

Final Exam Module: Candy Sales Projections

A candy company is planning to introduce a new product. They have built a spreadsheet model to predict sales for the first seven years. There are four tabs in the spreadsheet: Price and Cost, Units, Operating Costs, and Overall Financial Model.

Price and Cost Tab

Under this tab, you will find the following information:

- Wholesale Price: This is the per unit price the candy company plans to charge the convenience, grocery, and mass merchandise stores, referred to hereafter as “mass stores”.
- Per Unit Cost: This contains the cost structure for production. Notice that above a certain annual volume, the per-unit cost of production drops.

Units Tab

This tab contains information used to estimate number of units sold in three steps:

- Step 1: Estimate the number of stores in each of three distribution channels: convenience stores, grocery stores, and mass stores. The estimates for Years 1 and 2 are numbers based on their sense of how current negotiations with the stores are going. Estimates for Years 3-7 are based on the growth rate given in the spreadsheet. (You can display the store counts as whole numbers in your sheet, but **don't** actually round the values.)
- Step 2: Estimate the number of units each type of store will sell annually using the Annual Units per Store by Channel given in the spreadsheet.
- Step 3: Add up the total units across the three store types (convenience, grocery, and mass).

Operating Costs Tab

This tab contains information for predicting operating costs. Like estimating the number of stores, this value is directly estimated for Years 1 and 2. Use the growth rate given in the spreadsheet to calculate operating costs for Years 3-7.

Overall Financial Model Tab

This tab contains an empty table which you will use to construct the financial model. The values for Total Units, Wholesale Price, and Operating Costs can be filled in on this sheet with references to other tabs.

The Cost of Goods is the total cost of producing the number of units needed for the year. Write a formula to calculate this cost. Remember to account for the change in per unit cost above the given volume (see Price and Cost tab for details).

The other values can be calculated as follows:

- Revenue = Total Units * Wholesale Price
- Operating Income = Revenue – Cost of Goods – Operating Costs

Exam Preparation

To prepare for the exam, fill in the financial model using the estimates given for initial levels of units and costs, for growth rates, and for costs.

The correct values for the Overall Financial Model are shown below.

Financial Model	Year	Year	Year	Year	Year	Year	Year
	1	2	3	4	5	6	7
	Total Units	225,000	640,000	704,000	774,400	851,840	937,024
Wholesale Price	\$0.40	\$0.40	\$0.40	\$0.40	\$0.40	\$0.40	\$0.40
Revenue	\$90,000	\$256,000	\$281,600	\$309,760	\$340,736	\$374,810	\$412,291
Cost of Goods	\$56,250	\$160,000	\$175,600	\$186,160	\$197,776	\$210,554	\$224,609
Operating Costs	\$50,000	\$120,000	\$124,800	\$129,792	\$134,984	\$140,383	\$145,998
Operating Income	-\$16,250	-\$24,000	-\$18,800	-\$6,192	\$7,976	\$23,873	\$41,683

The exam will have 20 questions. There will be five types of questions; the approximate number of questions of each type is given below.

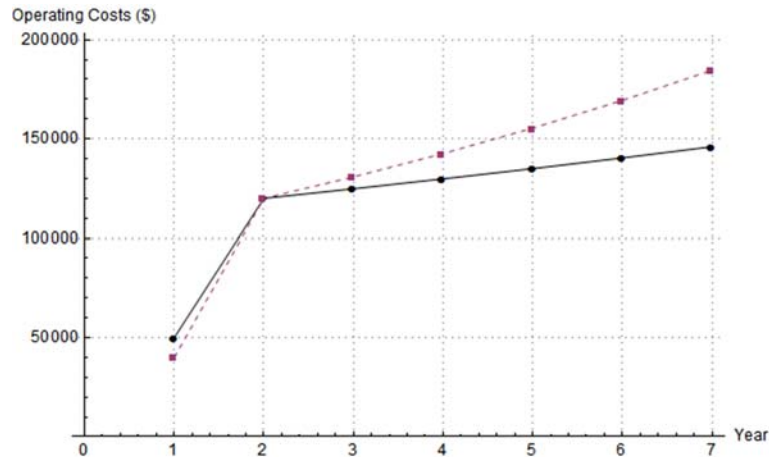
Question Type 1: Calculating and Understanding the Model

(approximately 8 questions)

Sample questions:

- 1) How much would it cost to produce 300,000 units in a year? Report your answer rounded to the nearest dollar. NO CENTS.
- 2) How much would it cost to produce 710,000 units in a year? Report your answer rounded to the nearest dollar. NO CENTS.
- 3) How many grocery stores will carry the new product in Year 6? Report your answer rounded to the nearest whole number.
- 4) How many units will be sold in convenience stores in Year 7? Report your answer rounded to the nearest whole number.
- 5) How many units will be sold in Year 5? Report your answer rounded to the nearest whole number.
- 6) Using the growth rate in the spreadsheet for operating costs, find the operating costs in Year 6. Report your answer rounded to the nearest dollar. NO CENTS.

- 7) In what years does the company project enough demand to take advantage of the lower per unit cost?
- 8) Fill in the blank with the correct answer. The growth in operating costs in Years 3-7 is _____ for the dashed line than for the solid line.



- a. Higher
b. Lower

Question Type 2: Mathematical Notation
(approximately 3 questions)

Sample skills:

- 1) If M mass stores carry the new product in Year 2 and the annual growth rate in the number of stores carrying the product is r , write an expression (by hand) for the number of mass stores carrying the product in Year 3.
- 2) If there are M mass stores carrying the product in Year 2 and the annual growth rate in the number of stores carrying the product is r , write an expression for the number of mass stores carrying the product in Year 4.
- 3) Let u_c denote the number of units sold annually per convenience store, C is the number of convenience stores carrying the product in Year 2, and r the annual growth rate in the number of stores carrying the product. Using summation notation, write an expression for the total number of units sold in convenience stores from Year 2 to Year 7.

Question Type 3: Sensitivity to Assumptions

(approximately 3 questions)

Sample questions:

- 1) What is the highest possible growth rate in operating costs that will result in non-negative Operating Income in Year 4? Report your answer as a percentage rounded to exactly two decimal places, e.g., 49.0185% would be entered as 49.02%, not 0.49.
- 2) **Remember to RESTORE the original growth rate in operating costs before answering this question.** What is the lowest growth rate in number of stores carrying the product that will result in non-negative Operating Income in Year 7? Report your answer as a percentage rounded to exactly two decimal places, e.g., 49.0185% would be entered as 49.02%, not 0.49.

You should be able to answer these questions numerically and create and/or recognize graphs that represent the answers to these questions.

Question Type 4: Extrapolation of the Model

(approximately 3 questions)

Remember to RESTORE the original growth rates in operating costs and number of stores before answering these questions.

Sample questions:

- 1) Extend the model out to Year 10. What is the Operating Income in Year 10? Report your answer rounded to the nearest dollar. NO CENTS.
- 2) Extend the model out to Year 12. Suppose the growth in number of stores carrying the product is 15% annually instead of 10%. What would the Operating Income in Year 12 be, in that case? Report your answer rounded to the nearest dollar. NO CENTS.

You should be able to answer these questions numerically and create and/or recognize graphs that represent the answers to these questions.

Question Type 5: Other Questions About and Extensions to the Model

(approximately 3 questions)

The list of possible extensions to the model includes another distribution channel, a change in the production cost structure (e.g., upfront and per-unit costs), a change in the wholesale price, a change in Year 2 estimates, and/or a change in other information you have been given about the model.

Answers to the Sample Questions

Type 1

- 1) \$75,000
- 2) \$176,500
- 3) 88
- 4) 644,204
- 5) 851,840
- 6) \$140,383
- 7) Years 3-7.
- 8) Higher

Type 2

- 1) $M(1+r)$ or $M+Mr$
- 2) $M(1+r)^2$ or $M(1+r)(1+r)$ or $M+2Mr+Mr^2$
- 3) $\sum_{i=2}^7 u_C C(1+r)^{i-2}$ (other variations are possible)

Type 3

- 1) 1.49%
- 2) 6.19%

Type 4

- 1) \$108,746
- 2) \$399,660