Solutions Manual

# Chapter 16: Inventory Control Models

1.



Cognitive Domain: Knowledge

Difficulty Level: Easy

2. 

EOQ does not double; it increases by 41% since annual demand is under the radical and the square root of 2 is 1.4142.

Cognitive Domain: Comprehension

Difficulty Level: Medium

3a. 

3b. 

3c. 

3d. 



Order quantity increases as it becomes less expensive to hold inventory. The total cost drops.

3e. 

The total cost increases.

Cognitive Domain: Comprehension

Difficulty Level: Medium

4a.



4b.





The total cost increases by $1,100, so it’s not a good idea to order more frequently.

Cognitive Domain: Comprehension

Difficulty Level: Medium

5.



Cognitive Domain: Analysis

Difficulty Level: Medium

6. 









Cognitive Domain: Comprehension

Difficulty Level: Medium

7. 







TC when setup cost is $50 = 2 x (60,000x50)/2450 = $2,450





This is $552 less than if the setup cost is $50.

Cognitive Domain: Comprehension

Difficulty Level: Medium

8a. 

8b. 

8c.



8d.



8e.

TC when setup costs = 50 = 2 x (30000/1253.57) x 50 = 2393.17





Reducing setups to $40 lowers total cost to $2,140.50, a reduction of $252.65 per year.

Cognitive Domain: Comprehension

Difficulty Level: Medium

9a. 

9b. 

9c. 

9d. 

9e.

TC when setup cost = $1,800 = 2 x (20000/7395) x 1,800 = $9,737





The annual savings would be $848.

Cognitive Domain: Comprehension

Difficulty Level: Medium

10a. 

10b. 

10c. 

10d. 

10e. 



Cognitive Domain: Comprehension

Difficulty Level: Medium

11.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| *Qty per Order* | *Price per Unit* | *Qopt* | *Setup Cost ($)* | *Holding Cost ($)* | *Cost of Goods $* | *TC ($)* |
| 0 to 499 | $140.00 | 69 | 869.48 | 869.48 | 280,000 | 281,739 |
| 500 and over | $131.60 | 500 | 120 | 5922 | 263,200 | 269,242 |

The lowest cost alternative is to purchase 500 magic wands per order.

Cognitive Domain: Knowledge

Difficulty Level: Easy

12.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| *Qty per Order* | *Price per Unit* | *Qopt* | *Setup Cost ($)* | *Holding Cost ($)* | *Cost of Goods $* | *TC ($)* |
| 0 to 499 | $8.00 | 447.2 | 134.16 | 134.16 | 16,000 | 16,268.3 |
| 500 to 999 | $7.20 | 500 | 120 | 150 | 14,400 | 14,760 |
| 1,000 to 1499 | $6.20 | 1,000 | 60 | 300 | 12,400 | 12,760 |
| 1,500 and over | $5.00 | 1,500 | 40 | 450 | 10,000 | 10,490 |

The lowest cost alternative is to purchase 1,500 reams/order.

Cognitive Domain: Knowledge

Difficulty Level: Medium

13.

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| --- | --- | --- | --- | --- | --- | --- |
| *Qty per Order* | *Price per Unit* | *Qopt* | *Setup Cost ($)* | *Holding Cost ($)* | *Cost of Goods $* | *TC ($)* |
| 0 to 499 | $55.00 | 313.34 | 3,446 | 3,446 | 495,000 | 501,893.5 |
| 500 to 999 | $52.00 | 500 | 2,160 | 5,200 | 468,000 | 475,360 |
| 1,000 to 1499 | $49.00 | 1,000 | 1,080 | 9,800 | 441,000 | 451,880 |
| 1,500 and over | $45.00 | 1,500 | 720 | 13,500 | 405,000 | 419,220 |

The lowest cost alternative is to purchase 1,500 gemstones/order.

Cognitive Domain: Knowledge

Difficulty Level: Medium

14.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| ***Indian Supplier*** | | | | | | |
| *Qty per Order* | *Price per Unit* | *Qopt* | *Setup Cost ($)* | *Holding Cost ($)* | *Cost of Goods $* | *TC ($)* |
| 0 to 3,999 | $35.00 | 4,993.5 | NA | NA | NA | NA |
| 4,000 to 7,999 | $32.00 | 5,222.3 | 18,382.6 | 18,382.6 | 9,600,000 | 9,636,765 |
| 8,000 to 11,999 | $27.00 | 8,000 | 12,000 | 23,760 | 8,100,000 | 8,135,760 |
| 12,000 plus | $22.00 | 12,000 | 8,000 | 29040 | 6,600,000 | 6,637,040 |

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| --- | --- | --- | --- | --- | --- | --- |
| ***Philippines Supplier*** | | | | | | |
| *Qty per Order* | *Price per Unit* | *Qopt* | *Setup Cost ($)* | *Holding Cost ($)* | *Cost of Goods $* | *TC ($)* |
| 0 to 3,999 | $37.00 | 4,856 | NA | NA | NA | NA |
| 4,000 to 7,999 | $34.00 | 5,066 | 18,948 | 18,948 | 10,200,000 | 10,237,900 |
| 8,000 to 11,999 | $26.00 | 8,000 | 12,000 | 22,880 | 7,800,000 | 783,488 |
| 12,000 plus | $20.00 | 12,000 | 8,000 | 26,400 | 6,000,000 | 6,034,400 |

The lowest cost alternative is to purchase 12,000 units/order from the Philippines.

Cognitive Domain: Knowledge

Difficulty Level: Medium

15a.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| ***Supplier A*** | | | | | | |
| *Qty per Order* | *Price per Unit* | *Qopt* | *Setup Cost ($)* | *Holding Cost ($)* | *Cost of Goods $* | *TC ($)* |
| 0 to 1,999 | $10.00 | 1,224.7 | 1224.75 | 1,224.75 | 100,000 | 102,499 |
| 3,000 to 4,999 | $9.50 | 3,000 | 500 | 2,850 | 95,000 | 98,350 |
| 5,000 to 7,999 | $8.00 | 5,000 | 300 | 4,000 | 80,000 | 84,300 |
| 8,000 plus | $7.00 | 8,000 | 187.5 | 5,600 | 70,000 | 75,787.5 |

The EOQ for Supplier A is 8,000 units.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| ***Supplier B*** | | | | | | |
| *Qty per Order* | *Price per Unit* | *Qopt* | *Setup Cost ($)* | *Holding Cost ($)* | *Cost of Goods $* | *TC ($)* |
| 0 to 3999 | $11.00 | 1,167.7 | 1,284.5 | 1,284.5 | 110,000 | 112,569 |
| 4000 to 7999 | $10.50 | 4,000 | 375 | 4,200 | 105,000 | 109,575 |
| 8,000 to 11999 | $9.00 | 8,000 | 187.5 | 7,200 | 90,000 | 97,381.5 |
| 12,000 plus | $7.00 | 12,000 | 125 | 8,400 | 70,000 | 78,525 |

The EOQ for Supplier B is 12,000 units.

15b. The lowest cost alternative is to order 12,000 units/order from Supplier B.

15c. The total cost of the optimal order from Supplier B is $78,525.

15d. Emily should consider speed and reliability of delivery and quality of the goods.

Cognitive Domain: Analysis

Difficulty Level: Medium

16. 

Cognitive Domain: Knowledge

Difficulty Level: Easy

17. 

Safety stock is 26.6 units (746.6-9\*80).

Cognitive Domain: Comprehension

Difficulty Level: Medium

18.  This is a 95.2% service level.

Cognitive Domain: Comprehension

Difficulty Level: Medium

19a. 

19b.  with 40.22 units safety stock

Cognitive Domain: Comprehension

Difficulty Level: Medium

20. 

Cognitive Domain: Knowledge

Difficulty Level: Easy

21a. 

21b. 

21c. 

Safety stock drops by 66 units.

Cognitive Domain: Comprehension

Difficulty Level: Medium

22.



Cognitive Domain: Knowledge

Difficulty Level: Easy

23a. 

23b. service level is 77.4%

Cognitive Domain: Comprehension

Difficulty Level: Medium

24a. 

24b. 

Cognitive Domain: Analysis

Difficulty Level: Hard

25a. 

25b. 

25c. 

Cognitive Domain: Comprehension

Difficulty Level: Medium

26a. 

26b. 

Cognitive Domain: Comprehension

Difficulty Level: Medium

27a.  for SKU-11

 for SKU-27

27b 

27c. 

Cognitive Domain: Comprehension

Difficulty Level: Medium

28a. 

28b. 

Cognitive Domain: Comprehension

Difficulty Level: Medium

29a. 

29b. 

Cognitive Domain: Comprehension

Difficulty Level: Medium

30a. 

30b. 

Cognitive Domain: Comprehension

Difficulty Level: Medium

31.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| *Qty per Order* | *Price per Unit* | *Qopt* | *Setup Cost ($)* | *Holding Cost ($)* | *Cost of Goods $* | *TC ($)* |
| 0 to 499 | $20.00 | 282.84 | 565.69 | 565.69 | 40,000 | 41,131.37 |
| 500 to 799 | $19.40 | 500 | 320 | 970 | 38,800 | 40,090 |
| 800 to 999 | $19.20 | 800 | 200 | 1,536 | 38,400 | 40,136 |
| 1,000 plus | $19.00 | 1000 | 160 | 1,900 | 38,000 | 40,060 |

The optimal order quantity is 1,000 units for a total annual cost of $40,060.

Cognitive Domain: Knowledge

Difficulty Level: Easy

32.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| *Qty per Order* | *Price per Unit* | *Qopt* | *Setup Cost ($)* | *Holding Cost ($)* | *Cost of Goods $* | *TC ($)* |
| 0 to 499 | $20.00 | 302.37 | 529.15 | 529.15 | 40,000 | 41,058 |
| 500 to 799 | $19.40 | 500 | 320 | 875 | 38,800 | 39,995 |
| 800 to 999 | $19.20 | 800 | 200 | 1,400 | 38,400 | 40,000 |
| 1,000 plus | $19.00 | 1000 | 160 | 1,750 | 38,000 | 39,910 |

The optimal order quantity is 1,000 units for a total annual cost of $39,910.

Cognitive Domain: Knowledge

Difficulty Level: Easy

33a. 

33b. 

Cognitive Domain: Comprehension

Difficulty Level: Medium

34. 



Cognitive Domain: Comprehension

Difficulty Level: Medium

35. The assumption is that the service level is 95%.





Cognitive Domain: Analysis

Difficulty Level: Medium