Chapter 2
Cost Terms, Concepts, and Classifications

Solution to Discussion Case

Possible reasons for disagreeing with the statement:

- Distinguishing between product and period costs will still be important, even for small single-product companies. For companies in competitive markets knowing product costs will help them manage profitability more successfully. Knowing product costs is also important for companies that are able to set their own prices as it will provide an indication of the price needed to cover the costs of production.
- Understanding how costs behave (variable versus fixed) is still important even for small companies as it will help them predict how costs will change in response to changes in activity levels. This knowledge will be helpful when developing budgets (more on this in chapter 9), which based on the authors' research, is a tool used by a large majority of companies, small and large.
- Understanding concepts such as opportunity costs and sunk costs is still important in smaller companies because they will still arise. For example a company that devotes its production equipment to producing one product is still incurring an opportunity cost that is equal to the benefits that would arise from using the invested capital in something else. Periodically owners of small companies should still evaluate whether the benefits of the status quo exceed the opportunity costs being incurred related to the next best alternative for using the company's resources. Sunk costs also arise in small companies and should be ignored.

Possible reasons for agreeing with the statement:

- Students who agree will likely take the view that, as per the question wording, many of the concepts in Chapter 2 take on more importance as the complexity of operations increases. For example, understanding product versus period costs is arguably more important in a multi-product setting where managers have to allocate resources across multiple products in an effort to maximize profitability.

Solutions to Questions

2-1 No. Only costs related to operating the production facilities are included as manufacturing overhead. Costs related to the administrative building would be an administrative expense.

2-2

a. Direct materials are an integral part of a finished product and their costs can be conveniently traced to it.

b. Indirect materials are generally small items of material such as glue and nails. They may be an integral part of a finished product but their costs can be traced to the product only at great cost or inconvenience. Indirect materials are ordinarily classified as manufacturing overhead.

c. Direct labour includes those labour costs that can be easily traced to individual units of products. Direct labour is also called "touch labour."

d. Indirect labour includes the labour costs of janitors, supervisors, materials handlers, and other factory workers that cannot be conveniently traced directly to particular products. These labour costs are incurred to support production, but the workers involved do not directly work on the product.

e. Manufacturing overhead includes all manufacturing costs except direct materials and direct labour.

2-3 Not always. Product costs are expensed in the same period in which the related products are sold. For example, if product costs were incurred in December but the products weren't sold until January, the costs would not be expensed as part of cost of goods sold until January. In this example, the product costs would be included on the December balance sheet as finished goods inventory.

2-4 Administrative costs are those costs with the general management of the company such as accounting, legal, human resources, executive compensation, etc. They are always treated as period costs on the income statement. As a result, they are expensed in the period incurred.

2-5 Raw materials inventory includes direct and indirect materials that have not yet been placed into production. Conversely work in process inventory includes costs related to direct and indirect materials, direct and indirect labour and overhead that have been placed into production but the goods are not yet complete.

Both raw materials and work in process inventories are included on the balance sheet. Only when goods are finished and sold do the associated costs get transferred from the balance sheet inventory account(s) to cost of goods sold on the income statement.

2-6 Prime costs consist of direct materials and direct labour. Conversion costs consist of manufacturing overhead and direct labour.

2-7 Total manufacturing costs are the total costs of direct materials, direct labour and manufacturing overhead incurred in the current period for products that are both complete and partially complete at the end of the period. Cost of goods manufactured represents the direct materials, direct labour and manufacturing overhead costs for goods completed during the period. Cost of goods manufactured = Total manufacturing costs + beginning WIP – ending WIP.

2-8 Yes, costs such as salaries and depreciation can end up as assets on the balance sheet if these are manufacturing costs. Manufacturing costs are inventoried until the associated finished goods are sold. Thus, if some units are still in inventory, such costs may be part of either Work in Process inventory or Finished Goods inventory at the end of a period.

2-9 Wages are a mixed cost for this company since it contains both a fixed portion (weekly salary based on 40 hours) and a variable portion based on overtime hours at $20 per hour.

2-10 As activity levels increase, variable costs per unit do not change within the relevant range. However, as activity levels increase, fixed costs per unit decrease. This decrease happens because total fixed costs remain unchanged (the numerator in the calculation of fixed costs per unit) even though the activity levels are increasing (the denominator in the calculation of fixed costs per unit).

2-11 The relevant range is the range of activity within which assumptions about variable and fixed costs are valid. The relevant range is important when predicting costs because cost behaviour may change when activity levels are well below or well above the normal range of activity. For example, if the relevant range of production activity is 10,000 to 20,000 units and next year, 30,000 units of production are expected, both variable and fixed costs may change. Fixed costs will likely increase as the result of needing to expand production capacity; depreciation, insurance, rent, taxes and so on will rise. Variable costs per unit may also change as production volume increases to 30,000 units. Buying raw materials in larger quantities may drive down unit costs but hiring additional employees could result in higher hourly wages if there is a shortage of available labour. Thus, managers will have to estimate the effects of production exceeding the relevant range on both variable and fixed cost behaviour.

2-12 Manufacturing overhead is an indirect cost since these costs cannot be easily and conveniently traced to particular units of products.

2-13 No. The original cost of the existing machine is a sunk cost that is not relevant to the decision as to whether the new machine should be purchased. The original cost has already been incurred and cannot be undone at this point. Thus it is irrelevant for decision-making purposes.

2-14 No; differential costs can be either variable or fixed. For example, the alternatives might consist of purchasing one machine rather than another to make a product. The difference in the fixed costs of purchasing the two machines would be a differential cost.

2-15 Typically when overtime can be isolated to a particular job or product, it should be treated as direct labour rather than included as overhead and charged to all jobs and products. The rationale is that treating it as direct labour results in a more accurate picture of the total cost of completing jobs on a rush-order basis.

2-16 It is possible if the company had $100,000 in beginning finished goods inventory and sold it all during the period, but did not complete the production of any new units.

Foundational Exercises

1. Direct materials	$ 6.00	
Direct labor	3.50	
Variable manufacturing overhead	1.50	
Variable manufacturing cost per unit	$11.00	
Variable manufacturing cost per unit (a)	$11.00	
Number of units produced (b)	10,000	
Total variable manufacturing cost (a) × (b)		$110,000
Average fixed manufacturing overhead per unit (c)	$4.00	
Number of units produced (d)	10,000	
Total fixed manufacturing cost (c) × (d)		40,000
Total product (manufacturing) cost		$150,000

Note: The average fixed manufacturing overhead cost per unit of $4.00 is valid for only one level of activity—10,000 units produced.

2. Sales commissions	$1.00	
Variable administrative expense	0.50	
Variable selling and administrative per unit	$1.50	
Variable selling and admin. per unit (a)	$1.50	
Number of units sold (b)	10,000	
Total variable selling and admin. expense (a) × (b)		$15,000
Average fixed selling and administrative expense per unit ($3 fixed selling + $2 fixed admin.) (c)	$5.00	
Number of units sold (d)	10,000	
Total fixed selling and administrative expense (c) × (d)		50,000
Total period (nonmanufacturing) cost		$65,000

Note: The average fixed selling and administrative expense per unit of $5.00 is valid for only one level of activity—10,000 units sold.

Foundational Exercises (continued)

3.	Direct materials	$ 6.00
	Direct labor	3.50
	Variable manufacturing overhead	1.50
	Sales commissions	1.00
	Variable administrative expense	0.50
	Variable cost per unit sold	$12.50
4.	Direct materials	$ 6.00
	Direct labor	3.50
	Variable manufacturing overhead	1.50
	Sales commissions	1.00
	Variable administrative expense	0.50
	Variable cost per unit sold	$12.50
5.	Variable cost per unit sold (a)	$12.50
	Number of units sold (b)	8,000
	Total variable costs (a) × (b)	$100,000
6.	Variable cost per unit sold (a)	$12.50
	Number of units sold (b)	12,500
	Total variable costs (a) × (b)	$156,250
7.	Total fixed manufacturing cost (see requirement 1) (a)	$40,000
	Number of units produced (b)	8,000
	Average fixed manufacturing cost per unit produced (a) ÷ (b)	$5.00
8.	Total fixed manufacturing cost (see requirement 1) (a)	$40,000
	Number of units produced (b)	12,500
	Average fixed manufacturing cost per unit produced (a) ÷ (b)	$3.20
9.	Total fixed manufacturing cost (see requirement 1)	$40,000

Foundational Exercises (continued)

10. Total fixed manufacturing cost (see requirement 1)	$40,000	
11. Variable overhead per unit (a)	$1.50	
Number of units produced (b)	8,000	
Total variable overhead cost (a) × (b)		$12,000
Total fixed overhead (see requirement 1)		40,000
Total manufacturing overhead cost		$52,000
Total manufacturing overhead cost (a)		$52,000
Number of units produced (b)		8,000
Manufacturing overhead per unit (a) ÷ (b)		$6.50
12. Variable overhead per unit (a)	$1.50	
Number of units produced (b)	12,500	
Total variable overhead cost (a) × (b)		$18,750
Total fixed overhead (see requirement 1)		40,000
Total manufacturing overhead cost		$58,750
Total manufacturing overhead cost (a)		$58,750
Number of units produced (b)		12,500
Manufacturing overhead per unit (a) ÷ (b)		$4.70

Foundational Exercises (continued)

13. Direct materials per unit	$6.00	
Direct labor per unit	3.50	
Direct manufacturing cost per unit (a)	$9.50	
Number of units produced (b)	11,000	
Total direct manufacturing cost (a) × (b)	$104,500	
Variable overhead per unit (a)	$1.50	
Number of units produced (b)	11,000	
Total variable overhead cost (a) × (b)		$16,500
Total fixed overhead (see requirement 1)		40,000
Total indirect manufacturing cost		$56,500

14. Direct materials per unit	$6.00	
Direct labor per unit	3.50	
Variable manufacturing overhead per unit	1.50	
Incremental cost per unit produced	$11.00	

Note: Variable selling and administrative expenses are variable with respect to the number of units sold, not the number of units produced.

Exercise 2-1 (15 minutes)

1. Manufacturing overhead cost.

2. Administrative and marketing and selling costs. The rent would be allocated based on the amount of space in the building used by the administrative (accounting, human resources) and marketing and selling activities.

3. Direct labour cost.

4. Manufacturing overhead cost. Because the cost of glue would likely be very low per speaker, it would be considered an indirect material and thus included with manufacturing overhead.

5. Marketing and selling cost.

6. Administrative cost.

7. Manufacturing overhead.

8. Direct material cost.

9. Marketing and selling cost.

10. Administrative cost.

Exercise 2-2 (15 minutes)

		Product (Inventoriable) Cost	*Period Cost*
1.	Depreciation on salespersons' cars		X
2.	Rent on equipment used in the factory	X	
3.	Lubricants used for machine maintenance	X	
4.	Salaries of personnel who work in the finished goods warehouse		X
5.	Soap and paper towels used by factory workers at the end of a shift	X	
6.	Factory supervisors' salaries	X	
7.	Heat, water, and power consumed in the factory	X	
8.	Materials used for boxing products for shipment overseas (units are not normally boxed)		X
9.	Advertising costs		X
10.	Workers' compensation insurance for factory employees	X	
11.	Depreciation on chairs and tables in the factory lunchroom	X	
12.	The wages of the receptionist in the administrative offices		X
13.	Cost of leasing the corporate jet used by the company's executives		X
14.	The cost of renting rooms at a British Columbia resort for the annual sales conference		X
15.	The cost of packaging the company's product	X	

Exercise 2-3 (15 minutes)

Home Entertainment
Income Statement
For the month ended xxx

Sales		$150,000
Cost of goods sold:		
Beginning merchandise inventory	$ 12,000	
Add: Purchases	90,000	
Goods available for sale	102,000	
Deduct: Ending merchandise inventory	22,000	80,000
Gross margin		70,000
Selling and administrative expenses:		
Selling expense	40,000	
Administrative expense	25,000	65,000
Operating income		$ 5,000

Exercise 2-4 (15 minutes)

1.

Classic Sound
Schedule of Cost of Goods Manufactured
For the quarter ended xxx

Direct materials:		
Beginning raw materials inventory.....	$ 0	
Add: Purchases of raw materials	50,000	
Raw materials available for use	50,000	
Deduct: Ending raw materials inventory....	25,000	
Raw materials used in production.....		$ 25,000
Direct labour		40,000
Manufacturing overhead.....		30,000
Total manufacturing costs		95,000
Add: Beginning work in process inventory....		0
		95,000
Deduct: Ending work in process inventory ...		5,000
Cost of goods manufactured.....		$90,000

2. Items likely included in manufacturing overhead:

- Rent for the production facility
- Depreciation on the production equipment
- Insurance on the production equipment
- Indirect materials used in producing records
- Indirect labour related to the CEO's supervision of the production process (20% of her time).

Exercise 2-5 (30 minutes)

1. Per unit amounts:

Item			
Variable expenses:	Amount	July Activity	Per Unit
Direct materials	$200,000	1,000	$200
Direct labour	$30,000	1,000	$30
Indirect materials	$10,000	1,000	$10
Fixed expenses:			
Installation supervisor's wages	$4,000	1,000	$4
Installation scheduler's wages	$2,000	1,000	$2
Warehouse expenses	$5,000	1,000	$5

2. a & b

Item	(1)	(2)	(3)	(3) ÷ (1)
Variable expenses:	August Activity	July Per Unit	August Total Cost	August Per Unit
Direct materials	1,200	$200	$240,000	$200
Direct labour	1,200	$30	$36,000	$30
Indirect materials	1,200	$10	$12,000	$10
Fixed expenses:				
Installation supervisor's wages	1,200	n/a	$4,000	$3.33
Installation scheduler's wages	1,200	n/a	$2,000	$1.67
Warehouse expenses	1,200	n/a	$5,000	$4.17

- Variable expenses per unit do not change within the relevant range of activity so the July and August amounts should not differ.
- Fixed expenses per unit decrease in August because the total fixed expenses are being spread over a higher activity base (1,200 installations versus 1,000).

Exercise 2-5 continued

3. Factors that could cause variable costs per unit to change when activity levels fall outside the relevant range:

    - Direct material costs per unit could decrease if quantity discounts are received from the manufacturer for larger order quantities.
    - Direct material costs could increase if quantity discounts currently being received are lost if order quantities decrease significantly.
    - Direct labour costs per unit could increase if activity levels increase and installations have to be completed using more expensive overtime hours.
    - Direct labour costs per unit could increase if activity levels decrease and less experienced, and lower paid, installers are laid off.
    - Direct labour costs per unit could decrease as the number of installations increases due to the effects of learning (i.e., the time required for each installation may decrease with experience).

Note: requirement three may be a stretch for many students given that the factors affecting cost behaviour outside the relevant range are not discussed in detail in Chapter 2. Accordingly, providing some hints to generate ideas may be warranted.

Exercise 2-6 (15 minutes)

	Cost	*Cost Object*	*Direct Cost*	*Indirect Cost*
1.	The wages of pediatric nurses	The pediatric department	X	
2.	Prescription drugs	A particular patient	X	
3.	Heating the hospital	The pediatric department		X
4.	The salary of the head of pediatrics	The pediatric department	X	
5.	The salary of the head of pediatrics	A particular pediatric patient		X
6.	Hospital chaplain's salary	A particular patient		X
7.	Lab tests by outside contractor	A particular patient	X	
8.	Lab tests by outside contractor	A particular department	X	

Exercise 2-7 (15 minutes)

	Item	*Differential Revenue*	*Differential Cost*	*Opportunity Cost*	*Sunk Cost*
Ex.	Cost of electricity for the warehouse .		X		
1.	Sublet revenue for the new warehouse	X			
2.	Lease payments for the new warehouse		X		
3.	Net book value of the existing warehouse				X
4.	Sales proceeds from selling the existing warehouse	X			
5.	Warehouse maintenance costs.....		X		
6.	Warehouse staff wages.....		X		
7.	Paving costs for the parking lot at existing warehouse ...				X
8.	Parking lot revenues for existing warehouse*	X		X	

*The revenue foregone by moving to the new warehouse can be considered either differential revenue or an opportunity cost.

Exercise 2-8 (15 minutes)

Opportunity versus Sunk Costs:

Opportunity Costs
The $1,000,000 offered for the building, land and equipment is an opportunity cost since it represents a benefit that the company would give up if it continues to manufacture the product.

The $20,000 is also an opportunity cost since it represents another benefit that the company would have to forego if it continues to manufacture the product.

Sunk Costs The original cost of the land ($500,000), building ($1,500,000), and manufacturing equipment ($300,000), the net book value of the building ($1,375,000) and equipment ($150,000), and the insurance and taxes recently paid on the building ($30,000), are all sunk costs. In each case they have already been incurred and there is nothing management can do at this point to change that fact. Note: students could argue that some portion of the insurance and taxes may be recoverable if the building is sold and thus are not sunk cost.

Exercise 2-9 (30 minutes)

1. a. Discs purchased	1,000
Discs drawn from inventory	200
Discs remaining in inventory	800
Cost per disc	× $2
Cost in Raw Materials Inventory at February	$1,600
b. Discs used in production (200-20)	180
Units completed and transferred to Finished Goods (75% × 180)	135
Units still in Work in Process at February 28	45
Cost per disc	× $2
Cost in Work in Process Inventory at February 28	$ 90
c. Units completed and transferred to Finished Goods (above)	135
Units sold during the month (60% × 135)	81
Units still in Finished Goods at February 28	54
Cost per disc	× $2
Cost in Finished Goods Inventory at May 31	$108
d. Units sold during the month (above)	81
Cost per disc	× $2
Cost in Cost of Goods Sold at February 28	$162
e. Discs used in advertising	20
Cost per disc	× $2
Cost in Advertising Expense for February	$ 40

2. Raw Materials Inventory—balance sheet	$1,600	
Work in Process Inventory—balance sheet	90	
Finished Goods Inventory—balance sheet	108	
Cost of Goods Sold—income statement	162	
Advertising Expense—income statement	40	
	$2,000	

Note: the $2,000 above reconciles to the total amount spent on the discs in February: 1,000 x $2 per unit = $2,000.

Exercise 2-10 (30 minutes)

1.

Tiessen Limited
Schedule of Cost of Goods Manufactured
For the year ended December 31

Direct materials:		
Raw materials inventory, beginning	$ 24,000	
Add: Purchases of raw materials	396,000	
Raw materials available for use	420,000	
Deduct: Raw materials inventory, ending	30,000	
Raw materials used in production		$390,000
Direct labour		270,000
Manufacturing overhead:		
Rent, manufacturing building	$ 240,000	
Indirect labour	168,900	
Utilities, manufacturing	27,000	
Depreciation, manufacturing equipment	72,000	
Supplies, manufacturing	2,100	
Repairs, manufacturing equipment	120,000	
Total manufacturing overhead costs		630,000
Total manufacturing costs		1,290,000
Add: Work in process, beginning		15,000
		1,305,000
Deduct: Work in process, ending		60,000
Cost of goods manufactured		$1,245,000

2. The cost of goods sold section would be:

Finished goods inventory, beginning	$ 210,000
Add: Cost of goods manufactured	1,245,000
Goods available for sale	1,455,000
Deduct: Finished goods inventory, ending	75,000
Cost of goods sold	$1,380,000

Exercise 2-11 (15 minutes)

	Cost Item	*Cost Behaviour* — *Variable*	*Cost Behaviour* — *Fixed*	*Selling and Administrative Cost*	*Product Cost*
1.	The costs of turn signal switches used at a General Motors plant.....	X			X
2.	Salary of production manager at Blackberry		X		X
3.	Salesperson's commissions at Avon Products	X		X	
4.	Insurance on one of Bombardier's factory buildings.....		X		X
5.	The costs of shipping brass fittings to customers in California.....	X		X	
6.	Depreciation on the bookshelves at Reston Bookstore.....		X	X	
7.	The costs of X-ray film at the Toronto General's radiology lab.....	X			X
8.	The cost of leasing a toll-free telephone number at Staples Canada		X	X	
9.	The depreciation on the playground equipment at a McDonald's outlet		X	X	
10.	The cost of the mozzarella cheese used at a Pizza Hut outlet.....	X			X

Exercise 2-12 (15 minutes)

1. Direct labour cost: 48 hours × $24 per hour $1152
   Manufacturing overhead cost: 8 hours × $12 per hour 96
   Total wages earned $1248

2. Had the overtime been incurred to meet a rush order for a particular client then all of the wages ($1248) would have been treated as a direct labour.

3. Direct labour cost: 35 hours × $24 per hour $ 840
   Manufacturing overhead cost: 5 hours × $24 per hour 120
   Total wages earned $ 960

Problem 2-13 (30 minutes)

1. a-e

Item	Behaviour	Type	Direct/ Indirect
Leather used for the bicycle seats	Variable	Manufacturing	Direct
Production manager's salary	Fixed	Manufacturing	Indirect
Life insurance for the company president		Administrative	
Electricity used in the production facilities*	Variable/fixed	Manufacturing	Indirect
Sales commissions		Selling	
Internet advertising		Selling	
Employee benefits for the production workers	Variable	Manufacturing	Indirect
Property taxes on the production facilities	Fixed	Manufacturing	Indirect
Shipping costs		Administrative	
Salary of the chief financial officer		Administrative	

*There is a fixed and variable component to this cost. The base charge of $100 represents a fixed cost with the remainder varying with the level of production activity.

Problem 2-13 continued

2. Unit costs for variable manufacturing expenses based on November (October) amounts:

Leather used in seats: $30,000 ($27,000) ÷ 1,000 (900) = $30/bike
Electricity: $1,000* ($900*) ÷ 1,000 (900) = $1/bike
Employee benefits: $20,000 ($18,000) ÷ 1,000 (900) = $20/bike

*$1,100 ($1,000) - $100 basic charge = $1,000 ($900).

December manufacturing costs:

Item	Per unit Amount	Activity	Cost
Leather in seats (variable)	$30	1,200	$36,000
Electricity (variable)	$1	1,200	$1,200
Employee benefits (variable)	$20	1,200	$24,000
Production manager's salary (fixed)	n/a	1,200	$6,000
Electricity (fixed)	n/a	1,200	$100
Property taxes (fixed)	n/a	1,200	$1,000

Problem 2-14 (30 minutes)

1. Total wages for the week:

Regular time: 40 hours × $30 per hour		$ 1,200
Overtime: 10 hours × $45 per hour		450
Total wages		$1,650
Allocation of total wages:		
Direct labour: 50 hours × $30 per hour		$1,500
Manufacturing overhead: 10 hours × $15 per hour		150
Total wages		$1,650

2. Total wages for the week:

Regular time: 40 hours × $30 per hour		$ 1,200
Overtime: 5 hours × $45 per hour		225
Total wages		$1,425
Allocation of total wages:		
Direct labour: 42 hours × $30 per hour		$1,260
Manufacturing overhead:		
Idle time: 3 hours × $30 per hour	$ 90	
Overtime premium: 5 hours × $15 per hour	75	165
Total wages		$1,425

3. Total wages and employee benefits for the week:

Regular time: 40 hours × $30 per hour		$ 1,200
Overtime: 12 hours × $45 per hour		540
Fringe benefits: 52 hours × $9 per hour		468
Total wages and fringe benefits		$2,208
Allocation of wages and employee benefits:		
Direct labour: 46 hours × $30 per hour		$1,380
Manufacturing overhead:		
Idle time: 6 hours × $30 per hour	$ 180	
Overtime premium: 12 hours × $15 per hour	180	
Employee benefits: 52 hours × $9 per hour	468	828
Total wages and employee benefits		$2,208

Problem 2-14 (continued)

4. Allocation of wages and employee benefits:

Direct labour:		
Wage cost: 46 hours × $30 per hour	$1,380	
Employee benefits: 46 hours × $9 per hour	414	$1,794
Manufacturing overhead:		
Idle time: 6 hours × $30 per hour	180	
Overtime premium: 12 hours × $15 per hour	180	
Employee benefits: 6 hours × $9 per hour	54	414
Total wages and employee benefits		$2,208

Problem 2-15 (30 minutes)

Name of the Cost	*Variable Cost*	*Fixed Cost*	*Product Cost*			*Period (Selling and Admin.) Cost*	*Opportunity Cost*	*Sunk Cost*
			Direct Materials	*Direct Labour*	*Mfg. Overhead*			
Rental revenue forgone, $35,000 per year							X	
Direct materials cost, $50 per unit	X		X					
Supervisor's salary, $3,000 per month		X			X			
Direct labour cost, $22 per unit	X			X				
Rental cost of warehouse, $1,500 per month		X				X		
Rental cost of equipment, $2,200 per month		X			X			
Depreciation of the building, $7,000 per year		X			X			X
Advertising cost, $28,000 per year		X				X		
Shipping cost, $7 per unit	X					X		
Electrical costs, $4 per unit	X				X			
Return earned on investments, $5,000 per year							X	

Problem 2-16 (20 minutes)

Note to the Instructor: Some of the answers below are debatable.

Cost Item	*Variable or Fixed*	*Selling Cost*	*Administrative Cost*	*Product Cost*	
				Direct	*Indirect*
1. Depreciation, executive jet	F		X		
2. Costs of shipping finished goods to customers	V	X			
3. Wood used in manufacturing furniture	V			X	
4. Sales manager's salary	F	X			
5. Electricity used in manufacturing furniture	V				X
6. Salary of secretary to the company president	F		X		
7. Aerosol attachment placed on a spray can produced by the company	V			X	
8. Billing costs	V	X*			
9. Packing supplies for shipping products overseas	V	X			
10. Sand used in manufacturing concrete	V			X	
11. Supervisor's salary, factory	F				X
12. Executive life insurance	F		X		
13. Sales commissions	V	X			
14. Employee benefits, assembly line workers	V			X**	
15. Advertising costs	F	X			
16. Property taxes on finished goods warehouses	F	X			
17. Lubricants for production equipment	V				X

*Could be an administrative cost.

**Could be an indirect cost.

Problem 2-17 (60 minutes)

1.

Precious Production
Schedule of Cost of Goods Manufactured
For the quarter ended xxxx

Direct materials:		
Raw materials inventory, beginning	$ 40,000	
Add: Purchases of raw materials	360,000	
Raw materials available for use	400,000	
Deduct: Raw materials inventory, ending	68,000	
Raw materials used in production		$ 332,000
Direct labour		240,000
Manufacturing overhead:		
Depreciation, factory	168,000	
Insurance, factory	20,000	
Maintenance, factory	120,000	
Utilities, factory	108,000	
Supplies, factory	4,000	
Indirect labour	260,000	
Total overhead costs		680,000
Total manufacturing costs		1,252,000
Add: Work in process inventory, beginning		28,000
		1,280,000
Deduct: Work in process inventory, ending		120,000
Cost of goods manufactured		$1,160,000

Problem 2-17 (continued)

2.

Precious Production Limited
Income Statement
For the quarter ended xxxx

Sales		$1,800,000
Cost of goods sold:		
Finished goods inventory, beginning	$ 40,000	
Add: Cost of goods manufactured	1,160,000	
Goods available for sale	1,200,000	
Deduct: Finished goods inventory, ending	160,000	1,040,000
Gross margin		760,000
Selling and administrative expenses:		
Selling expenses	320,000	
Administrative expenses	280,000	600,000
Operating income		$ 160,000

3. Direct labour: $240,000 ÷ 10,000 units = $24.00 per unit.
   Insurance: $20,000 ÷ 10,000 units = $2.00 per unit.

4. Direct materials:
   Unit cost: 332,000/10000=
$33.20
   Total cost: 12,000 units × $33.20 per unit = $398,400.
   Insurance:
   Unit cost: $20,000 ÷ 12,000 units = $1.67 per unit (rounded).
   Total cost: $20,000 (unchanged)

5. Unit cost for insurance dropped from $2.00 to $1.67, because of the increase in production between the two years. Since fixed costs do not change *in total* as the activity level changes, they will decrease on a unit basis as the activity level rises.

6. If the company produced 20,000 units then the following costs would appear in inventory:

Direct materials ($332,000/20,000)*4,000 units	= $ 66,400
Direct labour ($240,000/20,000)* 4,000 units	= 48,000
Manufacturing overhead ($680,000/20,000) * 4,000 units	= 136,000

Total	$ 250,400

Problem 2-18 (15 minutes)

1. The controller is correct that the salary cost should be classified as a selling (marketing) cost. The duties described in the problem have nothing to do with manufacturing the product, but rather deal with order-taking and shipping finished goods to customers. As stated in the text, selling costs include all costs necessary to secure customer orders and get the finished product into the hands of customers.

2. No, the president is not correct; how the salary cost is classified can affect the reported operating income for the year. If the salary cost is classified as a selling expense all of it will appear on the income statement as a period cost. However, if the salary cost is classified as a manufacturing (product) cost, then it will be added to Work in Process Inventory along with other manufacturing costs for the period. To the extent that goods are still in process at the end of the period, part of the salary cost will remain with these goods in the Work in Process Inventory account. Only that portion of the salary cost that has been assigned to finished units will leave the Work in Process Inventory account and be transferred into the Finished Goods Inventory account. In like manner, to the extent that goods are unsold at the end of the period, part of the salary cost will remain with these goods in the Finished Goods Inventory account. Only that portion of the salary that has been assigned to finished units *that are sold during the period* will appear on the income statement as an expense (part of Cost of Goods Sold) for the period.

Problem 2-19 (30 minutes)

1.						Period		
			Product Cost					
Name of the Cost	*Variable Cost*	*Fixed Cost*	*Direct Materials*	*Direct Labour*	*Mfg. Overhead*	*(Selling and Admin.) Cost*	*Opportunity Cost*	*Sunk Cost*
Todd's present salary of $2,000 per month		X					X	
Rent on the production building, $1,500 per month		X			X			
Rent of production equipment, $550 per month		X			X			
Materials for producing brooms, at $11.50 each	X		X					
Labour cost of producing brooms, at $4.25 each	X			X				
Rent of room for a sales office, $250 per month		X				X		
Voice mail, $5 per month		X				X		
Interest lost on savings account, $1,100 per year							X	
Advertising cost, $450 per month		X				X		
Sales commission, at $0.80 per broom	X					X		
Legal and filing fees, $1,500		X				X		X

Problem 2-19 (continued)

2. The $1,500 legal and filing fees are not a differential cost. These legal and filing fees have already been paid and are a sunk cost. Sunk costs are never differential costs. Thus, the cost will not differ depending on whether Todd decides to produce
brooms or to stay with the janitorial service. All other costs listed above are differential costs since they will be incurred only if Todd leaves the janitorial service and produces the brooms.

Problem 2-20 (45 minutes)

1.

Cost Item	*Cost Behavior*		*Selling or Administrative*	*Product Cost*	
	Variable	*Fixed*	*Cost*	*Direct*	*Indirect*
Direct labour	$118,000			$118,000	
Advertising		$50,000	$50,000		
Factory supervision		40,000			$40,000
Property taxes, factory building		3,500			3,500
Sales commissions	80,000		80,000		
Insurance, factory		2,500			2,500
Depreciation, administrative office equipment		4,000	4,000		
Lease cost, factory equipment		12,000			12,000
Indirect materials, factory	6,000				6,000
Depreciation, factory building		10,000			10,000
Administrative office supplies	3,000		3,000		
Direct materials used	94,000			94,000	
Utilities, factory	20,000				20,000
Total costs	$321,000	$122000	$137000	$212,000	$94,000

Problem 2-20 (continued)

2. Only the product costs will be included in the cost of a patio set. The cost per set will be:

Direct product costs.....	$212,000
Indirect product costs	94,000
Total product costs	$306,000

$306,000 ÷ 2,000 sets = $153 per set

3. The cost per set would increase. This is because the fixed costs would be spread over fewer units, causing the cost per unit to rise.

4. a. Yes, there probably would be a disagreement. The president is likely to want a price of at least $153, which is the average cost per unit to manufacture 2,000 patio sets. He may expect an even higher price than this to cover a portion of the administrative costs as well. His sister will probably be thinking of cost as including only materials used, or perhaps materials and direct labour.

   b. The term is opportunity cost. Since the company is operating at full capacity, the president must give up the full, regular price of a set to sell a patio set to his sister. Therefore, the president's cost is really the full, regular price of a set.

Problem 2-21 (15 minutes)

Item	*Description*	*Direct or Indirect Cost of the Meals-On-Wheels Program*		*Direct or Indirect Cost of Particular Seniors Served by the Meals-On-Wheels Program*		*Variable or Fixed with Respect to the Number of Seniors Served by the Meals-On-Wheels Program*	
		Direct	*Indirect*	*Direct*	*Indirect*	*Variable*	*Fixed*
a.	The cost of leasing the Meals-On-Wheels van.....	X			X		X
b.	The cost of incidental supplies such as salt, pepper, napkins, and so on	X			X*	X	
c.	The cost of gasoline consumed by the Meals-On-Wheels van	X			X	X	
d.	The rent on the facility that houses Madison Seniors Care Center, including the Meals-On-Wheels program		X		X*		X
e.	The salary of the part-time manager of the Meals-On-Wheels program	X			X		X
f.	Depreciation on the kitchen equipment used in the Meals-On-Wheels program	X			X		X
g.	The hourly wages of the caregiver who drives the van and delivers the meals.....	X		X		X	
h.	The costs of complying with health safety regulations in the kitchen	X			X		X
i.	The costs of mailing letters soliciting donations to the Meals-On-Wheels program	X			X		X

* These costs could be direct costs of serving particular seniors.

Problem 2-22 (60 minutes)

1.

Veekay Company
Schedule of Cost of Goods Manufactured
For the Month Ended June 30

Direct materials:		
Raw materials inventory, June 1	$ 19,000	
Add: Purchases of raw materials	209,000	
Raw materials available for use	228,000	
Deduct: Raw materials inventory, June 30	46,000	
Raw materials used in production		$182,000
Direct labour		99,000
Manufacturing overhead:		
Rent on facilities (85% × $40,000)	34,000	
Insurance (90% × $10,000)	9,000	
Utilities (80% × $55,000)	44,000	
Indirect labour	119,000	
Maintenance, factory	8,000	
Depreciation, factory equipment	13,000	
Total overhead costs		227,000
Total manufacturing costs		508,000
Add: Work in process inventory, June 1		77,000
		585,000
Deduct: Work in process inventory, June 30		94,000
Cost of goods manufactured		$491,000

Problem 2-22 (continued)

2.

Veekay Company
Income Statement
For the Month Ended June 30

Sales		$660,000
Cost of goods sold:		
Finished goods inventory, June 1	$ 22,000	
Add: Cost of goods manufactured	491,000	
Goods available for sale	513,000	
Deduct: Finished goods inventory, June 30	66,000	447,000
Gross margin		213,000
Selling and administrative expenses:		
Selling and administrative salaries	39,000	
Rent on facilities (15% × $40,000)	6,000	
Depreciation, sales equipment	11,000	
Insurance (10% × $10,000)	1,000	
Utilities (20% × $55,000)	11,000	
Advertising	88,000	156,000
Operating income		$ 57,000

Note: the $88,000 difference between the operating income shown above and the operating loss ($31,000) shown on the June income statement can be reconciled as follows:

Operating loss……..$ (31,000)
Less opening inventories…..(118,000) ($19,000 + $77,000 + $22,000)
Add closing inventories…….. 206,000 ($46,000 + $94,000 + $66,000)
Operating income…….$ 57,000

Problem 2-22 (continued)

3. In preparing the income statement shown in the text, the accountant failed to distinguish between product costs and period costs, and also failed to recognize the change in inventories between the beginning and end of the month. Once these errors have been corrected, the financial condition of the company looks much better and continuing operations appears more attractive.

Problem 2-23 (30 minutes)

1. Mr. Richart's first action was to direct that discretionary expenditures be delayed until the first of the new year. Providing that these "discretionary expenditures" can be delayed without hampering operations, this is a good business decision. By delaying expenditures, the company can keep its cash a bit longer and thereby earn a bit more interest. There is nothing unethical about such an action. The second action was to ask that the order for the parts be cancelled. Since the clerk's order was a mistake, there is nothing unethical about this action either.

   The third action was to ask the accounting department to delay recognition of the delivery until the bill is paid in January. This action is dubious. Asking the accounting department to ignore transactions strikes at the heart of the integrity of the accounting system. If the accounting system cannot be trusted, it is very difficult to run a business or obtain funds from outsiders. However, in Mr. Richart's defense, the purchase of the raw materials really shouldn't be recorded as an expense. He has been placed in an extremely awkward position because the company's accounting policy is flawed.

2. The company's accounting policy with respect to raw materials is incorrect. Raw materials should be recorded as an asset when delivered rather than as an expense. If the correct accounting policy were followed, there would be no reason for Mr. Richart to ask the accounting department to delay recognition of the delivery of the raw materials. This flawed accounting policy creates incentives for managers to delay deliveries of raw materials until after the end of the fiscal year. This could lead to raw materials shortages and poor relations with suppliers who would like to record *their* sales before the end of the year.

   The company's "manage-by-the-numbers" approach does not foster ethical behaviour—particularly when managers are told to "do anything so long as you hit the target profits for the year." Such "no excuses" pressure from the top too often leads to unethical behaviour when managers have difficulty meeting target profits.

Problem 2-24 (60 minutes)

1.

Carlton Manufacturing
Schedule of Cost of Goods Manufactured

Direct materials:				
Raw materials inventory, beginning	$ 25,000			
Add: Purchases of raw materials	130,000			
Raw materials available for use	155,000			
Deduct: Raw materials inventory, ending	20,000	*		
Raw materials used in production			$135,000	(given)
Direct labour			32,500	
Manufacturing overhead:				
Insurance, factory	4,000			
Rent, factory building	45,000	*		
Utilities, factory	26,000			
Indirect materials, factory	3,000			
Depreciation, factory equipment	55,000			
Maintenance, factory	37,000			
Total overhead costs			170,000	(given)
Total manufacturing costs			337,500	
Add: Work in process inventory, beginning			24,000	
			361,500	
Deduct: Work in process inventory, ending			16,500	*
Cost of goods manufactured			$345,000	**

** computed in Cost of Goods Sold section next page

Problem 2-24 (continued)

The cost of goods sold section of the income statement follows:

Finished goods inventory, beginning	$ 15,000	
Add: Cost of goods manufactured	345,000	*
Goods available for sale.....	360,000	(given)
Deduct: Finished goods inventory, ending	42,500	*
Cost of goods sold	$317,500	(given)

*These items must be computed by working backwards up through the statements. An effective way of doing this is to place the form and known balances on the paper, and then work toward the unknown figures.

2. Direct materials: $135,000 ÷ 15,000 units = $9.00 per unit.
   Rent, factory building: $45,000 ÷ 15,000 units = $3.00 per unit.

3. Direct materials:
   Per unit: $9.00 (unchanged)
   Total: 20,000 units × $9.00 per unit = $180,000.

   Rent, factory building:
   Per unit: $45,000 ÷ 20,000 units = $2.25 per unit.
   Total: $45,000 (unchanged).

4. The average cost per unit for rent dropped from $3.00 to $2.25, because of the increase in production between the two years. Since fixed costs do not change *in total* as the activity level changes, the *average* unit cost will decrease as the activity level rises.

Problem 2-25 (60 minutes)

	Case 1	Case 2	Case 3	Case 4
Direct materials	$ 5,600	$10,400	$ 6,600	$ 7,600
Direct labour	1,600	4,600	5,500*	2,900
Manufacturing overhead	8,000	13,800*	7,700	20,000
Total manufacturing costs	15,200*	28,800	19,800	30,500*
Beginning work in process inventory	2,400*	1,200	2,200	1,300*
Ending work in process inventory	(3,200)	(4,000)	(4,400) *	(1,900)
Cost of goods manufactured	$14,400	$26,000*	$17,600	$29,900
Sales	$20,000	$46,000	$33,000	$47,500
Beginning finished goods inventory	4,800	9,100*	7,700	8,600
Cost of goods manufactured	14,400	26,000*	17,600	29,900
Goods available for sale	19,200*	35,100*	25,300*	38,500*
Ending finished goods inventory	7,200	4,600	5,500*	6,700
Cost of goods sold	12,000*	30,500	19,800	31,800*
Gross margin	8,000*	15,500*	13,200*	15,700*
Selling and administrative expenses	4,800	9,200*	9,900*	9,500
Operating income	$ 3,200*	$ 6,300	$ 3,300	$ 6,200*

*Missing data in the problem.

Problem 2-26 (45 minutes)

1.

MITCHELL COMPANY

Schedule of Cost of Goods Manufactured
For the Year Ended December 31

Direct materials:		
Raw materials inventory, January 1	$ 90,000	
Add: Purchases of raw materials	750,000	
Raw materials available for use	840,000	
Deduct: Raw materials inventory, December 31	60,000	
Raw materials used in production		$ 780,000
Direct labour		150,000
Manufacturing overhead:		
Utilities, factory	36,000	
Depreciation, factory	162,000	
Insurance, factory	40,000	
Supplies, factory	15,000	
Indirect labour	300,000	
Maintenance, factory	87,000	
Total overhead costs		640,000
Total manufacturing costs		1,570,000
Add: Work in process inventory, January 1.		180,000
		1,750,000
Deduct: Work in process inventory, December 31		100,000
Cost of goods manufactured		$1,650,000

Problem 2-26 (continued)

2. The cost of goods sold would be computed as follows:

Finished goods inventory, January 1	$ 260,000
Add: Cost of goods manufactured	1,650,000
Goods available for sale	1,910,000
Deduct: Finished goods inventory, December 31	210,000
Cost of goods sold	$1,700,000

3.

MITCHELL COMPANY
Income Statement
For the Year Ended December 31

Sales		$2,500,000
Less cost of goods sold (above)		1,700,000
Gross margin		800,000
Less selling and administrative expenses:		
Selling expenses	$140,000	
Administrative expenses	270,000	
Total expenses		410,000
Operating income		$ 390,000

4. Ending finished good inventory:

Direct materials ($780,000/412,500 = $1.8909) $1.8909 × 55,176	$104,332
Direct labour ($150,000/412,500 = $0.3636) $0.3636 × 55,176	20,062*
Manufacturing overhead ($640,000/412,500 = $1.5515) $1.5515 × 55,176	85,606
Total cost	$210,000

*Rounding down is undertaken to account for unit cost rounding.

Problem 2-27 (30 minutes)

1.

	Keep Old Mowers	Lease New Mowers	Difference
Lease costs (2 x $200)	$0	$400	($400)
Lease administration fee	$0	$25	($ 25)
Oil change changes & blade sharpening (2 x $100)	$200	$0	$200
Foregone revenue	$0	$75	($75)
Salvage value – old mowers (2 x $40)	$0	$80	$80
Gas expense savings*	$0	$240	$360
Net difference			$140

*(2,400 x $1 x 7.5%) x 2 = $360

The above analysis shows that Lilly will be $140 better off by selling her old mowers and leasing the two new mowers for the fifth-year of operations. The biggest factor driving the advantage of leasing the mowers is the gas savings of $360. It would be worthwhile to point out to students that if Lilly's estimate of the efficiency gains is off by as little as 2.5% (i.e., only 5% savings are achieved) then the differential savings are only about $20.

2. Items excluded from the analysis and rationale:
   - Cost ($1,000) and net book value ($240) of existing mowers since these are sunk costs.
   - Wage increase of $1,200 for Lilly's brother since it does not differ under the keep versus replace alternatives.
   - Total repair costs of $300 per year as they are not estimated to differ under the two alternatives.
   - Total costs of $200 ($100 x 2) to replace the wheels and starter cords at the end of the fourth season since this is a sunk cost.
   - Additional revenue of $2,400 since it will not differ between the two alternatives.

Case 2-28 (30 minutes)

1. The error made by Ranton when calculating the 2018 expected operating income was to treat all expenses as if they were variable. This is incorrect since the case indicates that advertising and the salaries of the website administrator and the bookkeeper are fixed costs. By including these costs in the calculation of 2017 operating expenses on a per unit basis, Ranton is effectively treating them as if they will vary in direct proportion with unit activity. This will lead to an overstatement of the expected amount of these expenses because they will not increase proportionately with sales activity.

2. The expected results for 2018, along with the 2017 actual results for comparison, are shown below.

	Actual 2017	Expected 2018
Sales (units)	8,000	10,000
Sales	$800,000	$1,000,000
Cost of goods sold:	640,000	800,000
Gross margin	160,000	200,000
Operating expenses		
Advertising	8,000	8,000
Salaries	92,000	92,000
Commissions*	8,000	10,000
Total operating expenses	108,000	110,000
Operating income	$52,000	$90,000

The above shows that expected results for 2018 should have been $90,000. This assumes, as per the case, that advertising and salaries remain fixed at respectively, $8,000 and $92,000 per year. The only variable operating expense is the commission paid to the website designer/administrator based on 1% of total sales. Compared to the recalculated expected 2018 results, the actual operating income of $75,000 no longer looks as good since it is $15,000 below the anticipated level.

Case 2-28 (continued)

3. Comparison of expected and actual operating expenses in 2018:

Expected expenses (per part 2 above)	$110,000
Actual expenses	$125,000
Difference	$ 15,000

Assuming no mistakes were made by the bookkeeper in preparing the 2018 financial statements Ranton needs to focus on the only variable operating expense – sales commissions paid to the website designer. If salaries ($92,000) and advertising ($8,000) truly are both fixed costs and did not change in 2018, the $15,000 difference between expected and actual operating expenses must be attributable to an increase in the amount of commissions actually paid. Perhaps a mistake was made in calculating the amount of the sales commissions but Ranton will want to get an answer.

Case 2-29 (30 minutes)

1. Differential revenues:
   - The rental revenue that will be received from sub-letting 15% of the new warehouse.
   - Sales proceeds (less real estate commissions, legal fees, etc.) received from selling old warehouse.
   - Revenues from existing parking lot.

   Differential costs:
   - Monthly lease payments for the new warehouse.
   - Utility costs (expected to be lower at new warehouse).
   - Property taxes (none paid at new building).
   - Building insurance (none paid at new building).
   - Maintenance and repair costs (likely lower at new building).
   - Salary of current maintenance manager (won't be needed if PE moves to the new building).
   - Cost of maintaining the existing parking lot.

   Note: some students may want to also include the inventory insurance costs and the security personnel costs as differential costs. However, the facts of the case indicate that Reg does not believe these costs will change if the new warehouse is rented. As a result, these are not differential costs.

2. An opportunity cost is a potential benefit given up when one alternative is chosen over another. If PE sells the old warehouse they will incur an opportunity cost equal to the operating income currently being earned on the small parking lot set up on one corner of the property.

3. The depreciation expense represents a sunk cost because it represents the allocation to reporting periods of the original depreciable cost of the old warehouse. It should not be considered in deciding whether to lease the new warehouse. Because that original cost cannot be changed it is a sunk cost, and thus so too is the depreciation of that original cost.