TRUE/FALSE

6.1 Inventory is such an expensive asset that it may account for as much as 40 percent of a firm's invested capital.

ANSWER: TRUE

6.2 It is impossible to have labor stored in inventory.

ANSWER: FALSE

6.3 The objective of inventory control is to minimize customer dissatisfaction due to inventory control outages, called stockouts.

ANSWER: FALSE

6.4 While most large organizations don't need inventory planning and control, it is nearly essential for manufacturing firms.

ANSWER: FALSE

6.5 Generally, supply and demand will be constant for a product.

ANSWER: FALSE

6.6 Inventory control may be considered a common thread that ties all of the functions and departments of an organization together.

ANSWER: TRUE

6.7 Hewlett Packard developed an inventory model based on different markets.

ANSWER: TRUE

6.8 In the decoupling function, some inventory may be stored between each production process to act as a buffer.

ANSWER: TRUE

6.9 Economic order quantity (EOQ) analysis has recently become practical as a consequence of high-speed computers.

ANSWER: FALSE

6.10 When a firm receives its inventory over a period of time, a model is needed that does not require the instantaneous receipt assumption.

ANSWER: TRUE

6.11 In the basic EOQ model, if the C_0 is doubled, the resultant EOQ is doubled.

ANSWER: FALSE

6.12 The reorder point occurs during a stockout situation.

ANSWER: FALSE

6.13 Safety stock is ignored when computing the reorder point.

ANSWER: FALSE

6.14 ABC analysis categorizes inventory into 26 different categories for computer analysis.

ANSWER: FALSE

6.15 Service level is the chance, measured in percent, that there will be a stockout.

ANSWER: FALSE

6.16 A stockout is a situation that occurs when there is no inventory on hand.

ANSWER: TRUE

6.17 Not all organizations are required to work with inventory.

ANSWER: FALSE

6.18 The first step in developing an inventory control process is identifying a method to forecast demand.

ANSWER: FALSE

6.19 The concept of inventory is applicable to both manufacturing and service organizations.

ANSWER: TRUE

6.20 As the amount of inventory rises, the total cost to the firm also rises.

ANSWER: FALSE

6.21 The purpose of the EOQ model is to achieve a balance between the cost of holding inventory and the cost of stockouts.

ANSWER: FALSE

6.22 One of the assumptions of the EOQ model is that orders for inventory are placed periodically (weekly, monthly, etc.).

ANSWER: FALSE

6.23 Fortunately, the EOQ model is relatively insensitive to minor errors in our forecast of demand.

ANSWER: TRUE

6.24 The EOQ model makes the assumption that inventory spoilage and pilferage costs are zero.

ANSWER: FALSE

6.25 The objective of most inventory models is to minimize stockouts.

ANSWER: FALSE

6.26 The EOQ is defined by the intersection of the *Ordering Cost Curve* and the *Total Cost Curve*.

ANSWER: FALSE

6.27 Under the assumptions made to develop the EOQ model, average inventory is one half the maximum inventory.

ANSWER: TRUE

6.28 The EOQ model is relatively insensitive to minor violations of the basic assumptions.

ANSWER: TRUE

6.29 The production run model is also useful when a firm purchases inventory which is then delivered over a period of time.

ANSWER: TRUE

6.30 We can develop an EOQ model for any situation for which we can define an "ordering" cost (order, setup, etc.) and a holding cost.

ANSWER: TRUE

6.31 If we wish to use the EOQ model in a situation where there are quantity discounts, the optimal solution is the EOQ which is appropriate for the lowest, discounted, cost.

ANSWER: FALSE

6.32 Safety stock can be used to "compensate" for variation in delivery lead times.

ANSWER: TRUE

6.33 We can usually determine an appropriate safety stock even if we are unable to accurately assess the actual cost of a stockout.

ANSWER: TRUE

6.34 In ABC inventory analysis, items in the "A" group should have the lowest dollar value to the firm.

ANSWER: FALSE

*6.35 One reason inventory is required is the uneven flow of resources through a company.

ANSWER: TRUE

*6.36 The lower the level of inventory, the lower the cost to acquire and store the inventory, but the greater the effort to track inventory required to avoid stockouts.

ANSWER: TRUE

*6.37 A lower level of inventory saves costs in two ways. It costs less to acquire and store the inventory, and it decreases the effort required to avoid stockouts.

ANSWER: FALSE

*6.38 The costs involved in a typical inventory model are: order costs, management costs, and holding costs.

ANSWER: FALSE

*6.39 Understanding the inventory control process is a significant part of the problem of inventory model building.

ANSWER: TRUE

*6.40 The Economic Order Quantity helps one estimate the optimal number of units to purchase with each order.

ANSWER: TRUE

MULTIPLE CHOICE

6.41 Inventory

(a) is any stored resource used to satisfy current or future need.
(b) includes raw materials, work-in-process, and finished goods.
(c) levels for finished goods are a direct function of demand.
(d) needs from raw materials through finished goods can be reasonably determined, once finished goods demand is determined.
(e) all of the above

ANSWER: e

6.42 Extra inventory that is used to avoid stockouts is known as

(a) planned shortages.
(b) quantity discounts.
(c) safety stock.
(d) service level.
(e) ABC analysis.

ANSWER: c

6.43 As the service level increases,

(a) safety stock increases at a decreasing rate.
(b) safety stock increases at an increasing rate.
(c) safety stock decreases at an increasing rate.
(d) safety stock decreases at a decreasing rate.
(e) none of the above

ANSWER: b

6.44 As the service level increases,

(a) carrying cost increases at an increasing rate.
(b) carrying cost increases at a decreasing rate.
(c) carrying cost decreases at a decreasing rate.
(d) carrying cost decreases at an increasing rate.
(e) none of the above

ANSWER: a

6.45 Which of the following is not a use of inventory?

(a) the decoupling function
(b) the translucent function
(c) an inflation hedge
(d) allow for quantity discounts
(e) to avoid stockouts and shortages

ANSWER: b

6.46 In making inventory decisions, the purpose of the basic model is to

(a) minimize customer dissatisfaction.
(b) minimize stock on hand.
(c) minimize carrying costs.
(d) minimize ordering costs.
(e) minimize the sum of carrying costs and ordering costs.

ANSWER: e

6.47 Which of the following factors is (are) not included in ordering cost?

(a) bill paying
(b) obsolescence
(c) purchasing department overhead costs
(d) inspecting incoming inventory
(e) developing and sending purchase orders

ANSWER: b

6.48 Which of the following factors is (are) not included in carrying cost?

(a) spoilage.
(b) obsolescence.
(c) cost of capital.
(d) inspecting incoming inventory.
(e) warehousing overhead costs.

ANSWER: d

6.49 A false statement about EOQ or economic order quantity is that it

(a) is relatively easy to use.
(b) is one of the most commonly used inventory control techniques.
(c) is one of the oldest inventory control techniques.
(d) was developed during the second World War.
(e) is the quantity where the total annual carrying cost and total annual ordering costs are equal.

ANSWER: d

6.50 Which of the following is not an assumption for the basic EOQ model?

(a) Only an integer number of orders can be made each year.

(b) Quantity discounts are not possible.
(c) Inventory receipt is instantaneous (all at once).
(d) With orders placed at the correct time, there will be no shortages.
(e) Demand is known.

ANSWER: a

6.51 For the basic EOQ model, which of the following relationships is not true?

(a) The optimal number of orders per year equals annual demand divided by the EOQ.
(b) The reorder point equals daily demand times the lead time in days.
(c) The average dollar level of inventory equals unit price times order quantity.
(d) Average inventory level equals one-half the order size.
(e) At EOQ, ordering cost equals carrying cost.

ANSWER: c

6.52 The EOQ would double if everything stayed constant, except that

(a) ordering cost decreased by a factor of four.
(b) carrying cost increased by a factor of four.
(c) annual demand increased by a factor of four.
(d) ordering costs doubled.
(e) carrying cost doubled.

ANSWER: c

6.53 The reorder point is

(a) the average inventory level.
(b) the quantity level at which to place an order for Q.
(c) the slope of the inventory level curve.
(d) where ordering cost equals carrying cost.
(e) found by a square root formula.

ANSWER: b

6.54 The EOQ model without the instantaneous receipt assumption is commonly called the

(a) quantity discount model.
(b) safety stock model.
(c) planned shortage model.
(d) production run model.
(e) none of the above

ANSWER: d

6.55 In the production run model of EOQ, the ordering cost of the basic model is replaced by the

(a) setup cost.
(b) stockout cost.
(c) carrying cost.
(d) material cost.

(e) none of the above

ANSWER: a

6.56 Sensitivity analysis of EOQ refers to

(a) the attitude of top management toward the use of the EOQ model.
(b) an assessment of the impact of obsolescence upon the EOQ.
(c) analysis of how much the EOQ will change when other variables change.
(d) a study of the impact of storing incompatible products in the same warehouse.
(e) analysis of the impact of stock shortages on customers or on production.

ANSWER: c

6.57 In the ABC analysis of inventory, the A group items

(a) are critical to the functioning of the organization.
(b) are the most expensive class of items.
(c) typically account for over 70 percent of the company's business in dollars.
(d) typically account for about 10 percent of a company's inventory items.
(e) all of the above

ANSWER: e

6.58 Rolf Steps is the production manager for a local manufacturing firm. This company produces staplers and other items. The annual demand for a particular stapler is 1,600 units. The holding cost is $2 per unit per year. The cost of setting up the production line for this is $25. There are 200 working days per year. The production rate for this product is 80 per day. If Rolf decided to produce 200 units each time he started production of the stapler, what would his maximum inventory level be?

(a) 200
(b) 180
(c) 100
(d) 90
(e) none of the above

ANSWER: b

6.59 Rolf Steps is the production manager for a local manufacturing firm. This company produces staplers and other items. The annual demand for a particular stapler is 1,600 units. The holding cost is $2 per unit per year. The cost of setting up the production line for this is $25. There are 200 working days per year. The production rate for this product is 80 per day. If Rolf decided to produce 200 units each time he started production of the stapler, how long would it take to produce 200 units?

(a) 1 year
(b) 2.5 days
(c) 4 days
(d) 10 days
(e) none of the above

ANSWER: b

6.60 Rolf Steps is the production manager for a local manufacturing firm. This company produces staplers and other items. The annual demand for a particular stapler is 1,600 units. The holding cost is $2 per unit per year. The cost of setting up the production line for this is $25. There are 200 working days per year. The production rate for this product is 80 per day. How many units should Rolf produce each time he starts production of this product if he wishes to minimize total inventory cost (round answer to nearest unit)?

(a) 200
(b) 80
(c) 100
(d) 211
(e) none of the above

ANSWER: d

6.61 With an annual demand of 2,400 units, daily demand of 10 units, and daily production rate of 40 units, a company has determined that each production run will be for 200 units. If production starts when the inventory level is at zero, how many units would actually be in the warehouse at the end of the first day of production (round answer to nearest unit)?

(a) 12
(b) 20
(c) 30
(d) 40
(e) none of the above

ANSWER: c

6.62 R.C. Barker makes purchasing decisions for his company. One product that he buys costs $50 per unit when the order quantity is less than 500. When the quantity ordered is 500 or more, the price per unit drops to $48. The ordering cost is $30 per order and the annual demand is 7,500 units. The holding cost is 10 percent of the purchase cost. If R.C. wishes to minimize his total annual inventory costs, he must evaluate the total cost for two possible order quantities. What are these two possible quantities (round answer to nearest unit)?

(a) 300 and 306
(b) 300 and 500
(c) 306 and 50
(d) 200 and 306
(e) none of the above

ANSWER: b

6.63 R.C. Barker makes purchasing decisions for his company. One product that he buys costs $50 per unit when the order quantity is less than 500. When the quantity ordered is 500 or more, the price per unit drops to $48. The ordering cost is $30 per order and the annual demand is 7,500 units. The holding cost is 10 percent of the purchase cost. If R.C. orders 500 units each time he places an order, what would the total annual holding cost be?

(a) $450
(b) $1,200
(c) $1,250
(d) $2,400
(e) none of the above

ANSWER: b

6.64 R.C. Barker makes purchasing decisions for his company. One product that he buys costs $50 per unit when the order quantity is less than 500. When the quantity ordered is 200 or more, the price per unit drops to $48. The ordering cost is $30 per order and the annual demand is 7,500 units. The holding cost is 10 percent of the purchase cost. How many units should R.C. order to minimize his total annual inventory cost (round answer to nearest unit)?

(a) 300
(b) 306
(c) 500
(d) 200
(e) none of the above

ANSWER: c

6.65 Consider an inventory situation where all the EOQ assumptions are met except there are quantity discounts. When a person orders more than the EOQ so that the discount price can be had, which of the following is true?

(a) Total ordering cost usually decreases relative to EOQ cost.
(b) Total purchase cost usually increases relative to EOQ cost.
(c) Total holding cost usually decreases relative to EOQ cost.
(d) Holding cost per unit usually increases relative to EOQ cost.
(e) none of the above

ANSWER: a

6.66 The annual demand for a product is 1,000 units. The company orders 200 units each time an order is placed. The lead time is 6 days, and the company has determined that 20 units should be held as a safety stock. There are 250 working days per year. What is the reorder point?

(a) 20
(b) 24
(c) 44
(d) 120
(e) none of the above

ANSWER: c

6.67 The annual demand for a product has been projected to be 2,000 units. This demand is assumed to be constant throughout the year. The ordering cost is $20 per order, and the holding cost is 20 percent of the purchase cost. Currently, the purchase cost is $40 per unit. There are 250 working days per year. Whenever an order is placed, it is known that the entire order will arrive on a truck in 6 days. Currently, the company is ordering 500 units each time an order is placed. What is the average inventory level under the current policy?

(a) 50
(b) 100
(c) 250
(d) 500
(e) none of the above

ANSWER: c

6.68 The annual demand for a product has been projected to be 2,000 units. This demand is assumed to be constant throughout the year. The ordering cost is $20 per order, and the holding cost is 20 percent of the purchase cost. Currently, the purchase cost is $40 per unit. There are 250 working days per year. Whenever an order is placed, it is known that the entire order will arrive on a truck in 6 days. Currently, the company is ordering 500 units each time an order is placed. What is the total holding cost for the year using this policy?

(a) $400
(b) $2,000
(c) $4,000
(d) $8,000
(e) none of the above

ANSWER: b

6.69 The annual demand for a product has been projected to be 2,000 units. This demand is assumed to be constant throughout the year. The ordering cost is $20 per order, and the holding cost is 20 percent of the purchase cost. Currently, the purchase cost is $40 per unit. There are 250 working days per year. Whenever an order is placed, it is known that the entire order will arrive on a truck in 6 days. Currently, the company is ordering 500 units each time an order is placed. What is the total ordering cost for the year using this policy?

(a) $400
(b) $160
(c) $40
(d) $80
(e) none of the above

ANSWER: d

6.70 The annual demand for a product has been projected to be 2,000 units. This demand is assumed to be constant throughout the year. The ordering cost is $20 per order, and the holding cost is 20 percent of the purchase cost. Currently, the purchase cost is $40 per unit. There are 250 working days per year. Whenever an order is placed, it is known that the entire order will arrive on a truck in 6 days. Currently, the company is ordering 500 units each time an order is placed. What is the reorder point under the current policy?

(a) 48
(b) 100
(c) 6
(d) 24
(e) none of the above

ANSWER: a

6.71 The annual demand for a product has been projected to be 2,000 units. This demand is assumed to be constant throughout the year. The ordering cost is $20 per order, and the holding cost is 20 percent of the purchase cost. Currently, the purchase cost is $40 per unit. There are 250 working days per year. Whenever an order is placed, it is known that the entire order will arrive on a truck in 6 days. Currently, the company is ordering 500 units each time an order is placed. How many orders would be placed each year using the current policy?

(a) 100
(b) 6
(c) 4
(d) 8
(e) none of the above

ANSWER: c

6.72 The annual demand for a product has been projected to be 2,000 units. This demand is assumed to be constant throughout the year. The ordering cost is $20 per order, and the holding cost is 20 percent of the purchase cost. Currently, the purchase cost is $40 per unit. There are 250 working days per year. Whenever an order is placed, it is known that the entire order will arrive on a truck in 6 days. How many units should the company order each time an order is placed if the company wishes to minimize total inventory cost?

(a) 100
(b) 200
(c) 250
(d) 500
(e) none of the above

ANSWER: a

6.73 Mark Achin sells 3,600 electric motors each year. The cost of these is $200 each, and demand is constant throughout the year. The cost of placing an order is $40, while the holding cost is $20 per unit per year. How many units should Mark order to minimize total inventory costs for the year?

(a) 500
(b) 120
(c) 600
(d) 300
(e) none of the above

ANSWER: b

6.74 Mark Achin sells 3,600 electric motors each year. The cost of these is $200 each, and demand is constant throughout the year. The cost of placing an order is $40, while the holding cost is $20 per unit per year. There are 360 working days per year and the lead time is 6 days. What is the reorder point?

(a) 86
(b) 60
(c) 120
(d) 200
(e) none of the above

ANSWER: b

6.75 Mark Achin sells 3,600 electric motors each year. The cost of these is $200 each, and demand is constant throughout the year. The cost of placing an order is $40, while the holding cost is $20 per unit per year. There are 360 working days per year and the lead time is 5 days. If Mark orders 200 units each time he places an order, what would his average inventory be (in units)?

(a) 100
(b) 200
(c) 60
(d) 120
(e) none of the above

ANSWER: a

6.76 Mark Achin sells 3,600 electric motors each year. The cost of these is $200 each, and demand is constant throughout the year. The cost of placing an order is $40, while the holding cost is $20 per unit per year. There are 360 working days per year and the lead time is 5 days. If Mark orders 200 units each time he places an order, what would his total ordering cost be for the year?

(a) $2,000
(b) $2,720
(c) $200
(d) $720
(e) none of the above

ANSWER: d

6.77 Andre Candess manages an office supply store. One product in the store is computer paper. Andre knows that 10,000 boxes will be sold this year at a constant rate throughout the year. There are 250 working days per year and the lead time is 3 days. The cost of placing an order is $30, while the holding cost is $15 per box per year. What is the daily demand for paper?

(a) 40
(b) 250
(c) 120
(d) 200
(e) none of the above

ANSWER: a

6.78 Andre Candess manages an office supply store. One product in the store is computer paper. Andre knows that 10,000 boxes will be sold this year at a constant rate throughout the year. There are 250 working days per year and the lead time is 3 days. The cost of placing an order is $30, while the holding cost is $15 per box per year. If Andre orders 500 boxes each time he orders from his supplier, what would his total relevant inventory cost be (holding cost plus ordering cost)?

(a) $3,000
(b) $4,350
(c) $3,075
(d) $3,750
(e) none of the above

ANSWER: b

6.79 Andre Candess manages an office supply store. One product in the store is computer paper. Andre knows that 10,000 boxes will be sold this year at a constant rate throughout the year. There are 250 working days per year and the lead time is 3 days. The cost of placing an order is $30, while the holding cost is $15 per box per year. How many units should Andre order each time to minimize his annual inventory cost?

(a) 200
(b) 400
(c) 500
(d) 100
(e) none of the above

ANSWER: a

6.80 Daniel Trumpe has computed the EOQ for a product he sells to be 400 units. However, due to recent events he has a cash flow problem. Therefore, he only orders 100 units each time he places an order. Which of the following is true for this situation?

(a) Total ordering cost will be higher than total holding cost.
(b) Total ordering cost will be lower than total holding cost.
(c) Total ordering cost will equal total holding cost.
(d) Nothing can be determined without more information.
(e) none of the above

ANSWER: a

6.81 A person is using the normal distribution to determine the safety stock for a product. What "z" value would be associated with a 90 percent service level?

(a) 0.90
(b) 1.28
(c) 0.53
(d) –0.90
(e) none of the above

ANSWER: b

6.82 A person is using the normal distribution to determine the safety stock for a product. What "z" value would be associated with a 95 percent service level?

(a) 0.95
(b) 1.28
(c) 1.65
(d) –0.95
(e) none of the above

ANSWER: c

6.83 A person is using the normal distribution to determine the safety stock for a product. What "z" value would be associated with a 99 percent service level?

(a) 0.90
(b) 1.65
(c) 2.32
(d) –0.99
(e) none of the above

ANSWER: c

6.84 Demand for a product is constant, but the lead time fluctuates. The demand during the lead time is normally distributed with a mean of 40 and a standard deviation of 4. If the company wishes to maintain a 90 percent service level, how much safety stock should be held?

(a) 45.12
(b) 41.28
(c) 1.28
(d) 5.12
(e) none of the above

ANSWER: d

6.85 Jack Spratt is the production manager for a local manufacturing firm. This company produces wizzy-gadgets and other items. The annual demand for a particular wizzy-gadget is 1,600 units. The holding cost is $2 per unit per year. The cost of setting up the production line for this is $25. There are 200 working days per year. The production rate for this product is 80 per day. If his maximum inventory level is 180 units, how many units did he produce each time he started production of the wizzy-gadgets?

(a) 200
(b) 180
(c) 100
(d) 90
(e) none of the above

ANSWER: a

6.86 Rose Arena is the production manager for a local manufacturing firm. This company produces buggy whips and other items. The annual demand for a particular buggy whip is 1,600 units. The holding cost is $2 per unit per year. The cost of setting up the production line for this is $25. There are 200 working days per year. Rose decided to produce 200 units each time she started production of the buggy whips. If it took her four days to produce the 200 units, what was her production rate?

(a) 80 units/day
(b) 60 units/day
(c) 40 units/day
(d) 100 units/day
(e) none of the above

ANSWER: e

6.87 Rolf Steps is the production manager for a local manufacturing firm. This company produces staplers and other items. The holding cost is $2 per unit per year. The cost of setting up the production line for this is $25. There are 200 working days per year. The production rate for this product is 80 per day. If the production order quantity is 200 units, what was the daily demand (rounded to the nearest whole unit)?

(a) 6 units
(b) 7 units
(c) 8 units
(d) 9 units
(e) none of the above

ANSWER: b

6.88 The annual demand for a product is 1,000 units. The company orders 200 units each time an order is placed. The lead time is six days. There are 250 working days per year. If the reorder point is 50, what safety stock are they using?

(a) 22
(b) 4
(c) 26
(d) 28
(e) none of the above

ANSWER: c

6.89 The annual demand for a product has been projected to be 2,000 units. This demand is assumed to be constant throughout the year. The ordering cost is $20 per order, and the holding cost is 20 percent of the purchase cost. Currently, the purchase cost is $40 per unit. There are 250 working days per year. Whenever an order is placed, it is known that the entire order will arrive on a truck in 6 days. If the average inventory is 400 units, how many units is the company ordering at a time?

(a) 300
(b) 400
(c) 500
(d) 600
(e) none of the above

ANSWER: e

6.90 The annual demand for a product has been projected to be 2,000 units. This demand is assumed to be constant throughout the year. The ordering cost is $20 per order, and the holding cost is 20 percent of the purchase cost. Currently, the purchase cost is $40 per unit. There are 250 working days per year. Whenever an order is placed, it is known that the entire order will arrive on a truck in 6 days. If the total holding cost for the year is $2,000, how many units does the company order at a time?

(a) 300
(b) 400
(c) 500
(d) 600
(e) none of the above

ANSWER: c

6.91 The annual demand for a product has been projected to be 2,000 units. This demand is assumed to be constant throughout the year. The ordering cost is $20 per order, and the holding cost is 20 percent of the purchase cost. The purchase cost is $40 per unit. There are 250 working days per year. Whenever an order is placed, it is known that the entire order will arrive on a truck in 6 days. Currently, the company is ordering 500 units each time an order is placed. What level of safety stock would give a reorder point of 60 units?

(a) 10
(b) 14
(c) 18
(d) 22
(e) none of the above

ANSWER: e

6.92 The annual demand for a product has been projected to be 2,000 units. This demand is assumed to be constant throughout the year. The ordering cost is $20 per order, and the holding cost is 20 percent of the purchase cost. The purchase cost is $40 per unit. There are 250 working days per year. Currently, the company is ordering 500 units each time an order is placed. Assuming the company uses a safety stock of 20 units resulting in a reorder point of 60 units, what is the expected lead time for delivery?

(a) 4 days
(b) 5 days
(c) 6 days
(d) 7 days
(e) none of the above

ANSWER: b

6.93 Mark Achin sells 3,600 electric motors each year. The cost of these is $200 each, and demand is constant throughout the year. The holding cost is $20 per unit per year. If Mark is minimizing total inventory cost and is ordering in lots of 90 units, what is his total order cost per year?

(a) 500
(b) 700
(c) 900
(d) 1,100
(e) insufficient information

ANSWER: c

6.94 Mark Achin sells 3,600 electric motors each year. The cost of these is $200 each, and demand is constant throughout the year. The holding cost is $20 per unit per year. There are 360 working days per year and the lead time is 5 days. For what order cost would Mark order 200 units each time he placed an order?

(a) 20
(b) 40
(c) 60
(d) 80
(e) none of the above

ANSWER: e

6.95 Mark Achin sells 3,600 electric motors each year. The cost of these is $200 each, and demand is constant throughout the year. The holding cost is $20 per unit per year. There are 360 working days per year and the lead time is 5 days. Assuming that Mark orders 200 units (the EOQ) each time he places an order, what would be his total ordering cost per year?

(a) $2,000
(b) $2,720
(c) $200
(d) $720
(e) none of the above

ANSWER: a

6.96 Andre Candess manages an office supply store. One product in the store is computer paper. Andre knows that 10,000 boxes will be sold this year at a constant rate throughout the year. There are 250 working days per year. The cost of placing an order is $30, while the holding cost is $15 per box per year. What is the delivery lead time?

(a) 5 days
(b) 6 days
(c) insufficient information
(d) 8 days
(e) none of the above

ANSWER: c

6.97 Andre Candess manages an office supply store. One product in the store is computer paper. Andre knows that 10,000 boxes will be sold this year at a constant rate throughout the year. There are 250 working days per year and the lead time is 3 days. The holding cost is $15 per box per year.

Andre orders 500 boxes each time he orders from his supplier. If his total relevant inventory cost (holding cost plus ordering cost) is $4,350, what is his cost for each order?

(a) $50/order
(b) $40/order
(c) $30/order
(d) $20/0rder
(e) none of the above

ANSWER: c

6.98 A person is using the normal distribution to determine the safety stock for a product. The "z" value of 1.28 would be associated with what service level?

(a) 40 percent
(b) 95 percent
(c) 70 percent
(d) 90 percent
(e) none of the above

ANSWER: d

6.99 A person is using the normal distribution to determine the safety stock for a product. The "z" value of 1.65 would be associated with what service level?

(a) 90 percent
(b) 95 percent
(c) 100 percent
(d) 92.5 percent
(e) none of the above

ANSWER: b

6.100 A person is using the normal distribution to determine the safety stock for a product. The "z" value of 2.32 would be associated with what service level?

(a) 95 percent
(b) 97.5 percent
(c) 98 percent
(d) 99 percent
(e) none of the above

ANSWER: d

6.101 Demand for a product is constant, but the lead time fluctuates. The demand during the lead time is normally distributed with a mean of 40 and a standard deviation of 4. If they have calculated a reorder point of 45.12 units, what service level are they assuming?

(a) 85 percent
(b) 90 percent
(c) 95 percent
(d) 97.5 percent
(e) none of the above

ANSWER: b

*6.102 Which of the following is not an assumption of the simple EOQ inventory model?

(a) Demand is known and constant.
(b) Lead time is known and is zero.
(c) Quantity discounts are not possible.
(d) Per unit cost is constant.
(e) none of the above

ANSWER: b

*6.103 Which of the following circumstances requires that adjustments be made to the simple EOQ model?

(a) Service levels are specified.
(b) Lead time is known, but non-zero.
(c) Receipt of inventory occurs over time rather than instantaneously.
(d) Orders are placed so as to limit the number of stockouts.
(e) c and d

ANSWER: e

*6.104 The "point at which to reorder" does not depend on which of the following:

(a) Lead time.
(b) ordering cost
(c) EOQ
(d) Storage costs.
(e) none of the above

ANSWER: a

*6.105 The EOQ is particularly sensitive to which of the following?

(a) Yearly demand.
(b) Order cost.
(c) Holding cost.
(d) Production cost.
(e) none of the above
ANSWER: e

*6.106 To evaluate quantity discounts, one uses the EOQ model, and modifies the model so that

(a) holding cost is considered as a percentage of unit cost rather than a separable dollar cost.
(b) the EOQ is calculated to lie within one of the cost corridors.
(c) holding cost is calculated on an "average basis" across the discounts.
(d) any one of the above approaches could be used.
(e) none of the above

ANSWER: a

*6.107 Which of the following does not impact on EOQ?

(a) safety stock
(b) demand per unit time
(c) order cost
(d) all of the above
(e) none of the above

ANSWER: a

PROBLEMS

6.108 East Valve Distributors distributes industrial valves and control devices. The Eastern control device has an annual demand of 9,375 units and sells for $100 per unit. The cost of ordering is $40 per order and the average carrying cost per unit per year is $0.75. Determine the economic order quantity.

ANSWER: EOQ = 1,000 units

6.109 East Valve Distributors distributes industrial valves and control devices. The Eastern valve has an annual demand of 10,000 units and a cost of $80 per unit. The cost of ordering is $72 per order and inventory carrying cost is estimated to be 5 percent of the cost of each valve. Lead time is four working days. Determine (assume 250 working days):

(a) the economic order quantity
(b) the reorder point
(c) the optimal number of orders per year
(d) the optimal number of days between any two orders

ANSWER:

(a) EOQ = 600 units
(b) ROP = 40(4) = 160 units
(c) number of orders per year = D/Q = 10,000/600 = 16.67 orders
(d) number of days between orders = 250/16.67 = 15 days

6.110 Furniture Manufacturers Inc., uses 20,000 loads of lumber per year. A load of lumber costs $500 and the carrying cost is 10 percent of the unit cost. The cost to order is $200 per order and the lead time is three working days. Determine (assume 200 working days):

(a) the economic order quantity
(b) the reorder point
(c) number of orders per year
(d) days between orders

ANSWER:

(a) EOQ = 400 units
(b) ROP = 100(3) = 300 units
(c) number of orders per year = D/Q = 2000/400 = 50 orders
(d) days between orders = 200/50 = 4 days

6.111 We use 1,500 per year of a certain subassembly that has an annual holding cost of $45 per unit. Each order placed costs us $150. We operate 300 days per year and have found that an order must be placed with our supplier 6 working days before we can expect to receive that order. For this subassembly, find:

(a) the economic order quantity
(b) the annual holding cost
(c) the annual ordering cost
(d) the reorder point

ANSWER:

(a) EOQ = 100
(b) annual holding cost = (100/2)(45) = 2250
(c) annual ordering cost = (1500/100)150 = 2250
(d) ROP = 5(6) = 30 units

6.112 We use 1,200 of a certain spare part that costs $25 for each order and has a $24 annual holding cost. Calculate the total cost for order sizes of: 25, 40, 50, 60, and 100. Identify the economic order quantity and consider the implications for making an error in calculating the economic order quantity.

ANSWER:

Total Cost = total ordering cost + total holding cost

Q = 25 TC = 1200 + 300 = $1,500
Q = 40 TC = 750 + 480 = $1,230
Q = 50 TC = 600 + 600 = $1,200
Q = 60 TC = 500 + 720 = $1,220
Q = 100 TC = 300 + 1200 = $1,500

Small variations in order quantity will not have a significant impact on total costs.

6.113 Mark Barry forecasts annual demand of his new computer software to be 6,250 units. This should be relatively constant throughout the year. The cost of placing an order is $40, while the holding cost per unit is $2 per unit per year. Lead time is constant at four days, and there are 250 working days per year.

(a) To minimize total cost, how many units should Barry order each time he places an order?
(b) What is the reorder point?

ANSWER:

(a) EOQ = 500 units
(b) ROP = 4(6250/250) = 100 units

6.114 David and Beth Sheba run a health food store. Their top selling item is called Heavenly Kelp. The annual demand for this is 810 units, and demand is constant throughout the year. The cost of placing an order is $20, while the holding cost per unit per year is $4.

(a) How many orders per year should be placed if they wish to minimize their total cost?
(b) What is the minimum possible annual holding cost?

ANSWER:

(a) EOQ = 90 units. Therefore, the number of orders per year is 810/90 = 9 orders per year.
(b) (90/2)4 = $180 total holding cost

6.115 The H.A.L. Computer Store sells a printer for $200. Demand for this is constant during the year, and annual demand is forecasted to be 600 units. The holding cost is $20 per unit per year, while the cost of ordering is $60 per order. Currently, the company is ordering 12 times per year (50 units each time). There are 250 working days per year and the lead time is 10 days.

(a) Given the current policy of ordering 50 units at a time, what is the total of the annual ordering cost and the annual holding cost?
(b) If the company used the absolute best inventory policy, what would the total of the ordering and holding cost be?
(c) What is the reorder point?

ANSWER:

(a) TOC + THC = 720 + 500 = $1220
(b) If we order EOQ = 60 units, TOC + THC = 600 + 600 = $1,200.
(c) ROP = (600/250)10 = 24 units

6.116 Purinnerds Dog Food is a very popular product at Kay Gnein's corner grocery. Demand for this is relatively constant, and the total demand for the year is 1,200 bags. The cost of placing an order is $50, while the holding cost is $3 per unit per year. The store is open 300 days per year. Lead time for this is 8 days.

(a) If Kay places 50 orders per year, what would her ordering and holding costs be?
(b) If Kay wishes to minimize her total inventory cost, how many units should she order each time an order is placed?
(c) What is the reorder point?

ANSWER:

(a) With 50 orders per year, Q=24. TC = TOC + THC = 2500 + 36 = $2,536
(b) EOQ = 200
(c) ROP = (1200/300)8 = 32 units

6.117 Everett Mann's Dream Store sells water beds and assorted supplies. The best selling bed in the store has an annual demand of 400 units. The ordering cost is $40, while the holding cost is $5 per unit per year. There are 250 working days per year, and the lead time is 6 days.

(a) To minimize total cost, how many units should be ordered each time an order is placed?
(b) If the holding cost per unit was $6 instead of $5, what would the optimal order quantity be?

ANSWER:

(a) EOQ = 80 units
(b) EOQ = 73.02 units if C_h=6.

6.118 The Handy Manufacturing Company manufactures small air conditioner compressors. The estimated demand for the year is 12,000 units. The setup cost for the production process is $200 per run, and the carrying cost is $10.00 per unit per year. The daily production rate is 100 units per day, and demand has been 50 units per day. Determine the number of units to produce in each batch. (Problem assumes 240 operating days.)

ANSWER: Optimum production quantity = 979.8 units

6.119 The New Company inventories product R. The carrying cost of one unit per year is $8.00, and the cost of a stockout is $20.00 per unit. Using the lead time demand probability distribution given below, determine the appropriate safety stock. Assume the optimum number of orders is known to be 15.

	Lead Time Demand (Units)	Probability
	200	0.10
	250	0.20
ROP=>	300	0.40
	350	0.20
	400	0.10

ANSWER:

Optimum safety stock = 100 units
Total cost for safety stock of 100 units = $800
Total cost for safety stock of 500 units = $2,500
Total cost for safety stock of 0 units = $6,000

6.120 Candy Incorporated stocks bubble gum game cards, an item that has a normally distributed demand during the reorder period with a mean of 12 dozen boxes and a standard deviation of two dozen boxes. If it is desirable to experience a stockout only 10 percent of the time, what is the appropriate safety stock?

ANSWER:

For 90 percent service level, we must have X = 12 + 1.28(2) = 14.56 dozen.

Since the mean is 12, the safety stock = 14.56 - 12 = 2.56

6.121 Susan Holland sells hand-painted shirts to vacationers who enter her gift shop. Her supplier can only deliver 10 of these per day, but if she orders more than this, the supplier will deliver 10 each day until the entire order is met. Her annual demand for these is 1,000, and the sales are relatively constant for each of the 250 days that her store is open. The cost of placing an order is $20, while the holding cost per unit per year is $2. If she wishes to minimize her annual inventory cost, how many units should she order each time she places an order?

ANSWER:

Q = 182.5 units will minimize costs.

6.122 Ivonne Callen sells beauty supplies. Her annual demand for a particular skin lotion is 1,000 units. The cost of placing an order is $20, while the holding cost per unit per year is 10 percent of the cost. This item currently costs $10 if the order quantity is less than 100. For orders of 300 units or more, the cost falls to $9.80. To minimize total cost, how many units should Ivonne order each time she places an order? What is the minimum total cost?

ANSWER:

With EOQ = 200, the total cost is $10,200.

With Q = 300 to obtain discount, the total cost is $10,013,67.

Therefore, she should order 300 units.

6.123 The purchasing manager for a firm is trying to determine what the safety stock should be for a particular product. She has developed the following table, which gives the distribution of demand during the lead time and the probabilities:

Demand During Lead Time	Probability
40	0.20
50	0.25
60	0.25
70	0.20
80	0.10

The carrying cost is $5 per unit per year, the ordering cost is $30 per order, and the stockout cost is $40 per unit. The reorder point is 60 units, and 6 orders are placed each year. What level of safety stock should be maintained?

ANSWER:

Safety Stock	Additional Holding Cost	Stockout Cost	Total Cost
0	0	(10)(0.2)(40)(10)+(20)(0.1)(40)(10)	1600
10	50	(10)(0.1)(40)(10)	450
20	100	0	100

Therefore, 20 units of safety stock should be carried.

6.124 Fred Frummer is the inventory manager for Frummer Retail and Distributors. One product, automobile distributors, has an annual demand of 4,000 units. The ordering cost is $25 per order and the holding cost is $5 per unit per year. If Fred uses joint ordering, the ordering cost would fall to $20 per order.

(a) What is the optimal order quantity if joint ordering is not used?
(b) What is the optimal order quantity if joint ordering is used?
(c) What is the cost savings of using joint ordering?

ANSWER:

(a) EOQ with no joint ordering = 200 units
(b) EOQ with joint ordering = 178.8
(c) Cost savings = 1000 - 894.43 = 105.57

6.125 Martha Maples opened a new beauty products retail store. There are numerous items in inventory, and Martha knows that there are costs associated with inventory. However, her time is limited, so she cannot carefully evaluate the inventory policy for all products. Martha wants to classify the

items according to the dollars invested in these. The following table provides information about the 10 items that she carries:

Item Number	Unit Cost	Demand (units)
E102	4.00	800
D23	8.00	1,200
D27	3.00	700
R02	2.00	1,000
R19	8.00	2,000
S107	6.00	500
S123	1.00	1,200
U11	7.00	800
U23	1.00	1,500
V75	4.00	1,500

Use ABC analysis to classify these items into categories A, B, and C.

ANSWER:

Item Number	Unit Cost	Demand (units)	Annual Cost ($)
E102	4.00	800	3,200
D23	8.00	1,200	9,600
D27	3.00	700	2,100
R02	2.00	1,000	2,000
R19	8.00	200	1,600
S107	6.00	500	3,000
S123	1.00	1,200	1,200
U11	7.00	800	5,600
U23	1.00	1,500	1,500
V75	4.00	1,500	6,000

D23 would be a Class A item. U11 and V75 would be Class B items, and the rest would be Class C items. The percentages are not exactly as described in the textbook, but the relative importance is certainly evident from this table.

6.126 East Valve Distributors distributes industrial valves and control devices. The Eastern control device has an annual demand of 9,375 units and sells for $100 per unit. The cost of ordering is $40 per order. If the EOQ is calculated to be 1,000 units, what is the average carrying cost per unit per year?

ANSWER: Average carrying cost = $0.75 per unit

6.127 We use 1,500 per year of a certain subassembly that has an annual holding cost of $45 per unit. Each order placed costs us $150. We operate 300 days per year and have found that an order must be placed with our supplier 6 working days before we can expect to receive that order. What reorder point should we use?

ANSWER: reorder point = 30 units

6.128 Mark Barry forecasts annual demand his new computer software to be 6,250 units. This should be relatively constant throughout the year. The cost of placing an order is $40, while the holding cost per unit is $2 per unit per year. Lead time is constant at 4 days, and there are 250 working days per year. If lead time can be reduced to 2 days, what should the new EOQ be?

ANSWER: EOQ = 500 units

6.129 The H.A.L. Computer Store sells a printer for $200. Demand for this is constant during the year, and annual demand is forecasted to be 600 units. The holding cost is $20 per unit per year, while the cost of ordering is $60 per order. Currently, the company is ordering 12 times per year (50 units each time) with a total annual ordering and holding cost of $1,400. There are 250 working days per year and the lead time is 10 days.

(a) Is the annual total order and holding cost more or less than the optimal?
(b) If the company decides to keep a safety stock equal to 5 units, what is the reorder point?

ANSWER:

(a) EOQ = 60, giving TOC + THC = $600 + $600 = $1,200. Therefore, present cost is above optimal.
(b) ROP = (600/250)*10 + 5 = 29 units

6.130 Everett Mann's Dream Store sells water beds and assorted supplies. The best selling bed in the store has an annual demand of 400 units. The ordering cost is $40. Present holding cost is $6 per year, but Mr. Mann believes that he can reduce this cost to $5. What impact would this reduction in holding cost have on the EOQ? There are 250 working days per year, and the lead time is 6 days.

ANSWER:

EOQ (C^h=$5) = 80 units;

EOQ (C_h=$6) = 73.02 units

6.131 Susan Holland sells hand-painted shirts to vacationers who enter her gift shop. Her supplier can only deliver 10 of these per day, but if she orders more than this, the supplier will deliver 10 each day until the entire order is met. Her annual demand for these is 1,000, and the sales are relatively constant for each of the 250 days that her store is open. The cost of placing an order is $20, while the holding cost per unit per year is $2. If she could convince her supplier to deliver her entire order on a single day, would this increase or decrease her carrying plus ordering cost?

ANSWER:

Q(Production model) = 182.5 units. Total carrying cost: = (1/2)*(182.5*2)*(1 - 4/10)
= 182.5*.6 = $109.5

Q(Simple EOQ Model) = 141 units. Total carrying cost: = 70.5*2 = $141

Therefore, having the supplier deliver 10 units per day until he has filled her order is the alternative that minimizes the total carrying plus order costs.

6.132 The purchasing manager for a firm is trying to determine what the safety stock should be for a particular product. She has developed the following table, which gives the distribution of demand during the lead time and the probabilities:

Demand During Lead Time	Probability
40	0.10
50	0.20
60	0.25
70	0.25
80	0.20

The carrying cost is $5 per unit per year, the ordering cost is $30 per order, and the stockout cost is $40 per unit. The reorder point is 60 units, and 6 orders are placed each year. What level of safety stock should be maintained?

ANSWER:

Safety Stock	Additional Holding Cost	Stockout Cost	Total Cost ($)
0	0	(10)(0.25)(40)(10)+(20)(0.2)(40)(10)	2600
10	50	(10)(0.2)(40)(10)	850
20	100	0	100

Therefore, 20 units of safety stock should be carried.

*6.133 Rascal's Inc. stocks beef jerky, an item that has a normally distributed demand during the reorder period with a mean of 7 dozen boxes and a standard deviation of three dozen boxes. If it is desirable to experience a stockout only 10 percent of the time, what is the appropriate safety stock?

ANSWER:

For 90 percent service level we must have X = 7 + 1.28(3) = 9.56 dozen.

Since the mean is 7, the safety stock = 9.56 - 7 = 2.56 dozen

*6.134 ArtOrgan, Ltd. distributes mechanical replacements for human mitral heart valves. Their artificial valve has a demand of 12,765 units per year and sells for $7,900 per unit. The cost of ordering is $75 per order and the average carrying cost per unit per year is $150. Determine the economic order quantity.

ANSWER: EOQ = 113 units

*6.135 ArtOrgan, Ltd. distributes porcine replacements for human mitral heart valves. Their replacement valve has a demand of 12,765 units per year and sells for $7,900 per unit. The cost of ordering is $75 per order and the average carrying cost per unit per year works out to be about 5% of the cost of the valve. Lead time is 4 working days. Determine (assume 250 working days):

(a) the economic order quantity
(b) the reorder point
(c) the optimal number of orders per year
(d) the optimal number of days between any two orders

ANSWER:

(a) EOQ = 69.6 units
(b) Reorder point = 204.24
(c) Number of orders per year = 183.34
(d) Optimal number of days between orders = 1.4 working days

*6.136 We use 2,750 per year of a certain subassembly that has a purchase cost of $450, and an annual holding cost of $500 per unit. Each order placed costs us $150. We operate 300 days per year and have found that an order must be placed with our supplier 6 working days before we can expect to receive that order. For this subassembly, find:

(a) economic order quantity = 40.6
(b) annual holding cost (using EOQ) = $10155.60
(c) annual ordering cost (using EOQ) = $10155.60
(d) reorder point = 55

*6.137 We use 1,300 of a certain spare part that costs $35 for each order and has a $32 annual holding cost. Calculate the total cost for order sizes of: 25, 40, 50, 60, and 100. Identify the economic order quantity and consider the implications for making an error in calculating the economic order quantity.

ANSWER:

Total Cost = total ordering cost + total holding cost

Q = 25 TC = $2220.00
Q = 40 TC = $1777.50
Q = 50 TC = $1710.00
$\mathbf{Q}^*$ = 53.3 TC = $1706.40
Q = 60 TC = $1718.00
Q = 100 TC = $2055.00

Percent variation of total cost is certainly less than percent variation in order quantity.

*6.138 The H.A.L. Computer Store sells a printer for $400. Demand for this is constant during the year, and annual demand is forecasted to be 1100 units. The holding cost is $20 per unit per year, while

the cost of ordering is $90 per order. Currently, the company is ordering 12 times per year (92 units each time). There are 250 working days per year and the lead time is 8 days.

(a) Given the current policy of ordering 92 units at a time, what is the total of the annual ordering cost and the annual holding cost?
(b) If the company used the absolute best inventory policy, what would the total of the ordering and holding cost be?
(c) What is the reorder point?
(d) How many days between orders with 12 orders per year?

ANSWER:

(a) TC = $1,996.09
(b) Using EOQ of 99.5 units: TC = $1990.00
(c) ROP = 35.2 units
(d) Number of days between orders = 22.6

SHORT ANSWER/ESSAY

6.139 Explain inventory's financial role in a company.

ANSWER: Inventory often represents a considerable amount of invested capital, thus inventory control is essential.

6.140 List three general categories of inventory.

ANSWER: raw material, work-in-process inventory, finished goods inventory

6.141 Explain how inventory can act as a buffer in the production process.

ANSWER: By storing some inventory, it helps to decouple the manufacturing process within the organization.

6.142 List three disadvantages of buying inventory in large quantities.

ANSWER: higher storage cost, more spoilage, damaged stock, theft, insurance, less cash to invest, etc.

6.143 List four significant inventory costs.

ANSWER: the inventory itself, order cost, carry cost, stockout cost

6.144 List three carrying-cost factors.

ANSWER: taxes, insurance, spoilage, theft, obsolescence, warehouse personnel wages, etc.

6.145 List three order cost factors.

ANSWER: sending a purchase order, inspecting incoming inventory, bill paying, inventory questions, purchasing department expenses, etc.

6.146 Explain what is meant by reorder point.

ANSWER: The reorder point is when time to reorder an inventory item.

6.147 Why carry safety stock?

ANSWER: to prevent costly stockouts

6.148 Describe ABC analysis.

ANSWER: Divide inventory into three categories by importance of control, assign A items as the most important to control and C items with little or no need of control.

*6.149 Describe, in general, the procedure for finding EOQ.

ANSWER: Write the equation to represent the equality: Order Cost = Holding Cost, and solve for Q.

*6.150 Explain the basic difference(s) between the simple EOQ model and the Production Run Model.

ANSWER: In the simple EOQ, inventory delivery is assumed to occur instantaneously, while in the Production Run Model, inventory is assumed to be produced (or "delivered") over time.

*6.151 Is the comment "The only function of safety stock is to protect against fluctuations in demand during lead time" an accurate depiction of the purpose of the function of safety stock?

ANSWER: Safety stock certainly does mitigate the effect of fluctuation in demand during lead time. It also helps mitigate the effect of quality problems and other such issues on the supply side.