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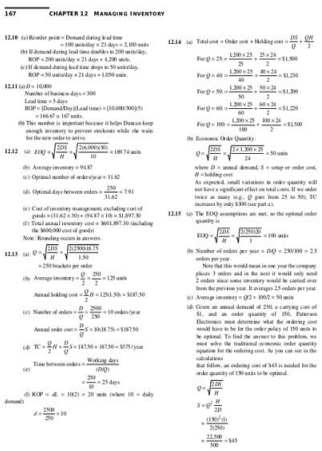



**12.10** (a) Reorder point = Demand during lead time
= 100 units/day × 21 days = 2,100 units
(b) If demand during lead time doubles to 200 units/day,
ROP = 200 units/day × 21 days = 4,200 units.
(c) If demand during lead time drops to 50 units/day,
ROP = 50 units/day × 21 days = 1,050 units.

**12.11** (a) $D = 10{,}000$
Number of business days = 300
Lead time = 5 days
ROP = [Demand/Day](Lead time) = [10,000/300](5)
= 166.67 ≈ 167 units.
(b) This number is important because it helps Duncan keep enough inventory to prevent stockouts while she waits for the new order to arrive.

**12.12** (a) $EOQ = \sqrt{\frac{2DS}{H}} = \sqrt{\frac{2(8{,}000)(30)}{10}} = 189.74$ units
(b) Average inventory = 94.87
(c) Optimal number of orders/year = 31.62
(d) Optimal days between orders = $\frac{250}{31.62} = 7.91$
(e) Cost of inventory management, excluding cost of goods = (31.62 × 30) + (94.87 × 10) = $1,897.30
(f) Total annual inventory cost = $601,897.30 (including the $600,000 cost of goods)
Note: Rounding occurs in answers.

**12.13** (a) $Q = \sqrt{\frac{2DS}{H}} = \sqrt{\frac{2(250)(18.75)}{1.50}}$
= 250 brackets per order
(b) Average inventory = $\frac{Q}{2} = \frac{250}{2} = 125$ units
Annual holding cost = $\frac{Q}{2}H = 125(1.50) = \$187.50$
(c) Number of orders = $\frac{D}{Q} = \frac{2500}{250} = 10$ orders/year
Annual order cost = $\frac{D}{Q}S = 10(18.75) = \$187.50$
(d) TC = $\frac{Q}{2}H + \frac{D}{Q}S = 187.50 + 187.50 = \$375$/year
(e) Time between orders = $\frac{\text{Working days}}{(DQ)}$
$= \frac{250}{10} = 25$ days
(f) ROP = $dL = 10(2) = 20$ units (where 10 = daily demand)
$d = \frac{2500}{250} = 10$

**12.14** (a) Total cost = Order cost + Holding cost = $\frac{DS}{Q} + \frac{QH}{2}$
For $Q = 25$: $= \frac{1{,}200 \times 25}{25} + \frac{25 \times 24}{2} = \$1{,}500$
For $Q = 40$: $= \frac{1{,}200 \times 25}{40} + \frac{40 \times 24}{2} = \$1{,}250$
For $Q = 50$: $= \frac{1{,}200 \times 25}{50} + \frac{50 \times 24}{2} = \$1{,}200$
For $Q = 60$: $= \frac{1{,}200 \times 25}{60} + \frac{60 \times 24}{2} = \$1{,}220$
For $Q = 100$: $= \frac{1{,}200 \times 25}{100} + \frac{100 \times 24}{2} = \$1{,}500$
(b) Economic Order Quantity:
$Q = \sqrt{\frac{2DS}{H}} = \sqrt{\frac{2 \times 1{,}200 \times 25}{24}} = 50$ units
where $D$ = annual demand, $S$ = setup or order cost, $H$ = holding cost
As expected, small variations in order quantity will not have a significant effect on total costs. If we order twice as many (e.g., $Q$ goes from 25 to 50), TC increases by only $300 (see part a).

**12.15** (a) The EOQ assumptions are met, so the optimal order quantity is
$EOQ = \sqrt{\frac{2DS}{H}} = \sqrt{\frac{2(250)(30)}{1}} = 100$ units
(b) Number of orders per year = $DQ = 250/100 = 2.5$ orders per year.
Note that this would mean in one year the company places 3 orders and in the next it would only need 2 orders since some inventory would be carried over from the previous year. It averages 2.5 orders per year.
(c) Average inventory = $Q/2 = 100/2 = 50$ units
(d) Given an annual demand of 250, a carrying cost of $1, and an order quantity of 150, Patterson Electronics must determine what the ordering cost would have to be for the order policy of 150 units to be optimal. To find the answer to this problem, we must solve the traditional economic order quantity equation for the ordering cost. As you can see in the calculations
that follow, an ordering cost of $45 is needed for the order quantity of 150 units to be optimal.
$Q = \sqrt{\frac{2DS}{H}}$
$S = Q^2 \frac{H}{2D}$
$= \frac{(150^2)(1)}{2(250)}$
$= \frac{22{,}500}{500} = \$45$

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## Operation Management An Asian Perspective Answer Key