250,000$$

Therefore, its annual rate of return is:

$50,000/$250,000 = 20%

BRIEF EXERCISE 26-11

Project A

	Cash Flows	X	9% Discount Factor	=	Present Value
Present value of net annual cash flows	$70,000	X	6.41766	=	$449,236
Capital investment					395,000
Net present value					$ 54,236

Project B

	Cash Flows	X	9% Discount Factor	=	Present Value
Present value of net annual cash flows	$50,000	X	6.41766	=	$320,883
Capital investment					270,000
Net present value					$ 50,883

Since Project A has a higher net present value than Project B, it should be selected.

BRIEF EXERCISE 26-12

When net annual cash flows are expected to be equal, the internal rate of return can be approximated by dividing the capital investment by the net annual cash flows to determine the discount factor, and then locating this discount factor on the present value of an annuity table.

$170,000/$33,740 = 5.03853

By tracing across on the 7-year row we see that the discount factor for 9% is 5.03295. Thus, the internal rate of return on this project is approximately 9%.

BRIEF EXERCISE 26-13

	Present Value
Net annual cash flows – $34,000 X 6.71	$228,140
Capital investment $225,000 X 1.00	225,000
Positive net present value	$ 3,140

The investment should be made because net present value is positive.

SOLUTIONS TO EXERCISES

EXERCISE 26-1

1. False. The first step in management's decision-making process is *"identify the problem and assign responsibility"*.
2. False. The final step in management's decision-making process is to *review the results of the decision*.
3. True.
4. False. In making business decisions, management ordinarily considers *both* financial *and nonfinancial* information.
5. True.
6. True.
7. False. Costs that are the same under all alternative courses of action *do not* affect the decision.
8. False. When using incremental analysis, *either* costs or *revenues or both* will change under alternative courses of action.
9. False. Sometimes variable costs will *not* change under alternative courses of action, but fixed costs *will*.

EXERCISE 26-2

(a)

	Reject Order	Accept Order		Net Income Increase (Decrease)
Revenues (40,000 X $6.00)	$0	$240,000		$ 240,000
Cost of goods sold	0	168,000	(1)	(168,000)
Operating expenses	0	62,000	(2)	(62,000)
Net income	$0	$ 10,000		$ 10,000

(1) Variable cost of goods sold = $2,400,000 X 70% = $1,680,000.
Variable cost of goods sold per unit = $1,680,000 ÷ 400,000 = $4.20.
Variable cost of goods sold for the special order = $4.20 X 40,000 = $168,000.

(2) Variable operating expenses = $900,000 X 60% = $540,000;
$540,000 ÷ 400,000 = $1.35 per unit;
40,000 X $1.35 = $54,000;
$54,000 + $8,000 = $62,000.

(b) As shown in the incremental analysis, Wyco Company should accept the special order because incremental revenues exceed incremental expenses by $10,000.

EXERCISE 26-3

(a)

	Reject Order	Accept Order	Net Income Effect
Revenues	$ -0-	$23,750	$23,750
Materials ($0.50)	-0-	(2,500)	(2,500)
Labor ($1.50)	-0-	(7,500)	(7,500)
Variable overhead ($1.00)	-0-	(5,000)	(5,000)
Fixed overhead	-0-	(5,000)	(5,000)
Sales commissions	-0-	-0-	-0-
Net income	$ -0-	$ 3,750	$ 3,750

(b) As shown in the incremental analysis, Innova should accept the special order because incremental revenue exceeds incremental expenses by $3,750.

(c) It is assumed that sales of the golf disc in other markets would not be affected by this special order. If other sales were affected. Innova would have to consider the lost sales in making the decision. Second, if Innova is operating at full capacity, it is likely that the special order would be rejected.

EXERCISE 26-4

(a)

	Make	Buy	Net Income Increase (Decrease)
Direct materials (40,000 X $4.00)	$160,000	$ 0	$ 160,000
Direct labor (40,000 X $6.00)	240,000	0	240,000
Variable manufacturing costs ($240,000 X 50%)	120,000	0	120,000
Fixed manufacturing costs	40,000	40,000	0
Purchase price (40,000 X $13.50)	0	540,000	(540,000)
Total annual cost	$560,000	$580,000	$ (20,000)

EXERCISE 26-4 (Continued)

(b) No, Shannon Inc. should not purchase the lamps. As indicated by the incremental analysis, it would cost the company $20,000 more to purchase the lamps.

(c) Yes, by purchasing the lamp shades, a total cost saving of $15,000 will result as shown below.

	Make	Buy	Net Income Increase (Decrease)
Total annual cost (above)	$560,000	$580,000	$(20,000)
Opportunity cost	35,000	0	35,000
Total cost	$595,000	$580,000	$ 15,000

EXERCISE 26-5

	Sell (Basic Kit)	Process Further (Stage 2 Kit)	Net Income Increase (Decrease)
Sales per unit	$27.00	$33.00	$ 6.00
Costs per unit			
Direct materials	$12.00	$ 6.00 (1)	$ 6.00
Direct labor	0	9.00 (2)	(9.00)
Total	$12.00	$15.00	$(3.00)
Net income per unit	$15.00	$18.00	$ 3.00

(1) The cost of materials decreases because Stacy can make two Stage 2 Kits from the materials for a basic kit.

(2) The total time to make the two kits is one hour at $18 per hour or $9 per unit.

Stacy should carry the Stage 2 Kits. The incremental revenue, $6.00, exceeds the incremental processing costs, $3.00. Thus, net income will increase by processing the kits further.

EXERCISE 26-6

(a)

	Sell	Process Further	Net Income Increase (Decrease)
Sales per unit	$400	$450	$ 50
Costs per unit			
Materials	150	155	(5)
Labor	70	90	(20)
Variable overhead (70%)	49	63	(14)
Fixed overhead	21	21	-0-
Total	$290	329	(39)
Net income per unit	$110	$121	$ 11

(b) As shown in the incremental analysis, Donkey Bikes should process further (rather than sell unassembled) because incremental revenue exceeds incremental expenses by $11 per unit.

EXERCISE 26-7

	Retain Machine	Replace Machine	Net Income Increase (Decrease)
Operating costs	$120,000 (1)	$100,000 (2)	$ 20,000
New machine cost (Depr.)	0	21,000	(21,000)
Salvage value (old)	0	(5,000)	5,000
Total	$120,000	$116,000	$ 4,000

(1) $24,000 X 5.
(2) $20,000 X 5.

The current machine should be replaced. The incremental analysis shows that net income for the five-year period will be $4,000 higher by replacing the current machine.

EXERCISE 26-8

	Continue	Eliminate	Net Income Increase (Decrease)
Sales	$ 98,200	$ 0	$(98,200)
Variable expenses			
Cost of goods sold	56,000	0	56,000
Operating expenses	12,000	0	12,000
Total variable	68,000	0	68,000
Contribution margin	30,200	0	(30,200)
Fixed expenses			
Cost of goods sold	20,470	20,470	0
Operating expenses	26,600	26,600	0
Total fixed	47,070	47,070	0
Net income (loss)	$(16,870)	$(47,070)	$(30,200)

Judy is incorrect. The incremental analysis shows that net income will be $30,200 less if the Ketchum Division is eliminated. This amount equals the contribution margin that would be lost by discontinuing the division.

EXERCISE 26-9

(a) $30,000 + $75,000 – $30,000 = $75,000

(b)

	Stunner	Double-Set	Total
Sales	$300,000	$500,000	$800,000
Variable expenses	150,000	200,000	350,000
Gross profit	150,000	300,000	450,000
Fixed expenses	142,500*	262,500**	405,000
Net income	$ 7,500	$ 37,500	$ 45,000

*$30,000 + [($300,000 ÷ $800,000) X $300,000]
**$75,000 + [($500,000 ÷ $800,000) X $300,000]

(c) As shown in the analysis above, Shatner should not eliminate the Mega-Power product line. Elimination of the line would cause net income to drop from $75,000 to $45,000. The reason for this decrease in net income is that elimination of the product line would result in the loss of $60,000 of contribution margin while saving only $30,000 of fixed expenses.

EXERCISE 26-10

(a)

	Product		
	A	B	C
Contribution margin per unit (a)	$7	$4	$6
Machine hours required (b)	2	1	2
Contribution margin per unit of limited resource (a) ÷ (b)	$3.50	$4	$3

(b) Product B should be manufactured because it results in the highest contribution margin per machine hour.

(c) (1)

	Product		
	A	B	C
Machine hours (a) (3,000 ÷ 3)	1,000	1,000	1,000
Contribution margin per unit of limited resource (b)	$ 3.50	$ 4	$ 3
Total contribution margin [(a) X (b)]	$3,500	$4,000	$3,000

The total contribution margin is $10,500 ($3,500 + $4,000 + $3,000).

(2)

	Product B
Machine hours (a)	3,000
Contribution margin per unit of limited resource (b)	$ 4
Total contribution margin [(a) X (b)]	$12,000

EXERCISE 26-11

(a) Cost of hoist: $15,000 + $2,900 + $820 = $18,720.
Net annual cash flow:

Number of extra mufflers: 4 X 52 weeks	(a)	208
Contribution margin per muffler ($65 – $35 – $10)	(b)	$ 20
Total net annual cash flow (a) X (b)		$4,160

Cash payback = $18,720 ÷ $4,160 = 4.5 years.

EXERCISE 26-11 (Continued)

(b) Average investment: ($18,720 + $1,080) ÷ 2 = $9,900.
Annual depreciation: ($18,720 – $1,080) ÷ 5 = $3,528.
Annual net income: $4,160 – $3,528 = $632.
Average annual rate of return = $632 ÷ $9,900 = 6.4% (rounded).

EXERCISE 26-12

(a)

	AA	
Year	Annual Net Cash Flow	Cumulative Net Cash Flow
1	$ 7,000	$ 7,000
2	9,000	16,000
3	15,000	31,000

Cash payback 2.40 years
$22,000 – $16,000 = $6,000
$6,000 ÷ $15,000 = .40

BB

22,000 ÷ (28,500 ÷ 3) = 2.32 years

CC

Year		
1	$13,000	$13,000
2	10,000	23,000
3	9,000	32,000

Cash payback 1.9 years
$22,000 – 13,000 = $9,000
$9,000 ÷ $10,000 = .9

The most desirable project is CC because it has the shortest payback period. The least desirable project is AA because it has the longest payback period. As indicated, only CC is acceptable because its cash payback is 1.9 years.

EXERCISE 26-12 (Continued)

(b)

		AA		BB		CC	
Year	Discount Factor	Net Annual Cash Flow	Present Value	Net Annual Cash Flow	Present Value	Net Cash flow	Present Value
1	.89286	$ 7,000	$ 6,250	$9,500	$ 8,482	$13,000	$ 11,607
2	.79719	9,000	7,175	9,500	7,573	10,000	7,972
3	.71178	15,000	10,677	9,500	6,762	9,000	6,406
Total present value			24,102		22,817(1)		25,985
Investment			22,000		22,000		22,000
Net present value			$ 2,102		$ 817		$ 3,985

(1) This total may also be obtained from Table 2: $9,500 X 2.40183 = $22,817. Project CC is still the most desirable project. Also, on the basis of net present values, all of the projects are acceptable. Project BB is the least desirable.

EXERCISE 26-13

(a) (1) Annual rate of return: $18,000 ÷ [($150,000 + $0) ÷ 2] = 24%.

(2) Cash payback: $150,000 ÷ $48,000 = 3.13 years.

(b)

Item	Amount	Years	PV Factor	Present Value
Net annual cash flows	$ 48,000	1-5	3.60478	$173,029
Capital investment	$150,000	Now	1.00000	150,000
Positive net present value				$ 23,029

EXERCISE 26-14

(a)

Project	Investment	÷	(Income + Depreciation)	=	Internal Rate of Return Factor	Closest Discount Factor	Internal Rate of Return
22A	$240,000	÷	($13,300 + $40,000)	=	4.503	4.48592	9%
23A	$270,000	÷	($21,000 + $30,000)	=	5.294	5.32825	12%
24A	$288,000	÷	($20,000 + $36,000)	=	5.143	5.14612	11%

(b) The acceptable projects are 23A and 24A because their rates of return are equal to or greater than the 11% minimum required rate of return.

EXERCISE 26-15

(a) Project A: ($50,000 X 3.79079) – $200,000 = $(10,461)

Project B: ($65,000 X 4.86842) – $300,000 = $16,447

(b) Vasquez should invest in Project B only. Project B is acceptable because it has a positive net present value. Project A is unacceptable because it has a negative net present value.

(c) Project A (adjusted): ($60,000 X 3.79079) – $220,000 = $7,447. Vasquez' decision would change. Now both projects are acceptable.

SOLUTIONS TO PROBLEMS

PROBLEM 26-1A

(a) Production capacity = 20,000 units (16,000 ÷ 80%).
Units for special order = 4,000 (20,000 – 16,000).

Current selling price = $20 ($320,000 ÷ 16,000).
Special order price = $15 ($20 X 75%).

(b)

Variable manufacturing cost per unit	$ 8.00
Fixed manufacturing cost per unit ($56,000 ÷ 16,000)	3.50
Total manufacturing cost per unit	$11.50

(c)

	Reject Order	Accept Order	Net Income (Increase (Decrease)
Revenues (4,000 X $15)	$0	$60,000	$ 60,000
Costs			
Variable manufacturing (4,000 X $8.00)	0	32,000	(32,000)
Sales commission	0	3,500	(3,500)
Shipping (4,000 X $2.00)	0	8,000	(8,000)
Stamping machine	0	2,500	(2,500)
Total costs	0	46,000	(46,000)
Net income	$0	$14,000	$ 14,000

Korte Company should accept the special order because it will produce $14,000 of incremental net income.

(d) The cost of the special order = $46,000 ÷ 4,000 = $11.50 Thus, the minimum selling price to produce net income of $1.20 per unit is $12.70.

(e) Nonfinancial factors to be considered are: (1) possible effects on domestic sales, (2) possible alternative uses of the unused plant capacity, and (3) ability to meet customer's schedule for delivery without increasing costs.

PROBLEM 26-2A

(a)

	Make	Buy	Net Income Increase (Decrease)
Direct material (36,000 X $2.00)	$ 72,000	$ 0	$ 72,000
Direct labor (2,000 X 3 X $11.00)	66,000	0	66,000
Manufacturing costs			
Indirect labor	5,500	0	5,500
Utilities	1,300	0	1,300
Depreciation	1,600	0	1,600
Property taxes & insurance	1,000	0	1,000
Cost of goods purchased (36,000 X $3.90)	0	140,400	(140,400)
Receiving	0	8,500	(8,500)
Freight (36,000 X $.30)	0	10,800	(10,800)
Storage (6,000 X $.60)	3,600	0	3,600
Total annual cost	$151,000	$159,700	$ (8,700)

Decision: Continue to make the part. The cost to make the part and rent storage space for the finished product is $151,000, while the cost to buy the part and use the excess space for storage is $159,700. Hence, continuing to make the part will result in an annual cost savings of $8,700.

(b)

	Make	Buy	Net Income Increase (Decrease)
Total annual cost	$151,000	$159,700	$ (8,700)
Opportunity cost	10,000	0	10,000
Total cost	$161,000	$159,700	$ 1,300

Decision: Buy the part.

(c) Nonfinancial factors include: (1) the adverse effect on employees if the part is purchased, (2) how long the supplier will be able to satisfy the Martinez Manufacturing Company's quality control standards at the quoted price per unit, and (3) will the supplier deliver the units when they are needed?

PROBLEM 26-3A

(a)

	Denver	Tacoma
Sales	$455,000	$515,000
Variable expenses		
Cost of goods sold	361,000	387,000
Selling and administrative	96,000	72,000
Total variable expenses	457,000	459,000
Contribution margin	$ (2,000)	$ 56,000

(b) (1)

Denver Division	Continue	Eliminate	Net Income Increase (Decrease)
Contribution margin (above)	$ (2,000)	$ 0	$ 2,000
Fixed expenses			
Cost of goods sold	19,000	7,600	11,400
Selling and administrative	24,000	9,600	14,400
Total fixed expenses	43,000	17,200	25,800
Income (loss) from operations	$(45,000)	$(17,200)	$27,800

(2)

Tacoma Division	Continue	Eliminate	Net Income Increase (Decrease)
Contribution margin (above)	$ 56,000	$ 0	$(56,000)
Fixed expenses			
Cost of goods sold	43,000	17,200	25,800
Selling and administrative	48,000	19,200	28,800
Total fixed expenses	91,000	36,400	54,600
Income (loss) from operations	$(35,000)	$(36,400)	$ (1,400)

The Denver Division should be eliminated because it is producing negative contribution margin ($2,000). Income from operations will increase $27,800 if the division is discontinued.

The Tacoma Division should be continued as its contribution margin, $56,000, is greater than the savings in fixed costs ($91,000 – $36,400 = $54,600) that would result from elimination. Therefore, income from operations would decrease $1,400 if the Tacoma Division were eliminated.

PROBLEM 26-3A (Continued)

(c)

DESKINS MANUFACTURING COMPANY
CVP Income Statement
For the Quarter Ended March 31, 2008

	Divisions			
	Miami	San Diego	Tacoma	Total
Sales	$730,000	$920,000	$515,000	$2,165,000
Variable expenses				
Cost of goods sold	384,000	518,400	387,000	1,289,400
Selling and administrative	124,200	172,200	72,000	368,400
Total variable expenses	508,200	690,600	459,000	1,657,800
Contribution margin	221,800	229,400	56,000	507,200
Fixed expenses				
Cost of goods sold (1)	98,280	61,400	44,520	204,200
Selling and administrative (2)	85,680	78,600	49,920	214,200
Total fixed expenses	183,960	140,000	94,440	418,400
Income (loss) from operations	$ 37,840	$ 89,400	$ (38,440)	$ 88,800

(1) Division's own fixed costs plus its share of Denver's unavoidable fixed costs of $7,600. (Miami $2,280, San Diego $3,800, and Tacoma $1,520).

(2) Division's own fixed costs plus its share of Denver's unavoidable fixed costs of $9,600. (Miami $2,880, San Diego $4,800, and Tacoma $1,920).

(d) Total income from operations with the Denver Division is $61,000 (given). Without the Denver Division, income from operations is $88,800. The difference of $27,800 ($88,800 – $61,000) is the incremental income that is gained through elimination of the Denver Division.

PROBLEM 26-4A

(a) Project Brown = $14,400 ÷ [($190,000 + $0) ÷ 2] = 15.2%.
Project Red = $20,000 ÷ [($220,000 + $0) ÷ 2] = 18.2%.
Project Yellow = $22,000 ÷ [($250,000 + $0) ÷ 2] = 17.6%.

(b)

Project Brown

Year	Net Annual Cash Flow	Cumulative Net Cash Flow
1	$63,000 ($25,000 + $38,000)	$ 63,000
2	$54,000 ($16,000 + $38,000)	$117,000
3	$51,000 ($13,000 + $38,000)	$168,000
4	$48,000 ($10,000 + $38,000)	$216,000
5	$46,000 ($ 8,000 + $38,000)	$262,000

Cash Payback 3.46 years
$190,000 – $168,000 = $22,000
$22,000 ÷ $48,000 = .46

Project Red = $220,000 ÷ [($20,000 + $44,000)] = 3.44 years

Project Yellow

Year	Net Annual Cash Flow	Cumulative Net Cash Flow
1	$76,000 ($26,000 + $50,000)	$ 76,000
2	$74,000 ($24,000 + $50,000)	$150,000
3	$73,000 ($23,000 + $50,000)	$223,000
4	$67,000 ($17,000 + $50,000)	$290,000
5	$70,000 ($20,000 + $50,000)	$360,000

Cash payback 3.40 years
$250,000 – $223,000 = $27,000
$27,000 ÷ $67,000 = .40

(c)

Project Red

Item	Amount	Years	PV Factor	Present Value
Net Annual cash flows	$64,000	1–5	3.60478	$230,706
Capital investment				220,000
Positive net present value				$ 10,706

PROBLEM 26-4A (Continued)

		Project			
		Brown		Yellow	
Year	Discount Factor	Net Annual Cash Flow	PV	Net Annual Cash Flow	PV
1	.89286	$ 63,000	$ 56,250	$ 76,000	$ 67,857
2	.79719	54,000	43,048	74,000	58,992
3	.71178	51,000	36,301	73,000	51,960
4	.63552	48,000	30,505	67,000	42,580
5	.56743	46,000	26,102	70,000	39,720
Total		$262,000	192,206	$360,000	261,109
Capital investment			190,000		250,000
Net present value			$ 2,206		$ 11,109

(d)

Project	Annual Rate of Return	Cash Payback	Net Present Value
Brown	3	3	3
Red	1	2	2
Yellow	2	1	1

The best project is Yellow.

PROBLEM 26-5A

(a)

	(1) Annual Net Income	(2) Annual Cash Flow
Fee revenue (12 X $200 X 52)	$124,800	$124,800
Expenses		
Salaries	103,800	103,800
Food and supplies	14,000	14,000
Depreciation ($25,000 ÷ 5)	5,000	0
Total expenses	122,800	117,800
Net income	$ 2,000	
Net annual cash flow		$ 7,000

(b) (1) Annual rate of return = $2,000 ÷ $\frac{(\$25,000+0)}{2}$ = 16%.

(2) Cash payback period = $25,000 ÷ $7,000 = 3.57 years.

(c)

Present value of net annual cash flows ($7,000 X 3.79079)	=	$ 26,536
Present value of investment ($25,000 X 1.00000)	=	(25,000)
Positive net present value		$ 1,536

(d) The computations show that the proposed day care center is a good investment. The annual rate of return is good and the net present value is positive. A minor negative factor is that the cash payback period is 71% (3.57 ÷ 5) of the useful life of the equipment.

PROBLEM 26-6A

(a)

(1) Option A

	Cash Flows	X	9% Discount Factor	=	Present Value
Present value of net annual cash flows	$ 20,000	X	5.53482	=	$110,696
Present value of cost to rebuild	(26,500)	X	.64993	=	(17,223)
Present value of salvage value	0	X	.50187	=	0
					93,473
Capital investment					90,000
Net present value					$ 3,473

(2) The internal rate of return can be approximated by finding the discount rate that results in a net present value of approximately zero. This is accomplished with a 10% discount rate.

	Cash Flows	X	10% Discount Factor	=	Present Value
Present value of net annual cash flows	$ 20,000	X	5.33493	=	$106,699
Present value of cost to rebuild	(26,500)	X	.62092	=	(16,454)
Present value of salvage value	0	X	.46651	=	0
					90,245
Capital investment					90,000
Net present value					$ 245

(1) Option B

	Cash Flows	X	9% Discount Factor	=	Present Value
Present value of net annual cash flows	$32,000	X	5.53482	=	$177,114
Present value of cost to rebuild	0	X	.64993	=	0
Present value of salvage value	27,500	X	.50187	=	13,801
					190,915
Capital investment					170,000
Net present value					$ 20,915

PROBLEM 26-6A (Continued)

(2) Internal rate of return on Option B is 12%, as calculated below:

	Cash Flows	X	12% Discount Factor	=	Present Value
Present value of net annual cash flows	$32,000	X	4.96764	=	$158,964
Present value of cost to rebuild	0	X	.56743	=	0
Present value of salvage value	27,500	X	.40388	=	11,107
					170,071
Capital investment					170,000
Net present value					$ 71

(b) Option A has a lower net present value than Option B, and also a lower internal rate of return. Therefore, Option B is the preferred project.

PROBLEM 26-1B

(a)

	Reject Order	Accept Order	Net Income Increase (Decrease)
Revenues (6,000 X $35)	$0	$210,000	$ 210,000
Cost of goods sold	0	180,000 (1)	(180,000)
Selling and administrative expenses	0	12,000 (2)	(12,000)
Net income	$0	$ 18,000	$ 18,000

(1) Variable costs = $3,600,000 – $900,000 = $2,700,000;
$2,700,000 ÷ 90,000 units = $30 per unit;
6,000 X $30 = $180,000.

(2) Variable costs = $360,000 – $225,000 = $135,000;
$135,000 ÷ 90,000 units = $1.50 per unit;
6,000 X ($1.50 + $0.50) = $12,000.

(b) Yes, the special order should be accepted because net income will be increased by $18,000.

(c) Unit selling price = $30 (variable manufacturing costs) + $2.00 variable selling and administrative expenses + $3.00 net income = $35.00.

(d) Nonfinancial factors to be considered are: (1) possible effect on domestic sales, (2) possible alternative uses of the unused plant capacity, and (3) ability to meet customer's schedule for delivery without increasing costs.

PROBLEM 26-2B

(a)

	Make WISCO	Buy WISCO	Net Income Increase (Decrease)
Direct materials (8,000 X $4.75)	$38,000	$ 0	$ 38,000
Direct labor (8,000 X $4.60)	36,800	0	36,800
Indirect labor (8,000 X $.45)	3,600	0	3,600
Utilities (8,000 X $.35)	2,800	0	2,800
Depreciation	2,500	900	1,600
Property taxes	600	200	400
Insurance	1,500	600	900
Purchase price	0	88,000	(88,000)
Freight and inspection (8,000 X $.30)	0	2,400	(2,400)
Receiving costs	0	750	(750)
Total annual cost	$85,800	$92,850	$ (7,050)

(b) The company should continue to make WISCO because net income would be $7,050 less if WISCO were purchased from the supplier.

(c) The decision would be different. Because of the opportunity cost of $8,000, net income will be $950 higher if WISCO is purchased as shown below:

	Make WISCO	Buy WISCO	Net Income Increase (Decrease)
Total annual cost	$85,800	$92,850	$(7,050)
Opportunity cost	8,000	0	8,000
Total cost	$93,800	$92,850	$ 950

(d) Nonfinancial factors include: (1) the adverse effect on employees if WISCO is purchased, (2) how long the supplier will be able to satisfy the Edgerton Manufacturing Company's quality control standards at the quoted price per unit, and (3) will the supplier deliver the units when they are needed by Edgerton?

PROBLEM 26-3B

(a)

	Division III	Division IV
Sales	$290,000	$200,000
Variable expenses		
Cost of goods sold	202,500	162,000
Selling and administrative	21,000	42,000
Total variable expenses	223,500	204,000
Contribution margin	$ 66,500	$ (4,000)

(b) (1)

Division III	Continue	Eliminate	Net Income Increase (Decrease)
Contribution margin (above)	$ 66,500	$ 0	$(66,500)
Fixed expenses			
Cost of goods sold	67,500	33,750	33,750
Selling and administrative	14,000	7,000	7,000
Total fixed expenses	81,500	40,750	40,750
Income (loss) from operations	$(15,000)	$(40,750)	$(25,750)

(2)

Division IV	Continue	Eliminate	Net Income Increase (Decrease)
Contribution margin (above)	$ (4,000)	$ 0	$ 4,000
Fixed expenses			
Cost of goods sold	18,000	9,000	9,000
Selling and administrative	18,000	9,000	9,000
Total fixed expenses	36,000	18,000	18,000
Income (loss) from operations	$(40,000)	$(18,000)	$22,000

Division III should be continued as contribution margin ($66,500) is greater than the savings in fixed costs ($40,750) that would result from elimination. Therefore, income from operations would decrease $25,750 if Division III is eliminated.

Division IV should be eliminated because it is producing negative contribution margin ($4,000). Income from operations will increase $22,000 by discontinuing this division.

PROBLEM 26-3B (Continued)

(c)

PLOTT MANUFACTURING COMPANY
CVP Income Statement
For the Quarter Ended March 31, 2009

	Divisions			
	I	II	III	Total
Sales	$490,000	$410,000	$290,000	$1,190,000
Variable expenses				
Cost of goods sold	210,000	200,000	202,500	612,500
Selling and administrative	24,000	40,000	21,000	85,000
Total variable expenses	234,000	240,000	223,500	697,500
Contribution margin	256,000	170,000	66,500	492,500
Fixed expenses				
Cost of goods sold (1)	93,000	53,000	70,500	216,500
Selling and administrative (2)	39,000	43,000	17,000	99,000
Total fixed expenses	132,000	96,000	87,500	315,500
Income (loss) from operations	$124,000	$ 74,000	$ (21,000)	$ 177,000

(1) Division's fixed cost of goods sold plus 1/3 of Division IV's unavoidable fixed cost of goods sold [$180,000 X (100% – 90%) X 50% = $9,000]. Each division's share is $3,000.

(2) Division's fixed selling and administrative expenses plus 1/3 of Division IV's unavoidable fixed selling and administrative expenses [$60,000 X (100% – 70%) X 50% = $9,000]. Each division's share is $3,000.

(d) Income from operations with Division IV of $155,000 (given) plus incremental income of $22,000 from eliminating Division IV = $177,000 income from operations without Division IV.

PROBLEM 26-4B

(a) Project Tic = $13,000 ÷ [($160,000 + $0) ÷ 2] = 16.3%.
Project Tac = $14,400 ÷ [($180,000 + $0) ÷ 2] = 16%.
Project Toe = $18,000 ÷ [($200,000 + $0) ÷ 2] = 18%.

(b) Project Tic $160,000 ÷ [($13,000 + $32,000)] = 3.56 years

Project Tac

Net Annual Cash Flow	Cumulative Net Cash Flow
$54,000 ($18,000 + $36,000)	$ 54,000
$53,000 ($17,000 + $36,000)	$107,000
$52,000 ($16,000 + $36,000)	$159,000
$48,000 ($12,000 + $36,000)	$207,000
$45,000 ($9,000 + $36,000)	$252,000

Cash payback 3.44 years
$180,000 – $159,000 = $21,000
$21,000 ÷ $48,000 = .44

Project Toe

Year	Net Annual Cash Flow	Cumulative Net Cash Flow
1	$67,000 ($27,000 + $40,000)	$ 67,000
2	$62,000 ($22,000 + $40,000)	$129,000
3	$56,000 ($16,000 + $40,000)	$185,000
4	$53,000 ($13,000 + $40,000)	$238,000
5	$52,000 ($12,000 + $40,000)	$290,000

Cash payback 3.28 years
$200,000 – $185,000 = $15,000
$15,000 ÷ $53,000 = .28

PROBLEM 26-4B (Continued)

(c)

Project Tic

Item	Amount	Years	PV Factor	Present Value
Net Annual cash flows	$45,000	1–5	3.35216	$ 150,847
Capital investment				160,000
Negative net present value				$ (9,153)

		Project Tac		Project Toe	
Year	Discount Factor	Net Annual Cash Inflow	PV	Net Annual Cash Inflow	PV
1	.86957	$ 54,000	$ 46,957	$ 67,000	$ 58,261
2	.75614	53,000	40,075	62,000	46,881
3	.65752	52,000	34,191	56,000	36,821
4	.57175	48,000	27,444	53,000	30,303
5	.49718	45,000	22,373	52,000	25,853
Total		$252,000	171,040	$290,000	198,119
Capital investment			180,000		200,000
Positive (negative) net present value			$ (8,960)		$ (1,881)

(d)

Project	Annual Rate of Return	Cash Payback	Net Present Value
Tic	2	3	3
Tac	3	2	2
Toe	1	1	1

The best project is Toe since it has the highest annual rate of return, the shortest cash payback, and the lowest negative net present value.

PROBLEM 26-5B

(a)

	(1) Annual Net Income	(2) Annual Cash Flow
Sales	$135,000*	$ 135,000
Expenses		
Drivers' salaries	70,000	(70,000)
Out-of-pocket expenses	31,000	(31,000)
Depreciation	30,000	0
Total expenses	131,000	(101,000)
Net income	$ 4,000	
Net annual cash flow		$ 34,000

*6 vans X 10 trips X 5 students X 30 weeks X $15.00 = $135,000.

(b) (1) Annual rate of return = $4,000 ÷ $\frac{(\$90,000+0)}{2}$ = 8.89%.

(2) Cash payback period = $90,000 ÷ $34,000 = 2.65 years.

(c)

Present value of net annual cash flows ($34,000 X 2.48685*)	= $ 84,553
Present value of investment ($90,000 X 1.00000)	= 90,000
Negative net present value	$ (5,447)

*3 years at 10%, PV of ordinary annuity.

(d) The computations show that the commuter service is not a wise investment for these reasons: (1) annual net income will only be $4,000, (2) the annual rate of return (8.89%) is less than the cost of capital (10%), (3) the cash payback period is 88% (2.65 ÷ 3) of the useful life of the vans, and (4) net present value is negative.

PROBLEM 26-6B

(a)

(1) Option A

	Cash Flows		11% Discount Factor		Present Value
Present value of net annual cash flows	$ 40,000	X	5.14612	=	$205,845
Present value of cost to rebuild	(60,000)	X	.65873	=	(39,524)
Present value of salvage value	0	X	.43393	=	0
					$166,321
Capital investment					160,000
Net present value					$ 6,321

(2) The internal rate of return can be approximated by finding the discount rate that results in a net present value of approximately zero. This is accomplished with a 12% discount rate.

	Cash Flows		12% Discount Factor		Present Value
Present value of net annual cash flows	$ 40,000	X	4.96764	=	$198,706
Present value of cost to rebuild	(60,000)	X	.63552	=	(38,131)
Present value of salvage value	0	X	.40388	=	0
					$160,575
Capital investment					160,000
Net present value					$ 575

(1) Option B

	Cash Flows		11% Discount Factor		Present Value
Present value of net annual cash flows	$50,000	X	5.14612	=	$257,306
Present value of cost to rebuild	0	X	.65873	=	0
Present value of salvage value	12,000	X	.43393	=	5,207
					$262,513
Capital investment					227,000
Net present value					$ 35,513

PROBLEM 26-6B (Continued)

(2) Internal rate of return on Option B is 15%, as calculated below:

	Cash Flows		15% Discount Factor		Present Value
Present value of net annual cash flows	$50,000	X	4.48732	=	$224,366
Present value of cost to rebuild	0	X	.57175	=	0
Present value of salvage value	12,000	X	.32690	=	3,923
					$228,289
Capital investment					227,000
Net present value					$ 1,289

(b) Option A has a lower net present value than Option B, and also a lower internal rate of return. Therefore, Option B is the preferred project.

COMPREHENSIVE PROBLEM: CHAPTERS 19 TO 26

Note to instructor: **Solutions will vary by student. This is an extensive, comprehensive problem whose solution will depend on the assumptions and computations in previous parts. While the variety of assumptions that may be made by students are valuable in themselves, requiring students to project information as required in a real-life scenario, you may wish to assist students (and reduce grading requirements) by providing students with sufficient data from the suggested solution to ensure consistency of responses (see data provided in parts (b), (c), (e), (j), (l), and (n)).**

You may also wish to consider assigning one or more selected parts of this problem, depending on time available. One suggested solution follows:

(a), (b), and (c)

	Product Costs			
Item	Direct Materials	Direct Labor	Manufacturing Overhead	Period Costs
Rent on production equipment			$ 6,000	
Insurance on building			1,500	
Raw materials (plastics, polystyrene, etc.)	$70,000			
Utility costs			900	
Office supplies				$ 300
Wages		$70,000		
Depreciation on office equipment				800
Miscellaneous			1,000	
Administrative salaries				15,500
Property taxes on building			400	
Advertising for helmets				11,000
Sales commissions				40,000
Depreciation on building			1,500	
Professional fees				500
Research and development				10,000
Totals	$70,000	$70,000	$11,300	$78,100

COMPREHENSIVE PROBLEM (Continued)

(d) Assume first month of operations is December 2008.

BICYCLE HELMET COMPANY
Cost of Goods Manufactured Schedule
For the Month Ended December 31, 2008

Work in process, December 1			$ 0
Direct materials			
Raw materials inventory (Dec. 1)	$ 0		
Raw materials purchased	70,000		
Less: Raw materials inventory (Dec. 31)	0		
Direct materials used		$70,000	
Direct labor		70,000	
Manufacturing overhead			
Rent on production equipment	$ 6,000		
Insurance on building	1,500		
Utility costs	900		
Miscellaneous	1,000		
Property taxes on building	400		
Depreciation on building	1,500		
		11,300	
Total manufacturing costs			151,300
Total cost of work in process			151,300
Less: Work in process (Dec. 31)			0
Cost of goods manufactured			$151,300

(e) Assume 10,000 helmets will be produced the first month of operations.

Production cost per helmet = $151,300 [from (d)] ÷ 10,000 = $15.13.

(f) The Bicycle Helmet Company likely will use a process cost system. Process costing is used when large volumes of a homogenous product are produced on a continuous basis. The Bicycle Helmet Company would

find it useful, using a process costing system, to identify the cost of each production batch of helmets. If the Bicycle Helmet Company moves to produce additional helmets (e.g., baseball, hockey, football, etc., or different models of bicycle helmets), it may find it useful to move to a job order costing system.

(g) In a process cost system, manufacturing costs (direct materials, direct labor, and manufacturing overhead) are assigned to Work in Process accounts for each department or process. As helmets are completed, the cost of the work in process is transferred out to Finished Goods Inventory using an inventory allocation method such as FIFO. Later, when the helmets are sold, their cost is transferred to Cost of Goods Sold.

(h)

Item	Variable Costs	Fixed Costs	Total Costs
Rent on production equipment		$ 6,000	$ 6,000
Insurance on building		1,500	1,500
Raw materials (plastics, polystyrene, etc.)	$ 70,000		70,000
Utility costs		900	900
Office supplies		300	300
Wages	70,000		70,000
Depreciation on office equipment		800	800
Miscellaneous	1,000		1,000
Administrative salaries		15,500	15,500
Property taxes on building		400	400
Advertising for helmets		11,000	11,000
Sales commissions	40,000		40,000
Depreciation on building		1,500	1,500
Professional fees		500	500
Research and development		10,000	10,000
Total	$181,000	$48,400	$229,400

(i) Unit variable cost = $181,000 ÷ 10,000 helmets
= $18.10 per helmet

COMPREHENSIVE PROBLEM (Continued)

(j) Estimated number of helmets sold in December 2008 = 8,000 helmets (good Christmas sales!)

Projected wholesale selling price = $40 per helmet

Contribution margin per unit = Unit selling Price – Unit variable costs
= $40.00 – $18.10
= $21.90

Contribution margin ratio = Contribution margin per unit ÷ Unit selling price
= $21.90 ÷ $40.00
= 54.75%

(k) Breakeven point in dollars: Sales dollars at the breakeven point = Variable costs as a percentage of unit selling price X Sales dollars at the breakeven point) + Total fixed costs

$$X = 0.4525*X + \$48,400$$
$$0.5475X = \$48,400$$
$$X = \$88,402$$

***$18.10 ÷ $40.00 = 0.4525 variable costs as a percentage of unit selling price**

Breakeven point in units: Unit selling price X Sales volume = (Variable cost per unit X Sales volume) + Total fixed costs

$$\$40X = \$18.10X + \$48,400$$
$$\$21.90X = \$48,400$$
$$X = 2,210 \text{ helmets}$$

(l)

BICYCLE HELMET COMPANY
Sales Budget
For the Month Ended December 31, 2008

Expected unit sales	8,000
Unit selling price	X $40
Total sales	$320,000

COMPREHENSIVE PROBLEM (Continued)

BICYCLE HELMET COMPANY
Production Budget
For the Month Ended December 31, 2008

Expected unit sales	8,000
Add: Desired ending finished goods units	2,000
Total required units	10,000
Less: Beginning finished goods units	0
Required production units	10,000

BICYCLE HELMET COMPANY
Direct Materials Budget
For the Month Ended December 31, 2008

Units to be produced	10,000
Direct materials per unit	X 1kg
Total kilograms needed for production	10,000
Add: Desired ending direct materials (kilograms)	0
Total materials required	10,000
Less: Beginning direct materials (kilograms)	0
Direct materials purchases	10,000
Cost per kilogram	X $7
Total cost of direct materials purchases	$70,000

BICYCLE HELMET COMPANY
Direct Labor Budget
For the Month Ended December 31, 2008

Units to be produced	10,000
Direct labor time (hours) per unit	X 0.35
Total required direct labor hours	3,500
Direct labor cost per hour	X $20
Total direct labor cost	$70,000

COMPREHENSIVE PROBLEM (Continued)

BICYCLE HELMET COMPANY
Selling and Administrative Expense Budget
For the Month Ended December 31, 2008

Variable (sales commissions)	$40,000
Fixed	
($300 + $800 + $15,500 + $11,000 + $500 + $10,000)	38,100
Total	
[Note: Equals total of period costs from part (b)]	$78,100

BICYCLE HELMET COMPANY
Budgeted Income Statement
For the Month Ended December 31, 2008

Sales (8,000 X $40)	$320,000
Cost of goods sold [8,000 X $15.13 (from part (e)]	121,040
Gross profit	198,960
Selling and administrative expenses	78,100
Income from operations	120,860
Income tax expense (45%)	54,387
Net income	$ 66,473

(m)

BICYCLE HELMET COMPANY
Cash Budget
For the Month Ended December 31, 2008

Beginning cash balance	$ 0
Add: Receipts	
Collections from customers	
(75% of sales, $320,000)	240,000
Total receipts	240,000
Total available cash	240,000

BICYCLE HELMET COMPANY
Cash Budget (Continued)
For the Month Ended December 31, 2008

Less: Disbursements	
Direct materials (75% of direct materials purchases, $70,000)	52,500
Direct labor	70,000
Manufacturing overhead ($11,300 from part (d) – $1,500 depreciation)	9,800
Selling and administrative expenses ($78,100 from part (l) – $800 depreciation)	77,300
Total disbursements	209,600
Excess (deficiency) of available cash over disbursements	30,400
Financing: Borrowings	0
Ending cash balance	$ 30,400

(n)

BICYCLE HELMET COMPANY
Monthly Flexible Manufacturing Costs Budget
For the Month Ended December 31, 2008

Activity level			
Production in units	8,000	9,000	10,000
Variable costs			
Raw materials ($7)	$ 56,000	$ 63,000	$ 70,000
Wages ($7)	56,000	63,000	70,000
Miscellaneous ($0.10)	800	900	1,000
Total variable ($14.10)	112,800	126,900	141,000
Fixed costs			
Total fixed costs [as per (b)]	10,300*	10,300	10,300
Total costs	$123,100	$137,200	$151,300

*$11,300 [from (b)] – $1,000 miscellaneous (variable cost).

COMPREHENSIVE PROBLEM (Continued)

(o) Potential causes of a materials variance: price paid for plastics or any other raw materials included in helmet; new employees; faulty equipment

Potential causes of a direct labor variance: change in pay rates; inexperienced employees; faulty equipment

Potential causes of a manufacturing overhead variance: change in use of supplies; increase in indirect costs such as fuel, heat, etc.

(p) Cash payback period: Cost of capital investment ÷ Annual cash inflow

$720,000 ÷ [$30,400 (from part (m) X 12 months)] = 2 years (1.97 years).

(q) Relevant nonquantitative factors: availability of skilled workforce; location, including cost of shipping to market(s); availability of investment incentives; market surveys; ease of entry; and laws and regulations.

BYP 26-1 DECISION MAKING ACROSS THE ORGANIZATION

(a)

	Retain Old Machine		Purchase New Machine		Net Income Increase (Decrease)
Sales	$4,000,000	(1)	$4,800,000	(2)	$ 800,000
Costs and expenses					
Cost of goods sold	3,000,000	(3)	3,456,000	(4)	(456,000)
Selling expenses	540,000		594,000		(54,000)
Admin. expenses	400,000		452,000		(52,000)
Depreciation	36,000		180,000	(5)	(144,000)
Total costs and expenses	3,976,000		4,682,000		(706,000)
Net income	$ 24,000		$ 118,000		$ 94,000

(1) 10,000 X $100 X 4 years = $4,000,000.
(2) $4,000,000 X 120% = $4,800,000.
(3) $4,000,000 X (100% – 25%) = $3,000,000.
(4) $4,800,000 X (100% – 28%) = $3,456,000.
(5) $170,000 + $4,000 + $6,000 = $180,000.

(b) Annual rate of return = 32.78%; ($118,000 ÷ 4) ÷ [($180,000 + $0) ÷ 2]

(c) Cash payback period = 2.42 yrs.; $180,000 ÷ [($118,000 + $180,000) ÷ 4]

(d) Net present value =

	Amount	Factor	Present Value
Net annual cash flows	$ 74,500*	2.85498	$212,696
Capital investment	$180,000	1.00000	180,000
Positive net present value			$ 32,696

*($118,000 + $180,000) ÷ 4

(e) The new machine should be purchased. The incremental analysis shows that net income will increase from $24,000 to $118,000 over the four years with the new machine, which results in a 32.78% annual rate of return. The payback period of 2.42 years meets management's minimum requirement of three years. In addition, net present value is $32,696 positive, which indicates that the investment meets the required minimum rate of return of 15%.

(a)

	Make	Buy—Silver Star	Buy—Sigma
Sales Revenue	$ 13.00	$ 13.00	$ 13.00
Variable Manufacturing Cost:			
Circuit Board	$ 1.00	$ 0	$ 0
Plastic Case	0.50	0	0
Alarms	0.60	0	0
Labor	3.00	0	0
Overhead	0.40	0	0
Purchase Cost	0	9.00	5.00
Fixed Manufacturing Cost:*	1.00	1.00	1.00
Total Manufacturing Cost	$ 6.50	$ 10.00	$ 6.00
Profit per Unit	$ 6.50	$ 3.00	$ 7.00
Total Profit	$32,500	$15,000	$35,000

***The $5,000 cost that will continue to be incurred, even if the product is not manufactured, divided by the 5,000 units.**

The company will make the most profit if the clocks are purchased from Sigma Company. The company will make $2,500 less if the clocks are manufactured by Barone. The company will make $20,000 less if the clocks are purchased from Silver Star.

(b) There are several important nonfinancial factors described in the case. Other factors might be identified as well. The factors described are: The company is having serious difficulty manufacturing the clocks. Therefore, it would probably be willing to have someone else manufacture the clocks, even if it cost more to do so. The most promising company appears to be Sigma; however, there is a serious question about Sigma's ability to remain in business. However, the company could purchase just this one order from Sigma, and then continue to search for another manufacturer, or stop manufacturing the clocks. Silver Star's stringent requirements for preferred customer status, in the form of large sales requirements, appear to limit the possibilities for Barone to use it as a supplier. However, if Barone does desire to continue to offer the clocks because of their popularity, then perhaps Silver Star could be used in the future.

(c) Many answers are possible, depending upon each group's assessment of the seriousness of the issues mentioned in (b). One answer would be: The company should use Sigma to manufacture the Kmart order. After that the company should not offer the clocks any longer. Especially since the clocks are no longer profitable, it does not seem like a good idea to keep spending money to modify the process.

(a) Before building the special-order new ceiling fans, company management must consider the effect of the new lines on current production capacity, existing and available avenues of distribution, the effect on manufacturing efficiency, the effect on sales of current lines of product, and the supply of materials and labor.

(b) Incremental analysis would provide a financial comparison of income with the special-order new ceiling fans to income without the new line of fans.

BYP 26-4 EXPLORING THE WEB

Answers to this problem will vary depending on the year chosen by the student. The following solution is provided for the year ended July, 31, 2005.

(a) The company reported purchases of plant assets of $332 million in 2005, and $288 million in 2004.

(b) The company reported interest rates on long-term debt ranging from a low of 4.88% to a high of 8.88%.

(c) The internal rate of return is calculated as:

($332,000,000/$45,000,000) = 7.38. Using table C-2 in Appendix C, a PV factor of 7.38 translates to a return of approximately 6%.

BYP 26-5 COMMUNICATION ACTIVITY

To: Angie Baden, Supervisor

From: _____, Assistant Chief Accountant

Subject: Retain or Replace Equipment

The quantitative analysis pertaining to this management decision is as follows:

Cost of hoist: $15,000 + $2,900 + $820 = $18,720.
Net annual cash flow:

Number of extra mufflers: 4 X 52 weeks	(a)	208
Contribution margin per muffler ($65 – $35 – $10)	(b)	$ 20
Net annual cash flow (a) X (b)		$4,160

Cash payback = $18,720 ÷ $4,160 = 4.5 years.

Average investment: ($18,720 + $1,080) ÷ 2 = $9,900.
Annual depreciation: ($18,720 – $1,080) ÷ 5 = $3,528.
Annual net income: $ 4,160 – $3,528 = $632.
Average annual rate of return = $632 ÷ $9,900 = 6.4% (rounded).

These data indicate that the cash payback period is 90% of the new asset's useful life. As you know, management prefers for the payback period to be less than 50% of the asset's useful life. However, the 90% still falls within management's acceptable range.

The data also show a 6.4% annual rate of return. This is a marginally acceptable return even though it is below management's minimum rate of return of 10%.

I believe the workers will be pleased to have the new equipment. It should make their work much easier. In addition, the new equipment is not a threat to a reduction in the present work force.

BYP 26-5 (Continued)

I believe it also will be possible to feature the hoist as the latest in modern technology in our advertising. This could bring in more customers.

It is my recommendation that management buy the new hoist.

(a) The stakeholders are:

- **Yourself.**
- **Your wife and children.**
- **Employees of Devito Company.**
- **Citizens of the town where the company is presently located.**
- **The stockholders of Devito Company.**

(b) The ethical issue is:

- **An employee's personal interests and those of his co-workers and the town versus the best interests of the company and its stockholders.**

(c) The student should recognize a conflict of interest. The company should hire an outside consultant to study and evaluate such a move rather than place one of its employees in this dilemma.

You should rise above the conflict of interest and perform an objective economic evaluation, but also be prepared to remind management, should they be so oblivious, of the consequences to the employees and the town. Knowingly preparing a biased or false report is unethical.

(a) Chronic homelessness is defined as being on the streets for a year or more.

(b) Homelessness costs cities money because the chronic homeless have frequent jail time, shelter costs, emergency room visits and hospital stays. Some costs per city per homeless person are: New York $40,000; Dallas $50,000; San Diego $150,000.

(c) The first step is to try to identify the size of the problem by doing street counts. From this count, benchmarks can be set, enabling a reward system for meeting goals. Next is to identify what the homeless people want. What do they think they need to help them address their problem? They typically want adequate housing with some privacy.

(d) It has been estimated that in New York this approach costs about $22,000 per year. New York has documented a 88% success rate (defined as not returning to the streets for five years).

(e) In terms of incremental analysis, two alternatives are to either continue with the current situation, with the costs presented in part (b) or to implement the approach outlined in part (d). From a purely financial perspective the approach in (d) appears to have significant merit also (d) does not even take into account the intangible benefits of improving the quality of life for this segment of the population.