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Cost Behavior and Cost Estimation

Learning Objectives

1. Identify basic cost behavior patterns and explain how changes in activity level affect total cost and unit cost. (Unit 2.1)
2. Estimate a cost equation from a set of cost data and predict future total cost from that equation. (Unit 2.2)
3. Prepare a contribution format income statement. (Unit 2.3)

Summary of End of Chapter Material

Difficulty: E = Easy, M = Moderate, D = Difficult
Bloom: K = Knowledge, C = Comprehension, AP = Application, AN = Analysis, S = Synthesis, E = Evaluation
AACSB: A = Analytic, C = Communication, E = Ethics
AICPA FN: DM = Decision modeling, RA = Risk Analysis, M = Measurement, R = Reporting, RS = Research, T = Technology
AICPA PC: C = Communication, I = Interaction, L = Leadership, P = Professional demeanor, PM = Project Management, PS = Problem Solving and Decision Making, T = Technology
IMA: BA = Business applications, BP = Budget Preparation, CM = Cost Management, DA = Decision Analysis, PM = Performance Measurement, R = Reporting, SP = Strategic Planning

Item	L. O.	Difficulty Level	Minutes to Complete	Bloom's Taxonomy	AACSB	AICPA FN	AICPA PC	IMA	Ethics Coverage
GUIDED UNIT PREPARATION									
Unit 2.1									
1	1	M	2	C	A	R	C	CM	
2	1	M	4	C, K	A	R	C	CM	
3	1	M	3	C, K	A	R	C	CM	
4	1	E	2	C	A	R	C	CM	
5	1	M	4	C, K	A	R	C	CM	
6	1	M	4	C, K	A	R	C	CM	
Unit 2.2									
1	2	E	1	K	A	M	PS	CM	
2	2	M	2	C	A	M	PS	CM	
3	2	M	4	K	A	M	PS	CM	
4	2	E	2	C	A	M	PS	CM	
5	2	M	4	C	A	M	PS	CM	
Unit 2.3									
1	3	E	1	K	A	M	PS	CM	
2	3	E	2	K	A	M	PS	CM	
3	3	D	3	C	A	M	PS	CM	
4	3	D	3	C	A	M	PS	CM	
EXERCISES									
2-1	1	M	12	C	A	R	C	CM	
2-2	1	M	15	C	A	R	C	CM	
2-3	1	M	12	AP	A	M	PS	CM	
2-4	1	M	15	AP, C	A	M	PS	CM	
2-5	1	M	15-20	AP, AN	A	M	PS	CM	
2-6	1	D	5-7	AN	A	M	PS	CM	

Item	L. O.	Difficulty Level	Minutes to Complete	Bloom's Taxonomy	AACSB	AICPA FN	AICPA PC	IMA	Ethics Coverage
2-7	1	D	8	AP, AN	A	M	PS	CM	
2-8	2	M	15-20	AP, AN	A	M	PS	CM	
2-9	2	M	20	AP, AN	A	M	PS	CM	
2-10	2	M	12	AP, AN	A	M	PS	CM	
2-11	2	D	20	AP	A	M	PS	CM	
2-12	2	D	10-15	AP	A	M	PS	CM	
2-13	3	M	10-15	AP	A	M	PS	CM	
2-14	3	E	10-15	AN	A	M	PS	CM	
2-15	3	D	10-15	AP	A	M	PS	CM	
2-16	3	M	15	AP	A	M	PS	CM	
2-17	3	E	15	AP	A	M	PS	CM	
2-18	3	E	10	AP	A	M	PS	CM	
PROBLEMS									
2-19	1	E	20-25	AP, AN	A	M	PS	CM	
2-20	2	M	20-25	AP, AN	A	M	PS	CM	
2-21	2	D	15-20	AP, AN	A	M	PS	CM	
2-22	2	M	20-25	AP, AN	A	M	PS	CM	
2-23	2	D	30-35	AP, AN	A	M	PS	CM	
2-24	1, 3	D	20-25	AP	A	M	PS	CM	
2-25	2, 3	D	20	AP	A	M	PS	CM	
2-26	3	D	20-25	AP	A	M	PS	CM, DA	
C&C CONTINUING CASE									
2-27	1	E	5-7	C	A	M	PS	CM	
2-28	2, 3	M	10	AP, AN	A	M	PS	CM	
CASES									
2-29	1	D	20-25	AP	A	M	PS	CM	
2-30		M	10-15	AN	A, E	R	C	BA	✔

SOLUTIONS TO GUIDED UNIT PREPARATION

Unit 2.1

1. Managers must be able to predict the financial results of their various decisions. The only way to predict results is to know how costs will change or "behave" with changes in activity.

2. A variable cost is a cost that varies in total in proportion to a business activity. Within the relevant range, variable cost per unit is constant. As the level of activity increases, the total cost increases by the same proportion. Examples include commissions, cost of bicycle tires for a bicycle manufacturer, and cost of postage for a direct mail advertiser.

3. A fixed cost is a cost that does not change in total with the activity level. Within the relevant range, the total fixed cost remains constant as the activity level changes. However, the cost per unit varies inversely with changes in activity level. Examples include monthly rent, a manager's salary, and property taxes.

4. Discretionary fixed costs are fixed costs that can be changed over the short run. Committed fixed costs cannot be changed over the short run.

5. A mixed cost is a cost that has both fixed and variable components. As the level of activity increases, the total cost increases and the cost per unit decreases. Examples include electricity cost, party hall rental when the charge includes a flat fee plus a cost per guest, and t-shirt printing when the charge includes a set up fee plus a charge for each t-shirt printed.

6. A step cost is a cost that is fixed over a small range of activity. Total cost will not change as activity levels increase if the level of activity is within a certain range. However, once the activity level exceeds this range, total cost will increase. Examples include maintenance costs when a new maintenance worker is needed per 10 machines, nurse salaries per 5 patients on a hospital floor, and hotel room rates per 4 students on a class trip.

Unit 2.2

1. TC = (VC × x) + FC

2. With a scattergraph, a line is drawn to best fit the data points. The point at which the line intersects the y-axis is the value for fixed costs. The slope of the line, change in total cost divided by change in activity, is the variable cost per unit.

3. The high-low method uses the highest and lowest points within a data range to construct a total cost line. The variable cost per unit is calculated by dividing the change in total cost by the change in activity. The fixed cost is calculated by plugging the variable cost in the formula TC = (VC × x) + FC and using either the high point or low point of activity.

4. Regression analysis is preferable as it produces a line with the least amount of error and is relatively easy to use in Excel or other spreadsheet software.

5. The relevant range is the normal level of operating activity. The relevant range applies to the whole company and is valid for all cost relationships. The steps in a step cost are ranges that are only valid for that particular cost. The steps in the range are smaller than the relevant range.

Unit 2.3

1. Contribution margin is the difference between sales and variable cost.

2. Contribution margin ratio is the contribution margin divided by sales. The variable cost ratio is 1 minus the contribution margin ratio. The larger the variable cost ratio, the smaller the contribution margin will be, since the two ratios must add to 100%.

3. If the variable cost per unit increases and the selling price decreases, the contribution margin per unit will decrease. The change in fixed cost has no bearing on the contribution margin.

4. A product's contribution margin can be increased by increasing the selling price per unit or decreasing variable costs per unit. Total contribution margin can be increased by selling more units.

SOLUTIONS TO EXERCISES

Exercise 2-1

a. variable
b. fixed
c. variable
d. fixed
e. step
f. fixed
g. mixed

Exercise 2-2

a. variable
b. fixed
c. step
d. mixed
e. variable
f. fixed
g. mixed
h. variable
i. variable
j. fixed

Exercise 2-3

a. TC(300) = (300 × $10 per return) + $500 fee = $3,500
TC(400) = (400 × $10 per return) + $500 fee = $4,500
TC(500) = (500 × $10 per return) + $500 fee = $5,500

b. Cost per unit (300) = $3,500 ÷ 300 = $11.67
Cost per unit (400) = $4,500 ÷ 400 = $11.25
Cost per unit (500) = $5,500 ÷ 500 = $11.00

c. As the number of returns increased from 300 to 500, the fixed cost of $500 decreased on a per unit basis.

Exercise 2-4

	Answer	Reasoning
Balloons	variable	The total cost increases as activity increases and the cost per unit remains constant at $2 per bouquet.
Insurance	fixed	The total cost remains constant across all activity levels.
Delivery	mixed	The total cost increases as activity increases and the cost per unit decreases as activity increases.
Employee compensation	mixed	The total cost increases as activity increases and the cost per unit decreases as activity increases.
Advertising	fixed	The total cost remains constant across all activity levels.

Per unit costs:

	5,000	7,500	10,000
Balloons	$\frac{\$10,000}{5,000 \text{ bouquets}} = \$2$	$\frac{\$15,000}{7,500 \text{ bouquets}} = \$2$	$\frac{\$20,000}{10,000 \text{ bouquets}} = \$2$
Delivery	$\frac{\$5,500}{5,000 \text{ bouquets}} = \$1.10$	$\frac{\$8,000}{7,500 \text{ bouquets}} = \$1.07$	$\frac{\$10,500}{10,000 \text{ bouquets}} = \$1.05$
Employee compensation	$\frac{\$10,000}{5,000 \text{ bouquets}} = \$2$	$\frac{\$13,000}{7,500 \text{ bouquets}} = \$1.73$	$\frac{\$16,000}{10,000 \text{ bouquets}} = \$1.60$

Exercise 2-5

		Home Visit Hours			
	F, V, M	10,000	12,500	15,000	17,500
Medical records automation and storage	mixed	$3,000	**$3,625**	$4,250	$4,875
Medical testing supplies	variable	$7,500	$9,375	**$11,250**	$13,125
Insurance filing services	variable	$4,000	$5,000	$6,000	**$7,000**
Communications system lease	fixed	**$2,000**	$2,000	**$2,000**	$2,000

Variable cost per unit:

Medical records automation and storage:

$$\frac{\$4,875 - \$3,000}{17,500 - 10,000} = \$0.25 \text{ per home visit hour}$$

Medical testing supplies:

$$\frac{\$13,125 - \$7,500}{17,500 - 10,000} = \$0.75 \text{ per home visit hour}$$

Insurance filing services:

$$\frac{\$6,000 - \$4,000}{15,000 - 10,000} = \$0.40 \text{ per home visit hour}$$

Fixed cost (using the low point):

Medical records automation and storage:

$3,000 – (10,000 hours × $.25) = $500

Medical testing supplies:

$7,500 – (10,000 hours × $.75) = $0

Insurance filing services:

$4,000 – (10,000 hours × $.40) = $0

Exercise 2-5, continued

Total cost:

Medical records automation and storage:
(12,500 hours × $.25) + $500 = $3,625

Medical testing supplies:
(15,000 hours × $.75) + $0 = $11,250

Insurance filing services:
(17,500 hours × $.40) + $0 = $7,000

Exercise 2-6

Undoubtedly, some of your costs are fixed and will not change with the number of units sold. For example, you probably pay rent to the mall to set up your kiosk. Total rent does not change with the number of MP3 players sold. Using the unit cost you calculated, your estimate will be too high if you sell more units next year and too low if you sell fewer units next year.

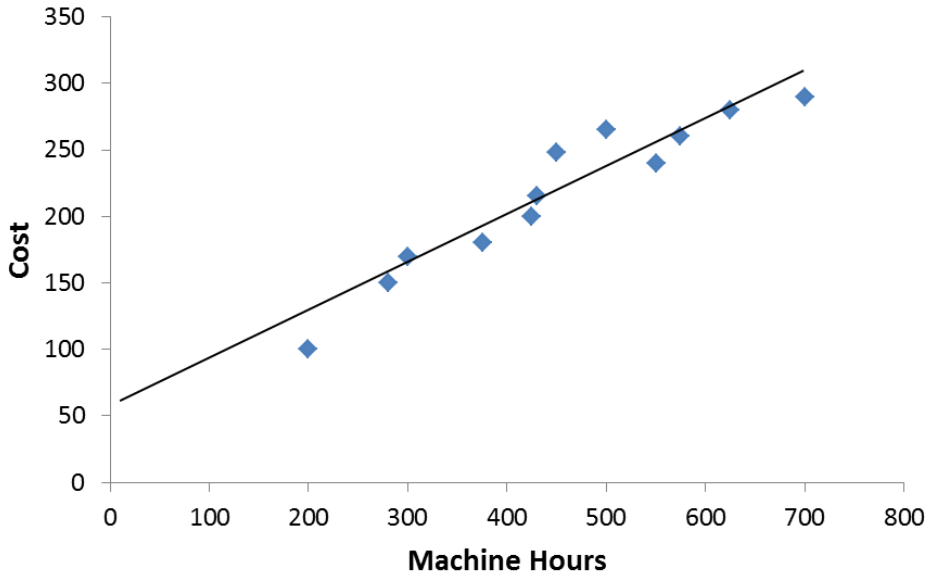
Exercise 2-7

a. No effect – total fixed costs do not change with changes in quantity.

b. Decrease – the increase in accounting quantity would lower the fixed costs per unit, which would lower the unit cost of the 737 Next Generation plane.

Exercise 2-8

a.



Note: Students may draw lines that differ from the one above. That will affect the equation they use in the remaining parts of the exercise.

b. The line intersects the y-axis at $50, representing total fixed costs. The line passes through the point (575, $260), so the slope can be calculated as follows:

$$\frac{\$260 - \$50}{575 - 0} = \$0.37 \text{ per machine hour}$$

The equation of the line is: y = ($0.37 × MH) + $50

c. Total cost = ($0.37 × 425 MH) + $50 = $207.25

d. The line is merely an estimation of what costs will be. Since the line does not intersect the actual cost at which machine hours is 425, then the cost estimate will not equal the actual cost.

Exercise 2-9

a. Variable cost = $\frac{\$290 - \$100}{700 - 200}$ = $0.38 per machine hour

b. Fixed cost using the low point = $100 – ($0.38 × 200) = $24

c. Total cost = ($0.38 × MH) + $24

d. Total cost = ($0.38 × 425 MH) + $24 = $185.50

e. The equation of the line was determined using two points, neither of which was 425 machine hours. Since the line does not intersect the actual cost at which machine hours is 425, then the cost estimate will not equal the actual cost.

Exercise 2-10

a. Variable cost = $\frac{\$10,000 - \$6,500}{1,200 - 500}$ = $5 per instrument

b. Fixed cost using the low point = $6,500 – ($5 × 500) = $4,000

c. Total cost = ($5 × # of instruments) + $4,000

d. Total cost = ($5 × 1,150 instruments) + $4,000 = $9,750

Exercise 2-11

	Answer	Calculations
Balloons	y = $2x + $0	VC = $\frac{\$20,000 - \$10,000}{10,000 - 5,000}$ = $2 FC = $20,000 – $2(10,000) = $0
Insurance	y = $5,000	Since the total cost is constant, no calculations are needed.
Delivery	y = $1x + $500	VC = $\frac{\$10,500 - \$5,500}{10,000 - 5,000}$ = $1 FC = $10,500 – $1(10,000) = $500
Employee compensation	y = $1.20x + $4,000	VC = $\frac{\$16,000 - \$10,000}{10,000 - 5,000}$ = $1.20 FC = $16,000 – $1.2(10,000) = $4,000
Advertising	y = $1,500	Since the total cost is constant, no calculations are needed.

Exercise 2-12

a. Current system = (.03 × sales) + $60,000
Salary and 5% = (.05 × sales) + $50,000
12% commission = .12 × sales

b.

	Current system	Salary and 5% commission	12% commission
Sales revenue[a]	$1,000,000	$1,120,000	$1,200,000
Cost of goods sold	300,000	336,000	360,000
Gross profit	700,000	784,000	840,000
Compensation expense	90,000[b]	106,000[c]	144,000[d]
Operating income	$610,000	$678,000	$696,000

The 12% commission results in the most profitable result for the company.

[a].3 × Sales revenue
[b]$60,000 + ($1,000,000 × 0.03)
[c]$50,000 + ($1,120,000 × 0.05)
[d]$1,200,000 × 0.12

Exercise 2-13

			Per Unit
Sales revenue		$50,000	$100
Variable expenses:			
Cost of goods sold	$30,000		60
Commissions expense	3,000		6
Shipping expense	1,000		2
Total variable expenses		34,000	68
Contribution margin		16,000	$ 32
Fixed expenses:			
Salaries expense	8,000		
Advertising expense	6,000		
Total fixed expenses		14,000	
Operating income		$ 2,000	

Exercise 2-14

	a.	b.	c.	d.
Sales revenue	**$300,000**	$450,000	**$280,000**	$600,000
Variable expenses	210,000	**300,000**	96,000	**200,000**
Contribution margin	90,000	150,000	**184,000**	400,000
Fixed expenses	**75,000**	90,000	120,000	**180,000**
Operating income	15,000	**60,000**	**64,000**	**220,000**
Income taxes	**4,500**	18,000	16,000	55,000
Net income	$10,500	**$42,000**	$48,000	$165,000

Exercise 2-15

			Per Unit
Sales revenue		$10,000	$5.00
Variable costs:			
Cost of goods sold	$3,000		1.50
Operating expenses	1,000[a]		.50
Total variable expenses		4,000	2.00
Contribution margin		6,000	$3.00
Fixed operating expenses		1,500[b]	
Operating Income		$4,500	

Units sold = $10,000 sales revenue ÷ $5.00 per unit = 2,000 units
[a]2,000 units × $0.50 per unit
[b]$2,500 total operating costs – $1,000 variable cost

Exercise 2-16

a.

Sales price	$5.00
Less variable costs:	
Towel, water, protein shake	1.75
Contribution margin	$3.25

b. $\frac{\$3.25}{\$5.00} = 65\%$

c.

			Unit
Sales revenue		$25,000	$5.00
Variable expenses:			
Towel, water, shake		8,750	1.75
Contribution margin		16,250	$3.25
Fixed expenses:			
Instructor salaries expense	$3,000		
Management salary expense	4,000		
Rent expense	1,500		
Depreciation expense	1,250		
Utilities & insurance expense	1,800		
Total fixed expenses		11,550	
Operating Income		$ 4,700	

Exercise 2-17

a.

Sales revenue		$50,000
Variable expenses:		
Cost of goods sold	$25,575	
Selling expense (20%)	1,600[a]	
Administrative expense (60%)	7,200[b]	
Total variable expenses		34,375
Contribution margin		15,625
Fixed expenses:		
Selling expense (80%)	6,400[c]	
Administrative expense (40%)	4,800[d]	
Total fixed expenses		11,200
Operating Income		$4,425

[a]$8,000 × 0.20
[b]$12,000 × 0.60
[c]$8,000 × 0.80
[d]$12,000 × 0.40

b. $50,000 ÷ $1.60 per cookie = 31,250 cookies

c. $15,625 ÷ 31,250 cookies = $0.50 per cookie

d. $15,625 ÷ $50,000 = 31.25%

Exercise 2-18

a. $\frac{\$175{,}000}{\$35 \text{ per unit}}$ = 5,000 phone covers

b. $\frac{\$99{,}750}{5{,}000 \text{ units}}$ = $19.95 per phone cover

c. $\frac{\$19.95}{\$35.00}$ = 57%

SOLUTIONS TO PROBLEMS

Problem 2-19

a.

Minutes	Cost per minute	Total Cost
10	$5.00	$50
100	$0.50	$50
250	$0.20	$50
500	$0.10	$50

b. This is a fixed cost because total cost remains fixed while the cost per minute decreases as minutes used increases.

c. 1,000 $\times$ $0.02 = $20; prefer $0.02 per minute instead of $50 per month

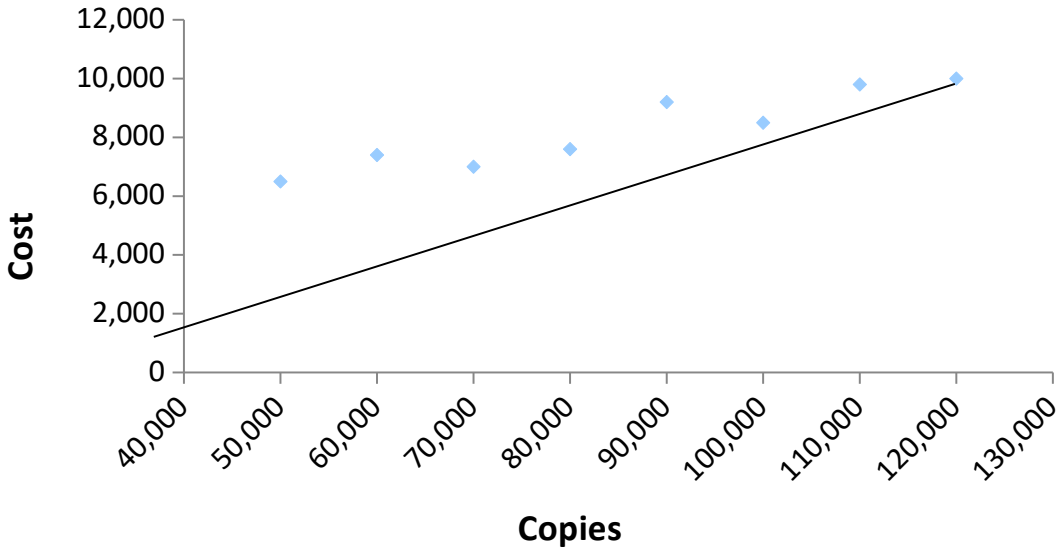
3,000 $\times$ $0.02 = $60; prefer $50 per month

indifferent where $50 = $0.02x
x = 2,500 minutes

d. You should determine which phone plan to buy based on how many minutes you expect to use in one month.

Problem 2-20

a.



The line intersects the y-axis at $3,500, representing total fixed costs. The line passes through the point (80,000, $7,600), so the slope can be calculated as follows:

$$\frac{\$7,600 - \$3,500}{80,000 - 0} = \$0.05125 \text{ per copy}$$

The equation of the line is: y = $0.05125/copy + $3,500

b. Variable cost = $\frac{\$10,000 - \$6,500}{120,000 - 50,000}$ = $0.05 per copy

c. Fixed cost = $10,000 – ($.05 × 120,000) = $4,000

d. y = $0.05x + $4,000

e. September cost = ($0.05 × 70,000) + $4,000 = $7,500. The equation is just an approximation of the relationship between cost and copies. Since the March cost was not one of the points used to construct the line, then it is not surprising that the two figures are not equal.

Problem 2-21

a. Variable cost = $\frac{\$77,000 - \$55,000}{7,500 - 2,500}$ = $4.40 per labor hour
Fixed cost = $77,000 – ($4.40 × 7,500) = $44,000

b. Total cost = ($4.40 × 2,800) + $44,000 = $56,320

c. Additional overhead = $4.40 × 200 = $880

d. In regression analysis, the cost equation is calculated using all of the data points. In the high-low method, only two points are used to determine the cost equation. In either case, they are both estimates.

Problem 2-22

a. Variable cost = $\frac{\$83,050 - \$74,525}{561,000 - 390,500}$ = $0.05 per spike set sold

b. Fixed cost = $83,050 – ($0.05 × 561,000) = $55,000

c. Marketing cost = ($0.05 × sets sold) + $55,000

d. February sales volume and costs are much lower than the others.

e. Variable cost = $\frac{\$83,050 - \$82,330}{561,000 - 543,000}$ = $0.04 per spike set sold
Fixed cost = $83,050 – ($0.04 × 561,000) = $60,610
Marketing cost = ($0.04 × sets sold) + $60,610

f. The second equation is better for estimating future costs because the endpoints used to estimate the line are more consistent with the normal sales volumes and costs.

Problem 2-23

a. **Passengers:**

Variable cost = $\frac{\$25,459 - \$22,225}{2,430 - 2,136}$ = $11 per passenger

Fixed cost = $25,459 – ($11 × 2,430) = ($1,271)

Fuel expense = ($11 × passengers) – $1,271

Passenger miles:

Variable cost = $\frac{\$24,481 - \$22,435}{578,133 - 373,533}$ = $0.01 per passenger mile

Fixed cost = $24,481 – ($0.01 × 578,133) = $18,699.67

Fuel expense = ($0.01 × passenger miles) + $18,699.67

Train Miles:

Variable cost = $\frac{\$25,459 - \$22,225}{3,315 - 2,825}$ = $6.60 per train mile

Fixed cost = $25,459 – ($6.60 × 3,315) = $3,580

Fuel expense = ($6.60 × train mile) + $3,580

b. The formula based on passengers doesn't make sense as the fixed cost is negative. While this might have some predictive ability, it doesn't help managers understand any causal relationship between the number of passengers and fuel expense.

c. Logically, train miles would seem to have the most predictive ability since the miles a train travels and fuel costs should be directly related. While passenger miles would likely provide information related to the fuel expended due to weight (more passengers, greater weight), it is unlikely that one more passenger mile will have the same impact on fuel expenses that one more train mile will have.

Problem 2-24

a. Cost of goods sold – variable
Advertising expense – fixed
Salaries and wages expense – mixed
Insurance expense – fixed
Postage expense – variable

b. Sales price = \$3,000 ÷ 2,000 windows = \$1.50 per window

Cost of goods sold = \$1,200 ÷ 2,000 windows = \$0.60 per window

Variable salaries expense = $\frac{\$1{,}100 - \$700}{6{,}000 - 2{,}000}$ = \$0.10 per window

Postage expense = \$400 ÷ 2,000 windows = \$0.20 per window

Fixed salaries expense = \$1,100 – (.1 × 6,000) = \$500

		3,000 windows	Per Unit
Sales revenue		\$4,500	\$1.50
Variable expenses:			
Cost of goods sold	1,800		0.60
Salaries expense	300		0.10
Postage expense	600		0.20
Total variable expenses		2,700	0.90
Contribution margin		1,800	\$0.60
Fixed expenses:			
Advertising expense	400		
Salaries expense	500		
Insurance expense	200		
Total fixed expenses		1,100	
Operating Income		\$ 700	

Problem 2-25

a. coats sold = $750,000 ÷ $250 = 3,000 units

variable selling expense = $6.50 × 3,000 = $19,500

variable administrative expense = 5% × $750,000 = $37,500 ÷ 3,000 = $12.50

fixed selling expense = $23,560 – $19,500 = $4,060

fixed administrative expense = $49,500 – $37,500 = $12,000

			Per Unit
Sales revenue		$750,000	$250.00
Variable expenses:			
Cost of goods sold	300,000		100.00
Selling expense	19,500		6.50
Administrative expense	37,500		12.50
Total variable expenses		357,000	119.00
Contribution margin		393,000	$131.00
Fixed expenses:			
Selling expense	4,060		
Administrative expense	12,000		
Total fixed expenses		16,060	
Operating Income		$376,940	

b. Operating expenses = $119x + $16,060

c. $131 × 2,700 = $353,700

Problem 2-26

a.

			Per Unit
Sales revenue		$25,500	$30
Variable expenses:			
Service expense	$14,450		17
Bookkeeping expense	1,700		2
Total variable expenses		16,150	19
Contribution margin		9,350	$11
Fixed expenses:			
Vans expense	2,000		
Salaries expense	3,000		
Total fixed expenses		5,000	
Operating Income		$4,350	

b. $4,350 + (150 × $11) = $6,000

Problem 2-26, continued

c.

	850	1,000	1,100
Current cost: $2 × customers × 12 months	$20,400	$24,000	$26,400
Option 1: $10,200 + ($1 × customers × 12 months)	$20,400	$22,200	$23,400
Option 2: $18,000 + $5,000	$23,000	$23,000	$23,000

d. Mr. Henley needs to evaluate what he thinks future demand for his services will be. If he thinks he will have more customers, then he should consider switching to option 1 or 2 before prices increase. He also needs to think about the stability of his customer base. If he services fewer than 850 customers, options 1 and 2 will be more expensive than the current arrangement.

SOLUTIONS TO CONTINUING CASE PROBLEMS

Problem 2-27

	Cost	Behavior
a.	Monthly sales staff payroll of $650 plus 6% sales commission on jerseys	mixed
b.	$100 monthly rental for credit card processing equipment	fixed
c.	Cost of goods sold of $14.80 per jersey	variable
d.	The cost of price tags attached to each jersey	variable
e.	Inventory insurance that costs $2 per $1,000 of sales	step
f.	Website hosting cost of $25 per month	fixed

Problem 2-28

a. $20.00x – $16.00x – $168,000 = operating profit

b. ($16.00 × 55,000) + $168,000 = $880,000 + $168,000 = $1,048,000

c. Fixed selling expenses will increase by $20,000 to $136,500, so total fixed expenses will increase by $20,000 to $188,000.

d.

			Per Unit
Sales revenue		$1,200,000	$20.00
Variable expenses:			
Cost of goods sold	$888,000		14.80
Sales commission expense	72,000		1.20
Total variable expenses		960,000	16.00
Contribution margin		240,000	$ 4.00
Fixed expenses:			
Selling expense	136,500		
Administrative expense	51,500		
Total fixed expenses		188,000	
Operating Income		$ 52,000	

SOLUTIONS TO CASES

Case 2-29

a.

Ad development	$5,000	
Placement[a]	1,600	($0.80 × 2,000)
Click-through	4,000	($0.02 × .1 × 2,000,000)
	$10,600	

[a] $\frac{\text{2,000,000 ad impressions}}{\text{1,000}}$ = 2,000 (impressions are priced per thousand)

b. customers = 2,000,000 × .1 × .05 = 10,000

$$\frac{\$10{,}600}{10{,}000} = \$1.06 \text{ per customer}$$

c. You need to work backwards to solve this problem:

Since only 5% of those who click through make a purchase, it will take 20 click-throughs to generate one customer (1 ÷ .05).

Since only 10% of banner ad viewers click through, 200 more banner ads need to be placed (20 ÷ .10)

Cost of 200 placements = (200 ÷ 1,000) x $0.80	$0.16
Cost of 20 click-throughs = 20 × $0.02	$0.40
	$0.56

Case 2-30

a. No, it wasn't ethical. The family and friends are not legitimate customers, and they are driving up Helios's cost.

b. No, it wouldn't change. While the purchase is an unintended benefit, the motivation behind Sami's actions was fraudulent.

c. As a result of Sami's actions, Helios will experience a higher click through rate and a lower purchase rate than expected. These "artificial" rates could influence future expectations for similar ad campaigns. Additionally, Helios will incur increased advertising expenses as a result of the additional click throughs ($0.02 per click through).