

Cost Accounting, Cdn. Ed., 7e (Horngren)
Chapter 11 Decision Making and Relevant Information

11.1 Distinguish relevant from irrelevant information in decision situations.

1) A decision model is a formal method of making a choice that uses only quantitative analyses.

Answer: FALSE

Explanation: A decision model is a formal method of making a choice that often involves both quantitative and qualitative analyses.

Diff: 1 Type: TF

Skill: Remember

Objective: LO 11-1

11.2 Identify the differences among relevant costs for short-term and long-term production output decisions.

1) The purpose of evaluating performance in the decision process is to provide feedback.

Answer: TRUE

Diff: 1 Type: TF

Skill: Remember

Objective: LO 11-2

2) Anticipated future costs that differ with alternative courses of action are known as relevant costs.

Answer: TRUE

Diff: 1 Type: TF

Skill: Remember

Objective: LO 11-2

3) Divisional revenues which remain at the same level from year to year are known as relevant revenues.

Answer: FALSE

Explanation: Relevant revenues are expected future revenues.

Diff: 2 Type: TF

Skill: Remember

Objective: LO 11-2

4) The total cost difference between two separate alternatives in a decision making process is the net relevant cost.

Answer: TRUE

Diff: 2 Type: TF

Skill: Understand

Objective: LO 11-2

5) Each item included in the relevant-cost analysis should differ according to the alternative being considered and be an expected future revenue or cost.

Answer: TRUE

Diff: 2 Type: TF

Skill: Remember

Objective: LO 11-2

6) When choosing between two alternatives, costs that do not differ between the two alternatives can be considered to be irrelevant to that decision.

Answer: TRUE

Diff: 1 Type: TF

Skill: Remember

Objective: LO 11-2

7) All fixed costs are irrelevant in relevant-cost analysis.

Answer: FALSE

Explanation: Fixed costs that occur in the future or are different between alternatives are relevant.

Diff: 2 Type: TF

Skill: Understand

Objective: LO 11-2

8) All variable costs are relevant in relevant-cost analysis.

Answer: FALSE

Explanation: Fixed costs that occur in the future or are different between alternatives are relevant.

Diff: 2 Type: TF

Skill: Understand

Objective: LO 11-2

9) The last step in the decision process is normally to

A) evaluate and explain outcomes.

B) make assumptions and predictions.

C) choose alternatives.

D) perform quantitative analysis.

E) gather information.

Answer: A

Diff: 2 Type: MC

Skill: Understand

Objective: LO 11-2

10) The feedback obtained in the decision process cannot affect

A) future predictions.

B) the prediction method.

C) the decision model.

D) implementation.

E) past performance.

Answer: E

Diff: 2 Type: MC

Skill: Understand

Objective: LO 11-1

11) The Gameshop manufactures specialized board games. Management is attempting to search for ways to reduce costs and is considering two alternatives for an upcoming project of special games that must be delivered to the customer in 12 months' time. Management agreed to the special project job as they have an idle plant that is scheduled for demolition 18 months from now, and either alternative will easily meet the delivery deadline.

Alternative 1 requires 10 machine operators and 2.5 individuals to handle direct materials. Employee pay averages \$17.50 per hour and will increase to \$18.50 at the mid-point (July 1) of next year. Each employee currently works 2,500 hours but will decrease to 2,400 hours if Alternative 2 is implemented. The second proposal only requires 8.5 workers.

Which of the following items of information are relevant to this decision?

- A) property taxes for the idle plant
- B) hourly wage rates
- C) the timing of the wage increase
- D) the number of employees required in each alternative
- E) the delivery deadline

Answer: D

Explanation: D) Note: none of the other items differ between the available alternative.

Diff: 2 Type: MC

Skill: Understand

Objective: LO 11-2

12) Which of the following anticipated future costs always differ among alternative courses of actions?

- A) direct labour costs
- B) historical costs
- C) relevant costs
- D) direct materials costs
- E) indirect costs

Answer: C

Diff: 1 Type: MC

Skill: Remember

Objective: LO 11-1

13) When making decisions, it is best to use

- A) average costs.
- B) fixed costs that would be incurred.
- C) unit cost, rather than total cost.
- D) variable costs that would be incurred.
- E) relevant costs.

Answer: E

Diff: 1 Type: MC

Skill: Remember

Objective: LO 11-1

14) Which of the following should management consider to avoid the pitfalls of relevant-cost analysis?

- A) Consider all current revenues and costs.
- B) Include any item of revenue or cost that is either an expected future revenue or expected future cost, and, differs between the alternatives.
- C) Historic revenues and costs for items that differ according to alternatives should be considered.
- D) Assume that all fixed costs are irrelevant.
- E) Assume that all variable costs are relevant.

Answer: B

Diff: 2 Type: MC

Skill: Remember

Objective: LO 11-2

15) Sunk costs

- A) are relevant.
- B) are differential.
- C) have future implications.
- D) are ignored when evaluating alternatives.
- E) are evaluated to determine if they are relevant or not evaluating alternatives.

Answer: D

Diff: 1 Type: MC

Skill: Remember

Objective: LO 11-2

16) Past costs that are unavoidable and unchangeable are known as

- A) fixed overhead costs.
- B) operating costs.
- C) product production costs.
- D) sunk costs.
- E) constraining costs.

Answer: D

Diff: 1 Type: MC

Skill: Remember

Objective: LO 11-2

17) A computer system installed last year is an example of a(n)

- A) sunk cost.
- B) relevant cost.
- C) differential cost.
- D) avoidable cost.
- E) opportunity cost.

Answer: A

Diff: 1 Type: MC

Skill: Understand

Objective: LO 11-2

18) Which of the following costs are never relevant in the decision-making process?

- A) fixed costs
- B) historical costs
- C) relevant costs
- D) variable costs
- E) opportunity costs

Answer: B

Diff: 2 Type: MC

Skill: Understand

Objective: LO 11-2

19) Jansen Industries is considering replacing a machine that is presently used in its production process. The following information is available:

	Old Machine	Replacement Machine
Original cost	\$25,000	\$35,000
Remaining useful life in years	1	5
Current age in years	5	0
Book value	\$5,000	
Current disposal value in cash	\$3,000	
Future disposal value in cash (in 5 years)	\$0	\$2,000
Annual cash operating costs	\$7,000	\$4,000

Which of the information provided in the table is irrelevant to the replacement decision?

- A) the annual operating cost of the old machine
- B) the original cost of the old machine
- C) the current disposal value of the old machine
- D) the future disposal value of the replacement machine
- E) the remaining useful life of the old machine

Answer: B

Diff: 2 Type: MC

Skill: Apply

Objective: LO 11-2

Answer the following question(s) using the information below.

Jim's 5-year-old Geo Prizm requires repairs estimated at \$3,000 to make it road worthy again. His friend, Julie, suggested that he should buy a 5-year-old used Honda Civic instead for \$3,000 cash. Julie estimated the following costs for the two cars:

	<u>Geo Prizm</u>	<u>Honda Civic</u>
Acquisition cost	\$15,000	\$3,000
Repairs	\$2,900	—
Annual operating costs		
(Gas, maintenance, insurance)	\$2,280	\$2,100

20) The cost NOT relevant for this decision is the

- A) acquisition cost of the Geo Prizm.
- B) acquisition cost of the Honda Civic.
- C) repairs to the Geo Prizm.
- D) annual operating costs of the Honda Civic.
- E) annual operating costs of the Geo Prizm.

Answer: A

Diff: 2 Type: MC

Skill: Apply

Objective: LO 11-2

21) What should Jim do? What are his savings in the first year?

- A) Buy the Honda Civic; \$15,080
- B) Fix the Geo Prizm; \$2,820
- C) Buy the Honda Civic; \$180
- D) Fix the Geo Prizm; \$5,280
- E) Buy the Honda Civic; \$80

Answer: E

Explanation: E) Geo (\$2,900 + \$2,280) - Honda (\$3,000 + \$2,100) = \$80 cost savings with the Honda option

Diff: 2 Type: MC

Skill: Apply

Objective: LO 11-2

Answer the following question(s) using the information below.

John's 8-year-old Chevrolet Trail Blazer requires repairs estimated at \$6,000 to make it roadworthy again. His wife, Sherry, suggested that he should buy a 5-year-old used Jeep Grand Cherokee instead for \$6,000 cash. Sherry estimated the following costs for the two cars:

	Trail Blazer	Grand Cherokee
Acquisition cost	\$25,000	\$6,000
Repairs	\$6,000	—
Annual operating costs		
(Gas, maintenance, insurance)	\$2,280	\$2,100

22) The cost NOT relevant for this decision is the

- A) acquisition cost of the Trail Blazer.
- B) acquisition cost of the Grand Cherokee.
- C) repairs to the Trail Blazer.
- D) annual operating costs of the Grand Cherokee.
- E) annual operating costs of the Trail Blazer.

Answer: A

Diff: 2 Type: MC

Skill: Apply

Objective: LO 11-2

23) What should John do? What are his savings in the first year?

- A) Buy the Grand Cherokee; \$8,100
- B) Fix the Trail Blazer; \$3,180
- C) Buy the Grand Cherokee; \$180
- D) Fix the Trail Blazer; \$6,280
- E) Buy the Grand Cherokee; \$280

Answer: C

Explanation: C) Trail Blazer (\$6,000 + \$2,280) - Grand Cherokee (\$6,000 + \$2,100) = \$180 cost savings with the Grand Cherokee option

Diff: 2 Type: MC

Skill: Apply

Objective: LO 11-2

24) Boyd Tool Company is a tool manufacturer. Production capacity is 3,000 units per month; however, they are considering alternative ways to increase capacity to 3,500 units. One of the alternatives involves purchasing new equipment. In this alternative, there are two choices: machine A will provide increased capacity of 4,000 units per month, with unit costs of \$14 at capacity; and, machine B will increase capacity to 3,600 units per month with unit costs of \$15 at capacity. Both machines are adequate since Boyd's does not intend to go beyond the 3,500 units per month level for the foreseeable future.

Relevant information for this decision includes

- A) whether other costs will change solely due to a capacity increase.
- B) the different unit cost of production between the two machine at their capacity levels.
- C) Boyd's planned capacity utilization.
- D) excess capacity of either machine.
- E) the different unit cost of production between the two machines at Boyd's planned capacity levels.

Answer: E

Explanation: E) Note: A and D are common to both alternatives, C is already decided, B will never be a factor

Diff: 3 Type: MC

Skill: Understand

Objective: LO 11-2

25) Companies periodically confront decisions about discontinuing or adding branches or business segments. In order to determine the best course of action, a _____ should be performed in order to make the optimal decision.

- A) relevant feasibility study
- B) relevant risk assessment
- C) relevant-revenue and relevant-cost analysis
- D) relevant-risks and relevant-loss analysis
- E) relevant capital and relevant cash flow analysis

Answer: C

Diff: 1 Type: MC

Skill: Understand

Objective: LO 11-2

26) Koch Brothers purchased a new production machine for \$200,000. It is capable of producing 400,000 units over its useful life, thus the manufacturer's salesperson claimed the unit cost would only be \$0.50. Koch's own engineers recommended that the company acquire a machine that would have a unit cost of production of no more than \$0.48 (with a \$0.03 variance). A competitor of the vendor, who also was trying to sell Koch some equipment, claimed that the \$0.50 is understated by \$0.04 per unit. The total anticipated demand over the asset's useful life is 300,000 units.

Relevant information includes

- A) the \$0.50 unit cost.
- B) the fact that the \$0.50 falls below the \$0.48 + \$0.03 variance.
- C) the unit cost at Koch's planned capacity utilization.
- D) being able to produce at excess capacity.
- E) the different unit costs of production between the two vendors' machines.

Answer: C

Explanation: C) Note: A, B and E are in the past; D will never be a factor.

Diff: 3 Type: MC

Skill: Understand

Objective: LO 11-2

27) Scott is the new manager of the credit card department of a large bank. One of his first changes, directed by the president, was to reorganize the activities of the department. He is reluctant to start the reorganization without including a comprehensive report from accounting about the current costs of operations and possible costs of changes.

Required:

Explain how the decision process model can assist the manager and discuss the steps in the decision process model that might be taken to ensure an orderly decision process.

Answer: The accounting information can assist the manager by helping him understand the actual costs of operating the department. Costs would probably need to be categorized as fixed and variable to help the manager understand how costs behave when changes take place.

The steps that should be taken include:

1. Identify the problem and uncertainties.
2. Obtain information.
3. Make predictions about the future.
4. Make decisions by choosing among the alternatives.
5. Implement the decision, evaluate the performance, and learn.

Feedback can affect future predictions, the prediction method used, the decision model, or the implementation. Careful monitoring aids in fine-tuning the new system and ensuring that all necessary activities are being properly performed.

Diff: 2 Type: ES

Skill: Understand

Objective: LO 11-2

28) A student is considering whether to finish their university program in four consecutive years, or take a year off and work for some extra cash.

Required:

- a. Identify at least two revenues or costs that are relevant to making this decision. Explain why each is relevant.
- b. Identify at least two costs that would be considered sunk costs for this decision.
- c. Comment on at least one qualitative consideration for this decision.

Answer:

a. Relevant revenues/costs are those that differ between the alternatives of continuing with university or taking a year off from university and working. Relevant costs for continuing your college education without a break include:

1. Earnings lost next year due to the hours you are not able to work because of classes and homework.
2. As a result of graduating a year earlier, higher wages will be earned a year earlier as well.

b. Sunk costs for this decision include:

1. Amounts paid for university tuition and books during the past two years.
2. Amounts committed for university tuition and books for the remaining two years.

c. A qualitative consideration would include having different activities and priorities than your friends who are students, graduating later than students who started university the same time you did, and retaining information over the year off from school.

Diff: 2 Type: ES

Skill: Understand

Objective: LO 11-2

29) Explain what revenues and costs are relevant when choosing among alternatives.

Answer: Future amounts that differ among alternatives are considered relevant. Amounts that remain the same among alternatives do not add useful information for selecting an alternative, and therefore, are not considered relevant for decision making.

Diff: 2 Type: ES

Skill: Remember

Objective: LO 11-2

30) Explain why sunk costs are not considered relevant when choosing among alternatives.

Answer: Amounts that remain the same among alternatives do not add useful information for selecting an alternative, and therefore, are not considered relevant for decision making. Sunk costs by definition are those costs that have already been committed, cannot be changed, and will never differ among alternatives.

Diff: 2 Type: ES

Skill: Understand

Objective: LO 11-2

31) Chalet Ski & Patio manufactures a product that has two parts, X and Y. It is currently considering two alternative proposals related to parts X and Y.

The first proposal is for buying part Y. This would free up some of the plant space for the manufacture of more of part X and assembly of the final product. The product vice-president believes the additional production of the final product can be sold at the current market price. No other changes in manufacturing would be needed.

The second proposal is for buying new equipment for the production of part Y. The new equipment requires fewer workers and uses less power to operate. The old equipment has a net disposal value of zero.

Required:

Tell whether the following items are relevant or irrelevant for each proposal. Treat each proposal independently.

- a. Sales revenue of the product.
- b. Variable costs of assembling final products.
- c. Direct manufacturing materials, part X.
- d. Direct manufacturing materials, part Y.
- e. Direct manufacturing labour, part X.
- f. Direct manufacturing labour, part Y.
- g. Variable manufacturing overhead, part X.
- h. Variable manufacturing overhead, part Y.
- i. Cost of old equipment for manufacturing Y.
- j. Cost of new equipment for manufacturing Y.
- k. Variable selling and administrative costs.

Answer:	Proposal 1	Proposal 2
a.	R	I
b.	R	I
c.	R	I
d.	R	I
e.	R	I
f.	R	R
g.	R	I
h.	R	R
i.	I	I
j.	I	R
k.	R	I

Diff: 2 Type: ES

Skill: Apply

Objective: LO 11-2

11.3 Contrast relevant and irrelevant costs and revenue as well as quantitative and qualitative information influencing pricing decisions.

1) Quantitative factors are always expressed in financial terms.

Answer: FALSE

Explanation: Some quantitative factors are not expressed in monetary terms.

Diff: 2 Type: TF

Skill: Remember

Objective: LO 11-3

2) If a manufacturer chooses to continue purchasing direct materials from a supplier because of the on-going relationship that has developed over the years, the decision is based on qualitative factors.

Answer: TRUE

Diff: 2 Type: TF

Skill: Understand

Objective: LO 11-3

3) Insourcing is the process of producing goods and services within the firm rather than purchasing them from an outside supplier.

Answer: TRUE

Diff: 1 Type: TF

Skill: Remember

Objective: LO 11-3

4) An example of an outsourcing process is when a computer company purchases keyboards from another company instead of producing the components internally.

Answer: TRUE

Diff: 1 Type: TF

Skill: Understand

Objective: LO 11-3

5) For one-time-only special orders, variable costs may be relevant but not fixed costs.

Answer: TRUE

Diff: 2 Type: TF

Skill: Understand

Objective: LO 11-3

6) Outsourcing is risk free to the manufacturer because the supplier now has the responsibility of producing the part.

Answer: FALSE

Explanation: Outsourcing has risks since the manufacturer is dependent on the supplier for a quality product, delivered in a timely manner, for a reasonable price.

Diff: 2 Type: TF

Skill: Understand

Objective: LO 11-3

7) Bid prices and costs that are relevant for regular orders are the same costs that are relevant for one-time-only special orders.

Answer: FALSE

Explanation: Since long-term costs are relevant for regular orders and short-term costs are relevant for one-time-only special orders, the relevant costs differ.

Diff: 2 Type: TF

Skill: Understand

Objective: LO 11-3

8) The variation in total costs between two alternatives is known as

A) differential cost.

B) analyzed cost.

C) irrelevant cost.

D) predictable cost.

E) expected cost.

Answer: A

Diff: 2 Type: MC

Skill: Remember

Objective: LO 11-3

9) Employee morale at Bedland Inc. is very high. This type of information is known as

A) a qualitative factor.

B) a quantitative factor.

C) a nonmeasurable factor.

D) a financial factor.

E) a numerical factor.

Answer: A

Diff: 1 Type: MC

Skill: Understand

Objective: LO 11-3

10) Ted owns a small body shop. His major costs include labour, parts, and rent. In the decision making process, these costs are always considered to be

A) fixed.

B) qualitative factors.

C) quantitative factors.

D) variable.

E) relevant costs.

Answer: C

Diff: 1 Type: MC

Skill: Understand

Objective: LO 11-3

11) Which of the following represents a qualitative factor?

- A) any nonfinancial factor
- B) historical costs
- C) relevant costs
- D) the timing of variable costs
- E) an outcome that cannot be measured in numerical terms

Answer: E

Diff: 1 Type: MC

Skill: Remember

Objective: LO 11-3

12) A one-time-only special order decision

- A) should consider only long-term costs and benefits.
- B) must still consider short-term and long-term costs and benefits.
- C) allows a company to sell products at prices which only cover fixed costs.
- D) should consider only short-term costs and benefits.
- E) should only be undertaken if there is idle capacity.

Answer: B

Diff: 2 Type: MC

Skill: Understand

Objective: LO 11-3

13) Comics Plus has a current production level of 200,000 comics per month. Unit costs at this level are:

Direct materials	\$0.125
Direct labour	0.200
Variable overhead	0.075
Fixed overhead	0.100
Marketing - Fixed	0.100
Marketing/distribution - Variable	0.200

Current monthly sales are 180,000 units. Printers Ltd. has contacted Comics Plus about purchasing 15,000 units at \$1.00 each. Current sales would not be affected by the special order, and variable marketing/distributing costs would not be incurred on the special order.

What is Comics Plus' change in profits if the order is accepted?

- A) \$6,000 increase
- B) \$6,000 decrease
- C) \$7,500 increase
- D) \$9,000 increase
- E) \$3,000 increase

Answer: D

Explanation: D) Relevant variable cost per unit = \$0.125 + \$0.20 + \$0.075 = \$0.40

15,000 × (\$1.00 - \$0.40) = \$9,000 increase

Diff: 2 Type: MC

Skill: Apply

Objective: LO 11-3

14) Northern Glass Manufacturing has a current production level of 200,000 glass jars per month. Unit costs at this level are:

Direct materials	\$0.345
Direct labour	0.400
Variable overhead	0.175
Fixed overhead	0.100
Marketing - Fixed	0.100
Marketing/distribution - Variable	0.200

Current monthly sales are 180,000 units. Canadian Hardware Ltd. has contacted Northern Glass Manufacturing about purchasing 15,000 units at \$1.00 each. Current sales would not be affected by the special order, and variable marketing/distributing costs would not be incurred on the special order.

What is Comics Plus' change in profits if the order is accepted?

- A) \$4,800 increase
- B) \$4,800 decrease
- C) \$1,800 decrease
- D) \$300 decrease
- E) \$1,200 increase

Answer: E

Explanation: E) Manufacturing cost per unit = $\$0.345 + \$0.40 + \$0.175 = \0.92

$15,000 \times (\$1.00 - \$0.92) = \$1,200$ increase

Diff: 2 Type: MC

Skill: Apply

Objective: LO 11-3

15) First Image has a plant capacity of 80,000 units per month. Unit costs at capacity are:

Direct materials	\$2.00
Direct labour	3.00
Variable overhead	1.50
Fixed overhead	1.50
Marketing - Fixed	3.50
Marketing/distribution - Variable	1.80

Current monthly sales are 78,000 units at \$12.60 each. Computer Output Management has contacted First Image about purchasing 2,000 units at \$12.00 each. Current sales would not be affected by the special order. What is First Image's change in profits if the order is accepted?

- A) \$7,400 increase
- B) \$8,600 increase
- C) \$4,400 increase
- D) \$2,600 decrease
- E) \$3,600 decrease

Answer: A

Explanation: A) $(\$2.00 + 3.00 + 1.50 + 1.80) = \8.30

$(\$12.00 - 8.30) \times 2,000 = \$7,400$ increase

Diff: 2 Type: MC

Skill: Apply

Objective: LO 11-3

16) Ratzlaff Company has a current production level of 20,000 units per month. Unit costs at this level are:

Direct materials	\$0.25
Direct labour	0.40
Variable overhead	0.15
Fixed overhead	0.20
Marketing - fixed	0.20
Marketing/distribution - variable	0.40

Current monthly sales are 18,000 units. Jim Company has contacted Ratzlaff Company about purchasing 1,500 units at \$2.00 each. Current sales would NOT be affected by the one-time-only special order, and variable marketing/distribution costs would NOT be incurred on the special order. What is Ratzlaff Company's change in operating profits if the special order is accepted?

- A) \$400 increase in operating profits
- B) \$400 decrease in operating profits
- C) \$1,800 increase in operating profits
- D) \$1,800 decrease in operating profits
- E) \$1,500 increase in operating profits

Answer: C

Explanation: C) Manufacturing cost per unit = $\$0.25 + \$0.40 + \$0.15 = \0.80 ; $1,500 \times (\$2.00 - \$0.80) = \$1,800$ increase

Diff: 2 Type: MC

Skill: Apply

Objective: LO 11-3

17) Precision Sewing Company incorporates the services of Rosie's Sewing. Precision purchases pre-cut dresses from Rosie's. This is primarily known as

- A) insourcing.
- B) outsourcing.
- C) product needs analysis.
- D) product specialization.
- E) qualitative analysis.

Answer: B

Diff: 1 Type: MC

Skill: Understand

Objective: LO 11-3

18) Anchor Sign Company manufactures signs from direct materials to the finished product. This is an example of which of the following?

- A) insourcing
- B) outsourcing
- C) product needs analysis
- D) product specialization
- E) utilization of idle facilities

Answer: A

Diff: 1 Type: MC

Skill: Understand

Objective: LO 11-3

19) Omark Corporation currently manufactures a subassembly for its main product. The variable costs per unit are \$48, in addition to a \$6 charge based on estimated selling expenses.

R-Corp has contacted Omark with an offer to sell them 5,000 of the subassemblies for \$44.00 each. Omark will eliminate \$50,000 of fixed overhead if it accepts the proposal.

What is increase or decrease in profit from accepting the offer?

- A) \$50,000 increase
- B) \$100,000 increase
- C) \$170,000 increase
- D) \$50,000 decrease
- E) \$70,000 increase

Answer: B

Explanation: B) $((\$54 \times 5,000) + \$50,000) - (\$44 \times 5,000) = \$100,000$

Diff: 2 Type: MC

Skill: Apply

Objective: LO 11-3

20) When considering a project that will require production using otherwise idle resources, which of the following are TRUE?

- A) Avoidable fixed costs are irrelevant.
- B) Only the variable costs of the project are relevant.
- C) Only financial factors should be considered.
- D) The project should not be undertaken if total revenue from the project is less than the total costs of production.
- E) In the short run, even if revenue is less than the total costs of production, the project could help the company's overall operating income.

Answer: E

Diff: 2 Type: MC

Skill: Understand

Objective: LO 11-3

Use the information below to answer the following question(s).

Northwoods manufactures rustic furniture. The cost accounting system estimates manufacturing costs to be \$90 per table, consisting of 80% variable costs and 20% fixed costs. The company has surplus capacity available. It is Northwoods' policy to add a 50% markup to full costs.

21) Northwoods is invited to bid on a one-time-only special order to supply 100 rustic tables. What is the lowest price Northwoods should bid on this special order?

- A) \$6,300
- B) \$7,200
- C) \$10,800
- D) \$13,500
- E) \$9,000

Answer: B

Explanation: B) $\$90 \times 80\% \times 100 \text{ tables} = \$7,200$

Diff: 2 Type: MC

Skill: Apply

Objective: LO 11-3

Answer the following question(s) using the information below.

Welch Manufacturing is approached by a European customer to fulfill a one-time-only special order for a product similar to one offered to domestic customers. Welch Manufacturing has excess capacity. The following per unit data apply for sales to regular customers:

Variable costs:	
Direct materials	\$40
Direct labour	20
Manufacturing support	35
Marketing costs	15
Fixed costs:	
Manufacturing support	45
Marketing costs	15
Total costs	\$170
Markup (50%)	85
Targeted selling price	\$255

22) What is the full cost of the product per unit?

- A) \$110
- B) \$170
- C) \$255
- D) \$95
- E) \$140

Answer: B

Explanation: B) $\$40 + \$20 + \$35 + \$15 + \$45 + \$15 = \$170$

Diff: 1 Type: MC

Skill: Apply

Objective: LO 11-3

23) What is the contribution margin per unit?

- A) \$85
- B) \$110
- C) \$145
- D) \$160
- E) \$195

Answer: C

Explanation: C) $\$255 - (\$40 + \$20 + \$35 + \$15) = \145

Diff: 2 Type: MC

Skill: Apply

Objective: LO 11-3

24) For Welch Manufacturing, what is the minimum acceptable price of this special order?

- A) \$110
- B) \$140
- C) \$170
- D) \$240
- E) \$255

Answer: A

Explanation: A) $\$40 + \$20 + \$35 + \$15 = \$110$

Diff: 2 Type: MC

Skill: Apply

Objective: LO 11-3

25) What is the change in operating profits if the one-time-only special order for 1,000 units is accepted for \$180 a unit by Welch?

- A) \$70,000 increase in operating profits
- B) \$10,000 increase in operating profits
- C) \$10,000 decrease in operating profits
- D) \$75,000 decrease in operating profits
- E) \$40,000 increase in operating profits

Answer: A

Explanation: A) $\$180 - (\$40 + \$20 + \$35 + \$15) = \70 ; $1,000 \times \$70 = \$70,000$ increase

Diff: 3 Type: MC

Skill: Apply

Objective: LO 11-3

Answer the following question(s) using the information below.

Grant's Kitchens is approached by Ms. Tammy Wang, a new customer, to fulfill a large one-time-only special order for a product similar to one offered to regular customers. The following per unit data apply for sales to regular customers:

Direct materials	\$455
Direct labour	300
Variable manufacturing support	45
Fixed manufacturing support	100
Total manufacturing costs	\$900
Markup (60%)	540
Targeted selling price	\$1,440

Grant's Kitchens has excess capacity. Ms. Wang wants the cabinets in cherry rather than oak, so direct material costs will increase by \$30 per unit.

26) For Grant's Kitchens, what is the minimum acceptable price of this one-time-only special order?

- A) \$830
- B) \$900
- C) \$930
- D) \$1,440
- E) \$800

Answer: A

Explanation: A) $\$455 + \$300 + \$45 + \$30 = \$830$

Diff: 2 Type: MC

Skill: Apply

Objective: LO 11-3

27) Other than price, what other item should Grant's Kitchens consider before accepting this one-time-only special order?

- A) reaction of shareholders
- B) management stock options
- C) demand for cherry cabinets
- D) price is the only consideration
- E) reaction of existing customers to the lower price offered to Ms. Wang

Answer: E

Diff: 2 Type: MC

Skill: Understand

Objective: LO 11-3

- 28) For make-or-buy decisions, a supplier's ability to deliver the item on a timely basis is considered a(n)
- A) qualitative factor.
 - B) relevant cost.
 - C) differential factor.
 - D) opportunity cost.
 - E) quantitative factor.

Answer: A

Diff: 1 Type: MC

Skill: Remember

Objective: LO 11-3

Answer the following question(s) using the information below.

Konrade's Engine Company manufactures part TE456 used in several of its engine models. Monthly production costs for 1,000 units are as follows:

Direct materials	\$40,000
Direct labour	10,000
Variable overhead costs	30,000
Fixed overhead costs	<u>20,000</u>
Total costs	<u>\$100,000</u>

It is estimated that 10% of the fixed overhead costs assigned to TE456 will no longer be incurred if the company purchases TE456 from the outside supplier. Konrade's Engine Company has the option of purchasing the part from an outside supplier at \$85 per unit.

- 29) If Konrade's Engine Company accepts the offer from the outside supplier, the monthly avoidable costs (costs that will no longer be incurred) total

- A) \$80,000
- B) \$98,000
- C) \$50,000
- D) \$100,000.
- E) \$82,000

Answer: E

Explanation: E) $\$40,000 + \$10,000 + \$30,000 + (\$20,000 \times 10\%) = \$82,000$

Diff: 2 Type: MC

Skill: Apply

Objective: LO 11-3, 4

30) If Konrade's Engine Company purchases 1,000 TE456 parts from the outside supplier per month, then its monthly operating income will

- A) increase by \$13,000.
- B) increase by \$15,000.
- C) decrease by \$5,000.
- D) decrease by \$3,000.
- E) decrease by \$35,000.

Answer: D

Explanation: D) Avoidable costs $\$82,000 - (\$85 \times 1,000 \text{ units}) = \text{decrease of } \$3,000$

Diff: 3 Type: MC

Skill: Analyze

Objective: LO 11-3, 4

31) The *maximum* price that Konrade's Engine Company should be willing to pay the outside supplier is

- A) \$80 per TE456 part.
- B) \$82 per TE456 part.
- C) \$98 per TE456 part.
- D) \$100 per TE456 part.
- E) \$50 per TE456 part.

Answer: B

Explanation: B) Avoidable costs $\$82,000 / 1,000 \text{ units} = \82 per part

Diff: 2 Type: MC

Skill: Analyze

Objective: LO 11-3, 4

32) Unit cost data can mislead decisions by including irrelevant costs or by

- A) not computing fixed overhead costs.
- B) computing labour and materials costs only.
- C) computing administrative costs.
- D) not computing unit costs at the relevant output level.
- E) including qualitative data.

Answer: D

Diff: 2 Type: MC

Skill: Remember

Objective: LO 11-3

33) Audio Labs collected the following information on the cost of producing 20,000 speaker units:

Direct materials	\$32.00 per unit
Direct labour	4.00 per unit
Variable overhead	16.00 per unit
Fixed overhead	20.00 per unit

Cartunes has offered to sell Audio 10,000 speakers for \$56.00 each.

Should Audio Labs make or buy the parts if the facilities remain idle when speakers are purchased?

- A) buy, save \$16.00 per unit
- B) buy, save \$4.00 per unit
- C) make, save \$2.00 per unit
- D) make, save \$4.00 per unit
- E) make, save \$6.00 per unit

Answer: D

Explanation: D)	<u>Make</u>	<u>Buy</u>
Purchase price		\$56
Direct materials	\$32	
Direct labour	4	
Variable overhead	16	
	\$52	\$56

\$52 - \$56 = (4); fixed costs are the same under both alternatives

Diff: 2 Type: MC

Skill: Apply

Objective: LO 11-3

34) Snapper Tool Company has a production capacity of 3,000 units per month, but current production is only 2,500 units. Total manufacturing costs are \$60 per unit and marketing costs are \$16 per unit. Doug Levy offers to purchase 500 units at \$76 each for the next five months. Should Snapper accept the one-time-only special order if only absorption-costing data are available?

- A) Yes, good customer relations are essential.
- B) No, the company will only break even.
- C) No, since only the employees will benefit.
- D) Yes, since operating profits will most likely increase.
- E) Yes, because breaking even is better than having idle capacity.

Answer: D

Explanation: D) Since the \$60 absorption cost per unit is most likely not all variable costs and since the entire \$16 per unit of marketing costs may not be incurred, operating profits will most likely increase.

Diff: 3 Type: MC

Skill: Understand

Objective: LO 11-3

35) Clearwater Company operates a wine outlet in a tourist area. One litre bottles sell for \$12. Daily fixed costs are \$3,000, and variable costs are \$6 per litre. An average of 750 litres are sold each day. Clearwater has a capacity of 800 litres per day.

Required:

- Determine the average cost per bottle.
- A bus loaded with 40 senior citizens stops by at closing time and the tour director offers Clearwater \$300 for 40 litres. Clearwater refuses, saying they would lose \$2.50 on each litre. Is Clearwater correct about the \$2.50? Why or why not?
- A fund-raising organization has offered Clearwater a one-year contract to buy 300 litres a day for \$7.50 each. Should they accept the offer? Why or why not?

Answer:

a.

Variable costs ($\$6 \times 750$) \$4,500

Fixed costs 3,000

Total costs \$7,500

Average costs = $\$7,500 / 750 = \10

b.

Average costs \$10.00

Offer ($\$300/40$) 7.50

Net loss \$2.50

Clearwater is correct in that she would lose \$2.50. However, since it is the end of the day, and assuming she has capacity, she should accept the offer since it covers her variable cost. She would make a contribution of $\$1.50 \times (\$7.50 - \$6.00)$ per unit for a total of \$60.

c.

Capacity 800

Offer 300

Net to other customers 500

Current average 750

Lost regular sales 250

Lost regular sales $250 \times (\$12 - \$6)$ \$1,500

Offer $250 \times (\$7.50 - \$6) =$ 375

Lost contribution margin \$1,125

Margin gained $50 \times (\$7.50 - \$6)$ 75

Net loss \$1,050

Clearwater should not accept the offer because it reduces sales by 50 units at the regular price of \$12. This reduces total contribution margin by \$1,050 a day.

Diff: 3 Type: ES

Skill: Analyze

Objective: LO 11-3

36) Axle and Wheel Manufacturing is approached by a European customer to fill a one-time-only special order for a product similar to one offered to domestic customers. The following per unit data apply for sales to regular customers:

Direct materials	\$33
Direct labour	15
Variable manufacturing support	24
Fixed manufacturing support	<u>52</u>
Total manufacturing costs	\$124
Markup (50%)	<u>62</u>
Targeted selling price	<u>\$186</u>

Axle and Wheel Manufacturing has excess capacity.

Required:

- What is the full cost of the product per unit?
- What is the contribution margin per unit?
- Which costs are relevant for making the decision regarding this one-time-only special order? Why?
- For Axle and Wheel Manufacturing, what is the minimum acceptable price of this one-time-only special order?
- For this one-time-only special order, should Axle and Wheel Manufacturing consider a price of \$100 per unit? Why or why not?

Answer:

- \$124
- \$114 = Selling price \$186 - Variable costs (\$33 + \$15 + \$24).
- Relevant costs for decision making are those costs that differ between alternatives, which in this situation are the incremental costs. The incremental costs total \$72 = Variable costs (\$33 + \$15 + \$24).
- The minimum acceptable price is \$72 = Variable costs (\$33 + \$15 + \$24), which are the incremental costs in the short term.
- Yes, because this price is greater than the minimum acceptable price of this special order determined in (d).

Diff: 2 Type: ES

Skill: Analyze

Objective: LO 11-3

37) Parker and Spitzer Manufacturing is approached by a European customer to fulfill a one-time-only special order for a product similar to one offered to domestic customers. The following per unit data apply for sales to regular customers:

Direct materials	\$66
Direct labour	30
Variable manufacturing support	48
Fixed manufacturing support	<u>104</u>
Total manufacturing costs	248
Markup (50%)	<u>124</u>
Targeted selling price	<u>\$372</u>

Parker and Spitzer Manufacturing has excess capacity.

Required:

- What is the full cost of the product per unit?
- What is the contribution margin per unit?
- Which costs are relevant for making the decision regarding this one-time-only special order? Why?
- For Parker and Spitzer Manufacturing, what is the minimum acceptable price of this one-time-only special order?
- For this one-time-only special order, should Parker and Spitzer Manufacturing consider a price of 200 per unit? Why or why not?

Answer:

- \$248
- $\$228 = \text{Selling price } \$372 - \text{Variable costs } (\$66 + \$30 + \$48)$.
- Relevant costs for decision making are those costs that differ between alternatives, which in this situation are the incremental costs. The incremental costs total $\$144 = \text{Variable costs } (\$66 + \$30 + \$48)$.
- The minimum acceptable price is $\$144 = \text{Variable costs } (\$66 + \$30 + \$48)$, which are the incremental costs in the short term.
- Yes, because this price is greater than the minimum acceptable price of this special order determined in (d).

Diff: 2 Type: ES

Skill: Analyze

Objective: LO 11-3

38) Silver Lake Cabinets is approached by Ms. Jenny Zhang, a new customer, to fulfill a large one-time-only special order for a product similar to one offered to regular customers. The following per unit data apply for sales to regular customers:

Direct materials	\$100
Direct labour	125
Variable manufacturing support	60
Fixed manufacturing support	<u>75</u>
Total manufacturing costs	\$360
Markup (60%)	<u>216</u>
Targeted selling price	<u>\$576</u>

Silver Lake Cabinets has excess capacity. Ms. Zhang wants the cabinets in cherry rather than oak, so direct material costs will increase by \$30 per unit.

Required:

- For Silver Lake Cabinets, what is the minimum acceptable price of this one-time-only special order?
- Other than price, what other items should Silver Lake Cabinets consider before accepting this one-time-only special order?
- How would the analysis differ if there was limited capacity?

Answer:

- $\$315 = \text{Variable costs } (\$100 + \$125 + \$60) + \$30 \text{ additional cost for cherry.}$
- Silver Lake Cabinets should also consider the impact on current customers when these customers hear that another customer was offered a discounted price, and the impact on the competition and if they might choose to meet the discounted price.
- Currently, the incremental costs total \$315. If additional capacity is needed to process this order, these incremental costs will increase by the cost of adding capacity.

Diff: 2 Type: ES

Skill: Analyze

Objective: LO 11-3

39) Are relevant revenues and relevant costs the only information needed by managers to select among alternatives? Explain using examples.

Answer: No, relevant revenues and costs provide a financial analysis but do not take into consideration qualitative implications. In a make-or-buy decision, examples of qualitative issues include the supplier's ability to meet expected quality and delivery standards, and the likelihood that suppliers increase prices of the components in the future.

Diff: 2 Type: ES

Skill: Understand

Objective: LO 11-3

40) A restaurant is deciding whether it wants to update its image or not. It currently has a cozy appeal with loyal customers. The outdated décor that is still in good condition; menus and carpet need to be replaced.

Required:

Identify for the restaurant management:

- a. those costs that are relevant to this decision
- b. qualitative considerations.

Answer: For the decision of whether to update the restaurant's image:

- a. Relevant costs include a one-time cost of the renovation for the updated image, and a change in future sales which includes an increase in sales due to the updated image, decrease in sales due to loss of that cozy appeal, and loss of sales due to being closed or having a limited serving area during renovation.
- b. Qualitative considerations include whether the restaurant will lose that cozy appeal it currently has, if the restaurant needs to be closed for renovations it may result in loss of customers, and new customers may not be the type of customer they want to attract.

Diff: 2 Type: ES

Skill: Apply

Objective: LO 11-3

11.4 Explain the opportunity-cost concept and why it is used in decision making.

1) Opportunity cost is the contribution to income that is recognized through the use of limited resources available in the best alternative.

Answer: FALSE

Explanation: Opportunity cost is the contribution to operating income that is lost by not using a limited resource in its next-best alternative use.

Diff: 2 Type: TF

Skill: Remember

Objective: LO 11-4

2) Quantitative factors are relevant, and qualitative factors are irrelevant, in making outsourcing decisions.

Answer: FALSE

Diff: 2 Type: TF

Skill: Remember

Objective: LO 11-3, 4

3) If the \$17,000 spent to purchase inventory could be invested and earn interest of \$1,000, then the opportunity cost of holding inventory is \$17,000.

Answer: FALSE

Explanation: The opportunity cost of holding inventory is \$1,000.

Diff: 2 Type: TF

Skill: Apply

Objective: LO 11-3

4) When opportunity costs exist, they are always relevant.

Answer: TRUE

Diff: 2 Type: TF

Skill: Understand

Objective: LO 11-4

5) When managers are faced with constraints the product line with the higher contribution margin per unit is always the best choice to make.

Answer: FALSE

Diff: 2 Type: TF

Skill: Remember

Objective: LO 11-4

6) A decision as to whether to insource or outsource is a(n)

A) idle capacity decision.

B) production scheduling analysis.

C) product mix decision.

D) short-run focus decision.

E) make/buy decision.

Answer: E

Diff: 1 Type: MC

Skill: Remember

Objective: LO 11-3, 4

7) Which of the following would not be considered in a make or buy decision?

A) potential usage of manufacturing capacity

B) variable costs of production

C) potential rental income from space occupied by production area

D) unchanged fixed costs

E) qualitative factors

Answer: D

Diff: 1 Type: MC

Skill: Understand

Objective: LO 11-3, 4

8) Which of the following is TRUE concerning opportunity costs?

A) They are incorporated into formal financial accounting reports.

B) They entail cash receipts.

C) They entail cash disbursements.

D) They require accounting journal entries.

E) They are relevant for the make/buy decision.

Answer: E

Diff: 3 Type: MC

Skill: Understand

Objective: LO 11-4

9) If Harry Inc. doesn't use one of its limited resources in the best possible way, the lost contribution to income could be called

- A) an alternative cost.
- B) a total alternative cost.
- C) an opportunity cost.
- D) a resource cost.
- E) a constraining factor.

Answer: C

Diff: 2 Type: MC

Skill: Remember

Objective: LO 11-4

10) A company has two manufacturing facilities: one in Alberta that produces a bulk chemical that it sells to many different retailers, and one facility in Ontario that is dedicated to producing a specialty chemical for one client only. The annual profit from the single client is \$150,000; and, the profit from the other facility's sales is \$1,500,000, after allocating combined fixed costs based on units produced. Another company has offered to lease the Ontario facilities for \$250,000.

Which of the following is TRUE?

- A) The \$250,000 is an opportunity cost of continuing to use the Ontario plant.
- B) The company incurred a \$250,000 opportunity cost for the past years, but this was not recorded on its books.
- C) The company needs to determine the contribution margin for each product before making any decision.
- D) Incremental revenues exceed total costs if the plant is rented.
- E) Incremental costs exceed incremental revenues if the plant is rented.

Answer: A

Diff: 2 Type: MC

Skill: Understand

Objective: LO 11-4

Answer the following question(s) using the information below.

Central Medical Supply Inc., a manufacturer of medical testing equipment, has \$240,000 worth of an obsolete line of testing equipment. The obsolete equipment can be adapted to fit another line of testing equipment at a cost of \$64,000; the market value would then be \$136,000. However, Tripac offered to purchase the obsolete equipment as is for \$88,000.

11) Central Medical Supply Inc., a manufacturer of medical testing equipment, has \$240,000 worth of an obsolete line of testing equipment. The obsolete equipment can be adapted to fit another line of testing equipment at a cost of \$64,000; the market value would then be \$136,000. However, Tripac offered to purchase the obsolete equipment as is for \$88,000.

What are the relevant figures above for management in their decision?

- A) (\$240,000 + \$64,000); (\$88,000 - 0)
- B) (\$240,000 + \$64,000); (\$88,000 - 240,000)
- C) (\$240,000 + \$64,000); (\$88,000 + 240,000)
- D) (\$136,000 - \$64,000); (\$88,000 - 0)
- E) (\$136,000 - \$64,000); (\$88,000 - 240,000)

Answer: D

Explanation: D) Note: the \$240,000 is a sunk cost.

	Repair	Sell
Revenues	\$136,000	\$88,000
Additional Costs	<u>64,000</u>	<u>.....0</u>
Differential totals	<u>\$72,000</u>	<u>\$88,000</u>

Diff: 2 Type: MC

Skill: Analyze

Objective: LO 11-3, 4

12) What is the opportunity cost associated with the adaptation of the equipment to another line of testing equipment assuming Central accepts Tripac's offer?

- A) \$72,000
- B) \$88,000
- C) \$63,000
- D) \$240,000
- E) none of the above

Answer: A

Explanation: A) Best alternative is to sell; therefore, the opportunity cost is \$72,000.

Diff: 3 Type: MC

Skill: Understand

Objective: LO 11-4

13) For make-or-buy decisions, relevant costs include

- A) direct material costs plus direct labour costs.
- B) incremental costs plus opportunity costs.
- C) differential costs plus sunk costs.
- D) incremental costs plus fixed costs.
- E) variable costs plus fixed overhead.

Answer: B

Diff: 3 Type: MC

Skill: Remember

Objective: LO 11-3, 4

14) The opportunity cost of holding significant inventory includes

- A) contribution margin on the extra inventory.
- B) additional insurance costs.
- C) additional storage costs.
- D) the cost of the inventory plus the added insurance and storage costs.
- E) the interest forgone on an alternative investment.

Answer: E

Diff: 2 Type: MC

Skill: Understand

Objective: LO 11-4

Answer the following question(s) using the information below.

Schmidt Corporation produces a part that is used in the manufacture of one of its products. The costs associated with the production of 10,000 units of this part are as follows:

Direct materials	\$45,000
Direct labour	65,000
Variable factory overhead	30,000
Fixed factory overhead	70,000
Total costs	<u>\$210,000</u>

Of the fixed factory overhead costs, \$30,000 is avoidable.

15) Phil Company has offered to sell 10,000 units of the same part to Schmidt Corporation for \$18 per unit. Assuming there is no other use for the facilities, Schmidt should

- A) make the part, as this would save \$3 per unit.
- B) buy the part, as this would save \$3 per unit.
- C) make the part, as this would save \$4 per unit.
- D) make the part, as this would save \$1 per unit.
- E) buy the part, as this would save \$4 per unit.

Answer: D

Explanation: D) Avoidable costs total \$170,000 = \$45,000 + \$65,000 + \$30,000 + \$30,000.

\$18 - (\$170,000/10,000) = \$1

Diff: 3 Type: MC

Skill: Analyze

Objective: LO 11-3, 4

16) Assuming no other use of their facilities, the highest price that Schmidt should be willing to pay for 10,000 units of the part is

- A) \$210,000.
- B) \$170,000.
- C) \$110,000.
- D) \$180,000.
- E) \$140,000.

Answer: B

Explanation: B) $\$45,000 + \$65,000 + \$30,000 + \$30,000 = \$170,000$

Diff: 2 Type: MC

Skill: Analyze

Objective: LO 11-3, 4

17) Assuming accepting the offer creates excess facility capacity that can be used to produce 2,000 units of another product that has a unit selling price of \$24, variable costs of \$12, and fixed cost allocation of \$3.

What is the highest price that Schmidt should be willing to pay Phil Company for 10,000 units of the part?

- A) \$146,000
- B) \$164,000
- C) \$152,000
- D) \$134,000
- E) \$140,000

Answer: A

Explanation: A) $(\$45,000 + \$65,000 + \$30,000 + \$30,000) - (2,000 \times (\$24 - \$12)) = \$146,000$

Diff: 3 Type: MC

Skill: Analyze

Objective: LO 11-3, 4

18) Lynn Valley Corporation currently manufactures a subassembly for its main product. The costs per unit are as follows:

Direct materials	\$2.00
Direct labour	20.00
Variable overhead	10.00
Fixed overhead	16.00

Reliance Corp has contacted Lynn Valley with an offer to sell them 5,000 of the subassemblies for \$44.00 each. Lynn Valley will eliminate \$50,000 of fixed overhead if it accepts the proposal.

Should Omark make or buy the subassemblies? What is the difference between the two alternatives?

A) buy; savings = \$20,000

B) buy; savings = \$50,000

C) make; savings = \$60,000

D) make; savings = \$10,000

E) buy; savings = \$10,000

Answer: D

Explanation: D) Cost to buy: $5,000 \times \$44 = \$220,000$;

Cost to make: $((\$2.00 + 20.00 + 10.00) \times 5000) + \$50,000 = \$210,000$

$$\$220,000 - 210,000 = \$10,000 \text{ ** make}$$

Diff: 3 Type: MC

Skill: Analyze

Objective: LO 11-3, 4

Answer the following question(s) using the information below.

Day Star collected the following information:

Cost to buy one unit	\$48
Production costs per unit:	
Direct materials	\$22
Direct labour	\$16
Variable overhead	\$2
Total fixed overhead	\$360,000

Day Star can sell 25,000 units per year, at \$80 each. The company also has an offer from a subsidiary to rent its plant facilities for \$2,000,000. The fixed overhead will be incurred in each alternative, but there will be a savings of \$150,000 in the fixed costs under the renting alternative.

19) Based on the above information only, should Day Star make or buy the product or rent its facilities out?

- A) buy
- B) make
- C) either make or buy - indifferent
- D) rent the facilities to the subsidiary
- E) either make or rent - indifferent

Answer: D

Explanation: D) As the revenue is the same for each alternative, only cost is relevant.

Relevant cost to make: $(\$22 + \$16 + \$2) \times 25,000 + \$360,000 = \$1,360,000$

Relevant cost to buy: $(25,000 \times \$80) - [(25,000 \times \$48) + \$360,000] = \$1,560,000$

Relevant revenue/cost if rent = \$210,000

Diff: 3 Type: MC

Skill: Analyze

Objective: LO 11-3, 4

20) What production level is required for Day Star to be indifferent between making or buying the part if \$260,000 of fixed costs can be eliminated by buying?

- A) 32,500 units
- B) 26,500 units
- C) 12,500 units
- D) 1,000 units
- E) 0 units

Answer: A

Explanation: A) $[\$48X + (\$360,000 - \$260,000)] = \$40X + \$360,000$

$\$48X - \$40X = \$260,000$

$\$8X = \$260,000$

$X = 32,500$ units

Diff: 3 Type: MC

Skill: Analyze

Objective: LO 11-3, 4

Answer the following question(s) using the information below.

Helmer's Rockers manufactures two models, Standard and Premium. Weekly demand is estimated to be 100 units of the Standard Model and 70 units of the Premium Model. The following per unit data apply:

	<u>Standard</u>	<u>Premium</u>
Contribution margin per unit	\$18	\$20
Number of machine-hours required	3	4

21) The contribution per machine-hour is

- A) \$18 for Standard, \$20 for Premium.
- B) \$54 for Standard, \$80 for Premium.
- C) \$15 for Standard, \$16 for Premium.
- D) \$6 for Standard, \$5 for Premium.
- E) \$5 for Standard, \$6 for Premium.

Answer: D

Explanation: D) Standard $\$18/3 = \6 ; Premium $\$20/4 = \5

Diff: 2 Type: MC

Skill: Apply

Objective: LO 11-4

22) If there are 496 machine-hours available per week, how many rockers of each model should Jim Helmer produce to maximize profits?

- A) 100 units of Standard and 54 units of Premium
- B) 72 units of Standard and 70 units of Premium
- C) 100 units of Standard and 70 units of Premium
- D) 85 units of Standard and 60 units of Premium
- E) 100 units of Standard and 49 units of Premium

Answer: E

Explanation: E) Standard (100 units \times 3mh) + Premium (49 units \times 4 mh) = 496 machine-hours of the constrained resource

Diff: 3 Type: MC

Skill: Apply

Objective: LO 11-4

Answer the following question(s) using the information below.

Braun's Brakes manufactures three different product lines, Model X, Model Y, and Model Z. Considerable market demand exists for all models. The following per unit data apply:

	<u>Model X</u>	<u>Model Y</u>	<u>Model Z</u>
Selling price	\$50	\$60	\$70
Direct materials	6	6	6
Direct labour (\$12 per hour)	12	12	24
Variable support costs (\$4 per machine-hour)	4	8	8
Fixed support costs	10	10	10

23) If there is excess capacity then which model is the most profitable to produce?

- A) Model X
- B) Model Y
- C) Model Z
- D) Models X and Y
- E) Models X and Z

Answer: B

Explanation: B) Model Y since it has the greatest contribution margin per unit

Model X $\$50 - \$6 - \$12 - \$4 = \$28$

Model Y $\$60 - \$6 - \$12 - \$8 = \$34$ highest

Model Z $\$70 - \$6 - \$24 - \$8 = \$32$

Diff: 2 Type: MC

Skill: Apply

Objective: LO 11-4

24) If capacity is constrained then which model is the most profitable to produce?

- A) Model X
- B) Model Y
- C) Model Z
- D) Models Y and Z
- E) Models X and Z

Answer: A

Explanation: A) Model X since it has the greatest contribution margin per machine-hour

Model X $\$50 - \$6 - \$12 - \$4 = \$28$ highest

Model Y $\$60 - \$6 - \$12 - \$8 = \$34/2 = \17

Model Z $\$70 - \$6 - \$24 - \$8 = \$32/2 = \16

Diff: 3 Type: MC

Skill: Apply

Objective: LO 11-4

25) The greatest possible contribution margin per unit of the constraining factor will ensure which of the following?

- A) minimum total variable costs
- B) zero imputed costs
- C) minimum fixed cost per unit of production
- D) minimum variable costs per unit of production
- E) maximum operating income

Answer: E

Diff: 2 Type: MC

Skill: Understand

Objective: LO 11-4

26) Decisions on product mix involving multiple products, should be based on which of the following?

- A) the variable cost differential between the products
- B) the differential selling prices between the products
- C) fixed cost savings
- D) the amount of idle capacity
- E) individual product contribution margin totals

Answer: E

Diff: 2 Type: MC

Skill: Remember

Objective: LO 11-4

27) Last year, a sailboard company produced two types of boards: a regular board for multi-purpose sailing; and, a special trick board used by experts for competitions. The regular board sells for \$750 and the competition board sells for \$1,350. The variable production costs are \$250 and \$400 respectively, and the company has \$400,000 in fixed costs overall. Marketing staff have determined that the company should specialize in the competition boards only, and sell the regular boards, if at all, under a different brand name. Last year the company made a profit, selling twice as many regular boards as competition boards, resulting in a fixed cost allocation of \$5.00 per board. It takes 6 hours of direct labour to make a regular board and 12 hours to make a competition board. The company worked at full capacity of 19,500 direct labour hours last year.

Based on the above information only, which product or mix of products, should the company choose?

Assume that any and all production can be sold.

- A) the regular board only, as it takes fewer direct labour hours to build
- B) both, as the company made a profit last year using this strategy
- C) the competition board only, as it has a higher contribution margin
- D) Any combination is equivalent, based on the contribution margin times the number of boards that could be sold.
- E) the regular board only, as it has the highest contribution margin per direct labour hour

Answer: E

Diff: 2 Type: MC

Skill: Understand

Objective: LO 11-4

28) A local accounting firm has offered to do all the billings and collections of a general practitioner. The annual fee will be \$12,000. The service will replace the part-time bookkeeper who works for \$12 an hour, 10 hours a week. Because outsourcing accounting activities will take place away from the office, the doctor estimates that she will have one additional hour a week to see patients. Normally she sees four patients an hour with an average visit fee of \$100. The office is open 50 weeks a year. Since the computer service will maintain all records in its office, the doctor will no longer need to rent storage space for the office files. The storage space rents for \$150 a month.

Required: Determine whether or not the doctor should accept the offer to use the computer service.

Answer: Computer service Keep In-house

Computer service	\$12,000	
Bookkeeper ($10 \times 50 \times \$12$)		6,000
Rent ($12 \times \$150$)		1,800
Opportunity costs		
($4 \times 1 \times \$100 \times 50$)		<u>20,000</u>
Totals	<u>\$12,000</u>	<u>\$27,800</u>

Therefore, she should accept the offer to use the computer service

Diff: 3 Type: ES

Skill: Analyze

Objective: LO 11-4

29) Car Parts Company manufactures a part for use in its production of automobiles. The costs per unit when 10,000 items are produced are:

Direct materials	\$6
Direct manufacturing labour	30
Variable manufacturing overhead	12
Fixed manufacturing overhead	<u>16</u>
Total	\$64

Auto Company has offered to sell to Car Parts Company 10,000 units of the part for \$60. The plant facilities could be used to manufacture another part at a savings of \$90,000 if Car Parts accepts the offer. In addition, \$10 per unit of fixed manufacturing overhead on the original part would be eliminated.

Required:

- What is the relevant per unit cost for the original part?
- Which alternative is best for Car Parts Company? By how much?

Answer:

a.

Direct materials	\$6
Direct manufacturing labour	30
Variable manufacturing overhead	12
Avoidable fixed mfg. overhead	<u>10</u>
Total relevant per unit costs	\$58

b.

	<u>Make</u>	<u>Buy</u>	<u>Effect of Buying</u>
Purchase price		\$(600,000)	
Savings in space		90,000	
Direct materials	\$60,000		
Direct mfg. labour	300,000		
Variable overhead	120,000		
Fixed overhead saved		100,000	
Totals	\$480,000	\$410,000	\$70,000

Diff: 3 Type: ES

Skill: Analyze

Objective: LO 11-3, 4

30) Clinton Company sells two items, product A and product B. The company is considering dropping product B. It is expected that sales of product A will increase by 40% as a result. Dropping product B will allow the company to cancel its monthly equipment rental costing \$100 per month. The other existing equipment will be used for additional production of product A. One employee earning \$200 per month can be terminated if product B production is dropped. Clinton's other fixed costs are allocated and will continue regardless of the decision made. A condensed, budgeted monthly income statement with both products follows:

	<u>Product A</u>	<u>Product B</u>	<u>Total</u>
Sales	\$10,000	\$8,000	\$18,000
Direct materials	2,500	2,000	4,500
Direct labour	2,000	1,200	3,200
Equipment rental	300	2,600	2,900
Other allocated overhead	<u>1,000</u>	<u>2,100</u>	<u>3,100</u>
Operating income	\$4,200	\$100	\$4,300

Required:

Prepare an incremental analysis to determine the financial effect of dropping product B.

Answer: Incremental change in revenue:

	Product A increase in sales $\$10,000 \times 40\%$	\$4,000
	Product B decrease in sales	<u>(8,000)</u>
Incremental decrease in revenue		(\$4,000)

Incremental change in variable costs:

Direct materials:	Product A increase $\$2,500 \times 40\%$	\$(1,000)
	Product B decrease	2,000
Direct labour :	Product A increase $\$2,000 \times 40\%$	(800)
	Product B decrease	<u>200</u>
Incremental decrease in variable costs		\$400
Equipment rental deduction		<u>100</u>
Incremental decrease in profits if product B is dropped		(\$3,500)

Diff: 3 Type: ES

Skill: Analyze

Objective: LO 11-4

31) Kirkland Company manufactures a part for use in its production of hats. When 10,000 items are produced, the costs per unit are:

Direct materials	\$0.60
Direct manufacturing labour	3.00
Variable manufacturing overhead	1.20
Fixed manufacturing overhead	<u>1.60</u>
Total	<u>\$6.40</u>

Mike Company has offered to sell to Kirkland Company 10,000 units of the part for \$6.00 per unit. The plant facilities could be used to manufacture another item at a savings of \$9,000 if Kirkland accepts the offer. In addition, \$1.00 per unit of fixed manufacturing overhead on the original item would be eliminated.

Required:

- What is the relevant per unit cost for the original part?
- Which alternative is best for Kirkland Company? By how much?

Answer:

a.

Direct materials	\$0.60
Direct manufacturing labour	3.00
Variable manufacturing overhead	1.20
Avoidable fixed manufacturing overhead	<u>1.00</u>
Total relevant per unit costs	<u>\$5.80</u>

b.

	<u>Make</u>	<u>Buy</u>	<u>Effect of Buying</u>
Purchase price		\$60,000	\$(60,000)
Savings in space		(9,000)	9,000
Direct materials	\$6,000		6,000
Direct mfg. labour	30,000		30,000
Variable overhead	<u>12,000</u>		12,000
Fixed overhead saved		<u>(10,000)</u>	<u>10,000</u>
Totals	<u>\$48,000</u>	<u>\$41,000</u>	<u>\$7,000</u>

Diff: 3 Type: ES

Skill: Analyze

Objective: LO 11-3, 4

32) Lewis Auto Company manufactures a part for use in its production of automobiles. When 10,000 items are produced, the costs per unit are:

Direct materials	\$12
Direct manufacturing labour	60
Variable manufacturing overhead	24
Fixed manufacturing overhead	<u>32</u>
Total	<u>\$128</u>

Monty Company has offered to sell Lewis Auto Company 10,000 units of the part for \$120 per unit. The plant facilities could be used to manufacture another part at a savings of \$180,000 if Lewis Auto accepts the supplier's offer. In addition, \$20 per unit of fixed manufacturing overhead on the original part would be eliminated.

Required:

- What is the relevant per unit cost for the original part?
- Which alternative is best for Lewis Auto Company? By how much?

Answer:

a.

Direct materials	\$12
Direct manufacturing labour	60
Variable manufacturing overhead	24
Avoidable fixed manufacturing overhead	<u>20</u>
Total relevant per unit costs	<u>\$116</u>

b.

	<u>Make</u>	<u>Buy</u>	<u>Effect of Buying</u>
Purchase price		\$1,200,000	\$(1,200,000)
Savings in space		(180,000)	180,000
Direct materials	\$120,000		120,000
Direct manufacturing labour	600,000		600,000
Variable overhead	<u>240,000</u>		240,000
Fixed overhead saved		<u>(200,000)</u>	<u>200,000</u>
Totals	<u>\$960,000</u>	<u>\$820,000</u>	<u>\$140,000</u>

The best alternative is to buy the part.

Diff: 3 Type: ES

Skill: Analyze

Objective: LO 11-3, 4

33) A cafe specializes in short order meals; and, morning and afternoon snack breaks. It is open from 9:00 am until 4:00 pm. An office manager in a nearby high rise office building offers the owner a contract to provide her 50 employees with afternoon snack breaks for \$2.00 each. Each employee would receive a drink and a snack item. The shop has an hourly capacity of 50 customers. The owner estimates that the variable costs of the afternoon breaks would be \$1.20 each. Currently the afternoon service, starting at 2:00, is running at only 50 percent capacity, although the morning and noon activities are near capacity. At the present level of operations each meal/snack served is allocated a fixed cost of \$0.25.

Required:

- a. What nonfinancial factors should be considered by the owner?
- b. Given your concerns listed in part a. and quantitative analysis, should the offer be accepted? Why or why not?

Answer:

a.

Nonfinancial factors to consider in evaluating the offer:

1. Length of the offer.
2. Impact on walk-in customers, continued same quality of service.
3. Types of food to be allowed under terms of contract.
4. Number of employees in office who are already regular customers.
5. How does the \$2.00 compare to current prices?

b.

Current costs allocations: Variable costs \$1.20 + Fixed costs .25 = \$1.45

*If the current level of operations permits a proper allocation of \$0.25 per customer visit, any permanent increase in volume should reduce the fixed cost per customer visit. The current level should be about 600 customers a day ((5 hours × 100) + (2 hours × 50)). This level of 600 times \$0.25 equals fixed costs of \$150. At a capacity of 700 customers the average fixed cost is approximately \$0.214 per customer.

Proposed costs allocations: Variable costs \$1.20 + Fixed costs \$0.21 = \$1.41

If the financial and nonfinancial factors can be combined into a satisfactory level of service the owner might accept the offer. However, a \$0.04 profit per customer is probably not acceptable without some advantages offered by the nonfinancial factors. Most respondents to this problem will probably not accept the offer.

Diff: 3 Type: ES

Skill: Analyze

Objective: LO 11-3, 4

34) Collier Bicycles has been manufacturing its own wheels for its bikes. The company is currently operating at 100% capacity, and variable manufacturing overhead is charged to production at the rate of 30% of direct labour cost. The direct materials and direct labour cost per unit to make the wheels are \$1.50 and \$1.80, respectively. Normal production is 200,000 wheels per year.

A supplier offers to make the wheels at a price of \$4 each. If the bicycle company accepts this offer, all variable manufacturing costs will be eliminated, but the \$42,000 of fixed manufacturing overhead currently being charged to the wheels will have to be absorbed by other products.

Required:

- Prepare an incremental analysis for the decision to make or buy the wheels.
- Should Collier Bicycles buy the wheels from the outside supplier? Justify your answer.

Answer:

a.

	<u>Make</u>	<u>Buy</u>
Direct materials (200,000 × \$1.50)	\$300,000	-0-
Direct labour (200,000 × \$1.80)	360,000	-0-
Variable manufacturing costs (\$360,000 × 30%)	108,000	-0-
Purchase price (200,000 × \$4)	<u>-0-</u>	<u>800,000</u>
Total annual cost	\$768,000	\$800,000

- The wheels should continue to be manufactured by Collier Bicycles. The company's net income would decrease \$32,000 by purchasing the wheels.

Diff: 2 Type: ES

Skill: Analyze

Objective: LO 11-3, 4

35) Sarasota Bicycles has been manufacturing its own wheels for its bikes. The company is currently operating at 100% capacity, and variable manufacturing overhead is charged to production at the rate of 30% of direct labour cost. The direct materials and direct labour cost per unit to make the wheels are \$3.00 and \$3.60 respectively. Normal production is 200,000 wheels per year.

A supplier offers to make the wheels at a price of \$8 each. If the bicycle company accepts this offer, all variable manufacturing costs will be eliminated, but the \$84,000 of fixed manufacturing overhead currently being charged to the wheels will have to be absorbed by other products.

Required:

- a. Prepare an incremental analysis for the decision to make or buy the wheels.
- b. Should Sarasota Bicycles buy the wheels from the outside supplier? Justify your answer.

Answer:

a.	<u>Make</u>	<u>Buy</u>
Direct materials (200,000 × \$3.00)	\$600,000	-0-
Direct labour (200,000 × \$3.60)	720,000	-0-
Variable manufacturing costs (\$720,000 × 30%)	216,000	-0-
Purchase price (200,000 × \$8)	<u>-0-</u>	<u>1,600,000</u>
Total annual cost	\$1,536,000	\$1,600,000

b. The wheels should continue to be manufactured by Sarasota Bicycles. The company's net income would decrease \$64,000 by purchasing the wheels.

Diff: 2 Type: ES

Skill: Analyze

Objective: LO 11-3, 4

36) Southwestern Company needs 1,000 motors in its manufacture of automobiles. It can buy the motors from Jinx Motors for \$1,250 each. Southwestern's plant can manufacture the motors for the following costs per unit:

Direct materials	\$500
Direct manufacturing labour	250
Variable manufacturing overhead	200
Fixed manufacturing overhead	<u>350</u>
Total	<u>\$1,300</u>

If Southwestern buys the motors from Jinx, 30% of the fixed manufacturing overhead applied will be avoided.

Required:

- Should the company make or buy the motors?
- What additional qualitative factors should Southwestern consider in deciding whether or not to make or buy the motors?

Answer:

a.

<i>Cost to buy the part:</i> $(1,000 \times \$1,250)$	\$1,250,000
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Relevant costs to make:

Variable costs:

Direct materials $(1,000 \times \$500)$	\$500,000	
Direct manufacturing labour $(1,000 \times \$250)$	250,000	
Variable manufacturing overhead $(1,000 \times \$200)$	<u>200,000</u>	
Total	950,000	
Avoidable fixed costs: $(\$350 \times 1,000 \times 0.30)$	<u>105,000</u>	<u>1,055,000</u>
<i>Savings if part is manufactured</i>		<u>\$195,000</u>

b. Management should consider several qualitative factors in deciding whether to make or buy the motors.

- *Quality controls* The company's ability to manufacture quality motors versus that of the supplier.
- *Delivery* Can they make them when needed versus Jinx delivering them when needed?
- *Reputation* What is the overall reputation of Jinx?
- *Term* Is Jinx willing to make long-term commitments for delivery of the motors?
- *Facilities* What are the opportunity costs of using the space and equipment to manufacture other items?

Diff: 3 Type: ES

Skill: Analyze

Objective: LO 11-3, 4

37) Quiett Truck manufactures part WB23 used in several of its truck models. 10,000 units are produced each year with production costs as follows:

Direct materials	\$45,000
Direct manufacturing labour	15,000
Variable support costs	35,000
Fixed support costs	<u>25,000</u>
Total costs	<u>\$120,000</u>

Quiett Truck has the option of purchasing part WB23 from an outside supplier at \$11.20 per unit. If WB23 is outsourced, 40% of the fixed costs cannot be immediately converted to other uses.

Required:

- Describe avoidable costs. What amount of the WB23 production costs is avoidable?
- Should Quiett Truck outsource WB23? Why or why not?
- What qualitative factors should Quiett Truck consider before outsourcing any of the parts it currently manufactures?

Answer:

- Avoidable costs are those costs eliminated when a part, product, product line, or business segmented is discontinued. Avoidable production costs for WB23 total \$110,000, which are all but the \$10,000 ($\$25,000 \times 40\%$) of fixed costs that cannot be immediately converted to other uses.
- Based on the financial considerations given, Quiett Truck should NOT outsource WB23 because the \$112,000 (10,000 units \times \$11.20 per part) outsourced cost is greater than the \$110,000 reduction in annual production costs. In other words, the outsourcing would cost Quiett Truck an additional \$2,000 annually.
- Other factors to consider include the supplier's ability to meet expected quality and delivery standards, and the likelihood of suppliers increasing prices of components in the future.

Diff: 3 Type: ES

Skill: Analyze

Objective: LO 11-3, 4

38) Nall Custom Pool Inc. needs 10,000 units of a certain part for its manufacturing process. It can buy the part from Wholesale Pool Supplies and Equipment for \$53. Nall's plant can manufacture the part for the following costs per unit:

Direct materials	\$6
Direct manufacturing labour	24
Variable manufacturing overhead	12
Fixed manufacturing overhead	<u>15</u>
Total	\$57

If Nall buys the part from Wholesale, 60 percent of the fixed manufacturing overhead applied will continue to be incurred.

Required:

What is the relevant dollar difference between making and buying the part?

Answer: Cost to buy the part: $(10,000 \times \$53) =$ \$530,000

Relevant cost to make:

Variable costs:

Direct materials $(10,000 \times \$6)$ \$60,000

Direct mfg. labour $(10,000 \times \$24)$ 240,000

Variable mfg. overhead $(10,000 \times \$12)$ 120,000

Total \$420,000

Avoidable fixed costs $(\$150,000 \times 0.40)$ 60,000 480,000

Savings if part is manufactured \$50,000

Diff: 2 Type: ES

Skill: Apply

Objective: LO 11-3, 4

39) A florist produces table settings for weddings. Based on an annual volume of 10,000 units it incurs \$100,000 in fixed manufacturing costs. Variable costs per unit are \$16 for direct materials, \$3 for direct manufacturing labour, and \$14 for variable factory overhead.

Another company has offered to supply empty baskets for the settings for \$8, with a minimum annual order of 5,000 units. If the florist accepts the offer, it will be able to reduce variable labour and overhead costs by 50 percent. The materials for the empty baskets will cost \$4 if the florist assembles them.

Required:

- Determine if they should make or assemble the empty baskets.
- Should they make or assemble the empty baskets if they could rent the space that the basket assembly requires for \$16,000 per year to another company?

Answer:

a.

	<u>Make</u>	<u>Buy</u>	<u>Effect of Buying</u>
Purchase from supplier		\$80,000	
Manufacturing costs:			
Materials	\$160,000	40,000	
Direct labour*	30,000	15,000	
Variable overhead*	<u>140,000</u>	<u>70,000</u>	
Totals	\$330,000	\$205,000	\$125,000

Difference favours purchasing the baskets.

*Labour = $\$3 \times 10,000 \times 0.50 = \$15,000$

Variable overhead = $\$14 \times 10,000 \times 0.50 = \$70,000$

b. from part a.

Part a. Totals	\$330,000	\$205,000	\$125,000
Rent		<u>(16,000)</u>	<u>16,000</u>
Totals	<u>\$330,000</u>	<u>\$189,000</u>	<u>\$141,000</u>

Difference favours purchasing the baskets.

Diff: 3 Type: ES

Skill: Analyze

Objective: LO 11-3, 4

40) Lovejoy's Cake Shop makes three types of cakes: White, Chocolate, and Swirl on one assembly line that has a limit of 400 labour-hours per week. Lovejoy can sell all the cakes it can make under current operating capacity. Manufacturing information per cake for each product is as follows:

	<u>White</u>	<u>Chocolate</u>	<u>Swirl</u>
Selling price	\$16	\$10	\$20
Variable costs	10	5	18
Labour-hours per cake	.4	.2	.4

Required:

Determine the total weekly contribution margin when all labour-hours are allotted to the product with the highest:

- Unit selling price.
- Unit contribution margin.
- Contribution per labour-hour.

Answer:	<u>White</u>	<u>Chocolate</u>	<u>Swirl</u>
Selling price	\$16	\$10	\$20
Variable costs	<u>10</u>	<u>5</u>	<u>18</u>
Contribution margin	<u>\$6</u>	<u>\$5</u>	<u>\$2</u>

Contribution per labour hour:

White = $\$6/0.4 = \15 ; Chocolate = $\$5/0.2 = \25 ; Swirl = $\$2/0.4 = \5

- Selling price: Swirl
Total cakes = $400/0.4 = 1,000$
Total contribution margin = $\$2 \times 1,000 = \$2,000$
- Unit contribution margin: White
Total cakes = $400/0.4 = 1,000$
Total contribution margin = $\$6 \times 1,000 = \$6,000$
- Contribution per labour hour: Chocolate
Total cakes = $400/0.2 = 2,000$
Total contribution margin = $\$5 \times 2,000 = \$10,000$

Diff: 2 Type: ES

Skill: Apply

Objective: LO 11-4

41) Ralph's Mufflers manufactures three different product lines, Model X, Model Y, and Model Z. Considerable market demand exists for all models. The following per unit data apply:

	<u>Model X</u>	<u>Model Y</u>	<u>Model Z</u>
Selling price	\$160	\$180	\$200
Direct materials	60	60	60
Direct labour (\$20 per hour)	30	30	40
Variable support costs (\$10 per machine-hour)	10	20	20
Fixed support costs	40	40	40

- For each model, compute the contribution margin per unit.
- For each model, compute the contribution margin per machine-hour.
- If there is excess capacity, which model is the most profitable to produce? Why?
- If there is constrained capacity, which model is the most profitable to produce? Why?
- How can Ralph encourage her sales people to promote the more profitable model?

Answer:

- The contribution margin per unit is:
 \$60 for Model X (\$160 - \$90 - \$30 - \$10),
 \$70 for Model Y (\$180 - \$60 - \$30 - \$20),
 and \$80 for Model Z (\$200 - \$60 - \$40 - \$20).
- The contribution margin per machine-hour is
 \$60 for Model X (\$60 contribution margin/1.0 machine-hour per unit),
 \$35 for Model Y (\$70/2.0), and
 \$40 for Model Z (\$80/2.0).
- When there is excess capacity, Model Z is the most profitable because it has the greatest contribution margin per unit.
- When there are machine-hour capacity constraints, Model X is the most profitable because it has the greatest contribution margin per constrained resource.
- To encourage sales persons to promote specific products, Ralph may want to provide marketing incentives such as higher sales commissions for products contributing the most to profits. Ralph may also want to educate salespeople about the effects of constrained resources.

Diff: 3 Type: ES

Skill: Apply

Objective: LO 11-4

42) Norton's Mufflers manufactures three different product lines: Model X, Model Y, and, Model Z. Considerable market demand exists for all models. The following per unit data apply:

	<u>Model X</u>	<u>Model Y</u>	<u>Model Z</u>
Selling price	\$80	\$90	\$100
Direct materials	30	30	30
Direct labour (\$10 per hour)	15	15	20
Variable support costs (\$5 per machine-hour)	5	10	10
Fixed support costs	20	20	20

Required:

- For each model, compute the contribution margin per unit.
- For each model, compute the contribution margin per machine-hour.
- If there is excess capacity, which model is the most profitable to produce? Why?
- If there is a machine breakdown, which model is the most profitable to produce? Why?
- How can Norton encourage her sales people to promote the more profitable model?

Answer:

- The contribution margin per unit is:
 \$30 for Model X (\$80 - \$30 - \$15 - \$5),
 \$35 for Model Y (\$90 - \$30 - \$15 - \$10),
 and \$40 for Model Z (\$100 - \$30 - \$20 - \$10).
- The contribution margin per machine-hour is
 \$30 for Model X (\$30 contribution margin/1.0 machine-hour per unit),
 \$17.50 for Model Y (\$35/2.0), and
 \$20 for Model Z (\$40/2.0).
- When there is excess capacity, Model Z is the most profitable because it has the greatest contribution margin per unit.
- When there are machine-hour capacity constraints, Model X is the most profitable because it has the greatest contribution margin per constrained resource.
- To encourage sales persons to promote specific products, Norton may want to provide marketing incentives such as higher sales commissions for products contributing the most to profits. Norton may also want to educate salespeople about the effects of constrained resources.

Diff: 3 Type: ES

Skill: Apply

Objective: LO 11-4

43) John Hatelak, a sales representative for a manufacturing equipment company, has decided to spend less time traveling. He is going to spend only 172 hours per month with his customers. To do this he will have to give up some of his clients. The following information is from his last full month's sales activities.

	Large Customers	Medium Customers	Small Customers
Number of customers	20	100	160
Average sale per customer	\$6,000	\$2,000	\$1,200
Commission (% of sales \$)	10%	7%	5%
Average time per customer	6 hours	4 hours	3 hours

Required:

- What should be his customer mix in order to maximize his sales commissions?
- What will be his income at the best possible customer mix?

Answer:

a.

	Large Customers	Medium Customers	Small Customers
Average sale	\$6,000	\$2,000	\$1,200
Commission rate	<u>$\times 0.10$</u>	<u>$\times 0.07$</u>	<u>$\times 0.05$</u>
Average commission	\$600	\$140	\$60
Hours per customer	<u>$/6$</u>	<u>$/4$</u>	<u>$/3$</u>
Commission per hour	<u>\$100</u>	<u>\$35</u>	<u>\$20</u>

First, he should service all the large customers because they provide the most commissions per hour.

20 large customers \times 6 hours = 120 hours

This leaves 52 hours (172 - 120) for the next best group, the medium customers.

13 Medium customers \times 4 hours = 52 hours

b.

Total commissions:

Large customers 20 \times \$600 \$12,000

Medium customers 13 \times \$140 1,820

Total \$13,820

Diff: 3 Type: ES

Skill: Apply

Objective: LO 11-4

44) Under what conditions might a manufacturing firm sell a product for less than its long-term price? Why?

Answer: The price for a short-term order may be less than the price offered to a long-term customer. If a firm has excess capacity that is sitting idle, it is more profitable for the firm to accept a special order for a price below the long-run price than it is to let the capacity sit idle. In addition, the firm may use this strategy for market penetration and to obtain greater market share.

Diff: 2 Type: ES

Skill: Understand

Objective: LO 11-3, 4

45) For short-term pricing decisions, what costs are relevant when there is available surplus capacity? When there is no available surplus capacity?

Answer: For both situations the relevant costs are the future incremental costs. However, when there is limited capacity the incremental costs will be greater because they will include the costs of adding capacity or the opportunity costs of alternative manufacturing choices.

Diff: 2 Type: ES

Skill: Understand

Objective: LO 11-3, 4

46) How does a manager go about choosing which of three products to produce and sell when each product uses a single machine with a limited capacity?

Answer: Management should attempt to maximize output from the machine which is the limited resource. This involves maximizing the contribution margin per unit of the scarce resource. First of all, management needs to determine the contribution margin of each of the three products. Then, the time that it takes to produce a unit of each of the three products should be determined. Then, a contribution margin per machine hour can be calculated. The first product that should be produced is the one with the highest contribution margin per machine hour.

Diff: 2 Type: ES

Skill: Understand

Objective: LO 11-4

A client in another province needs immediate help in solving a personnel training problem in the shipping department. Match each activity on the basis of its relationship with this consulting engagement. Items may have multiple classifications.

- A) Irrelevant Costs
- B) Opportunity Cost
- C) Opportunity, Irrelevant Costs
- D) Sunk Costs
- E) Relevant Costs
- F) Sunk, Irrelevant Costs

47) Four employees will have to spend three nights in Quebec City, the hotel bill has been negotiated in advance for \$1,800

Diff: 2 Type: MA

Skill: Understand

Objective: LO 11-2, 3, 4

48) All staff members receive \$1,000 per diem for travel

Diff: 2 Type: MA

Skill: Understand

Objective: LO 11-2, 3, 4

49) Current year's amortization of the firm's computer system is \$15,000

Diff: 2 Type: MA

Skill: Understand

Objective: LO 11-2, 3, 4

50) Round-trip transportation for each staff member is \$500

Diff: 2 Type: MA

Skill: Understand

Objective: LO 11-2, 3, 4

51) The firm is also sending the same four staff members to Toronto, for a two week engagement upon their return from this trip. The firm's cost of this trip will be \$10,000

Diff: 2 Type: MA

Skill: Understand

Objective: LO 11-2, 3, 4

52) The firm has a \$2,000 maintenance contract on its telecommunication system for the current year

Diff: 2 Type: MA

Skill: Understand

Objective: LO 11-2, 3, 4

53) If the firm accepts this job, it will have to decline a job in Vancouver that has the potential of providing a net cash inflow of \$5,000 after all expenses

Diff: 2 Type: MA

Skill: Understand

Objective: LO 11-2, 3, 4

54) The firm's variable overhead is \$50 per client hour

Diff: 2 Type: MA

Skill: Understand

Objective: LO 11-2, 3, 4

55) The firm will pay \$60 next month for this year's membership in the Canadian Consultants Society for each professional staff member

Diff: 2 Type: MA

Skill: Understand

Objective: LO 11-2, 3, 4

56) Last year the firm paid \$4,000 to make improvements in its 5-year leasehold on its offices

Diff: 2 Type: MA

Skill: Understand

Objective: LO 11-2, 3, 4

Answers: 47) E 48) E 49) F 50) E 51) A 52) A 53) B 54) E 55) A 56) F

11.5 Explain the theory of constraints and how to manage "bottlenecks."

1) The theory of constraints describes methods of reducing bottlenecks by identifying and reducing fixed costs previously viewed as variable.

Answer: FALSE

Explanation: The theory of constraints (TOC) describes methods to maximize operating income (or, "throughput") when faced with operations that because of limited capacity form a constraint, or "bottleneck."

Diff: 2 Type: TF

Skill: Remember

Objective: LO 11-5

2) The theory of constraints analyzes fixed costs and considers short-run costs to be variable costs.

Answer: FALSE

Explanation: It focuses on shortrun maximization of throughput margin, revenues minus direct materials costs of goods sold.

Diff: 2 Type: TF

Skill: Remember

Objective: LO 11-5

3) In a manufacturing operation, the bottleneck machine sets the pace for all non-bottleneck machines.

Answer: TRUE

Diff: 1 Type: TF

Skill: Remember

Objective: LO 11-5

4) Producing more non-bottleneck output increases throughput contribution.

Answer: FALSE

Explanation: Throughput contribution is increase by increasing bottleneck capacity.

Diff: 2 Type: TF

Skill: Understand

Objective: LO 11-5

5) The objective of the theory of constraints is to increase throughput contribution while decreasing investments and operating costs.

Answer: TRUE

Diff: 2 Type: TF

Skill: Remember

Objective: LO 11-5

6) Throughput contribution is equal to revenues minus direct material and direct labour costs.

Answer: FALSE

Explanation: Throughput contribution is equal to revenues minus the direct materials cost of goods sold.

Diff: 1 Type: TF

Skill: Remember

Objective: LO 11-5

7) When considering the theory of constraints, operating costs refer to all costs involved in the manufacturing process.

Answer: FALSE

Explanation: When considering the theory of constraints, all costs except for direct materials are considered operating costs.

Diff: 3 Type: TF

Skill: Understand

Objective: LO 11-5

8) The only cost of poor quality at a nonbottleneck operation is the cost of the materials wasted.

Answer: FALSE

Explanation: At a bottleneck operation, the cost of poor quality is the cost of materials wasted *plus* the opportunity cost of lost throughput margin.

Diff: 2 Type: TF

Skill: Remember

Objective: LO 11-5

9) When a firm has a bottleneck machine, a good way to manage the bottleneck is to make sure that prior machines produce more units for the bottleneck machine to increase its throughput.

Answer: FALSE

Explanation: When a firm has a bottleneck machine, making sure that prior machines produce more units for the bottleneck machine will not increase throughput of the bottleneck machine.

Diff: 2 Type: TF

Skill: Understand

Objective: LO 11-5

10) The theory of constraints focuses on shortrun maximization of throughput margin, revenues minus the cost of goods manufactured.

Answer: FALSE

Explanation: The theory of constraints focuses on shortrun maximization of throughput margin, revenues minus direct materials costs of goods sold.

Diff: 2 Type: TF

Skill: Remember

Objective: LO 11-5

11) The theory of constraints is more useful than activity-based costing in long-run decisions.

Answer: FALSE

Explanation: In contrast (to TOC), activity-based costing (ABC) systems take a long-run perspective and focus on improving processes by eliminating non-value-added activities and reducing the costs of performing value-added activities.

Diff: 2 Type: TF

Skill: Remember

Objective: LO 11-5

12) A company would subordinate all bottleneck production to non-bottleneck machines when

A) the bottleneck resource was temporarily unused.

B) setup time on the non-bottleneck machine is higher than on the bottleneck machine.

C) setup time on the non-bottleneck machine is less than on the bottleneck machine.

D) it intends to increase throughput contribution.

E) it wants to produce at least a minimum buffer inventory.

Answer: D

Diff: 2 Type: MC

Skill: Understand

Objective: LO 11-5

13) Which of the following statements related to the theory of constraints is/are TRUE?

A) Sales less direct materials costs equals throughput contribution.

B) Throughput contribution equals sales plus direct materials, and the theory of constraints focuses on revenue and cost management when an organization is faced with bottlenecks.

C) Throughput contribution equals sales plus direct materials.

D) The theory of constraints focuses on process-costing when an organization is faced with bottlenecks.

E) Throughput contribution equals sales plus direct manufacturing costs.

Answer: A

Diff: 2 Type: MC

Skill: Remember

Objective: LO 11-5

- 14) Increasing throughput contribution and managing bottlenecks includes all of the following EXCEPT
- A) workstations without large quantities of jobs to be worked on are ignored.
 - B) recognize that a bottleneck determines throughput contribution of the entire process related to the bottleneck.
 - C) a cost-benefit analysis of alternative actions to increase bottleneck efficiency.
 - D) short-run time horizons.
 - E) a cost-benefit analysis of alternative actions to increase bottleneck capacity.

Answer: A

Diff: 3 Type: MC

Skill: Understand

Objective: LO 11-5

- 15) Producing more non-bottleneck output
- A) creates more inventory but does not increase throughput contribution.
 - B) creates more inventory and increases throughput contribution.
 - C) creates less pressure for the bottleneck workstations.
 - D) allows for the maximization of overall contribution.
 - E) allows for the maximization of overall shop effectiveness.

Answer: A

Diff: 2 Type: MC

Skill: Understand

Objective: LO 11-5

Answer the following question(s) using the information below.

Quick Shop Printing has two workstations, cutting and pasting. The cutting station is limited by the speed of operating the cutting machine. Pasting is limited by the speed of the workers. Pasting normally waits on work from cutting. Each department works an eight-hour day. If cutting begins work two hours earlier than pasting each day, the two departments generally finish their work at about the same time. Not only does this eliminate the bottleneck, but it increases finished units produced each day by 80 units. All units produced can be sold. The cost of operating the cutting department two more hours each day is \$800. The contribution margin of the finished products is \$3 each. Inventory carrying costs are \$0.20 per unit per day.

- 16) What is the daily capacity of the pasting workstation based on a ten hour day?
- A) 320
 - B) 400
 - C) 440
 - D) 800
 - E) 820

Answer: B

Explanation: B) Units per hour = 80 incremental units/2 hours = 40/hour;

Daily output = $40 \times 10 = 400$

Diff: 2 Type: MC

Skill: Analyze

Objective: LO 11-5

17) What is the change in the daily contribution margin if the change is made?

- A) \$1,200
- B) \$(128)
- C) \$(560)
- D) \$240
- E) \$(568)

Answer: E

Explanation: E) Units per hour = $80/2 = 40$
units per day = $40 \times 10 = 400$ units

Total contribution margin ($80 \times \$3$)	\$240
Carrying cost ($40 \text{ units} \times \0.20)	(8)
Increased costs	<u>(800)</u>
Net change in contribution margin	<u>\$(568)</u>

Diff: 3 Type: MC

Skill: Analyze

Objective: LO 11-5

18) Which of the following is NOT a key step in managing bottleneck resources?

- A) Recognize that the bottleneck resource determines throughput contribution of the plant as a whole.
- B) Search and find the bottleneck resource by identifying resources with large quantities of inventory waiting to be worked on.
- C) Keep the bottleneck operation busy and subordinate all nonbottleneck resources to the bottleneck resource.
- D) Reduce the number of employees who work in the bottleneck area.
- E) Take action to increase bottleneck efficiency and capacity.

Answer: D

Diff: 2 Type: MC

Skill: Remember

Objective: LO 11-5

19) Which of the following sets of sentences has two statements which are TRUE?

- A) Poor quality is more costly at a bottleneck workstation than it is at a nonbottleneck workstation. The cost of poor quality at a bottleneck workstation is the cost of materials in waiting.
- B) Throughput contribution increases only by increasing bottleneck output. Throughput contribution is not increased when nonbottleneck output is increased.
- C) The cost of poor quality at a nonbottleneck operation is the cost of materials wasted. Increasing idle time at the bottleneck operation helps relieve the delays at the nonbottleneck operations.
- D) The cost of poor quality at a bottleneck operation is the cost of materials wasted. Increasing idle time at the nonbottleneck operation helps relieve the delays at the bottleneck operations.
- E) Throughput contribution increases only by decreasing bottleneck output. Throughput contribution is not increased when nonbottleneck output is increased.

Answer: B

Diff: 2 Type: MC

Skill: Understand

Objective: LO 11-5

20) Which of the following statements is TRUE?

- A) The elimination of defects always increases productivity.
- B) Nonbottleneck operations should be refined for high efficiency before starting on bottleneck improvement because nonbottleneck operations are generally easier to correct and improve.
- C) Throughput contribution is not increased when nonbottleneck output is increased.
- D) Quality and time are seldom related in service industries.
- E) The elimination of defects always decreases revenues.

Answer: C

Diff: 2 Type: MC

Skill: Understand

Objective: LO 11-5

Answer the following question(s) using the information below.

Speedy Dress Manufacturing has two workstations, cutting and finishing. The cutting station is limited by the speed of operating the cutting machine. Finishing is limited by the speed of the workers. Finishing normally waits for work from cutting. Each department works an eight-hour day. If cutting begins work two hours earlier than finishing each day, the two departments generally finish their work at about the same time. Not only does this eliminate the bottleneck, but also it increases finished units produced each day by 160 units. All units produced can be sold even though the change increases inventory stock by 20% from 400 units. The cost of operating the cutting department two more hours each day is \$1,600. The contribution margin of the finished products is \$6 each. Inventory carrying costs are \$0.40 per unit per day.

21) What is the total production per day if the change is made?

- A) 6400 units
- B) 800 units
- C) 880 units
- D) 1600 units
- E) 640 units

Answer: B

Explanation: B) Units per hour = $160/2 = 80$

Units per day = $80 \times 10 = 800$ units

Diff: 2 Type: MC

Skill: Analyze

Objective: LO 11-5

22) What is the change in the daily contribution margin if the change is made?

- A) \$(608)
- B) \$(634)
- C) \$(672)
- D) \$800
- E) \$960

Answer: C

Explanation: C) Units per hour = $160/2 = 80$
units per day = $80 \times 10 = 800$ units

Total contribution margin ($160 \times \$6$)	\$960
Carrying cost ($80 \text{ units} \times \0.40)	(32)
Increased costs	<u>(1,600)</u>
Net change in contribution margin	<u>\$(672)</u>

Diff: 3 Type: MC

Skill: Analyze

Objective: LO 11-5

23) The Glass Shop, a manufacturer of large windows, is experiencing a bottleneck in its plant. Setup time at one of its workstations has been identified as the culprit. A manager has proposed a plan to reduce setup time at a cost of \$72,000. The change will result in 8,000 additional windows. The selling price per window is \$18, direct labour costs are \$3 per window, and the cost of direct materials is \$5 per window. Assume all units produced can be sold. The change will result in an increase in the throughput contribution of

- A) \$104,000.
- B) \$80,000.
- C) \$32,000.
- D) \$8,000.
- E) \$120,000.

Answer: A

Explanation: A) $8,000 \times (\$18 - \$5) = \$104,000$

Diff: 2 Type: MC

Skill: Apply

Objective: LO 11-5

24) Palmateer Industries makes an electronic component in two departments, Machining and Assembly. The capacity per month is 30,000 units in the Machining Department and 20,000 in the Assembly Department. The only variable cost of the product is the direct material of \$100 per unit. All direct material cost is incurred in the Machining Department. All other costs of operating the two departments are fixed costs. Palmateer can sell as many units of this electronic component as it produces at a selling price of \$300 per unit.

Required:

Assuming any defective units produced in either department must be scrapped:

- Compute the loss that occurs if a defective unit is produced in the Machining Department.
- Compute the loss that occurs if a defective unit is produced in the Assembly Department.
- How do your answers in parts (a) and (b) relate to the theory of constraints? Explain.

Answer:

a.

Direct material cost	\$100
Add forgone contribution margin on lost sale,	
\$0 because Machining has more capacity than Assembly	<u>0</u>
Loss from producing a defective unit in Machining	<u>\$100</u>

b.

Direct material cost	\$100
Add forgone contribution margin on lost sale (\$300-100)	<u>200</u>
Loss from producing a defective unit in Assembly	<u>\$300</u>

c.

Under the theory of constraints, the objective is to maximize throughput contribution, which is equal to revenues minus direct material cost of the cost of goods sold. In this case, Palmateer Industries should focus on improving quality first in the Assembly Department because poor quality (defective units) in that department is more costly. That is, because the Machining Department has more capacity than the Assembly Department, forgone throughput contribution only occurs from poor quality in the Assembly Department.

Diff: 3 Type: ES

Skill: Analyze

Objective: LO 11-5

25) Brix, Inc., prepares frozen food for fast-food restaurants. It has two workstations, cooking and assembly. The cooking station is limited by the cooking time of the food. Assembly is limited by the speed of the workers. Assembly normally waits on food from cooking. Because the demand has increased in recent months to 2,800 dozen units, management is considering adding another cooking station or else having the cooks start to work earlier.

The monthly cost of operating the cooking station one more hour each day is \$2,400. The cost of adding another cooking station would add an average of \$10 per hour.

The current operating hours total eight hours a day, 22 days a month. The contribution margin of the finished products is currently \$8 per dozen. Inventory carrying costs average \$2.00 per dozen per month. Either the extra hour or the new cooking station would increase production by 20 dozen a day, with a long-run increase of 80 dozen units in finished goods inventory to 280 dozen.

Required:

- What is the total production per month if the change is made?
- What is the current monthly contribution margin, and the expected monthly product contribution for both of the possible changes? Assume long-run production equals sales.
- What course of action would you recommend?

Answer:

- Total dozen per month = $2,800 + (22 \times 20) = 3,240$

b.

<i>Current product contribution margin</i> ($2,800 \times \$8$)		\$22,400
Carrying costs ($200 \times \$2$)		(400)
Current net contribution		<u>\$22,000</u>
<i>More hours:</i>		
<i>Expected product contribution margin</i> ($3,240 \times \$8$)		\$25,920
<i>Carrying costs</i> ($280 \times \$2$)	\$ 560	
<i>Increased costs</i>	<u>2,400</u>	(2,960)
Expected net product contribution		<u>\$22,960</u>
Increase = $\$22,960 - \$22,000 =$		\$ 960
<i>New cooking station:</i>		
<i>Expected product contribution margin</i> ($3,240 \times \$8$)		\$25,920
<i>Carrying costs</i> ($280 \times \$2$)	\$ 560	
<i>Increased costs</i> ($\$10 \times 22 \times 8$)	<u>1,760</u>	(2,320)
Expected net product contribution		<u>\$23,600</u>
Increase = $\$23,600 - \$22,000 =$		\$1,600

Diff: 3 Type: ES

Skill: Analyze

Objective: LO 11-5

26) Aunt Lydia's Cookies, Inc., prepares frozen gourmet cookies for shipment to upscale grocery stores as well as mailing to web and catalog customers. The company has two workstations, cooking and distribution. The cooking station is limited by the cooking time of the food. Distribution is limited by the speed of the workers. Distribution normally waits on food from cooking. Because the demand has increased in recent months to 4,000 dozen cookies, management is considering adding another oven in the cooking station or else having the cooks start to work earlier. The cost of adding another oven in the cooking station would add an average of \$8 per hour. The monthly cost of operating the cooking station one more hour each day is \$1,500.

The current operating hours total eight hours a day, 24 days a month. The contribution margin of the finished products is currently \$2 per dozen. Inventory carrying costs average \$0.50 per dozen per month. Either the extra hour or the new oven at the cooking station would increase production by 50 dozen a day, with a long-run increase of 100 dozen units in finished goods inventory to 500 dozen.

Required:

- What is the total production per month if the change is made?
- What is the current monthly contribution margin, and the expected monthly product contribution for both of the possible changes? Assume long-run production equals sales.
- What course of action would you recommend?

Answer:

- Total dozen per month = $4,000 + (24 \times 50) = 5,200$

b.

Current product contribution margin ($4,000 \times \$2$)		\$8,000
Carrying costs ($400 \times \$0.50$)		(200)
Current net contribution		<u>\$7,800</u>
More hours:		
Expected unit contribution margin ($5,200 \times \$2$)		\$10,400
Carrying costs ($500 \times \$0.50$)	\$ 250	
Increased costs	<u>1,500</u>	(1,750)
Expected net product contribution		<u>\$8,650</u>
Increase = $\$8,650 - \$7,800 =$		\$ 850
New oven in the cooking station:		
Expected unit contribution margin ($5,200 \times \$2$)		\$10,400
Carrying costs ($500 \times \$0.50$)	\$ 250	
Increased costs ($\$8 \times 24 \times 8$)	<u>1,536</u>	(1,786)
Expected net product contribution		<u>\$8,614</u>
Increase = $\$8,614 - \$7,800 =$		\$814

c.

The most cost effective option is to have the cooks start to work an hour earlier and work an extra hour each day.

Diff: 3 Type: ES

Skill: Analyze

Objective: LO 11-5

27) A machine has been identified as a bottleneck and the source of the constraint for a manufacturing company that has multiple products and multiple machines. List and describe five ways the company can overcome the bottleneck.

Answer: The ways include:

- a. Eliminating idle time at the bottleneck operation. Extra staffing at the bottleneck would be a possibility, particularly if numerous manual type tasks were involved.
- b. Concentrate on processing those parts or products that increase throughput contribution, not parts or products that remain in finished goods or spare parts inventories.
- c. Shift a part of the products produced at the bottleneck machine to other machines or outsource part of the production.
- d. Reduce setup time and processing time at bottleneck operations.
- e. Improve the quality of the production process. Poor quality is especially costly at a bottleneck operation.

Diff: 3 Type: ES

Skill: Remember

Objective: LO 11-5

11.6 Explain why the book value of equipment is irrelevant in equipment replacement decisions.

1) The financial measures used to evaluate a manager's performance should be consistent with the decision model.

Answer: TRUE

Diff: 2 Type: TF

Skill: Understand

Objective: LO 11-6

2) The gain or loss on the disposal of a machine is a relevant factor when considering replacing the machine if tax is a consideration.

Answer: TRUE

Diff: 2 Type: TF

Skill: Understand

Objective: LO 11-6

3) Book value of equipment is irrelevant in equipment-replacement decisions.

Answer: TRUE

Diff: 1 Type: TF

Skill: Remember

Objective: LO 11-6

4) An item's book value is the historical cost plus accumulated amortization.

Answer: FALSE

Explanation: ...minute accumulated amortization

Diff: 1 Type: TF

Skill: Remember

Objective: LO 11-6

5) When replacing an old machine with a new machine, the purchase price of the old machine is a relevant cost.

Answer: FALSE

Explanation: The original price of the old machine is a sunk cost and therefore an irrelevant cost.

Diff: 1 Type: TF

Skill: Remember

Objective: LO 11-6

6) A customer can be considered to be a cost object, in the decision to add or drop a particular customer.

Answer: TRUE

Diff: 2 Type: TF

Skill: Understand

Objective: LO 11-6

7) Econ Services has requested your services in determining the book values of the following assets, respectively.

	<u>Historical Costs</u>	<u>Accumulated Amortization</u>
Auto	\$20,000	\$15,000
Machinery	150,000	95,000

General repairs and maintenance for the automobile amounted to \$4,000. Machinery maintenance included \$2,000 for general upkeep.

What are the book values for Auto and Machinery, respectively?

A) \$5,000; \$55,000

B) \$9,000; \$57,000

C) \$20,000; \$150,000

D) \$35,000; \$245,000

E) \$1,000; \$53,000

Answer: A

Explanation: A) Auto ($\$20,000 - 15,000$) = \$5,000

Machinery ($\$150,000 - 95,000$) = \$55,000

Diff: 2 Type: MC

Skill: Apply

Objective: LO 11-6

8) Which of the following factors would be considered irrelevant when evaluating equipment replacement decisions?

- A) the book value of the old machine
- B) manufacturing costs
- C) overhead costs
- D) product production costs
- E) useful life of new equipment

Answer: A

Diff: 1 Type: MC

Skill: Remember

Objective: LO 11-6

9) Ignoring tax consequences, how should the gain or loss on disposal of an old machine be treated in an equipment replacement decision?

- A) used to defray installation costs of the new machine
- B) deducted from the accumulated amortization
- C) deducted from the cost of the new machine
- D) added to the accumulated amortization (or deducted from the cost) of the old machine
- E) It is irrelevant.

Answer: E

Diff: 1 Type: MC

Skill: Remember

Objective: LO 11-6

10) Electrical Engineering Equipment Ltd. purchased a machine for \$100,000; current accumulated amortization totals \$40,000. Management is contemplating the purchase of a new machine for \$120,000. Current disposal of the old machine would cost \$65,000.

What is the correct category for each item?

- A) Irrelevant: \$120,000 of new machine, \$40,000 accumulated amortization;
Relevant: \$100,000 cost of old machine, \$65,000 of disposal of old machine, \$5,000 gain on sale
- B) Irrelevant: \$100,000 cost of old machine, \$40,000 accumulated amortization;
Relevant: \$120,000 cost of new machine, \$5,000 gain on sale, \$65,000 disposal of old machine
- C) Irrelevant: \$120,000 cost of new machine, \$65,000 disposal of old machine;
Relevant: \$100,000 cost of old machine, \$60,000 book value of old machine, \$5,000 gain on sale
- D) Irrelevant: \$100,000 cost of old machine, \$60,000 book value of old machine;
Relevant: \$120,000 cost of new machine, \$65,000 disposal of old machine, \$5,000 gain on sale
- E) Irrelevant: \$100,000 cost of old machine, \$40,000 accumulated amortization, \$5,000 gain on sale;
Relevant: \$120,000 cost of new machine, \$65,000 disposal of old machine

Answer: E

Diff: 2 Type: MC

Skill: Understand

Objective: LO 11-6

11) Managers tend to favour the alternative that makes their performance look best. This leads to conflicts between which of the following?

- A) the status quo and the chosen alternative
- B) the decision model and the performance evaluation model
- C) the constraining factor and the performance evaluation model
- D) gathering the required information and the performance evaluation model
- E) the accrual accounting model and the performance evaluation model

Answer: D

Diff: 2 Type: MC

Skill: Understand

Objective: LO 11-6

12) If management takes a multiple-year view in the decision model and judges success according to the current year's results, a problem will occur in the

- A) decision model.
- B) performance evaluation model.
- C) production evaluation model.
- D) year-end review model.
- E) responsibility centre allocation.

Answer: B

Diff: 2 Type: MC

Skill: Understand

Objective: LO 11-6

13) Top management faces a persistent challenge to make sure that the performance evaluation model of lower level managers is

- A) focused on short-term performance.
- B) based solely on quantitative factors.
- C) not consistent with the decision model.
- D) consistent with the decision model.
- E) based only on future costs.

Answer: D

Diff: 2 Type: MC

Skill: Understand

Objective: LO 11-6

14) Pat, a Pizzeria manager, replaced the convection oven just six months ago. Today, Turbo Ovens Manufacturing announced the availability of a new convection oven that cooks more quickly with lower operating expenses. Pat is considering the purchase of this faster, lower-operating cost convection oven to replace the existing one they recently purchased. Selected information about the two ovens is given below:

	<u>Existing</u>	<u>New Turbo Oven</u>
Original cost	\$60,000	\$50,000
Accumulated depreciation	\$5,000	–
Current salvage value	\$40,000	–
Remaining life	5 years	5 years
Annual operating expenses	\$10,000	\$7,500
Disposal value in 5 years	\$0	\$0

Required:

- What costs are sunk?
- What costs are relevant?
- What are the net cash flows over the next 5 years assuming the Pizzeria purchases the new convection oven?
- What other items should Pat, as manager of the Pizzeria, consider when making this decision?

Answer:

- Sunk costs include the original cost of the existing convection oven and the accompanying accumulated depreciation.

- Relevant costs include:

Acquisition cost of the new Turbo oven

Current disposal value of the existing convection oven

Annual operating expenses for the existing and the new Turbo oven

- Net cash flows over 5 years with the new Turbo oven:

Cash inflow:

Decrease in annual operating expenses	$(\$2,500 \times 5)$	\$12,500
Sale of the existing oven		40,000

Cash outflow:

Acquisition of the new Turbo oven	<u>(50,000)</u>
<i>Net cash inflow (outflow)</i>	<u>\$2,500</u>

- Other items the manager should consider when making this decision include:
 - The Turbo oven's reliability and efficiency is still unknown since it is a brand-new product.
 - If the Turbo oven bakes faster as it claims, the Pizzeria may be able to increase sales due to the quicker baking time.
 - After purchasing another oven just six months prior, top management should consider the Turbo oven option, but instead may question the decision-making ability of Pat, the current manager.

Diff: 3 Type: ES

Skill: Analyze

Objective: LO 11-6

15) Hasselhoff Camera is considering eliminating Model EOS1 from its camera line because of losses over the past quarter. The past three months of information for model EOS1 is summarized below:

Sales (1,000 units)	\$250,000
Manufacturing costs:	
Direct materials	90,000
Direct labour (\$15 per hour)	80,000
Support	<u>100,000</u>
Operating loss	<u>(\$20,000)</u>

Support costs are 70% variable and the remaining 30% is depreciation of special equipment for model EOS1 that has no resale value.

Should Hasselhoff Camera eliminate Model EOS1 from its product line? Why or why not?

Answer: No, Hasselhoff Camera should not eliminate Model EOS1 from its product line because it contributes \$10,000 toward fixed costs and profits.

Sales (1,000 units)	\$250,000
Manufacturing costs:	
Direct materials	90,000
Direct labour	80,000
Variable support ($\$100,000 \times 70\%$)	<u>70,000</u>
Contribution margin	<u>\$10,000</u>

Diff: 2 Type: ES

Skill: Analyze

Objective: LO 11-6

16) Hackerott Camera is considering eliminating Model AE1 from its camera line because of losses over the past quarter. The past three months of information for model AE1 is summarized below:

Sales (1,000 units)	\$250,000
Manufacturing costs:	
Direct materials	140,000
Direct labour (\$15 per hour)	30,000
Support	<u>100,000</u>
Operating loss	<u>(\$20,000)</u>

Support costs are 70% variable and the remaining 30% is depreciation of special equipment for model AE1 that has no resale value.

Should Hackerott Camera eliminate Model AE1 from its product line? Why or why not?

Answer: No, Hackerott Camera should not eliminate Model AE1 from its product line because it contributes \$10,000 toward fixed costs and profits.

Sales (1,000 units)	\$250,000
Manufacturing costs:	
Direct materials	140,000
Direct labour	30,000
Variable support ($\$100,000 \times 70\%$)	<u>70,000</u>
Contribution margin	<u>\$10,000</u>

Diff: 2 Type: ES

Skill: Analyze

Objective: LO 11-6

17) The management accountant for the Awesome Candy Company has prepared the following income statement for the most current year:

	<u>Chocolate</u>	<u>Other Candy</u>	<u>Fudge</u>	<u>Total</u>
Sales	\$50,000	\$15,000	\$40,000	\$105,000
Cost of goods sold	<u>24,000</u>	<u>8,000</u>	<u>19,000</u>	<u>51,000</u>
Contribution margin	\$26,000	\$7,000	\$21,000	\$54,000
Delivery and ordering costs	1,000	500	800	2,300
Rent (per sq. metre used*)	5,000	3,000	4,000	12,000
Allocated corporate costs	<u>5,000</u>	<u>5,000</u>	<u>5,000</u>	<u>15,000</u>
Corporate profit	<u>\$15,000</u>	<u>\$(1,500)</u>	<u>\$11,200</u>	<u>\$24,700</u>

* The company pays for the entire space and allocates based on sq. metres used.

- Do you recommend discontinuing the Other Candy product line? Why or why not?
- If the Chocolate product line had been discontinued, corporate profits for the current year would have decreased by what amount?

Answer:

- No, I would not recommend discontinuing the Other Candy product line because this product line contributes \$6,500 towards corporate costs and profits.

$$\$7,000 - \$500 = \$6,500$$

Without the Other Candy product line, corporate profits would be \$6,500 less than currently reported.

- If the Chocolate product line were discontinued, corporate profits would immediately decrease by \$25,000.

$$\$26,000 - \$1,000 = \$25,000$$

Diff: 2 Type: ES

Skill: Analyze

Objective: LO 11-6

18) The management accountant for the Chocolate S'more Company has prepared the following income statement for the most current year:

	<u>Chocolate</u>	<u>Other Candy</u>	<u>Fudge</u>	<u>Total</u>
Sales	\$40,000	\$25,000	\$35,000	\$100,000
Cost of goods sold	<u>26,000</u>	<u>15,000</u>	<u>19,000</u>	<u>60,000</u>
Contribution margin	\$14,000	\$10,000	\$16,000	\$40,000
Delivery and ordering costs	2,000	3,000	2,000	7,000
Rent (per sq. metre used*)	3,000	3,000	2,000	8,000
Allocated corporate costs	<u>5,000</u>	<u>5,000</u>	<u>5,000</u>	<u>15,000</u>
Corporate profit	<u>\$4,000</u>	<u>\$(1,000)</u>	<u>\$7,000</u>	<u>\$10,000</u>

* The company pays for the entire space and allocates based on sq. metres used.

Required:

- Do you recommend discontinuing the Other Candy product line? Why or why not?
- If the Chocolate product line had been discontinued, corporate profits for the current year would have decreased by what amount?

Answer:

- No, I would not recommend discontinuing the Other Candy product line because this product line contributes \$4,000 towards corporate costs and profits.

$$\$25,000 - \$15,000 - \$3,000 = \$7,000$$

Without the Other Candy product line, corporate profits would be \$7,000 less than currently reported.

- If the Chocolate product line were discontinued, corporate profits would immediately decrease by \$9,000.

$$\$40,000 - \$26,000 - \$2,000 = \$12,000$$

Diff: 3 Type: ES

Skill: Analyze

Objective: LO 11-6

19) Why is the book value of old equipment irrelevant to the equipment replacement decision?

Answer: The book value of old equipment is made up of the cost and accumulated depreciation, both of which are sunk costs and therefore irrelevant.

Diff: 2 Type: ES

Skill: Understand

Objective: LO 11-6

20) Doggie Dinner, Inc., currently manufactures three different types of scientifically balanced dog food. The firm is considering eliminating one of the three products. What factors should be taken into account in making this decision?

Answer: In deciding whether or not to eliminate a product, the firm should determine if costs that can be eliminated will exceed the revenues that will be lost. The firm needs to classify the costs into those costs which will be eliminated and therefore are relevant, and which costs will continue even if the product is deleted. Costs that often continue are those costs which have been allocated rather than incurred directly by the product. The firm must also look to see if any other products may be harmed by the elimination of the product. Maybe the products are complements, and loss of one sale will result in loss of another. The firm should consider whether another product's sales might increase if the product is deleted, which could be an opportunity to earn more contribution from another area. Can the firm use the space freed up for some other purpose that could generate additional inflows, which is an opportunity cost? The firm must also look at how its reputation among its customers for selling a full line of products might be damaged as a result of this decision.

Diff: 2 Type: ES

Skill: Understand

Objective: LO 11-6

11.7 Appendix 11A: Linear Programming

1) Linear programming is a tool that maximizes total contribution margin of a mix of products with multiple constraints.

Answer: TRUE

Diff: 1 Type: TF

Skill: Remember

Objective: LO 11-7

2) Which of the following is NOT one of the steps involved in linear programming?

- A) determining the objective
- B) determining the technical coefficients
- C) computing the optimal solution
- D) determining the relevant and irrelevant costs
- E) specifying the constraints

Answer: D

Diff: 2 Type: MC

Skill: Remember

Objective: LO 11-7

3) In linear programming, the goals of management are expressed in

- A) an objective function.
- B) constraints.
- C) operating policies.
- D) business functions.
- E) a mathematical inequality or equality.

Answer: A

Diff: 2 Type: MC

Skill: Understand

Objective: LO 11-7

- 4) In linear programming a mathematical inequality or equality that must be appeased is known as
- A) an objective function.
 - B) a constraint.
 - C) an operating policy.
 - D) a business function.
 - E) the optimal solution.

Answer: B

Diff: 2 Type: MC

Skill: Remember

Objective: LO 11-7

5) Computer Products produces two keyboards, Regular and Special. Regular keyboards have a unit contribution margin of \$128, and Special keyboards have a unit contribution margin of \$720. The demand for Regulars exceeds Computer Products' production capacity, which is limited by available machine-hours and direct manufacturing labour hours. The maximum demand for Special keyboards is 80 per month. Management desires a product mix that will maximize the contribution toward fixed costs and profits. Direct manufacturing labour is limited to 1,600 hours a month and machine hours are limited to 1,200 a month. The Regular keyboards require 20 hours of labour and 8 machine hours. Special keyboards require 34 labour hours and 20 machine hours.

Select the appropriate linear programming objective and constraint functions designed to maximize Computer Products total contribution margin. Let R represent Regular keyboards and S represent Special keyboards.

A)

Maximize:	$\$720S + \$128R$
Constraints:	Labour hours: $20R + 8S \leq 1,600$
Machine hours:	$34R + 20S \leq 1,200$
Special:	$S \leq 80$ $S \geq 0$
Regular:	$R \geq 0$

B)

Maximize:	$\$128R + \$720S$
Constraints:	Labour hours: $20R + 34S \leq 1,600$
Machine hours:	$8R + 20S \leq 1,200$
Special:	$S \geq 80$ $S \leq 0$
Regular:	$R \leq 0$

C)

Maximize:	$\$128R + \$720S$
Constraints:	Labour hours: $20R + 34S \geq 1,600$
Machine hours:	$8R + 20S \geq 1,200$
Special:	$S \leq 80$ $S \geq 0$
Regular:	$R \geq 0$

D)

Maximize:	$\$128R + \$720S$
Constraints:	Labour hours: $20R + 34S \leq 1,600$
Machine hours:	$8R + 20S \leq 1,200$
Special:	$S \leq 80$ $S \geq 0$
Regular:	$R \geq 0$

E)

Maximize:	$\$720S + \$128R$
Constraints:	Labour hours: $20R + 34S \leq 1,600$
Machine hours:	$8R + 20S \leq 1,200$
Special:	$S \leq 80$ $S \leq 0$
Regular:	$R \leq 0$

Answer: D

Diff: 3 Type: MC

Skill: Apply

Objective: LO 11-7

6) Jamboree Manufacturing Ltd. produces two products, steel and wood beams. Steel beams have a unit contribution margin of \$400, and wood beams have a unit contribution margin of \$300. The demand for steel beams exceeds their production capacity, which is limited by available direct labour and machine hours. The maximum demand for wood beams is 60 per week. Management desires that the product mix should maximize the weekly contribution toward fixed costs and profits.

Direct manufacturing labour is limited to 2,700 hours a week and 900 hours is all that the company's outdated machines can run a week. The steel beams require 180 hours of labour and 90 machine hours. Wood beams require 270 labour hours and 60 machine hours.

Required:

Formulate the linear programming objective function and constraints necessary to determine the optimal product mix.

Answer: S = steel beams W = wood beams

Maximize: $\$400S + \$300W$

Constraints: Labour hours: $180S + 270W \leq 2,700$

 Machine hours: $90S + 60W \leq 900$

 Wood beams: $W \geq 0$

 Steel beams: $S \geq 0$

Note: $W \leq 60$ constraint is not necessary as labour and machine hour constraints limit units to less than this amount.

Diff: 3 Type: ES

Skill: Apply

Objective: LO 11-7

7) Local Steel Construction Company produces two products, steel and wood beams. Steel beams have a unit contribution margin of \$200, and wood beams have a unit contribution margin of \$150. The demand for steel beams exceeds Local Steel Construction Company's production capacity, which is limited by available direct labour and machine-hours. The maximum demand for wood beams is 90 per week. Management desires that the product mix should maximize the weekly contribution toward fixed costs and profits.

Direct manufacturing labour is limited to 3,000 hours a week and 1,000 hours is all that the company's outdated machines can run a week. The steel beams require 120 hours of labour and 60 machine-hours. Wood beams require 150 labour hours and 120 machine-hours.

Required:

Formulate the objective function and constraints necessary to determine the optimal product mix.

Answer: S = steel beams W = wood beams

Maximize: \$200S + \$150W

Constraints: Labour hours: $120S + 150W \leq 3,000$
 Machine-hours: $60S + 120W \leq 1,000$
 Wood beams: $W \leq 90$ $W \geq 0$
 Steel beams: $S \geq 0$

Diff: 3 Type: ES

Skill: Apply

Objective: LO 11-7

8) Kando Manufacturing Ltd. produces two products, lawn mowers and power washers. Lawn mowers have a unit contribution margin of \$75, and power washers have a unit contribution margin of \$55. The demand for lawn mowers exceeds their production capacity, which is limited by available direct labour and machine hours. The maximum demand for power washers is 300 per week. Management desires that the product mix should maximize the weekly contribution toward fixed costs and profits.

Direct manufacturing labour is limited to 600 hours a week and 400 hours is all that the company's outdated machines can run a week. The lawn mowers require 1.5 hours of labour and 1 machine hour. Power washers require 2.5 labour hours and 2 machine hours.

Required:

Formulate the linear programming objective function and constraints necessary to determine the optimal product mix.

Answer: L = lawn mowers P = power washers

Maximize: \$75L + \$55P

Constraints: Labour hours: $1.5L + 2.5P \leq 600$
 Machine hours: $1L + 2P \leq 400$
 Power washers: $P \geq 0$
 Lawn mowers: $L \geq 0$

Note: $P \leq 300$ is not necessary as labour and machine hours constraints limits demand to less than this amount.

Diff: 3 Type: ES

Skill: Apply

Objective: LO 11-7

9) Describes the steps involved in solving a linear programming problem.

Answer: Step 1: Determine the objective function.

Step 2: Specify the constraints

Step 3: Compute the optimal solution

Diff: 2 Type: ES

Skill: Remember

Objective: LO 11-7