

Exercise 13-1 (15 minutes)

	<i>Total</i>	<i>Weedban</i>	<i>Greengrow</i>
Sales*	\$300,000	\$90,000	\$210,000
Variable expenses**	<u>183,000</u>	<u>36,000</u>	<u>147,000</u>
Contribution margin.....	117,000	54,000	63,000
Traceable fixed expenses	<u>66,000</u>	<u>45,000</u>	<u>21,000</u>
Product line segment margin..	51,000	<u>\$ 9,000</u>	<u>\$ 42,000</u>
Common fixed expenses not traceable to products	<u>33,000</u>		
Net operating income	<u>\$ 18,000</u>		

- * Weedban: 15,000 units × \$6.00 per unit = \$90,000.
Greengrow: 28,000 units × \$7.50 per unit = \$210,000.
- ** Weedban: 15,000 units × \$2.40 per unit = \$36,000.
Greengrow: 28,000 units × \$5.25 per unit = \$147,000.

Exercise 13-2 (10 minutes)

$$\begin{aligned} 1. \text{ Margin} &= \frac{\text{Net operating income}}{\text{Sales}} \\ &= \frac{\$600,000}{\$7,500,000} = 8\% \end{aligned}$$

$$\begin{aligned} 2. \text{ Turnover} &= \frac{\text{Sales}}{\text{Average operating assets}} \\ &= \frac{\$7,500,000}{\$5,000,000} = 1.5 \end{aligned}$$

$$\begin{aligned} 3. \text{ ROI} &= \text{Margin} \times \text{Turnover} \\ &= 8\% \times 1.5 = 12\% \end{aligned}$$

Exercise 13-3 (10 minutes)

Average operating assets	<u>£2,800,000</u>
Net operating income	£ 600,000
Minimum required return:	
18% × £2,800,000	<u>504,000</u>
Residual income	<u>£ 96,000</u>

Exercise 13-4 (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 13-6 (20 minutes)

1. ROI computations:

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

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

Osaka Division:

$$\begin{aligned} \text{ROI} &= \frac{¥210,000}{¥3,000,000} \times \frac{¥3,000,000}{¥1,000,000} \\ &= 7\% \times 3 = 21\% \end{aligned}$$

Yokohama Division:

$$\begin{aligned} \text{ROI} &= \frac{¥720,000}{¥9,000,000} \times \frac{¥9,000,000}{¥4,000,000} \\ &= 8\% \times 2.25 = 18\% \end{aligned}$$

2.

	<i>Osaka</i>	<i>Yokohama</i>
Average operating assets (a).....	<u>¥1,000,000</u>	<u>¥4,000,000</u>
Net operating income	¥ 210,000	¥ 720,000
Minimum required return on average operating assets: 15% × (a)	<u>150,000</u>	<u>600,000</u>
Residual income.....	<u>¥ 60,000</u>	<u>¥ 120,000</u>

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.

Problem 13-18 (30 minutes)

1.		<i>Present</i>	<i>New Line</i>	<i>Total</i>
	(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).....	<u>1,200,000</u>
Contribution margin.....	800,000
Fixed expenses.....	<u>640,000</u>
Net operating income.....	<u>\$ 160,000</u>

2. Dell Havasi will be inclined to reject the new product line because accepting it would reduce his division's overall rate of return.
3. The new product line promises an ROI of 16%, whereas the company's overall ROI last year was only 15%. Thus, adding the new line would increase the company's overall ROI.

4. a.		<i>Present</i>	<i>New Line</i>	<i>Total</i>
	Operating assets.....	\$4,000,000	\$1,000,000	\$5,000,000
	Minimum return required	<u>× 12%</u>	<u>× 12%</u>	<u>× 12%</u>
	Minimum net operating income	<u>\$ 480,000</u>	<u>\$ 120,000</u>	<u>\$ 600,000</u>
	Actual net operating income ...	\$ 800,000	\$ 160,000	\$ 960,000
	Minimum net operating income (above)	<u>480,000</u>	<u>120,000</u>	<u>600,000</u>
	Residual income.....	<u>\$ 320,000</u>	<u>\$ 40,000</u>	<u>\$ 360,000</u>

- b. 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.