

## **Order of Operations Problem: Cost Justification**

Kevin Hudson, Internet Solutions Consultant, AT&T, Dallas, Texas

### **Background:**

Kevin Hudson makes sales visits to a wide variety of companies. During his initial interview, he learns as much as possible about each business. He assesses the needs and strengths of the business to determine what kind of telecommunications options could benefit the business. In particular, he evaluates the potential value to the business of using the Internet.

### **Problem:**

You are the Internet Solutions Consultant for a telecommunications company. You make a sales call to Dr. Tomas Jones, who manufactures and sells his own vitamin formulas. During your discussion with him, you learn that Dr. Jones is concerned about a downturn in his revenues, and that he feels that he needs to increase sales.

You ask Dr. Jones about his current sales, and he reveals that most of his vitamins are sold to people who call in on an 800 number that he advertises in health magazines. The typical order is for several bottles and the average amount per sale is \$80. Dr. Jones fills an average of 15,000 orders per month. He reports that after all production, marketing, and overhead expenses are subtracted, his profit margin is about 3%.

You discuss the possibility of selling his vitamins over the Internet. Dr. Jones is curious but doesn't know if it will be cost-effective. He feels any investment he makes must pay for itself and become profitable within one year. You agree to put together a cost proposal for him and present it to him.

You know the following facts about the Internet costs: a web hosting service will cost \$100 per month; a transaction service to process credit card sales from the web site will cost another \$100 per month; and the services of a webmaster to create a site to suit his purposes will cost about \$5000.

Some of the benefits of the Internet service are difficult to quantify, but they can be discussed with Dr. Jones, as follows:

- a) Dr. Jones has a potentially much wider audience on the Internet than the group of magazine subscribers he currently reaches through his advertisements.
- b) The ratio of sales to people who see the Internet site should be higher (than the ratio of sales to people who see the magazine ads) because people who visit the web site will be shopping specifically for the featured product.
- c) If people use their credit cards to purchase over the Internet, Dr. Jones will also save money on 800-number phone calls currently used for orders. Even if some Internet customers use the 800-number rather than conducting their transaction over the

Internet, money will be saved because more complete product information can be provided via Internet, thus reducing the amount of time spent on the 800-number call.

- Determine how many sales must be generated per month by the web site during the first year in order for the web site to pay for itself by the end of the first year it is installed. Determine what percentage of total current sales these new Internet sales represents. Determine how many sales must be generated per month by the web site after the first year in order for the site to continue to pay for itself.
- For presentation to Dr. Jones, develop a cost justification of no more than one page, including the number of sales must be generated per month by the web site during the first year in order for the web site to pay for itself by the end of the first year it is installed.

*Helpful hint:* Write an equation for the profit per month on new Internet sales. Keep in mind that the break-even point is reached when the profit is zero, and that Dr. Jones wants to reach this point in 12 months.

## Order of Operations Problem: Telecommunications

Kevin Hudson, Internet Solutions Consultant, AT&T, Dallas, Texas

### Solution:

Cost justification should include the following:

Data: One-time cost for web site design: \$5000  
On-going cost for site: \$200/month

Let: N = number of new sales/month  
P = profit on new sales per month

Apply the rules for order of operations:

Rules for order of operations state the following: Exponents and roots are calculated first; multiplication and division are calculated next; addition and subtraction are calculated last. Operations within grouping symbols, such as parentheses, brackets, fraction bars, and radical signs, are executed from the inside out.

First year:

$$P = (.03) N \times (\$80) - \$200 + \$5000/12$$

$$P = \$2.4 N - \$200 - \$417$$

$$P = \$2.4 N - \$617$$

Dr. Jones wants the break-even point to be reached by the end of the first year. When the break-even point is reached, the profit from the new sales per month is equal to the amount paid out per month for the Internet site. This can be expressed as:  $P = 0$ . In the equation below, 0 has been substituted for P, and you can solve for N, as shown:

$$0 = \$2.4 N - \$617$$

$$N = \$617/\$2.4$$

$$N = 257 \text{ sales/month}$$

What percentage increase in sales does this 257 sales represent?

$$257 \text{ new sales per month} / 15,000 \text{ current sales per month} = 1.7\%$$

Dr. Jones will have to judge whether this increase is a reasonable expectation, but less than a 2% increase would appear to be reasonable, especially given the increased audience provided by the Internet.

To determine the number of sales per month that must be generated *after the first year* in order for the web site to pay for itself, use the same equation you used for the first year, but eliminate the \$5000/12 portion of the equation.