Exercise 14-1 (15 minutes)

		Case 1		*Case 2*	
	Item	*Relevant*	*Not Relevant*	*Relevant*	*Not Relevant*
a.	Sales	X			X
b.	Direct materials	X		X	
c.	Direct labor	X			X
d.	Variable manufacturing overhead	X			X
e.	Depreciation— Model B100 machine		X		X
f.	Book value— Model B100 machine		X		X
g.	Disposal value— Model B100 machine		X	X	
h.	Market value—Model B300 machine (cost)	X		X	
i.	Fixed manufacturing overhead		X		X
j.	Variable selling expense	X			X
k.	Fixed selling expense	X			X
l.	General administrative overhead	X			X

Exercise 14-2 (30 minutes)

1. No, production and sale of the racing bikes should not be discontinued. If the racing bikes were discontinued, then the net operating income for the company as a whole would decrease by $11,000 each quarter:

Lost contribution margin		$(27,000)
Fixed costs that can be avoided:		
Advertising, traceable	$ 6,000	
Salary of the product line manager	10,000	16,000
Decrease in net operating income for the company as a whole		$(11,000)

The depreciation of the special equipment is a sunk cost and is not relevant to the decision. The common costs are allocated and will continue regardless of whether or not the racing bikes are discontinued; thus, they are not relevant to the decision.

Alternative Solution:

	Current Total	*Total If Racing Bikes Are Dropped*	*Difference: Net Operating Income Increase or (Decrease)*
Sales	$300,000	$240,000	$(60,000)
Variable expenses	120,000	87,000	33,000
Contribution margin	180,000	153,000	(27,000)
Fixed expenses:			
Advertising, traceable	30,000	24,000	6,000
Depreciation on special equipment*	23,000	23,000	0
Salaries of product managers	35,000	25,000	10,000
Common allocated costs	60,000	60,000	0
Total fixed expenses	148,000	132,000	16,000
Net operating income	$ 32,000	$ 21,000	$(11,000)

*Includes pro-rated loss on the special equipment if it is disposed of.

Exercise 14-2 (continued)

2. The segmented report can be improved by eliminating the allocation of the common fixed expenses. Following the format introduced in Chapter 13 for a segmented income statement, a better report would be:

	Total	*Dirt Bikes*	*Mountain Bikes*	*Racing Bikes*
Sales	$300,000	$90,000	$150,000	$60,000
Variable manufacturing and selling expenses	120,000	27,000	60,000	33,000
Contribution margin	180,000	63,000	90,000	27,000
Traceable fixed expenses:				
Advertising	30,000	10,000	14,000	6,000
Depreciation of special equipment	23,000	6,000	9,000	8,000
Salaries of the product line managers	35,000	12,000	13,000	10,000
Total traceable fixed expenses	88,000	28,000	36,000	24,000
Product line segment margin	92,000	$35,000	$ 54,000	$ 3,000
Common fixed expenses	60,000			
Net operating income	$ 32,000			

Exercise 14-3 (30 minutes)

1.

	Per Unit Differential Costs		*15,000 units*	
	Make	*Buy*	*Make*	*Buy*
Cost of purchasing		$35		$525,000
Direct materials	$14		$210,000	
Direct labor	10		150,000	
Variable manufacturing overhead	3		45,000	
Fixed manufacturing overhead, traceable[1]	2		30,000	
Fixed manufacturing overhead, common				
Total costs	$29	$35	$435,000	$525,000
Difference in favor of continuing to make the carburetors	$6		$90,000	

[1] Only the supervisory salaries can be avoided if the carburetors are purchased. The remaining book value of the special equipment is a sunk cost; hence, the $4 per unit depreciation expense is not relevant to this decision.

Based on these data, the company should reject the offer and should continue to produce the carburetors internally.

2.

	Make	*Buy*
Cost of purchasing (part 1)		$525,000
Cost of making (part 1)	$435,000	
Opportunity cost—segment margin foregone on a potential new product line	150,000	
Total cost	$585,000	$525,000
Difference in favor of purchasing from the outside supplier	$60,000	

Thus, the company should accept the offer and purchase the carburetors from the outside supplier.

Exercise 14-4 (15 minutes)

Only the incremental costs and benefits are relevant. In particular, only the variable manufacturing overhead and the cost of the special tool are relevant overhead costs in this situation. The other manufacturing overhead costs are fixed and are not affected by the decision.

	Per Unit	*Total for 20 Bracelets*
Incremental revenue	$169.95	$3,399.00
Incremental costs:		
Variable costs:		
Direct materials	$ 84.00	1,680.00
Direct labor	45.00	900.00
Variable manufacturing overhead	4.00	80.00
Special filigree	2.00	40.00
Total variable cost	$135.00	2,700.00
Fixed costs:		
Purchase of special tool		250.00
Total incremental cost		2,950.00
Incremental net operating income		$ 449.00

Even though the price for the special order is below the company's regular price for such an item, the special order would add to the company's net operating income and should be accepted. This conclusion would not necessarily follow if the special order affected the regular selling price of bracelets or if it required the use of a constrained resource.

Exercise 14-5 (30 minutes)

1.

	A	*B*	*C*
(1) Contribution margin per unit	$54	$108	$60
(2) Direct material cost per unit	$24	$72	$32
(3) Direct material cost per pound	$8	$8	$8
(4) Pounds of material required per unit (2) ÷ (3)	3	9	4
(5) Contribution margin per pound (1) ÷ (4)	$18	$12	$15

2. The company should concentrate its available material on product A:

	A	*B*	*C*
Contribution margin per pound (above)	$ 18	$ 12	$ 15
Pounds of material available	× 5,000	× 5,000	× 5,000
Total contribution margin	$90,000	$60,000	$75,000

Although product A has the lowest contribution margin per unit and the second lowest contribution margin ratio, it is preferred over the other two products because it has the greatest amount of contribution margin per pound of material, and material is the company's constrained resource.

3. The price Barlow Company would be willing to pay per pound for additional raw materials depends on how the materials would be used. If there are unfilled orders for all of the products, Barlow would presumably use the additional raw materials to make more of product A. Each pound of raw materials used in product A generates $18 of contribution margin over and above the usual cost of raw materials. Therefore, Barlow should be willing to pay up to $26 per pound ($8 usual price plus $18 contribution margin per pound) for the additional raw material, but would of course prefer to pay far less. The upper limit of $26 per pound to manufacture more product A signals to managers how valuable additional raw materials are to the company.

   If all of the orders for product A have been filled, Barlow Company would then use additional raw materials to manufacture product C. The company should be willing to pay up to $23 per pound ($8 usual price plus $15 contribution margin per pound) for the additional raw materials to manufacture more product C, and up to $20 per pound ($8 usual price plus $12 contribution margin per pound) to manufacture more product B if all of the orders for product C have been filled as well.

Exercise 14-6 (10 minutes)

	A	*B*	*C*
Selling price after further processing…	$20	$13	$32
Selling price at the split-off point	16	8	25
Incremental revenue per pound or gallon	$ 4	$ 5	$ 7
Total quarterly output in pounds or gallons.....	×15,000	×20,000	×4,000
Total incremental revenue.....	$60,000	$100,000	$28,000
Total incremental processing costs.....	63,000	80,000	36,000
Total incremental profit or loss	$(3,000)	$ 20,000	$(8,000)

Therefore, only product B should be processed further.

Problem 14-23 (60 minutes)

1.

Selling price per unit	$32
Variable expenses per unit	18 *
Contribution margin per unit	$14

*$10.00 + $4.50 + $2.30 + $1.20 = $18.00

Increased sales in units (60,000 units × 25%)	15,000
Contribution margin per unit	× $14
Incremental contribution margin	$210,000
Less added fixed selling expenses	80,000
Incremental net operating income	$130,000

Yes, the increase in fixed selling expenses would be justified.

2.

Variable manufacturing cost per unit	$16.80 *
Import duties per unit	1.70
Permits and licenses ($9,000 ÷ 20,000 units)	0.45
Shipping cost per unit	3.20
Break-even price per unit	$22.15

*$10 + $4.50 + $2.30 = $16.80.

3. The relevant cost is $1.20 per unit, which is the variable selling expense per Dak. Because the irregular units have already been produced, all production costs (including the variable production costs) are sunk. The fixed selling expenses are not relevant because they will be incurred whether or not the irregular units are sold. Depending on how the irregular units are sold, the variable expense of $1.20 per unit may not even be relevant. For example, the units may be disposed of through a liquidator without incurring the normal variable selling expense.

4. If the plant operates at 30% of normal levels, then only 3,000 units will be produced and sold during the two-month period:

60,000 units per year × 2/12 = 10,000 units.
10,000 units × 30% = 3,000 units produced and sold.

Problem 14-23 (continued)

Given this information, the simplest approach to the solution is:

Contribution margin lost if the plant is closed (3,000 units × ▪$14 per unit*)		$(42,000)
Fixed costs that can be avoided if the plant is closed:		
Fixed manufacturing overhead cost ($300,000 × 2/12 = $50,000; $50,000 × ▪40%)	$20,000	
Fixed selling cost ($210,000 × 2/12 = $35,000; $35,000 × ▪20%)	7,000	27,000
Net disadvantage of closing the plant		$(15,000)

*$32.00 – ($10.00 + $4.50 + $2.30 + $1.20) = $14.00

Some students will take a longer approach such as that shown below:

	Continue to Operate	*Close the Plant*
Sales (3,000 units × $32 per unit)	$ 96,000	$ 0
Variable expenses (3,000 units × $18 per unit)	54,000	0
Contribution margin	42,000	0
Fixed expenses:		
Fixed manufacturing overhead cost:		
$300,000 × 2/12	50,000	
$300,000 × 2/12 × 60%		30,000
Fixed selling expense:		
$210,000 × 2/12	35,000	
$210,000 × 2/12 × 80%		28,000
Total fixed expenses	85,000	58,000
Net operating income (loss)	$(43,000)	$(58,000)

Problem 14-23 (continued)

5. The relevant costs are those that can be avoided by purchasing from the outside manufacturer. These costs are:

Variable manufacturing costs	$16.80
Fixed manufacturing overhead cost ($300,000 × 75% = $225,000; $225,000 ÷ 60,000 units)	3.75
Variable selling expense ($1.20 × 1/3)	0.40
Total costs avoided	$20.95

To be acceptable, the outside manufacturer's quotation must be *less* than $20.95 per unit.