Matching Supply with Demand: An Introduction to Operations Management, 4e **(Cachon)**
Chapter 2 The Process View of the Organization

1) Butternut is a ski resort in Massachusetts. One of their triple chair lifts unloads 1296 skiers per hour at the top of the slope. (A triple chair lift can carry three passengers per chair.) The ride from the bottom to the top takes 5 minutes. How many skiers are riding on the lift at any one time? **(Round the answer to the nearest whole number.)**

Answer: 108 skiers
Explanation: Use Little's Law. 1296 skiers/hour * 5/60 = 108 skiers
Difficulty: 3 Hard
Topic: Littles Law
AACSB: Analytical Thinking
Blooms: Apply

2) Home Depot's annual turns are 4.7, its Cost of Goods Sold (COGS) is $44.7 billion, and its gross margin is 33%. Recall, gross margin = (Revenue – COGS) / Revenue. What is the average inventory it holds? **(Round the answer to 2 decimal places.)**

Answer: $9.51 billion
Explanation: $44.7 billion / 4.7 =$9.51 billion. Note that average inventory in dollars is measured by the cost of goods sold, thus the gross margin does not play a role in the calculation.
Difficulty: 3 Hard
Topic: Littles Law
AACSB: Analytical Thinking
Blooms: Apply

3) A company's holding cost is 16% per year. Its annual inventory turns are 9.5. The company buys an item for $50. What is the average cost in dollars to hold this item in inventory? **(Round the answer to 2 decimal places.)**

Answer: Average cost: $ 0.84
Explanation: The item will be turned 9.5 times a year. Thus, for each turn it stays in inventory, the holding cost is 16%/9.5 of the cost of the item. Thus, the average cost to hold this item in inventory is $50 * (16%/9.5) = $0.84
Difficulty: 3 Hard
Topic: Inventory Turns and Inventory Costs
AACSB: Analytical Thinking
Blooms: Apply

4) Trader Bob, an organic food retail chain, operates 365 days a year. In 2007, the company turned its inventory approximately 25 times. The company's COGS were 60% of its Sales and its annual Sales were about $7,000M that year. What was Trader Bob's average inventory in 2007? **(Round the answer to the nearest whole number.)**

Answer: $168 million
Explanation: COGS = 0.6 × 7000M = 4200M. Inventory = COGS / Turns = 4200M / 25 = $168M
Difficulty: 3 Hard
Topic: Littles Law
AACSB: Analytical Thinking
Blooms: Apply

5) Assuming Trader Bob's annual inventory holding costs are 20% (an item that cost $10 to purchase would cost $2 to hold in inventory for one year), what is the inventory cost of an item which sells for $20 and costs Trader Bob $12 to buy? Assume that this item has inventory turns of 25 per year. **(Round the answer to 3 decimal places.)**

Answer: $0.096
Explanation: 20% per year with 25 turns is .20/25 = 0.008%. COGs is $12. So, inventory cost is 0.008% × $12 = $0.096
Difficulty: 3 Hard
Topic: Inventory Turns and Inventory Costs
AACSB: Analytical Thinking
Blooms: Apply

[The following information applies to questions 6-7.]

Joe's Beer, Bait, & Tackle Co.

Joe's Beer, Bait, & Tackle Co. is a small chain of fishing tackle stores in northern Minnesota. In 2009, the company's revenue was $4,300,000 and its cost of sales was $3,200,000. Assume 52 weeks and 365 days per year.

6) Joe keeps only 5.5 days-of-supply of inventory on average because much of his inventory is live bait and micro-brew beer, both of which have a short shelf life. What is his annual inventory turns? **(Round the answer to 2 decimal places.)**

Answer: 66.36
Explanation: 365/5.5 = 66.36
Difficulty: 3 Hard
Topic: Inventory Turns and Inventory Costs
AACSB: Analytical Thinking
Blooms: Apply

7) Given that he has 5.5-days-of-supply of inventory on average, how much inventory does Joe have on average? **(Round the answer to the nearest whole number.)**

Answer: $48,219
Explanation: $3,200,000/ (365/5.5) =$48,219
Difficulty: 3 Hard
Topic: Five Reasons to Hold Inventory
AACSB: Analytical Thinking
Blooms: Apply

8) Which of the following best explains why slow turning items may not be profitable at a brick-and-mortar retailer?
A) If turns are low, days-of-supply will also be low.
B) If turns are low, the gross margin will also be low.
C) If turns are low, the setup costs to stock the shelf will be high.
D) If turns are low, blocking and starving are more likely to occur.
E) If turns are low, units spend a long time on the retailer's shelves.

Answer: E
Explanation: a) If turns are low, days-of-supply will be high. b) it is not necessary that the gross margin will be low, since various factors affect gross margin. c) setup costs are not affected by turns. d) starving is less likely to occur when turns are low. e) units spend too much time on the shelves, and this will increase the inventory holding cost.
Difficulty: 3 Hard
Topic: Inventory Turns and Inventory Costs
AACSB: Analytical Thinking
Blooms: Analyze

9) Is it possible for two firms to have the same annual inventory turns and the same gross-margin but different days-of-supply?
A) Yes, because days-of-supply measures how long the firm can satisfy demand with its current inventory whereas inventory turns measures the frequency at which inventory turns over.
B) Yes, inventory turns and gross margin are related but they are independent of days-of-supply
C) Yes, the firm with the higher days-of-supply will have the lower return on invested capital.
D) No, if firms have the same gross-margin then they must have the same days-of-supply.
E) No, if firms have the same inventory turns then they must have the same days-of-supply.
F) None of the above.

Answer: E
Explanation: Knowing inventory turns uniquely specifies days of supply because inventory turns = 365/ days of supply.
Difficulty: 3 Hard
Topic: Inventory Turns and Inventory Costs
AACSB: Analytical Thinking
Blooms: Analyze

[The following information applies to questions 10-11.]

ProofSmart Inc.

ProofSmart Inc., a supplier of home insulation materials, was burned down in a recent fire. From the remains of what used to be the accounting ledger, the following information was recovered:

	2006	2007
Inventory	$2,367,121	$2,418,257
Gross Margin	42%	45%
Inventory Turns	11	[unreadable]

Prior to the fire, ProofSmart saw a sales growth of 48% in 2007, a record performance for the 18-year-old company. (NOTE: Gross margin is defined as 1 - (COGS/Sales).)

10) What was the sales for 2007?
Circle the answer closest to the correct answer.
A) $318,000
B) $38,000,000
C) $43,000,000
D) $66,000,000
E) $85,000,000
F) Cannot be determined from the data given

Answer: D
Explanation: 2006 COGS = 2,367,121 * 11 = $26,038,331
2006 Sales = 26,038,331 / (1-42%) = $44,893,674
2007 Sales = 44,893,674 * 148% = $66,442,638
Difficulty: 3 Hard
Topic: Inventory Turns and Inventory Costs
AACSB: Analytical Thinking
Blooms: Apply

11) What was the inventory turns for 2007?
Circle the answer closest to the correct answer.
A) 10
B) 11
C) 12
D) 13
E) 14
F) 15
G) Cannot be determined from the data given
H) None of these

Answer: F
Explanation: 2007 COGS = $66,442,638 * (1-45%) = $36,543,451
2007 Inventory Turns = $36,543,451/2,418,257 = 15
Difficulty: 3 Hard
Topic: Inventory Turns and Inventory Costs
AACSB: Analytical Thinking
Blooms: Apply

[The following information applies to questions 12-13.]

Cheap Retailers
The following table shows financial data (year 2006) for Dirt Cheap Wholesale and Kwiki-Mart, two U.S. retailers.

	DIRT CHEAP WHOLESALE	KWIKI-MART STORES
Inventories ($MM)	4754	40894
Sales (net $MM)	59217	397206
COGS ($MM)	52762	326606

Assume that both companies have an average annual holding cost rate of 20% (i.e. it costs both retailers $2 to hold an item that they procured for $10 for one entire year).

12) How many days, on average, does a product stay in Dirt Cheap's inventory before it is sold? Assume that stores operate 365 days a year. **(Round the answer to 2 decimal places.)**

Answer: 32.89 days
Explanation: Dirt Cheap has a COGS=$52762M = flow rate R. Inventory I = $4754M. Therefore, flow time T = I/R = 4754/52762 = .09 years, or 32.89 days.
Difficulty: 3 Hard
Topic: Inventory Turns and Inventory Costs
AACSB: Analytical Thinking
Blooms: Apply

13) How much lower (expressed in dollars) is, on average, the inventory cost for Dirt Cheap compared to Kwiki-Mart of a house hold cleaner valued at $5 COGS? Assume that the unit cost of the house hold cleaner is the same for both companies and that the price and the inventory turns of an item are independent. **(Round the answer to 3 decimal places.)**

Answer: $0.035
Explanation: Inventory turns for Dirt Cheap = 1/.09 = 11.1 turns. Flow time for Kwiki-Mart = Inventory/COGS = 40894/326606 = 0.125. Therefore, inventory turns for Kwiki-Mart = 7.98. Holding costs per year = 20% or $1 per unit for one year. This means inventory costs per unit for Dirt Cheap = 1/11.1 = $0.09. For Kwiki-Mart, the inventory costs per unit = 1/7.98 = $0.125. So, Dirt Cheap's costs are 3.5 cents or $0.035 lower.
Difficulty: 3 Hard
Topic: Inventory Turns and Inventory Costs
AACSB: Analytical Thinking
Blooms: Analyze