Activity: taking the discount

Chapter 3, Deterministic Lot Sizing

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Work in pairs. 20 minutes.

Names: _____

The item. The distributor that stocks the mower deck belt also sells a replacement blade kit, at a steady **2,400** kits a year. Placing an order costs **\$60**, and the carrying charge is **25%** a year. No shortages are allowed, and orders arrive all at once.

The quote. The supplier prices the kit at **\$5.00** on orders below **600** kits and **\$4.80** on every kit of an order of 600 or more (an all-units discount).

Notation. λ is the demand rate, k the ordering cost and i the carrying charge. Level j has break point q_j and price c_j, with holding cost $h_j = ic_j$. On level j the total cost rate, purchase included, is

$$TC_j(Q) = c_j\lambda + \frac{k\lambda}{Q} + \frac{h_jQ}{2}, \qquad q_j \le Q < q_{j+1}$$

Report costs in dollars a year, to the cent.

Part A. Predict

Before computing anything: will the best order be about 480 kits, about 490, or 600? Write down your guess and one reason.

Part B. The four steps

1. For each price, compute h_j and the economic order quantity Q_j^*. Which are feasible on their own level?
2. Move any infeasible quantity to the nearest feasible point of its level, and compute the total cost rate of every candidate, term by term.
3. Which order quantity do you choose, and how much a year does the discount save?
4. The discount raises the holding cost. By how much, and why is it still worth taking?

Part C. The counteroffer

The supplier comes back: \$4.80 only on orders of **1,500** or more.

1. Do you still take the discount? Show the comparison.
2. What is the largest break quantity at which the \$4.80 price is still worth taking? Set up the equation, solve it, and round to a whole kit.

Part D, if you have time. A third level

Back to the original quote, with one more level added: **\$4.70** on orders of **1,200** or more. Which order quantity now, and by how much does it beat the next best? Would you place it? Name one thing the model leaves out that might change your answer.

Exit ticket (tear off and hand in)

Name: _____

1. Why can the minimum of an all-units cost not be found by setting its derivative to zero?

2. True or false, and why: if the discount price's economic order quantity falls below its break point, the discount is not worth taking.