

# [Purchasing plan](https://assignbuster.com/purchasing-plan/)

An optimized schedule of purchasing orders is required, however, there is uncertainty as to demand. There is a chance that each month demands could be 30% higher than projected. This creates competing constraints of inventory costs versus purchasing costs. More specifically, each lot of purchasing incurs a fixed cost of $150 without regard to the number of items purchased. This constraint argues for purchasing large lots. However, an inventory cost of $1 per unit per month is incurred as well. Thus, this cost driver tends to push the purchasing decision back towards smaller more frequent lot orders.

There are also costs associated with purchasing too little or too much. If available inventory comes up short in any given month, extra charges for special ordering are incurred. If demand exceeds on-hand supply, special order costs of $10 per unit are incurred to fill the back orders, as well as the $150 delivery fee if it is the only delivery for the month. This constraint urges over-buying to prevent special order costs. On the other hand, if there is remaining inventory at the end of the year, it must be cleared out by selling at half price.

The inventory must be sold at $75 per unit (half the normal price of $150). Obviously, this constraint pushes the decision towards under-buying to avoid year-end inventory clearance. Further, this item incurs a purchase price increase of 5% (a price increase from $100 to $105 per unit) for the latter half of the year (from July through December). Demand for this item tends to be seasonal, with large demand from May to September, but very little demand during the other months of the year.

Even so, this demand can vary by 30% from a low of 2, 210 units annually to a high of 2, 873. In obtaining a solution to this problem, first an optimal linear programming solution was obtained for the cases of low annual demand (2, 210 units) and for high annual demand (2, 873 units). Optimality was obtained by maximizing profit with the cost constraints mentioned above and a fixed sales price of $150 per unit. This was done by setting up, on a month by month basis, the requirement that beginning inventory plus purchases (if any) must exceed demand.

If a lot purchase was required in any give month, the cost of that purchase was unit cost times quantity purchased, plus the $150 fixed costs. Also, for every month an inventory cost equal to $1 times the average inventory for that month was incurred. The optimal purchasing schedules obtained, and resulting costs and profits are given in the tables below. Next, the above optimal purchasing schedules were considered for the opposite cases. That is, a low demand purchasing plan meeting with actual high demand, and a high demand purchasing plan meeting with actual low demand.

In the Low Purchase/High Demand plan, back orders and special ordering costs are incurred. The special order costs include the purchase price plus the $10 premium and the $150 delivery fee if the special order was the only delivery for the month. The Low Purchase Plan is the recommended optimal solution in all cases, except the most optimistic of High Purchase/High Demand. That is, if low purchase plan is selected and high demand occurs, there is a regret of $8, 157. However, if the high purchase plan is selected and low demand occurs, the regret is $20, 909. 50.

This huge disparity in regret comes because profit leak due to year end inventory clearance requirements dominates any profit leakage due to increased purchasing costs to meet back order requirements. For every unit sold at half price to clear it out of year end inventory, there is a $75 profit loss. By contrast, special order costs to meet back order requirements are between $10 and $20 per unit. 1 Thus, left over inventory is a much bigger threat to profit than back orders from under ordering.

In fact, the case was examined where for a high demand scenario (2, 873 units) no planned purchases were made and every unit was special ordered. In that case, the profit was still $102, 870. Similarly, for low demand with all special ordering the profit was $78, 750. Clearly the worst case is to have inventory left over. 1 The special ordering cost is $10 per unit plus $150 if no planned purchases were made that month. In the case of a back order of 26 in December, this works out to be approximately $20 per unit. In every other case, the cost is less than $20 per unit.