DECISION MAKING

Key Terms and Concepts to Know

Relevance:

- Relevant costs and benefits are those that differ among alternatives
- Total approach vs. differential approach and why relevant costs must be isolated.
- Difference between costs that are avoidable and those that are not avoidable.
- Avoidable costs are those that can be eliminated (in whole or in part) by choosing one alternative over another in a decision
- Sunk costs, costs that has already been incurred and that cannot be changed by any decision made now or in the future, are never relevant
- Future revenues and costs that will not change by choosing one alternative over another in a decision are never relevant
- How and why some fixed costs (common fixed costs) need to be allocated, and the problems inherit in the allocation process.

Constraints:

- Limitations under which a company must operate, such as limited available machine time or raw materials, which restricts the company's ability to satisfy demand.
  Constraints or bottlenecks limit a company's ability to grow and limit the total output of the entire system.

Opportunity Costs:

- Opportunity costs are not recorded in the general ledger.
- Opportunity costs are factors in the decision-making process because they differ among alternatives.

Key Topics to Know

- Companies make many decisions which require relevant information on a timely basis. Some of these decisions include:
  - Accepting or not accepting a special order, a one-time sales order that is not considered part of the company's normal ongoing business.
  - Dropping or retaining a product line or other business segment
  - Make or buy decisions, concerning whether an item should be produced internally or purchased from an outside supplier.
  - The most profitable use of a constrained resource to maximize the company's total contribution margin.
  - Sell or process further decisions.
- Allocated common fixed costs, as noted in other chapters, can distort profitability analyses. Allocating these costs is generally an arbitrary process. These costs tend to be unaffected by the decisions covered in this chapter and therefore are the same before and after the decision has been made.
- Problems may state how allocated fixed costs will change. If that is the case, the change in the allocated fixed costs should be included in the solution.

Relevant Costs

Example #1

Birmingham Company normally runs at capacity and the Model CY1000 machine is the company's production constraint. Management is considering purchasing a new machine, Model CZ4000 and selling the CY1000. The CZ4000 is more efficient and can produce 20% more units than the old one. If the new machine is purchased, there should be a reduction in maintenance costs. The company will need to borrow money in order to purchase the CZ4000. The increase in volume will require increases in fixed selling expense, but general administrative expenses will remain unchanged.

Required: For each cost listed below, determine whether the cost is relevant or irrelevant to the decision to replace the CY1000.

a) Sales Revenue
b) Direct materials
c) Direct labor
d) Variable manufacturing overhead
e) Rent on the factory building
f) Janitorial salaries

g) President's salary
h) Book Value of CY1000
i) Cost of CY1000
j) Cost of CZ4000
k) Interest on money borrowed to make purchase.
l) Shipping costs
m) Market value of old machine CY1000
n) Insurance on factory building
o) Salaries paid to personnel in sales office

Solution #1

Relevant: a, b, c, d, j, k, l, m, o
Not Relevant: e, f, g, h, i, n

Special Orders

Special orders are the simplest decision: if the special order is not accepted, then nothing changes; if the special order is accepted, then the only change from the status quo is the special order itself. Therefore only the special order itself should be analyzed.

Example #2

Trojan Company produces a single product. The cost of producing and selling a single unit of this product at the company's normal activity level of 8,000 units per year is:

Direct materials	$2.50
Direct labor	3.00
Variable manufacturing overhead	.50
Fixed manufacturing overhead	4.25
Variable selling and administrative expense	1.50
Fixed selling and administrative expense	2.00

The normal selling price is $15.00 per unit. The company's capacity is 10,000 units per month. An order has been received from an overseas source for 2,000 units at the special price of $12.00 per unit. This order would not affect regular sales.

Required: a) If the order is accepted, how much will monthly profits increase or decrease? (The order will not change the company's total fixed costs.)

b) he company has 500 units of this product left over from last year that are vastly inferior to the current model. The units must be sold through regular channels at reduced prices. What unit cost is relevant for establishing a minimum selling price for these units? Explain.

Solution #2

a)

Selling price		$12.00
Direct materials	$2.50	
Direct labor	3.00	
Variable manufacturing overhead	.50	
Variable selling and administrative expense	1.50	
Total variable expenses		7.50
Contribution margin		4.50
Units sold		2,000
Total contribution margin		$9,000

b)

The relevant cost is $1.50 (the variable selling and administrative costs). All other variable costs are sunk, since the units have already been produced. The fixed costs would not be relevant, since they will not be affected by the sale of leftover units.

Dropping or Retaining a Segment

For this decision, the question is whether avoiding traceable and perhaps common fixed costs will offset the lost contribution margin from the dropped segment. Dropping a segment may also affect the profitability of some or all of the remaining segments. These effects must be included in the analysis of the decision.

Example #3

B & B Inc., a retailing company has two departments, X and Y. A recent monthly contribution format income state for the company follows.

	X	Y	Total
Sales	$3,000,000	$1,000,000	$4,000,000
Variable expenses	900,000	400,000	1,300,000
Contribution margin	2,100,000	600,000	2,700,000

Fixed expenses	1,400,000	800,000	2,200,000
Operating income (loss)	$700,000	($200,000)	$500,000

A study indicates that $340,000 of the fixed expenses being charged to Y are sunk costs or allocated costs that will continue even if Y is dropped. In addition the elimination of Y will result in a 10% decrease in the sales of X.

Required: If Department Y is discontinued, will this be a positive move or a negative move for the company as a whole?

Solution #3

Contribution margin lost if Y is dropped:

Department Y contribution margin lost	($600,000)
Department X contribution margin lost	(210,000)
Total contribution margin lost	(810,000)
Avoidable fixed costs	460,000
Decrease in operating income	($350,000)

Make or Buy

Make or buy decisions do not involve revenue; rather they are least-cost decisions: is it cheaper to make the product in-house or to contract it out to a supplier? For these decisions, common allocated fixed costs are rarely relevant.

Buying the product from a supplier may make manufacturing and/or warehouse space available for an alternative, profitable use. The potential profits are opportunity costs that are added to the costs of manufacturing the product in-house.

Example #4

For many years Lansing Company has purchased the starters that it installs in its standard line of garden tractors. Due to a reduction in output, the company has idle capacity that could be used to produce the starters. The chief engineer has recommended against this move, however, pointing out that the cost to produce the starters would be greater than the current $10.00 per unit purchase price. The company's unit product cost, based on a production level of 60,000 starters per year, is as follows:

	Make	
Direct materials	$4.00	
Direct labor	2.75	
Variable manufacturing overhead	.50	
Fixed manufacturing overhead, traceable	3.00	$180,000
Fixed manufacturing overhead, common (allocated based on direct labor hours)	2.25	135,000
Total production cost	$12.50	

An outside supplier has offered to supply the starter to Lansing for only $10.00 per starter. One-third of the traceable fixed manufacturing costs represent supervisory salaries and other costs that can be eliminated of the starters are purchased. The other two-thirds of the traceable fixed manufacturing costs is depreciation of special manufacturing equipment that has no resale value. The decision would have no effect on the common fixed costs of the company and the space being used to produce the parts would otherwise be idle.

Required: Should the company make or buy the starters?

Solution #4

	Relevant Costs	
	Make	Buy
Direct materials	$4.00	
Direct labor	2.75	
Variable manufacturing overhead	.50	
Fixed manufacturing overhead, traceable	1.00	
Purchase price		$10.00
Total relevant cost	$8.25	$10.00
Units produced	60,000	60,000
Total Cost	$495,000	$600,000

The two-thirds of the traceable fixed manufacturing overhead costs that cannot be eliminated, and all of the common fixed manufacturing overhead costs, are irrelevant. The company would save $105,000 per year by continuing to make the parts itself. In other words, profits would decline by $105,000 per year if the parts were purchased from the outside supplier.

Constrained Resources

A constraint is a limitation; therefore a constrained resource is one that is scare or has limited availability. Since the company's objective is to maximize profit, the constrained resource must be used in a way that allows the company to achieve this objective.

Each time a unit of the constrained resource is used, the contribution it makes toward the company's profitability must be maximized. The contribution toward profit is measured by the contribution margin per unit of constrained resource.

- Selling the products with the highest selling prices per unit will maximize sales but not necessarily profits because both variable costs per unit and the amount of the constrained resource have not been considered.
- Maximizing selling price per unit – variable costs per unit = contribution margin per unit is better but the amount of the constrained resource still has not been considered.
- Therefore contribution margin per unit of constrained resource is the proper measurement of profitability as it considers all three factors.

Example #5

Oregon Company produces three products, X, Y, and Z. Data concerning the three products are as follows:

	X	Y	Z
Selling price	$80.00	$56.00	$70.00
Variable expenses:			
Direct materials	24.00	15.00	9.00
Direct labor	14.00	13.00	15.00
Other variable expenses	10.00	14.00	25.00
Contribution margin	$32.00	$14.00	$21.00

Demand for the company's products is very strong, with far more order each month than the company can produce with the available raw materials. The same material is used in each product. The material cost $3 per pound, with a maximum of 5,000 pounds available each month.

Required: In which order should the company produce X, Y and Z?

Solution #5

The company should accept orders first for Z, second for X and third for Y.

	X	Y	Z
Direct materials cost	$24.00	$15.00	$9.00
Cost per pound	$3.00	$3.00	$3.00
Direct material pounds per unit	8.00	5.00	3.00
Contribution margin	$32.00	$14.00	$21.00
Contribution margin per pound	$4.00	$2.80	$7.00

Sell or Process Further Decisions

In some industries, multiple products can be produced for a single raw material. Typically these products emerge after some amount of processing has been done to the raw material. For example, a lumber mill will process the basic raw material, logs, up to the point at which they have been cut into lumber. Certainly the rough-cut lumber can be sold as-is, but it could also be processed further into consumer-ready products. The sawdust and shavings could also be sold as-is or processed further into products such as particleboard.

- Costs incurred in processing the basic raw materials up to the point where the separate products emerge are called joint costs.
- The point where these separate or joint products emerge is called the split-off point.
- At the split-off point, the products are referred to as intermediate products. They are not finished products because further processing could occur.
- The additional processing occurs at an additional cost and generates additional sales revenue.
- The decision whether to process further is based on the incremental profit after the split off point.

The question is whether the additional incremental revenues earned justify the additional incremental processing costs incurred to produce the finished products. The joint costs incurred up to the split-off point are not relevant to this decision as they would have been incurred regardless of the decision made.

Example #6

Omaha Beef processes slaughtered steers. All carcasses are processed to the point where they can be sold as sides of beef to grocery stores, butcher shops and restaurants. The cost to process each steer is $700. The carcass can be sold for $600 and the hides can be sold for $300 each. Joint costs are allocated to the products based on total sales value at the split-off point. 100,000 steers are processed each year.

The carcasses may be processed further by cutting them into consumer-ready products such as steaks and chops. Further processing is very labor intensive, incurring an addition $500 per carcass. The finished products from each carcass can be sold for $1,300. The hides can be cleaned before being sold. Cleaning adds $75 of additional cost. Cleaned hides can be sold for $350.

Required: Which products should be sold at the split-off point and which products should be processed further?

Solution #6

Selling the products at the split-off point is profitable as the total sales value of each steer is $900 and the joint costs are $700, producing a profit of $200 per steer.

Further processing of hides:
Cleaning the hides generates $50 of additional revenue: $350 sales value after cleaning - $300 sales value at the split-off point. However, the cost of cleaning each hide is $75. Therefore cleaning each hides results in a $25 loss: $50 - $75. Hides should be sold at the split-off point.

Further processing of carcasses:
Cutting the caresses into consumer-ready products generates $700 of additional revenue: $1,300 sales value of the consumer-ready products - $600 sales value at the split-off point. However, the cost of further processing each carcass is $500. Therefore further processing results in a $200 profit: $700 - $500. Carcasses should be sold after processing beyond the split-off point.

Practice Problems

Practice Problem #1

Jackson Company is now making a small part used in one of its products. The unit costs of producing the part internally are:

Direct materials	$15.00
Direct labor	10.00
Variable manufacturing overhead	2.00
Fixed manufacturing overhead, traceable	4.00
Fixed manufacturing overhead, allocated	5.00
Unit product cost	$36.00

Depreciation of special equipment represents 75% of the traceable fixed manufacturing overhead cost with supervisory salaries representing the balance. The supervisory salaries could be avoided if production of the part were discontinued. An outside supplier has offered to sell the part to Jackson Company for $30 each, based on an order of 5,000 parts per year.

Required: Should Jackson Company accept this offer?

Practice Problem #2

Tampa Company makes two models of its hair dryer. The copper-winding machine has been the production constraint as it is useable only 9,600 minutes per month. Data concerning these two products appear below:

	Standard	Premium
Selling price	$14.00	$20.00
Variable cost	.00	8.00
Contribution margin	9.00	12.00
Machine time per unit	.5 minutes	.6 minutes
Monthly demand	12,000 units	8,000 units

Required:
a) Does product demand really exceed machine capacity?
b) Determine the contribution margin per minute for each product.
c) How many units of each product should be made to maximize net operating income?

Practice Problem #3

Moo Milk makes the 1-gallon plastic milk jugs used to package its premium goat's milk. The company has been approached by a plastic molding company with an offer to produce the milk jugs at a cost of $14.00 per thousand jugs. Moo's president believes the company should continue to produce the jugs and the plant manager has recommended accepting the offer because the cost to produce the jugs is greater than the purchase price. The company's cost to produce one thousand jugs is as follows:

Direct materials	$4.00
Direct labor	2.75
Variable manufacturing overhead	3.50
Fixed manufacturing overhead, traceable	3.00
Fixed manufacturing overhead, common	2.50
Total production cost	$15.75

One-half of the traceable fixed manufacturing costs represent supervisory salaries and other costs that can be eliminated if the milk jugs are purchased. The balance of the traceable fixed manufacturing costs is depreciation of manufacturing equipment that has no resale value. Some of the space being used to produce the milk jugs could be used to store empty jugs, eliminating a rented warehouse and reducing common fixed costs by 20%. The rest of the space could be rented to another company for $30,000 per year. Moo Milk produces 10,000,000 milk jugs per year.

Required: Should Moo Milk make or buy the milk jugs?

Practice Problem #4

Teton Tents makes backpacking tents. It has the capacity to produce 10,000 tents per year and currently is producing and selling 7,000 tents. Normal selling price for a tent is $470. Unit-level costs are $100 for direct materials, $200 for direct labor, and $25 for other manufacturing costs. Facility-level costs of $80 are allocated to each tent. Teton has received a special order for 1,500 tents at $340 each.

Required: How much income will Teton make on the special order?

Practice Problem #5

World Classics Publishing Company produces updated versions of literary classics targeted for children. Its book binding machines are capable of producing 50 books per hour. The unit cost of producing books is $3.00, and World Classics sells its books for $10 each. Speedy Read Publishing has asked the company to produce 10,000 copies of a book for $7.00. World Classics estimates that for this special order the unit-related cost of producing the book will be $4.00 and that, due to the size of the book, its binding machines will only be able to produce 20 books per hour. World Classics has a total of 5,000 machine hours of capacity. In addition, to complete the special order, World Classics will have to purchase an additional special-purpose machine that will cost $10,000.

Required: Assuming that existing demand for World Classics' children's classics is 200,000 units and that the special order has to be either taken in full or rejected, should the special order be accepted?

Practice Problem #6

Excell Company currently produces a component that it uses in making some of its products. The company has calculated the following costs for making the part:

Unit Costs:	
Materials	$20
Labor	28
Overhead	2
Allocated facility-level costs	10
Total Unit Cost	$60

A supplier has offered to sell a component to Excell for $54 each. Excell needs 10,000 units each year. If Excell does outsource the component, it can use the facilities to make another product that would yield contribution margin of $60,000 per year.

Required: Should Excell outsource the component?

Practice Problem #7

The Mendoza Company is trying to decide whether to replace a packing machine that it uses to pack pasta into serving size packages. The following information is available:

	Current Machine	New Machine
Original cost	$13,000	$8,000
Accumulated depreciation	8,000	
Annual operating costs	2,000	500
Current salvage value	2,000	
Salvage value in 5 years	500	500

Required:
a) Compute the increase or decrease in total net income over the five-year period if the company chooses to buy the new machine.
b) Compute the impact on the company's net income in the first year if the current machine is replaced. Do not take depreciation into account.

Practice Problem #8

Cheeks Company has two divisions whose most recent income statements are shown below:

	Commercial Division	Residential Division
Unit sales	10,000	2,000
Sales	$800,000	$200,000
Cost of goods sold:		
Production costs	350,000	120,000
Depreciation expense, equipment	150,000	50,000
Gross margin	$300,000	$30,000
Operating expenses:		
Traceable selling and administrative costs	80,000	20,000
Corporate office expenses	25,000	15,000
Net Income (Loss)	$195,000	($5,000)

Required: Compute the impact on profit if the Residential Division is eliminated.

Practice Problem #9

A company has already incurred $93,000 cost in partially producing its three products. Their selling prices when partially and fully processed are shown in the table below with the additional costs necessary to finish their processing.

Product	Unfinished Selling Price	Finished Selling Price	Further Processing Costs
A	$31.27	$62.37	$33.76
B	42.56	96.11	49.82
C	89.01	102.72	17.29

Required: Based on this information, should any products be processed further?

True / False Questions

1. The book value of old equipment is not a relevant cost in a decision.
   True False

2. One of the dangers of allocating common fixed costs to a product line is that such allocations can make the line appear less profitable than it really is.
   True False

3. A differential cost is a variable cost.
   True False

4. All future costs are relevant in decision making.
   True False

5. Variable costs are always relevant costs.
   True False

6. A sunk cost is a cost that has already been incurred but that can be avoided at least in part depending on the action a manager takes.
   True False

7. A cost that will be incurred regardless of which course of action a manager takes is relevant to the manager's decision.
   True False

8. Opportunity costs are recorded in the accounts of an organization.
   True False

9. In a decision to drop a segment, the opportunity cost of the space occupied by the segment would be the profit that could be derived from the best alternative use of the space.
   True False

10. Only the variable costs identified with a product are relevant in a decision concerning whether to eliminate the product.
    True False

11. Managers should pay little attention to bottleneck operations because they have limited capacity for producing output.
    True False

12. An out-of-pocket cost requires a current and/or future outlay of cash.
    True False

13. The concept of incremental cost is the same as the concept of differential cost.
    True False

14. The decision to accept an additional volume of business should be based on a comparison of the revenue from the additional business with the sunk costs of producing that revenue.
    True False

15. Contribution margin lost from a decline in sales is an opportunity cost.
    True False

16. When considering whether a business segment should be eliminated, unavoidable expenses are amounts that will continue even if a given segment is eliminated.
    True False

17. If accepting additional business would cause existing sales to decline, the offer should always be declined.
    True False

18. If a company has the capacity to produce either 10,000 units of Product X or 10,000 units of Product Y, and the markets for both products are unlimited, the company should commit 100% of its capacity to the product that has the higher contribution margin.
    True False

19. Joint costs should be added to incremental costs to determine whether an intermediate product should be processed further.
    True False

20. Revenues at the split-off point are not relevant in the decision to process further.
    True False

Multiple Choice Questions

1. Which cost is not relevant to the decision whether to purchase a new chocolate dipping machine or continue using the old one:
   a) The cost of the new machine
   b) Lower maintenance costs for the new machine
   c) The cost of the old machine
   d) Additional training required for operating the new machine

2. A cost that does not affect a decision is called an
   a) opportunity cost
   b) incremental cost
   c) avoidable cost
   d) irrelevant cost

3. Costs that change between alternatives are called
   a) fixed costs.
   b) opportunity costs.
   c) relevant costs.
   d) sunk costs.

4. A cost incurred in the past that cannot be changed by any future action is:
   a) opportunity cost
   b) sunk cost
   c) relevant cost
   d) avoidable cost

5. Which statement is true about relevant costs in incremental analysis?
   a) All costs are relevant if they change between alternatives
   b) Only fixed costs are relevant
   c) Only variable costs are relevant
   d) Relevant costs should be ignored

6. Canada Inc. expands its capacity to accept a special order. It is likely that:
   a) Unit variable costs will increase
   b) Fixed costs will not be relevant
   c) Both variable and fixed costs will be relevant
   d) The company should accept the order

7. A company decided to replace an old machine with a new machine. Which of the following is considered a relevant cost?
   a) The book value of the old equipment
   b) Depreciation expense of the old equipment
   c) The loss on disposal of the old equipment
   d) The current disposal price of the old equipment

8. It costs Lannon Fields $14 of variable costs and $6 of allocated fixed costs to produce an industrial trash can that sells for $30. A buyer in Mexico offers to purchase 3,000 units at $18 each. Lannon Fields has excess capacity and can handle the additional production. What effect will acceptance of the offer have on net income?
   a) Decrease $6,000
   b) Increase $6,000
   c) Increase $54,000
   d) Increase $12,000

9. A factory is operating at less than 100% capacity. Potential additional business will not use up the remainder of the plant capacity. Which of the following costs should be ignored in a decision to produce additional units of product?
   a) Variable selling expenses
   b) Fixed factory overhead
   c) Direct labor
   d) Contribution margin of additional units

10. A company contemplating the acceptance of a special order has the following unit cost behavior, based on 10,000 units:

Direct materials	$4.00
Direct labor	10.00
Variable overhead	8.00
Fixed overhead	6.00

A foreign company wants to purchase 1,000 units at a special unit price of $25. The normal price per unit is $40. A special stamping machine will have to be purchased for $2,000 in order to stamp the foreign company's name on the product. The incremental income (loss) from accepting the order is
   a) $3,000
   b) $1,000
   c) $(3,000)
   d) $(1,000)

11. Which one of the following does not affect a make-or-buy decision?
    a) Variable manufacturing costs
    b) Opportunity costs
    c) Incremental revenue
    d) Direct labor

12. Wishnell Toys can make 1,000 toy robots with the following costs:

Direct materials	$70,000
Direct labor	26,000
Variable overhead	15,000
Fixed overhead	15,000

The company can purchase the 1,000 robots externally for $120,000. The avoidable fixed costs are $5,000 if the units are purchased externally. What is the cost savings if the company makes the robots?
    a) $1,000
    b) $5,000
    c) $10,000
    d) $4,000

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

The next 3 questions refer to the following information:
Abel Company produces three versions of baseball bats: wood, aluminum, and hard rubber. A segmented income statement for a recent period follows:

	Wood	Aluminum	Hard Rubber	Total
Sales	$500,000	$200,000	$65,000	$765,000
Variable Expenses	325,000	140,000	58,000	523,000
Contribution Margin	175,000	60,000	7,000	242,000
Fixed Expenses	75,000	35,000	22,000	132,000
Operating Income	$100,000	$25,000	($15,000)	$110,000

Assume none of the fixed expenses for the hard rubber line are avoidable.

14. What will be total net income if the hard rubber line is dropped?
    a) $125,000
    b) $103,000
    c) $105,000
    d) $140,000

15. Assume all of the fixed expenses for the hard rubber line are avoidable. What will be total net income if that line is dropped?
    a) $125,000
    b) $103,000
    c) $105,000
    d) $140,000

16. If the total net income after dropping the hard rubber line is $105,000, hard rubber's avoidable fixed expenses were
    a) $20,000.
    b) $2,000.
    c) $7,000.
    d) $5,000.

17. North Division has the following information:

Sales	$900,000
Variable Expenses	480,000
Fixed Expenses	465,000

    If this division is eliminated, the fixed expenses will be allocated to the company's other divisions. What is the incremental effect on net income if the division is dropped?
    a) $45,000 increase
    b) $465,000 decrease
    c) $420,000 decrease
    d) $435,000 increase

18. A company decided to replace an old machine with a new machine. Which of the following is *not* considered in the incremental analysis?
    a) Annual operating cost of the new equipment
    b) Annual operating cost of the old equipment
    c) Net cost of the new equipment
    d) Book value of the old equipment

19. Wade Company is operating at 75% of its manufacturing capacity of 140,000 product units per year. A customer has offered to buy an additional 20,000 units at $32 each and sell them outside the country so as not to compete with Wade. The following data are available:

Costs at 75% Capacity	Per Unit	Total
Direct materials	$12.00	$1,260,000
Direct labor	9.00	945,000
Overhead applied	15.00	1,575,000
Total	$36.00	$3,780,000

In producing 20,000 additional units, fixed overhead costs would remain at their current level but incremental variable overhead costs of $6 per unit would be incurred. What is the effect on income if Wade accepts this order?

a) Income will decrease by $4 per unit.
b) Income will increase by $4 per unit.
c) Income will increase by $5 per unit.
d) Income will increase by $11 per unit.

The next 2 questions refer to the following information:
Marsden manufactures a cat food product called Special Export. Marsden currently has 10,000 bags of Special Export on hand. The variable production costs per bag are $1.80 and total fixed costs are $10,000. The cat food can be sold as it is for $9.00 per bag or be processed further into Prime Cat Food and Feline Surprise at an additional $2,000 cost. The additional processing will yield 10,000 bags of Prime Cat Food and 3,000 bags of Feline Surprise, which can be sold for $8 and $6 per bag, respectively.

20. The net advantage (incremental income) of processing Special Export further into Prime and Feline Surprise would be:

a) $98,000
b) $96,000
c) $8,000
d) $6,000

21. If Special Export is processed further into Prime Cat Food and Feline Surprise, the total gross profit would be:

a) $68,000
b) $78,000
c) $96,000
d) $98,000

22. A company has already incurred a $12,000 cost in partially producing its two products. Their selling prices when partially and fully processed are shown in the table below with the additional costs necessary to finish their processing. Based on this information, should any products be processed further?

Product	Unfinished Selling Price	Finished Selling Price	Further Processing Costs
A	$78	$325	$168
B	85	600	555

a) Both product A and product B should be processed further.
b) Neither product A nor product B should be processed further.
c) Only product B should be processed further.
d) Only product A should be processed further.

23. A company has already incurred a $15,000 cost in partially producing its three products. Their selling prices when partially and fully processed are shown in the table below with the additional costs necessary to finish their processing. Based on this information, should any products be processed further?

Product	Unfinished Selling Price	Finished Selling Price	Further Processing Costs
A	$750	$875	$130
B	850	1,000	155
C	950	1,200	255

a) Only product A should be processed further.
b) Products A, B and C should not be processed further.
c) Only product B should be processed further.
d) Only product C should be processed further.

Solutions to Practice Problems

Practice Problem #1

Direct materials	$15.00	
Direct labor	10.00	
Variable manufacturing overhead	2.00	
Fixed manufacturing overhead, traceable	1.00	
Purchase price		$30.00
Unit product cost	$28.00	$30.00
Units produced	5,000	5,000
Total cost	$140,000	$150,000

Difference in favor of making: $10,000. The depreciation on the equipment and common fixed overhead are not avoidable costs.

Practice Problem #2

a)

	Standard	Premium	Total
Monthly demand	12,000 units	8,000 units	
Machine time	.5 minutes	.6 minutes	
Total time	6,000 minutes	4,800 minutes	10,800 minutes

Demand exceeds capacity for the copper-winding machine. Total time required is 10,800 minutes and the capacity of the copper-winding machine is only 9,600 minutes.

b) The contribution margin per copper-winding minute for the two products is as follows.

	Standard	Premium
Selling price	$14.00	$20.00
Variable cost	5.00	8.00
Contribution margin	9.00	12.00
Machine time	.5 minutes	.6 minute
Contribution margin per minute	$18.00 per minute	$20.00 per minute

c) Because the contribution margin per minute is higher for the premium model than for the standard model, the premium model should be produced first. All 8,000 units of the premium model should be produced first with the remaining capacity, 4,800 minutes, used to produce 2,400 units of the standard product:

Total machine time available	9,600
Minutes required to produce 8,000 units of premium model	4,800
Remaining minutes available	4,800
Minutes per unit of standard model	.5 minutes per unit
Units of standard model produced	2,400

Practice Problem #3

	Make	Buy
Direct materials	$4.00	
Direct labor	2.75	
Variable manufacturing overhead	3.50	
Fixed manufacturing overhead, traceable	1.50	
Fixed manufacturing overhead, common	.50	
Purchase price		$14.00
Unit product cost	$12.25	$14.00
Units produced (in thousands)	10,000	10,000
Subtotal	$122,500	$140,000
Opportunity cost of making the jugs	30,000	
Total cost	$152,500	$140,000

Difference in favor of buying: $12,500. The opportunity cost changed the decision from making to buying the milk jugs.

Practice Problem #4

Differential revenues 1,500 x $340 =	$510,000
Avoidable costs:	
Materials	150,000
Labor	300,000
Other manufacturing costs	37,500
Differential income (loss)	22,500

The special order would cause income to increase by $22,500; based on this information, it should be accepted.

Practice Problem #5

Machine hours available	5,000
Machine hours to satisfy demand 200,000 / 50 =	4,000
Machine hours available for special order	1,000
Machine hours required for special order 10,000 / 20 =	500
Contribution margin from special order ($7 - 4) x 10,000 =	$30,000
Incremental fixed costs	10,000
Increase in income from special order	20,000

Since the special order generates additional income, it should be accepted.

Practice Problem #6

Relevant costs:		
Materials $20 x 10,000 =	$200,000	
Labor $28 x 10,000 =	280,000	
Overhead $2 x 10,000 =	20,000	
Total cost to make	$500,000	
Contribution margin from another product	60,000	
Total cost	$560,000	

Since the total cost to outsource the component is ($54 × 10,000) = $540,000, Excell would be $20,000 better off to outsource the component.

Practice Problem #7

a)

Life of New Machine		
Original cost of new machine		($8,000)
Annual operating costs avoided 2,000 – 500 =	1,500	
Useful life	X 5	
Total savings		7,500
Current salvage value		2,000
Salvage value in 5 years		500
Increase in income from buying new machine		$2,000

b)

First year for new machine	
Original cost of new machine	($8,000)

Annual operating costs avoided 2,000 – 500 =	1,500	
Useful life	X 1	
Total savings		1,500
Current salvage value		2,000
Increase in income from buying new machine		($4,500)

Practice Problem #8

Commercial division net income	$195,000
less: residential division depreciation	(50,000)
less: corporate office expenses allocated to residential division	(15,000)
Reduction in company profits	$130,000

Practice Problem #9

	Product A	Product B	Product C
Finished selling price	$62.37	$96.11	$102.72
Unfinished selling price	31.27	42.56	89.01
Incremental selling price	31.10	53.55	13.71
Further processing costs	33.76	49.82	17.29
Incremental profit (loss)	(2.66)	3.62	(3.58)

Only Product B should be processed further as it has a positive incremental profit.

Solutions to True / False Problems

1. True
2. True
3. False - Both variable and fixed costs may be differential costs.
4. False - future costs are relevant only if they differ among the alternatives.
5. False - variable costs are relevant only if they differ among the alternatives.
6. False - sunk costs occurred in the past and cannot be changed by future decisions. They are never relevant.
7. False - relevant costs differ among the alternatives. Costs that are incurred regardless of the alternative chosen will not differ and are not relevant.
8. False - opportunity costs are never recorded in the general ledger.
9. True
10. False - variable costs are not inherently relevant. Only the variable costs that differ among the alternatives are relevant.
11. False - bottlenecks limit production and may cause increased costs. Limited production translates into lower sales and income.
12. True
13. True
14. False – The decision to accept additional business should be based on a comparison of additional benefits and additional costs.
15. True
16. True
17. False – If there is incremental profit from the additional business then the business should be accepted.
18. True
19. False – joint costs are irrelevant in deciding whether to process further.
20. True

Solutions to Multiple Choice Questions

1. C
2. D
3. C
4. B
5. A
6. C
7. C
8. D
9. B
10. B
11. C
12. D
13. A
14. B
15. A
16. B
17. B
18. D
19. C
20. D
21. A
22. D
23. B