Chapter 10
Performance Measurement in Decentralized Organizations

Solutions to Questions

10-1 In a decentralized organization, decision-making authority isn't confined to a few top executives; instead, decision-making authority is spread throughout the organization.

10-2 The benefits of decentralization include: (1) by delegating day-to-day problem solving to lower-level managers, top management can concentrate on bigger issues such as overall strategy; (2) empowering lower-level managers to make decisions puts decision-making authority in the hands of those who tend to have the most detailed and up-to-date information about day-to-day operations; (3) by eliminating layers of decision-making and approvals, organizations can respond more quickly to customers and to changes in the operating environment; (4) granting decision-making authority helps train lower-level managers for higher-level positions; and (5) empowering lower-level managers to make decisions can increase their motivation and job satisfaction.

10-3 The manager of a cost center has control over cost, but not revenue or the use of investment funds. A profit center manager has control over both cost and revenue. An investment center manager has control over cost and revenue and the use of investment funds.

10-4 Margin is the ratio of net operating income to total sales. Turnover is the ratio of total sales to average operating assets. The product of the two numbers is the ROI.

10-5 Residual income is the net operating income an investment center earns above the company's minimum required rate of return on operating assets.

10-6 If ROI is used to evaluate performance, a manager of an investment center may reject a profitable investment opportunity whose rate of return exceeds the company's required rate of return but whose rate of return is less than the investment center's current ROI. The residual income approach overcomes this problem because any project whose rate of return exceeds the company's minimum required rate of return will result in an increase in residual income.

10-7 The difference between delivery cycle time and throughput time is the waiting period between when an order is received and when production on the order is started. Throughput time is made up of process time, inspection time, move time, and queue time. Process time is value-added time and inspection time, move time, and queue time are non-value-added time.

10-8 An MCE of less than 1 means that the production process includes non-value-added time. An MCE of 0.40, for example, means that 40% of throughput time consists of actual processing, and that the other 60% consists of moving, inspection, and other non-value-added activities.

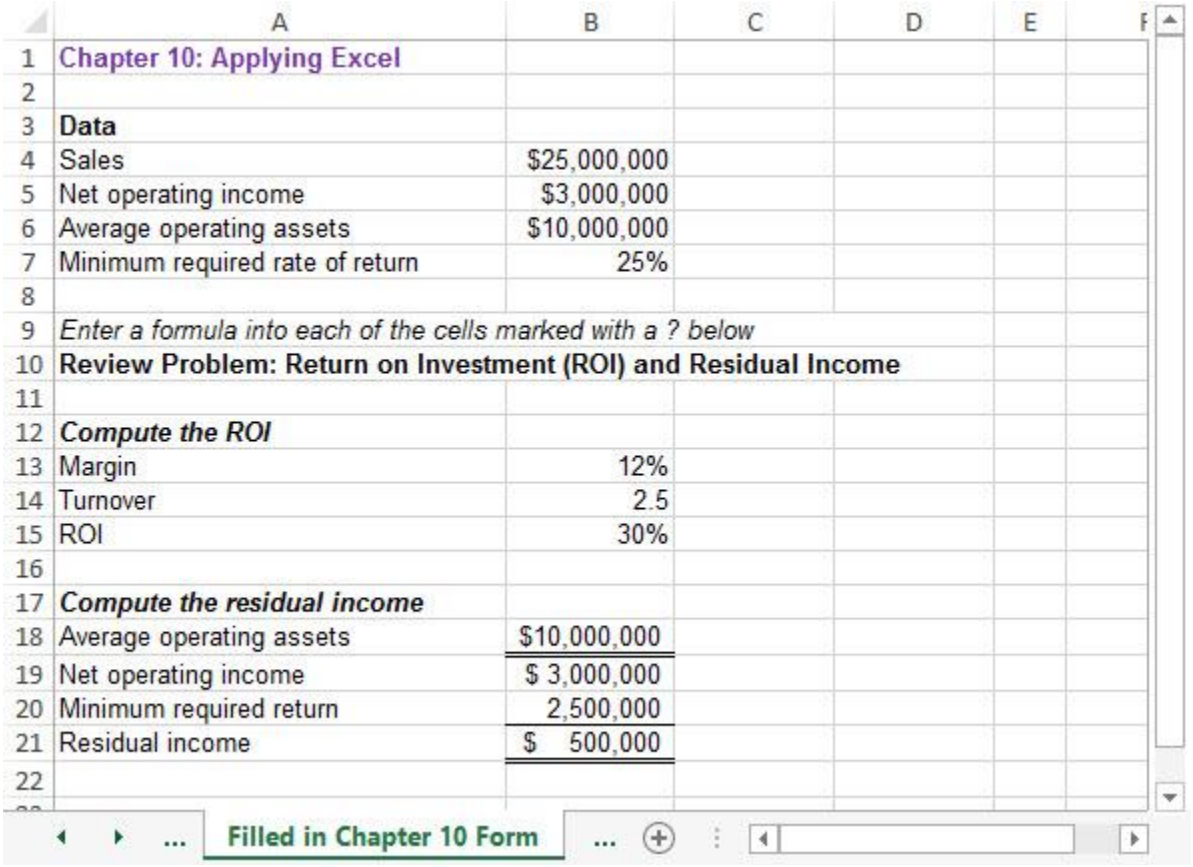
10-9 A company's balanced scorecard should be derived from and support its strategy. Because different companies have different strategies, their balanced scorecards should be different.

10-10 The balanced scorecard is constructed to support the company's strategy, which is a

theory about what actions will further the company's goals. Assuming that the company has financial goals, measures of financial performance must be included in the balanced scorecard as a check on the reality of the theory. If the internal business processes improve, but the financial outcomes do not improve, the theory may be flawed and the strategy should be changed.

Chapter 10: Applying Excel

The completed worksheet is shown below.



	A	B
1	Chapter 10: Applying Excel	
2		
3	**Data**	
4	Sales	$25,000,000
5	Net operating income	$3,000,000
6	Average operating assets	$10,000,000
7	Minimum required rate of return	25%
8		
9	*Enter a formula into each of the cells marked with a ? below*	
10	**Review Problem: Return on Investment (ROI) and Residual Income**	
11		
12	***Compute the ROI***	
13	Margin	12%
14	Turnover	2.5
15	ROI	30%
16		
17	***Compute the residual income***	
18	Average operating assets	$10,000,000
19	Net operating income	$ 3,000,000
20	Minimum required return	2,500,000
21	Residual income	$ 500,000
22		

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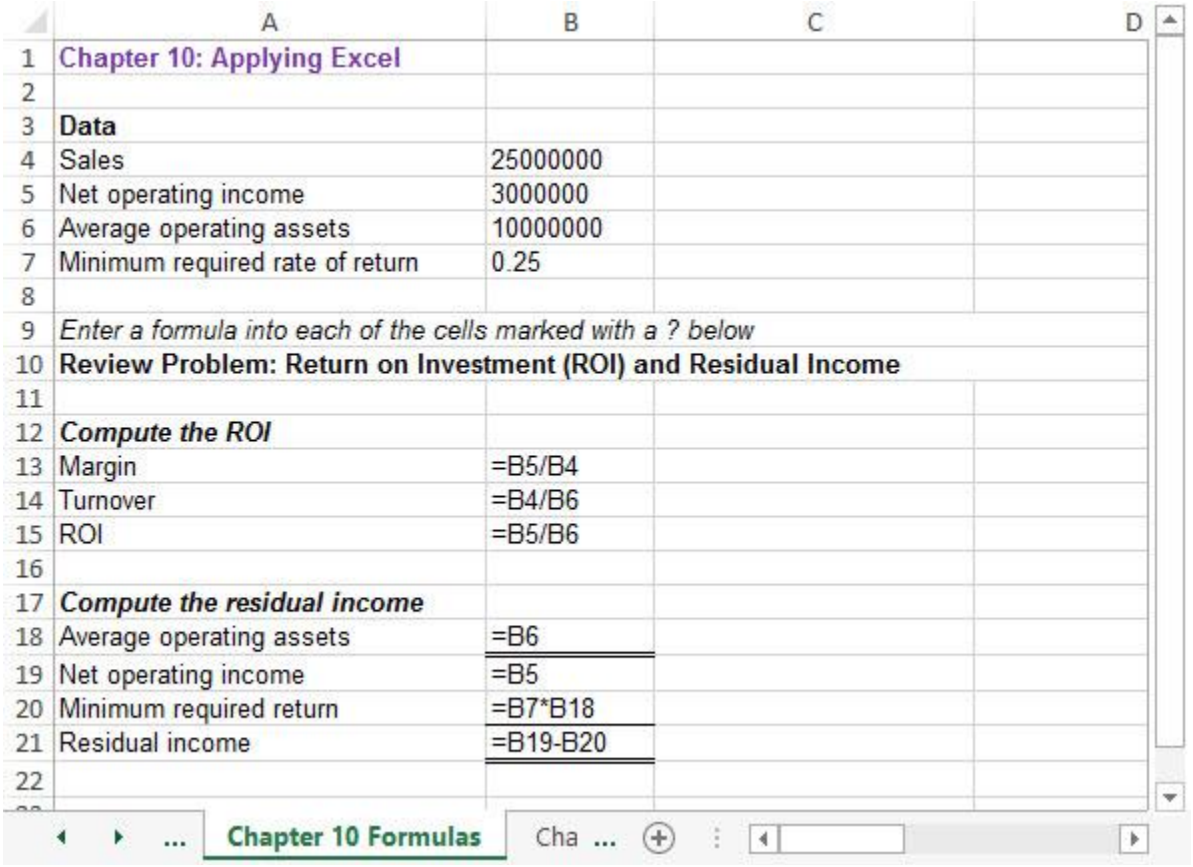
Chapter 10: Applying Excel (continued)

The completed worksheet, with formulas displayed, is shown below.

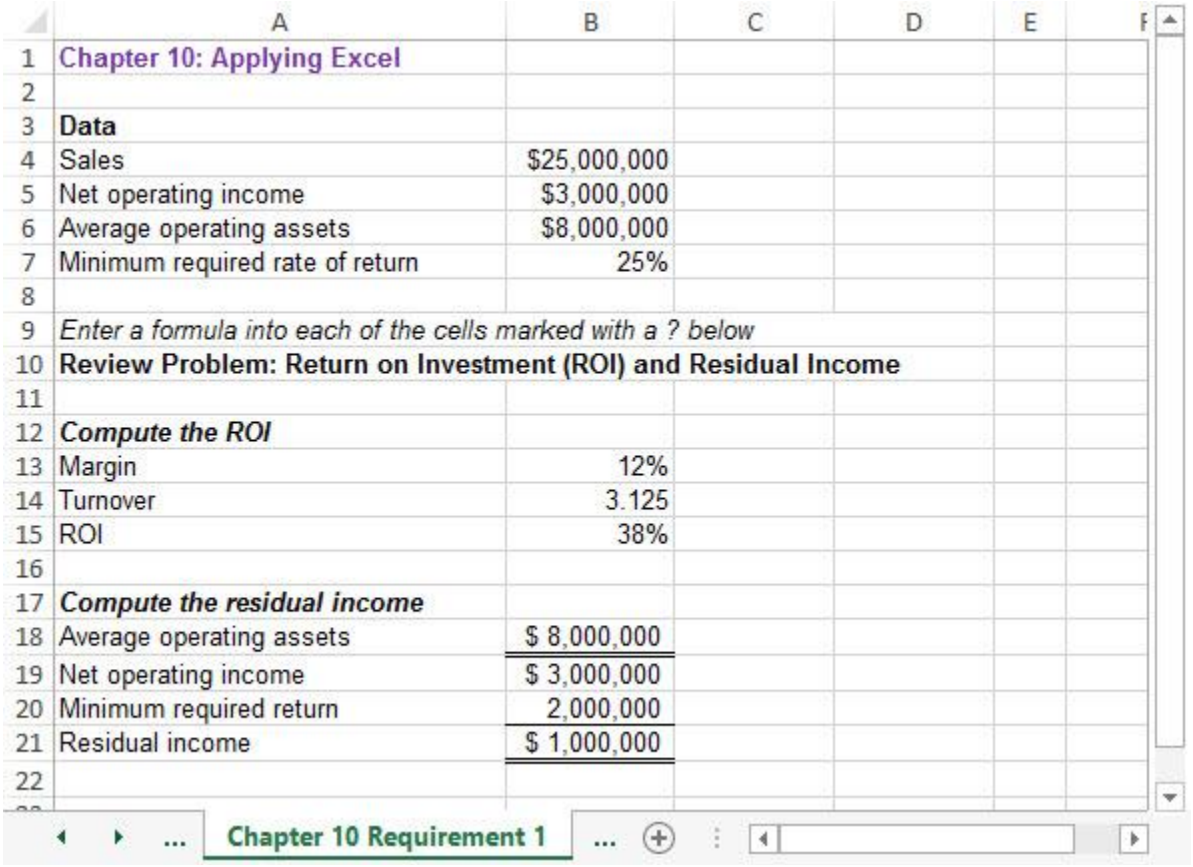


	A	B	C	D
1	Chapter 10: Applying Excel			
2				
3	**Data**			
4	Sales	25000000		
5	Net operating income	3000000		
6	Average operating assets	10000000		
7	Minimum required rate of return	0.25		
8				
9	*Enter a formula into each of the cells marked with a ? below*			
10	**Review Problem: Return on Investment (ROI) and Residual Income**			
11				
12	***Compute the ROI***			
13	Margin	=B5/B4		
14	Turnover	=B4/B6		
15	ROI	=B5/B6		
16				
17	***Compute the residual income***			
18	Average operating assets	=B6		
19	Net operating income	=B5		
20	Minimum required return	=B7*B18		
21	Residual income	=B19-B20		
22				

... Chapter 10 Formulas Cha ...

Chapter 10: Applying Excel (continued)

1. With the changes in average operating assets, the result is:



	A	B	C	D	E
1	Chapter 10: Applying Excel				
2					
3	**Data**				
4	Sales	$25,000,000			
5	Net operating income	$3,000,000			
6	Average operating assets	$8,000,000			
7	Minimum required rate of return	25%			
8					
9	*Enter a formula into each of the cells marked with a ? below*				
10	**Review Problem: Return on Investment (ROI) and Residual Income**				
11					
12	***Compute the ROI***				
13	Margin	12%			
14	Turnover	3.125			
15	ROI	38%			
16					
17	***Compute the residual income***				
18	Average operating assets	$ 8,000,000			
19	Net operating income	$ 3,000,000			
20	Minimum required return	2,000,000			
21	Residual income	$ 1,000,000			
22					

Chapter 10 Requirement 1

An increase in average operating assets will increase both the ROI and residual income.

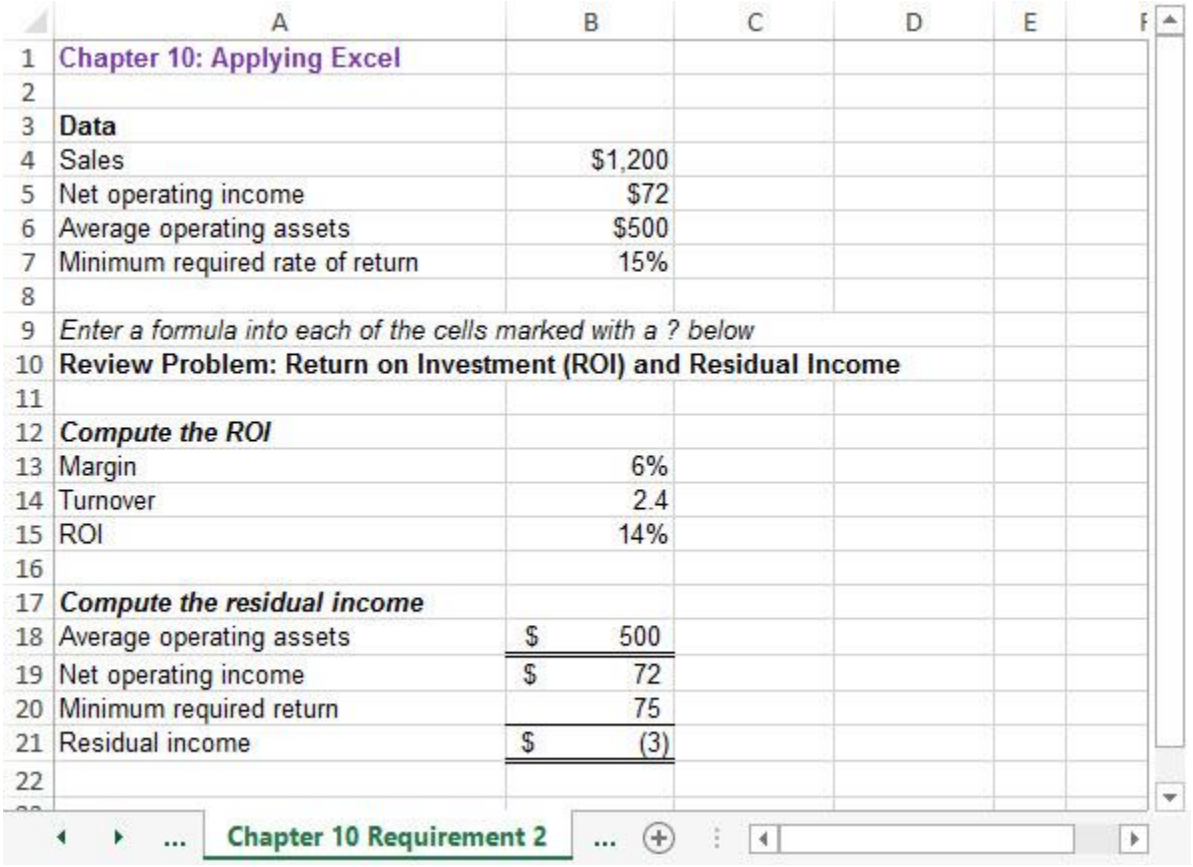
ROI = Net operating income/Average operating assets

Residual income = Net operating income – Required return
Required return = Minimum required rate of return × Average operating assets

ROI increases because average operating assets is in the denominator of ROI. Residual income increases when average operating assets decreases because a reduction in the average operating assets results in a reduction of the required return.

Chapter 10: Applying Excel (continued)

2. With the revised data, the worksheet should look like this:



	A	B	C	D	E
1	Chapter 10: Applying Excel				
2					
3	**Data**				
4	Sales	$1,200			
5	Net operating income	$72			
6	Average operating assets	$500			
7	Minimum required rate of return	15%			
8					
9	*Enter a formula into each of the cells marked with a ? below*				
10	**Review Problem: Return on Investment (ROI) and Residual Income**				
11					
12	***Compute the ROI***				
13	Margin	6%			
14	Turnover	2.4			
15	ROI	14%			
16					
17	***Compute the residual income***				
18	Average operating assets	$ 500			
19	Net operating income	$ 72			
20	Minimum required return	75			
21	Residual income	$ (3)			
22					

... Chapter 10 Requirement 2 ...

a. As shown above, the ROI is 14%.

b. As shown above, the residual income is $(3).

c. Because the ROI of 14% is less than minimum required return of 15%, the residual income is negative.

The Foundational 15

1. Last year's margin is:

$$\text{Margin} = \frac{\text{Net operating income}}{\text{Sales}}$$

$$= \frac{\$200{,}000}{\$1{,}000{,}000} = 20\%$$

2. Last year's turnover is:

$$\text{Turnover} = \frac{\text{Sales}}{\text{Average operating assets}}$$

$$= \frac{\$1{,}000{,}000}{\$625{,}000} = 1.6$$

3. Last year's return on investment (ROI) is:

$$\text{ROI} = \text{Margin} \times \text{Turnover}$$

$$= 20\% \times 1.6 = 32\%$$

4. The margin for this year's investment opportunity is:

$$\text{Margin} = \frac{\text{Net operating income}}{\text{Sales}}$$

$$= \frac{\$30{,}000^*}{\$200{,}000} = 15\%$$

* $\$200{,}000 - [\$200{,}000 \times (1 - 60\%)] - \$90{,}000 = \$30{,}000$

5. The turnover for this year's investment opportunity is:

$$\text{Turnover} = \frac{\text{Sales}}{\text{Average operating assets}}$$

$$= \frac{\$200{,}000}{\$120{,}000} = 1.67 \text{ (rounded)}$$

The Foundational 15 (continued)

6. The ROI for this year's investment opportunity is:

$$\text{ROI} = \text{Margin} \times \text{Turnover}$$

$$= 15\% \times 1.67 = 25\% \text{ (rounded)}$$

7, 8, and 9.

If the company pursues the investment opportunity, this year's margin, turnover, and ROI would be:

$$\text{Margin} = \frac{\text{Net operating income}}{\text{Sales}}$$

$$= \frac{\$200{,}000 + \$30{,}000}{\$1{,}000{,}000 + \$200{,}000}$$

$$= \frac{\$230{,}000}{\$1{,}200{,}000} = 19.2\% \text{ (rounded)}$$

$$\text{Turnover} = \frac{\text{Sales}}{\text{Average operating assets}}$$

$$= \frac{\$1{,}000{,}000 + \$200{,}000}{\$625{,}000 + \$120{,}000}$$

$$= \frac{\$1{,}200{,}000}{\$745{,}000} = 1.61 \text{ (rounded)}$$

$$\text{ROI} = \text{Margin} \times \text{Turnover}$$

$$= 19.2\% \times 1.61 = 30.9\% \text{ (rounded)}$$

10. The CEO would not pursue the investment opportunity because it lowers her ROI from 32% to 30.9%. The owners of the company would want the CEO to pursue the investment opportunity because its ROI of 25% exceeds the company's minimum required rate of return of 15%.

The Foundational 15 (continued)

11. Last year's residual income is:

Average operating assets	$625,000
Net operating income.....	$200,000
Minimum required return:	
15% × $625,000	93,750
Residual income	$106,250

12. The residual income for this year's investment opportunity is:

Average operating assets	$120,000
Net operating income.....	$30,000
Minimum required return:	
15% × $120,000	18,000
Residual income	$12,000

13. If the company pursues the investment opportunity, this year's residual income will be:

Average operating assets	$745,000
Net operating income.....	$230,000
Minimum required return:	
15% × $745,000	111,750
Residual income	$118,250

14. The CEO would pursue the investment opportunity because it would raise her residual income by $12,000 (= $118,250 – $106,250).

15. The CEO and the company would not want to pursue this investment opportunity because it does not exceed the minimum required return:

Average operating assets	$120,000
Net operating income ($200,000 ×	
50% – $90,000)	$10,000
Minimum required return:	
15% × $120,000	18,000
Residual income	$ (8,000)

Exercise 10-1 (10 minutes)

1. $$\text{Margin} = \frac{\text{Net operating income}}{\text{Sales}}$$

$$= \frac{\$600{,}000}{\$7{,}500{,}000} = 8\%$$

2. $$\text{Turnover} = \frac{\text{Sales}}{\text{Average operating assets}}$$

$$= \frac{\$7{,}500{,}000}{\$5{,}000{,}000} = 1.5$$

3. ROI = Margin × Turnover

= 8% × 1.5 = 12%

Exercise 10-2 (10 minutes)

Average operating assets.....	$2,800,000
Net operating income.....	$ 600,000
Minimum required return:	
18% × $2,800,000.....	504,000
Residual income.....	$ 96,000

Exercise 10-3 (20 minutes)

1. Throughput time = Process time + Inspection time + Move time + Queue time
   = 2.7 days + 0.3 days + 1.0 days + 5.0 days
   = 9.0 days

2. Only process time is value-added time; therefore, the manufacturing cycle efficiency (MCE) is:

$$\text{MCE} = \frac{\text{Value-added time}}{\text{Throughput time}} = \frac{2.7\text{ days}}{9.0\text{ days}} = 0.30$$

3. If the MCE is 30%, then 30% of the throughput time was spent in value-added activities. Consequently, the other 70% of the throughput time was spent in non-value-added activities.

4. Delivery cycle time = Wait time + Throughput time
   = 14.0 days + 9.0 days
   = 23.0 days

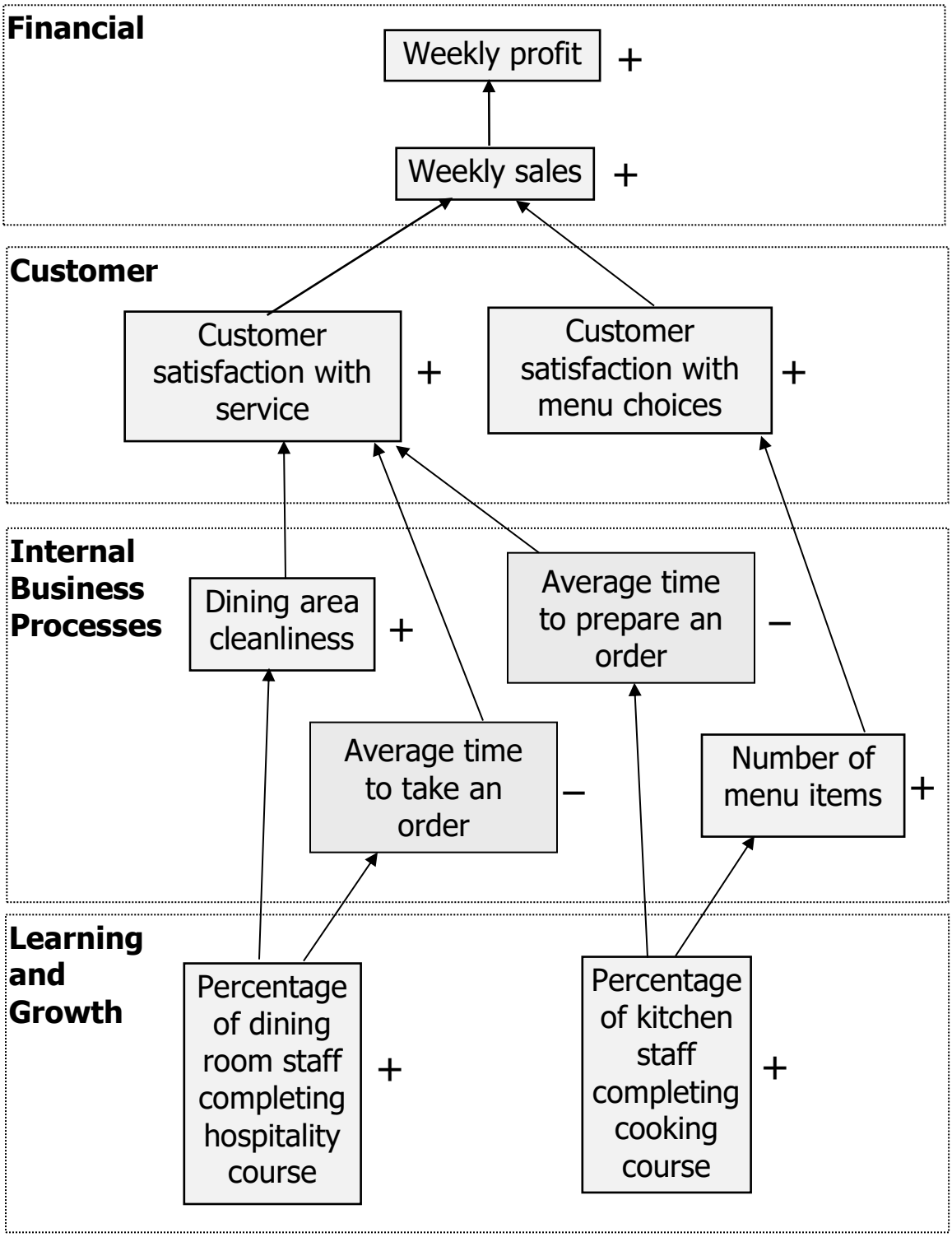
5. If all queue time is eliminated, then the throughput time drops to only 4 days (2.7 + 0.3 + 1.0). The MCE becomes:

$$\text{MCE} = \frac{\text{Value-added time}}{\text{Throughput time}} = \frac{2.7\text{ days}}{4.0\text{ days}} = 0.675$$

   Thus, the MCE increases to 67.5%. This exercise shows quite dramatically how lean production can improve the efficiency of operations and reduce throughput time.

Exercise 10-4 (45 minutes)

1. Students' answers may differ in some details from this solution.



Exercise 10-4 (continued)

2. The hypotheses underlying the balanced scorecard are indicated by the arrows in the diagram. Reading from the bottom of the balanced scorecard, the hypotheses are:
   - If the percentage of dining room staff that complete the basic hospitality course increases, then the average time to take an order will decrease.
   - If the percentage of dining room staff that complete the basic hospitality course increases, then dining room cleanliness will improve.
   - If the percentage of kitchen staff that complete the basic cooking course increases, then the average time to prepare an order will decrease.
   - If the percentage of kitchen staff that complete the basic cooking course increases, then the number of menu items will increase.
   - If the dining room cleanliness improves, then customer satisfaction with service will increase.
   - If the average time to take an order decreases, then customer satisfaction with service will increase.
   - If the average time to prepare an order decreases, then customer satisfaction with service will increase.
   - If the number of menu items increases, then customer satisfaction with menu choices will increase.
   - If customer satisfaction with service increases, weekly sales will increase.
   - If customer satisfaction with menu choices increases, weekly sales will increase.
   - If sales increase, weekly profits for the Lodge will increase.

   Each of these hypotheses can be questioned. For example, the items added to the menu may not appeal to customers. So even if the number of menu items increases, customer satisfaction with the menu choices may not increase. The fact that each of the hypotheses can be questioned does not, however, invalidate the balanced scorecard. If the scorecard is used correctly, management will be able to identify which, if any, of the hypotheses are incorrect. [See below.]

Exercise 10-4 (continued)

3. Management will be able to tell if a hypothesis is false if an improvement in a performance measure at the bottom of an arrow does not, in fact, lead to improvement in the performance measure at the tip of the arrow. For example, if the number of menu items is increased, but customer satisfaction with the menu choices does not increase, management will immediately know that something was wrong with that particular hypothesis.

Exercise 10-5 (15 minutes)

	Division		
	Alpha	*Bravo*	*Charlie*
Sales (a)	$4,000,000	$11,500,000 *	$3,000,000
Net operating income (b)	$160,000	$920,000 *	$210,000 *
Average operating assets (c)	$800,000 *	$4,600,000	$1,500,000
Margin (b) ÷ (a)	4%*	8%	7%*
Turnover (a) ÷ (c)	5*	2.5	2
Return on investment (ROI)	20%	20%*	14%*

Note that Divisions Alpha and Bravo apparently have different strategies to obtain the same 20% return. Division Alpha has a low margin and a high turnover, whereas Division Bravo has just the opposite.

*Given.

Exercise 10-6 (20 minutes)

1. ROI computations:

$$\text{ROI} = \frac{\text{Net operating income}}{\text{Sales}} \times \frac{\text{Sales}}{\text{Average operating assets}}$$

Osaka Division:

$$\text{ROI} = \frac{\$210{,}000}{\$3{,}000{,}000} \times \frac{\$3{,}000{,}000}{\$1{,}000{,}000} = 7\% \times 3 = 21\%$$

Yokohama Division:

$$\text{ROI} = \frac{\$720{,}000}{\$9{,}000{,}000} \times \frac{\$9{,}000{,}000}{\$4{,}000{,}000} = 8\% \times 2.25 = 18\%$$

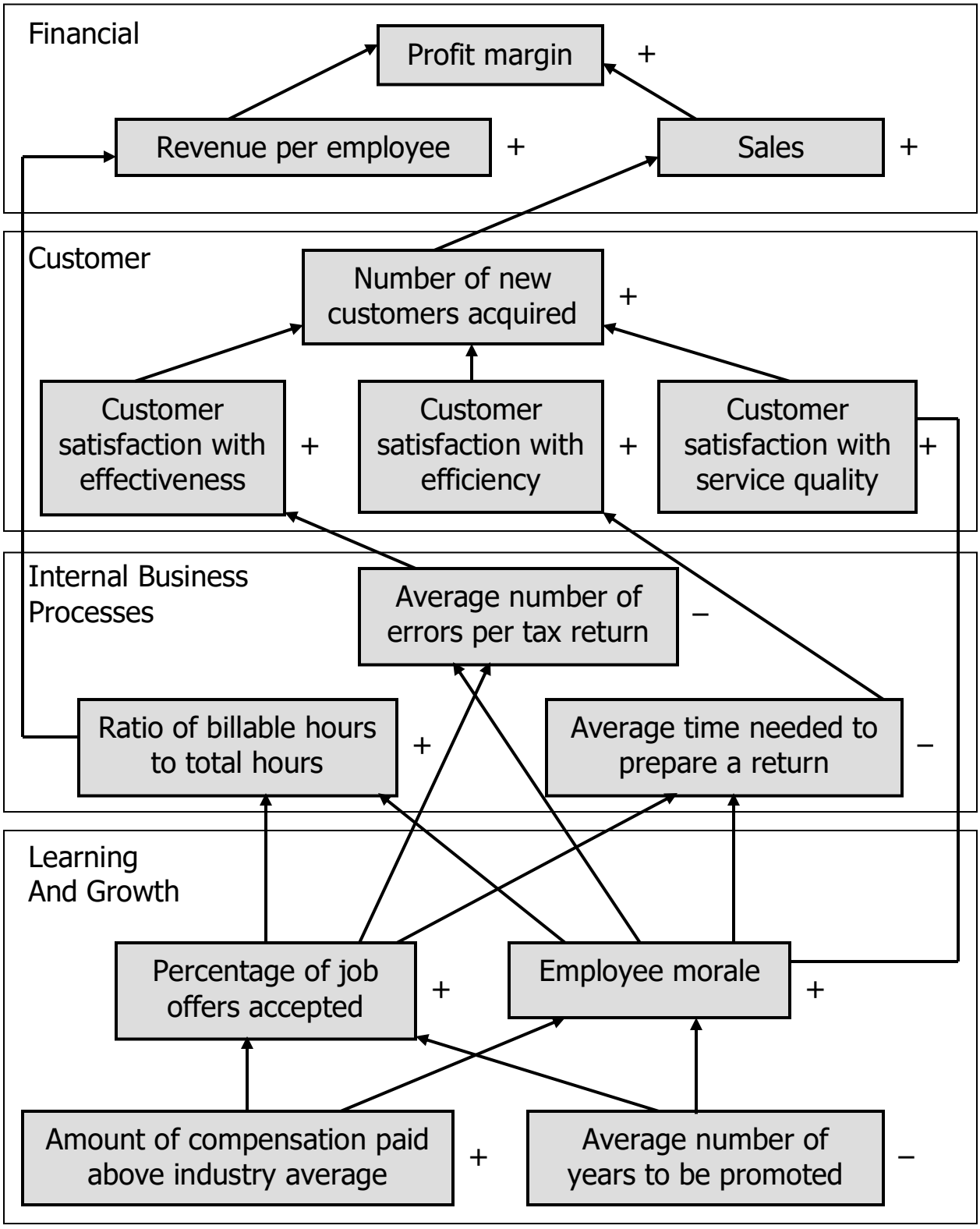
2.

	Osaka	*Yokohama*
Average operating assets (a)	$1,000,000	$4,000,000
Net operating income.....	$210,000	$720,000
Minimum required return on average operating assets: 15% × (a)	150,000	600,000
Residual income	$ 60,000	$120,000

3. No, the Yokohama Division is simply larger than the Osaka Division and for this reason one would expect that it would have a greater amount of residual income. Residual income can't be used to compare the performance of divisions of different sizes. Larger divisions will almost always look better. In fact, in the case above, the Yokohama Division does not appear to be as well managed as the Osaka Division. Note from Part (1) that Yokohama has only an 18% ROI as compared to 21% for Osaka.

Exercise 10-7 (45 minutes)

1. Students' answers may differ in some details from this solution.



Exercise 10-7 (continued)

2. The hypotheses underlying the balanced scorecard are indicated by the arrows in the diagram. Reading from the bottom of the balanced scorecard, the hypotheses are:
   - If the amount of compensation paid above the industry average increases, then the percentage of job offers accepted and the level of employee morale will increase.
   - If the average number of years to be promoted decreases, then the percentage of job offers accepted and the level of employee morale will increase.
   - If the percentage of job offers accepted increases, then the ratio of billable hours to total hours should increase while the average number of errors per tax return and the average time needed to prepare a return should decrease.
   - If employee morale increases, then the ratio of billable hours to total hours should increase while the average number of errors per tax return and the average time needed to prepare a return should decrease.
   - If employee morale increases, then the customer satisfaction with service quality should increase.
   - If the ratio of billable hours to total hours increases, then the revenue per employee should increase.
   - If the average number of errors per tax return decreases, then the customer satisfaction with effectiveness should increase.
   - If the average time needed to prepare a return decreases, then the customer satisfaction with efficiency should increase.
   - If the customer satisfaction with effectiveness, efficiency, and service quality increases, then the number of new customers acquired should increase.
   - If the number of new customers acquired increases, then sales should increase.
   - If revenue per employee and sales increase, then the profit margin should increase.

Exercise 10-7 (continued)

Each of these hypotheses can be questioned. For example, Ariel's customers may define effectiveness as minimizing their tax liability which is not necessarily the same as minimizing the number of errors in a tax return. If some of Ariel's customers became aware that Ariel overlooked legal tax minimizing opportunities, it is likely that the "customer satisfaction with effectiveness" measure would decline. This decline would probably puzzle Ariel because, although the firm prepared what it believed to be error-free returns, it overlooked opportunities to minimize customers' taxes. In this example, Ariel's internal business process measure of the average number of errors per tax return does not fully capture the factors that drive the customer satisfaction. The fact that each of the hypotheses mentioned above can be questioned does not invalidate the balanced scorecard. If the scorecard is used correctly, management will be able to identify which, if any, of the hypotheses are invalid and then modify the balanced scorecard accordingly.

3. The performance measure "total dollar amount of tax refunds generated" would motivate Ariel's employees to aggressively search for tax minimization opportunities for its clients. However, employees may be too aggressive and recommend questionable or illegal tax practices to clients. This undesirable behavior could generate unfavorable publicity and lead to major problems for the company as well as its customers. Overall, it would probably be unwise to use this performance measure in Ariel's scorecard.

   However, if Ariel wanted to create a scorecard measure to capture this aspect of its client service responsibilities, it may make sense to focus the performance measure on its training process. Properly trained employees are more likely to recognize viable tax minimization opportunities.

Exercise 10-7 (continued)

4. Each office's individual performance should be based on the scorecard measures only if the measures are controllable by those employed at the branch offices. In other words, it would not make sense to attempt to hold branch office managers responsible for measures such as the percent of job offers accepted or the amount of compensation paid above industry average. Recruiting and compensation decisions are not typically made at the branch offices. On the other hand, it would make sense to measure the branch offices with respect to internal business process, customer, and financial performance. Gathering this type of data would be useful for evaluating the performance of employees at each office.

Exercise 10-8 (15 minutes)

1. ROI computations:

$$\text{ROI} = \frac{\text{Net operating income}}{\text{Sales}} \times \frac{\text{Sales}}{\text{Average operating assets}}$$

Queensland Division:

$$\text{ROI} = \frac{\$360{,}000}{\$4{,}000{,}000} \times \frac{\$4{,}000{,}000}{\$2{,}000{,}000} = 9\% \times 2 = 18\%$$

New South Wales Division:

$$\text{ROI} = \frac{\$420{,}000}{\$7{,}000{,}000} \times \frac{\$7{,}000{,}000}{\$2{,}000{,}000} = 6\% \times 3.5 = 21\%$$

2. The manager of the New South Wales Division seems to be doing the better job. Although the New South Wales Division's margin is three percentage points lower than the margin of the Queensland Division, its turnover is higher (a turnover of 3.5, as compared to a turnover of 2.0 for the Queensland Division). The greater turnover more than offsets the lower margin, resulting in a 21% ROI, as compared to an 18% ROI for the other division.

   Notice that if you look at margin alone, then the Queensland Division appears to be the stronger division. This fact underscores the importance of looking at turnover as well as at margin in evaluating performance in an investment center.

Exercise 10-9 (15 minutes)

	Company A	*Company B*	*Company C*
Sales (a)	$9,000,000 *	$7,000,000 *	$4,500,000 *
Net operating income (b)	$540,000	$280,000 *	$360,000
Average operating assets (c)	$3,000,000 *	$2,000,000	$1,800,000 *
Return on investment (ROI) (b) ÷ (c)	18%*	14%*	20%
Minimum required rate of return:			
Percentage (d)	16%*	16%	15%*
Dollar amount (c) × (d)	$480,000	$320,000 *	$270,000
Residual income (b) – [(c) × (d)]	$60,000	$(40,000)	$90,000 *

*Given.

Exercise 10-10 (20 minutes)

1.

(a) Sales	*(b) Net Operating Income**	*(c) Average Operating Assets*	*ROI (b) ÷ (c)*
$2,500,000	$475,000	$1,000,000	47.5%
$2,600,000	$500,000	$1,000,000	50.0%
$2,700,000	$525,000	$1,000,000	52.5%
$2,800,000	$550,000	$1,000,000	55.0%
$2,900,000	$575,000	$1,000,000	57.5%
$3,000,000	$600,000	$1,000,000	60.0%

*Sales × Contribution Margin Ratio of 25% – Fixed Expenses of $150,000

2. The ROI increases by 2.5% for each $100,000 increase in sales. This happens because each $100,000 increase in sales brings in an additional profit of $25,000. When this additional profit is divided by the average operating assets of $1,000,000, the result is an increase in the company's ROI of 2.5%.

Increase in sales	$100,000	(a)
Contribution margin ratio	25%	(b)
Increase in contribution margin and net operating income (a) × (b)	$25,000	(c)
Average operating assets	$1,000,000	(d)
Increase in return on investment (c) ÷ (d)	2.5%	

Exercise 10-11 (30 minutes)

1.
$$\text{Margin} = \frac{\text{Net operating income}}{\text{Sales}}$$
$$= \frac{\$70{,}000}{\$1{,}400{,}000} = 5\%$$
$$\text{Turnover} = \frac{\text{Sales}}{\text{Average operating assets}}$$
$$= \frac{\$1{,}400{,}000}{\$350{,}000} = 4$$
$$\text{ROI} = \text{Margin} \times \text{Turnover}$$
$$= 5\% \times 4 = 20\%$$

2.
$$\text{Margin} = \frac{\text{Net operating income}}{\text{Sales}}$$
$$= \frac{\$70{,}000 + \$18{,}200}{\$1{,}400{,}000 + \$70{,}000}$$
$$= \frac{\$88{,}200}{\$1{,}470{,}000} = 6\%$$
$$\text{Turnover} = \frac{\text{Sales}}{\text{Average operating assets}}$$
$$= \frac{\$1{,}400{,}000 + \$70{,}000}{\$350{,}000}$$
$$= \frac{\$1{,}470{,}000}{\$350{,}000} = 4.2$$
$$\text{ROI} = \text{Margin} \times \text{Turnover}$$
$$= 6\% \times 4.2 = 25.2\%$$

Exercise 10-11 (continued)

3.

$$\text{Margin} = \frac{\text{Net operating income}}{\text{Sales}}$$

$$= \frac{\$70{,}000 + \$14{,}000}{\$1{,}400{,}000}$$

$$= \frac{\$84{,}000}{\$1{,}400{,}000} = 6\%$$

$$\text{Turnover} = \frac{\text{Sales}}{\text{Average operating assets}}$$

$$= \frac{\$1{,}400{,}000}{\$350{,}000} = 4$$

$$\text{ROI} = \text{Margin} \times \text{Turnover}$$

$$= 6\% \times 4 = 24\%$$

4.

$$\text{Margin} = \frac{\text{Net operating income}}{\text{Sales}}$$

$$= \frac{\$70{,}000}{\$1{,}400{,}000} = 5\%$$

$$\text{Turnover} = \frac{\text{Sales}}{\text{Average operating assets}}$$

$$= \frac{\$1{,}400{,}000}{\$350{,}000 - \$70{,}000}$$

$$= \frac{\$1{,}400{,}000}{\$280{,}000} = 5$$

$$\text{ROI} = \text{Margin} \times \text{Turnover}$$

$$= 5\% \times 5 = 25\%$$

Exercise 10-12 (30 minutes)

1. ROI computations:

$$\text{ROI} = \frac{\text{Net operating income}}{\text{Sales}} \times \frac{\text{Sales}}{\text{Average operating assets}}$$

Division A:

$$\text{ROI} = \frac{\$600{,}000}{\$12{,}000{,}000} \times \frac{\$12{,}000{,}000}{\$3{,}000{,}000} = 5\% \times 4 = 20\%$$

Division B:

$$\text{ROI} = \frac{\$560{,}000}{\$14{,}000{,}000} \times \frac{\$14{,}000{,}000}{\$7{,}000{,}000} = 4\% \times 2 = 8\%$$

Division C:

$$\text{ROI} = \frac{\$800{,}000}{\$25{,}000{,}000} \times \frac{\$25{,}000{,}000}{\$5{,}000{,}000} = 3.2\% \times 5 = 16\%$$

2.

	Division A	*Division B*	*Division C*
Average operating assets	$3,000,000	$7,000,000	$5,000,000
Required rate of return	× 14%	× 10%	× 16%
Minimum required return	$ 420,000	$ 700,000	$ 800,000
Actual operating income	$ 600,000	$ 560,000	$ 800,000
Minimum required return (above)	420,000	700,000	800,000
Residual income	$ 180,000	$(140,000)	$ 0

Exercise 10-12 (continued)

3. a. and b.

	Division A	*Division B*	*Division C*
Return on investment (ROI)	20%	8%	16%
Therefore, if the division is presented with an investment opportunity yielding 15%, it probably would	Reject	Accept	Reject
Minimum required return for computing residual income	14%	10%	16%
Therefore, if the division is presented with an investment opportunity yielding 15%, it probably would	Accept	Accept	Reject

If performance is being measured by ROI, both Division A and Division C probably would reject the 15% investment opportunity. These divisions' ROIs currently exceed 15%; accepting a new investment with a 15% rate of return would reduce their overall ROIs. Division B probably would accept the 15% investment opportunity because accepting it would increase the division's overall rate of return.

If performance is measured by residual income, both Division A and Division B probably would accept the 15% investment opportunity. The 15% rate of return promised by the new investment is greater than their required rates of return of 14% and 10%, respectively, and would therefore add to the total amount of their residual income. Division C would reject the opportunity because the 15% return on the new investment is less than its 16% required rate of return.

Exercise 10-13 (15 minutes)

1. $$\text{Margin} = \frac{\text{Net operating income}}{\text{Sales}}$$

$$= \frac{\$150{,}000}{\$3{,}000{,}000} = 5\%$$

$$\text{Turnover} = \frac{\text{Sales}}{\text{Average operating assets}}$$

$$= \frac{\$3{,}000{,}000}{\$750{,}000} = 4$$

$$\text{ROI} = \text{Margin} \times \text{Turnover}$$

$$= 5\% \times 4 = 20\%$$

2. $$\text{Margin} = \frac{\text{Net operating income}}{\text{Sales}}$$

$$= \frac{\$150{,}000(1.00 + 2.00)}{\$3{,}000{,}000(1.00 + 0.50)}$$

$$= \frac{\$450{,}000}{\$4{,}500{,}000} = 10\%$$

$$\text{Turnover} = \frac{\text{Sales}}{\text{Average operating assets}}$$

$$= \frac{\$3{,}000{,}000(1.00 + 0.50)}{\$750{,}000}$$

$$= \frac{\$4{,}500{,}000}{\$750{,}000} = 6$$

$$\text{ROI} = \text{Margin} \times \text{Turnover}$$

$$= 10\% \times 6 = 60\%$$

Exercise 10-13 (continued)

3.

$$\text{Margin} = \frac{\text{Net operating income}}{\text{Sales}}$$

$$= \frac{\$150{,}000 + \$200{,}000}{\$3{,}000{,}000 + \$1{,}000{,}000}$$

$$= \frac{\$350{,}000}{\$4{,}000{,}000} = 8.75\%$$

$$\text{Turnover} = \frac{\text{Sales}}{\text{Average operating assets}}$$

$$= \frac{\$3{,}000{,}000 + \$1{,}000{,}000}{\$750{,}000 + \$250{,}000}$$

$$= \frac{\$4{,}000{,}000}{\$1{,}000{,}000} = 4$$

$$\text{ROI} = \text{Margin} \times \text{Turnover}$$

$$= 8.75\% \times 4 = 35\%$$

Problem 10-14 (30 minutes)

1. a., b., and c.

	Month			
	1	*2*	*3*	*4*
Throughput time—days:				
Process time (x)	2.1	2.0	1.9	1.8
Inspection time	0.6	0.7	0.7	0.6
Move time	0.4	0.3	0.4	0.4
Queue time	4.3	5.0	5.8	6.7
Total throughput time (y)	7.4	8.0	8.8	9.5
Delivery cycle time—days:				
Wait time from order to start of production	16.0	17.5	19.0	20.5
Throughput time	7.4	8.0	8.8	9.5
Total delivery cycle time	23.4	25.5	27.8	30.0
Manufacturing cycle efficiency (MCE):				
Process time (a)	2.1	2.0	1.9	1.8
Throughout time (b)	7.4	8.0	8.8	9.5
MCE (a) ÷ (b)	28.4%	25.0%	21.6%	18.9%

2. All of the performance measures display unfavorable trends. Throughput time per unit is increasing—largely because of an increase in queue time. Manufacturing cycle efficiency is declining and delivery cycle time is increasing. In addition, the percentage of on-time deliveries has dropped.

Problem 10-14 (continued)

3. a. and b.

	Month	
	5	*6*
Throughput time—days:		
Process time (x)	1.8	1.8
Inspection time	0.6	0.0
Move time	0.4	0.4
Queue time	0.0	0.0
Total throughput time (y)	2.8	2.2
Manufacturing cycle efficiency (MCE):		
Process time (x) ÷ Throughput time (y)	64.3%	81.8%

As a company reduces non-value-added activities, the manufacturing cycle efficiency increases rapidly. The goal, of course, is to have an efficiency of 100%. This will be achieved when *all* non-value-added activities have been eliminated and process time is equal to throughput time.

Problem 10-15 (20 minutes)

1. Operating assets do not include investments in other companies or in undeveloped land.

	Beginning Balances	*Ending Balances*
Cash	$ 140,000	$ 120,000
Accounts receivable	450,000	530,000
Inventory	320,000	380,000
Plant and equipment (net)	680,000	620,000
Total operating assets	$1,590,000	$1,650,000

$$\text{Average operating assets} = \frac{\$1{,}650{,}000 + \$1{,}590{,}000}{2} = \$1{,}620{,}000$$

2. The margin, turnover, and return on investment (ROI) are calculated as follows:

$$\text{Margin} = \frac{\text{Net operating income}}{\text{Sales}}$$

$$= \frac{\$405{,}000}{\$4{,}050{,}000} = 10\%$$

$$\text{Turnover} = \frac{\text{Sales}}{\text{Average operating assets}}$$

$$= \frac{\$4{,}050{,}000}{\$1{,}620{,}000} = 2.5$$

$$\text{ROI} = \text{Margin} \times \text{Turnover}$$

$$= 10\% \times 2.5 = 25\%$$

3. The residual income is calculated as follows:

Net operating income	$405,000
Minimum required return (15% × $1,620,000)	243,000
Residual income	$162,000

Problem 10-16 (45 minutes)

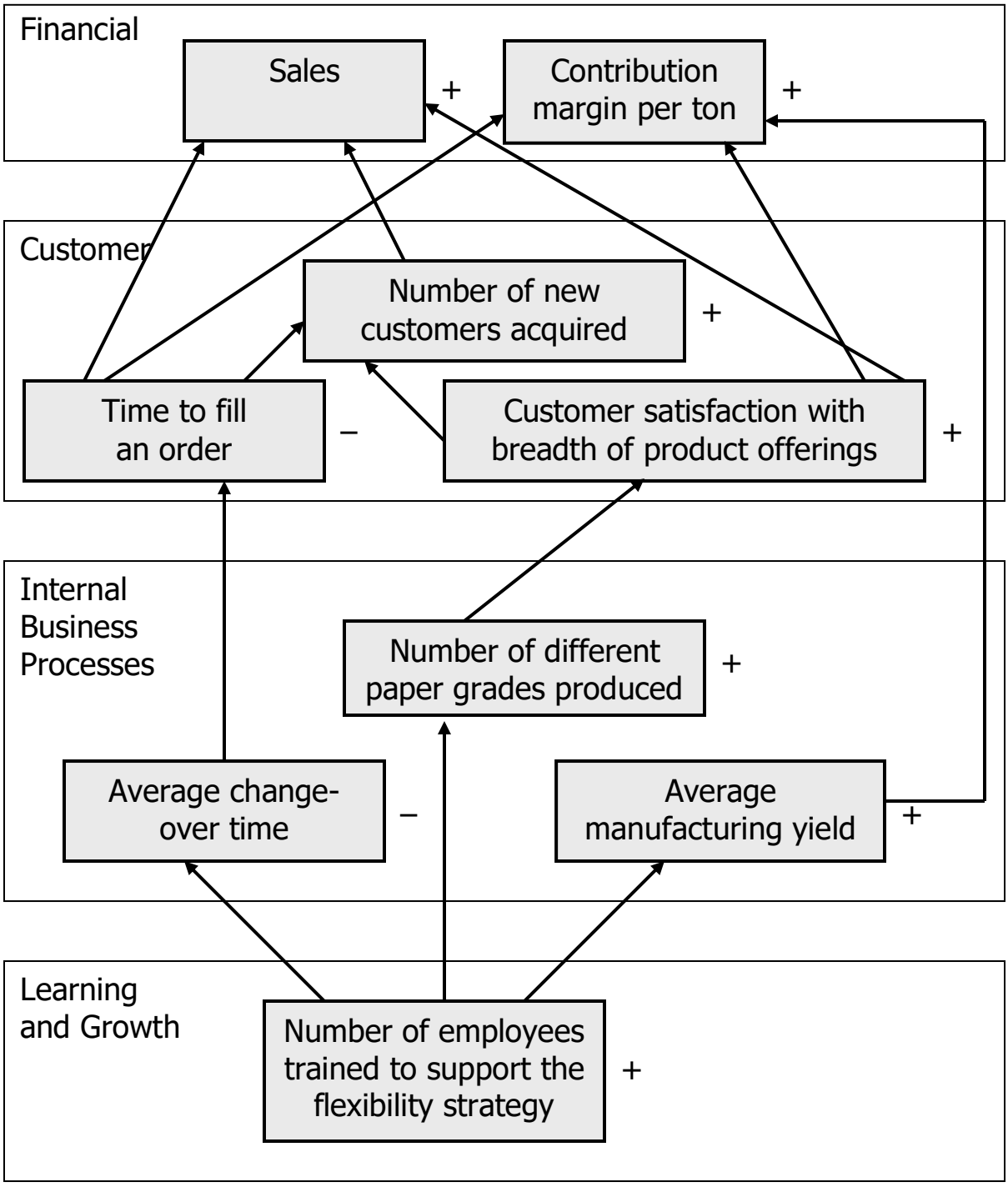
1. MPC's previous manufacturing strategy was focused on high-volume production of a limited range of paper grades. The goal of this strategy was to keep the machines running constantly to maximize the number of tons produced. Changeovers were avoided because they lowered equipment utilization. Maximizing tons produced and minimizing changeovers helped spread the high fixed costs of paper manufacturing across more units of output. The new manufacturing strategy is focused on low-volume production of a wide range of products. The goals of this strategy are to increase the number of paper grades manufactured, decrease changeover times, and increase yields across non-standard grades. While MPC realizes that its new strategy will decrease its equipment utilization, it will still strive to optimize the utilization of its high fixed cost resources within the confines of flexible production. In an economist's terms, the old strategy focused on economies of scale while the new strategy focuses on economies of scope.

2. Employees focus on improving those measures that are used to evaluate their performance. Therefore, strategically-aligned performance measures will channel employee effort towards improving those aspects of performance that are most important to obtaining strategic objectives. If a company changes its strategy but continues to evaluate employee performance using measures that do not support the new strategy, it will be motivating its employees to make decisions that promote the old strategy, not the new strategy. And if employees make decisions that promote the new strategy, their performance measures will suffer.

   Some performance measures that would be appropriate for MPC's old strategy include: equipment utilization percentage, number of tons of paper produced, and cost per ton produced. These performance measures would not support MPC's new strategy because they would discourage increasing the range of paper grades produced, increasing the number of changeovers performed, and decreasing the batch size produced per run.

Problem 10-16 (continued)

3. Students' answers may differ in some details from this solution.



Problem 10-16 (continued)

4. The hypotheses underlying the balanced scorecard are indicated by the arrows in the diagram. Reading from the bottom of the balanced scorecard, the hypotheses are:
   - If the number of employees trained to support the flexibility strategy increases, then the average changeover time will decrease and the number of different paper grades produced and the average manufacturing yield will increase.
   - If the average changeover time decreases, then the time to fill an order will decrease.
   - If the number of different paper grades produced increases, then the customer satisfaction with breadth of product offerings will increase.
   - If the average manufacturing yield increases, then the contribution margin per ton will increase.
   - If the time to fill an order decreases, then the number of new customers acquired, sales, and the contribution margin per ton will increase.
   - If the customer satisfaction with breadth of product offerings increases, then the number of new customers acquired, sales, and the contribution margin per ton will increase.
   - If the number of new customers acquired increases, then sales will increase.

   Each of these hypotheses can be questioned. For example, the time to fill an order is a function of additional factors above and beyond changeover times. Thus, MPC's average changeover time could decrease while its time to fill an order increases if, for example, the shipping department proves to be incapable of efficiently handling greater product diversity, smaller batch sizes, and more frequent shipments. The fact that each of the hypotheses mentioned above can be questioned does not invalidate the balanced scorecard. If the scorecard is used correctly, management will be able to identify which, if any, of the hypotheses are invalid and modify the balanced scorecard accordingly.

Problem 10-17 (30 minutes)

1. Breaking the ROI computation into two separate elements reveals important relationships that otherwise might remain hidden. First, the importance of asset turnover as a key element to overall profitability is emphasized. Prior to use of the ROI formula, managers tended to allow operating assets to swell to excessive levels. Second, the importance of sales volume in profit computations is explicitly recognized. Third, breaking the ROI computation into margin and turnover elements stresses the possibility of trading one off for the other in attempts to improve the overall profit picture. That is, a company may shave its margins slightly hoping for a large enough increase in turnover to increase the overall rate of return. Fourth, ratios make it easier to make comparisons between segments of the organization.

2. The missing information is as follows:

	Companies in the Same Industry		
	A	*B*	*C*
Sales (a)	$600,000 *	$500,000 *	$2,000,000
Net operating income (b)	$84,000 *	$70,000 *	$70,000
Average operating assets (c)	$300,000 *	$1,000,000	$1,000,000 *
Margin (b) ÷ (a)	14%	14%	3.5% *
Turnover (a) ÷ (c)	2.0	0.5	2.0 *
Return on investment (ROI)	28%	7% *	7%

*Given.

NAA Report No. 35 states (p. 35):

"Introducing sales to measure level of operations helps to disclose specific areas for more intensive investigation. Company B does as well as Company A in terms of profit margin, for both companies earn 14% on sales. But Company B has a much lower turnover of capital than does Company A. Whereas a dollar of investment in Company A supports two dollars in sales each period, a dollar investment in Company B supports only fifty cents in sales each period. This suggests that the analyst should look carefully at Company B's investment. Is the company keeping an inventory larger than necessary for its sales volume? Are receivables being collected promptly? Or did Company A acquire its fixed assets at a price level which was much lower than that at which Company B purchased its plant?"

Problem 10-17 (continued)

Thus, by including sales specifically in ROI computations the manager is able to discover possible problems, as well as reasons underlying a strong or a weak performance. Looking at Company A compared to Company C, notice that C's turnover is the same as A's, but C's margin on sales is much lower. Why would C have such a low margin? Is it due to inefficiency, is it due to geographical location (requiring higher salaries or transportation charges), is it due to excessive materials costs, or is it due to other factors? ROI computations raise questions such as these, which form the basis for managerial action.

To summarize, in order to bring B's ROI into line with A's, it seems obvious that B's management will have to concentrate its efforts on increasing turnover, either by increasing sales or by reducing assets. It seems unlikely that B can appreciably increase its ROI by improving its margin on sales. On the other hand, C's management should concentrate its efforts on the margin element by trying to pare down its operating expenses.

Problem 10-18 (30 minutes)

Requirements 1, 2, and 3:

	This Year	*New Line*	*Next Year*
(1) Sales	$10,000,000	$2,000,000	$12,000,000
(2) Net operating income	$800,000	$160,000 *	$960,000
(3) Operating assets	$4,000,000	$1,000,000	$5,000,000
(4) Margin (2) ÷ (1)	8%	8%	8%
(5) Turnover (1) ÷ (3)	2.5	2.0	2.4
(6) ROI (4) × (5)	20.0%	16.0%	19.2%

* Sales	$2,000,000
Variable expenses (60% × $2,000,000)	1,200,000
Contribution margin	800,000
Fixed expenses	640,000
Net operating income	$ 160,000

4. Dell Havasi will be inclined to reject the new product line because accepting it would reduce his division's overall rate of return.

5. The new product line promises an ROI of 16%, whereas the company's overall ROI this year was only 15%. Thus, adding the new line would increase the company's overall ROI.

6a through 6c:

	This Year	*New Line*	*Next Year*
Operating assets	$4,000,000	$1,000,000	$5,000,000
Minimum return required	× 12%	× 12%	× 12%
Minimum required return	$ 480,000	$ 120,000	$ 600,000
Actual net operating income	$ 800,000	$ 160,000	$ 960,000
Minimum required return (above)	480,000	120,000	600,000
Residual income	$ 320,000	$ 40,000	$ 360,000

6d. Under the residual income approach, Dell Havasi would be inclined to accept the new product line because adding the product line would increase the total amount of his division's residual income, as shown above.

Problem 10-19 (30 minutes)

1. a., b., and c.

	Month			
	1	*2*	*3*	*4*
Throughput time in days:				
Process time	2.1	2.0	1.9	1.8
Inspection time	0.8	0.7	0.7	0.7
Move time	0.3	0.4	0.4	0.5
Queue time during production	2.8	4.4	6.0	7.0
Total throughput time	6.0	7.5	9.0	10.0
Manufacturing cycle efficiency (MCE):				
Process time ÷ Throughput time	35.0%	26.7%	21.1%	18.0%
Delivery cycle time in days:				
Wait time to start of production	9.0	11.5	12.0	14.0
Throughput time	6.0	7.5	9.0	10.0
Total delivery cycle time	15.0	19.0	21.0	24.0

2. a. Areas where the company is improving:

   Quality control. The number of defects has decreased by over 50% (from 185 to 91) in the last four months. Moreover, both warranty claims and customer complaints are down sharply. In short, overall quality appears to have significantly improved.

   Material control. The purchase order lead time is only half (now 4 days from 8 days) of what it was four months ago, which indicates that purchases are arriving in less time. This trend may be a result of the company's move toward JIT purchasing.

   Process Time. The process time has decreased by 14% from 2.1 days to 1.8 days over the last four months.

Problem 10-19 (continued)

b. Areas of deterioration:

Material control. Scrap as a percentage of total cost has tripled (from 1% to 3%) over the last four months.

Machine performance. Machine downtime has doubled (from 3% to 6%) over the last four months. This may be a result of the greater setup time, or it may just reflect efforts to get the new equipment operating properly. Also note that use of the machines as a percentage of availability is declining rapidly.

Delivery performance. All delivery performance measures are moving in the wrong direction. Throughput time and delivery cycle time are both increasing, and the manufacturing cycle efficiency is decreasing.

3. a. and b.

	Month	
	5	*6*
Throughput time in days:		
Process time	1.8	1.8
Inspection time	0.7	0.0
Move time	0.5	0.5
Queue time during production	0.0	0.0
Total throughput time	3.0	2.3
Manufacturing cycle efficiency (MCE):		
Process time ÷ Throughput time	60.0%	78.3%

As non-value-added activities are eliminated, the manufacturing cycle efficiency improves. The goal, of course, is to have an efficiency of 100%. This is achieved when all non-value-added activities have been eliminated and process time equals throughput time.

Problem 10-20 (30 minutes)

1. $$\text{ROI} = \frac{\text{Net operating income}}{\text{Sales}} \times \frac{\text{Sales}}{\text{Average operating assets}}$$

$$= \frac{\$360{,}000}{\$4{,}000{,}000} \times \frac{\$4{,}000{,}000}{\$2{,}000{,}000}$$

$$= 9\% \times 2 = 18\%$$

2. $$\text{ROI} = \frac{\$360{,}000}{\$4{,}000{,}000} \times \frac{\$4{,}000{,}000}{\$1{,}600{,}000}$$

$$= \underset{\text{(Unchanged)}}{9\%} \times \underset{\text{(Increase)}}{2.5} = \underset{\text{(Increase)}}{22.5\%}$$

3. $$\text{ROI} = \frac{\$392{,}000}{\$4{,}000{,}000} \times \frac{\$4{,}000{,}000}{\$2{,}000{,}000}$$

$$= \underset{\text{(Increase)}}{9.8\%} \times \underset{\text{(Unchanged)}}{2} = \underset{\text{(Increase)}}{19.6\%}$$

4. Interest is a financing expense and thus it is not used to compute net operating income.

$$\text{ROI} = \frac{\$380{,}000}{\$4{,}000{,}000} \times \frac{\$4{,}000{,}000}{\$2{,}500{,}000}$$

$$= \underset{\text{(Increase)}}{9.5\%} \times \underset{\text{(Decrease)}}{1.6} = \underset{\text{(Decrease)}}{15.2\%}$$

Problem 10-20 (continued)

5. The company has a contribution margin ratio of 30% ($24 CM per unit, divided by the $80 selling price per unit). Therefore, a 20% increase in sales would result in a new net operating income of:

Sales (1.20 × $4,000,000)	$4,800,000	100 %
Variable expenses	3,360,000	70 *
Contribution margin	1,440,000	30 %
Fixed expenses	840,000	
Net operating income	$ 600,000	

* $56 ÷ $80 = 70%

$$\text{ROI} = \frac{\$600{,}000}{\$4{,}800{,}000} \times \frac{\$4{,}800{,}000}{\$2{,}000{,}000}$$

$$= \underset{\text{(Increase)}}{12.5\%} \times \underset{\text{(Increase)}}{2.4} = \underset{\text{(Increase)}}{30\%}$$

6. $$\text{ROI} = \frac{\$320{,}000}{\$4{,}000{,}000} \times \frac{\$4{,}000{,}000}{\$1{,}960{,}000}$$

$$= \underset{\text{(Decrease)}}{8\%} \times \underset{\text{(Increase)}}{2.04} = \underset{\text{(Decrease)}}{16.3\%}$$

7. $$\text{ROI} = \frac{\$360{,}000}{\$4{,}000{,}000} \times \frac{\$4{,}000{,}000}{\$1{,}800{,}000}$$

$$= \underset{\text{(Unchanged)}}{9\%} \times \underset{\text{(Increase)}}{2.22} = \underset{\text{(Increase)}}{20\%}$$

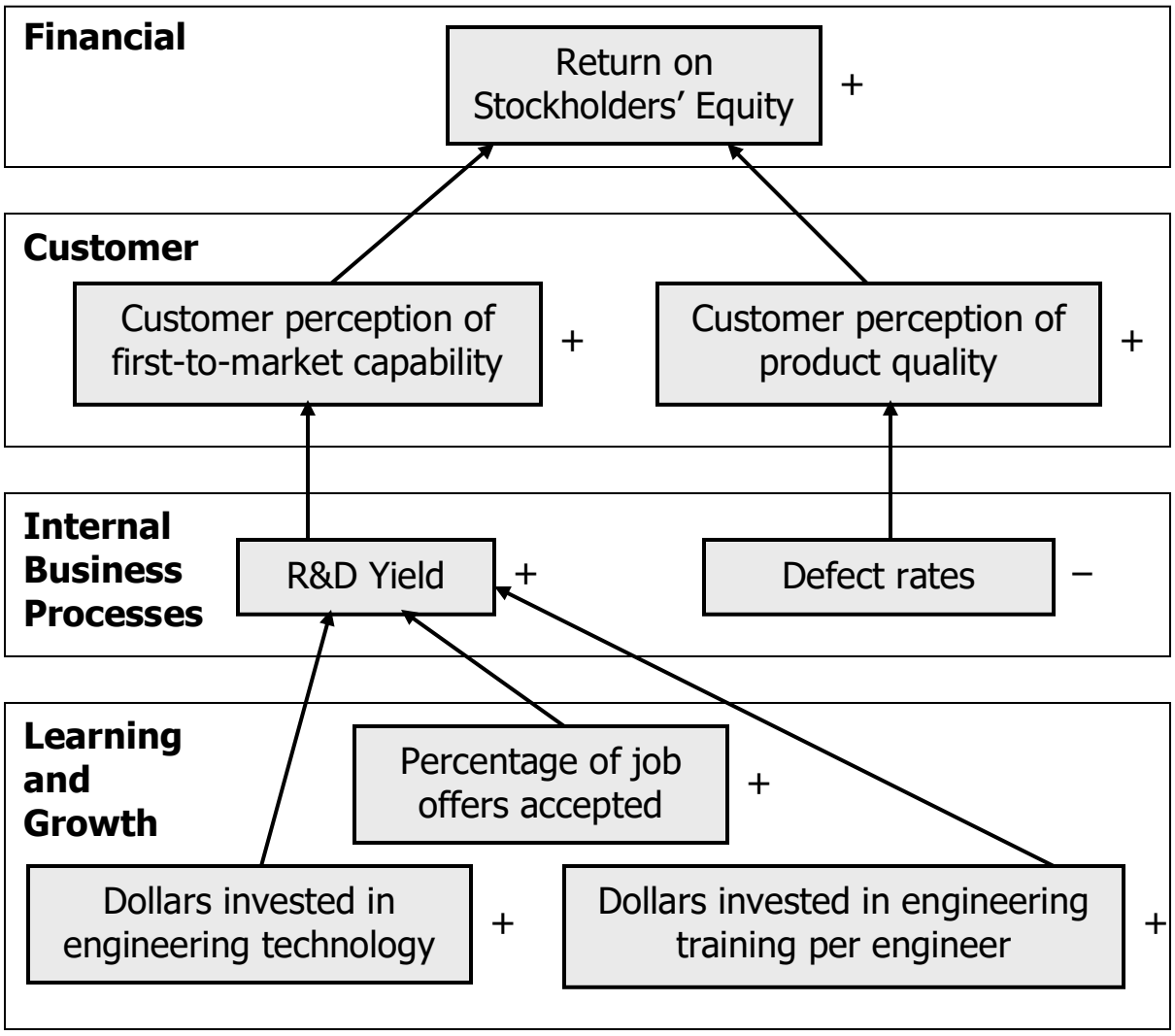
Problem 10-21 (90 minutes)

1. Both companies view training as important; both companies need to leverage technology to succeed in the marketplace; and both companies are concerned with minimizing defects. There are numerous differences between the two companies. For example, Applied Pharmaceuticals is a product-focused company and Destination Resorts International (DRI) is a service-focused company. Applied Pharmaceuticals' training resources are focused on their engineers because they hold the key to the success of the organization. DRI's training resources are focused on their front-line employees because they hold the key to the success of their organization. Applied Pharmaceuticals' technology investments are focused on supporting the innovation that is inherent in the product development side of the business. DRI's technology investments are focused on supporting the day-to-day execution that is inherent in the customer interface side of the business. Applied Pharmaceuticals defines a defect from an internal manufacturing standpoint, while DRI defines a defect from an external customer interaction standpoint.

Problem 10-21 (continued)

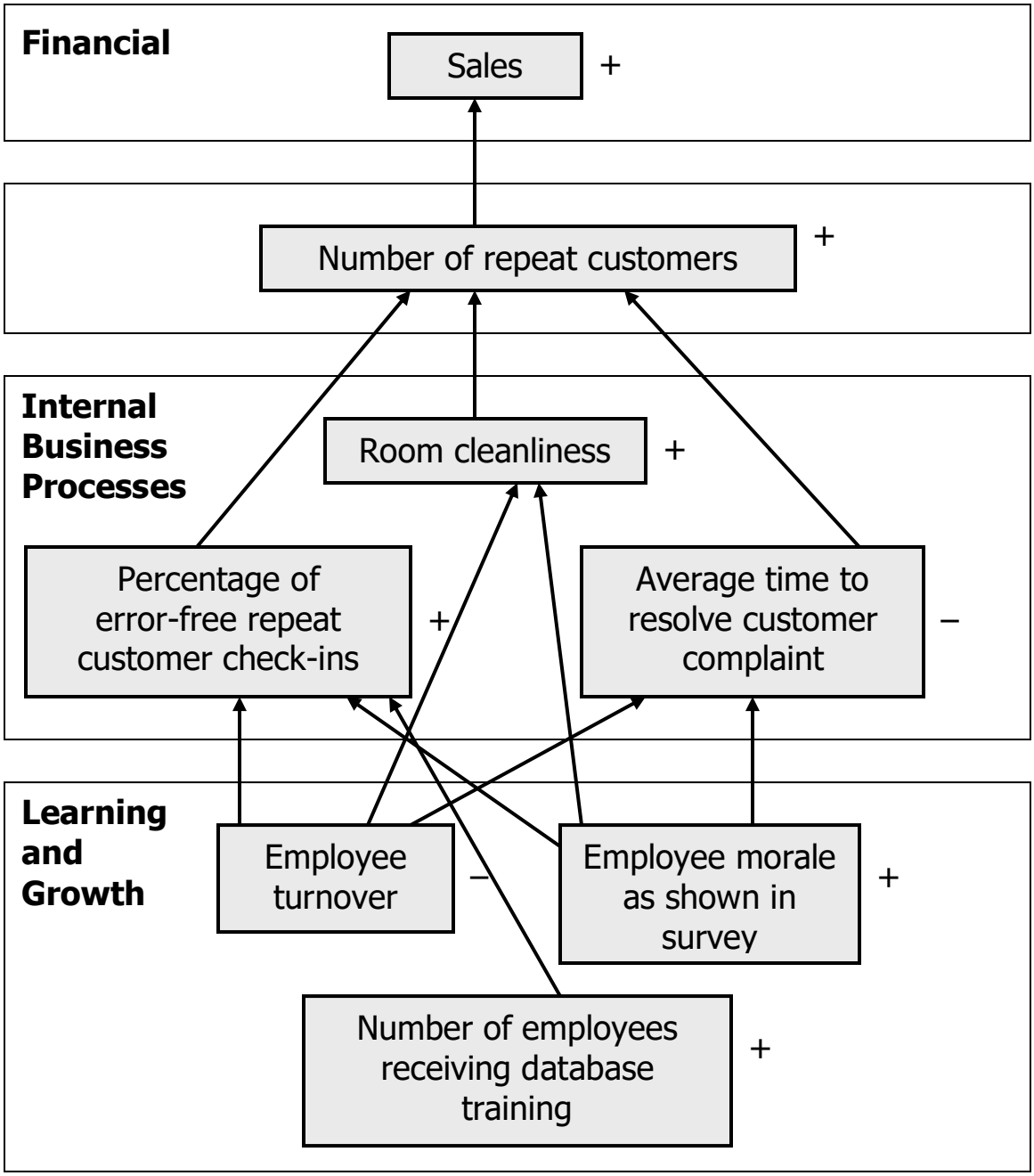
2. Students' answers may differ in some details from this solution.

Applied Pharmaceuticals



Problem 10-21 (continued)

Destination Resorts International



Problem 10-21 (continued)

3. The hypotheses underlying the balanced scorecards are indicated by the arrows in each diagram. Reading from the bottom of each balanced scorecard, the hypotheses are:

Applied Pharmaceuticals

- If the dollars invested in engineering technology increase, then the R&D yield will increase.
- If the percentage of job offers accepted increases, then the R&D yield will increase.
- If the dollars invested in engineering training per engineer increase, then the R&D yield will increase.
- If the R&D yield increases, then customer perception of first-to-market capability will increase.
- If the defects per million opportunities decrease, then the customer perception of product quality will increase.
- If the customer perception of first-to-market capability increases, then the return on stockholders' equity will increase.
- If the customer perception of product quality increases, then the return on stockholders' equity will increase.

Destination Resort International

- If the employee turnover decreases, then the percentage of error-free repeat customer check-ins and room cleanliness will increase and the average time to resolve customer complaints will decrease.
- If the number of employees receiving database training increases, then the percentage of error-free repeat customer check-ins will increase.
- If employee morale increases, then the percentage of error-free repeat customer check-ins and room cleanliness will increase and the average time to resolve customer complaints will decrease.
- If the percentage of error-free repeat customer check-ins increases, then the number of repeat customers will increase.
- If the room cleanliness increases, then the number of repeat customers will increase.
- If the average time to resolve customer complaints decreases, then the number of repeat customers will increase.
- If the number of repeat customers increases, then sales will increase.

Problem 10-21 (continued)

Each of these hypotheses is questionable to some degree. For example, in the case of Applied Pharmaceuticals, R&D yield is not the sole driver of the customers' perception of first-to-market capability. More specifically, if Applied Pharmaceuticals experimented with nine possible drug compounds in year one and three of those compounds proved to be successful in the marketplace it would result in an R&D yield of 33%. If in year two, it experimented with four possible drug compounds and two of those compounds proved to be successful in the marketplace it would result in an R&D yield of 50%. While the R&D yield has increased from year one to year two, it is quite possible that the customer's perception of first-to-market capability would decrease. The fact that each of the hypotheses mentioned above can be questioned does not invalidate the balanced scorecard. If the scorecard is used correctly, management will be able to identify which, if any, of the hypotheses are invalid and the balanced scorecard can then be appropriately modified.

Problem 10-22 (45 minutes)

The answers below are not the only possible answers. Ingenious people can figure out many different ways of making performance look better even though it really isn't. This is one of the reasons for a *balanced scorecard*. By having a number of different measures that ultimately are linked to overall financial goals, "gaming" the system is more difficult.

1. Speed-to-market can be improved by taking on less ambitious projects. Instead of working on major product innovations that require a great deal of time and effort, R&D may choose to work on small, incremental improvements in existing products. There is also a danger that in the rush to push products out the door, the products will be inadequately tested and developed.

2. In this case, the ground crews raced from one arriving airplane to another in an effort to unload luggage from these airplanes as soon as possible. However, once the luggage was unloaded from the airplane it was being left on the tarmac rather than being delivered in a timely manner to carousels or appropriate connecting flights.

   Another flaw of the CEO's bonus system is that ground crews would probably "smooth" their rate of improvement to earn as many monthly bonuses as possible. They would not perform at their highest level during the first month of the new bonus scheme because it would diminish their chances of earning bonuses in subsequent months.

3. In real life, the production manager simply added several weeks to the delivery cycle time. In other words, instead of promising to deliver an order in four weeks, the manager promised to deliver in six weeks. This increase in delivery cycle time did not, of course, please customers and drove some business away, but it dramatically improved the percentage of orders delivered on time.

Problem 10-22 (continued)

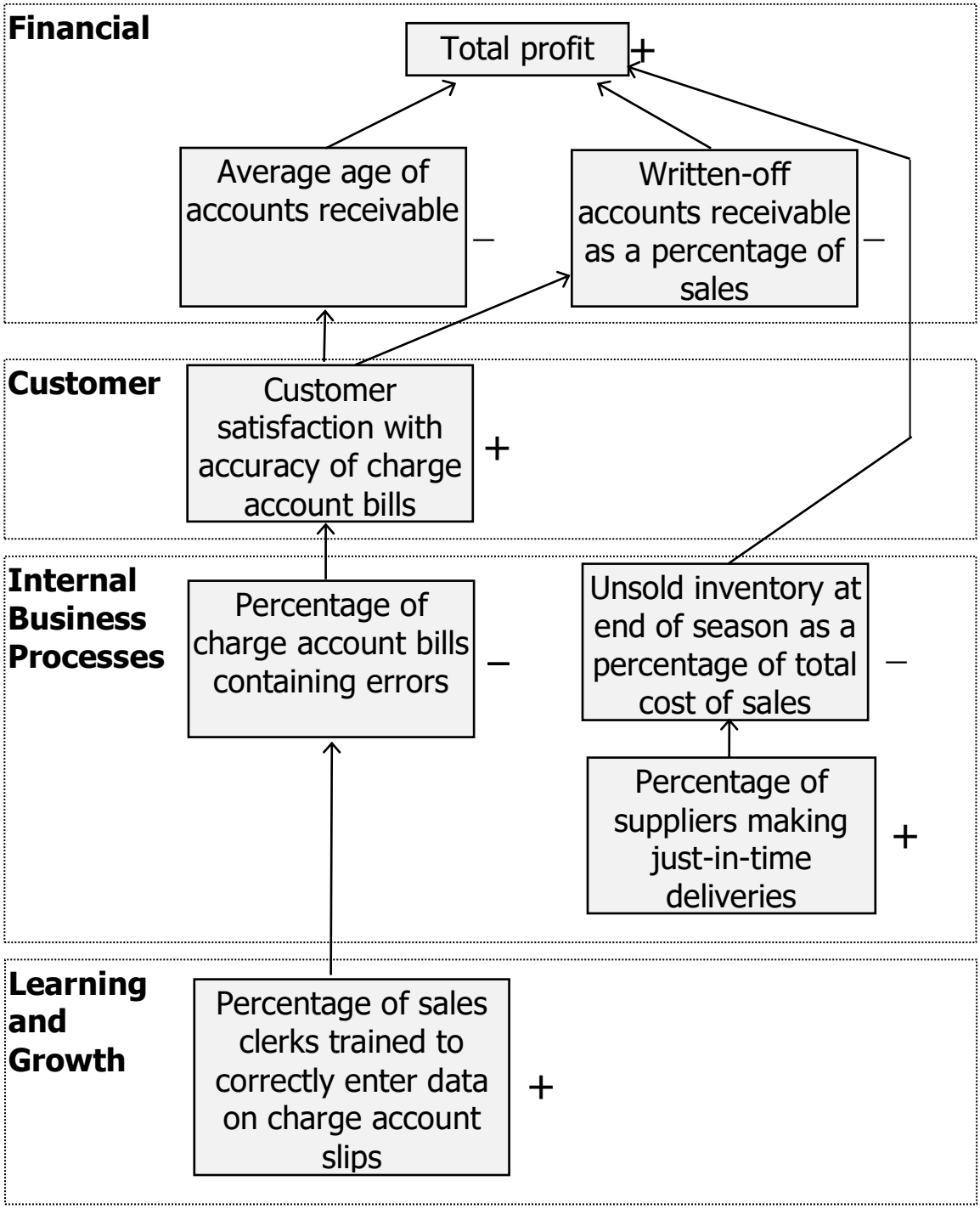
4. As stated above, ratios can be improved by changing either the numerator or the denominator. Managers who are under pressure to increase the revenue per employee may find it easier to eliminate employees than to increase revenues. Of course, eliminating employees may reduce total revenues and total profits, but the revenue per employee will increase as long as the percentage decline in revenues is less than the percentage cut in number of employees. Suppose, for example, that a manager is responsible for business units with a total of 1,000 employees, $120 million in revenues, and profits of $2 million. Further suppose that a manager can eliminate one of these business units that has 200 employees, revenues of $10 million, and profits of $1.2 million.

	Before eliminating the business unit	*After eliminating the business unit*
Total revenue.....	$120,000,000	$110,000,000
Total employees	1,000	800
Revenue per employee .	$120,000	$137,500
Total profits	$2,000,000	$800,000

As these examples illustrate, performance measures should be selected with a great deal of care and managers should avoid placing too much emphasis on any one performance measure.

Case (60 minutes)

1. Student answers may differ concerning which category—learning and growth, internal business processes, customers, or financial—a particular performance measure belongs to.



Case (continued)

A number of the performance measures suggested by managers have not been included in the above balanced scorecard. The excluded performance measures may have an impact on total profit, but they are not linked in any obvious way with the two key problems that have been identified by management—accounts receivables and unsold inventory. If every performance measure that potentially impacts profit is included in a company's balanced scorecard, it would become unwieldy and focus would be lost.

2. The results of operations can be exploited for information about the company's strategy. Each link in the balanced scorecard should be regarded as a hypothesis of the form "If ..., then ...". For example, the balanced scorecard on the previous page contains the hypothesis "If customers express greater satisfaction with the accuracy of their charge account bills, then the average age of accounts receivable will improve." If customers in fact do express greater satisfaction with the accuracy of their charge account bills, but the average age of accounts receivable does not improve, this would have to be considered evidence that is inconsistent with the hypothesis. Management should try to figure out why the average age of receivables has not improved. (See the answer below for possible explanations.) The answer may suggest a shift in strategy.

   In general, the most important results are those that provide evidence inconsistent with the hypotheses embedded in the balanced scorecard. Such evidence suggests that the company's strategy needs to be reexamined.

Case (continued)

3. a. This evidence is inconsistent with two of the hypotheses underlying the balanced scorecard. The first of these hypotheses is "If customers express greater satisfaction with the accuracy of their charge account bills, then the average age of accounts receivable will improve." The second of these hypotheses is "If customers express greater satisfaction with the accuracy of their charge account bills, then there will be improvement in bad debts." There are a number of possible explanations. Two possibilities are that the company's collection efforts are ineffective and that the company's credit reviews are not working properly. In other words, the problem may not be incorrect charge account bills at all. The problem may be that the procedures for collecting overdue accounts are not working properly. Or, the problem may be that the procedures for reviewing credit card applications let through too many poor credit risks. If so, this would suggest that efforts should be shifted from reducing charge account billing errors to improving the internal business processes dealing with collections and credit screening. And in that case, the balanced scorecard should be modified.

   b. This evidence is inconsistent with three hypotheses. The first of these is "If the average age of receivables declines, then profits will increase." The second hypothesis is "If the written-off accounts receivable decrease as a percentage of sales, then profits will increase." The third hypothesis is "If unsold inventory at the end of the season as a percentage of cost of sales declines, then profits will increase."

   Again, there are a number of possible explanations for the lack of results consistent with the hypotheses. Managers may have decreased the average age of receivables by simply writing off old accounts earlier than was done previously. This would actually decrease reported profits in the short term. Bad debts as a percentage of sales could be decreased by drastically cutting back on extensions of credit to customers—perhaps even canceling some charge accounts. (Bad debts would be zero if there were no credit sales.) This would have the effect of reducing bad debts, but might irritate otherwise loyal credit customers and reduce sales and profits.

Case (continued)

The reduction in unsold inventories at the end of the season as a percentage of cost of sales could have occurred for a number of reasons that are not necessarily good for profits. For example, managers may have been too cautious about ordering goods to restock low inventories—creating stockouts and lost sales. Or, managers may have cut prices drastically on excess inventories in order to eliminate them before the end of the season. This may have reduced the willingness of customers to pay the store's normal prices. Or, managers may have gotten rid of excess inventories by selling them to discounters *before* the end of the season.

Communicating in Practice

Date: Current date
To: Instructor
From: Student's Name
Subject: Talk with a store manager

The student's memorandum should address the following:

- The name, title and job affiliation of the individual interviewed. (Note: These data are not specifically required in problem but are essential background. This could provide a good basis for class discussion of what should be included in a memorandum.)
- A brief description of the corporation's goals (that is, the broad, long-range plans of the company).
- A summary of the performance measures that are used to help motivate the managers and monitor progress toward achieving the corporation's goals, and an indication as to whether the performance measures include return on investment and/or residual income.
- A synopsis of the manager's opinion as to whether the performance measures are consistent with the manager's compensation plan.