Homework (1)

- A candy wholesaler faces steady daily demand of 2 tons
- The value of one ton of candies is £1,000
- The holding cost is 20% of the value of the candies
- The ordering cost is £400 per ordering
- The wholesaler operates 200 days per year
- Determine:
  1. the annual operating cost if the lot size is equal to 100 tons
  2. the lot size that minimises the total annual cost
  3. the total annual setup cost for the optimal lot size
  4. the time between orders (cycle length) if the wholesaler orders under the EOQ

Solution Homework (1)

- Annual demand D is 2*200 = 400 tons
- Holding cost H is 20%*1000 = £200
- Ordering cost S is £400

1. If Q = 100, then the annual operating cost is:
   400*(400/100) + ½* 200*100 = £11,600
2. $EOQ = \sqrt{\frac{2DS}{H}}$ = 40 tons
3. If Q = 40, the total annual setup cost is 400*(400/40) = £4,000
4. Since Q = 40 and the daily demand is 2 tons, this means the wholesaler places an order every 20 days

Homework (2)

- The value of one ton of candies is depends on the order quantity as follows:

Order Quantity	Price per ton
0-19	1000
20-39	900
40-59	800
60-	700

- Determine the lot size that minimises the total annual cost

Solution Homework (2)

- Calculate EOQ, starting from the lowest price to the next higher price

$$EOQ = \sqrt{\frac{2DS}{H}}$$

Order Quantity	Price per ton	Optimal order quantity
0-19	1000	No reason to calculate that price
20-39	900	No reason to calculate that price
40-59	800	**44.72 tons, feasible**
60-	700	**47.81 tons, not feasible**

The total annual cost when ordering 44.72 tons is:

$$\frac{44.72}{2} * 0.20 * 800 + \frac{400}{44.72} * 400 + 400 * 800 = 327{,}155$$

The total annual cost when ordering 60 tons is:

$$\frac{60}{2} * 0.20 * 700 + \frac{400}{60} * 400 + 400 * 700 = 286{,}867$$

Homework (3)

- The John Equipment Company estimates its holding cost at 15% and its ordering cost at £9 per order. The estimated annual requirement is 48,000 units at a price of £4 per unit.

- Questions:
  1. What is the most economical number of units to order?
  2. How many orders should be placed in a year?
  3. How often should an order be placed?

Solution Homework (3)

1. $EOQ = \sqrt{\frac{2DS}{H}}$ = 1200 units
2. Annual requirement / EOQ = 48,000/1,200 = 40 orders
3. Frequency of orders = 360 days / 40 orders = 9 days

Homework (4)

- To date, Raymond Bro. has been purchasing an item in lots of 900 units. This equates to a three-month supply. The cost per unit is £12, the order cost is £16 per order, and the holding cost is 25%.

- **Question**: How much can Raymond Bro. save per year by purchasing the item in the most economical quantities?

Solution Homework (4)

- Operating cost (Q=900) = 4*16 + ½*900*(0.25*12) = £1,414
- $EOQ = \sqrt{\frac{2DS}{H}}$ = 196 units
- Operating cost (Q=196) = (3,600/196)*16 + ½*196*(0.25*12) = £588
- Savings: Operating cost (Q=900) - Operating cost (Q=196)

  1,414 – 588 = £826

Homework (5)

- A manufacturing company places a semi-annual order of 24,000 units at a price of £20 per unit. The holding cost is 15% and the order cost is £12 per order.

- Questions:
  1. What is the most economical order quantity?
  2. How many orders need to be placed?

Solution Homework (5)

1. $EOQ = \sqrt{\frac{2DS}{H}}$ = 620 units

2. Number of orders per year =

   Annual requirement / EOQ = 48,000/1,200 = 40 orders