Crummy Cracker Company: Exercises for managerial accounting

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ABSTRACT

The Crummy Cracker Company is a fictitious case designed to give students practice working with several of the concepts and tools encountered in a typical undergraduate managerial accounting course. The problems use a common data set and focus on the transition from financial accounting, cost classifications breakeven analysis, alternative income statement formats, operational budgeting and decision making.

Keywords: managerial accounting, cost behavior, breakeven analysis, budgeting

Note: This is a fictitious case developed for educational use. All statements, names, numbers, dates, etc. used herein were created for the purposes of this case and should not be construed as factual.

INTRODUCTION TO THE STUDENT

This series of problems is designed to give you practice working with several of the concepts and tools encountered in a typical undergraduate managerial accounting course. As is evident from the title, the focus is on a fictitious small business selling a readily recognizable item—crackers. Why focus on small businesses? Well, small businesses are familiar. The local non-chain burger joint, the dry cleaner, your favorite spot to hang out with friends, and the mechanic who fixes your car are all probably small businesses. Furthermore, Exxon's mega millions are simply beyond our frame of reference; it is hard to imagine financial numbers that big. Finally, if someone in your family owns a small business, the sorts of issues in these exercises may well be the subject of conversation around the dinner table at home; for those with such a background, much of what follows may be familiar territory.

The problems that follow use a common data set. One advantage to the use of a common set of data is that, with repeated use of the same data, the concepts and tools of managerial accounting begin to make a little more sense. It becomes more obvious how the pieces of the puzzle fit together and one sees the business in the larger context of the variety of problems and issues facing a small business owner. The materials that follow are not a substitute for a textbook, class attendance, participation in on-line learning sessions, or whatever other materials your instructor may use.

Here is an overview of the modules that follow.

1. The first section focuses on the balance sheet. What will the balance sheet look like and how will it change as a prospective small business owner invests in the business, gets a loan from the bank and acquires assets? Obtaining a loan from the bank carries with it the presumption of repayment, one of the exercises in this section involves setting up a mortgage amortization table; the table will enable the Stevensons to determine how much principle and interest will be repaid each month.
2. The next topic is costs, cost classifications, and where different kinds of costs show up on the income statement.
3. There are two different income statement formats: absorption costing and variable costing. Absorption costing is required for GAAP. Under absorption costing, fixed manufacturing overhead is allocated to production, capitalized in inventory, and written off with cost of goods sold. For internal decision making purposes, variable costing is often used; under variable costing, only the variable costs of production are charged to inventory and expensed through cost of goods sold. Fixed manufacturing overhead is expensed as a lump sum.
4. The next topic is operational budgeting, which is the development of comprehensive projections of sales, expenses, cash flows, and the impact of transactions on the balance sheet and the income statement.
5. One of the major topics covered in a managerial accounting course is incremental analysis and decision making. Decisions about pricing, production and distribution can have a significant impact on profitability. This section provides some examples of those decisions in the context of the Crummy Cracker Company.
6. The final section focuses on variance analysis and performance evaluation. The case "fast-forwards" to the end of Crummy Cracker's first year of operations and see how they did. Was net income higher or lower than expected? Why? There are numerous reasons why income might be different from what was expected. Revenues might be higher [or lower]

because more [or fewer] boxes of crackers were sold than anticipated. If they sold more because the price was reduced, did they sell enough more crackers to offset the revenue lost because they cut the price? These are some of the issues covered in this section.

PART 1: BALANCE SHEET RELATIONSHIPS

The objectives of this first unit are to [1] establish the context for the exercises that follow, [2] to review the basics of balance sheet relationships, and [3] to illustrate the use of Excel to calculate a mortgage payment and to create a mortgage amortization table.

Context: George Stevenson and his brother Bob have decided to form a new business—the Crummy Cracker Company. This fictitious setting provides an opportunity to discuss many of the issues covered in an introductory managerial accounting course. The first unit follows George and Bob as they go through the steps necessary to get the business started. Because our focus is on the accounting impact of each step, time is compressed. Getting a business like this started would realistically take several months, so several simplifying assumptions are added. The case assumes that they get everything done in a week. Let's follow George and Bob as they get the business started.

Early on December 26th, 2011, the Stevensons invested $65,000 in the business. Later that day, the Stevensons filed the necessary legal papers to incorporate their business in the state of Washington. George wrote a check to cover the $2,000 in legal costs and other fees associated with the preparation of the firm's articles of incorporation.

Balance sheet #1: Use the template on the next page to prepare a balance sheet as of the end of the day on December 26th. Hint: Note that startup costs are not the same as an investment in the firm or the use of invested funds to acquire capital assets. Work through the following definitions to be sure you understand the difference between these concepts. They are things that often give students trouble.

- Investment: The investor exchanges money [or some other asset] for an ownership share in the firm. Investment in the firm increases the firm's assets and increases the equity in the firm.
  Capital assets: The firm uses invested or borrowed funds [= "money"] to acquire physical stuff, such as buildings, land, machinery, rights to patents, or whatever. If cash is spent for capital assets, total assets stay the same—they have just exchanged one type of asset for another. If capital assets are acquired through the use of debt, both debt and assets increase in equal amounts.
- Startup costs: The firm spends money to do things [other than acquire capital assets] up front before they actually open the door. The legal expenses are what are called a "startup" cost—a one-time outlay required to get the business started. Other examples of startup costs would include things like research about potential markets and the viability of a particular business or business location, advertising prior to opening the business, or wages and salaries incurred prior to the opening of the business. Under GAAP, startup costs must be expensed as they are incurred. The major difference between startup costs and investments is that startup costs are individually relatively small in amount and not expenditures for capital assets—land, buildings, machinery, equipment, etc.
- Expenses: Expenses represent the *recurring* consumption of a resource. They may be outlays of cash [e.g., for rent, payroll, office supplies, or any number of other things] or

they may be noncash recognition of the declining value of an asset [e.g., depreciation on machinery or amortization of patents]. They major difference between startup costs and expenses is that expenses are recurring; startup costs happen once.

Balance Sheet Template

	A	B	C	D
1	Assets	Amount	Liabilities & Equity	Amount
2				
3				
4				
5				
6	Total		Total	

On December 27h, George and Bob went to the First Last and Only National Bank of Parkland, and because of their excellent credit ratings, were immediately able to secure a $35,000, 5-year term loan at 8% annual interest to finance the start up of the business. The bank transferred the proceeds of the loan directly into the company's bank account.

Balance sheet #2: Create a new balance sheet to reflect the situation at the end of the day on December 27th. Use the template below.

Balance Sheet Template

	A	B	C	D
1	Assets	Amount	Liabilities & Equity	Amount
2				
3				
4				
5				
6	Total		Total	

About that mortgage

Late on December 27th, as they drove home from the bank, George and Bob began to wonder [and worry] about the size of the mortgage payment they would have to make for the

$35,000 loan. They called us as soon as they got home and asked for help. The mortgage calculations can be done on a financial calculator; this section illustrates the mechanics of setting up the calculations in Excel.

Determining the monthly payment: Open a new worksheet in the same Excel workbook as your balance sheets; rename the worksheet "Mtge" [no quotes]. Set up a worksheet that looks like the screenshot below. Don't worry about the shading and cross-hatching. That formatting is used simply to indicate that those cells are blank. Note that CELL REFERENCING has been used for all the calculations and for any information that was entered previously [like the amount of the loan]. Note also that items are labeled in the cells to the left so that the amounts entered can be used later in calculations.

	A	B	C	D	E
1	Crummy Cracker Mortgage Amortization				
2		Basic Calculations			
3		Principle	35000		
4		Interest rate	0.08	=(C4/12)	(per month)
5		Years	5	=C5*12	months
6		Periodic payment	=PMT(D4,D5,-C3)		
7		Annual payment	=C6*12		
8		Total interest	=(+C6*D5)-C3		

The arguments for the =PMT( ) function are the interest rate, the number of periods over which the debt will be repaid, and the original amount borrowed. It is important that the number of payment periods and the interest rate be consistent. The Stevensons are making monthly payments over 5 years, or 60 monthly payments; therefore, cell E5 will return a value of 60. Since the payments are monthly, it is essential to use a monthly interest rate; cell E4 will return a value of 0.67% or 0.00666666666667. Finally, use of the –C3 in cell C6 returns the payment as a positive number. The folks who wrote the code for Excel elected to make the "normal" result from the =PMT( ) function negative, presumably because the amount is typically a payment. However, this can create problems unless you have your brain programmed to enter all payments as negative values. To avoid this, simply force the function to give an unsigned value, thus eliminating the possibility of a "sign" error in later calculations. The cell references in the top of the mortgage worksheet looks like this:

After you are finished, your mortgage worksheet should look like the screenshot below. Make corrections in your worksheet as necessary.

	A	B	C	D	E
1		Crummy Cracker Mortgage Amortization			
2		Basic Calculations			
3		Principle	$35,000		
4		Interest rate	8%	0.67%	(per month)
5		Years	5	60	months
6		Periodic payment	$709.67		
7		Annual payment	$8,516		
8		Total interest	$7,580		

Setting up a mortgage amortization table: Now they know the total annual payment, but George and Bob want to know how that breaks down between principle and interest. Let's create a mortgage amortization table for the Crummy Cracker Company. The screenshot below is in the Mtge worksheet, starting with row 9. Once you have filled in row 13, the appropriate combination of absolute and relative cell referencing enables you to simply copy columns C, D, E, and F down and complete the entire table. Row 22 is highlighted in gray shading because it is the 12th month and therefore the end of year 1. Row 23 starts the next year.

	A	B	C	D	E	F
6		Periodic payment	=PMT(D4,D5,-C3)			
7		Annual payment	=C6*12			
8		Total interest	=(+C6*D5)-C3			
9	Amortization schedule					
10	Year	Month	Payment	Interest	Principle	Balance due
11	Beginning balance					=C$3-E11
12	1	1	=$C$6	=D4*C3	=C12-D12	=C$3-E12
13	1	2	=$C$6	=$D$4*F12	=C13-D13	=F12-E13
14	1	3	=$C$6	=$D$4*F13	=C14-D14	=F13-E14
15	1	4	=$C$6	=$D$4*F14	=C15-D15	=F14-E15
16	1	5	=$C$6	=$D$4*F15	=C16-D16	=F15-E16
17	1	6	=$C$6	=$D$4*F16	=C17-D17	=F16-E17
18	1	7	=$C$6	=$D$4*F17	=C18-D18	=F17-E18
19	1	8	=$C$6	=$D$4*F18	=C19-D19	=F18-E19
20	1	9	=$C$6	=$D$4*F19	=C20-D20	=F19-E20
21	1	10	=$C$6	=$D$4*F20	=C21-D21	=F20-E21
22	1	11	=$C$6	=$D$4*F21	=C22-D22	=F21-E22
23	1	12	=$C$6	=$D$4*(C$3-SUM	=C23-D23	=F22-E23
24	2	1	=$C$6	=$D$4*(C$3-SUM	=C24-D24	=F23-E24
25	2	2	=$C$6	=$D$4*(C$3-SUM	=C25-D25	=F24-E25
26	2	3	=$C$6	=$D$4*(C$3-SUM	=C26-D26	=F25-E26
27	2	4	=$C$6	=$D$4*(C$3-SUM	=C27-D27	=F26-E27

The formulas in the screenshot above yield the numerical results in the screenshot below.

	A	B	C	D	E	F
6		Periodic payment	$709.67			
7		Annual payment	$8,516			
8		Total interest	$7,580			
9	Amortization schedule					
10	Year	Month	Payment	Interest	Principle	Balance due
11	Beginning balance					$ 35,000
12	1	1	$710	$233	$476	34,524
13	1	2	710	230	480	34,044
14	1	3	710	227	483	33,561
15	1	4	710	224	486	33,075
16	1	5	710	221	489	32,586
17	1	6	710	217	492	32,094
18	1	7	710	214	496	31,598
19	1	8	710	211	499	31,099
20	1	9	710	207	502	30,597
21	1	10	710	204	506	30,091
22	1	11	710	201	509	29,582
23	1	12	710	197	512	29,070
24	2	1	710	194	516	28,554
25	2	2	710	190	519	28,034
26	2	3	710	187	523	27,512
27	2	4	710	183	526	26,985

Note that the monthly amounts are formatted to zero decimals. In this particular set of calculations, the pennies are irrelevant; the decimal point and the values in the ones and tens column each take up column space, necessitating wider columns. As you widen the columns, you can see less of an individual worksheet on the screen, and printing consumes more area on the page. Moral? Show decimals where they are relevant.

Note also that formatting cells to a number of decimal places is strictly cosmetic—it changes what you see on the screen [or paper], but the value behind the visual image stays the same. For example, the monthly payment is actually $709.673800094479, formatted to 12 decimal places. However, if you use the =ROUND function, it will truncate values to a specific number of places to the right or left of the decimal. Therefore, the =ROUND function actually changes the value in a cell, and consequently changes results when the rounded values are used in later calculations.

Balance sheet #3: On December 28th, George and Bob rented the space they would need and acquired bakery equipment worth $57,000 and office equipment worth $25,000. Installation of the bakery equipment [wiring, plumbing, etc.] cost $3,000. George wrote checks to cover these transactions. The Stevensons were able to find a very capable and speedy crew to help them set up the equipment before they headed off to a New Year's Eve party. Create yet another balance sheet to reflect the situation as of December 31st. Use the form below. You may or may not need to add lines.

Balance Sheet Template

	A	B	C	D
1	Assets	Amount	Liabilities & Equity	Amount
2				
3				
4				
5				
6	Total		Total	

Hint #1: Installation costs and other costs [e.g., transportation] associated with the acquisition of capital assets are capitalized.

Hint #2: Show the short term portion of the long term debt as a separate item under *current* liabilities.

Excel extension:

1. Set up a balance sheet worksheet in Excel, using your pencil-and-paper balance sheets as a model. The overall structure of your worksheet should look something like the screenshot on the next page. Put them all in the same worksheet, using the first few rows for the first balance sheet, the next fw rows for the second, and so on.
2. Set up the mortgage worksheet in Excel. Use the model given above as a guide.

PART 2: FIXED COSTS, VARIABLE COSTS AND INCOME STATMENTS

Details about revenues, costs, and operations: It is now December 30th. George and Bob have already spent considerable time thinking about their business and have developed a relatively comprehensive analysis of anticipated costs and revenues. The Stevensons want help developing a projection for net income for their first year of operations.

The Stevensons plan to start out selling just one kind of crackers—"regular" Crummy Crackers—which will sell for $2.40 per box. Direct material [cracker ingredients] is expected to cost $0.50 per box. Direct labor [cracker maker-baker wages] is expected to be $0.25 per box. Variable overhead [electricity, cracker boxes, plastic liners for the boxes] is expected to amount to $0.41 per box. Bakery supervision will cost $28,000 annually. George's salary as president of the company will be $42,000; Bob will be in charge of sales and will earn a salary of $9,000 annually, plus a commission of 10% of sales. Fire insurance is $4,000 per year, payable on the first of January, April, July, and October. The bakery will have an annual capacity of 150,000 boxes of crackers.

Required: calculate the following items. Omit the interest on the debt for the purpose of these calculations.

1. Variable costs:
    a. total variable manufacturing cost per box
    b. total variable selling and administrative costs per box
    c. total variable cost per box
2. Fixed costs
    a. total fixed manufacturing costs per year
    b. total manufacturing cost per box at a production level of
        i. 120,000 boxes and
        ii. 150,000 boxes.
    c. What conclusion can you draw about the usefulness of total costs per box?
3. Determine the total fixed non-manufacturing costs per year
4. Determine the total fixed cost per year
5. Write an equation that will enable you to determine net income at any reasonable level of sales, using X as the variable for the number of boxes of crackers sold.
6. Use your equation from #5 to determine the projected net income under absorption costing, given the following alternative scenarios:
    a. they produce and sell 120,000 boxes
    b. they produce and sell 100,000 boxes
    c. they produce 120,000 boxes but sell only 100,000 boxes.

Coming up next: a different income statement format

PART 3: INTRODUCING THE CONCEPT OF CONTRIBUTION MARGIN

The original data are repeated below for your reference.

The Stevensons plan to start out selling just one kind of crackers—"regular" Crummy Crackers—which will sell for $2.40 per box. Direct material [cracker ingredients] is expected to cost $0.50 per box. Direct labor [cracker maker-baker wages] is expected to be $0.25 per box. Variable overhead [electricity, cracker boxes, plastic liners for the boxes] is expected to amount to $0.41 per box. Bakery supervision will cost $28,000 annually. George's salary as president of the company will be $42,000; Bob will be in charge of sales and will earn a salary of $9,000 annually, plus a commission of 10% of sales. Fire insurance is $4,000 per year, payable on the first of January, April, July, and October. The bakery will have an annual capacity of 150,000 boxes of crackers.

Required: Calculate the following items; ignoring the interest on the debt for now.

1. Contribution margin
    a. contribution margin from production per unit
    b. total contribution margin per unit
    c. total contribution margin ratio
2. Breakeven
    a. annual breakeven point in boxes
    b. annual breakeven point in sales revenue

3. Write an equation that will enable you to determine net income at any reasonable level of sales, assuming variable costing. Use X as the variable for the number of boxes of crackers sold.
4. Determine the projected net income under variable costing, given the following scenarios:
    a. they produce and sell 120,000 boxes
    b. they produce and sell 100,000 boxes.
5. Look at your answers to 4a and 4b, above.
    a. Subtract your net income from 4b, above from your net income from 4a.
    b. In 4b vs. 4a, what is the difference in the number of boxes produced and sold?
    c. Divide the difference in net income by the difference in boxes.
    d. Where have you seen this number before?
    e. What conceptual relationship can you use to simplify the calculation of net income under variable costing?
6. Use your equation from #3 to determine the net income under variable costing, assuming that they produce 120,000 boxes but sell only 100,000 boxes. Would net income under absorption costing be greater or less than net income under variable costing? Why? What is going on? Ignore startup costs and interest.

After listening to your analysis of these numbers, the Stevenson's have suddenly realized that there is a whole lot more to planning business operations for a year then they had thought. They have asked for much more detailed projections for their first year of operations. So that you can respond to their needs, the next section deals with what is called operational budgeting.

PART 4: OPERATIONAL BUDGETING

After reviewing your work on the income statements, the Stevensons realize this is a whole lot more complicated than they had expected. What about cash? Inventory? They have decided a more comprehensive budget is necessary and have asked for your assistance. With a bit of prodding, they are able to provide more information about their anticipated operations. The Stevensons have projected annual sales of 120,000 boxes of crackers, distributed as follows:

Projected monthly sales [boxes of regular crackers]												
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
8,000	9,500	9,500	11,500	10,000	11,500	10,000	10,000	11,000	9,000	10,000	10,000	120,000

They had initially hoped that they would be able to collect all the cash from sales within the month of the sale, but after conversations with local businesses, they realize that their assumption about cash collections was unrealistic. It appears that a more realistic scenario is as follows: 50% of the sales would be collected in the month of sale, 25% in the month following the sale, and 24% in the second month following the sale. It appears that even after careful credit reviews and aggressive efforts at nagging delinquent accounts, 1% of the receivables will have to be written off as bad debts.

George figures they will need to have one month's worth a raw material inventory [= cracker ingredients] on hand at any given time. Furthermore, they want to have 25% of the next month's sales in ending finished goods inventory. They will buy inventory on account, with 60% of purchases paid in the month of purchase and 40% in the month following purchase.

Sales commissions will be paid in the month following the month in which they are earned. All other expenses will be paid as incurred.

George is also worried about cash flow. They have invested most of their savings in the business, so they have little to fall back on if things don't work out well. Consequently, they made another trip to the bank and were able to secure a $20,000 line of credit at 10% annual interest. Borrowing on the line will be as needed, with repayments as cash flows permit. Interest will accrue on any balance outstanding, with interest payable on the first of the month following accrual.

Required: Prepare the following schedules for the Stevenson's first years of operation; all are by month, except the balance sheet, for which an end-of-year balance sheet is all that is needed. Use Excel. You will need a series of =IF() statements to determine the borrowing and/or repayments on the line of credit.

1. Sales budget, in boxes of crackers and dollar sales	2. Cash receipts budget
3. Production budget	4. Purchases budget, including a schedule of payments for purchases
5. Selling and administrative expense budget	6. Cash budget
7. Profit plan [=budgeted income statement]; use a variable costing format.	8. Pro-forma year end balance sheet

Coming soon to a store near you…Crummy Low Fat Crackers—half the fat and twice the flavor compared to Crummy Regular Crackers.

PART 5: LET'S PRODUCE LOW-FAT CACKERS, TOO!

The Stevensons realize that production of an additional cracker variety will complicate their operations, so they would like to have a better idea of the financial impact of producing two different kinds of crackers. After considerable research, they have developed the cost and revenue numbers for a low fat cracker that they believe would appeal to their customers. Market research has shown that the low fat crackers would sell for a twenty-five cent premium over the regular crackers. Direct material would be $0.40 per box. Other variable production costs would be the same as for regular crackers and sales commissions would remain at 10% of sales. Market research indicates that 40% of the boxes sold would be low-fat and 60% would be regular. For the purposes of this analysis, ignore the startup costs and interest.

1. Determine the breakeven point if the expectations regarding the low fat crackers are fulfilled.
2. Suppose the product mix is reversed—40% of the boxes sold are regular crackers and 60% are low fat. BEFORE doing any calculations, think about whether the breakeven point will go up or down, and why. Then verify your thinking by crunching the numbers.
3. Suppose that, out of their magnanimous concern for the health of their customers, the Stevensons decide to drop regular crackers and produce only low-fat crackers. Costs, production volumes and sales prices remain the same. Assuming that 120,000 boxes are produced and sold, will net income go up or down? By how much?

4. Assume that Crummy Cracker produces and sells only low fat crackers. Determine the number of boxes of low fat crackers that would have to be sold to earn the same net income that would be earned if they produced and sold 120,000 boxes of regular crackers.

Next up: excess inventory [which means stale crackers, unfortunately], and a special order from a local supermarket chain.

PART 6: INCREMENTAL ANALYSIS AND DECISION MAKING

Each of the following scenarios is independent.

1. The Stevensons found that their sales estimates for the first few months were wildly optimistic. Consequently, there are currently 10,000 boxes of "old" crackers in inventory which cannot be sold through regular channels. Assume that annual production was 120,000 boxes. Determine the book value of the crackers:
    a. under absorption costing.
    b. under variable costing.
2. A number of options have been proposed for dealing with the excess inventory cited in #1.. For each of the following scenarios, determine the ***incremental impact*** on annual net income. Some options may have qualitative implications for the company. Identify these and evaluate the financial impact vs. the potential positive or negative qualitative implications.
    a. A local farmer has offered to haul the crackers away in his truck. He would use them for cattle feed. However, because the cattle can't eat the packaging, a Crummy Cracker employee would have to "unpackage" the crackers at a net cost to the company of $0.05 per box.
    b. Suppose the inventory value of the crackers was "astronomically higher" than either of your answers to 1[a] and 1[b]; i. e., there were lots of zeros to the left of the decimal point. Would your answer to 2[a] change? Why or why not?
    c. The crackers can be hauled to the local landfill. The county solid waste department charges $20.00 for the first 500 pounds; the fee for amounts in excess of 500 pounds is $110 per ton. The gross weight of the crackers is 17 ounces per box.
    d. Frozen Solid, Inc. a local frozen food processor would buy the crackers for a price equal to Crummy Crackers' variable cost per box. FSI would crush the crackers and use the crumbs as part of the breading for frozen fish and chicken. Crummy Cracker would have to unpackage the crackers at a cost of $0.05 per box. George Stevenson favors this idea because "at least that way we would recover our variable cost." Evaluate George's thinking.
    e. Crummy Cracker can donate the crackers to the county food bank. Food bank officials have said the crackers would "disappear quickly," given the level of unemployment in the area. The food bank would send their truck to pick up the crackers and assist in loading the crackers on the truck, so any additional costs to Crummy Cracker would be negligible.
3. Sooper Dooper Markets, a local supermarket chain, has offered to buy 10,000 boxes of regular crackers under a private label arrangement. Sooper Dooper would provide the boxes, reducing Crummy Cracker's variable overhead by $0.06 per box, and the commissions would be avoided on this order. Sooper Dooper would pay $1.20 per box. Upon hearing about the

proposed $1.20 price, Bob Stevenson said that "…we would be fools to accept that offer. Our average cost per box is $2.23; we would be losing over a dollar on every box." George Stevenson was pretty sure that Bob's evaluation was "not quite right," but he could not seem to come up with a compelling argument. Who is right? Assume that the special order would have no impact on regular sales.

4. Now assume that the special order in #2, above, would displace the sale of an equal number of boxes of regular crackers at the regular sales price. Determine the impact on net income for the year if the order is accepted.

Next on the agenda: performance evaluation and variance analysis

PART 8: PERFORMANCE REPORTING AND VARIANCE ANALYSIS

Fast forward to the end of the Stevenson's first year of operations. Late on December 31, George and Bob tally up their sales and costs for the year. Actual cracker sales volume turned out to be 123,000 boxes of regular crackers. They thought they would have some left in inventory, but thanks to several big Christmas and New Year's parties, they were able to all 123,000 boxes. While they are pleased with the sales volume, they found that the average sales price was $2.35 per box—a nickel less than they had planned. Unfortunately, $2,500 in sales proved to be uncollectible and will have to be written off. Total direct labor costs for the year were $31,500 and total direct material costs were $62,300. Variable overhead was $50,175. Sales commissions were $28,905. Fixed costs turned out to be pretty much as expected; the main exception was bakery supervision, which was $32,000. Interest on the line of credit turned out to be $967.

Required: George and Bob would like a comprehensive report on their first year of operations. Develop an analysis which compares the static budget, a flexible budget and actual experience for Crummy Cracker's first year. Compute whatever other performance indices you believe a appropriate. Your analysis should include a brief written analysis which explains the potential reasons for any variances that you find, and which provides an overall assessment of Crummy Cracker's first year of operations. The Stevenson's original estimates of costs and sales prices are repeated here for your convenience.

> The Stevensons plan to start out selling just one kind of crackers—"regular" Crummy Crackers—which will sell for $2.40 per box. Direct material [cracker ingredients] is expected to cost $0.50 per box. Direct labor [cracker maker-baker wages] is expected to be $0.25 per box. Variable overhead [electricity, cracker boxes, plastic liners for the boxes] is expected to amount to $0.41 per box. Bakery supervision will cost $28,000 annually. George's salary as president of the company will be $40,000; Bob will be in charge of sales and will earn a salary of $9,000 annually, plus a commission of 10% of sales. Rent is $6,000 per year. The bakery will have an annual capacity of 150,000 boxes of crackers.

Assume a static budget of 120,000 boxes.

Crummy Cracker Company: Exercises for managerial Accounting
Teaching Note

This set of exercise began as a simple breakeven problem. Over time, I added several of the other topics typically covered in an introductory managerial accounting class. The sections at the beginning are specifically designed to serve as a bridge from introductory financial accounting. As with many such efforts, there tends to be an emphasis on those elements that seem to cause the most difficulty for students. Hence the coverage of investment, purchase of fixed assets, startup costs, and the initial focus on balance sheets.

The exercises are intended for use in an introductory undergraduate managerial accounting class. The entire document can be handed out as a set at the start of the course or individual sections can be handed out as needed. The exercises can be used as tutorials, homework assignments, or quizzes. The topics are covered in the following order:

1. Balance sheets, including a section on mortgage amortization using Excel
2. Cost classifications and income statements; absorption costing
3. Contribution margins, breakeven points
4. Operational budgeting
5. Let's produce low-fat crackers; multiple product break even analysis
6. Decision making and incremental analysis
7. Performance review and variance analysis

PART 1: BALANCE SHEETS

Balance sheet as of December 26th, 2011:

Crummy Cracker Company			
Balance Sheet #1 [12/26/2011]			
Assets		Liabilities and equity	
Cash	$ 63,000	Owner equity	$65,000
		Retained earnings	$ (2,000)
Total assets	$ 63,000	Total Liabilities + Equity	$63,000

Balance sheet on December 27th:

Crummy Cracker Company			
Balance Sheet #2 [12/27/2011]			
Assets		Liabilities and equity	
Cash	$ 98,000	Mortgage [FL & O N B of P]	$35,000
		Owner equity	$65,000
		Retained earnings	$ (2,000)
Total assets	$ 98,000	Total Liabilities + Equity	$98,000

Balance sheet on December 28th:

Crummy Cracker Company			
Balance Sheet #3 [12/28/2011]			
Assets		Liabilities and equity	
Cash	$ 13,000	Mortgage [FL & O N B of P]	$35,000
Bakery equipmer	$ 60,000	Owner equity	$65,000
Office equipment	$ 25,000	Retained earnings	$ (2,000)
Total assets	$ 98,000	Total Liabilities + Equity	$98,000

The cash balance is $98,000 – 60,000 – 25,000.

PART 2: FIXED COSTS, VARIABLE COSTS, AND INCOME STATEMENTS

a. Variable costs:
    a. total variable manufacturing cost per box $0.50 + 0.25 + 0.41 = $1.16
    b. total variable selling and administrative costs per box 10% * $2.40 = $0.24
    c. total variable cost per box $1.16 + 0.24 = $1.40
b. Fixed costs
    a. total fixed manufacturing costs per year

Supervision	$28,000
Depreciation on bakery equipment [$57,000 + $3,000 = $60,000; 5 yr useful life, so annual depreciation is $12,000]	12,000
Total annual fixed manufacturing costs	$40,000

    b. Total fixed manufacturing cost per box:

Variable mfg cost per unit	Total fixed mfg costs	Production volume	Fixed mfg cost per unit	Total cost per unit
$1.16	$40,000	120,000	$0.333	$1.49
$1.16	$40,000	150,000	$0.267	$1.43

    c. Total manufacturing costs per box is dependent on production volume. Since the cost will be "correct" only at one specific volume, total costs per unit should be used with extreme caution.
c. Total fixed non-manufacturing costs are the president's salary [$42,000], the sales salaries [$9,000], the annual insurance premium [$4,000], and the depreciation on office equipment [$5,000], for a total of $60,000.
d. Total fixed costs per year are $100,000 [$40,000 + $60,000].
e. Income statement equation is

NI = $2.40X - $1.16X – [$40,000 * % of production sold] - $.24X - $60,000

f. Projected net incomes under absorption costing given the three scenarios follow below

If 120,000 boxes are produced and sold, the formula yields a net income of $20,000:

Crummy Cracker Company: Income statement under absorption costing					
	Regular		Low-Fat		Total
Production in units	120,000		-		120,000
Sales in units	120,000		-		120,000
Percentage of output sold	100%		0%		
Percentage of output to inventory	0%		100%		
Units to Inventory	-		-		-
Revenue	$ 2.40	$288,000	2.65	$ -	$288,000
Total cost of goods manufactured	Per unit	Total	Per unit	Total	
Raw material	$ 0.500	$ 60,000	0.40	$ -	
Direct labor	$ 0.250	30,000	0.25	-	
Variable overhead	$ 0.410	49,200	0.41	-	
Fixed overhead		40,000		-	
Total manufacturing costs incurred		179,200		-	
Amt to CGS		179,200		-	$179,200
Amount to inventory		-		-	
Gross margin					108,800
Less selling and administrative costs					
Commissions	10.00%	28,800	10.00%	$ -	28,800
Exec Salaries					42,000
Sales salaries					9,000
Depreciation					5,000
Insurance premium					4,000
Total selling and administrative costs					88,800
Net income before writeoff of startup costs and interest					20,000

If 100,000 boxes are produced and sold, the formula reveals that they are at the breakeven point:

Crummy Cracker Company: Income statement under absorption costing					
	Regular		Low-Fat		Total
Production in units	100,000		-		100,000
Sales in units	100,000		-		100,000
Percentage of output sold	100%		0%		
Percentage of output to inventory	0%		100%		
Units to Inventory	-		-		-
Revenue	$ 2.40	$240,000	2.65	$ -	$240,000
Total cost of goods manufactured	Per unit	Total	Per unit	Total	
Raw material	$ 0.500	$ 50,000	0.40	$ -	
Direct labor	$ 0.250	25,000	0.25	-	
Variable overhead	$ 0.410	41,000	0.41	-	
Fixed overhead		40,000		-	
Total manufacturing costs incurred		156,000		-	
Amt to CGS		156,000		-	$156,000
Amount to inventory		-		-	
Gross margin					84,000
Less selling and administrative costs					
Commissions	10.00%	24,000	10.00%	$ -	24,000
Exec Salaries					42,000
Sales salaries					9,000
Depreciation					5,000
Insurance premium					4,000
Total selling and administrative costs					84,000
Net income before writeoff of startup costs and interest					-

If they produce 120,000 boxes, but sell only 100,000, the income statement will look like this:

Crummy Cracker Company: Income statement under absorption costing					
	Regular		Low-Fat		Total
Production in units	120,000		-		120,000
Sales in units	100,000		-		100,000
Percentage of output sold	83%		0%		
Percentage of output to inventory	17%		100%		
Units to Inventory	20,000		-		20,000
Revenue	$ 2.40	$240,000	2.65	$ -	$240,000
Total cost of goods manufactured	Per unit	Total	Per unit	Total	
Raw material	$ 0.500	$ 60,000	0.40	$ -	
Direct labor	$ 0.250	30,000	0.25	-	
Variable overhead	$ 0.410	49,200	0.41	-	
Fixed overhead		40,000		-	
Total manufacturing costs incurred		179,200		-	
Amt to CGS		149,333		-	$149,333
Amount to inventory		29,867		-	
Gross margin					90,667
Less selling and administrative costs					
Commissions	10.00%	24,000	10.00%	$ -	24,000
Exec Salaries					42,000
Sales salaries					9,000
Depreciation					5,000
Insurance premium					4,000
Total selling and administrative costs					84,000
Net income before writeoff of startup costs and interest					6,667

PART 3: CONTRIBUTION MARGIN

1. Contribution margin calculations:

Sales price/unit		$ 2.400	given
Direct material per box		$ 0.500	given
Boxes produced per hour	60		given
Direct labor wage rate/hour	$ 15.00		given
Variable overhead rate/hour	$ 24.60		given
Direct labor per box		$ 0.250	given
Variable overhead per box		$ 0.410	given
Total variable mfg costs/box		$ 1.160	Sum of DL DM and VOHD
Contribution margin from production		$ 1.240	[1a] 2.40 – 1.16
Sales commission rate	10.00%		given
Sales commission [$]		$ 0.240	10% of sales price
Total variable cost/unit		$ 1.400	1.16 + .24 = 1.40
Total contribution margin/unit		$ 1.000	[1b] 2.40 – 1.40
Contribution margin ratio		41.67%	[1c] 1.00/2.40

2. a. break even in boxes = TFC/CM/unit = $100,000/$1.00 per unit = 100,000 units.

2. b. breakeven in revenue = TFC/CMR = $100,000/.41666…7 = $240,000; 100,000 boxes at $2.40 each = $240,000

3. The income statement equation would be:

NI = $2.40X - $1.40X – $40,000 – $60,000

4. Projected net incomes under variable costing, assuming [1] production and sales of 120,000 boxes, and [2] production and sales of 100,000 boxes are shown below.

Part a: Produce and sell 120,000 boxes

Crummy Cracker Company: income statement under variable costing					
	Regular		Low Fat		Total
Production in units	120,000		-		120,000
Sales in units	120,000		-		120,000
Percentage of output sold	100%		0%		
Percentage of output to inventory	0%		100%		
Units to Inventory	-		-		
Revenue	$ 2.40	$288,000	2.65	$ -	$ 288,000
Variable cost of goods manufactured	Per unit	Total	Per unit	Total	
Raw material	$0.500	$ 60,000	$ 0.400	$ -	$ 60,000
Direct labor	$0.250	$ 30,000	$ 0.250	$ -	$ 30,000
Variable overhead	$0.410	$ 49,200	$ 0.410	$ -	$ 49,200
Total variable manufacturing costs		$139,200		$ -	$ 139,200
Less: Amount to inventory		$ -		$ -	$ -
Amount to Variable CGS		$139,200		$ -	$ 139,200
Contribution margin from production					$ 148,800
Less variable selling expenses		28,800		-	$ 28,800
Contribution margin					$ 120,000
Less fixed costs	which are allocated to either product				
Manufacturing					
Supervision				28,000	
Depreciation				12,000	40,000
Selling & administrative expenses					
Exec Salaries				42,000	
Sales salaries				9,000	
Depreciation				5,000	
Insurance premium				4,000	60,000
Total fixed costs					100,000
Net income B/4 startup costs and interest					$ 20,000

Part b: Produce and sell 100,000 boxes

Crummy Cracker Company: income statement under variable costing					
	Regular		Low Fat		Total
Production in units	100,000		-		100,000
Sales in units	100,000		-		100,000
Percentage of output sold	100%		0%		
Percentage of output to inventory	0%		100%		
Units to Inventory	-		-		
Revenue	$ 2.40	$240,000	2.65	$ -	$ 240,000
Variable cost of goods manufactured	Per unit	Total	Per unit	Total	
Raw material	$0.500	$ 50,000	$ 0.400	$ -	$ 50,000
Direct labor	$0.250	$ 25,000	$ 0.250	$ -	$ 25,000
Variable overhead	$0.410	$ 41,000	$ 0.410	$ -	$ 41,000
Total variable manufacturing costs		$116,000		$ -	$ 116,000
Less: Amount to inventory		$ -		$ -	$ -
Amount to Variable CGS		$116,000		$ -	$ 116,000
Contribution margin from production					$ 124,000
Less variable selling expenses		24,000		-	$ 24,000
Contribution margin					$ 100,000
Less fixed costs					
Manufacturing					
Supervision				28,000	
Depreciation				12,000	40,000
Selling & administrative expenses					
Exec Salaries				42,000	
Sales salaries				9,000	
Depreciation				5,000	
Insurance premium				4,000	60,000
Total fixed costs					100,000
Net income B/4 startup costs and interest					$ -

5. Analysis of results from 3a and 3b:

Income at 120,000 units	$20,000	Q. 4a
Income at 100,000 units	0	
Difference in income	$20,000	
Difference in boxes sold	20,000	Q. 4b
Divide difference in income by difference in boxes sold	$1.00 per box	Q. 4c

Q. 4d and 4e: Where have you seen this number before? The contribution margin per unit is $1.00 per box. The conceptual relationship is as follows: Under variable costing, if you know the breakeven point, you can use the contribution margin per unit to determine net income, given a specific sales level. Each additional unit sold contributes $1.00 to Crummy Cracker's bottom line. Therefore, net income will increase by $1.00 per box as they move up from the breakeven point. Conversely, if they are at the breakeven point, each additional box NOT sold increases the net lost by $1.00.

6. NI = $2.40 [100,000] - $1.40 [100,000] – $40,000 – $60,000 = 0

They will break even if the startup costs and interest are ignored. Net income under absorption costing would be $6,667 before the write-off of startup costs and interest. The difference between this and the breakeven number under variable costing is due to the respective treatments of fixed manufacturing overhead. Under variable costing, all the fixed manufacturing overhead is written off against the revenue from the sale of 100,000 units, irrespective of how many units were produced. Under absorption costing, fixed overhead is written off in pro-rata fashion: they sold 10/12ths of the production [100K/120K] so 10/12ths of the fixed costs will be expensed. 10/12 = 5/6; 5/6 * $40,000 in fixed overhead = $33,333, which is the fixed cost portion of absorption cost of goods sold. Under absorption costing, the remaining $1/6^{th}$ of the overhead will be capitalized into inventory and expensed whenever the remaining units are sold. The difference between the total overhead [$40,000] and the $33,333 written off under absorption costing is $6,667, which is the net income under absorption costing. Since this amount is written off under variable costing, absorption costing shows a higher net income. Ceteris paribus, when production exceeds sales, absorption costing net income will be higher than variable costing net income. When sales exceeds production [drawing on "old" inventory"], variable costing will show a higher net income, since all of the fixed overhead associated with the "old" production will have been expensed in a prior period.

PART 4: OPERATIONAL BUDGETING

The sales and cash receipts budget is step 1. The results look like this.

		Sales forecast and cash receipts for Crummy Cracker																	
	Month	January	February	March	April	May	June	July	August	September	October	November	December	Total					
	Boxes	8,000	9,500	9,500	11,500	10,000	11,500	10,000	10,000	11,000	9,000	10,000	10,000	120,000					
	Sales	######	######	$ 22,800	$27,600	$24,000	$27,600	$24,000	$24,000	$ 26,400	$21,600	$ 24,000	$ 24,000	$288,000					
		Month of sale	Next Month	Second month	Bad Debts														
Cash collections pattern		50%	25%	24%	1%														
			Cash collected in																
			January	February	March	April	May	June	July	August	September	October	November	December	January	February	Bad debts	Proof of Total	
From sales in	January	$ 19,200	$ 9,600	$ 4,800	$ 4,608												$ 192	$ 19,200	
	February	$ 22,800		######	$ 5,700	$ 5,472											$ 228	$ 22,800	
	March	$ 22,800			$ 11,400	$ 5,700	$ 5,472										$ 228	$ 22,800	
	April	$ 27,600				$13,800	$ 6,900	$ 6,624									$ 276	$ 27,600	
	May	$ 24,000					$12,000	$ 6,000	$ 5,760								$ 240	$ 24,000	
	June	$ 27,600						$13,800	$ 6,900	$ 6,624							$ 276	$ 27,600	
	July	$ 24,000							$12,000	$ 6,000	$ 5,760						$ 240	$ 24,000	
	August	$ 24,000								$12,000	$ 6,000	$ 5,760					$ 240	$ 24,000	
	September	$ 26,400									$ 13,200	$ 6,600	$ 6,336				$ 264	$ 26,400	
	October	$ 21,600										$10,800	$ 5,400	$ 5,184			$ 216	$ 21,600	
	November	$ 24,000											$ 12,000	$ 6,000	$ 5,760		$ 240	$ 24,000	
	December	$ 24,000												$ 12,000	$ 6,000	$ 5,760	$ 240	$ 24,000	
Totals		$ 288,000	$ 9,600	######	$ 21,708	$24,972	$24,372	$26,424	$24,660	$24,624	$ 24,960	$23,160	$ 23,736	$ 23,184	$ 11,760	$ 5,760	$ 2,880		

The production budget and inventory analysis looks like this:

Crummy Cracker Production Budget															
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar
Sales [boxes]	8,000	9,500	9,500	11,500	10,000	11,500	10,000	10,000	11,000	9,000	10,000	10,000	8,000	9,500	9,500
Desired ending FG inventory [boxes]	2,375	2,375	2,875	2,500	2,875	2,500	2,500	2,750	2,250	2,500	2,500	2,000	2,375	2,375	
Total inventory requirement	10,375	11,875	12,375	14,000	12,875	14,000	12,500	12,750	13,250	11,500	12,500	12,000	10,375		
Less BFG invty	0	2,375	2,375	2,875	2,500	2,875	2,500	2,500	2,750	2,250	2,500	2,500	2,000		
Required production	10,375	9,500	10,000	11,125	10,375	11,125	10,000	10,250	10,500	9,250	10,000	9,500	8,375		
Direct material required for	$ 5,188	$ 4,750	$ 5,000	$ 5,563	$ 5,188	$ 5,563	$ 5,000	$ 5,125	$ 5,250	$ 4,625	$ 5,000	$ 4,750	$ 4,188		
Add: req'd DM ending invty	$ 4,750	$ 4,750	$ 5,750	$ 5,000	$ 5,750	$ 5,000	$ 5,000	$ 5,500	$ 4,500	$ 5,000	$ 5,000	$ 4,000			
Total direct mat'l	$ 9,938	$ 9,500	$ 10,750	$ 10,563	$ 10,938	$ 10,563	$ 10,000	$ 10,625	$ 9,750	$ 9,625	$ 10,000	$ 8,750			
Less beginning DM	$ -	$ (4,750)	$ (4,750)	$ (5,750)	$ (5,000)	$ (5,750)	$ (5,000)	$ (5,000)	$ (5,500)	$ (4,500)	$ (5,000)	$ (5,000)			
Required purchases of DM	$ 9,938	$ 4,750	$ 6,000	$ 4,813	$ 5,938	$ 4,813	$ 5,000	$ 5,625	$ 4,250	$ 5,125	$ 5,000	$ 3,750	$ 65,000		
Value of ending finished goods	$ 2,755.00	$ 2,755	$ 3,335	$ 2,900	$ 3,335	$ 2,900	$ 2,900	$ 3,190	$ 2,610	$ 2,900	$ 2,900	$ 2,320			
Value of VCGS	$ 9,280	$ 11,020	$ 11,020	$ 13,340	$ 11,600	$ 13,340	$ 11,600	$ 11,600	$ 12,760	$ 10,440	$ 11,600	$ 11,600			

Here is the analysis of payments for purchases of inventory, payroll, variable overhead, and bakery supervision:

Mo. Of	Next Mo.														
60%	40%														
Payments for purchases															
Purchases	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Proof	
$ 9,938	$ 5,962.50	$ 3,975.00												$ 9,938	
$ 4,750		$ 2,850.00	$ 1,900.00											$ 4,750	
$ 6,000			$ 3,600	$ 2,400										$ 6,000	
$ 4,813				$ 2,888	$ 1,925									$ 4,813	
$ 5,938					$ 3,563	$ 2,375								$ 5,938	
$ 4,813						$ 2,888	$ 1,925							$ 4,813	
$ 5,000							$ 3,000	$ 2,000						$ 5,000	
$ 5,625								$ 3,375	$ 2,250					$ 5,625	
$ 4,250									$ 2,550	$ 1,700				$ 4,250	
$ 5,125										$ 3,075	$ 2,050			$ 5,125	
$ 5,000											$ 3,000	$ 2,000		$ 5,000	
$ 3,750												$ 2,250	$ 1,500	$ 3,750	
	$ 5,963	$ 6,825	$ 5,500	$ 5,288	$ 5,488	$ 5,263	$ 4,925	$ 5,375	$ 4,800	$ 4,775	$ 5,050	$ 4,250	$ 1,500	$ 65,000.00	
	$ 2,594	$ 2,375	$ 2,500	$ 2,781	$ 2,594	$ 2,781	$ 2,500	$ 2,563	$ 2,625	$ 2,313	$ 2,500	$ 2,375			
	$ 4,254	$ 3,895	$ 4,100	$ 4,561	$ 4,254	$ 4,561	$ 4,100	$ 4,203	$ 4,305	$ 3,793	$ 4,100	$ 3,895			
	$ 2,333	$ 2,333	$ 2,333	$ 2,333	$ 2,333	$ 2,333	$ 2,333	$ 2,333	$ 2,333	$ 2,333	$ 2,333	$ 2,333			
	$ 9,181	$ 8,603	$ 8,933	$ 9,676	$ 9,181	$ 9,676	$ 8,933	$ 9,098	$ 9,263	$ 8,438	$ 8,933	$ 8,603			
	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000			
	$ 10,181	$ 9,603	$ 9,933	$ 10,676	$ 10,181	$ 10,676	$ 9,933	$ 10,098	$ 10,263	$ 9,438	$ 9,933	$ 9,603			

This is the analysis of selling and administrative expenses:

Crummy Cracker Company Selling & Administrative Expenses													
Month	January	February	March	April	May	June	July	August	September	October	November	December	Total
Boxes	8,000	9,500	9,500	11,500	10,000	11,500	10,000	10,000	11,000	9,000	10,000	10,000	120,000
Sales revenue	$19,200	$22,800	$22,800	$27,600	$24,000	$27,600	$24,000	$24,000	$26,400	$21,600	$24,000	$24,000	$288,000
Commissions earned	$ 1,920	$ 2,280	$ 2,280	$ 2,760	$ 2,400	$ 2,760	$ 2,400	$ 2,400	$ 2,640	$ 2,160	$ 2,400	$ 2,400	$ 28,800
Commissions paid		$ 1,920	$ 2,280	$ 2,280	$ 2,760	$ 2,400	$ 2,760	$ 2,400	$ 2,400	$ 2,640	$ 2,160	$ 2,400	$ 26,400
President's salary	$ 3,500	$ 3,500	$ 3,500	$ 3,500	$ 3,500	$ 3,500	$ 3,500	$ 3,500	$ 3,500	$ 3,500	$ 3,500	$ 3,500	$ 42,000
Sales salary	$ 750	$ 750	$ 750	$ 750	$ 750	$ 750	$ 750	$ 750	$ 750	$ 750	$ 750	$ 750	$ 9,000
Insurance premium	$ 1,000			$ 1,000			$ 1,000			$ 1,000			$ 4,000
Total S & A exp pa	$ 5,250	$ 6,170	$ 6,530	$ 7,530	$ 7,010	$ 6,650	$ 8,010	$ 6,650	$ 6,650	$ 7,890	$ 6,410	$ 6,650	$ 81,400
Add depreciation	$ 417	$ 417	$ 417	$ 417	$ 417	$ 417	$ 417	$ 417	$ 417	$ 417	$ 417	$ 417	$ 5,000
Total budgeted S & A expenses before interest	$ 5,667	$ 6,587	$ 6,947	$ 7,947	$ 7,427	$ 7,067	$ 8,427	$ 7,067	$ 7,067	$ 8,307	$ 6,827	$ 7,067	$ 86,400
Add mortgage intere	$ 233	$ 230	$ 227	$ 224	$ 221	$ 217	$ 214	$ 211	$ 207	$ 204	$ 201	$ 197	$ 2,586
Total cash outlay	$ 5,900	$ 6,817	$ 7,174	$ 8,170	$ 7,647	$ 7,284	$ 8,641	$ 7,277	$ 7,274	$ 8,511	$ 7,027	$ 7,264	$ 88,986

The cash budget:

Crummy Cracker Cash Budget													
Month	January	February	March	April	May	June	July	August	September	October	November	December	Total
Boxes sold	8,000	9,500	9,500	11,500	10,000	11,500	10,000	10,000	11,000	9,000	10,000	10,000	120,000
Beginning cash	$ -	$ 10,000	$ 10,000	$ 10,000	$ 10,000	$ 10,000	$ 10,000	$ 10,000	$ 10,000	$ 11,713	$ 13,060	$ 15,693	$ -
Cash rec'd from investors	$ 65,000												$ 65,000
Cash rec'd from bank	$ 35,000												$ 35,000
Cash collected from sales	$ 9,600	$ 16,200	$ 21,708	$ 24,972	$ 24,372	$ 26,424	$ 24,660	$ 24,624	$ 24,960	$ 23,160	$ 23,736	$ 23,184	$ 267,600
Total cash available	$ 109,600	$ 26,200	$ 31,708	$ 34,972	$ 34,372	$ 36,424	$ 34,660	$ 34,624	$ 34,960	$ 34,873	$ 36,796	$ 38,877	$ 488,066
Pay startup costs	$ 2,000												$ 2,000
Acquisition of capital assets	$ 85,000												$ 85,000
Purchase of raw material invty	$ 5,963	$ 6,825	$ 5,500	$ 5,288	$ 5,488	$ 5,263	$ 4,925	$ 5,375	$ 4,800	$ 4,775	$ 5,050	$ 4,250	$ 63,500
Labor payroll	$ 2,594	$ 2,375	$ 2,500	$ 2,781	$ 2,594	$ 2,781	$ 2,500	$ 2,563	$ 2,625	$ 2,313	$ 2,500	$ 2,375	$ 30,500
Variable overhead	$ 4,254	$ 3,895	$ 4,100	$ 4,561	$ 4,254	$ 4,561	$ 4,100	$ 4,203	$ 4,305	$ 3,793	$ 4,100	$ 3,895	$ 50,020
Bakery supervision	$ 2,333	$ 2,333	$ 2,333	$ 2,333	$ 2,333	$ 2,333	$ 2,333	$ 2,333	$ 2,333	$ 2,333	$ 2,333	$ 2,333	$ 28,000
Commissions paid	$ -	$ 1,920	$ 2,280	$ 2,280	$ 2,760	$ 2,400	$ 2,760	$ 2,400	$ 2,400	$ 2,640	$ 2,160	$ 2,400	$ 26,400
President's salary	$ 3,500	$ 3,500	$ 3,500	$ 3,500	$ 3,500	$ 3,500	$ 3,500	$ 3,500	$ 3,500	$ 3,500	$ 3,500	$ 3,500	$ 42,000
Sales salary	$ 750	$ 750	$ 750	$ 750	$ 750	$ 750	$ 750	$ 750	$ 750	$ 750	$ 750	$ 750	$ 9,000
Insurance premium	$ 1,000	$ -	$ -	$ 1,000	$ -	$ -	$ 1,000	$ -	$ -	$ 1,000	$ -	$ -	$ 4,000
Interest on mortgage	$ 233	$ 230	$ 227	$ 224	$ 221	$ 217	$ 214	$ 211	$ 207	$ 204	$ 201	$ 197	$ 2,586
Payment of principle on mortgage	$ 476	$ 480	$ 483	$ 486	$ 489	$ 492	$ 496	$ 499	$ 502	$ 506	$ 509	$ 512	$ 5,930
Total disbursements	$ 108,103	$ 22,308	$ 21,673	$ 23,203	$ 22,388	$ 22,298	$ 22,578	$ 21,833	$ 21,423	$ 21,813	$ 21,103	$ 20,213	$ 348,936
Cash balance before debt transactions [CBBDT]	1,497	3,892	10,035	11,769	11,984	14,126	12,082	12,791	13,537	13,060	15,693	18,664	$ 18,664
Minimum cash balance [MCB]	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000
Excess or deficiency of cash [EoDoC]	(8,503)	(6,108)	35	1,769	1,984	4,126	2,082	2,791	3,537	3,060	5,693	8,664	8,664
New borrowing required [NB]	8,503	6,108	-	-	-	-	-	-	-	-	-	-	-
Repayment needed? [RN]	8,503	14,611	14,611	14,576	12,807	10,823	6,697	4,615	1,824	-	-	-	-
Repayment possible? [RP]	-	-	35	1,769	1,984	4,126	2,082	2,791	3,537	-	-	-	-
Calculated repayment	-	-	35	1,769	1,984	4,126	2,082	2,791	1,824	-	-	-	-
Cash balance after debt transactions [CBADT]	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	11,713	13,060	15,693	18,664	18,664
Cumulative debt after new borrowing or repayment	8,503	14,611	14,576	12,807	10,823	6,697	4,615	1,824	-	-	-	-	-
Accrual of interest expense	$ 70.86	$ 121.76	$ 121.47	$ 106.73	$ 90.19	$ 55.81	$ 38.46	$ 15.20	$ -	$ -	$ -	$ -	$ -
Cumulative interest expense	$ 70.86	$ 192.62	$ 314.08	$ 420.81	$ 511.00	$ 566.81	$ 605.27	$ 620.47	$ 620.47	$ 620.47	$ 620.47	$ 620.47	$ 620.47

The blue-shaded cells require a complex set of =IF( ) functions in order to correctly calculate the borrowing and/or repayment. A set of PowerPoint slides explaining the structure of the borrowing and repayment calculations is available from the author on request.

Here is the profit plan; projected first year profit is around $12,500:

Crummy Cracker Company Profit Plan													
Month	January	February	March	April	May	June	July	August	September	October	November	December	Total
Boxes	8,000	9,500	9,500	11,500	10,000	11,500	10,000	10,000	11,000	9,000	10,000	10,000	120,000
Sales revenue	$19,200	$22,800	$22,800	$27,600	$24,000	$27,600	$24,000	$24,000	$ 26,400	$21,600	$ 24,000	$ 24,000	$288,000
Less VCGS	$ 9,280	$11,020	$11,020	$13,340	$11,600	$13,340	$11,600	$11,600	$ 12,760	$10,440	$ 11,600	$ 11,600	$139,200
Less Sales commissi	$ 1,920	$ 2,280	$ 2,280	$ 2,760	$ 2,400	$ 2,760	$ 2,400	$ 2,400	$ 2,640	$ 2,160	$ 2,400	$ 2,400	$ 28,800
TVC	$11,200	$13,300	$13,300	$16,100	$14,000	$16,100	$14,000	$14,000	$ 15,400	$12,600	$ 14,000	$ 14,000	$168,000
Contribution margin	$ 8,000	$ 9,500	$ 9,500	$11,500	$10,000	$11,500	$10,000	$10,000	$ 11,000	$ 9,000	$ 10,000	$ 10,000	$120,000
Fixed costs													
Bakery supervision	$ 2,333	$ 2,333	$ 2,333	$ 2,333	$ 2,333	$ 2,333	$ 2,333	$ 2,333	$ 2,333	$ 2,333	$ 2,333	$ 2,333	$ 28,000
Depreciation	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 12,000
President's salary	$ 3,500	$ 3,500	$ 3,500	$ 3,500	$ 3,500	$ 3,500	$ 3,500	$ 3,500	$ 3,500	$ 3,500	$ 3,500	$ 3,500	$ 42,000
Sales salary	$ 750	$ 750	$ 750	$ 750	$ 750	$ 750	$ 750	$ 750	$ 750	$ 750	$ 750	$ 750	$ 9,000
Insurance premium	$ 1,000	$ -	$ -	$ 1,000	$ -	$ -	$ 1,000	$ -	$ -	$ 1,000	$ -	$ -	$ 4,000
Depreciation	$ 417	$ 417	$ 417	$ 417	$ 417	$ 417	$ 417	$ 417	$ 417	$ 417	$ 417	$ 417	$ 5,000
Total fixed costs	$ 9,000	$ 8,000	$ 8,000	$ 9,000	$ 8,000	$ 8,000	$ 9,000	$ 8,000	$ 8,000	$ 9,000	$ 8,000	$ 8,000	$100,000
Net operating incom	$ (1,000)	$ 1,500	$ 1,500	$ 2,500	$ 2,000	$ 3,500	$ 1,000	$ 2,000	$ 3,000	$ -	$ 2,000	$ 2,000	$ 20,000
Interest	$ 233	$ 230	$ 227	$ 224	$ 221	$ 217	$ 214	$ 211	$ 207	$ 204	$ 201	$ 197	$ 2,586
Startup costs	$ 167	$ 167	$ 167	$ 167	$ 167	$ 167	$ 167	$ 167	$ 167	$ 167	$ 167	$ 167	$ 2,000
Bad debts expense	$ 192	$ 228	$ 228	$ 276	$ 240	$ 276	$ 240	$ 240	$ 264	$ 216	$ 240	$ 240	$ 2,880
Net income	$ (1,592)	$ 875	$ 878	$ 1,834	$ 1,373	$ 2,840	$ 379	$ 1,383	$ 2,362	$ (587)	$ 1,393	$ 1,396	$ 12,534

And finally, here is the balance sheet:

Balance sheet			
Cash	$ 18,664	Accounts payable	$ 1,500
Accts receivable	17,520	Commissions payable	2,400
Raw mat'l Inventory	4,000	Interest payable	
Finished goods invty	2,320	Mortgage payable	29,070
Bakery equipment	60,000		
Depreciation on bakery equipment	(12,000)		
Office equipment	25,000	Equity	65,000
Depreciation on office equipment	(5,000)	Retained earnings	12,534
Total assets	$ 110,504	Total L + E	$110,504

PART 5: LOW FAT CRACKERS

1. Breakeven is 88,496 boxes if they sell regular and low-fat in a 60%/40% ratio:

Breakeven calculations			
	Regular	Low-Fat	Company as a whole
Sales price/unit	$ 2.40	$ 2.65	
Product mix	60.00%	40.00%	
Weighted avg sales price	$ 1.440	$ 1.060	$ 2.500
Variable cost/unit	$ 1.400	$ 1.325	
Weighted avg VC/product	$ 0.840	$ 0.530	$ 1.370
Contribution margin per box	$ 1.000	$ 1.325	
Firm weighted CM/product	$ 0.600	$ 0.530	$ 1.130
Total fixed costs			$ 100,000
Breakeven point in total boxes			88,496
Required sales of each product [boxe	53,097	35,398	88,496
Revenue @ B E Pt	$ 127,434	$ 93,805	$ 221,239

2. If the ratio is reversed, the breakeven point will go down. Low-fat crackers have a higher contribution margin ratio [roughly 50%] compared with the 42% for regular crackers. Selling more of the more profitable item and less of the less profitable item will make things better.

Breakeven calculations			
	Regular	Low-Fat	Company as a whole
Sales price/unit	$ 2.40	$ 2.65	
Product mix	40.00%	60.00%	
Weighted avg sales price	$ 0.960	$ 1.590	$ 2.550
Variable cost/unit	$ 1.400	$ 1.325	
Weighted avg VC/product	$ 0.560	$ 0.795	$ 1.355
Contribution margin per box	$ 1.000	$ 1.325	
Firm weighted CM/product	$ 0.400	$ 0.795	$ 1.195
Total fixed costs			$ 100,000
Breakeven point in total boxes			83,682
Required sales of each product [boxe	33,473	50,209	83,682
Revenue @ B E Pt	$ 80,335	$ 133,054	$ 213,389

3. If they produced and sold only regular crackers, variable costing net income would be $20,000 at a volume of 120,000 boxes [20,000 boxes beyond the breakeven point at a contribution of $1.00 per box]. If volume is 120,000 boxes of low-fat crackers, net income will be $59,000 before the write off of the interest and startup costs:

Crummy Cracker Company: income statement under variable costing					
	Regular		Low Fat		Total
Production in units	-		120,000		120,000
Sales in units	-		120,000		120,000
Percentage of output sold	0%		100%		
Percentage of output to inventory	100%		0%		
Units to Inventory	-		-		
Revenue	$ 2.40	$ -	2.65	$ 318,000	$ 318,000
Variable cost of goods manufactured	Per unit	Total	Per unit	Total	
Raw material	$0.500	$ -	$ 0.400	$ 48,000	$ 48,000
Direct labor	$0.250	$ -	$ 0.250	$ 30,000	$ 30,000
Variable overhead	$0.410	$ -	$ 0.410	$ 49,200	$ 49,200
Total variable manufacturing costs		$ -		$ 127,200	$ 127,200
Less: Amount to inventory		$ -		$ -	$ -
Amount to Variable CGS		$ -		$ 127,200	$ 127,200
Contribution margin from production					$ 190,800
Less variable selling expenses		-		31,800.00	$ 31,800
Contribution margin					$ 159,000
Less fixed costs					
Manufacturing					
Supervision				28,000	
Depreciation				12,000	40,000
Selling & administrative expenses					
Exec Salaries				42,000	
Sales salaries				9,000	
Depreciation				5,000	
Insurance premium				4,000	60,000
Total fixed costs					100,000
Net income B/4 startup costs and interest					$ 59,000

4. Breakeven with low-fat crackers only is 75,472 boxes:

Breakeven calculations			
	Regular	Low-Fat	Company as a whole
Sales price/unit	$ 2.40	$ 2.65	
Product mix	0.00%	100.00%	
Weighted avg sales price	$ -	$ 2.650	$ 2.650
Variable cost/unit	$ 1.400	$ 1.325	
Weighted avg VC/product	$ -	$ 1.325	$ 1.325
Contribution margin per box	$ 1.000	$ 1.325	
Firm weighted CM/product	$ -	$ 1.325	$ 1.325
Total fixed costs			$ 100,000
Breakeven point in total boxes			75,472
Required sales of each product [boxe	-	75,472	75,472
Revenue @ B E Pt	$ -	$ 200,000	$ 200,000

Sale of 120,000 boxes is 44,528 boxes over the breakeven point. 44,528 boxes at a contribution margin of $1.325 per box is $59,000 [rounded]. Q. E. D.! This question effectively asks for the number of boxes of low-fat crackers they would have to sell to have the same contribution they would get from selling 120,000 boxes of regular crackers. Here is the equation needed to solve this:

120,000 boxes * $1.00/box = $1.325/box * X
X = 90,566 [rounded]

PART 6: INCREMENTAL ANALYSIS AND DECISION MAKING

1. **Part a**: Inventory value of 10,000 boxes of old crackers under absorption costing, assuming initial production of 120,000. Variable manufacturing cost is $1.16/box; fixed costs are $40,000 per year, or $0.33/box, for a total unit cost of $1.49/bos. $1.49/box * 10,000 boxes is $14,900.
   Part b. The same crackers under variable costing would have an inventory value of $11,600 [$1.16/box * 10,000].
2. **Part a**: The farmer is not going to pay for the crackers and it will cost Crummy Cracker $500 to "unpackage" the crackers. They would be $500 worse off than they would if they just tossed the crackers in the trash [assuming disposal was free—but see part 2c!]. Other than the animal welfare folks getting their noses out of joint, there are probably no particular ramifications here.
   Part b: The answer to part 2a would be the same--$500. The value of the inventory is a classic example of a sunk cost. Even if the crackers had gold dust in them and cost gazillions to produce, they are still a sunk cost.
   Part c: Hauling the crackers to the landfill would cost nearly $577.

Gross weight per box in ounces	17
Number of boxes	10,000
Total ounces	170,000
Ounces per pound	16
Total pounds to be disposed of	10,625
First 500 pounds is a fixed charge	500
Pounds subject to variable charge	10125
Pounds per ton	2000
Tons subject to variable charge	5.0625
Charge per ton	$ 110.00
Tonnage charge	$ 556.88
Add fixed fee	20.00
Total cost to dispose of the stale cracke	$ 576.88

Part d: The cost of unpackaging the crackers would be the same as in requirement 2a. However, they would be recovering the cost of the crackers themselves--$1.16/box * 10,000 boxes = $11,600. This is better than requirement 2a because at least they are recovering the

variable production cost. They would be $11,100 [= $11,600 – 500] better off for having recovered their variable costs.

Part e: There would be no impact on net income. However, the potential fallout from bad publicity could be a public relations nightmare. The newspaper headline [or leader on the 11:00 pm news] might be "Local Cracker Baker Donates Stale Inventory to Food Bank; CEO characterized as indifferent to the plight of those he laid off."

3. Total variable cost per box is normally $1.40, but the commissions [$0.24] would be avoided and they would save $0.06 on the boxes, reducing the variable cost per box to $1.10. With a sales price of $1.20, Crummy Cracker would make a net contribution of $1,000. But see question 4, below.
4. If the Sooper Dooper order displaced 10,000 boxes at the standard contribution of $1.00 per box, they would be losing $0.90 of contribution on every box sold to Sooper Dooper that could have been sold at the regular price.

PART 7: PERFORMANCE REPORTING AND VARIANCE ANALYSIS

The analysis of the variances looks like this:

Crummy Cracker Company Variance Analysis					
Line item	Actual results	Price, spending, and efficiency variances	Flexible budget	Volume variances	Static budget
Cracker volume	123,000	-	123,000	3,000	120,000
Revenue	$ 289,050	$ (6,150)	$ 295,200	$ 7,200	$ 288,000
Direct material	62,300	800	61,500	1,500	60,000
Direct labor	31,500	750	30,750	750	30,000
Variable overhead	50,175	(255)	50,430	1,230	49,200
Total variable manufacturing cost	143,975	1,295	142,680	3,480	139,200
Contribution margin from production	145,075	(7,445)	152,520	3,720	148,800
Sales commissions	28,905	(615)	29,520	720	28,800
Contribution margin	116,170	(6,830)	123,000	3,000	120,000
Depreciatioon on bakery equipment	12,000	-	12,000	-	12,000
Bakery supervision	32,000	4,000	28,000	-	28,000
Fire insurance premium	4,000	-	4,000	-	4,000
Sales salaries	9,000	-	9,000	-	9,000
Executive salaries	42,000	-	42,000	-	42,000
Depreciation on office equipment	5,000	-	5,000	-	5,000
Total fixed costs	104,000	4,000	100,000	-	100,000
Net income before interest	12,170	(10,830)	23,000	3,000	20,000
Interest on mortgage	2,586	-	2,586	-	2,586
Interest on line of credit	967	347	620	-	620
Net income	$ 8,617	$ (11,177)	$ 19,794	$ 3,000	$ 16,794
Total profit variance			$ (8,177)		

Students should make the following points:

1. They sold 3,000 boxes more than expected, but revenue was off $6,150 because of the nickel cut in the average sales price.
2. Net variable manufacturing costs were almost $1,300 higher than the flexible budget amount. Students should recognize that the $3,480 unfavorable volume variance was due to the fact that they sold more boxes of crackers. Variable costs would be expected to increase in proportion to sales.
3. Contribution margin was $7,445 less than the flexible budget. Variable manufacturing costs were higher and the sales price was lower, leading to an unfavorable variance in the total contribution margin.
4. Fixed costs were as expected, with the exception of bakery supervision and a small unfavorable variance for the interest on the line of credit.
5. The overall net impact on profit was an unfavorable variance of $8,177. Unfavorable price, spending, and efficiency variances amounting to $11,177 were offset by a favorable volume variance of $3,000 arising from the sale of 3,000 more boxes of crackers.