

Exercise 12-11 (15 minutes)

The company should accept orders first for Product Z, second for Product X, and third for Product Y. The computations are:

	<i>Product X</i>	<i>Product Y</i>	<i>Product Z</i>
(a) Direct materials required per unit	\$24.00	\$15.00	\$9.00
(b) Cost per kilogram	\$3.00	\$3.00	\$3.00
(c) Kilograms required per unit (a) ÷ (b)	8	5	3
(d) Contribution margin per unit	\$32.00	\$14.00	\$21.00
Contribution margin per kilogram of materials used (d) ÷ (c)	\$4.00	\$2.80	\$7.00

Since Product Z uses the least amount of material per unit of the three products, and since it is the most profitable of the three in terms of its use of this constrained resource, some students will immediately assume that this is an infallible relationship. That is, they will assume that the way to spot the most profitable product is to find the one using the least amount of the constrained resource. The way to dispel this notion is to point out that Product X uses more material (the constrained resource) than does Product Y, but yet it is preferred over Product Y.

The key factor is not how much of a constrained resource a product uses, but rather how much contribution margin the product generates per unit of the constrained resource.

Problem 12-26 (60 minutes)

1. The \$2.00 per unit general overhead cost is not relevant to the decision, since the total general company overhead cost will be the same regardless of whether the company decides to make or buy the subassemblies. Also, the depreciation on the old equipment is not a relevant cost since it represents a sunk cost and the old equipment is worn out and must be replaced. The cost of supervision is relevant since this cost can be avoided by buying the subassemblies.

	<i>Differential Costs Per Unit</i>		<i>Total Differential Costs for 40,000 Units</i>	
	<i>Make</i>	<i>Buy</i>	<i>Make</i>	<i>Buy</i>
Outside supplier's price		\$8.00		\$320,000
Direct materials	\$2.75		\$110,000	
Direct labour (\$4.00 × 0.75)	3.00		120,000	
Variable overhead (\$0.60 × 0.75)	0.45		18,000	
Supervision	0.75		30,000	
Equipment rental*	<u>1.50</u>		<u>60,000</u>	
Total	<u>\$8.45</u>	<u>\$8.00</u>	<u>\$338,000</u>	<u>\$320,000</u>
Difference in favour of buying		<u>\$0.45</u>		<u>\$18,000</u>

* \$60,000 per year ÷ 40,000 units per year = \$1.50 per unit

Problem 12-26 (continued)

2. a. Note that unit costs for both supervision and equipment rental will change if the company needs 50,000 subassemblies each year. These fixed costs will be spread over a larger number of units, thereby decreasing the cost per unit.

	<i>Differential Costs Per Unit</i>		<i>Total Differential Costs—50,000 Units</i>	
	<i>Make</i>	<i>Buy</i>	<i>Make</i>	<i>Buy</i>
Outside supplier's price		\$8.00		\$400,000
Direct materials	\$2.75		\$137,500	
Direct labour	3.00		150,000	
Variable overhead	0.45		22,500	
Supervision (\$30,000 ÷ 50,000 units)	0.60		30,000	
Equipment rental (\$60,000 ÷ 50,000 units)	<u>1.20</u>		<u>60,000</u>	
Total	<u>\$8.00</u>	<u>\$8.00</u>	<u>\$400,000</u>	<u>\$400,000</u>
Difference		<u>\$0</u>		<u>\$0</u>

The company would be indifferent between the two alternatives if 50,000 subassemblies were needed each year.

Problem 12-26 (continued)

- b. Again, notice that the unit costs for both supervision and equipment rental decrease with the greater volume of units.

	<i>Differential Costs Per Unit</i>		<i>Total Differential Costs—60,000 Units</i>	
	<i>Make</i>	<i>Buy</i>	<i>Make</i>	<i>Buy</i>
Outside supplier's price.....		\$8.00		\$480,000
Direct materials.....	\$2.75		\$165,000	
Direct labour.....	3.00		180,000	
Variable overhead	0.45		27,000	
Supervision (\$30,000 ÷ 60,000 units)....	0.50		30,000	
Equipment rental (\$60,000 ÷ 60,000 units)....	<u>1.00</u>		<u>60,000</u>	
Total	<u>\$7.70</u>	<u>\$8.00</u>	<u>\$462,000</u>	<u>\$480,000</u>
Difference in favour of making ..	<u>\$0.30</u>		<u>\$18,000</u>	

The company should rent the new equipment and make the subassemblies if 60,000 units per year are needed.

Problem 12-26 (continued)

3. Other factors that the company should consider include:

- a. Will volume in future years be increasing, or will it remain constant at 40,000 units per year? (If volume increases, then renting the new equipment becomes more desirable, as shown in the computations above.)
- b. Can quality control be maintained if the subassemblies are purchased from the outside supplier?
- c. Does the company have some other profitable use for the space now being used to produce the subassemblies? Does production of the subassemblies require use of a constrained resource?
- d. Will the outside supplier be dependable in meeting shipping schedules?
- e. Can the company begin making the subassemblies again if the supplier proves to be undependable, or are there alternative suppliers?
- f. If the outside supplier's offer is accepted and the need for subassemblies increases in future years, will the supplier have the capacity to provide more than 40,000 subassemblies per year?
- g. Will the rental cost of the equipment change in the future?

Problem 12-27 (30 minutes)

1. Since the fixed costs will not change as a result of the order, they are not relevant to the decision. The cost of the new machine is relevant, and this cost will have to be recovered by the current order since there is no assurance of future business from the retail chain.

	<i>Unit</i>	<i>Total—5,000 units</i>
Revenue from the order ($\$50 \times 84\%$)	<u>\$42</u>	<u>\$210,000</u>
Less costs associated with the order:		
Direct materials	15	75,000
Direct labour	8	40,000
Variable manufacturing overhead	3	15,000
Variable selling expense ($\$4 \times 25\%$)	1	5,000
Special machine ($\$10,000 \div 5,000$ units) ..	<u>2</u>	<u>10,000</u>
Total costs	<u>29</u>	<u>145,000</u>
Net increase in profits	<u>\$13</u>	<u>\$ 65,000</u>

2. Revenue from the order:

Reimbursement for costs of production (variable production costs of \$26, plus fixed manufacturing overhead cost of \$9 = \$35 per unit; \$35 per unit \times 5,000 units)	\$175,000
Fixed fee ($\$1.80$ per unit \times 5,000 units)	<u>9,000</u>
Total revenue	184,000
Less incremental costs—variable production costs ($\$26$ per unit \times 5,000 units)	<u>130,000</u>
Net increase in profits	<u>\$ 54,000</u>

3. Sales revenue:

From the Quebec government (above)	\$184,000
From regular channels ($\$50$ per unit \times 5,000 units)	<u>250,000</u>
Net decrease in revenue	(66,000)
Less variable selling expenses avoided if the Quebec government's order is accepted ($\$4$ per unit \times 5,000 units)	<u>20,000</u>
Net decrease in profits if the Quebec government's order is accepted	<u>\$(46,000)</u>