2. How would a knowledge of cost behavior patterns such as those above be of help to a manager in analyzing the cost structure of his or her company?

(CPA, adapted)

PROBLEM 2–16 Variable and Fixed Costs; Subtleties of Direct and Indirect Costs [LO 2–3, LO 2–6]

The Central Area Well-Baby Clinic provides a variety of health services to newborn babies and their parents. The clinic is organized into a number of departments, one of which is the Immunization Center. A number of costs of the clinic and the Immunization Center are listed below.

Example: The cost of polio immunization tablets

a. The salary of the head nurse in the Immunization Center.
b. Costs of incidental supplies consumed in the Immunization Center, such as paper towels.
c. The cost of lighting and heating the Immunization Center.
d. The cost of disposable syringes used in the Immunization Center.
e. The salary of the Central Area Well-Baby Clinic's information systems manager.
f. The costs of mailing letters soliciting donations to the Central Area Well-Baby Clinic.
g. The wages of nurses who work in the Immunization Center.
h. The cost of medical malpractice insurance for the Central Area Well-Baby Clinic.
i. Depreciation on the fixtures and equipment in the Immunization Center.

Required:

For each cost listed above, indicate whether it is a direct or indirect cost of the Immunization Center, whether it is a direct or indirect cost of immunizing particular patients, and whether it is variable or fixed with respect to the number of immunizations administered. Use the form shown below for your answer.

	Direct or Indirect Cost of the Immunization Center		Direct or Indirect Cost of Particular Patients		Variable or Fixed with Respect to the Number of Immunizations Administered	
Item Description	Direct	Indirect	Direct	Indirect	Variable	Fixed
Example: The cost of polio immunization tablets	X		X		X	

PROBLEM 2–17 High-Low Method; Predicting Cost [LO 2–3, LO 2–4]

Echeverria SA is an Argentinian manufacturing company whose total factory overhead costs fluctuate somewhat from year to year according to the number of machine-hours worked in its production facility. These costs (in Argentinian pesos) at high and low levels of activity over recent years are given below:

	Level of Activity	
	Low	High
Machine-hours	60,000	80,000
Total factory overhead costs	274,000 pesos	312,000 pesos

The factory overhead costs above consist of indirect materials, rent, and maintenance. The company has analyzed these costs at the 60,000 machine-hours level of activity as follows:

Indirect materials (variable)	90,000 pesos
Rent (fixed)	130,000
Maintenance (mixed)	54,000
Total factory overhead costs	274,000 pesos

For planning purposes, the company wants to break down the maintenance cost into its variable and fixed cost elements.

Required:

1. Estimate how much of the factory overhead cost of 312,000 pesos at the high level of activity consists of maintenance cost. (Hint: To do this, it may be helpful to first determine how much of the 312,000 pesos cost consists of indirect materials and rent. Think about the behavior of variable and fixed costs.)
2. Using the high-low method, estimate a cost formula for maintenance.
3. What *total* overhead costs would you expect the company to incur at an operating level of 65,000 machine-hours?

PROBLEM 2–18 Cost Behavior; High-Low Method; Contribution Format Income Statement [LO 2–3, LO 2–4, LO 2–5]

Frankel Ltd., a British merchandising company, is the exclusive distributor of a product that is gaining rapid market acceptance. The company's revenues and expenses (in British pounds) for the last three months are given below:

Frankel Ltd.
Comparative Income Statements
For the Three Months Ended June 30

	April	May	June
Sales in units	3,000	3,750	4,500
Sales revenue	£420,000	£525,000	£630,000
Cost of goods sold	168,000	210,000	252,000
Gross margin	252,000	315,000	378,000
Selling and administrative expenses:			
Shipping expense	44,000	50,000	56,000
Advertising expense	70,000	70,000	70,000
Salaries and commissions	107,000	125,000	143,000
Insurance expense	9,000	9,000	9,000
Depreciation expense	42,000	42,000	42,000
Total selling and administrative expenses	272,000	296,000	320,000
Net operating income (loss)	£ (20,000)	£ 19,000	£ 58,000

(Note: Frankel Ltd.'s income statement has been recast in the functional format common in the United States. The British currency is the pound, denoted by £.)

Required:

1. Identify each of the company's expenses (including cost of goods sold) as either variable, fixed, or mixed.
2. Using the high-low method, separate each mixed expense into variable and fixed elements. State the cost formula for each mixed expense.
3. Redo the company's income statement at the 4,500-unit level of activity using the contribution format.

PROBLEM 2–19 High-Low and Scattergraph Analysis [LO 2–4]

Sebolt Wire Company heats copper ingots to very high temperatures by placing the ingots in a large heat coil. The heated ingots are then run through a shaping machine that shapes the soft ingot into wire. Due to the long heat-up time, the coil is never turned off. When an ingot is placed in the coil, the temperature is raised to an even higher level, and then the coil is allowed to drop to the "waiting" temperature between ingots. Management needs to know the variable cost of power

involved in heating an ingot and the fixed cost of power during "waiting" periods. The following data on ingots processed and power costs are available:

Month	Number of Ingots	Power Cost
January	110	$5,500
February	90	$4,500
March	80	$4,400
April	100	$5,000
May	130	$6,000
June	120	$5,600
July	70	$4,000
August	60	$3,200
September	50	$3,400
October	40	$2,400

Required:

1. Using the high-low method, estimate a cost formula for power cost. Express the formula in the form $Y = a + bX$.
2. Prepare a scattergraph by plotting ingots processed and power cost on a graph. Draw a straight line though the two data points that correspond to the high and low levels of activity. Make sure your line intersects the Y-axis.
3. Comment on the accuracy of your high-low estimates assuming a least-squares regression analysis estimated the total fixed costs to be $1,185.45 per month and the variable cost to be $37.82 per ingot. How would the straight line that you drew in requirement 2 differ from a straight line that minimizes the sum of the squared errors?

PROBLEM 2–20 Ethics and the Manager [LO 2–2]


The top management of General Electronics, Inc., is well known for "managing by the numbers." With an eye on the company's desired growth in overall net profit, the company's CEO (chief executive officer) sets target profits at the beginning of the year for each of the company's divisions. The CEO has stated her policy as follows: "I won't interfere with operations in the divisions. I am available for advice, but the division vice presidents are free to do anything they want so long as they hit the target profits for the year."

In November, Stan Richart, the vice president in charge of the Cellular Telephone Technologies Division, saw that making the current year's target profit for his division was going to be very difficult. Among other actions, he directed that discretionary expenditures be delayed until the beginning of the new year. On December 30, he was angered to discover that a warehouse clerk had ordered $350,000 of cellular telephone parts earlier in December even though the parts weren't really needed by the assembly department until January or February. Contrary to common accounting practice, the General Electronics, Inc., Accounting Policy Manual states that such parts are to be recorded as an expense when delivered. To avoid recording the expense, Mr. Richart asked that the order be canceled, but the purchasing department reported that the parts had already been delivered and the supplier would not accept returns. Because the bill had not yet been paid, Mr. Richart asked the accounting department to correct the clerk's mistake by delaying recognition of the delivery until the bill is paid in January.

Required:

1. Are Mr. Richart's actions ethical? Explain why they are or are not ethical.
2. Do the general management philosophy and accounting policies at General Electronics encourage or discourage ethical behavior? Explain.

PROBLEM 2–21 High-Low Method; Predicting Cost [LO 2–3, LO 2–4]

Golden Company's total overhead cost at various levels of activity are presented below:

Month	Machine-Hours	Total Overhead Cost
March	50,000	$194,000
April	40,000	$170,200
May	60,000	$217,800
June	70,000	$241,600

Assume that the overhead cost above consists of utilities, supervisory salaries, and maintenance. The breakdown of these costs at the 40,000 machine-hour level of activity is as follows:

Utilities (variable)	$ 52,000
Supervisory salaries (fixed)	60,000
Maintenance (mixed)	58,200
Total overhead cost	$170,200

The company wants to break down the maintenance cost into its variable and fixed cost elements.

Required:

1. Estimate how much of the $241,600 of overhead cost in June was maintenance cost. (Hint: To do this, it may be helpful to first determine how much of the $241,600 consisted of utilities and supervisory salaries. Think about the behavior of variable and fixed costs within the relevant range.)
2. Using the high-low method, estimate a cost formula for maintenance.
3. Express the company's total overhead cost in the form $Y = a + bX$.
4. What total overhead cost would you expect to be incurred at an activity level of 45,000 machine-hours?

PROBLEM 2–22 Cost Classification [LO 2–2, LO 2–3, LO 2–6]

Listed below are costs found in various organizations.

1. Depreciation, executive jet.
2. Costs of shipping finished goods to customers.
3. Wood used in manufacturing furniture.
4. Sales manager's salary.
5. Electricity used in manufacturing furniture.
6. Secretary to the company president.
7. Aerosol attachment placed on a spray can produced by the company.
8. Billing costs.
9. Packing supplies for shipping products overseas.
10. Sand used in manufacturing concrete.
11. Supervisor's salary, factory.
12. Executive life insurance.
13. Sales commissions.
14. Fringe benefits, assembly-line workers.
15. Advertising costs.
16. Property taxes on finished goods warehouses.
17. Lubricants for production equipment.

Required:

Prepare an answer sheet with column headings as shown below. For each cost item, indicate whether it would be variable or fixed with respect to the number of units produced and sold; and

then whether it would be a selling cost, an administrative cost, or a manufacturing cost. If it is a manufacturing cost, indicate whether it would typically be treated as a direct or indirect cost with respect to units of product. Three sample answers are provided for illustration.

Cost Item	Variable or Fixed	Selling Cost	Administrative Cost	Manufacturing (Product) Cost	
				Direct	Indirect
Direct labor	V			X	
Executive salaries	F		X		
Factory rent	F				X

PROBLEM 2–23 High-Low Method; Contribution Format Income Statement [LO 2–4, LO 2–5]

Alden Company has decided to use a contribution format income statement for internal planning purposes. The company has analyzed its expenses and has developed the following cost formulas:

Cost	Cost Formula
Cost of goods sold	$20 per unit sold
Advertising expense	$170,000 per quarter
Sales commissions	5% of sales
Administrative salaries	$80,000 per quarter
Shipping expense	?
Depreciation expense	$50,000 per quarter

Management has concluded that shipping expense is a mixed cost, containing both variable and fixed cost elements. Units sold and the related shipping expense over the last eight quarters are given below:

Quarter	Units Sold	Shipping Expense
Year 1:		
First	16,000	$160,000
Second	18,000	$175,000
Third	23,000	$217,000
Fourth	19,000	$180,000
Year 2:		
First	17,000	$170,000
Second	20,000	$185,000
Third	25,000	$232,000
Fourth	22,000	$208,000

Management would like a cost formula derived for shipping expense so that a budgeted contribution format income statement can be prepared for the next quarter.

Required:

1. Using the high-low method, estimate a cost formula for shipping expense.
2. In the first quarter of Year 3, the company plans to sell 21,000 units at a selling price of $50 per unit. Prepare a contribution format income statement for the quarter.

PROBLEM 2–24 Cost Classification and Cost Behavior [LO 2–2, LO 2–3, LO 2–6]

Heritage Company manufactures a beautiful bookcase that enjoys widespread popularity. The company has a backlog of orders that is large enough to keep production going indefinitely at the plant's full capacity of 4,000 bookcases per year. Annual cost data at full capacity follow:

Direct materials used (wood and glass)	$430,000
Administrative office salaries	$110,000
Factory supervision	$70,000
Sales commissions	$60,000
Depreciation, factory building	$105,000
Depreciation, administrative office equipment	$2,000
Indirect materials, factory	$18,000
Factory labor (cutting and assembly)	$90,000
Advertising	$100,000
Insurance, factory	$6,000
Administrative office supplies (billing)	$4,000
Property taxes, factory	$20,000
Utilities, factory	$45,000

Required:

1. Prepare an answer sheet with the column headings shown below. Enter each cost item on your answer sheet, placing the dollar amount under the appropriate headings. As examples, this has been done already for the first two items in the list above. Note that each cost item is classified in two ways: first, as either variable or fixed with respect to the number of units produced and sold; and second, as either a selling and administrative cost or a product cost. (If the item is a product cost, it should also be classified as either direct or indirect as shown.)

	Cost Behavior		Selling or Administrative	Product Cost	
Cost Item	Variable	Fixed	Cost	Direct	Indirect*
Materials used	$430,000			$430,000	
Administrative office salaries		$110,000	$110,000		

*To units of product.

2. Total the dollar amounts in each of the columns in (1) above. Compute the average product cost per bookcase.
3. Due to a recession, assume that production drops to only 2,000 bookcases per year. Would you expect the average product cost per bookcase to increase, decrease, or remain unchanged? Explain. No computations are necessary.
4. Refer to the original data. The president's next-door neighbor has considered making himself a bookcase and has priced the necessary materials at a building supply store. He has asked the president whether he could purchase a bookcase from the Heritage Company "at cost," and the president has agreed to let him do so.
   a. Would you expect any disagreement between the two men over the price the neighbor should pay? Explain. What price does the president probably have in mind? The neighbor?
   b. Because the company is operating at full capacity, what cost term used in the chapter might be justification for the president to charge the full, regular price to the neighbor and still be selling "at cost"? Explain.

Cases

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All applicable cases are available with McGraw-Hill's *Connect™ Accounting*.

CASE 2–25 Scattergraph Analysis; Selection of an Activity Base [LO 2–4]

Mapleleaf Sweepers of Toronto manufactures replacement rotary sweeper brooms for the large sweeper trucks that clear leaves and snow from city streets. The business is seasonal, with the largest demand during and just preceding the fall and winter months. Because there are so many different kinds of sweeper brooms used by its customers, Mapleleaf Sweepers makes all of its brooms to order.