Chapter 9 *Rapid* Review

Main Heading	Review Material	MyOMLab
THE STRATEGIC IMPORTANCE OF LAYOUT DECISIONS (p. 370)	Layout has numerous strategic implications because it establishes an organization's competitive priorities in regard to capacity, processes, flexibility, and cost, as well as quality of work life, customer contact, and image. *The objective of layout strategy is to develop an effective and efficient layout that will meet the firm's competitive requirements.*	Concept Questions: 1.1–1.4
TYPES OF LAYOUT (pp. 370–371)	Types of layout and examples of their typical objectives include: 1. *Office layout*: Locate workers requiring frequent contact close to one another. 2. *Retail layout*: Expose customers to high-margin items. 3. *Warehouse layout*: Balance low-cost storage with low-cost material handling. 4. *Fixed-position layout*: Move material to the limited storage areas around the site. 5. *Process-oriented layout*: Manage varied material flow for each product. 6. *Work-cell layout*: Identify a product family, build teams, and cross-train team members. 7. *Product-oriented layout*: Equalize the task time at each workstation.	Concept Questions: 2.1–2.4
OFFICE LAYOUT (pp. 371–372)	■ **Office layout**—The grouping of workers, their equipment, and spaces/offices to provide for comfort, safety, and movement of information. A *relationship chart* displays a "closeness value" between each pair of people and/or departments that need to be placed in the office layout.	Concept Questions: 3.1–3.4
RETAIL LAYOUT (pp. 372–375)	■ **Retail layout**—An approach that addresses flow, allocates space, and responds to customer behavior. Retail layouts are based on the idea that sales and profitability vary directly with customer exposure to products. The main *objective of retail layout is to maximize profitability per square foot of floor space* (or, in some stores, per linear foot of shelf space). ■ **Slotting fees**—Fees manufacturers pay to get shelf space for their products. ■ **Servicescape**—The physical surroundings in which a service takes place and how they affect customers and employees.	Concept Questions: 4.1–4.4
WAREHOUSE AND STORAGE LAYOUTS (pp. 375–377)	■ **Warehouse layout**—A design that attempts to minimize total cost by addressing trade-offs between space and material handling. The variety of items stored and the number of items "picked" has direct bearing on the optimal layout. Modern warehouse management is often an automated procedure using *automated storage and retrieval systems* (ASRSs). ■ **Cross-docking**—Avoiding the placement of materials or supplies in storage by processing them as they are received for shipment. Cross-docking requires both tight scheduling and accurate inbound product identification. ■ **Random stocking**—Used in warehousing to locate stock wherever there is an open location. ■ **Customizing**—Using warehousing to add value to a product through component modification, repair, labeling, and packaging.	Concept Questions: 5.1–5.4
FIXED-POSITION LAYOUT (pp. 377–378)	■ **Fixed-position layout**—A system that addresses the layout requirements of stationary projects. Fixed-position layouts involve three complications: (1) there is limited space at virtually all sites, (2) different materials are needed at different stages of a project, and (3) the volume of materials needed is dynamic.	Concept Questions: 6.1–6.4
PROCESS-ORIENTED LAYOUT (pp. 378–383)	■ **Process-oriented layout**—A layout that deals with low-volume, high-variety production in which like machines and equipment are grouped together. ■ **Job lots**—Groups or batches of parts processed together. $$\text{Minimize cost} = \sum_{i=1}^{n}\sum_{j=1}^{n} X_{ij}C_{ij} \quad (9\text{-}1)$$	Concept Questions: 7.1–7.4 Problems: 9.1–9.10 Virtual Office Hours for Solved Problem: 9.1 **VIDEO 9.1** Laying Out Arnold Palmer Hospital's New Facility **ACTIVE MODEL 9.1**

Chapter 9 *Rapid* Review *continued*

Main Heading	Review Material	MyOMLab
WORK CELLS (pp. 383–386)	■ **Work cell**—An arrangement of machines and personnel that focuses on making a single product or family of related products. ■ **Takt time**—Pace of production to meet customer demands. Takt time = Total work time available/ Units required to satisfy customer demand (9-2) Workers required = Total operation time required/Takt time (9-3) ■ **Focused work center**—A permanent or semipermanent product-oriented arrangement of machines and personnel. ■ **Focused factory**—A facility designed to produce similar products or components.	Concept Questions: 8.1–8.4 Problem: 9.11
REPETITIVE AND PRODUCT-ORIENTED LAYOUT (pp. 386–391)	■ **Fabrication line**—A machine-paced, product-oriented facility for building components. ■ **Assembly line**—An approach that puts fabricated parts together at a series of workstations; a repetitive process. ■ **Assembly-line balancing**—Obtaining output at each workstation on a production line in order to minimize delay. ■ **Cycle time**—The maximum time that a product is allowed at each workstation. Cycle time = Production time available per day ÷ Units required per day (9-4) Minimum number of workstations = $\sum_{i=1}^{n}$ Time for task i/(Cycle time) (9-5) ■ **Heuristic**—Problem solving using procedures and rules rather than mathematical optimization. Line-balancing heuristics include *longest task (operation) time, most following tasks, ranked positional weight, shortest task (operation) time,* and *least number of following tasks.* $\text{Efficiency} = \frac{\sum \text{Task times}}{(\textit{Actual}\text{ number of workstations}) \times (\text{Largest assigned cycle time})}$ (9-6) Idle time = (Actual number of workstations × Largest assigned cycle time) − ∑Task times (9-7)	Concept Questions: 9.1–9.4 Problems: 9.12–9.27 **VIDEO 9.2** Facility Layout at Wheeled Coach Ambulances Virtual Office Hours for Solved Problem: 9.2

Self Test

Before taking the self-test, refer to the learning objectives listed at the beginning of the chapter and the key terms listed at the end of the chapter.

LO 9.1 Which of the statements below best describes *office layout*?
- **a)** Groups workers, their equipment, and spaces/offices to provide for movement of information.
- **b)** Addresses the layout requirements of large, bulky projects such as ships and buildings.
- **c)** Seeks the best personnel and machine utilization in repetitive or continuous production.
- **d)** Allocates shelf space and responds to customer behavior.
- **e)** Deals with low-volume, high-variety production.

LO 9.2 Which of the following does *not* support the retail layout objective of maximizing customer exposure to products?
- **a)** Locate high-draw items around the periphery of the store.
- **b)** Use prominent locations for high-impulse and high-margin items.
- **c)** Maximize exposure to expensive items.
- **d)** Use end-aisle locations.
- **e)** Convey the store's mission with the careful positioning of the lead-off department.

LO 9.3 The major problem addressed by the warehouse layout strategy is:
- **a)** minimizing difficulties caused by material flow varying with each product.
- **b)** requiring frequent contact close to one another.
- **c)** addressing trade-offs between space and material handling.
- **c)** balancing product flow from one workstation to the next.
- **d)** none of the above.

LO 9.4 A fixed-position layout:
- **a)** groups workers to provide for movement of information.
- **b)** addresses the layout requirements of large, bulky projects such as ships and buildings.
- **c)** seeks the best machine utilization in continuous production.
- **d)** allocates shelf space based on customer behavior.
- **e)** deals with low-volume, high-variety production.

LO 9.5 A process-oriented layout:
- **a)** groups workers to provide for movement of information.
- **b)** addresses the layout requirements of large, bulky projects such as ships and buildings.
- **c)** seeks the best machine utilization in continuous production.
- **d)** allocates shelf space based on customer behavior.
- **e)** deals with low-volume, high-variety production.

LO 9.6 For a focused work center or focused factory to be appropriate, the following three factors are required:
- **a)** _____
- **b)** _____
- **c)** _____

LO 9.7 Before considering a product-oriented layout, it is important to be certain of:
- **a)** _____
- **b)** _____
- **c)** _____
- **d)** _____

LO 9.8 An assembly line is to be designed for a product whose completion requires 21 minutes of work. The factory works 400 minutes per day. Can a production line with five workstations make 100 units per day?
- **a)** Yes, with exactly 100 minutes to spare.
- **b)** No, but four workstations would be sufficient.
- **c)** No, it will fall short even with a perfectly balanced line.
- **d)** Yes, but the line's efficiency is very low.
- **e)** Cannot be determined from the information given.

Answers: LO 9.1. a; LO 9.2. c; LO 9.3. c; LO 9.4. b; LO 9.5. e; LO 9.6. family of products, stable forecast (demand), volume; LO 9.7. adequate volume, stable demand, standardized product, adequate/quality supplies; LO 9.8. c.