CHAPTER 22
MANAGEMENT CONTROL SYSTEMS, TRANSFER PRICING, AND MULTINATIONAL CONSIDERATIONS

22-1 The goal of a management control system is to improve the collective decisions within an organization. This is accomplished by means of gathering and using information to aid and coordinate the planning and control decisions throughout an organization and to guide the behavior of its managers and employees.

22-2 To be effective, management control systems should be (a) closely aligned to an organization's strategies and goals, (b) designed to support the organizational responsibilities of individual managers, and (c) able to motivate managers and employees to put in effort to attain selected goals desired by top management.

22-3 Motivation combines goal congruence and effort. Motivation is the desire to attain a selected goal specified by top management (the goal-congruence aspect) combined with the resulting pursuit of that goal (the effort aspect).

22-4 The chapter cites five benefits of decentralization:

1. Creates greater responsiveness to local needs
2. Leads to gains from faster decision making
3. Increases motivation of subunit managers
4. Assists management development and learning
5. Sharpens the focus of subunit managers

The chapter cites four costs of decentralization:

1. Leads to suboptimal decision making
2. Focuses managers' attention on the subunit rather than the company as a whole
3. Increases costs of gathering information
4. Results in duplication of activities

22-5 No. Organizations typically compare the benefits and costs of decentralization on a function-by-function basis. For example, companies with highly decentralized operating divisions frequently have centralized income tax strategies.

22-6 No. A transfer price is the price one subunit of an organization charges for a product or service supplied to another subunit of the same organization. The two segments can be cost centers, profit centers, or investment centers. For example, the allocation of service department costs to production departments that are set up as either cost centers or investment centers is an example of transfer pricing.

22-7 Transfer prices are the prices one subunit of an organization charges for products or services supplied to another subunit of the same organization. The three general methods for determining transfer prices are:

1. Market-based transfer prices
2. Cost-based transfer prices
3. Negotiated transfer prices

22-8 Transfer prices should have the following properties. They should

1. promote goal congruence,
2. be useful for evaluating subunit performance,
3. motivate management effort, and
4. preserve a high level of subunit autonomy in decision making.

22-9 No, the chapter illustration demonstrates how division operating incomes differ dramatically under the variable costs, full costs, and market price methods of transfer pricing.

22-10 Transferring products or services at market prices generally leads to optimal decisions when (a) the market for the intermediate product market is perfectly competitive, (b) interdependencies of subunits are minimal, and (c) there are no additional costs or benefits to the company as a whole from buying or selling in the external market instead of transacting internally.

22-11 Often, managers will be motivated to use full cost based transfer prices because they represent relevant costs for long run decisions, they facilitate external pricing based on the inclusion of fixed as well as variable costs, and they are the least costly to administer.

One potential limitation of full-cost-based transfer prices is that they can lead to suboptimal decisions for the company as a whole. An example of a conflict between divisional action and overall company profitability resulting from an inappropriate transfer-pricing policy is buying products or services outside the company when it is beneficial to overall company profitability to source them internally. This situation often arises where full-cost-based transfer prices are used. This situation can make the fixed costs of the supplying division appear to be variable costs of the purchasing division. Another limitation is that the supplying division may not have sufficient incentives to control costs if the full-cost-based transfer price uses actual costs rather than standard costs.

22-12 Reasons why a dual-pricing approach to transfer pricing is not widely used in practice include:

1. In this approach, the manager of the supplying division uses a cost-based method to record revenues and does not have sufficient incentives to control costs.
2. This approach does not provide clear signals to division managers about the level of decentralization top management wants.
3. This approach tends to insulate managers from the frictions of the marketplace because costs, not market prices, affect the revenues of the supplying division.
4. It leads to problems in computing the taxable income of subunits located in different tax jurisdictions.

22-13 A negotiated transfer price is an outcome of a bargaining process between buying and selling units. It promotes goal congruence and motivates management efforts in addition to preserving the autonomy of the subunits. Cost and price information are often useful starting points in the negotiation process. Costs, particularly variable costs of the selling division, serve as a "floor" below which the selling division would be unwilling to sell. Prices that the buying division would pay to purchase products from the outside market serves as a "ceiling" above which the buying division would be unwilling to buy. The price negotiated by the two divisions will, in general, have no specific relationship to either costs or prices. But the negotiated price will generally fall between the variable costs-based floor and the market price-based ceiling.

22-14 Yes. The general transfer-pricing guideline specifies that the minimum transfer price equals the *incremental cost per unit* incurred up to the point of transfer *plus* the *opportunity cost per unit* to the supplying division. When the supplying division has idle capacity, its opportunity cost per unit is zero; when the supplying division has no idle capacity, its opportunity cost per unit is positive. Hence, the minimum transfer price will vary depending on whether the supplying division has idle capacity or not.

22-15 Alternative transfer-pricing methods can result in sizable differences in the reported operating income of divisions in different income tax jurisdictions. If these jurisdictions have different tax rates or deductions, the net income of the company as a whole can be affected by the choice of the transfer-pricing method.

22-16 (15 min.) **Management control systems, balanced scorecard.**

Greystone follows a low-cost strategy that emphasizes high quality, timeliness, and a multi-skilled workforce. Accordingly, Greystone should adopt financial and non-financial performance measures in its balanced scorecard that support this strategy. Examples of performance measures in each perspective are identified below.

Financial perspective	Revenue growth
	Operating income from productivity gain
	Operating income, EVA, ROI
	Gross margin percentage
Customer perspective	Growth in market share
	Customer satisfaction ratings
	Customer response time
	Number of customer complaints
	Number of new customers
Internal-business processes perspective	Yield
	Percent of defective tiles
	Manufacturing cycle efficiency
	On-time delivery
	Number of design and process changes made
Learning and growth perspective	Employee turnover
	Employee satisfaction ratings
	Percent of employees trained in quality management
	Hours of training
	Percent of compensation based on team incentives
	Information systems availability

22-17 (25 min.) **Cost centers, profit centers, decentralization**.

1. The Glass Department sends its product to the Wood and Metal Departments for finishing. The Glass Department does not negotiate internal prices. The Glass, Wood and Metal Departments are cost centers because they are only evaluated on output and cost control (cost variances).

2. The three departments are centralized because upper management dictates their production schedules.

3. A centralized department can be a profit center. Centralization relates to the degree of autonomy that a department has for decision making. This concept is independent of the type of responsibility center used to evaluate performance (for example the Glass Department could be a profit center if upper management chooses a transfer price for the glass transferred from the Glass to the Wood and Metal Departments). A department may be organized as a profit center but it will be centralized if it has little freedom in making decisions.

4. a) With these changes, Steffen will be moving toward a more decentralized environment because each department will have more local decision-making authority, such as the ability to set its own production schedule, buy and sell products in the external market and negotiate transfer prices. These changes also make all three departments profit centers (rather than cost centers) because the managers of each department are responsible for both costs and revenues.

   b) I would recommend that upper management evaluate the three departments as profit centers because profits would be a good indicator of how well each department is doing.

22-18 (15 min.) **Decentralization, goal congruence, responsibility centers.**

1. The environmental-management group appears to be decentralized because its managers have considerable freedom to make decisions. They can choose which projects to work on and which projects to reject. Top management will adjust the size of the environmental-management group to match the demand for the group's services by operating divisions.

2. The environmental-management group is a cost center. The group is required to charge the operating divisions for environmental services at cost and not at market prices that would help earn the group a profit.

3. The benefits of structuring the environmental-management group in this way are:
   a. The operating managers have incentives to carefully weigh and conduct cost-benefit analyses before requesting the environmental group's services.
   b. The operating managers have an incentive to follow the work and the progress made by the environmental team.
   c. The environmental group has incentives to fulfill the contract, to do a good job in terms of cost, time, and quality, and to satisfy the operating division to continue to get business.

   The problems in structuring the environmental-management group in this way are:
   a. The contract requires extensive internal negotiations in terms of cost, time, and technical specifications.
   b. The environmental group needs to continuously "sell" its services to the operating division, and this could potentially result in loss of morale.
   c. Experimental projects that have long-term potential may not be undertaken because operating division managers may be reluctant to undertake projects that are costly and uncertain, whose benefits will be realized only well after they have left the division.

   To the extent that the focus of the environmental-management group is on short-run projects demanded by the operating divisions, the current structure leads to goal congruence and motivation. Goal congruence is achieved because both operating divisions and the environmental-management group are motivated to work toward the organizational goals of reducing pollution and improving the environment. The operating divisions will be motivated to use the services of the environmental-management group to achieve the environmental goals set for them by top management. The environmental-management group will be motivated to deliver high-quality services in a cost-effective way to continue to create a demand for their services. The one issue that top management needs to guard against is that experimental projects with long-term potential that are costly and uncertain may not be undertaken under the current structure. Top management may want to set up a committee to study and propose such long-run projects for consideration and funding by corporate management.

22-19 (35 min.) **Multinational transfer pricing, effect of alternative transfer-pricing methods, global income tax minimization.**

1. This is a three-country, three-division transfer-pricing problem with three alternative transfer-pricing methods. Summary data in U.S. dollars are:

China Plant
Variable costs: 1,200 Yuan ÷ 8 Yuan per $ = $150 per subunit
Fixed costs: 2,000 Yuan ÷ 8 Yuan per $ = $250 per subunit
South Korea Plant
Variable costs: 372,000 Won ÷ 1,200 Won per $ = $310 per unit
Fixed costs: 492,000 Won ÷ 1,200 Won per $ = $410 per unit
U.S. Plant
Variable costs: = $125 per unit
Fixed costs: = $210 per unit

Market prices for private-label sale alternatives:
China Plant: 3,800 Yuan ÷ 8 Yuan per $ = $475 per subunit
South Korea Plant: 1,620,000 Won ÷ 1,200 Won per $ = $1,350 per unit

The transfer prices under each method are:

a. Market price
- China to South Korea = $475 per subunit
- South Korea to U.S. Plant = $1,350 per unit

b. 200% of full costs
- China to South Korea
  2.0 × ($150 + $250) = $800 per subunit
- South Korea to U.S. Plant
  2.0 × ($800 + $310 + $410) = $3,040 per unit

c. 300% of variable costs
- China to South Korea
  3.0 × $150 = $450 per subunit
- South Korea to U.S. Plant
  3.0 × ($450+ $310) = $2,280 per unit

	Method A Internal Transfers at Market Price	Method B Internal Transfers at 200% of Full Costs	Method C Internal Transfers at 300% of Variable Costs
1. *China Division*			
Division revenue per unit	$ 475	$ 800	$ 450
Cost per unit:			
Division variable cost per unit	150	150	150
Division fixed cost per unit	250	250	250
Total division cost per unit	400	400	400
Division operating income per unit	75	400	50
Income tax at 40%	30	160	20
Division net income per unit	$ 45	$ 240	$ 30
2. *South Korea Division*			
Division revenue per unit	$1,350	$3,040	$2,280
Cost per unit:			
Transferred-in cost per unit	475	800	450
Division variable cost per unit	310	310	310
Division fixed cost per unit	410	410	410
Total division cost per unit	1,195	1,520	1,170
Division operating income per unit	155	1,520	1,110
Income tax at 20%	31	304	222
Division net income per unit	$ 124	$1,216	$ 888
3. *United States Division*			
Division revenue per unit	$3,400	$3,400	$3,400
Cost per unit:			
Transferred-in cost per unit	1,350	3,040	2,280
Division variable cost per unit	125	125	125
Division fixed cost per unit	210	210	210
Total division cost per unit	1,685	3,375	2,615
Division operating income per unit	1,715	25	785
Income tax at 30%		7.5	235.5
Division net income per unit	514.5	$ 17.5	$ 549.5
	$1,200.5		

2. Division net income:

	Market Price	200% of Full Costs	300% of Variable Cost
China Division	$ 45.00	$ 240.00	$ 30.00
South Korea Division	124.00	1,216.00	888.00
U.S. Division	1,200.50	17.50	549.50
Convenient Computer, Inc.	$1,369.50	$1,473.50	$1,467.50

Convenient will maximize its net income by using 200% of full costs as the transfer-price. This is because Method B sources the largest proportion of income in Korea, the country with the lowest income tax rate.

22-20 (30 min.) **Transfer-pricing methods, goal congruence.**

1. *Alternative 1:* Sell as raw lumber for $200 per 100 board feet:

Revenue	$200
Variable costs	100
Contribution margin	$100 per 100 board feet

Alternative 2: Sell as finished lumber for $275 per 100 board feet:

Revenue		$275
Variable costs:		
Raw lumber	$100	
Finished lumber	125	225
Contribution margin		$ 50 per 100 board feet

British Columbia Lumber will maximize its total contribution margin by selling lumber in its raw form.

An alternative approach is to examine the incremental revenues and incremental costs in the Finished Lumber Division:

Incremental revenues, $275 – $200	$ 75
Incremental costs	125
Incremental loss	$ (50) per 100 board feet

2. Transfer price at 110% of variable costs:
   = $100 + ($100 × 0.10)
   = $110 per 100 board feet

	Sell as Raw Lumber	**Sell as Finished Lumber**
Raw Lumber Division		
Division revenues	$200	$110
Division variable costs	100	100
Division operating income	$100	$ 10
Finished Lumber Division		
Division revenues	$ 0	$275
Transferred-in costs	—	110
Division variable costs	—	125
Division operating income	$ 0	$ 40

The Raw Lumber Division will maximize reported division operating income by selling raw lumber, which is the action preferred by the company as a whole. The Finished Lumber Division will maximize division operating income by selling finished lumber, which is contrary to the action preferred by the company as a whole.

3. Transfer price at market price = $200 per 100 board feet.

	Sell as Raw Lumber	**Sell as Finished Lumber**
Raw Lumber Division		
Division revenues	$200	$200
Division variable costs	100	100
Division operating income	$100	$100
Finished Lumber Division		
Division revenues	$ 0	$275
Transferred-in costs	—	200
Division variable costs	—	125
Division operating income	$ 0	$ (50)

Since the Raw Lumber Division will be indifferent between selling the lumber in raw or finished form, it would be willing to maximize division operating income by selling raw lumber, which is the action preferred by the company as a whole. The Finished Lumber Division will maximize division operating income by not further processing raw lumber and this is preferred by the company as a whole. Thus, transfer at market price will result in division actions that are also in the best interest of the company as a whole.

22-21 (30 min.) **Effect of alternative transfer-pricing methods on division operating income**.

	Method A Internal Transfers at Market Prices	Method B Internal Transfers at 110% of Full Costs
1. *Mining Division*		
Revenues:		
$100, $77[1] × 250,000 units	$25,000,000	$19,250,000
Costs:		
Division variable costs:		
$61[2] × 250,000 units	15,250,000	15,250,000
Division fixed costs:		
$9[3] × 250,000 units	2,250,000	2,250,000
Total division costs	17,500,000	17,500,000
Division operating income	$ 7,500,000	$ 1,750,000
Metals Division		
Revenues:		
$175 × 250,000 units	$43,750,000	$43,750,000
Costs:		
Transferred-in costs:		
$100, $77 × 250,000 units	25,000,000	19,250,000
Division variable costs:		
$44[4] × 250,000 units	11,000,000	11,000,000
Division fixed costs:		
$18[5] × 250,000 units	4,500,000	4,500,000
Total division costs	40,500,000	34,750,000
Division operating income	$ 3,250,000	$ 9,000,000

[1] $77 = Full manufacturing cost per unit in the Mining Division, $70 × 110%

[2] Variable cost per unit in Mining Division = Direct materials + Direct manufacturing labor + 75% of manufacturing overhead = $15 + $19 + (75% × $36) = $61

[3] Fixed cost per unit = 25% of manufacturing overhead = 25% × $36 = $9

[4] Variable cost per unit in Metals Division = Direct materials + Direct manufacturing labor + 40% of manufacturing overhead = $9 + $23 + (40% × $30) = $44

[5] Fixed cost per unit in Metals Division = 60% of manufacturing overhead = 60% × $30 = $18

2. Bonus paid to division managers at 1% of division operating income will be as follows:

	Method A Internal Transfers at Market Prices	Method B Internal Transfers at 110% of Full Costs
Mining Division manager's bonus (1% × $7,500,000; 1% × $1,750,000)	$75,000	$ 17,500
Metals Division manager's bonus (1% × $3,250,000; 1% × $9,000,000)	32,500	90,000

The Mining Division manager will prefer Method A (transfer at market prices) because this method gives $75,000 of bonus rather than $17,500 under Method B (transfers at 110% of full costs). The Metals Division manager will prefer Method B because this method gives $90,000 of bonus rather than $32,500 under Method A.

3. Joseph Hayes, the manager of the Mining Division, will appeal to the existence of a competitive market to price transfers at market prices. Using market prices for transfers in these conditions leads to goal congruence. Division managers acting in their own best interests make decisions that are also in the best interests of the company as a whole.

Hayes will further argue that setting transfer prices based on cost will cause Hayes to pay no attention to controlling costs since all costs incurred will be recovered from the Metals Division at 110% of full costs.

22-22 (30 min.) **Transfer pricing, general guideline, goal congruence.**

1. Using the general guideline presented in the chapter, the minimum price at which the Airbag Division would sell airbags to the Tivo Division is $90, the incremental costs. The Airbag Division has idle capacity (it is currently working at 80% of capacity). Therefore, its opportunity cost is zero—the Airbag Division does not forgo any external sales and as a result, does not forgo any contribution margin from internal transfers. Transferring airbags at incremental cost achieves goal congruence.

2. Transferring products internally at incremental cost has the following properties:

   a. Achieves goal congruence—Yes, as described in requirement 1 above.
   b. Useful for evaluating division performance—No, because this transfer price does not cover or exceed full costs. By transferring at incremental costs and not covering fixed costs, the Airbag Division will show a loss. This loss, the result of the incremental cost-based transfer price, is not a good measure of the economic performance of the subunit.
   c. Motivating management effort—Yes, if based on budgeted costs (actual costs can then be compared to budgeted costs). If, however, transfers are based on actual costs, Airbag Division management has little incentive to control costs.
   d. Preserves division autonomy—No. Because it is rule-based, the Airbag Division has no say in the setting of the transfer price.

3. If the two divisions were to negotiate a transfer price, the range of possible transfer prices will be between $90 and $125 per unit. The Airbag Division has excess capacity that it can use to supply airbags to the Tivo Division. The Airbag Division will be willing to supply the airbags only if the transfer price equals or exceeds $90, its incremental costs of manufacturing the airbags. The Tivo Division will be willing to buy airbags from the Airbag Division only if the price does not exceed $125 per airbag, the price at which the Tivo division can buy airbags in the market from external suppliers. Within the price range or $90 and $125, each division will be willing to transact with the other and maximize overall income of Quest Motors. The exact transfer price between $90 and $125 will depend on the bargaining strengths of the two divisions. The negotiated transfer price has the following properties.

   a. Achieves goal congruence—Yes, as described above.
   b. Useful for evaluating division performance—Yes, because the transfer price is the result of direct negotiations between the two divisions. Of course, the transfer prices will be affected by the bargaining strengths of the two divisions.
   c. Motivating management effort—Yes, because once negotiated, the transfer price is independent of actual costs of the Airbag Division. Airbag Division management has every incentive to manage efficiently to improve profits.
   d. Preserves subunit autonomy—Yes, because the transfer price is based on direct negotiations between the two divisions and is not specified by headquarters on the basis of some rule (such as Airbag Division's incremental costs).

4. Neither method is perfect, but negotiated transfer pricing (requirement 3) has more favorable properties than the cost-based transfer pricing (requirement 2). Both transfer-pricing methods achieve goal congruence, but negotiated transfer pricing facilitates the evaluation of division performance, motivates management effort, and preserves division autonomy, whereas the transfer price based on incremental costs does not achieve these objectives.

22-23 (25 min.) **Multinational transfer pricing, global tax minimization.**

1. Solution Exhibit 22-23 shows the after-tax operating incomes earned by the U.S. and Austrian divisions from transferring 1,000 units of Product 4A36 using (a) full manufacturing cost per unit, and (b) market price of comparable imports as transfer prices.

2. There are many ways to proceed, but the first thing to note is that the transfer price that minimizes the total of company import duties and income taxes will be either the full manufacturing cost or the market price of comparable imports.

Consider what happens every time the transfer price is increased by $1 over, say, the full manufacturing cost of $500. This results in the following:

a.	an increase in U.S. taxes of 40% × $1	$0.400
b.	an increase in import duties paid in Austria, 10% × $1	0.100
c.	a decrease in Austrian taxes of 44% × $1.10 (the $1 increase in transfer price + $0.10 paid by way of import duty)	(0.484)
	Net effect is an increase in import duty and tax payments of:	$0.016

Hence, Mornay Company will minimize import duties and income taxes by setting the transfer price at its minimum level of $500, the full manufacturing cost.

SOLUTION EXHIBIT 22-23
Division Incomes of U.S. and Austrian Divisions from Transferring 1,000 Units of Product 4A36

	Method A Internal Transfers at Full Manufacturing Cost	Method B Internal Transfers at Market Price
U.S. Division		
Revenues:		
$500, $650 × 1,000 units	$500,000	$650,000
Costs:		
Full manufacturing cost:		
$500 × 1,000 units	500,000	500,000
Division operating income	0	150,000
Division income taxes at 40%	0	60,000
Division after-tax operating income	$ 0	$ 90,000
Austrian Division		
Revenues:		
$750 × 1,000 units	$750,000	$750,000
Costs:		
Transferred-in costs:		
$500 × 1,000, $650 × 1,000 units	500,000	650,000
Import duties at 10% of transferred-in price		
$50 × 1,000, $65 × 1,000 units	50,000	65,000
Total division costs	550,000	715,000
Division operating income	200,000	35,000
Division income taxes at 44%	88,000	15,400
Division after-tax operating income	$112,000	$ 19,600

22-24 (30 min.) **Multinational transfer pricing, goal congruence (continuation of 22-23).**

1. After-tax operating income if Mornay Company sells all 1,000 units of Product 4A36 in the United States:

Revenues, $600 × 1,000 units	$600,000
Full manufacturing costs, $500 × 1,000 units	500,000
Operating income	100,000
Income taxes at 40%	40,000
After-tax operating income	$ 60,000

From Exercise 22-23, requirement 1, Mornay Company's after-tax operating income if it transfers 1,000 units of Product 4A36 to Austria at full manufacturing cost and sells the units in Austria is $112,000. Therefore, Mornay should sell the 1,000 units in Austria.

2. Transferring Product 4A36 at the full manufacturing cost of the U.S. Division minimizes import duties and taxes (Exercise 22-23, requirement 2), but creates zero operating income for the U.S Division. Acting autonomously, the U.S. Division manager would maximize division operating income by selling Product 4A36 in the U.S. market, which results in $60,000 in after-tax division operating income as calculated in requirement 1, rather than by transferring Product 4A36 to the Austrian division at full manufacturing cost. Thus, the transfer price calculated in requirement 2 of Exercise 22-23 will not result in actions that are optimal for Mornay Company as a whole.

3. The minimum transfer price at which the U.S. division manager acting autonomously will agree to transfer Product 4A36 to the Austrian division is $600 per unit. Any transfer price less than $600 will leave the U.S. Division's performance worse than selling directly in the U.S. market. Because the U.S. Division can sell as many units that it makes of Product 4A36 in the U.S. market, there is an opportunity cost of transferring the product internally equal to $250 (selling price $600 − variable manufacturing costs, $350).

$$\text{Minimum transfer price per unit} = \text{Incremental cost per unit up to the point of transfer} + \text{Opportunity cost per unit to the selling (U. S.) division}$$

$$= \$350 + \$250 = \$600$$

This transfer price will result in Mornay Company as a whole paying more import duties and taxes than the answer to Exercise 22-23, requirement 2, as calculated below:

U.S. Division	
Revenues, $600 × 1,000 units	$600,000
Full manufacturing costs	500,000
Division operating income	100,000
Division income taxes at 40%	40,000
Division after-tax operating income	$ 60,000

Austrian Division	
Revenues, $750 × 1,000 units`	$750,000
Transferred in costs, $600 × 1,000 units	600,000
Import duties at 10% of transferred-in price, $60 × 1,000 units	60,000
Division operating income	90,000
Division income taxes at 44%	39,600
Division after-tax operating income	$ 50,400

Total import duties and income taxes at transfer prices of $500 and $600 per unit for 1,000 units of Product 4A36 follow:

		Transfer Price of $500 per Unit (Exercise 22-23, Requirement 2)	**Transfer Price of $600 per Unit**
(a)	U.S. income taxes	$ 0	$ 40,000
(b)	Austrian import duties	50,000	60,000
(c)	Austrian income taxes	88,000	39,600
		$138,000	$139,600

The minimum transfer price that the U.S. division manager acting autonomously would agree to results in Mornay Company paying $1,600 in additional import duties and income taxes.

A student who has done the calculations shown in Exercise 22-23, requirement 2, can calculate the additional taxes from a $600 transfer price more directly, as follows:

Every $1 increase in the transfer price per unit over $500 results in additional import duty and taxes of $0.016 per unit

So, a $100 increase ($600 – $500) per unit will result in additional import duty and taxes of $0.016 × 100 = $1.60

For 1,000 units transferred, this equals $1.60 × 1,000 = $1,600

22-25 (20 min.) **Transfer-pricing dispute.**

This problem is similar to the Problem for Self-Study in the chapter.

1. Company as a whole will not benefit if Division C purchases from external suppliers:

Purchase costs paid to external suppliers, 1,000 units × $135	$135,000
Deduct: Savings in variable costs by reducing Division A output, 1,000 units × $120	120,000
Net cost (benefit) to company as a whole as a result of purchasing from external suppliers	$ 15,000

Any transfer price between $120 and $135 per unit will achieve goal congruence. Division managers acting in their own best interests will take actions that are in the best interests of the company as a whole.

2. Company as a whole will benefit if Division C purchases from external suppliers:

Purchase costs paid to external suppliers, 1,000 units × $135		$135,000
Deduct: Savings in variable costs, 1,000 units × $120	$120,000	
Savings due to A's equipment and facilities assigned to other operations	18,000	138,000
Net cost (benefit) to company as a whole as a result of purchasing from external suppliers		$ (3,000)

Division C should purchase from external suppliers.

3. Company as a whole will benefit if Division C purchases from external suppliers:

Purchase costs paid to external suppliers, 1,000 units × $115	$115,000
Deduct: Savings in variable costs by reducing Division A output, 1,000 units × $120	120,000
Net cost (benefit) to company as a whole as a result of purchasing from external suppliers	$ (5,000)

The three requirements are summarized below (in thousands):

	(1)	**(2)**	**(3)**
Purchase costs paid to external suppliers	$135	$135	$115
Relevant costs if purchased from Division A:			
Incremental (outlay) costs if purchased from Division A	120	120	120
Opportunity costs if purchased from Division A	–	18	–
Total relevant costs if purchased from Division A	120	138	120
Operating income advantage (disadvantage) to company as a result of purchasing from Division A	$ 15	$ (3)	$ (5)

Goal congruence would be achieved if the transfer price is set equal to the total relevant costs of purchasing from Division A.

22-26 (5 min.) **Transfer-pricing problem (continuation of 22-25).**

The company as a whole would benefit in this situation if Division C purchased from external suppliers. The $15,000 disadvantage to the company as a whole as a result of purchasing from external suppliers would be more than offset by the $30,000 contribution margin of Division A's sale of 1,000 units to other customers:

Purchase costs paid to external suppliers, 1,000 units × $135		$135,000
Deduct variable cost savings, 1,000 units × $120		120,000
Net cost to the company as a result of purchasing from external suppliers		$ 15,000
Division A's sales to other customers, 1,000 units × $155		$155,000
Deduct:		
Variable manufacturing costs, $120 × 1,000 units	$120,000	
Variable marketing costs, $5 × 1,000 units	5,000	
Total variable costs		125,000
Contribution margin from selling units to other customers		$ 30,000

22-27 (20min.) **General guideline, transfer pricing.**

1. The minimum transfer price that the SD would demand from the AD is the net price it could obtain from selling its screens on the outside market: $145 minus $6 marketing and distribution cost per screen, or $139 per screen. The SD is operating at capacity. The incremental cost of manufacturing each screen is $95. Therefore, the opportunity cost of selling a screen to the AD is the contribution margin the SD would forego by transferring the screen internally instead of selling it on the outside market.

   Contribution margin per screen = $139 – $95 = $44

   Using the general guideline,

   $$\begin{array}{c}\text{Minimum transfer}\\ \text{price per screen}\end{array} = \begin{array}{c}\text{Incremental cost per}\\ \text{screen inccurred up to}\\ \text{the point of transfer}\end{array} + \begin{array}{c}\text{Opportunity cost per}\\ \text{screen to the}\\ \text{selling division}\end{array}$$

   $$= \$95 + \$44 = \$139$$

2. The maximum transfer price the AD manager would be willing to offer SD is its own total cost for purchasing from outside, $145 plus $4 per screen, or $149 per screen.

3. a. If the SD has excess capacity (relative to what the outside market can absorb), the minimum transfer price using the general guideline is: for the first 2,400 units (or 20% of output), $95 per screen because opportunity cost is zero; for the remaining 9,600 units (or 80% of output), $139 per screen because opportunity cost is $44 per screen.

3. b. From the point of view of Willman's management, all of the SD's output should be transferred to the AD. This would avoid the $4 per screen variable purchasing cost that is incurred by the AD when it purchases screens from the outside market and it would also save the $6 marketing and distribution cost the SD would incur to sell each screen to the outside market.

3. c. If the managers of the AD and the SD could negotiate the transfer price, they would settle on a price between $139 per screen (the minimum transfer price the SD will accept) and $149 per screen (the maximum transfer price the AD would be willing to pay). From requirements 1 and 2, we see that any price in this range would be acceptable to both divisions for all of the SD's output, and would also be optimal from Willman's point of view. The exact transfer price between $139 and $149 will depend on the bargaining strengths of the two divisions. Of course, Willman's management could also mandate a particular transfer price between $139 and $149 per screen.

22-28 (20–30 min.) **Pertinent transfer price.**

This problem explores the "general transfer-pricing guideline" discussed in the chapter.

1. No, transfers should not be made to Division B if there is no unused capacity in Division A. An incremental (outlay) cost approach shows a positive contribution for the company as a whole:

Selling price of final product		$300
Incremental cost per unit in Division A	$120	
Incremental cost per unit in Division B	150	270
Contribution margin per unit		$ 30

However, if there is no excess capacity in Division A, any transfer will result in diverting products from the market for the intermediate product. Sales in this market result in a greater contribution for the company as a whole. Division B should not assemble the bicycle since the incremental revenue Europa can earn, $100 per unit ($300 from selling the final product – $200 from selling the intermediate product) is less than the incremental cost of $150 to assemble the bicycle in Division B. Alternatively, Europa's contribution margin from selling the intermediate product exceeds Europa's contribution margin from selling the final product:

Selling price of intermediate product	$200
Incremental (outlay) cost per unit in Division A	120
Contribution margin per unit	$ 80

Using the general guideline described in the chapter,

$$\begin{aligned}\text{Minimum transfer price} &= \left(\begin{array}{c}\text{Additional } \textit{incremental} \text{ cost} \\ \textit{per unit} \text{ incurred up} \\ \text{to the point of transfer}\end{array}\right) + \left(\begin{array}{c}\textit{Opportunity} \text{ cost} \\ \textit{per unit} \text{ to the} \\ \text{supplying division}\end{array}\right) \\ &= \$120 + (\$200 - \$120) \\ &= \$200, \text{ which is the market price}\end{aligned}$$

The market price is the transfer price that leads to the correct decision; that is, do not transfer to Division B unless there are extenuating circumstances for continuing to market the final product. Therefore, Division B must either drop the product or reduce the incremental costs of assembly from $150 per bicycle to less than $100 (selling price, $300 – transfer price, $200).

2. If (a) A has excess capacity, (b) there is intermediate external demand for only 800 units at $200, and (c) the $200 price is to be maintained, then the opportunity costs per unit to the supplying division are $0. The general guideline indicates a minimum transfer price of: $120 + $0 = $120, which is the incremental or outlay costs for the first 200 units. B would buy 200 units from A at a transfer price of $120 because B can earn a contribution of $30 per unit [$300 – ($120 + $150)]. In fact, B would be willing to buy units from A at any price up to $150 per unit because any transfers at a price of up to $150 will still yield B a positive contribution margin.

Note, however, that if B wants more than 200 units, the minimum transfer price will be $200 as computed in requirement 1 because A will incur an opportunity cost in the form of lost contribution of $80 (market price, $200 – outlay costs of $120) for every unit above 200 units that are transferred to B.

The following schedule summarizes the transfer prices for units transferred from A to B:

Units	Transfer Price
0–200	$120–$150
200–1,000	$200

For an exploration of this situation when imperfect markets exist, see the next problem.

3. Division B would show zero contribution, but the company as a whole would generate a contribution of $30 per unit on the 200 units transferred. Any price between $120 and $150 would induce the transfer that would be desirable for the company as a whole. A motivational problem may arise regarding how to split the $30 contribution between Division A and B. Unless the price is below $150, B would have little incentive to buy.

Note: The transfer price that may appear optimal in an economic analysis may, in fact, be totally unacceptable from the viewpoints of (1) preserving autonomy of the managers, and (2) evaluating the performance of the divisions as economic units. For instance, consider the simplest case discussed previously, where there is idle capacity and the $200 intermediate price is to be maintained. To direct that A should sell to B at A's variable cost of $120 may be desirable from the viewpoint of B and the company as a whole. However, the autonomy (independence) of the manager of A is eroded. Division A will earn nothing, although it could argue that it is contributing to the earning of income on the final product.

If the manager of A wants a portion of the total company contribution of $30 per unit, the question is: How is an appropriate amount determined? This is a difficult question in practice. The price can be negotiated upward to somewhere between $120 and $150 so that some "equitable" split is achieved. A dual transfer-pricing scheme has also been suggested, whereby the supplier gets credit for the full intermediate market price and the buyer is charged with only variable or incremental costs. In any event, when there is heavy interdependence between divisions, such as in this case, some system of subsidies may be needed to deal with the three problems of goal congruence, management effort, and subunit autonomy. Of course, where heavy subsidies are needed, a question can be raised as to whether the existing degree of decentralization is optimal.

22-29 (30–40 min.) **Pricing in imperfect markets (continuation of 22-28).**

An alternative presentation, which contains the same numerical answers, can be found at the end of this solution.

1. Potential contribution from external intermediate sale is

1,000 × ($195 – $120)	$75,000
Contribution through keeping price at $200 is 800 × $80.	64,000
Forgone contribution by transferring 200 units	$11,000

Opportunity cost per unit to the supplying division by transferring internally:

$$\frac{\$11,000}{200} = \$55$$

Transfer price = $120 + $55 = $175

An alternative approach to obtaining the same answer is to recognize that the incremental or outlay cost is the same for all 1,000 units in question. Therefore, the total revenue desired by A would be the same for selling outside or inside.

Let X equal the transfer price at which Division A is indifferent between selling all units outside versus transferring 200 units inside.

$$1,000 \times \$195 = (800 \times \$200) + 200X$$
$$X = \$175$$

The $175 price will lead to the correct decision. Division B will not buy from Division A because its total costs of $175 + $150 will exceed its prospective selling price of $300. Division A will then sell 1,000 units at $195 to the outside; Division A and the company will have a contribution margin of $75,000. Otherwise, if 800 units were sold at $200 and 200 units were transferred to Division B, the company would have a contribution of $64,000 plus $6,000 (200 units of final product × $30), or $70,000.

A comparison might be drawn regarding the computation of the appropriate transfer prices between the preceding problem and this problem:

$$\text{Minimum transfer price} = \begin{pmatrix}\text{Additional } \textit{incremental} \text{ cost} \\ \textit{per unit} \text{ incurred up} \\ \text{to the point of transfer}\end{pmatrix} + \begin{pmatrix}\textit{Opportunity} \text{ cost} \\ \textit{per unit} \text{ to} \\ \text{Division A}\end{pmatrix}$$

$$\text{Perfect markets: } = \$120 + (\text{Selling price} - \text{Outlay costs per unit})$$
$$= \$120 + (\$200 - \$120) = \$200$$

$$\text{Imperfect markets: } = \$120 + \frac{\text{Marginal revenues} - \text{Outlay costs}}{\text{Number of units transferred}}$$

$$= \$120 + \frac{\$35{,}000^{a} - \$24{,}000^{b}}{200} = \$175$$

[a]Marginal revenues of Division A from selling 200 units outside rather than transferring to Division B
= ($195 × 1,000) – ($200 × 800) = $195,000 – $160,000 = $35,000.

[b]Incremental (outlay) costs incurred by Division A to produce 200 units
= $120 × 200 = $24,000.

Therefore, selling price ($195) and marginal revenues per unit ($175 = $35,000 ÷ 200) are not the same.

The following discussion is optional. These points should be explored only if there is sufficient class time:

Some students may erroneously say that the "new" market price of $195 is the appropriate transfer price. They may claim that the general guideline says that the transfer price should be $120 + ($195 – $120) = $195, the market price. This conclusion assumes a perfect market. However, in this case there are imperfections in the intermediate market. That is, the market price is *not* a good approximation of alternative revenue. If a division's sales are heavy enough to reduce market prices, marginal revenue will be less than market price.

It is true that *either* $195 or $175 will lead to the correct decision by B in this case. But suppose that B's variable costs were $120 instead of $150. Then B would buy at a transfer price of $175 (but not at a price of $195, because then B would earn a negative contribution of $15 per unit [$300 – ($195 + $120)]. Note that if B's variable costs were $120, transfers would be desirable:

Division A contribution is:	
[800 × ($200 – $120)] + [200 × ($175 – $120)]	$75,000
Division B contribution is:	
200 × [$300 – ($175 + $120)]	1,000
Total contribution	$76,000

Or the same facts can be analyzed for the company as a whole:

Sales of intermediate product,		
800 × ($200 – $120)	=	$64,000
Sales of final products,		
200 × [300 – ($120 + $120)]	=	12,000
Total contribution		$76,000

If the transfer price were $195, B would not accept the transfer and would not earn any contribution. As shown above, Division A and the company as a whole will earn a total contribution of $75,000 instead of $76,000.

2. a. Division A can sell 900 units at $195 to the outside market and 100 units to Division B, or 800 at $200 to the outside market and 200 units to Division B. Note that, under both alternatives, 100 units can be transferred to Division B at no opportunity cost to A.

Using the general guideline, the minimum transfer price of *the first 100 units* [901–1000] is:

$$TP_1 = \$120 + 0 = \$120$$

If Division B needs 100 additional units, the opportunity cost to A is not zero, because Division A will then have to sell only 800 units to the outside market for a contribution of 800 × ($200 – $120) = $64,000 instead of 900 units for a contribution of 900 × ($195 – $120) = $67,500. Each unit sold to B in addition to the first 100 units has an opportunity cost to A of ($67,500 – $64,000) ÷ 100 = $35.

Using the general guideline, the minimum transfer price of *the next 100 units* [801–900] is:

$$TP_2 = \$120 + \$35 = \$155$$

Alternatively, the computation could be:

Increase in contribution from 100 more units, 100 × $75	$7,500
Loss in contribution on 800 units, 800 × ($80 – $75)	4,000
Net "marginal revenue"	$3,500 ÷ 100 units = $35

(Minimum) transfer price applicable to first 100 units offered by A is $120 + $0	=	$120 per unit
(Minimum) transfer price applicable to next 100 units offered by A is $120 + ($3,500 ÷ 100)	=	$155 per unit
(Minimum) transfer price applicable to next 800 units	=	$195 per unit

b. The manager of Division B will not want to purchase more than 100 units because the units at $155 would decrease his contribution ($155 + $150 > $300). Because the manager of Division B does not buy more than 100 units, the manager of Division A will have 900 units available for sale to the outside market. The manager of Division A will strive to maximize the contribution by selling them all at $195.

This solution maximizes the company's contribution:

900 × ($195 – $120)	=	$67,500
100 × ($300 – $270)	=	3,000
		$70,500

which compares favorably to:

800 × ($200 – $120)	=	$64,000
200 × ($300 – $270)	=	6,000
		$70,000

ALTERNATIVE PRESENTATION (by James Patell)

1. Company Viewpoint

a: *Sell 1,000 units outside at $195 per unit*

Price	$195
Variable cost per unit	120
Contribution	$ 75 × 1,000 = $75,000

b: *Sell 800 units outside at $200 per unit, transfer 200*

Transfer price	$200
Variable cost per unit	120
Contribution	$ 80 × 800 = $64,000

Total contribution given up if transfer occurs*
= $75,000 – $64,000 = $11,000

On a per-unit basis, the relevant costs are:

$$\begin{matrix}\textit{Incremental cost per unit}\\ \text{incurred up to}\\ \text{the point of transfer}\end{matrix} + \begin{matrix}\textit{Opportunity cost per unit}\\ \text{to Division A}\end{matrix} = \text{Transfer price}$$

$$\$120 + \frac{\$11{,}000}{200} = \$175$$

By formula, costs are:

$$\begin{bmatrix}\text{Increment cost per unit}\\ \text{incurred up to point}\\ \text{to transfer}\end{bmatrix} + \begin{bmatrix}\text{Lost opportunity to}\\ \text{sell 200 units at \$195 per unit,}\\ \text{for contribution of \$75 per unit}\end{bmatrix} - \begin{bmatrix}\text{Gain when 1st 800 units}\\ \text{sell at \$200 per unit}\\ \text{instead of \$195 per unit}\end{bmatrix}$$

$$= \$120 + \frac{200 \times \$75}{200} - \frac{\left[(\$200 - \$195) \times 800\right]}{200}$$

$$= \$120 + \$75 - \$20 = \$175$$

*Contribution of $30 per unit by B is not given up if transfer occurs, so it is not relevant here.

2a. At most, Division A can sell only 900 units and can produce 1,000. Therefore, at least 100 units should be transferred at a transfer price no less than $120. The question is whether or not a second 100 units should be transferred:

Company Viewpoint

a: *Sell 900 units outside at $195 per unit transfer 100*

Transfer price	$195
Variable cost per unit	120
Contribution	$ 75 × 900 = $67,500

b: *Sell 800 units outside at $200 per unit,*

Transfer price	$200
Variable cost per unit	120
Contribution	$ 80 × 800 = $64,000

Total contribution forgone if transfer of 100 units occurs
= \$67,500 – \$64,000 = \$3,500 (or \$35 per unit)

$$\begin{array}{c}\text{Incremental cost per unit}\\ \text{incurred up to point of transfer}\end{array} + \begin{array}{c}\text{Opportunity cost per unit}\\ \text{to Division A}\end{array} = \text{Transfer price}$$

$$\$120 + \$35 = \$155$$

2b. By formula:

$$\left[\begin{array}{c}\text{Incremental cost per unit}\\ \text{incurred up to point}\\ \text{of transfer}\end{array}\right] + \left[\begin{array}{c}\text{Lost opportunity to}\\ \text{sell 100 units at \$195 per unit,}\\ \text{for contribution of \$75 per unit}\end{array}\right] - \left[\begin{array}{c}\text{Gain when 1st 800 units}\\ \text{sell at \$200 per unit}\\ \text{instead of \$195 per unit}\end{array}\right]$$

$$= \$120 + \frac{100 \times \$75}{100} - \frac{[(\$200 - \$195) \times 800]}{100}$$

$$= \$120 + \$75 - \$40 = \$155$$

Transfer Price Schedule (minimum acceptable transfer price):

Units	Transfer Price
0–100	\$120
101–200	\$155
201–1,000	\$195

22-30 (30–35 min.) **Effect of alternative transfer-pricing methods on division operating income.**

1.

Pounds of cranberries harvested		400,000
Gallons of juice processed (500 gals per 1,000 lbs.)		200,000
Revenues (200,000 gals. × $2.10 per gal.)		$420,000
Costs		
Harvesting Division		
Variable costs (400,000 lbs. × $0.10 per lb.)	$ 40,000	
Fixed costs (400,000 lbs. × $0.25 per lb.)	100,000	
Total Harvesting Division costs		140,000
Processing Division		
Variable costs (200,000 gals. × $0.20 per gal.)	$ 40,000	
Fixed costs (200,000 gals. × $0.40 per gal.)	80,000	
Total Processing Division costs		120,000
Total costs		260,000
Operating income		$160,000

2.

	200% of Full Costs	Market Price
Transfer price per pound (($0.10 + $0.25) × 2; $0.60)	$0.70	$0.60
1. Harvesting Division		
Revenues (400,000 lbs. × $0.70; $0.60)	$280,000	$240,000
Costs		
Division variable costs (400,000 lbs. ×$0.10 per lb.)	40,000	40,000
Division fixed costs (400,000 lbs. × $0.25 per lb.)	100,000	100,000
Total division costs	140,000	140,000
Division operating income	$140,000	$100,000
Harvesting Division manager's bonus (5% of operating income)	$7,000	$5,000
2. Processing Division		
Revenues (200,000 gals. × $2.10 per gal.)	$420,000	$420,000
Costs		
Transferred-in costs	280,000	240,000
Division variable costs (200,000 gals. × $0.20 per gal.)	40,000	40,000
Division fixed costs (200,000 gals. × $0.40 per gal.)	80,000	80,000
Total division costs	400,000	360,000
Division operating income	$ 20,000	$ 60,000
Processing Division manager's bonus (5% of operating income)	$1,000	$3,000

3. Bonus paid to division managers at 5% of division operating income is computed above and summarized below:

	Internal Transfers at 200% of Full Costs	Internal Transfers at Market Prices
Harvesting Division manager's bonus (5% × $140,000; 5% × $100,000)	$7,000	$5,000
Processing Division manager's bonus (5% × $20,000; 5% × $60,000)	$1,000	$3,000

The Harvesting Division manager will prefer to transfer at 200% of full costs because this method gives a higher bonus. The Processing Division manager will prefer transfer at market price for its higher resulting bonus.

Crango may resolve or reduce transfer pricing conflicts by:

- Basing division managers' bonuses on overall Crango profits in addition to division operating income. This will motivate each manager to consider what is best for Crango overall and not be concerned with the transfer price alone.
- Letting the two divisions negotiate the transfer price between themselves. However, this may result in constant re-negotiation between the two managers each accounting period.
- Using dual transfer prices However, a cost-based transfer price will not motivate cost control by the Harvesting Division manager. It will also insulate that division from the discipline of market prices.

22-31 (25 min.) **Goal congruence problems with cost-plus transfer-pricing methods, dual pricing system (continuation of 22-30).**

1. Two examples of goal congruence problems that arise if a transfer price of 200% of full costs is mandated and Borges' decentralization policy is adopted are:
   a. The Processing Division manager will prefer to buy cranberries from an external supplier at $0.60 per pound, incurring some extra purchasing costs and lowering Crane's overall operating income. Crango will incur costs of $0.60 per pound and save variable costs of only $0.10 per pound.
   b. The Harvesting Division manager is forced to sell to an outside purchaser (because the Processing Division prefers to purchase from an external supplier) when it is better for Crango Products to process internally.

2. *Transfer into buying division at market price*
   Harvesting Division to Processing Division = $0.60 per pound of cranberries
   Transfer out of selling division at 200% of full costs
   Harvesting Division to Processing Division = 2.0 × ($0.10 + $0.25) = $0.70 per pound of cranberries

   As calculated in Requirement 2 of 22-30 and also shown below, under the dual transfer-pricing policy, the Harvesting Division will earn an operating income of $140,000 and the Processing Division will earn an operating income of $60,000.

	200% of Full Costs	Market Price
Harvesting Division		
Revenues (400,000 lbs. × $0.70 per lb.)	$280,000	
Costs		
Division variable costs (400,000 lbs. × $0.10 per lb.)	40,000	
Division fixed costs (400,000 lbs. × $0.25 per lb.)	100,000	
Total division costs	140,000	
Division operating income	$140,000	
Processing Division		
Revenues (200,000 gals. × $2.10 per gal.)		$420,000
Costs		
Transferred in costs (400,000 lbs. × $0.60 per lb.)		240,000
Division variable costs (200,000 gals. × $0.20 per gal.)		40,000
Division fixed costs (200,000 gals. × $0.40 per gal.)		80,000
Total division costs		360,000
Division operating income		$ 60,000

3. Under the dual transfer pricing policy,

	Division Operating Income
Harvesting Division	$140,000
Processing Division	60,000
Crango Products	$200,000

The overall company operating income from harvesting and processing 400,000 pounds of cranberries is $160,000 (see Problem 22-30, requirement 1).

A dual transfer-pricing method entails using different transfer prices for transfers into the buying division and transfers out of the supplying division. As a result, the sum of division operating incomes does not equal the total company operating income.

4. Problems which may arise if Crango Products uses the dual transfer-pricing system include:

   a. It may reduce the incentives of the supplying division to control costs since every $1 of cost of the supplying division is transferred out to the buying division at $2.00.
   b. A dual transfer-pricing system does not provide clear signals to the individual divisions about the level of decentralization top management seeks.
   c. It insulates the Harvesting Division manager from the frictions and the discipline of the marketplace because costs, not market prices, affect the revenues of the supplying division.

22-32 (40 min.) **Multinational transfer pricing, global tax minimization.**

This is a two-country two-division transfer-pricing problem with two alternative transfer-pricing methods.

Summary data in U.S. dollars are:

South Africa Mining Division

Variable costs:	560 ZAR	÷ 7 =	$80 per lb. of raw diamonds
Fixed costs:	1,540 ZAR	÷ 7 =	$220 per lb. of raw diamonds
Market price:	3,150 ZAR	÷ 7 =	$450 per lb. of raw diamonds

U.S. Processing Division

Variable costs	=	$150 per lb. of polished industrial diamonds
Fixed costs	=	$700 per lb. of polished industrial diamonds
Market price	=	$5,000 per lb. of polished industrial diamonds

1. The transfer prices are:
   a. *200% of full costs*
      Mining Division to Processing Division
      = 2.0 × ($80 + $220) = $600 per lb. of raw diamonds
   b. *Market price*
      Mining Division to Processing Division
      = $450 per lb. of raw diamonds

	200% of Full Cost	Market Price
South Africa Mining Division		
Division revenues, $600, $450 × 4,000	$2,400,000	$1,800,000
Costs		
Division variable costs, $80 × 4,000	320,000	320,000
Division fixed costs, $220 × 4,000	880,000	880,000
Total division costs	1,200,000	1,200,000
Division operating income	$1,200,000	$ 600,000
U.S. Processing Division		
Division revenues, $5,000 × 2,000	$10,000,000	$10,000,000
Costs		
Transferred-in costs, $600, $450 × 4,000	2,400,000	1,800,000
Division variable cost, $150 ×2,000	300,000	300,000
Division fixed costs, $700 × 2,000	1,400,000	1,400,000
Total division costs	4,100,000	3,500,000
Division operating income	$ 5,900,000	$ 6,500,000

2.

	200% of Full Cost	Market Price
South Africa Mining Division		
Division operating income	$1,200,000	$600,000
Income tax at 18%	216,000	108,000
Division after-tax operating income	$ 984,000	$492,000
U.S. Processing Division		
Division operating income	$5,900,000	$6,500,000
Income tax at 30%	1,770,000	1,950,000
Division after-tax operating income	$4,130,000	$4,550,000

3.

	200% of Full Cost	Market Price
South Africa Mining Division:		
After-tax operating income	$ 984,000	$ 492,000
U.S. Processing Division:		
After-tax operating income	4,130,000	4,550,000
Industrial Diamonds:		
After-tax operating income	$5,114,000	$5,042,000

The South Africa Mining Division manager will prefer the higher transfer price of 200% of full cost and the U.S. Processing Division manager will prefer the lower transfer price equal to market price. Industrial Diamonds will maximize companywide net income by using the 200% of full cost transfer-pricing method. This method sources more of the total income in South Africa, the country with the lower income tax rate.

4. Factors that executives consider important in transfer pricing decisions include:
   a. Performance evaluation
   b. Management motivation
   c. Pricing and product emphasis
   d. External market recognition

   Factors specifically related to multinational transfer pricing include:
   a. Overall income of the company
   b. Income or dividend repatriation restrictions
   c. Competitive position of subsidiaries in their respective markets

22-33 (30–40 min.) **International transfer pricing, taxes, goal congruence.**

1. The minimum transfer price would be $99 to cover the variable production ($96 per unit) and shipping ($3 per unit) costs, because Pergan would want at a minimum zero contribution margin. The opportunity cost is $0 because there are no external customers for JT-2007. The maximum transfer price would be the $120 market price that Jetson would need to pay to acquire a product similar to JT-2007 from the external market in the United States.

2. To minimize income taxes, Leo should use a transfer price of $99. Canada has a higher tax rate so goods coming from Canada should have the lowest transfer price. Pergan would not like a transfer price of $99 because it would report no operating income from the transfer. Jetson would like a transfer price of $99 because it is lower than the outside market price of $120.

3. a. Pergan's after-tax income on each unit from accepting the special order is:

Revenue per unit	$114.00
Variable cost per unit	96.00
Contribution margin per unit	18.00
Income taxes (0.40 × $18)	7.20
Increase in division income per unit after tax	$ 10.80

It is easiest to see the solution to this problem if we assume a selling price for the product that Jetson manufactures, for example, $180. (The actual selling price you choose is irrelevant.) Jetson's after-tax income on each unit if Pergan accepts the special order and Jetson buys the substitute product for JT-2007 in the United States for $120 per unit is:

Revenue per unit	$180
Variable cost per unit	120
Contribution margin per unit	60
Income taxes (0.20 × $60)	12
Increase in division income per unit after tax	$ 48

Leo's net income on each unit from Pergan accepting the special order is $10.80 + $48 = $58.80. If Pergan rejects the special order and instead transfers the units internally to Jetson at $99 per unit, Pergan's after-tax income would be:

Revenue per unit	$99
Variable cost per unit	99
Contribution margin per unit	0
Income taxes	0
Increase in division income per unit after tax	$ 0

Jetson's after-tax income on each unit is:

Revenue per unit	$180.00
Variable cost per unit	99.00
Contribution margin per unit	81.00
Income taxes (0.20 × $81)	16.20
Increase in division income per unit after tax	$ 64.80

Leo's net income on each unit as a result of Pergan rejecting the special order and transferring units of JT-2007 to Jetson at $99 per unit is $64.80 per unit. Accepting the special order will not maximize after-tax operating income. After-tax operating income is maximized by rejecting the special order.

3. b. Jetson will not want Pergan to accept the special order. It is more costly to buy from the external market than from Pergan.

3. c. Pergan will want to accept the special order because Pergan's income per unit after-tax increases by $10.80 per unit by accepting the special order rather than transferring JT-2007 to Jetson at $99 per unit and earning $0 operating income.

3. d. Leo should set the transfer price at $117 per unit. This will result in each division taking actions in its own best interest that is also in the best interest of Leo as a whole acting as a decentralized organization.

The opportunity cost of transferring JT-2007 internally is $18 ($114 — $96) per unit for the first 12,000 units and $0 per unit thereafter.

Using the general guideline,

$$\text{Minimum transfer price} = \text{Incremental cost per unit inccurred up to the point of transfer} + \text{Opportunity cost per unit to the selling subunit}$$

$$\text{So, minimum transfer price} = \begin{cases} \$99 + \$18 = \$117 \text{ per unit for the first 12,000 units} \\ \$99 + \$0 = \$99 \text{ per unit for the next 12,000 units} \end{cases}$$

Leo should use these minimum transfer prices because they are also tax-efficient.

At a transfer price of $117 per unit for the first 12,000 units, Pergan is indifferent between accepting the special order or transferring internally. Pergan earns $18 per unit if it accepts the special order. It also earns $18 per unit if it transfers JT-2007 to Argone ($117 - $99 variable cost per unit).

Jetson will prefer to "buy" JT-2007 from Pergan because the transfer price of $117 is less than the $120 price it would pay to buy a product similar to JT-2007 in the United States.

The increase in Leo's income will be as follows:

From Pergan:	
Revenue per unit	$117.00
Variable cost per unit	99.00
Contribution margin per unit	18.00
Income taxes (0.40 × $18)	7.20
Increase in division income per unit after tax	$10.80
From Jetson:	
Revenue per unit	$180.00
Transfer price per unit	117.00
Contribution margin per unit	63.00
Income taxes (0.20 × $63)	12.60
Increase in division income per unit after tax	$ 50.40

Increase in Leo's income = $10.80 + $50.40 = $61.20

This net income is greater than the $58.80 net income that Leo would earn if Pergan accepted the special order. It is less than the $64.80 that Leo would earn if Pergan had transferred JT-2007 at $99 per unit. Of course, if the transfer price is set at $99 per unit, Pergan would accept the special order, which would lead to a lower net income of $58.80. If Leo wants to get the benefits of decentralization, it must be willing to suffer the consequences of higher taxes that Pergan would have to pay.

Note that Leo would not want to set the transfer price any higher than $117, the minimum transfer price that would induce Pergan to transfer internally to Jetson. Why? Because setting the transfer price any higher would result in exactly the same action (transferring JT-2007 internally) but at a higher cost because of the higher taxes that Pergan would have to pay in Canada. Consider for example a transfer price of $119 per unit. The increase in Leo's income will be as follows:

From Pergan:	
Revenue per unit	$119.00
Variable cost per unit	99.00
Contribution margin per unit	20.00
Income taxes (0.40 × $20)	8.00
Increase in division income per unit after tax	$12.00
From Jetson:	
Revenue per unit	$180.00
Transfer price per unit	119.00
Contribution margin per unit	61.00
Income taxes (0.20 × $61)	12.20
Increase in division income per unit after tax	$ 48.80

Increase in Leo's income $12.00 + $48.80 = $60.80, which is less than the $61.20 Leo earns if the transfer price is set at $117 per unit. A transfer price of $117 is the most tax-efficient transfer price consistent with Leo operating as a decentralized organization. Note also that the transfer price cannot be set above $120 per unit because then Jetson would buy a product similar to JT-2007 in the United States rather than from Pergan. This would result in a lower profit before tax and higher overall taxes because of the higher tax rate in Canada.

22-34 (30 min.) **Transfer pricing, goal congruence.**

1. See column (1) of Solution Exhibit 22-34. The net cost of the in-house option is $230,000.

2. See columns (2a) and (2b) of Solution Exhibit 22-34. As the calculations show, if Johnson Corporation offers a price of $38 per tape player, Orsilo Corporation should purchase the tape players from Johnson; this will result in an incremental net cost of $210,000 (column 2a). If Johnson Corporation offers a price of $45 per tape player, Orsilo Corporation should manufacture the tape players in-house; this will result in an incremental net cost of $230,000 (column 2b).

SOLUTION EXHIBIT 22-34

	Transfer 10,000 tape players to Assembly. Sell 2,000 in outside market at $35 each	**Buy 10,000 tape players from Johnson at $38. Sell 12,000 tape players in outside market at $35 each**	**Buy 10,000 tape players from Johnson at $40. Sell 12,000 tape players in outside market at $35 each**	**Buy 10,000 tape players from Johnson at $45. Sell 12,000 tape players in outside market at $35 each**
	(1)	**(2a)**	**(2x)**	**(2b)**
Incremental cost of Cassette Division supplying 10,000 tape players to Assembly Division $25 × 10,000; 0; 0; 0	$(250,000)	$ 0	$ 0	$ 0
Incremental costs of buying 10,000 tape players from Johnson $0; $38 × 10,000; $40 × 10,000; $45 × 10,000	0	(380,000)	(400,000)	(450,000)
Revenue from selling tape players in outside market $35 × 2,000; 12,000; 12,000; 12,000	70,000	420,000	420,000	420,000
Incremental costs of manufacturing tape players for sale in outside market $25 × 2,000; 12,000; 12,000; 12,000	(50,000)	(300,000)	(300,000)	(300,000)
Revenue from supplying head mechanism to Johnson $20 × 0; 10,000; 10,000; 10,000	0	200,000	200,000	200,000
Incremental costs of supplying head mechanism to Johnson $15 × 0; 10,000; 10,000; 10,000	0	(150,000)	(150,000)	(150,000)
Net costs	$(230,000)	$(210,000)	$(230,000)	$(280,000)

Comparing columns (1) and (2a), at a price of $38 per tape player from Johnson, the net cost of $210,000 is less than the net cost of $230,000 to Orsilo Corporation if it made the tape players in-house. So, Orsilo Corporation should outsource to Johnson.

Comparing columns (1) and (2b), at a price of $45 per tape player from Johnson, the net cost of $280,000 is greater than the net cost of $230,000 to Orsilo Corporation if it made the tape players in-house. Therefore, Orsilo Corporation should reject Johnson's offer.

Now consider column (2x) of Solution Exhibit 22-34. It shows that at a price of $40 per tape player from Johnson, the net cost is exactly $230,000, the same as the net cost to Orsilo Corporation of manufacturing in-house (column 1). Thus, for prices between $38 and $40, Orsilo will prefer to purchase from Johnson. For prices greater than $40 (and up to $45), Orsilo will prefer to manufacture in-house.

3. The Cassette Division can manufacture at most 12,000 tape players and it is currently operating at capacity. The incremental costs of manufacturing a tape player are $25 per unit. The opportunity cost of manufacturing tape players for the Assembly Division is (1) the contribution margin of $10 (selling price, $35 minus incremental costs $25) that the Cassette Division would forgo by not selling tape players in the outside market plus (2) the contribution margin of $5 (selling price, $20 minus incremental costs, $15) that the Cassette Division would forgo by not being able to sell the head mechanism to external suppliers of tape players such as Johnson (recall that the Cassette division can produce as many head mechanisms as demanded by external suppliers, but their demand will fall if the Cassette Division supplies the Assembly Division with tape players). Thus, the total opportunity cost to the Cassette Division of supplying tape players to Assembly is $10 + $5 = $15 per unit.

Using the general guideline,

$$\begin{array}{lcl} \text{Minimum transfer price per tape player} & = & \text{Incremental cost per tape player up to the point of transfer} \\ & & + \ \text{Opportunity cost per tape player to the selling division} \\ & = & \$25 + \$15 = \$40 \end{array}$$

Thus, the minimum transfer price that the Cassette Division will accept for each tape player is $40. Note that at a price of $40, Orsilo is indifferent between manufacturing tape players in-house or purchasing them from an external supplier.

4. a. The transfer price is set to $40 + $1 = $41 and Johnson is offering the tape players for $40.50 each. Now, for an outside price per tape player below $41, the Assembly Division would prefer to purchase from outside; above it, the Assembly Division would prefer to purchase from the Cassette Division. So, the Assembly division will buy from Johnson at $40.50 each and the Cassette Division will be forced to sell its output on the outside market.

4. b. But for Orsilo, as seen from requirements 1 and 2, an outside price of $40.50, which is greater than the $40 cut-off price, makes inhouse manufacture the optimal choice. So, a mandated transfer price of $41 causes the division managers to make choices that are sub-optimal for Orsilo.

4. c. When selling prices are uncertain, the transfer price should be set at the minimum acceptable transfer price. It is only if the price charged by the external supplier falls below $40 that Orsilo Corporation as a whole is better off purchasing from the outside market. Setting the transfer price at $40 per unit achieves goal congruence. The Cassette division will be willing to sell to the Assembly Division, and the Assembly Division will be willing to buy in-house and this would be optimal for Orsilo, too.

22-35 (20 min.) **Transfer pricing, goal congruence, ethics.**

1.

	Variable Cost (1)	Adjusted Variable Cost (2)	Benefit (3) = (2) – (1)
Transfer price($6; $7×5,000)	$30,000	$35,000	$5,000
Variable costs	30,000	35,000	(5,000)
Contribution margin	0	0	0
Fixed costs	15,000	10,000	5,000
Operating loss	$(15,000)	$(10,000)	$5,000

2. I would recommend a lump sum transfer of $20,000 (say) from Department B to Department A plus a transfer price equal to the variable cost per unit of $6 per unit. This would generate some operating income for Department A while Department A continues to make transfers at variable costs. Such a transfer pricing arrangement avoids the suboptimal decision making that can result from full cost transfer prices. Variable cost transfer prices often provide valuable information for decision making. The fixed payment is the price that Department B pays for using the capacity of Department A.

3. Asking the management accountant to reclassify costs is unethical. Green suggests that $7 per unit is a more appropriate variable cost per unit. However, he does not substantiate his claim with any costs that he thinks are misclassified. In fact, his variable cost per unit number seems arbitrary and specifically targeted to improve his transfer pricing negotiations. If that is the reason for his request and there is no fundamental problem with the current cost classifications, Trembley should not change the variable cost per unit. To do so would be unethical. To resolve this situation, Trembley should begin by explaining his decision to Green. If Green insists on using a higher variable cost per unit, then Trembley may need to alert Green's supervisor in Burnham's upper management.

22-36 (40–50 min.) **Transfer pricing, utilization of capacity.**

1.

	Super-chip	Okay-chip
Selling price	$60	$12
Direct material cost per unit	2	1
Direct manufacturing labor cost per unit	28	7
Contribution margin per unit	$30	$ 4
Contribution margin per hour ($30 ÷ 2; $4 ÷ 0.5)	$15	$ 8

Because the contribution margin per hour is higher for Super-chip than for Okay-chip, CIC should produce and sell as many Super-chips as it can and use the remaining available capacity to produce Okay-chip.

The total demand for Super-chips is 15,000 units, which would take 30,000 hours (15,000 × 2 hours per unit). CIC should use its remaining capacity of 20,000 hours (50,000 – 30,000) to produce 40,000 Okay-chips (20,000 ÷ 0.5).

2. Options for manufacturing process-control unit:

	Using Circuit Board	Using Super-chip
Selling price	$132	$132
Direct material cost per unit	60	2
Direct manufacturing labor cost per unit (Super-chip)	0	28
Direct manufacturing labor cost per unit (process-control unit)	50	60
Contribution margin per unit	$ 22	$ 42

Overall Company Viewpoint

Alternative 1: No Transfer of Super-chips:

Sell 15,000 Super-chips at contribution margin per unit of $30	$450,000
Transfer 0 Super-chips	0
Sell 40,000 Okay-chips at contribution margin per unit of $4	160,000
Sell 5,000 Control units at contribution margin per unit of $22	110,000
Total contribution margin	$720,000

Alternative 2: Transfer 5,000 Super-chips to Process-Control Division. These Super-chips would require 10,000 hours to manufacture, leaving only 10,000 hours for the manufacture of 20,000 Okay-chips (10,000 ÷ 0.5):

Sell 15,000 Super-chips at contribution margin per unit of $30	$450,000
Transfer 5,000 Super-chips to Process-Control Division	0
Sell 20,000 Okay-chips at contribution margin per unit of $4	80,000
Sell 5,000 Control units at contribution margin per unit of $42	210,000
Total contribution margin	$740,000

CIC is better off transferring 5,000 Super-chips to the Process-Control Division.

3. For each Super-chip that is transferred, two hours of time (labor capacity) are given up in the Semiconductor Division, and, in those two hours, four Okay-chips could be produced, each contributing $4.

$$\text{Minimum transfer price per Super-chip} = \text{Incremental cost per unit to the point of transfer} + \text{Opportunity cost per unit for the Semiconductor Division}$$

$$= \$30 + \$16$$

$$= \$46 \text{ per unit}$$

If the selling price for the process-control unit were firm at $132, the Process-Control Division would accept any transfer price up to $50 ($60 price of circuit board – $10 incremental labor cost if Super-chip used).

However, consider what happens if the transfer price of Super-chip is set at, say, $49, and the price of the control unit drops to $108. From CIC's viewpoint:

	Using Circuit Board	**Using Using Super-chip**
Selling price	$108	$108
Direct material cost per unit	60	49
Direct manufacturing labor cost per unit	50	60
Contribution margin per unit	$ –2	$ –1

Process-Control Division will not produce any control units. From the company's viewpoint, the contribution margin on the control unit if the Super-chip is used is:

Selling price	$108
Direct material cost per unit	2
Direct manufacturing labor cost per unit (Super-chip)	28
Direct manufacturing labor cost per unit (process-control unit)	60
Contribution margin per unit	$ 18

The contribution margin per unit from producing Super-chips for the process-control unit exceeds the contribution margin of $16 from producing 4 Okay-chips, each yielding a contribution margin of $4 per unit. Therefore, the Semiconductor Division should transfer 5,000 Super-chips as the following calculations show:

Alternative 1—No transfer (and, therefore, no sales of process-control units):

Sell 15,000 Super-chips at contribution margin per unit of $30	$450,000
Sell 40,000 Okay-chips at contribution margin per unit of $4	160,000
	$610,000

Alternative 2—Transfer 5,000 Super-chips:

Sell 15,000 Super-chips at contribution margin per unit of $30	$450,000
Sell 20,000 Okay-chips at contribution margin per unit of $4	80,000
Sell 5,000 control units at contribution margin per unit of $18	90,000
	$620,000

So, if the price for the control unit is uncertain, the transfer price must be set at the minimum acceptable transfer price of $46.

4. For a transfer of any amount between 0 and 10,000 Super-chips (which require 2 hours each to produce), the opportunity cost is the production of Okay-chips (which require ½ hour each). In this range, the relevant costs are equal to the transfer price of $46 established in part 3.

If more than 10,000 Super-chips are transferred, the opportunity cost becomes the sale of Super-chips on the outside market. Now the minimum transfer price per Super-chip becomes:

$$\begin{array}{c}\text{Incremental cost per Super-chip up to the point of transfer}\end{array} + \begin{array}{c}\text{Opportunity cost per Super-chip to the Semiconductor Division}\end{array} = \$30 + (\$60 - \$30) = \$60, \text{ the market price.}$$

At this transfer price, it is cheaper for the Process-Control Division to buy the circuit board for $60, since $10 of additional direct manufacturing labor cost is saved.

The Semiconductor Division should at most transfer 10,000 Super-chips:

Internal Demand	Transfer Price
0–10,000	$46
10,000–25,000	60