# CHAPTER 26

## INCREMENTAL ANALYSIS AND CAPITAL BUDGETING

### SUMMARY OF QUESTIONS BY STUDY OBJECTIVES AND BLOOM’S TAXONOMY

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### Multiple Choice Questions

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### Brief Exercises

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### SUMMARY OF QUESTIONS BY STUDY OBJECTIVES AND BLOOM’S TAXONOMY

#### Exercises

<table>
<thead>
<tr>
<th>Study Objective 1</th>
<th>Study Objective 2</th>
<th>Study Objective 3</th>
<th>Study Objective 4</th>
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The chapter also contains one set of ten Matching questions and four Short-Answer Essay questions.

CHAPTER STUDY OBJECTIVES

1. **Identify the steps in management’s decision-making process.** Management's decision-making process consists of (a) identifying the problem or opportunity, (b) assigning responsibility for the decision, (c) determining possible courses of action, (d) developing data relevant to each course of action, (e) making the decision, and (f) reviewing the results of the decision.

2. **Describe the concept of incremental analysis.** Incremental analysis identifies financial data that change under alternative courses of action. These data are relevant to the decision because they will vary in the future among the possible alternatives.

3. **Identify the relevant costs in accepting an order at a special price.** The relevant information in accepting an order at a special price is the difference between the variable manufacturing costs to produce the special order and expected revenues.

4. **Identify the relevant costs in a make-or-buy decision.** In a make-or-buy decision, the relevant costs are (a) the variable manufacturing costs that will be saved, (b) the purchase price, and (c) opportunity costs.

5. **Give the decision rule for whether to sell or process materials further.** The decision rule for whether to sell or process materials further is: Process further as long as the incremental revenue from processing exceeds the incremental processing costs.

6. **Identify the factors to consider in retaining or replacing equipment.** The factors to consider in determining whether equipment should be retained or replaced are the effects on variable costs and the cost of the new equipment. Also, any disposal value of the existing asset must be considered.

7. **Explain the relevant factors in whether to eliminate an unprofitable segment.** In deciding whether to eliminate an unprofitable segment, determine the contribution margin, if any, produced by the segment and the disposition of the segment’s fixed expenses.
8. **Determine which products to make and sell when resources are limited.** When a company has limited resources, find the contribution margin per unit of limited resource. Then multiply this amount by the units of limited resource to determine which product maximizes net income.

9. **Contrast annual rate of return and cash payback in capital budgeting.** The annual rate of return is obtained by dividing expected annual net income by the average investment. The higher the rate of return, the more attractive the investment. The cash payback technique identifies the time period to recover the cost of the investment. The formula is: Cost of capital expenditure divided by estimated net annual cash flows equals cash payback period. The shorter the payback period, the more attractive the investment.

10. **Distinguish between the net present value and internal rate of return methods.** Under the net present value method, compare the present value of future net cash flows with the capital investment to determine net present value. The NPV decision rule is: Accept the project if net present value is zero or positive. Reject the investment if net present value is negative.

    Under the internal rate of return method, find the interest yield of the potential investment. The IRR decision rule is: Accept the project when the internal rate of return is equal to or greater than the required rate of return. Reject the project when the internal rate of return is less than the required rate.
TRUE-FALSE STATEMENTS

1. An important step in management's decision-making process is to determine and evaluate possible courses of action.

2. In making decisions, management ordinarily considers both financial and nonfinancial information.

3. In incremental analysis, total variable costs will always change under alternative courses of action, and total fixed costs will always remain constant.

4. Accountants are mainly involved in developing nonfinancial information for management's consideration in choosing among alternatives.

5. Decision-making involves choosing among alternative courses of action.

6. Financial data are developed for a course of action under an incremental basis and then it is compared to data developed under a differential basis before a decision is made.

7. A special one-time order should never be accepted if the unit sales price is less than the unit variable cost.

8. If a company has excess capacity and present markets will not be affected, it would be profitable to accept an order at a special unit price even though the price is less than the unit variable cost to manufacture the item.

9. A company should never accept an order for its product at less than its regular sales price.

10. A decision whether to continue to make a product or buy it externally, depends on the external price and the amount of variable and fixed costs that can be eliminated assuming no alternative uses of resources.

11. An opportunity cost is the potential benefit obtained by using resources in an alternative course of action.

12. If an incremental make or buy analysis indicates that it is cheaper to buy rather than make an item, management should always make the decision to choose the lowest cost alternative.

13. In a sell or process further decision, management should process further as long as the incremental revenues from additional processing exceed the incremental variable costs.

14. It is always better to sell now rather than process further because of the time value of money.

15. In a decision concerning replacing old equipment with new equipment, the book value of the old equipment can be considered a sunk cost.

16. In a decision to retain or replace old equipment, the salvage value of the old equipment is relevant in incremental analysis.
17. It is better not to replace old equipment if it is not fully depreciated.

18. From a quantitative standpoint, a segment should be eliminated if its contribution margin is less than the fixed costs that can be eliminated.

19. The elimination of an unprofitable product line may adversely affect the remaining product lines.

20. When a company has limited resources to manufacture products, it should manufacture those products which have the highest contribution margin per unit of limited resource.

21. If a company has only a certain number of machine hours available for production, it is generally more profitable to produce and sell the product with the highest unit contribution margin.

22. Capital budgeting decisions usually involve large investments and can have a significant impact on a company's future profitability.

23. The annual rate of return technique requires dividing a project's annual cash inflows by the economic life of the project.

24. A hurdle rate is the rate of return set by applying ideal standards.

25. A major advantage of the annual rate of return technique is that it considers the time value of money.

26. The cash payback capital budgeting technique is a quick way to calculate a project's net present value.

27. The cash payback method is frequently used as a screening tool but it does not take into consideration the profitability of a project.

28. Using the net present value method, a net present value of zero indicates that the project would be acceptable.

29. The net present value method can only be used in capital budgeting if the expected cash flows from a project are an equal amount each year.

30. The interest rate yielded by a project is a rate that will cause the present value of the proposed capital expenditure to equal the present value of the expected annual cash inflows.

Additional True-False Questions

31. Accounting contributes to management's decision-making process through internal reports that review the actual impact of the decision.

32. The process used to identify the financial data that change under alternative courses of action is called allocation of limited resources.

33. If a company is operating at full capacity, the incremental costs of a special order will likely include fixed manufacturing costs.
34. The basic decision rule in a sell or process further decision is: sell without further processing as long as the incremental revenue from processing exceeds the incremental processing costs.

35. In deciding on the future status of an unprofitable segment, management should recognize that net income could decrease by eliminating the unprofitable segment.

36. The annual rate of return is computed by dividing expected annual net income by average investment.

37. The discounted cash flow technique considers estimated total cash inflows from the investment but not the time value of money.

Answers to True-False Statements

|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|

MULTIPLE CHOICE QUESTIONS

38. A major accounting contribution to the managerial decision-making process in evaluating possible courses of action is to
   a. assign responsibility for the decision.
   b. provide relevant revenue and cost data about each course of action.
   c. determine the amount of money that should be spent on a project.
   d. decide which actions that management should consider.

39. Which of the following stages of the management decision-making process is improperly sequenced?
   a. Evaluate possible courses of action → Make decision.
   b. Assign responsibility for the decision → Identify the problem.
   c. Identify the problem → Determine possible courses of action.
   d. Assign responsibility for decision → Determine possible courses of action.

40. Internal reports that review the actual impact of decisions are prepared by
   a. department heads.
   b. the controller.
   c. management accountants.
   d. factory workers.

41. Which of the following steps in the management decision-making process does not generally involve the managerial accountant?
   a. Determine possible courses of action
   b. Make the appropriate decision based on relevant data
   c. Prepare internal reports that review the impact of decisions
   d. None of these
42. The process of evaluating financial data that change under alternative courses of action is called
   a. double entry analysis.
   b. contribution margin analysis.
   c. incremental analysis.
   d. cost-benefit analysis.

43. Nonfinancial information that management might evaluate in making a decision would not include
   a. employee turnover.
   b. contribution margin.
   c. the environment.
   d. the corporate profile in the community.

44. Incremental analysis is synonymous with
   a. difficult analysis.
   b. differential analysis.
   c. gross profit analysis.
   d. derivative analysis.

45. In incremental analysis,
   a. only costs are analyzed.
   b. only revenues are analyzed.
   c. both costs and revenues may be analyzed.
   d. both costs and revenues that stay the same between alternate courses of action will be analyzed.

46. Incremental analysis is most useful
   a. in developing relevant information for management decisions.
   b. in choosing between the net present value method and the internal rate of return method.
   c. in evaluating the master budget.
   d. as a replacement technique for variance analysis.

47. The source of data to serve as inputs in incremental analysis is generated by
   a. market analysts.
   b. engineers.
   c. accountants.
   d. all of these.

48. Which of the following is not a true statement?
   a. Incremental analysis might also be referred to as differential analysis.
   b. Incremental analysis is the same as CVP analysis.
   c. Incremental analysis is useful in making decisions.
   d. Incremental analysis focuses on decisions that involve a choice among alternative courses of action.

49. Incremental analysis would not be appropriate for
   a. a make or buy decision.
   b. an allocation of limited resource decision.
   c. elimination of an unprofitable segment.
   d. analysis of manufacturing variances.
50. Incremental analysis would be appropriate for
   a. acceptance of an order at a special price.
   b. a retain or replace equipment decision.
   c. a sell or process further decision.
   d. all of these.

51. Which of the following is a true statement about cost behaviors in incremental analysis?
   1. Fixed costs will not change between alternatives.
   2. Fixed costs may change between alternatives.
   3. Variable costs will always change between alternatives.
   a. 1
   b. 2
   c. 3
   d. 2 and 3

52. A company is considering the following alternatives:

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<tr>
<td>Fixed costs</td>
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   Which of the following are relevant in choosing between the alternatives?
   a. Variable costs
   b. Revenues
   c. Fixed costs
   d. Variable costs and fixed costs

53. It costs Harmon Company $12 of variable and $5 of fixed costs to produce one bathroom scale which normally sells for $35. A foreign wholesaler offers to purchase 2,000 scales at $15 each. Harmon would incur special shipping costs of $1 per scale if the order were accepted. Harmon has sufficient unused capacity to produce the 2,000 scales. If the special order is accepted, what will be the effect on net income?
   a. $4,000 increase
   b. $4,000 decrease
   c. $6,000 decrease
   d. $30,000 increase

54. Adler Company manufactures a product with a unit variable cost of $50 and a unit sales price of $88. Fixed manufacturing costs were $240,000 when 10,000 units were produced and sold. The company has a one-time opportunity to sell an additional 1,000 units at $70 each in a foreign market which would not affect its present sales. If the company has sufficient capacity to produce the additional units, acceptance of the special order would affect net income as follows:
   a. Income would decrease by $4,000.
   b. Income would increase by $4,000.
   c. Income would increase by $70,000.
   d. Income would increase by $20,000.

55. In incremental analysis,
   a. costs are not relevant if they change between alternatives.
   b. all costs are relevant if they change between alternatives.
   c. only fixed costs are relevant.
   d. only variable costs are relevant.
56. If a plant is operating at full capacity and receives a one-time opportunity to accept an order at a special price below its usual price, then
   a. only variable costs are relevant.
   b. fixed costs are not relevant.
   c. the order will likely be accepted.
   d. the order will likely be rejected.

57. Diggs, Inc. has excess capacity. Under what situations should the company accept a special order for less than the current selling price?
   a. Never
   b. When additional fixed costs must be incurred to accommodate the order
   c. When the company thinks it can use the cheaper materials without the customer’s knowledge
   d. When incremental revenues exceed incremental costs

58. If a company must expand capacity to accept a special order, it is likely that there will be
   a. an increase in unit variable costs.
   b. no increase in fixed costs.
   c. an increase in variable and fixed costs per unit.
   d. an increase in fixed costs.

59. Which of the following is true if a company can accept a special order without affecting its regular sales and is within plant capacity?
   a. Net income will not be affected.
   b. Net income will increase if the special sales price per unit exceeds the unit variable costs.
   c. Net income will decrease.
   d. Additional fixed costs will probably be incurred.

60. If a company anticipates that other sales will be affected by the acceptance of a special order, then
   a. lost sales should be considered in the incremental analysis.
   b. lost sales should not be considered in the incremental analysis.
   c. the order should not be accepted.
   d. the order will only be accepted if the plant is below capacity.

61. Which decision will involve no incremental revenues?
   a. Make or buy decision
   b. Drop a product line
   c. Accept a special order
   d. Additional processing decision

62. An opportunity cost
   a. should be initially recorded as an asset.
   b. is the cost of a new product proposal.
   c. is the potential benefit that may be obtained by following an alternative course of action.
   d. is classified as manufacturing overhead.
63. Opportunity cost must be considered in decisions involving
   a. budgeting.
   b. financial accounting.
   c. CVP analysis.
   d. resources that have alternative uses.

64. The opportunity cost of an alternate course of action that is relevant to a make-or-buy decision is
   a. subtracted from the "Make" costs.
   b. added to the "Make" costs.
   c. added to the "Buy" costs.
   d. none of these.

65. Opportunity cost is usually
   a. a standard cost.
   b. a potential benefit.
   c. a sunk cost.
   d. included as part of cost of goods sold.

66. Each of the following is a disadvantage of buying rather than making a component of a company's product except that
   a. quality control specifications may not be met.
   b. the outside supplier could increase prices significantly in the future.
   c. profitable product lines may be dropped.
   d. the supplier may not deliver on time.

Use the following information for questions 67–68.

Rod's Manufacturing Company can make 100 units of a necessary component part with the following costs:

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<td>Direct Labor</td>
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<td>Variable Overhead</td>
<td>30,000</td>
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<tr>
<td>Fixed Overhead</td>
<td>20,000</td>
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</table>

67. If Rod's Manufacturing Company purchases the component externally, $15,000 of the fixed costs can be avoided. At what external price for the 100 units is the company indifferent between making or buying?
   a. $120,000
   b. $85,000
   c. $115,000
   d. $100,000

68. If Rod's Manufacturing Company can purchase the component externally for $110,000 and only $5,000 of the fixed costs can be avoided, what is the correct make-or-buy decision?
   a. Make and save $5,000
   b. Buy and save $5,000
   c. Make and save $15,000
   d. Buy and save $15,000
69. Cole’s Shop can make 1,000 units of a necessary component with the following costs:

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<td>9,000</td>
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<tr>
<td>Fixed Overhead</td>
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The company can purchase the 1,000 units externally for $117,000. The avoidable fixed costs are $6,000 if the units are purchased externally. An analysis shows that at this external price, the company is indifferent between making or buying the part. What are the fixed overhead costs of making the component?

a. $24,000  
b. $18,000  
c. $12,000  
d. Cannot be determined.

Use the following information for questions 70–71.

Pine Company produces 1,000 units of a necessary component with the following costs:

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<td>Fixed Overhead</td>
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70. Pine Company could avoid $3,000 in fixed overhead costs if it acquires the components externally. If cost minimization is the major consideration and the company would prefer to buy the components, what is the maximum external price that Pine Company would accept to acquire the 1,000 units externally?

a. $51,000  
b. $47,000  
c. $48,000  
d. $44,000

71. None of Pine Company’s fixed overhead costs can be reduced, but another product could be made that would increase profit contribution by $8,000 if the components were acquired externally. If cost minimization is the major consideration and the company would prefer to buy the components, what is the maximum external price that Pine Company would be willing to accept to acquire the 1,000 units externally?

a. $43,000  
b. $55,000  
c. $48,000  
d. $52,000

Use the following information for questions 72–73.

Hermantic, Inc. can produce 100 units of a component part with the following costs:

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<thead>
<tr>
<th>Cost Type</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct Materials</td>
<td>$30,000</td>
</tr>
<tr>
<td>Direct Labor</td>
<td>13,000</td>
</tr>
<tr>
<td>Variable Overhead</td>
<td>32,000</td>
</tr>
<tr>
<td>Fixed Overhead</td>
<td>22,000</td>
</tr>
</tbody>
</table>
72. If Hermantic, Inc. can purchase the units externally for $80,000, by what amount will its total costs change?
   a. An increase of $80,000
   b. An increase of $5,000
   c. An increase of $17,000
   d. A decrease of $22,000

73. If Hermantic, Inc. can purchase the component part externally for $88,000 and only $8,000 of the fixed costs can be avoided, what is the correct make-or-buy decision?
   a. Make and save $1,000
   b. Buy and save $1,000
   c. Make and save $5,000
   d. Buy and save $13,000

Use the following information for questions 74–75.

Eminen Music produces 60,000 CDs on which to record music. The CDs have the following costs:

<table>
<thead>
<tr>
<th>Cost Type</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct Materials</td>
<td>$11,000</td>
</tr>
<tr>
<td>Direct Labor</td>
<td>15,000</td>
</tr>
<tr>
<td>Variable Overhead</td>
<td>3,000</td>
</tr>
<tr>
<td>Fixed Overhead</td>
<td>7,000</td>
</tr>
</tbody>
</table>

74. Eminem could avoid $4,000 in fixed overhead costs if it acquires the CDs externally. If cost minimization is the major consideration and the company would prefer to buy the 60,000 units externally, what is the maximum external price that Eminem would expect to pay for the units?
   a. $32,000
   b. $29,000
   c. $36,000
   d. $33,000

75. None of Eminem’s fixed overhead costs can be reduced, but another product could be made that would increase profit contribution by $4,000 if the CDs were acquired externally. If cost minimization is the major consideration and the company would prefer to buy the CDs, what is the maximum external price that Eminem would be willing to accept to acquire the 60,000 units externally?
   a. $36,000
   b. $32,000
   c. $33,000
   d. $40,000

76. Hungry Bites produces corn chips. The cost of one batch is below:

<table>
<thead>
<tr>
<th>Cost Type</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct materials</td>
<td>$18.00</td>
</tr>
<tr>
<td>Direct labor</td>
<td>13.00</td>
</tr>
<tr>
<td>Variable overhead</td>
<td>11.00</td>
</tr>
<tr>
<td>Fixed overhead</td>
<td>14.00</td>
</tr>
</tbody>
</table>

An outside supplier has offered to produce the corn chips for $25 per batch. How much will Hungry Bites save if it accepts the offer?
a. $2.00 per batch  
b. $17.00 per batch  
c. $31.00 per batch  
d. $6.00 per batch

77. PH Toy Company is unsure of whether to sell its product assembled or unassembled. The unit cost of the unassembled product is $30 and PH Toy would sell it for $65. The cost to assemble the product is estimated at $21 per unit and the company believes the market would support a price of $85 on the assembled unit. What decision should PH Toy make?  
a. Sell before assembly, the company will be better off by $1 per unit.  
b. Sell before assembly, the company will be better off by $20 per unit.  
c. Process further, the company will be better off by $29 per unit.  
d. Process further, the company will be better off by $14 per unit.

78. Whisker Clean Company spent $4,000 to produce Product 89, which can be sold as is for $5,000, or processed further incurring additional costs of $1,500 and then be sold for $7,000. Which amounts are relevant to the decision about Product 89?  
a. $4,000, $5,000, and $7,000  
b. $4,000, $1,500, and $7,000  
c. $5,000, $1,500, and $7,000  
d. $4,000, $5,000, $1,500 and $7,000

79. Narst Company has old inventory on hand that cost $12,000. Its scrap value is $16,000. The inventory could be sold for $40,000 if manufactured further at an additional cost of $12,000. What should Narst do?  
a. Sell the inventory for $16,000 scrap value  
b. Dispose of the inventory to avoid any further decline in value  
c. Hold the inventory at its $12,000 cost  
d. Manufacture further and sell it for $40,000

80. Market Makeup produces face cream. Each bottle of face cream costs $10 to produce and can be sold for $13. The bottles can be sold as is, or processed further into sunscreen at a cost of $14 each. Market Makeup could sell the sunscreen bottles for $23 each.  
a. Face cream must be processed further because its profit is $9 each.  
b. Face cream must not be processed further because costs increase more than revenue.  
c. Face cream must not be processed further because it decreases profit by $1 each.  
d. Face cream must be processed further because it increases profit by $3 each.

81. Edmonds Company has old inventory on hand that cost $18,000. Its scrap value is $24,000. The inventory could be sold for $60,000 if manufactured further at an additional cost of $18,000. What should Edmonds do?  
a. Sell the inventory for $24,000 scrap value  
b. Dispose of the inventory to avoid any further decline in value  
c. Hold the inventory at its $18,000 cost  
d. Manufacture further and sell it for $60,000.
82. A company has a process that results in 15,000 pounds of Product A that can be sold for $8 per pound. An alternative would be to process Product A further at a cost of $100,000 and then sell it for $14 per pound. Should management sell Product A now or should Product A be processed further and then sold? What is the effect of the action?
   a. Process further, the company will be better off by $10,000.
   b. Sell now, the company will be better off by $10,000.
   c. Process further, the company will be better off by $90,000.
   d. Sell now, the company will be better off by $100,000.

83. The decision rule on whether to sell or process further
   a. varies from situation to situation.
   b. is process further as long as total revenue exceeds present revenues.
   c. is process further if incremental revenue from such processing exceeds incremental fixed costs.
   d. is process further if incremental revenue from such processing exceeds the incremental processing costs.

84. Bass Company is starting business and is unsure of whether to sell its product assembled or unassembled. The unit cost of the unassembled product is $80 and Bass Company would sell it for $180. The cost to assemble the product is estimated at $36 per unit and Bass Company believes the market would support a price of $232 on the assembled unit. What is the correct decision using the sell or process further decision rule?
   a. Sell before assembly, the company will be better off by $36 per unit.
   b. Sell before assembly, the company will be better off by $52 per unit.
   c. Process further, the company will be better off by $52 per unit.
   d. Process further, the company will be better off by $16 per unit.

85. Fleming Company manufactures widgets. Embree Company has approached Fleming with a proposal to sell the company widgets at a price of $80,000 for 100,000 units. Fleming is currently making these components in its own factory. The following costs are associated with this part of the process when 100,000 units are produced:

<table>
<thead>
<tr>
<th>Cost</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct material</td>
<td>$31,000</td>
</tr>
<tr>
<td>Direct labor</td>
<td>29,000</td>
</tr>
<tr>
<td>Manufacturing overhead</td>
<td>40,000</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>$100,000</strong></td>
</tr>
</tbody>
</table>

   The manufacturing overhead consists of $16,000 of costs that will be eliminated if the components are no longer produced by Fleming. From Fleming's point of view, how much is the incremental cost or savings if the widgets are bought instead of made?
   a. $20,000 incremental savings
   b. $4,000 incremental cost
   c. $4,000 incremental savings
   d. $20,000 incremental cost

86. The focus of a sell or process further decision is
   a. incremental revenue.
   b. incremental cost.
   c. both incremental revenue and incremental cost.
   d. neither incremental revenue nor incremental cost.
87. Kimble Company gathered the following data about the three products that it produces:

<table>
<thead>
<tr>
<th>Product</th>
<th>Present Sales Value</th>
<th>Estimated Additional Processing Costs if Processed Further</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>$12,000</td>
<td>$8,000</td>
</tr>
<tr>
<td>B</td>
<td>14,000</td>
<td>5,000</td>
</tr>
<tr>
<td>C</td>
<td>11,000</td>
<td>3,000</td>
</tr>
</tbody>
</table>

Which of the products should not be processed further?

a. Product A  
b. Product B  
c. Product C  
d. Products A and C

88. A company decided to replace an old machine with a new machine. Which of the following is considered a relevant cost?

a. The book value of the old equipment  
b. Depreciation expense on the old equipment  
c. The loss on the disposal of the old equipment  
d. The current disposal price of the old equipment

89. Which of the following is not relevant information in a decision whether old equipment presently being used should be replaced by new equipment?

a. The cash price of the new equipment  
b. The salvage value of the old equipment  
c. The book value of the old equipment  
d. The cost savings if the new equipment is purchased

90. Book value of old equipment is considered to be a

a. relevant cost.  
b. semi-relevant cost.  
c. sunk cost.  
d. cost that can be changed by a present or future decision.

91. A company is deciding on whether to replace some old equipment with new equipment. Which of the following is not a relevant cost for incremental analysis?

a. Annual operating cost of the new equipment  
b. Annual operating cost of the old equipment  
c. Net cost of the new equipment  
d. Accumulated depreciation on the old equipment

92. A company is considering replacing old equipment with new equipment. Which of the following is a relevant cost for incremental analysis?

a. Annual depreciation charge on the old equipment  
b. Book value of the old equipment  
c. Estimated annual depreciation of the new equipment  
d. Cost of the new equipment

93. In a retain or replace equipment decision, trade-in allowance available on old equipment

a. increases the cost of the new equipment.  
b. is relevant because it will not be realized if the old equipment is retained.  
c. is not relevant to the decision.  
d. reduces the cost of the old equipment.
94. What will most likely occur if a company eliminates an unprofitable segment when a portion of fixed costs are unavoidable?
   a. All expenses of the eliminated segment will be eliminated.
   b. Net income will decrease.
   c. Net income will increase.
   d. The company's variable costs will increase.

95. A company has three product lines, one of which reflects the following results:
   Sales $215,000
   Variable expenses 125,000
   Contribution margin 90,000
   Fixed expenses 140,000
   Net loss $(50,000)

   If this product line is eliminated, 60% of the fixed expenses can be eliminated and the other 40% will be allocated to other product lines. If management decides to eliminate this product line, the company's net income will
   a. increase by $50,000.
   b. decrease by $90,000.
   c. decrease by $6,000.
   d. increase by $6,000.

96. A company is considering eliminating a product line. The fixed costs currently allocated to the product line will be allocated to other product lines upon discontinuance. If the product line is discontinued,
   a. total net income will increase by the amount of the product line's fixed costs.
   b. total net income will decrease by the amount of the product line's fixed costs.
   c. the contribution margin of the product line will indicate the net income increase or decrease.
   d. the company's total fixed costs will decrease.

97. A segment has the following data:
   Sales $350,000
   Variable expenses 150,000
   Fixed expenses 275,000

   What will be the incremental effect on net income if this segment is eliminated, assuming the fixed expenses will be allocated to profitable segments?
   a. $200,000 increase
   b. $200,000 decrease
   c. $275,000 decrease
   d. Cannot be determined from the data provided.

98. Talbot Company expects income of $2,000 per year over the life of an investment that will cost $25,000. The calculation of the accounting rate of return is .16. The rate of return indicates that
   a. Talbot expects to earn 16% of $2,000 as profit each year the asset is used.
   b. Talbot expects to earn 16% of its investment annually.
   c. Talbot expects to earn 16% of its cash outlay back over the life of the asset.
   d. Talbot expects the asset will earn 16 times as much profit as its cost.
99. A company can sell all the units it can produce of either Product A or Product B but not both. Product A has a unit contribution margin of $16 and takes two machine hours to make and Product B has a unit contribution margin of $30 and takes three machine hours to make. If there are 1,000 machine hours available to manufacture a product, income will be
   a. $2,000 more if Product A is made.
   b. $2,000 less if Product B is made.
   c. $2,000 less if Product A is made.
   d. the same if either product is made.

100. If a company has limited resources, the key factor in performing incremental analysis is
   a. contribution margin.
   b. limited resources required.
   c. contribution margin per unit of limited resource.
   d. none of these.

101. A company can produce and sell only one of the following two products:

<table>
<thead>
<tr>
<th></th>
<th>Machine Hours Required</th>
<th>Contribution Margin Per Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Product 1</td>
<td>3</td>
<td>$30</td>
</tr>
<tr>
<td>Product 2</td>
<td>2</td>
<td>$25</td>
</tr>
</tbody>
</table>

If the company has machine capacity of 2,000 hours, what is the total contribution margin of the product it should produce to maximize net income?
   a. $20,000
   b. $24,000
   c. $25,000
   d. $16,000

102. Diaz Company’s contribution margin is $4 per unit for Product A and $5 for Product B. Product A requires 2 machine hours and Product B requires 4 machine hours. How much is the contribution margin per unit of limited resource for each product?

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>B</th>
</tr>
</thead>
<tbody>
<tr>
<td>a.</td>
<td>$4.00</td>
<td>$5.00</td>
</tr>
<tr>
<td>b.</td>
<td>$2.00</td>
<td>$1.25</td>
</tr>
<tr>
<td>c.</td>
<td>$1.25</td>
<td>$2.00</td>
</tr>
<tr>
<td>d.</td>
<td>$2.50</td>
<td>$1.00</td>
</tr>
</tbody>
</table>

Use the following information for questions 103 and 104.

A company is considering purchasing factory equipment that costs $320,000 and is estimated to have no salvage value at the end of its 8-year useful life. If the equipment is purchased, annual revenues are expected to be $90,000 and annual operating expenses exclusive of depreciation expense are expected to be $38,000. The straight-line method of depreciation would be used.

103. If the equipment is purchased, the annual rate of return expected on this equipment is
   a. 32.5%.
   b. 3.8%.
   c. 7.5%.
   d. 16.3%.
104. The cash payback period on the equipment is
   a. 13.3 years.
   b. 8.0 years.
   c. 6.2 years.
   d. 3.1 years.

105. Doris Co. is considering purchasing a new machine which will cost $200,000, but which will decrease costs each year by $40,000. The useful life of the machine is 10 years. The machine would be depreciated straight-line with no residual value over its useful life at the rate of $20,000/year. The cash payback period is
   a. 4.0 years.
   b. 4.5 years.
   c. 5.0 years.
   d. 10.0 years.

106. The following are all quantitative capital budgeting techniques except
   a. annual rate of return technique.
   b. cost-volume-profit technique.
   c. discounted cash flow technique.
   d. cash payback technique.

107. A company’s cost of capital refers to the
   a. rate management expects to pay on all borrowed and equity funds.
   b. total cost of a capital project.
   c. cost of printing and registering common stock shares.
   d. rate of return earned on total assets.

108. How is annual cash inflow determined?
   a. Depreciation is subtracted from net income because it is an expense.
   b. Depreciation is added back to net income because it is not an outflow of cash.
   c. Depreciation is subtracted from net income because it is an outflow of cash.
   d. Depreciation is added back to net income because it is an inflow of cash.

109. If an asset cost $210,000 and is expected to have a $30,000 salvage value at the end of its ten-year life, and generates annual net cash inflows of $30,000 each year, the cash payback period is
   a. 8 years.
   b. 7 years.
   c. 6 years.
   d. 5 years.

110. If the payback period for a project is greater than its economic life, the
   a. project will always be profitable.
   b. entire initial investment will never be recovered.
   c. project would only be acceptable if the company’s cost of capital was low.
   d. project's return will always exceed the company's cost of capital.
111. A company is considering purchasing factory equipment which costs $480,000 and is estimated to have no salvage value at the end of its 8-year useful life. If the equipment is purchased, annual revenues are expected to be $225,000 and annual operating expenses exclusive of depreciation expense are expected to be $95,000. The straight-line method of depreciation would be used. If the equipment is purchased, the annual rate of return expected on this project is
   a. 54.2%.
   b. 14.6%.
   c. 29.2%.
   d. 27.1%.

112. Capital budgeting is the process
   a. used in sell or process further decisions.
   b. of determining how much capital stock to issue.
   c. of making capital expenditure decisions.
   d. of eliminating unprofitable product lines.

113. Which of the following is not a common method of capital budgeting?
   a. Gross profit method
   b. Payback method
   c. Discounted cash flow method
   d. Annual rate of return method

114. The rate that management expects to pay on borrowed or equity funds is known as
   a. the hurdle rate.
   b. the cost of capital.
   c. the cutoff rate.
   d. all of these.

115. The higher the rate of return for a given risk, the
   a. more attractive the investment.
   b. less attractive the investment.
   c. higher the cost of capital.
   d. higher the hurdle rate.

116. The annual rate of return method is based on
   a. accounting data.
   b. time value of money data.
   c. market values.
   d. replacement values.

117. A company projects an increase in net income of $225,000 each year for the next five years if it invests $900,000 in new equipment. The equipment has a five-year life and an estimated salvage value of $300,000. What is the annual rate of return on this investment?
   a. 25.0%
   b. 37.5%
   c. 50.0%
   d. 57.5%
118. When using the payback method, payback is expressed in terms of
   a. a percent.
   b. dollars.
   c. time.
   d. a discount factor.

119. The payback method is criticized on the grounds that it
   a. ignores obsolescence factors.
   b. ignores the cost of an investment.
   c. is complicated to use.
   d. ignores the time value of money.

120. Laird Company is considering buying a machine for $90,000 with an estimated life of ten years and no salvage value. The straight-line method of depreciation will be used. The machine is expected to generate net income of $6,000 each year. The cash payback on this investment is
   a. 15 years.
   b. 10 years.
   c. 6 years.
   d. 3 years.

121. Colaw Company is considering buying equipment for $240,000 with a useful life of five years and an estimated salvage value of $12,000. If annual expected income is $21,000, the denominator in computing the annual rate of return is
   a. $240,000.
   b. $120,000.
   c. $126,000.
   d. $252,000.

122. A capital budgeting technique which takes into consideration the time value of money is the
   a. annual rate of return approach.
   b. return on stockholders' equity approach.
   c. payback approach.
   d. net present value method.

Use the following information for questions 123—126.

Carr Company is considering two capital investment proposals. Estimates regarding each project are provided below:

<table>
<thead>
<tr>
<th></th>
<th>Project Soup</th>
<th>Project Nuts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial investment</td>
<td>$400,000</td>
<td>$600,000</td>
</tr>
<tr>
<td>Annual net income</td>
<td>20,000</td>
<td>42,000</td>
</tr>
<tr>
<td>Net annual cash inflow</td>
<td>100,000</td>
<td>142,000</td>
</tr>
<tr>
<td>Estimated useful life</td>
<td>5 years</td>
<td>6 years</td>
</tr>
<tr>
<td>Salvage value</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

The company requires a 10% rate of return on all new investments.

<table>
<thead>
<tr>
<th>Periods</th>
<th>9%</th>
<th>10%</th>
<th>11%</th>
<th>12%</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>3.890</td>
<td>3.791</td>
<td>3.696</td>
<td>3.605</td>
</tr>
<tr>
<td>6</td>
<td>4.486</td>
<td>4.355</td>
<td>4.231</td>
<td>4.111</td>
</tr>
</tbody>
</table>
123. The cash payback period for Project Soup is
   a. 20 years.
   b. 10 years.
   c. 5 years.
   d. 4 years.

124. The annual rate of return for Project Soup is
   a. 5%.
   b. 10%.
   c. 25%.
   d. 50%.

125. The net present value for Project Nuts is
   a. $618,410.
   b. $182,912.
   c. $100,000.
   d. $18,410.

126. The internal rate of return for Project Nuts is approximately
   a. 10%.
   b. 11%.
   c. 12%.
   d. 9%.

Use the following table for questions 127–129.

<table>
<thead>
<tr>
<th>Period</th>
<th>8%</th>
<th>9%</th>
<th>10%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.926</td>
<td>.917</td>
<td>.909</td>
</tr>
<tr>
<td>2</td>
<td>1.783</td>
<td>1.759</td>
<td>1.736</td>
</tr>
<tr>
<td>3</td>
<td>2.577</td>
<td>2.531</td>
<td>2.487</td>
</tr>
</tbody>
</table>

127. A company has a minimum required rate of return of 10% and is considering investing in a project that requires an investment of $98,000 and is expected to generate cash inflows of $42,000 at the end of each year for three years. The present value of future cash inflows for this project is
   a. $98,000.
   b. $104,454.
   c. $114,898.
   d. $6,454.

128. A company has a minimum required rate of return of 9% and is considering investing in a project that costs $175,000 and is expected to generate cash inflows of $70,000 at the end of each year for three years. The net present value of this project is
   a. $177,170.
   b. $35,000.
   c. $17,718.
   d. $2,170.

129. A company has a minimum required rate of return of 8% and is considering investing in a project that costs $68,337 and is expected to generate cash inflows of $27,000 each year for three years. The approximate internal rate of return on this project is
Incremental Analysis and Capital Budgeting

130. Vault Company wants to purchase an asset with a 3-year useful life, which is expected to produce cash inflows of $15,000 each year for two years, and $10,000 in year 3. Vault has a 14% cost of capital, and uses the following factors. What is the present value of these future cash flows?

<table>
<thead>
<tr>
<th>Present Value of 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Period</td>
</tr>
<tr>
<td>1</td>
</tr>
<tr>
<td>2</td>
</tr>
<tr>
<td>3</td>
</tr>
</tbody>
</table>

- a. $29,800
- b. $30,400
- c. $31,450
- d. $34,750

Use the following information for questions 131–132.

Cleaners, Inc. is considering purchasing equipment costing $30,000 with a 6-year useful life. The equipment will provide cost savings of $7,300 and will be depreciated straight-line over its useful life with no salvage value. Cleaners, Inc. requires a 10% rate of return.

<table>
<thead>
<tr>
<th>Present Value of an Annuity of 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Period</td>
</tr>
</tbody>
</table>

131. What is the approximate net present value of this investment?
- a. $13,800
- b. $1,792
- c. $886
- d. $2,748

132. What is the approximate internal rate of return for this investment?
- a. 9%
- b. 10%
- c. 11%
- d. 12%

133. Which one of the following is correct?
- a. Cash flows are used to calculate the internal rate of return.
- b. Accrual income is used to calculate the payback period.
- c. Cash flows are used to calculate the annual rate of return.
- d. Accrual income is used to calculate the net present value.

134. If a company's required minimum rate of return is 10%, and in using the net present value method, a project's net present value is zero, this indicates that the
- a. project's rate of return exceeds 10%.
- b. project's rate of return is less than the minimum rate required.
- c. project earns a rate of return of 10%.
- d. project earns a rate of return of 0%.
135. Using the net present value method, the total present value of cash inflows for Project A is $30,000 and the total present value of cash inflows of Project B is $36,000. If Project A and Project B both require an initial investment of $30,000 and have the same economic life, the project that should be accepted is
a. Project A.
b. Project B.
c. neither; they are both the same.
d. not capable of being calculated.

136. Mock Plumbing used the net present value method and determined that project 34 had a zero net present value. What does this tell management about the project?
a. The return from this project is equal to the cost of capital.
b. The project guarantees company profitability.
c. The project's cash inflows will equal its cash outflows.
d. The project earns the company's desired minimum rate of return.

137. In using the internal rate of return method, the internal rate of return factor was 4.0 and the equal annual cash inflows were $40,000. The initial investment in the project must have been
a. $40,000.
b. $10,000.
c. $160,000.
d. an amount which cannot be determined.

Use the following table for questions 138–140.

<table>
<thead>
<tr>
<th>Period</th>
<th>Present value of an Annuity of 1</th>
<th>8%</th>
<th>9%</th>
<th>10%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td>.926</td>
<td>.917</td>
<td>.909</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>1.783</td>
<td>1.759</td>
<td>1.736</td>
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<tr>
<td>3</td>
<td></td>
<td>2.577</td>
<td>2.531</td>
<td>2.487</td>
</tr>
</tbody>
</table>

138. A company has a minimum required rate of return of 9%. It is considering investing in a project which costs $420,000 and is expected to generate cash inflows of $168,000 at the end of each year for three years. The net present value of this project is
a. $425,208.
b. $252,000.
c. $42,516.
d. $5,208.

139. A company has a minimum required rate of return of 8%. It is considering investing in a project that costs $227,790 and is expected to generate cash inflows of $90,000 each year for three years. The approximate internal rate of return on this project is
a. 8%.
b. 9%.
c. 10%.
d. The IRR on this project cannot be approximated.

140. A company has a minimum required rate of return of 10%. It is considering investing in a project that requires an investment of $210,000 and is expected to generate cash inflows of $90,000 at the end of each year for three years. The present value of future cash inflows for this project is
a. $210,000.
b. $223,830.
c. $246,210.
d. $13,830.

141. The conceptually superior approach to capital budgeting is
   a. a discounted cash flow method.
   b. the payback method.
   c. the annual rate of return method.
   d. none of these.

142. The appropriate table to use when an investment promises to return unequal cash flows is
   the
   a. future value of 1 table.
   b. future value of annuity table.
   c. present value of 1 table.
   d. present value of annuity table.

Additional Multiple Choice Questions

143. Accounting's contribution to the decision-making process occurs in all of the following steps except to
   a. identify the problem and assign responsibility.
   b. determine possible courses of action.
   c. review results of the decision.
   d. make a decision.

144. It costs Dryer Company $26 per unit ($18 variable and $8 fixed) to produce its product, which normally sells for $38 per unit. A foreign wholesaler offers to purchase 3,000 units at $21 each. Dryer would incur special shipping costs of $2 per unit if the order were accepted. Dryer has sufficient unused capacity to produce the 3,000 units. If the special order is accepted, what will be the effect on net income?
   a. $3,000 decrease
   b. $3,000 increase
   c. $9,000 increase
   d. $54,000 increase

145. In a make-or-buy decision, opportunity costs are
   a. added to the make total cost.
   b. deducted from the make total cost.
   c. added to the buy total cost.
   d. ignored.

146. Which of the following would generally not affect a make-or-buy decision?
   a. Selling expenses
   b. Direct labor
   c. Variable manufacturing costs
   d. Opportunity cost
147. A cost that cannot be changed by any present or future decision is a(n)
   a. incremental cost.
   b. opportunity cost.
   c. sunk cost.
   d. variable cost.

148. If an unprofitable segment is eliminated
   a. it is impossible for net income to decrease.
   b. fixed expenses allocated to the eliminated segment will be eliminated.
   c. variable expenses of the eliminated segment will be eliminated.
   d. it is impossible for net income to increase.

149. All of the following are relevant in deciding whether to eliminate an unprofitable segment except the segment’s
   a. sales.
   b. variable expenses.
   c. contribution margin.
   d. fixed expenses.

150. In the Rossetto Company, contribution margin per unit is $12 for Product X and $20 for Product Y. Product X requires 4 machine hours and Product Y requires 8 machine hours. What is the contribution margin per unit of limited resource for each product?

   X   Y
   a. $3.00 $2.50
   b. $5.00 $3.00
   c. $2.50 $1.50
   d. $5.00 $1.50

151. The rate of return that management expects to pay on all borrowed and equity funds is the
   a. cost of capital.
   b. cutoff rate.
   c. hurdle rate.
   d. minimum rate.

152. The cash payback formula is
   b. Cost of capital investment ÷ Annual cash inflow.
   c. Average investment ÷ Net income.
   d. Average investment ÷ Annual cash inflow.

153. To determine annual cash inflow, depreciation is
   a. subtracted from net income because it is an expense.
   b. subtracted from net income because it is an outflow of cash.
   c. added back to net income because it is an inflow of cash.
   d. added back to net income because it is not an outflow of cash.

154. Net present value is the difference between the
   a. future cash inflows and the capital investment.
   b. future cash inflows and the present value of the capital investment.
   c. present value of future cash inflows and the capital investment.
   d. present value of future net income and the capital investment.
155. A negative net present value means that the
   a. project's rate of return exceeds the required rate of return.
   b. project's rate of return is less than the required rate of return.
   c. project's rate of return equals the required rate of return.
   d. project is acceptable.

Answers to Multiple Choice Questions

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<tr>
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<td>d</td>
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<td>b</td>
<td>115.</td>
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<td>116.</td>
<td>a</td>
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<td>a</td>
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<td>120.</td>
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<td>b</td>
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<td>88.</td>
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<td>c</td>
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<td>d</td>
<td>139.</td>
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</tbody>
</table>

BRIEF EXERCISES

BE 156

Southern Sisters is considering Plan 1 which is estimated to have sales of $40,000 and costs of $15,000. The company currently has sales of $38,000 and costs of $14,000.

Instructions
Compare plans using incremental analysis.

Solution 156 (3 min.)

Incremental revenue ($40,000 – $38,000) $2,000
Incremental costs ($15,000 – $14,000) (1,000)
Incremental increase in profit if Plan 1 is selected $1,000
BE 157
McIntosh Enterprises produces giant stuffed bears. Each bear consists of $12 of variable costs and $9 of fixed costs and sells for $45. A wholesaler offers to buy 8,000 units at $14 each, of which McIntosh has the capacity to produce. McIntosh will incur extra shipping costs of $1.25 per bear.

Instructions
Determine the incremental income or loss that McIntosh Enterprises would realize by accepting the special order.

Solution 157  (5 min.)
Incremental revenue  \((8,000 \times \$14)\)  \$112,000
Incremental variable costs  \((12 \times 8,000)\) (96,000)
Incremental shipping costs  \((1.25 \times 8,000)\) (10,000)
Incremental profit if special order accepted  $ 6,000

BE 158
Temple, Inc. produces several models of clocks. An outside supplier has offered to produce the commercial clocks for Temple for $420 each. Temple needs 1,200 clocks annually. Temple has provided the following unit costs for its commercial clocks:

<table>
<thead>
<tr>
<th>Description</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct materials</td>
<td>$100</td>
</tr>
<tr>
<td>Direct labor</td>
<td>120</td>
</tr>
<tr>
<td>Variable overhead</td>
<td>80</td>
</tr>
<tr>
<td>Fixed overhead (40% avoidable)</td>
<td>150</td>
</tr>
</tbody>
</table>

Instructions
Prepare an incremental analysis which shows the effect of the make-or-buy decision.

Solution 158  (5 min.)

<table>
<thead>
<tr>
<th>Incremental Analysis</th>
<th>Incremental Effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost to buy ((1,200 \times $420))</td>
<td>$504,000</td>
</tr>
<tr>
<td>Cost savings:</td>
<td></td>
</tr>
<tr>
<td>Savings of DM</td>
<td>$100 \times 1,200 = $120,000</td>
</tr>
<tr>
<td>Savings of DL</td>
<td>$120 \times 1,200 = 144,000</td>
</tr>
<tr>
<td>Savings of VOH</td>
<td>$80 \times 1,200 = 96,000</td>
</tr>
<tr>
<td>Savings of FOH</td>
<td>40% \times $150 \times 1,200 = 72,000</td>
</tr>
<tr>
<td>Total cost savings</td>
<td>+ 432,000</td>
</tr>
<tr>
<td>Incremental net cost to buy</td>
<td>$ (72,000)</td>
</tr>
</tbody>
</table>
BE 159

Signa Corporation currently manufactures 3,000 staplers annually for its main product. The costs per stapler are as follows:

- Direct materials: $3.00
- Direct labor: $8.00
- Variable overhead: $4.00
- Fixed overhead: $7.00
- Total overhead: $22.00

Darsel Company has contacted Signa with an offer to sell it 3,000 staplers for $18.00 each. $5 of the fixed overhead per unit is unavoidable.

Instructions
Prepare an incremental analysis for the make-or-buy decision.

Solution 159 (5 min.)

- Incremental cost to buy: $(54,000)
- Incremental savings on direct materials: + $9,000
- Incremental savings on direct labor: + $24,000
- Incremental savings on variable MOH: + $12,000
- Incremental savings on fixed MOH: + $6,000
- Incremental net cost to buy: $(3,000)

BE 160

Cluck Farms, Inc. produces a crop of chickens at a total cost of $66,000. The production generates 60,000 chickens which can be sold for $1 each to a slaughtering company, or the chickens can be slaughtered in house and then sold for $2.25 each. It costs $55,000 more to turn the annual chicken crop into chicken meat.

Instructions
If Cluck Farms slaughters the chickens, determine how much incremental profit or loss it would report. What should Cluck Farms do?

Solution 160 (4 min.)

- Incremental revenues: $(2.25 – $1.00) × 60,000 chickens = $75,000
- Incremental costs: given as $55,000
- Incremental profits: $75,000 – $55,000 = $20,000 profit

Cluck Farms should slaughter.

BE 161

Kalamoo Company has a machine that affixes labels to bottles. The machine has a book value of $60,000 and a remaining useful life of 3 years and no salvage value. A new, more efficient machine is available at a cost of $225,000 that will have a 5-year useful life with no salvage value. The new machine will lower annual variable production costs from $400,000 to $310,000.

BE 161 (cont.)

**Instructions**

Prepare an analysis showing whether the old machine should be retained or replaced.

**Solution 161** (4 min.)

<table>
<thead>
<tr>
<th></th>
<th>Retain Equipment</th>
<th>Replace Equipment</th>
<th>Net Income Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Variable manufacturing costs</td>
<td>$1,200,000</td>
<td>$930,000</td>
<td>$270,000*</td>
</tr>
<tr>
<td>New machine cost</td>
<td></td>
<td>(225,000)</td>
<td></td>
</tr>
<tr>
<td>Net savings over 3 years</td>
<td></td>
<td></td>
<td>$ 45,000</td>
</tr>
</tbody>
</table>

*For 3 years of remaining life

BE 162

Crisp has 4 product lines: sour cream, ice cream, yogurt, and butter. The allocated fixed costs are based on units sold and are unavoidable. Demand of individual products is not affected by changes in other product lines. 40% of the fixed costs are direct, and the other 60% are allocated. Results of June follow:

<table>
<thead>
<tr>
<th></th>
<th>Sour Cream</th>
<th>Ice Cream</th>
<th>Yogurt</th>
<th>Butter</th>
<th>Total</th>
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</thead>
<tbody>
<tr>
<td>Units sold</td>
<td>2,000</td>
<td>500</td>
<td>400</td>
<td>200</td>
<td>3,100</td>
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<tr>
<td>Revenue</td>
<td>$10,000</td>
<td>$20,000</td>
<td>$10,000</td>
<td>$20,000</td>
<td>$60,000</td>
</tr>
<tr>
<td>Variable departmental costs</td>
<td>6,000</td>
<td>13,000</td>
<td>4,200</td>
<td>4,800</td>
<td>28,000</td>
</tr>
<tr>
<td>Fixed costs</td>
<td>5,000</td>
<td>2,000</td>
<td>3,000</td>
<td>7,000</td>
<td>17,000</td>
</tr>
<tr>
<td>Net income (loss)</td>
<td>$(1,000)</td>
<td>$ 5,000</td>
<td>$ 2,800</td>
<td>$ 8,200</td>
<td>$15,000</td>
</tr>
</tbody>
</table>

**Instructions**

Prepare an incremental analysis of the effect of dropping the sour cream product line.

**Solution 162** (4 min.)

- Incremental revenue $(10,000)
- Incremental variable cost savings + 6,000
- Incremental fixed cost savings ($5,000 x .40) + 2,000
- Incremental decrease in profits if dropped $ (2,000)

BE 163

Gladiator Company provided the following information concerning two products:

- Contribution margin per unit—Product 12 $23
- Contribution margin per unit—Product 43 $15
- Machine hours required for one unit—Product 12 2.5 hours
- Machine hours required for one unit—Product 43 1.5 hours

**Instructions**

Compute the contribution margin per unit of limited resource for each product. Which product should Gladiator tell its sales personnel to ‘push’ to customers?
Solution 163  (4 min.)
Product 12: $23 ÷ 2.5 hours = $9.20
Product 43: $15 ÷ 1.5 hours = $10
Therefore, sales personnel should push Product 43.

BE 164
Diamond Co. is considering investing in new equipment that will cost $900,000 with a 10-year useful life. The new equipment is expected to produce annual net income of $30,000 over its useful life. Depreciation expense, using the straight-line rate, is $90,000 per year.

Instructions
Compute the cash payback period.

Solution 164  (3 min.)
$900,000 ÷ ($30,000 + $90,000) = 7.5 years

BE 165
Salt Co. is considering investing in a new facility to extract and produce salt. The facility will increase revenues by $240,000, but will also increase annual expenses by $160,000. The facility will cost $980,000 to build, but will have a $20,000 salvage value at the end of its 20-year useful life.

Instructions
Calculate the annual rate of return on this facility.

Solution 165  (4 min.)
The annual rate of return is calculated by dividing expected annual income by the average investment. The company’s expected annual income is:

$240,000 – $160,000 = $80,000

Its average investment is:

\[
\frac{980,000 + 20,000}{2} = 500,000
\]

Therefore, its annual rate of return is:

$80,000 ÷ $500,000 = 16\%
BE 166

Madeline Company is proposing to spend $140,000 to purchase a machine that will provide annual cash flows of $25,000. The appropriate present value factor for 10 periods is 5.65.

**Instructions**

Compute the proposed investment’s net present value, and indicate whether the investment should be made by Madeline Company.

**Solution 166**  (4 min.)

| Cash inflows—$25,000 × 5.65 | Present Value | $141,250 |
| Cash outflow—investment $140,000 × 1.00 | (140,000) |
| Net present value | $ 1,250 |

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

BE 167

An investment costing $90,000 is being contemplated by Mint Co. The investment will have a life of 8 years with no salvage value and will produce annual cash flows of $16,870.

**Instructions**

Compute the approximate internal rate of return for this investment. (Table C-2 is needed)

**Solution 167**  (3 min.)

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

$90,000 ÷ $16,870 = 5.33

By tracing across on the 8-year row, we see that the discount factor for 10% is 5.33493. Thus, the internal rate of return on this project is approximately 10%.
EXERCISES

Ex. 168

Dingle Company produced and sold 50,000 units of product and is operating at 70% of plant capacity. Unit information about its product is as follows:

Sales Price $70
Variable manufacturing cost $45
Fixed manufacturing cost ($500,000 ÷ 50,000) 10 55
Profit per unit $15

The company received a proposal from a foreign company to buy 15,000 units of Dingle Company’s product for $50 per unit. This is a one-time only order and acceptance of this proposal will not affect the company’s regular sales. The president of Dingle Company is reluctant to accept the proposal because he is concerned that the company will lose money on the special order.

Instructions

Prepare a schedule reflecting an incremental analysis of this proposal and indicate the effect the acceptance of this order might have on the company’s income.

Solution 168 (9–13 min.)

DINGLE COMPANY
Incremental Analysis
Proposal to buy 15,000 units at $50

<table>
<thead>
<tr>
<th></th>
<th>Reject Order</th>
<th>Accept Order</th>
<th>Increase (Decrease)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Revenues (15,000 × $50)</td>
<td>$-0-</td>
<td>$750,000</td>
<td>$750,000</td>
</tr>
<tr>
<td>Costs (15,000 × $45)</td>
<td>-0-</td>
<td>(675,000)</td>
<td>(675,000)</td>
</tr>
<tr>
<td>Net Income</td>
<td>$-0-</td>
<td>$75,000</td>
<td>$75,000</td>
</tr>
</tbody>
</table>

Dingle Company would increase its income by $75,000 in accepting the special order.

Ex. 169

Eatman Company manufactures cappuccino makers. For the first eight months of 2008, the company reported the following operating results while operating at 80% of plant capacity:

Sales (500,000 units) $90,000,000
Cost of goods sold 54,000,000
Gross profit 36,000,000
Operating expenses 24,000,000
Net income $12,000,000

An analysis of costs and expenses reveals that variable cost of goods sold is $95 per unit and variable operating expenses are $35 per unit.
In September, Eatman Company receives a special order for 30,000 machines at $135 each from a major coffee shop franchise. Acceptance of the order would result in $10,000 of shipping costs but no increase in fixed expenses.

**Instructions**
(a) Prepare an incremental analysis for the special order.
(b) Should Eatman Company accept the special order? Justify your answer.

**Solution 169** (12–17 min.)

(a)  

<table>
<thead>
<tr>
<th></th>
<th>Reject Order</th>
<th>Accept Order</th>
<th>Increase (Decrease)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Revenues</td>
<td>$ -0-</td>
<td>$4,050,000</td>
<td>$4,050,000</td>
</tr>
<tr>
<td>Cost of Goods Sold</td>
<td>-0-</td>
<td>2,850,000*</td>
<td>(2,850,000)</td>
</tr>
<tr>
<td>Operating Expense</td>
<td>-0-</td>
<td>1,060,000**</td>
<td>(1,060,000)</td>
</tr>
<tr>
<td>Net Income</td>
<td>$ -0-</td>
<td>$140,000</td>
<td>$140,000</td>
</tr>
</tbody>
</table>

*Variable cost of goods sold = 30,000 × $95 = $2,850,000.

**Variable operating expenses = 30,000 × $35 = $1,050,000 + $10,000 = $1,060,000.

(b) The incremental analysis shows Eatman Company should accept the special order because incremental revenues exceed incremental costs. This recommendation assumes that acceptance of the special order will not affect relations with existing customers.

---

Ex. 170

Unruh Company supplies schools with floor mattresses to use in physical education classes. Unruh has received a special order from a large school district to buy 600 mats at $45 each. Acceptance of the special order will not affect fixed costs but will result in $1,200 of shipping costs.

For the first 6 months of 2008, the company reported the following operating results while operating at 80% capacity:

- **Sales (100,000 units)**: $7,000,000
- **Cost of goods sold**: 4,200,000
- **Gross profit**: 2,800,000
- **Operating expenses**: 2,000,000
- **Net income**: $800,000

Cost of goods sold was 70% variable and 30% fixed; operating expenses were 75% variable and 25% fixed.

**Instructions**
(a) Prepare an incremental analysis for the special order.
(b) Should Unruh Company accept the special order? Justify your answer.
Solution 170  (13–18 min.)

(a)  Net Income

<table>
<thead>
<tr>
<th></th>
<th>Reject Order</th>
<th>Accept Order</th>
<th>Net Income Increase (Decrease)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Revenues</td>
<td>$ -0-</td>
<td>$27,000</td>
<td>$27,000</td>
</tr>
<tr>
<td>Cost of Goods Sold</td>
<td>-0-</td>
<td>17,640</td>
<td>(17,640)</td>
</tr>
<tr>
<td>Operating Expense</td>
<td>-0-</td>
<td>10,200</td>
<td>(10,200)</td>
</tr>
<tr>
<td>Net Income</td>
<td>$ -0-</td>
<td>$ (840)</td>
<td>$ (840)</td>
</tr>
</tbody>
</table>

Variable cost of goods sold = $4,200,000 × 70% = $2,940,000.
Variable cost of goods sold per unit = $2,940,000 ÷ 100,000 = $29.40.
Variable cost of goods sold for the special order = 600 × $29.40 = $17,640.
Variable operating expenses = $2,000,000 × 75% = $1,500,000
Variable operating expenses per unit = $1,500,000 ÷ 100,000 = $15
Variable operating expenses for the special order = 600 × $15 = $9,000 + $1,200 = $10,200

(b) The incremental analysis shows Unruh Company should not accept the special order because incremental costs exceed incremental revenues.

Ex. 171

Gersen, Inc. budgeted 10,000 widgets for production during 2008. Gersen has capacity to produce 12,000 units. Fixed factory overhead is allocated to production. The following estimated costs were provided:

- Direct material ($7/unit) $ 70,000
- Direct labor ($15/hr. × 2 hrs./unit) 300,000
- Variable manufacturing overhead ($3/unit) 30,000
- Fixed factory overhead costs ($5/unit) 50,000
- Total $450,000

Cost per unit = $45

Instructions

Answer each of the following independent questions:
1. Gersen received an order for 1,000 units from a new customer in a country in which Gersen has never done business. This customer has offered $43 per widget. Should Gersen accept the order?

2. Gersen received an offer from another company to manufacture the same quality widgets for $39. Should Gersen let someone else manufacture all 10,000 widgets and focus only on distribution?

Solution 171  (10–12 min.)

1. Yes, Gersen can make an extra $3,000.

   Incremental revenue per widget $43
   Incremental cost per widget: $7 + ($15 × 2) + $3 = 40
   Incremental profit per unit $3
   Total incremental profit = $3 × 1,000 = $3,000
Solution 171  (cont.)

2. Yes, Gersen will save $10,000 if it buys instead of makes.

Cost to buy per widget $39
Cost to make per widget: $7 + ($15 × 2) + $3 = 40
Incremental savings per widget if purchased $ 1
Total incremental savings if purchased = $1 × 10,000 = $10,000

Ex. 172

Ferry Company manufactured 6,000 units of a component part that is used in its product and incurred the following costs:

- Direct materials $35,000
- Direct labor 15,000
- Variable manufacturing overhead 10,000
- Fixed manufacturing overhead 20,000
- Total annual cost $80,000

Another company has offered to sell the same component part to the company for $12 per unit. The fixed manufacturing overhead consists mainly of depreciation on the equipment used to manufacture the part and would not be reduced if the component part was purchased from the outside firm. If the component part is purchased from the outside firm, Ferry Company has the opportunity to use the factory equipment to produce another product which is estimated to have a contribution margin of $14,000.

Instructions

Prepare an incremental analysis report for Ferry Company which can serve as informational input into this make or buy decision.

Solution 172  (13–18 min.)

<table>
<thead>
<tr>
<th></th>
<th>Make</th>
<th>Buy</th>
<th>Increase (Decrease)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct materials</td>
<td>$35,000</td>
<td>$ -0-</td>
<td>$ 35,000</td>
</tr>
<tr>
<td>Direct labor</td>
<td>15,000</td>
<td>-0-</td>
<td>15,000</td>
</tr>
<tr>
<td>Variable manufacturing overhead</td>
<td>10,000</td>
<td>-0-</td>
<td>10,000</td>
</tr>
<tr>
<td>Fixed manufacturing overhead</td>
<td>20,000</td>
<td>20,000</td>
<td>-0-</td>
</tr>
<tr>
<td>Purchase price (6,000 × $12)</td>
<td>-0-</td>
<td>72,000</td>
<td>(72,000)</td>
</tr>
<tr>
<td>Total annual cost</td>
<td>80,000</td>
<td>92,000</td>
<td>(12,000)</td>
</tr>
<tr>
<td>Opportunity cost</td>
<td>14,000</td>
<td>-0-</td>
<td>14,000</td>
</tr>
<tr>
<td>Total cost</td>
<td>$94,000</td>
<td>$92,000</td>
<td>$ 2,000</td>
</tr>
</tbody>
</table>

Income is expected to increase by $2,000 if the component part is purchased from the outside firm and the new product is manufactured.
Ex. 173

Dryer Corporation currently manufactures a subassembly for its main product. The costs per unit are as follows:

<table>
<thead>
<tr>
<th>Description</th>
<th>Cost Per Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct materials</td>
<td>$ 1</td>
</tr>
<tr>
<td>Direct labor</td>
<td>10</td>
</tr>
<tr>
<td>Variable overhead</td>
<td>5</td>
</tr>
<tr>
<td>Fixed overhead</td>
<td>8</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>$24</strong></td>
</tr>
</tbody>
</table>

Funkhouser Company has contacted Dryer with an offer to sell it 5,000 of the subassemblies for $18 each. If Dryer makes the subassemblies, $3 of the fixed overhead per unit will be allocated to other products.

**Instructions**
Should Dryer make or buy the subassemblies? Explain your answer.

**Solution 173** (6 min.)

Cost to make - cost to buy = incremental cost

\[
(\text{Cost to make} - \text{Cost to buy}) - 18 = 1
\]

Incremental cost to make = $1 \times 5,000 \text{ units} = $5,000

Dryer should buy to save $1 per unit.

Ex. 174

Moon Bicycle Company has been manufacturing its own seats for its bicycles. The company is currently operating at 100% capacity, and variable manufacturing overhead is charged to production at the rate of 60% of direct labor cost. The direct materials and direct labor cost per unit to make the bicycle seats are $8.00 and $9.00, respectively. Normal production is 50,000 bicycles per year.

A supplier offers to make the bicycle seats at a price of $20 each. If the bicycle company accepts this offer, all variable manufacturing costs will be eliminated, but the $30,000 of fixed manufacturing overhead currently being charged to the bicycle seats will have to be absorbed by other products.

**Instructions**

(a) Prepare the incremental analysis for the decision to make or buy the bicycle seats.

(b) Should Moon Bicycle Company buy the seats from the outside supplier? Justify your answer.
**Solution 174**  (15–20 min.)

(a)  Net Income

<table>
<thead>
<tr>
<th></th>
<th>Make</th>
<th>Buy</th>
<th>Increase (Decrease)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct Materials</td>
<td>$400,000</td>
<td>-0-</td>
<td>$400,000</td>
</tr>
<tr>
<td>Direct Labor</td>
<td>450,000</td>
<td>-0-</td>
<td>450,000</td>
</tr>
<tr>
<td>Variable Manufacturing Costs ($450,000 × 60%)</td>
<td>270,000</td>
<td>-0-</td>
<td>270,000</td>
</tr>
<tr>
<td>Fixed Manufacturing Costs</td>
<td>30,000</td>
<td>30,000</td>
<td>-0-</td>
</tr>
<tr>
<td>Purchase Price</td>
<td>1,000,000</td>
<td>1,000,000</td>
<td>(1,000,000)</td>
</tr>
<tr>
<td>Total annual cost</td>
<td>$1,150,000</td>
<td>$1,030,000</td>
<td>$120,000</td>
</tr>
</tbody>
</table>

(b) The seats should be purchased from the outside supplier. As indicated, the company's net income would increase $120,000 by purchasing the seats.

**Ex. 175**

United Chemical Corporation produces an oil-based chemical product which it sells to paint manufacturers. In 2008, the company incurred $344,000 of costs to produce 40,000 gallons of the chemical. The selling price of the chemical is $11.00 per gallon. The costs per unit to manufacture a gallon of the chemical are presented below:

- Direct materials $6.00
- Direct labor 1.20
- Variable manufacturing overhead .80
- Fixed manufacturing overhead .60
- Total manufacturing costs $8.60

The company is considering manufacturing the paint itself. If the company processes the chemical further and manufactures the paint itself, the following additional costs per gallon will be incurred: Direct materials $1.70, Direct labor $.60, Variable manufacturing overhead $.50. No increase in fixed manufacturing overhead is expected. The company can sell the paint at $15.00 per gallon.

**Instructions**

Determine the incremental per gallon increase in net income and the total increase in net income if the company manufactures the paint.

**Solution 175**  (15–20 min.)

<table>
<thead>
<tr>
<th></th>
<th>Sell Chemical</th>
<th>Process Further</th>
<th>Increase (Decrease)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sales price per unit</td>
<td>$11.00</td>
<td>$15.00</td>
<td>$4.00</td>
</tr>
<tr>
<td>Cost per unit:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Direct materials (A)</td>
<td>6.00</td>
<td>7.70</td>
<td>(1.70)</td>
</tr>
<tr>
<td>Direct labor (B)</td>
<td>1.20</td>
<td>1.80</td>
<td>(.60)</td>
</tr>
<tr>
<td>Variable manufacturing overhead (C)</td>
<td>.80</td>
<td>1.30</td>
<td>(.50)</td>
</tr>
<tr>
<td>Fixed manufacturing overhead</td>
<td>.60</td>
<td>.60</td>
<td>—</td>
</tr>
<tr>
<td>Total</td>
<td>8.60</td>
<td>11.40</td>
<td>(2.80)</td>
</tr>
<tr>
<td>Net income per unit</td>
<td>$2.40</td>
<td>$3.60</td>
<td>$1.20</td>
</tr>
</tbody>
</table>
Solution 175  (cont.)

(A) $6.00 + $1.70
(B) $1.20 + $0.60
(C) $0.80 + $0.50

Assuming the company sells all 40,000 gallons that it produces, the incremental net income would be $48,000 (40,000 gallons × $1.20).

Ex. 176

Braum, Inc. produces milk at a total cost of $66,000. The production generates 60,000 gallons of milk which can be sold for $1 per gallon to a pasteurization company, or the milk can be processed further into ice cream and then sold for $2.50 per gallon. It costs $75,000 more to turn the annual milk supply into ice cream.

Instructions
If Braum processes the milk into ice cream, how much is the incremental profit or loss? Should Braum process the milk into ice cream or sell it as is?

Solution 176  (6 min.)

Incremental revenues: ($2.50 – $1.00) × 60,000 gallons = $90,000
Incremental costs: given as $75,000
Incremental profits: $90,000 – $75,000 = $15,000 profit

Braum should process into ice cream.

Ex. 177

Franke Timber Corporation uses a machine that removes the bark from cut timber. The machine is unreliable and results in a significant amount of downtime and excessive labor costs. The management is considering replacing the machine with a more efficient one which will minimize downtime and excessive labor costs. Data are presented below for the two machines:

<table>
<thead>
<tr>
<th></th>
<th>Old Machine</th>
<th>New Machine</th>
</tr>
</thead>
<tbody>
<tr>
<td>Original purchase cost</td>
<td>$340,000</td>
<td>$430,000</td>
</tr>
<tr>
<td>Accumulated depreciation</td>
<td>230,000</td>
<td>—</td>
</tr>
<tr>
<td>Estimated life</td>
<td>5 years</td>
<td>5 years</td>
</tr>
</tbody>
</table>

It is estimated that the new machine will produce annual cost savings of $95,000. The old machine can be sold to a scrap dealer for $8,000. Both machines will have a salvage value of zero if operated for the remainder of their useful lives.

Instructions
Determine whether the company should purchase the new machine.
Solution 177  (11–16 min.)

<table>
<thead>
<tr>
<th></th>
<th>Retain Equipment</th>
<th>Replace Equipment</th>
<th>Net Income Increase/(Decrease)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost savings</td>
<td>$ -0-</td>
<td>$475,000</td>
<td>(A) $475,000</td>
</tr>
<tr>
<td>New machine cost</td>
<td>-0-</td>
<td>(430,000)</td>
<td>(430,000)</td>
</tr>
<tr>
<td>Proceeds from sale of old machine</td>
<td>$ -0-</td>
<td>8,000</td>
<td>8,000</td>
</tr>
<tr>
<td>Net incremental net income</td>
<td>$ -0-</td>
<td>$ 53,000</td>
<td>$ 53,000</td>
</tr>
</tbody>
</table>

(A) $95,000 × 5 = $475,000.

The company should purchase the new machine because there will be an increase in net income of $53,000.

Ex. 178

Munroe Enterprises relies heavily on a copier machine to process its paperwork. Recently the copy clerk has not been able to process all the necessary copies within the regular work week. Management is considering updating the copier machine with a faster model.

<table>
<thead>
<tr>
<th></th>
<th>Current Copier</th>
<th>New Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>Original purchase cost</td>
<td>$10,000</td>
<td>$20,000</td>
</tr>
<tr>
<td>Accumulated depreciation</td>
<td>8,000</td>
<td>—</td>
</tr>
<tr>
<td>Estimated operating costs (annual)</td>
<td>9,000</td>
<td>4,200</td>
</tr>
<tr>
<td>Useful life</td>
<td>5 years</td>
<td>5 years</td>
</tr>
</tbody>
</table>

If sold now, the current copier would have a salvage value of $1,000. If operated for the remainder of its useful life, the current machine would have zero salvage value. The new machine is expected to have zero salvage value after five years.

Instructions

Prepare an analysis to show whether the company should retain or replace the machine.

Solution 178  (12–16 min.)

<table>
<thead>
<tr>
<th></th>
<th>Retain Machine</th>
<th>Replace Machine</th>
<th>Net Income Increase (Decrease)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating costs</td>
<td>$45,000</td>
<td>$21,000</td>
<td>$24,000</td>
</tr>
<tr>
<td>New machine cost</td>
<td>-0-</td>
<td>20,000</td>
<td>(20,000)</td>
</tr>
<tr>
<td>Salvage value</td>
<td>-0-</td>
<td>(1,000)</td>
<td>1,000</td>
</tr>
<tr>
<td>Totals</td>
<td>$45,000</td>
<td>$40,000</td>
<td>$ 5,000</td>
</tr>
</tbody>
</table>

The current copier should be replaced. The incremental analysis shows that net income for the five-year period will be $5,000 higher by replacing the current copier.
Ex. 179
Anheiser, Inc. has three divisions: Bud, Wise, and Er. The results of May, 2008 are presented below.

<table>
<thead>
<tr>
<th></th>
<th>Bud</th>
<th>Wise</th>
<th>Er</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Units sold</td>
<td>3,000</td>
<td>5,000</td>
<td>2,000</td>
<td>10,000</td>
</tr>
<tr>
<td>Revenue</td>
<td>$70,000</td>
<td>$50,000</td>
<td>$40,000</td>
<td>$160,000</td>
</tr>
<tr>
<td>Less variable costs</td>
<td>32,000</td>
<td>26,000</td>
<td>16,000</td>
<td>74,000</td>
</tr>
<tr>
<td>Less direct fixed costs</td>
<td>14,000</td>
<td>19,000</td>
<td>12,000</td>
<td>45,000</td>
</tr>
<tr>
<td>Less allocated fixed costs</td>
<td>6,000</td>
<td>10,000</td>
<td>4,000</td>
<td>20,000</td>
</tr>
<tr>
<td>Net income</td>
<td>$18,000</td>
<td>$(5,000)</td>
<td>$  8,000</td>
<td>$  21,000</td>
</tr>
</tbody>
</table>

All of the allocated costs will continue even if a division is discontinued. Anheiser allocates indirect fixed costs based on the number of units to be sold. Since the Wise division has a net loss, Anheiser feels that it should be discontinued. Anheiser feels if the division is closed, that sales at the Bud division will increase by 10%, and that sales at the Er division will stay the same.

Instructions
(a) Prepare an analysis showing the effect of discontinuing the Wise division.
(b) Should Anheiser close the Wise division? Briefly indicate why or why not.

Solution 179  (10–12 min.)

(a)

<table>
<thead>
<tr>
<th></th>
<th>Bud</th>
<th>Er</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Revenue</td>
<td>$77,000</td>
<td>$40,000</td>
<td>$117,000</td>
</tr>
<tr>
<td>Less variable costs</td>
<td>35,200</td>
<td>16,000</td>
<td>51,200</td>
</tr>
<tr>
<td>Less direct fixed costs</td>
<td>14,000</td>
<td>12,000</td>
<td>26,000</td>
</tr>
<tr>
<td>Less allocated fixed costs</td>
<td>12,453</td>
<td>7,547</td>
<td>20,000</td>
</tr>
<tr>
<td>Net income</td>
<td>$15,347</td>
<td>$  4,453</td>
<td>$  19,800</td>
</tr>
</tbody>
</table>

Calculations:
Revenue = $70,000 × 110% = $77,000
Variable costs = $32,000 × 110% = $35,200
Allocation of total allocated fixed costs of $20,000:
To Bud: [3,300 ÷ (3,300 + 2,000)] × $20,000 = $12,453
To Er: [2,000 ÷ (3,300 + 2,000)] × $20,000 = $7,547

(b) No. The profit decreases by $1,200 ($21,000 – $19,800) when the division is eliminated. The increase in sales by 10% of the Bud division was not enough to offset the loss of the Wise division.

Ex. 180
Simon Forest Corporation operates two divisions, the Timber Division and the Consumer Division. The Timber Division manufactures and sells logs to paper manufacturers. The Consumer Division operates retail lumber mills which sell a variety of products in the do-it-yourself homeowner market. The company is considering disposing of the Consumer Division since it has been consistently unprofitable for a number of years. The income statements for the two divisions for the year ended December 31, 2008 are presented below:
Ex. 180  (cont.)

<table>
<thead>
<tr>
<th></th>
<th>Timber Division</th>
<th>Consumer Division</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sales</td>
<td>$1,500,000</td>
<td>$500,000</td>
<td>$2,000,000</td>
</tr>
<tr>
<td>Cost of goods sold</td>
<td>900,000</td>
<td>350,000</td>
<td>1,250,000</td>
</tr>
<tr>
<td>Gross profit</td>
<td>600,000</td>
<td>150,000</td>
<td>750,000</td>
</tr>
<tr>
<td>Selling &amp; admin. exp.</td>
<td>250,000</td>
<td>180,000</td>
<td>430,000</td>
</tr>
<tr>
<td>Net income</td>
<td>$350,000</td>
<td>$(30,000)</td>
<td>$320,000</td>
</tr>
</tbody>
</table>

In the Consumer Division, 70% of the cost of goods sold are variable costs and 25% of selling and administrative expenses are variable costs. The management of the company feels it can save $45,000 of fixed cost of goods sold and $60,000 of fixed selling expenses if it discontinues operation of the Consumer Division.

Instructions
(a) Determine whether the company should discontinue operating the Consumer Division.
(b) If the company had discontinued the division for 2008, determine what net income would have been.

Solution 180  (20–25 min.)

(a) CONSUMER DIVISION

<table>
<thead>
<tr>
<th></th>
<th>Continue</th>
<th>Eliminate</th>
<th>Net Income Increase (Decrease)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sales</td>
<td>$500,000</td>
<td>$-0-</td>
<td>$(500,000)</td>
</tr>
<tr>
<td>Variable expenses:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cost of goods sold</td>
<td>245,000</td>
<td>(A) -0-</td>
<td>245,000</td>
</tr>
<tr>
<td>Selling and admin. exp.</td>
<td>45,000</td>
<td>(B) -0-</td>
<td>45,000</td>
</tr>
<tr>
<td>Contribution margin</td>
<td>210,000</td>
<td>-0-</td>
<td>(210,000)</td>
</tr>
<tr>
<td>Fixed expenses:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cost of goods sold</td>
<td>105,000</td>
<td>(C) 60,000</td>
<td>45,000</td>
</tr>
<tr>
<td>Selling and admin. exp.</td>
<td>135,000</td>
<td>(D) 75,000</td>
<td>60,000</td>
</tr>
<tr>
<td>Net income</td>
<td>$(30,000)</td>
<td>$(135,000)</td>
<td>$(105,000)</td>
</tr>
</tbody>
</table>

(A) $350,000 × 70% = $245,000
(B) $180,000 × 25% = $45,000
(C) $350,000 – $245,000 = $105,000
(D) $180,000 – $45,000 = $135,000

The company should continue the Consumer Division because contribution margin, $210,000, is greater than the avoidable fixed costs, $105,000.

(b) Net income for the total company would have been $245,000:

$$\text{Timber Division} + \text{Decrease in Net Income}$$

$$350,000 + (105,000) = 245,000$$
Ex. 181

Reiser has three product lines in its retail stores: books, videos, and music. Results of the fourth quarter are presented below:

<table>
<thead>
<tr>
<th></th>
<th>Books</th>
<th>Music</th>
<th>Videos</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Units sold</td>
<td>1,000</td>
<td>2,000</td>
<td>2,000</td>
<td>5,000</td>
</tr>
<tr>
<td>Revenue</td>
<td>$22,000</td>
<td>$40,000</td>
<td>$23,000</td>
<td>$85,000</td>
</tr>
<tr>
<td>Variable departmental costs</td>
<td>17,000</td>
<td>22,000</td>
<td>12,000</td>
<td>51,000</td>
</tr>
<tr>
<td>Direct fixed costs</td>
<td>1,000</td>
<td>3,000</td>
<td>2,000</td>
<td>6,000</td>
</tr>
<tr>
<td>Allocated fixed costs</td>
<td>7,000</td>
<td>7,000</td>
<td>7,000</td>
<td>21,000</td>
</tr>
<tr>
<td>Net income (loss)</td>
<td>$ (3,000)</td>
<td>$  8,000</td>
<td>$  2,000</td>
<td>$  7,000</td>
</tr>
</tbody>
</table>

The allocated fixed costs are unavoidable. Demand of individual products are not affected by changes in other product lines.

Instructions
What will happen to profits if Reiser discontinues the Books product line?

Solution 181  (6 min.)

Incremental revenue  $(22,000)
Incremental costs:
  Variable costs savings  + 17,000
  Direct fixed costs savings  + 1,000
Decrease in profits if discontinued  $(4,000)

Ex. 182

A recent accounting graduate from Missouri State University evaluated the operating performance of Boswell Company's four divisions. The following presentation was made to Boswell's Board of Directors. During the presentation, the accountant made the recommendation to eliminate the Southern Division stating that total net income would increase by $60,000. (See analysis below.)

<table>
<thead>
<tr>
<th></th>
<th>Other Three Divisions</th>
<th>Southern Division</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sales</td>
<td>$2,000,000</td>
<td>$480,000</td>
<td>$2,480,000</td>
</tr>
<tr>
<td>Cost of Goods Sold</td>
<td>950,000</td>
<td>400,000</td>
<td>1,350,000</td>
</tr>
<tr>
<td>Gross Profit</td>
<td>1,050,000</td>
<td>80,000</td>
<td>1,130,000</td>
</tr>
<tr>
<td>Operating Expenses</td>
<td>800,000</td>
<td>140,000</td>
<td>940,000</td>
</tr>
<tr>
<td>Net Income</td>
<td>$ 250,000</td>
<td>$(60,000)</td>
<td>$ 190,000</td>
</tr>
</tbody>
</table>

For the other divisions, cost of goods sold is 80% variable and operating expenses are 70% variable. The cost of goods sold for the Southern Division is 35% fixed, and its operating expenses are 75% fixed. If the division is eliminated, only $10,000 of the fixed operating costs will be eliminated.

Instructions
Do you concur with the new accountant's recommendation? Present a schedule to support your answer.
Solution 182  (20–25 min.)

<table>
<thead>
<tr>
<th></th>
<th>Continue</th>
<th>Eliminate</th>
<th>Net Income Increase (Decrease)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sales</td>
<td>$480,000</td>
<td>$ -0-</td>
<td>$(480,000)</td>
</tr>
<tr>
<td>Variable Expenses</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cost of goods sold</td>
<td>260,000</td>
<td>260,000</td>
<td></td>
</tr>
<tr>
<td>Operating expenses</td>
<td>35,000</td>
<td>35,000</td>
<td></td>
</tr>
<tr>
<td>Total Variable</td>
<td>295,000</td>
<td>295,000</td>
<td></td>
</tr>
<tr>
<td>Contribution Margin</td>
<td>185,000</td>
<td>185,000</td>
<td>$(185,000)</td>
</tr>
<tr>
<td>Fixed Expenses</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cost of goods sold</td>
<td>140,000</td>
<td>140,000</td>
<td>-0-</td>
</tr>
<tr>
<td>Operating expenses</td>
<td>105,000</td>
<td>95,000</td>
<td>10,000</td>
</tr>
<tr>
<td>Net Income (Loss)</td>
<td>$(60,000)</td>
<td>$(235,000)</td>
<td>$(175,000)</td>
</tr>
</tbody>
</table>

The accountant is not correct. If the Southern Division is eliminated, the net income will be $175,000 less, not $60,000 greater.

The reduction in income is the result of the loss of the contribution margin less the avoidable fixed costs of $10,000.

Ex. 183

Penner Company has 8,000 machine hours available to use to produce either Product A or Product B. The cost accounting department developed the following unit information for each of the products:

<table>
<thead>
<tr>
<th></th>
<th>Product A</th>
<th>Product B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sales price</td>
<td>$57</td>
<td>$71</td>
</tr>
<tr>
<td>Direct materials</td>
<td>19</td>
<td>21</td>
</tr>
<tr>
<td>Direct labor</td>
<td>15</td>
<td>14</td>
</tr>
<tr>
<td>Variable manufacturing overhead</td>
<td>8</td>
<td>12</td>
</tr>
<tr>
<td>Fixed manufacturing overhead</td>
<td>3</td>
<td>6</td>
</tr>
<tr>
<td>Machine hours required</td>
<td>.6</td>
<td>1.2</td>
</tr>
</tbody>
</table>

Management desires to make a decision regarding which product to produce in order to maximize the company's income.

Instructions
Taking into consideration the constraint under which the company operates, prepare a report to show which product should be produced and sold.
### Solution 183 (20–25 min.)

**PENNER COMPANY**

Contribution Margin per Unit Limited Resource

<table>
<thead>
<tr>
<th>Contribution margin per unit:</th>
<th>Product A</th>
<th>Product B</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sales price</strong></td>
<td>$57</td>
<td>$71</td>
</tr>
<tr>
<td><strong>Variable costs</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Direct material</td>
<td>$19</td>
<td>$21</td>
</tr>
<tr>
<td>Direct labor</td>
<td>15</td>
<td>14</td>
</tr>
<tr>
<td>Variable overhead</td>
<td>8</td>
<td>42</td>
</tr>
<tr>
<td><strong>Contribution margin</strong></td>
<td>$15</td>
<td>$24</td>
</tr>
</tbody>
</table>

| Machine hours required:         | .6 hrs.   | 1.2 hrs.  |

<table>
<thead>
<tr>
<th>Contribution margin per unit of limited resource</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>$(15 ÷ .6)$</td>
<td>$25</td>
</tr>
<tr>
<td>$(24 ÷ 1.2)$</td>
<td>$20</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Machine hours available</th>
<th>8,000</th>
<th>8,000</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Contribution margin</strong></td>
<td>$200,000</td>
<td>$160,000</td>
</tr>
</tbody>
</table>

The company should produce and sell Product A.

### Ex. 184

Dannon Company manufactures and sells two products. Relevant per unit data concerning each product are given below:

<table>
<thead>
<tr>
<th>Product</th>
<th>Standard</th>
<th>Deluxe</th>
</tr>
</thead>
<tbody>
<tr>
<td>Selling price</td>
<td>$28</td>
<td>$32</td>
</tr>
<tr>
<td>Variable costs</td>
<td>$10</td>
<td>$12</td>
</tr>
<tr>
<td>Machine hours</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

**Instructions**

(a) Compute the contribution margin per unit of the limited resource for each product.

(b) If 1,000 additional machine hours are available, which product should be manufactured?

(c) Prepare an analysis showing the total contribution margin if the additional hours are

1. Divided equally among the products.
2. Allocated entirely to the product identified in (b) above.

### Solution 184 (25–30 min.)

(a)  

<table>
<thead>
<tr>
<th>Product</th>
<th>Standard</th>
<th>Deluxe</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contribution margin per unit (a)</td>
<td>$18</td>
<td>$20</td>
</tr>
<tr>
<td>Machine hours required (b)</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Contribution margin per unit of limited resource (a) ÷ (b)</td>
<td>$4.50</td>
<td>$4.00</td>
</tr>
</tbody>
</table>
Solution 184  (cont.)

(b) The Standard product should be manufactured because it results in the highest contribution margin per machine hour.

(c) (1)

<table>
<thead>
<tr>
<th></th>
<th>Standard</th>
<th>Deluxe</th>
</tr>
</thead>
<tbody>
<tr>
<td>Machine hours</td>
<td>1,000</td>
<td>500</td>
</tr>
<tr>
<td>Machine hours per unit</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Units produced</td>
<td>125</td>
<td>100</td>
</tr>
<tr>
<td>Contribution margin per unit</td>
<td>$18</td>
<td>$20</td>
</tr>
<tr>
<td>Total contribution margin</td>
<td>$2,250</td>
<td>$2,000</td>
</tr>
</tbody>
</table>

(2)

<table>
<thead>
<tr>
<th></th>
<th>Standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>Machine hours</td>
<td>1,000</td>
</tr>
<tr>
<td>Machine hours per unit</td>
<td>4</td>
</tr>
<tr>
<td>Units produced</td>
<td>250</td>
</tr>
<tr>
<td>Contribution margin per unit</td>
<td>$18</td>
</tr>
<tr>
<td>Total contribution margin</td>
<td>$4,500</td>
</tr>
</tbody>
</table>

Ex. 185

Elston Company estimates the following cash flows and depreciation on a project that will cost $200,000 and will last 10 years with no salvage value:

Revenues
Sales $70,000
Operating expenses
Salary expense $32,000
Depreciation expense 20,000
Miscellaneous expenses 8,000
Net Income $10,000

Instructions
(a) Calculate the expected annual rate of return on this project showing calculations to support your answer.
(b) Calculate the cash payback on this project showing calculations to support your answer.

Solution 185  (9–14 min.)

(a) Annual rate of return is 10%.

Average investment = \( \frac{$200,000}{2} = $100,000 \)

Annual rate of return = \( \frac{$10,000}{$100,000} = 10\% \)
Solution 185  (cont.)
(b) Cash payback period is 6.67 years.
   Investment  $200,000
   Annual cash inflow ($10,000 + $20,000)  $30,000
   Cash payback  = $200,000 ÷ $30,000 = 6.67 years

Ex. 186
Newman Medical Center is considering purchasing an ultrasound machine for $1,135,000. The
machine has a 10-year life and an estimated salvage value of $40,000. Installation costs and
freight charges will be $24,200 and $800, respectively. The Center uses straight-line depreci-
ation.

The medical center estimates that the machine will be used five times a week with the average
charge to the patient for ultrasound of $850. There are $10 in medical supplies and $40 of
technician costs for each procedure performed using the machine.

Instructions
(a) Compute the payback period for the new ultrasound machine.
(b) Compute the annual rate of return for the new machine.

Solution 186  (16–22 min.)
(a) Cost of the ultrasound machine:  $1,135,000 + $24,200 + $800 = $1,160,000

   Annual Cash Flow:
      Number of procedures:  52 × 5 = 260
      Contribution margin per procedure:  $850 – $10 – $40 = $800
      Total annual cash flow:  260 × $800 = $208,000

   Cash payback:  \[ \frac{$1,160,000}{$208,000} = 5.6 \text{ years} \]

(b) Average Investment:  \[ \frac{$1,160,000 + $40,000}{2} = $600,000 \]

   Annual Depreciation:  \[ \frac{$1,160,000 – $40,000}{10 \text{ years}} = $112,000 \]

   Annual Net Income:  $208,000 – $112,000 = $96,000

   Average Annual Rate of Return:  \[ \frac{$96,000}{$600,000} = 16\% \]
Ex. 187

Fox Corporation recently purchased a new machine for its factory operations at a cost of $840,000. The investment is expected to generate $250,000 in annual cash flows for a period of five years. The required rate of return is 12%. The new machine is expected to have zero salvage value at the end of the five-year period.

Instructions
Calculate the internal rate of return. (Table 2 from Appendix C is needed.)

Solution 187  (4 min.)

\[
\text{IRR} = \frac{\text{Capital investment}}{\text{Annual cash inflows}} = \text{Factor}
\]

\[
\frac{$840,000}{\$250,000} = 3.36. \text{ This factor is found in the PVA table at } n = 5 \text{ periods.}
\]

\[
\text{IRR} = 15\%
\]

Ex. 188

Frankum Company is considering two new projects, each requiring an equipment investment of $72,000. Each project will last for three years and produce the following annual net income.

<table>
<thead>
<tr>
<th>Year</th>
<th>TIP</th>
<th>TOP</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>$6,000</td>
<td>$9,000</td>
</tr>
<tr>
<td>2</td>
<td>9,000</td>
<td>9,000</td>
</tr>
<tr>
<td>3</td>
<td>14,000</td>
<td>9,000</td>
</tr>
<tr>
<td></td>
<td>$29,000</td>
<td>$27,000</td>
</tr>
</tbody>
</table>

The equipment will have no salvage value at the end of its three-year life. Frankum Company uses straight-line depreciation. Frankum requires a minimum rate of return of 12%. Present value data are as follows:

<table>
<thead>
<tr>
<th>Present Value of 1</th>
<th>Present Value of an Annuity of 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Period</td>
<td>12%</td>
</tr>
<tr>
<td>1</td>
<td>.893</td>
</tr>
<tr>
<td>2</td>
<td>.797</td>
</tr>
<tr>
<td>3</td>
<td>.712</td>
</tr>
</tbody>
</table>

Instructions
(a) Compute the net present value of each project.
(b) Which project should be selected? Why?

Solution 188  (22–27 min.)

(a)  Project TIP

<table>
<thead>
<tr>
<th>Year</th>
<th>Annual Cash Inflows*</th>
<th>Present Value of 1</th>
<th>Present Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>$30,000</td>
<td>.893</td>
<td>$26,790</td>
</tr>
<tr>
<td>2</td>
<td>33,000</td>
<td>.797</td>
<td>26,301</td>
</tr>
<tr>
<td>3</td>
<td>38,000</td>
<td>.712</td>
<td>27,056</td>
</tr>
<tr>
<td></td>
<td>$101,000</td>
<td></td>
<td>$80,147</td>
</tr>
</tbody>
</table>

*Net income plus annual depreciation of $24,000.
Solution 188  (cont.)

- Present value of future cash inflows: $80,147
- Capital investment: $72,000
- Positive net present value: $8,147

Project TOP
- Present value of future cash inflows ($33,000 \times 2.402): $79,266
- Capital investment: $72,000
- Positive net present value: $7,266

(b) Both projects are acceptable because both show a positive net present value. Project TIP is the preferred project because its positive net present value is greater than project TOP's net present value.

Ex. 189

Unruh Company is considering investing in a project that will cost $162,000 and have no salvage value at the end of its 5-year life. It is estimated that the project will generate annual cash inflows of $45,000 each year. The company has a hurdle or cutoff rate of return of 8% and uses the following compound interest table:

<table>
<thead>
<tr>
<th>Period</th>
<th>6%</th>
<th>8%</th>
<th>10%</th>
<th>12%</th>
<th>15%</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>4.212</td>
<td>3.993</td>
<td>3.791</td>
<td>3.605</td>
<td>3.352</td>
</tr>
</tbody>
</table>

Instructions

Using the internal rate of return method, determine if this project is acceptable by calculating an approximate interest yield for the project.

Solution 189  (6–11 min.)

\[
\frac{\text{Capital Investment}}{\text{Annual Cash Inflows}} = \text{Internal Rate of Return Factor}
\]

\[
\frac{162,000}{45,000} = 3.60
\]

Since the calculated internal rate of return factor of 3.60 is very near the factor 3.605 for five periods and 12% interest, this project has an approximate interest yield of 12%, and is therefore acceptable because it is greater than the company's cutoff rate of 8%.
Ex. 190

Rodriguez Company has money available for investment and is considering two projects each costing $70,000. Each project has a useful life of 3 years and no salvage value. The investment cash flows follow:

<table>
<thead>
<tr>
<th></th>
<th>Project A</th>
<th>Project B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year 1</td>
<td>$8,000</td>
<td>$28,000</td>
</tr>
<tr>
<td>Year 2</td>
<td>24,000</td>
<td>28,000</td>
</tr>
<tr>
<td>Year 3</td>
<td>52,000</td>
<td>28,000</td>
</tr>
</tbody>
</table>

Instructions
If 8% is an acceptable earnings rate, which project should be selected? Justify your response. (Table 1 from Appendix C is needed.)

Solution 190  (12 min.)

Project B is acceptable since its net present value is positive. This indicates that project B provides a return greater than the company's minimum expected return of 8%. Project A earns less than an 8% return.

Project A

<table>
<thead>
<tr>
<th></th>
<th>Present value</th>
<th>$1,000 x .926</th>
<th>$ 7,408</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year 1</td>
<td>$8,000 x .926</td>
<td>$7,408</td>
<td></td>
</tr>
<tr>
<td>Year 2</td>
<td>$24,000 x .857</td>
<td>20,568</td>
<td></td>
</tr>
<tr>
<td>Year 3</td>
<td>$52,000 x .794</td>
<td>41,288</td>
<td></td>
</tr>
</tbody>
</table>

Present value of cash inflows 69,264
Cash purchase price (70,000)
Net present value of project A $ (736)

Project B

<table>
<thead>
<tr>
<th></th>
<th>Present value</th>
<th>$1,000 x .926</th>
<th>$25,928</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year 1</td>
<td>$28,000 x .926</td>
<td>$25,928</td>
<td></td>
</tr>
<tr>
<td>Year 2</td>
<td>$28,000 x .857</td>
<td>23,996</td>
<td></td>
</tr>
<tr>
<td>Year 3</td>
<td>$28,000 x .794</td>
<td>22,232</td>
<td></td>
</tr>
</tbody>
</table>

Present value of cash inflows 72,156
Cash purchase price (70,000)
Net present value of project B $ 2,156
COMPLETION STATEMENTS

191. An important purpose of management accounting is to provide _____________________ for decision making.

192. The process used to identify the financial data that change under alternative courses of action is called ________________ analysis.

193. In a decision on whether an order should be accepted at a special price when there is plant capacity available, a major consideration is whether the special price exceeds ________________.

194. The potential benefit that may be obtained by following an alternative course of action is called an ________________ cost.

195. A decision whether to sell a product now or to process it further, depends on whether the incremental ____________ from processing further are greater than the incremental processing ____________.

196. The ____________ value of old equipment is irrelevant in a decision to replace that equipment and is often referred to as a ____________ cost.

197. In an environment where there are limited resources, the products with the highest contribution per unit of ____________ should identify the products to be produced.

198. The process of making capital expenditure decisions in business is called ____________.

199. Three quantitative techniques which are frequently used in capital budgeting decisions are (1) ________________, (2) ________________, and (3) ________________.

200. A major limitation of the annual rate of return approach is that it does not consider the ____________ of money.

201. The technique which identifies the time period required to recover the cost of the investment is called the ________________ method.

202. The two discounted cash flow techniques used in capital budgeting are (1) the ________________ method and (2) the ________________ method.

203. Knowledge of the __________________ is necessary when discounting future cash flows under the net present value approach.

204. In using the net present value approach, a project is acceptable if the project’s net present value is ____________ or ____________.

205. The internal rate of return method differs from the net present value method in that it results in finding the ________________ of the potential investment.

Answers to Completion Statements

191. relevant information
192. incremental (differential)
193. variable costs (differential)
194. opportunity
195. revenues, costs
196. book, sunk
197. limited resource
198. capital budgeting

199. annual rate of return, cash payback, discounted cash flow
200. time value
201. cash payback
202. net present value, internal rate of return
203. required rate of return
204. zero, positive
205. interest yield
MATCHING

206. Match the items below by entering the appropriate code letter in the space provided.

A. Incremental analysis  
B. Opportunity cost  
C. Discounted cash flow technique  
D. Capital budgeting  
E. Annual rate of return technique  
F. Cash payback technique  
G. Hurdle or cutoff rate  
H. Net present value method  
I. Sunk cost  
J. Internal rate of return method

___ 1. A cost that cannot be changed by any present or future decision.

___ 2. A capital budgeting technique that considers both the estimated total cash inflows from the investment and the time value of money.

___ 3. A method used in capital budgeting in which cash inflows are discounted to their present value and then compared to the capital outlay required by the capital investment.

___ 4. The process of identifying the financial data that change under alternative courses of action.

___ 5. A method used in capital budgeting that results in finding the interest yield of the potential investment.

___ 6. The minimum rate of return management requires on an investment.

___ 7. The determination of the profitability of a capital expenditure by dividing expected annual net income by the average investment.

___ 8. The potential benefit that may be lost from following an alternative course of action.

___ 9. The process of making capital expenditure decisions in business.

___ 10. A capital budgeting technique that identifies the time period required to recover the cost of a capital investment from the annual cash inflow produced by the investment.

Answers to Matching

1. I  
2. C  
3. H  
4. A  
5. J  
6. G  
7. E  
8. B  
9. D  
10. F
SHORT-ANSWER ESSAY QUESTIONS

S-A E  207
Management is often faced with the alternative of continuing to make a product or component internally, or going to an external source and purchasing the product or component. In gathering relevant information for these two alternatives, briefly identify the quantitative factors that should be considered. Are there any qualitative factors that should also be considered?

Solution 207
The quantitative factors to be considered in a make or buy decision include the incremental costs to make the product, the incremental costs of buying the product, and the opportunity cost (potential benefit foregone) if the product is made. Generally, all variable production costs are relevant in a make or buy decision, but only some fixed costs, or no fixed costs, are relevant because many fixed costs will be incurred regardless of whether the decision is to make or buy. Qualitative factors include the possible adverse effect on employees and the stability of the supplier's price and quality.

S-A E  208
Management uses several capital budgeting approaches in evaluating projects for possible investment. Identify those approaches that are more desirable from a conceptual standpoint, and briefly explain what features these approaches have that make them more desirable than other approaches. Also identify the least desirable approach and explain its major weaknesses.

Solution 208
From a conceptual standpoint, the discounted cash flow methods (net present value and internal rate of return) are considered more desirable because they consider both the estimated cash flows and the time value of money. The time value of money is critical because of the long-term impact of capital budgeting decisions. Capital budgeting approaches which do not consider the time value of money include annual rate of return and cash payback. The cash payback method is the least desirable because it also ignores the expected profitability of the project.

S-A E  209  (Ethics)
Ron Stanton is on the capital budgeting committee for his company, Galena Tile. Joe Penley is an engineer for the firm. Joe expresses his disappointment to Ron that a project that was given to him to review before submission looks extremely good on paper. "I really hoped that the cost projections wouldn't pan out," he tells his friend. "The technology used in this is pie in the sky kind of stuff. There are a hundred things that could go wrong. But the figures are very convincing. I haven't sent it on yet, though I probably should."
"You can keep it if it's really that bad," assures Ron. "Anyway, you can probably get it shot out of the water pretty easily, and not have the guy who submitted it mad at you for not turning it in. Just fix the numbers. If you figure, for instance, that a cost is only 50% likely to be that low, then double it. We do it all the time, informally. Best of all, the rank and file don't get to come to those sessions. Your engineering genius need never know. He'll just think someone else's project was even better than his."

Required:
1. Who are the stakeholders in this situation?
2. Is it ethical to adjust the figures to compensate for risk? Explain.
3. Is it ethical to change the proposal before submitting it? Explain.

Solution 209
1. The stakeholders include:
   Joe Penley
   Galena Tile
   the engineer who submitted the proposal.

2. It is ethical, in general, to adjust projections to compensate for risk. However, it should be clearly stated that the projections have been adjusted for risk, and the method used should be available for review. Otherwise, the entire selection process is undermined, and it becomes entirely subjective.

3. It is probably not ethical to modify a proposal at all; certainly not in the way described. The engineer submitting the proposal should have the right to know about any changes that were made, and should have the right to review those changes.

S-A E 210 (Communication)

You are the general accountant for Word Systems, Inc., a typing service based in Los Angeles, California. The company has decided to upgrade its equipment. It currently has a widely used version of a word processing program. The company wishes to invest in more up-to-date software and to improve its printing capabilities.

Two options have emerged. Option #1 is for the company to keep its existing computer system, and upgrade its word processing program. The memory of each individual work station would be enhanced, and a larger, more efficient printer would be used. Better telecommunications equipment would allow for the electronic transmission of some documents as well.

Option #2 would be for the company to invest in an entirely different computer system. The software for this system is extremely impressive, and it comes with individual laser printers. However, the company is not well known, and the software does not connect well with well-known software. The net present value information for these options follows:
### Required:
Prepare a brief report for management in which you make a recommendation for one system or the other, using the information given.

### Solution 210
I recommend that the company accept Option #1, to purchase upgrades to our present system and to buy a more efficient printer. In the first place, the changes will be easier to implement because the equipment is similar to that which we already use. Secondly, the company will have less money invested in the project, which decreases our risk of loss should the project fail. Option #2 appears to be too risky.

<table>
<thead>
<tr>
<th></th>
<th>Option #1</th>
<th>Option #2</th>
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<tbody>
<tr>
<td>Initial Investment</td>
<td>$(95,000)</td>
<td>$(270,000)</td>
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<tr>
<td>Returns Year 1</td>
<td>55,000</td>
<td>90,000</td>
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<tr>
<td>Returns Year 2</td>
<td>30,000</td>
<td>90,000</td>
</tr>
<tr>
<td>Returns Year 3</td>
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<td>90,000</td>
</tr>
<tr>
<td>Net Present Value</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>