ch6

Student: _____

1. Continuous processing is the best way to produce customized output.
True False

2. As a general rule, continuous processing systems produce products for inventory rather than for customer order.
True False

3. A Job-Shop processing system generally requires less skilled workers than a continuous processing system.
True False

4. Avoiding bottlenecks is the primary goal of product design.
True False

5. In general, Job-Shop systems have a lower unit cost than continuous systems do because continuous systems use costly specialized equipment.
True False

6. A robot consists of three parts: a power supply, a controller, and a mechanical arm.
True False

7. Continuous production has been a significant factor underpinning the U.S. standard of living over the last century.
True False

8. Right-sized equipment tends to be larger than equipment used in traditional process layout.
True False

9. Intermittent processing can take the form of batch processing or a job shop.
True False

10. The term computer aided manufacturing (CAM) refers primarily to the use of robotics in process control.
True False

11. Flexible manufacturing systems (FMS) bring the benefits of automation to continuous processes.
True False

12. Repetitive processing systems usually produce goods specifically for customer orders rather than for inventory.
True False

13. Morale problems can be a reason for redesign of a facility layout.
True False

14. There are three basic process types - Input, Processing and Output.
True False

15. A cafeteria line would be an example of a process focused layout.
True False

16. A possible disadvantage of a product layout is an inflexible system.
True False

17. Product layouts involve high utilization of labor and equipment.
True False

18. A manufacturing cell allows the production of a wide-range of very different products.
True False

19. Product layouts can more easily adapt to variations in product requirements than process layouts can.
True False

20. Process layouts feature departments or other functional groupings of personnel or equipment.
True False

21. Information technology refers to competitive data.
True False

22. A process layout is more susceptible to shutdowns caused by equipment breakdowns than a product layout.
True False

23. Accounting, purchasing, and inventory control are fairly routine with process layouts.
True False

24. A disadvantage of a product layout can be high in-process inventory costs.
True False

25. In cellular manufacturing, machines and equipment are grouped by type (e.g., all grinders are grouped into a cell).
True False

26. Among the benefits claimed for cellular manufacturing are less material handling and reduced setup time.
True False

27. Group technology is closely connected to cellular manufacturing.
True False

28. The percentage of idle time in an assembly line is called cycle time.
True False

29. Mismatches between operational capabilities and market demand can have a negative impact on an organization.
True False

30. Service layouts must be visually pleasing as well as functional.
True False

31. "Balance delay" is another name for the percentage of idle time in a product layout.
True False

32. "Balance delay" is another name for the percentage of idle time in a process layout.
True False

33. For a production line, daily capacity can be determined by dividing the daily operating time by the line's cycle time.
True False

34. The minimum number of workstations for a production line is determined in part by the desired output rate.
True False

35. The goal of line balancing is to assign tasks to workstations in such a way that the workstations have approximately equal time requirements.
True False

36. An idle percentage of zero means a line is perfectly balanced.
True False

37. None of the approaches to line balancing, manual or computerized, guarantees an optimal solution.
True False

38. Heuristic approaches to line balancing are the only approach that will guarantee an optimal solution.
True False

39. The main issue in the design of process layouts concerns the relative positioning of the departments involved.
True False

40. An advantage of a U-shaped production line is that it facilitates teamwork and flexibility in work assignments.
True False

41. The goal in line balancing is to obtain a reasonable allocation of work to each station.
True False

42. Cycle time is the maximum time allowed for each workstation to complete its work on each unit.
True False

43. The design of service layouts, e.g., warehouse and supermarket layouts, focuses on cost minimization and product flow.
True False

44. Process layouts allow greater flexibility in processing than product layouts.
True False

45. Process layouts tend to have low in-process inventories.
True False

46. Flexibility can be used as a competitive strategy.
True False

47. Poor layouts are found in both manufacturing and service organizations.
True False

48. Numerically controlled (N/C) machine and some robots are applications of programmable automation.
True False

49. Which of the following is not a process commonly considered in making products or delivering services?
A. continuous
B. batch
C. repetitive
D. job shop
E. subcontracting

50. The type of processing system which is used for highly standardized products is:
A. continuous
B. intermittent
C. project
D. batch
E. unit

51. Cellular layout is a term associated with:
A. wireless telecommunication
B. part families
C. functional (or process) layouts
D. assembly lines
E. job shops

52. The substitution of machinery that has sensing and control devices for human labor is best described by the term:
A. automation
B. feedback control
C. computer-aided manufacturing
D. computer-integrated manufacturing
E. flexible manufacturing system

53. Computer-aided manufacturing (CAM) refers to the use of computers in:
A. product design
B. decision making
C. data analysis
D. quality control
E. process control

54. A group of machines including supervisory computer control, automatic material handling, and possibly robots is called:
A. computer aided design
B. a manufacturing cell
C. computer-aided manufacturing
D. computer-integrated manufacturing
E. a flexible manufacturing system

55. In which type of operations are you likely to see, at most, only minor variations in the product or service being produced using the same process and the same equipment?
A. a project
B. a job shop
C. repetitive production
D. batch processing
E. continuous production

56. The process of assigning tasks to workstations in such a way that the workstations have approximately equal time requirements is called:
A. fair employment practices
B. idle time analysis
C. line balancing
D. cycle time optimization
E. none of the above

57. An operations strategy for process selection should recognize that:
A. process selection seldom requires technical expertise
B. engineering "white elephants" are uncommon
C. there is little need to manage technology
D. flexibility is not always the best choice
E. most technical skills can be contracted out to consultants

58. Layout planning is required because of:
(I) Efficient operations
(II) Accidents or safety hazards
(III) New products or services
(IV) Morale problems
A. I and II
B. II and IV
C. I and III
D. II, III, and IV
E. I, II, III, and IV

59. The advantages of automation include:
(I) Reduced output variability.
(II) Reduced variable costs.
(III) Machines don't strike or file grievances.
(IV) Machines are always less expensive than human labor.
A. I and IV
B. II and III
C. I, II, and III
D. I and III
E. II and IV

60. The benefits of flexible manufacturing systems (FMS) include:
A. reduced labor costs
B. higher flexibility than automation
C. quick changeover from part to part
D. significantly lower unit costs
E. all of the above

61. Which type of processing system tends to produce the most product variety?
A. Assembly
B. Job-Shop
C. Batch
D. Continuous
E. Project

62. In which type of processing system would gasoline be produced from crude oil?
A. Job Shop
B. Batch
C. Assembly
D. Continuous
E. Project

63. Which of the following is not a characteristic of layout decisions in system design?
A. substantial investment of both money and effort
B. long-term commitment
C. significant impact on short-term efficiency
D. usually well-received by operative personnel
E. all of the above

64. An example of automated services is
A. on-line banking
B. build your own pizza
C. haircuts
D. massage parlors
E. all are examples of automated services

65. Which one of the following is not common to product layouts?
A. a high rate of output
B. specialization of labor
C. low unit costs
D. ability to adjust to changes in demand
E. all are common

66. Which one of the following is not considered an important factor in service layout design?
A. cost minimization and product flow
B. frequency of orders
C. customer attitude and image
D. all are important
E. none are important

67. The type of layout which features departments or other functional groupings in which similar activities are performed is:
A. process
B. product
C. fixed-position
D. mass
E. unit

68. Which of the following is not true about process layouts when they are compared to product layouts?
A. higher in-process inventories
B. lower span of supervision
C. lower rates of output
D. more involved cost accounting
E. lower unit costs

69. The type of layout in which workers, materials, and equipment are moved to the product as needed is:
A. process
B. product
C. fixed-position
D. batch
E. mass

70. The grouping of equipment by the operations needed to perform similar work for part families is:
A. product layout
B. cellular manufacturing layout
C. functional layout
D. fixed-position layout
E. process layout

71. Which term is most closely associated with cellular manufacturing?
A. part families
B. assembly line
C. robotics
D. CAD
E. CAM

72. Laser technology used in surgical procedures is an example of technological advances in:
A. Product
B. Service
C. Process
D. Information
E. Reverse Engineering

73. Product profiling links key product or service requirements to:
A. Market conditions
B. Order sizes
C. Pricing strategies
D. Schedule changes
E. Process capabilities

74. Layout design has many objectives, one of which is _____.
A. reduce bottlenecks
B. move materials and workers simultaneously
C. use workers and space efficiently
D. hold material handling costs to 27% or less
E. install computer terminals every 500 feet

75. Which phrase most closely describes flexible manufacturing systems?
A. a variation of CAD
B. a more fully automated version of cellular manufacturing
C. manufacturing resource planning
D. a process layout with a manufacturing overlay
E. an approach that allows workers to begin work at a time of their choosing

76. A service organization (for example, a hospital) is likely to use a _____ layout because of variability in customer processing requirements.
A. project
B. process
C. flow
D. assembly
E. non-repetitive

77. In a product layout, the task of deciding how to assign work to specific stations is referred to as:
A. process balancing
B. task allocation
C. line balancing
D. work allocation
E. station balancing

78. The minimum possible cycle time in a product layout is determined by the:
A. longest task time
B. shortest task time
C. average task time
D. total task time
E. none of the above

79. A production line is to be designed for a job with three tasks. The task times are 0.4 minutes, 1.2 minutes, and 0.5 minutes. The maximum cycle time in minutes is:
A. 0.3
B. 0.7
C. 1.4
D. 2.1
E. 0.8

80. A production line is to be designed for a job with three tasks. The task times are 0.3 minutes, 1.4 minutes, and 0.7 minutes. The minimum cycle time in minutes is:
A. 0.3
B. 0.7
C. 1.4
D. 2.4
E. 0.8

81. Daily capacity of a product layout is determined by:
A. cycle time divided by operating time
B. operating time divided by cycle time
C. operating time divided by total task time
D. total task time divided by cycle time
E. cycle time divided by total task time

82. The maximum allowable cycle time is computed as:
A. daily operating time divided by the desired output
B. desired output divided by the daily operating time
C. daily operating time divided by the product of the desired output and the sum of job times
D. the product of desired output and the sum of job times divided by daily operating time
E. 1.00 minus station time

83. If a line is balanced with 80 percent efficiency, the "balance delay" would be:
A. 20 percent
B. 80 percent
C. 100 percent
D. unknown, since balance delay isn't related to efficiency
E. depends on the next operation

84. The main issue in the design of process layouts for service operations concerns the relative positioning of:
A. workstations.
B. processing components.
C. departments.
D. entrances, loading docks, etc.
E. manufacturing cells.

85. Which of the following is not an information requirement for the design of a process layout?
A. a list of departments or work centers
B. a projection of work flows between the work centers
C. the distance between locations
D. the cost per unit of distance to move loads
E. a list of product cycle times for every product manufactured

86. Which of the following is not an approach that companies use to achieve a smooth flow of production?
A. line balancing heuristics
B. parallel workstations
C. dynamic line balancing (Cross train workers)
D. mixed model line
E. Companies use all of these.

87. A common goal in designing process layouts is:
A. minimizing the number of workers
B. minimizing idle time
C. minimizing transportation costs
D. maximizing work-station productive time
E. maximizing transportation distances

88. In the use of closeness ratings for process layouts, the code "U" means the closeness between two departments is:
A. (U)nknown
B. (U)nusually important
C. of (U)sual importance
D. (U)nimportant
E. (U)ndesirable

89. Which closeness rating reflects the undesirability of having two departments located near each other?
A. A
B. E
C. I
D. U
E. X

90. Which closeness rating reflects the highest importance for two departments being close to each other?
A. A
B. E
C. I
D. U
E. X

91. Which closeness rating reflects indifference on the nearness or lack of nearness of two departments?
A. A
B. E
C. I
D. U
E. X

92. Heuristic rules are used primarily in which of these types of layouts?
(I) Product
(II) Process
(III) Fixed-position
A. I
B. II
C. I and III
D. I and II
E. II and III

93. Heuristic rules are usually applied when:
A. an optimum is necessary
B. a computer program isn't available
C. a problem has a small number of alternatives
D. a problem has a large number of alternatives
E. other approaches have failed

94. An advantage of a U-shaped production line is that it:
A. is more compact.
B. permits better communication among employees.
C. facilitates teamwork among workers.
D. increases flexibility of work assignments.
E. all of the above

95. Which of these items would be most likely to be made with a fixed position layout?
A. a Boeing 777 jet aircraft
B. applesauce
C. a computer chip
D. toothpaste
E. all of these

96. A product focused, single piece flow, pull production system would be called a:
A. cellular layout
B. job shop
C. assembly line
D. non-repetitive process
E. continuous flow

97. Which one of these is a tool used to tell a machine the details of the operations to be performed?
A. CNC
B. CIM
C. CAD
D. CAM
E. automation

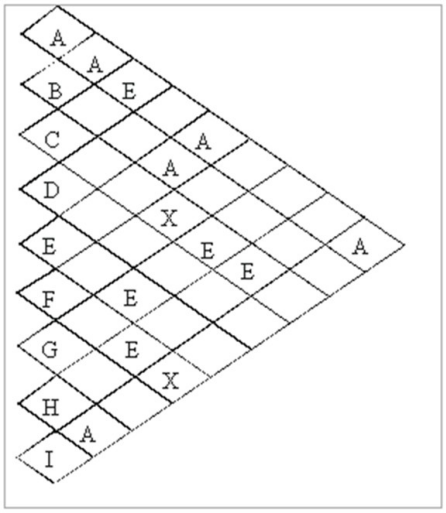
98. Which of the following is a primary concern for process selection?
A. variety in products/services
B. flexibility of equipment
C. volume of output
D. all of the above
E. none of the above

99. Management wants to design an assembly line that will turn out 800 videotapes per day. There will be eight working hours in each day. The industrial engineering staff has assembled the information below:

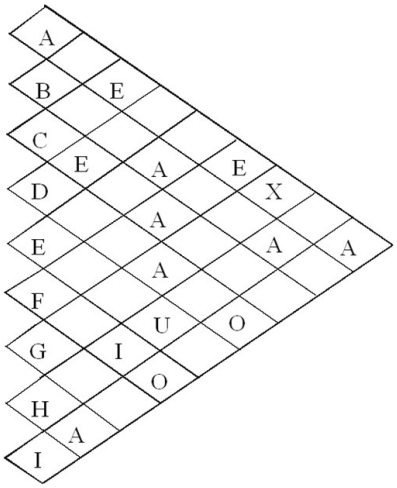
Task	Time (min.)	Immediate Predecessor
a	.2	none
b	.2	a
c	.4	none
d	.1	none
e	.3	c, d
f	.2	b, e
g	.1	none
h	.2	f, g
I	.6	h

(A) Determine the maximum and minimum cycle times.
(B) Determine the optimum cycle time.
(C) What is the minimum number of stations needed?
(D) Draw the precedence diagram.
(E) Assign tasks to stations in order of most following tasks first.

100. Given the information below, assign departments to locations in a 3 x 3 grid, with department F in the lower right hand corner.



101. Given the information below, assign the departments A through I to locations in a 3 x 3 grid, with department E fixed in the lower right-hand corner.



102. Determine the minimum number of workstations needed for this situation:
Operating time is 450 minutes per day.
Desired output is 80 units per day.
The sum of task times is 56 minutes.

103. Given the following data:

Station	Station time(min)	
1	4.2	
2	4.7	Cycle time = 5.1 minutes
3	4.4	
4	4.8	

Determine the percentage idle time.

104. Given the following process layout data for locating six departments in the six areas shown:

Department	I	II	III	IV	V	VI
I |	-	I	U	X	E	A
II |		-	O	E	I	O
III |			-	A	E	X
IV |				-	I	U
V |					-	O
VI |						-

FACILITY		
1	2	3
4	5	6

What process layout(s) satisfy(ies) these closeness ratings?

A company is designing a product layout for a new product. It plans to use this production line eight hours a day in order to meet projected demand of 480 units per day. The tasks necessary to produce this product:

Task	Time (secs)	Immediate Predecessor
u	30	none
v	30	u
w	6	u
x	12	w
y	54	x
z	30	v, y

105. Without regard to demand, what is the minimum possible cycle time (in seconds) for this situation?
A. 162
B. 72
C. 54
D. 12
E. 60

106. If the company desires that output rate equal demand, what is the desired cycle time (in seconds)?
A. 162
B. 72
C. 54
D. 12
E. 60

107. If the company desires that output rate equal demand, what is the minimum number of workstations needed?
A. 3
B. 4
C. 5
D. 6
E. 7

108. If the company desires that output rate equal demand, what would be the efficiency of this line with the minimum number of workstations?
A. 100%
B. 92.5%
C. 75%
D. 87.5%
E. 90%

109. If the company desires that output rate equal demand, what is the last task performed at the second workstation in the balance which uses the minimum number of workstations?
A. u
B. v
C. w
D. x
E. y

QRS Corp. is designing a product layout for a new product. They plan to use this production line ten hours a day in order to meet forecasted demand of 900 units per day. The following table describes the tasks necessary to produce this product:

Task	Time (secs)	Immediate Predecessor
a	34	none
b	20	a
c	10	b
d	16	b
e	10	c
f	24	d, e
g	38	f

110. Without considering forecasted demand, what is the minimum possible cycle time for this production line?
A. 10 seconds
B. 20 seconds
C. 34 seconds
D. 38 seconds
E. 152 seconds

111. For output to equal forecasted demand, what should be the actual cycle time for this production?
A. 32 seconds
B. 38 seconds
C. 40 seconds
D. 76 seconds
E. 152 seconds

112. For output to equal forecasted demand, what is the minimum number of workstations needed?
A. 1
B. 3
C. 3.75
D. 4
E. 5

113. For output to equal forecasted demand, what will be the efficiency of the production line that uses the least number of workstations?
A. 81%
B. 90%
C. 95%
D. 85%
E. 100%

114. For output to equal forecasted demand, what will be the second task performed at the second workstation of the production line that uses the fewest number of stations?
A. a
B. b
C. c
D. d
E. e

The maker of the world-famous Chocolate Chip Cookies needs to design a product layout for a new product, Mint Chocolate Chip. The company plans to use this new production line eight hours a day in order to meet projected demand of 1,440 cases per day. The following table describes the tasks involved in the production of a Mint Chocolate Chip Cookie.

Task	Time (secs)	Immediate Predecessor
u	4	none
v	14	u
w	12	v
x	12	v
y	6	w
z	8	x, y

115. Without considering projected demands, what is the minimum possible cycle time for this production line?
A. 54 seconds
B. 14 seconds
C. 12 seconds
D. 10 seconds
E. 4 seconds

116. For output to equal projected demand, what should be the actual cycle time for this production line?
A. 54 seconds
B. 27 seconds
C. 20 seconds
D. 18 seconds
E. 14 seconds

117. For output to equal projected demand, what is the minimum number of workstations needed?
A. 6
B. 4.5
C. 3
D. 2.7
E. 2

118. For output to equal projected demand, what will be the efficiency of the production line that uses the minimum number of workstations?
A. 90%
B. 95%
C. 97%
D. 99%
E. 100%

119. For output to equal projected demand, what will be the first task performed at the third workstation of the production line which uses the minimum number of stations?
A. u
B. v
C. w
D. x
E. y

A company needs to rebalance a product layout for producing new plastic license plates. They plan to use the assembly line 6 hours in order to meet projected demand of 2,160 license plates each day. The following table describes the tasks involved in the production of this product:

Task	Time (secs)	Immediate Predecessor
a	3	none
b	4	none
c	5	a, b
d	7	none
e	9	c, d

120. Without regard to projected demand, what is the minimum possible cycle time for this assembly line?
A. 0 seconds
B. 3 seconds
C. 9 seconds
D. 10 seconds
E. 28 seconds

121. For output to equal projected demand, what should be the actual cycle time for this assembly line?
A. 0 seconds
B. 3 seconds
C. 9 seconds
D. 10 seconds
E. 28 seconds

122. For output to equal projected demand, what is the minimum number of workstations needed?
A. 2
B. 2.8
C. 3
D. 4
E. 5

123. For output to equal projected demand, what will be the efficiency of the assembly line that uses the minimum number of workstations?
A. 0.0%
B. 6.7%
C. 70.0%
D. 93.3%
E. 100%

124. For output to equal projected demand, what will be the idle time at the second workstation of the assembly line that uses the minimum number of workstations?
A. 0 seconds
B. 1 second
C. 2 seconds
D. 3 seconds
E. 5 seconds

A company needs to locate three departments (X, Y, and Z) in the three areas (I, II, and III) of a new facility. They want to minimize interdepartmental transportation costs, which are expected to be $.50 per load per meter moved. An analyst has prepared the following distances and flow matrices:

Distances (meters)

From/To	I	II	III
I	-	10	20
II		-	10
III			-

Flows (loads per week

From/To	X	Y	Z
X	-	60	90
Y	40	-	160
Z	110	140	-

125. What is the distance (in meters) from area III to area I in this new facility?
A. 0
B. 10
C. 20
D. 30
E. 40

126. What is the total flow (loads per week) between department Y and department Z?
A. 140
B. 160
C. 200
D. 250
E. 300

127. If departments X, Y, and Z were to be located in areas I, II, and III, respectively, what would be the total distance (in meters) loads would be moved each week?
A. 4,000
B. 4,500
C. 7,000
D. 8,000
E. 9,000.

128. What are total weekly costs for the least costly process layout?
A. $2,800
B. $3,150
C. $3,500
D. $4,000
E. $4,500

129. How many least costly process layouts are there?
A. 1
B. 2
C. 3
D. 4
E. 5

A company needs to locate three departments (X, Y, and Z) in the three areas (I, II, and III) of a new facility. They want to minimize interdepartmental transportation costs, which are expected to be $.50 per load meter moved. An analyst has prepared the following flow and distance matrices:

Distances (meters)

From/To	I	II	III
I	-	10	20
II		-	10
III			-

Flows (loads per week

From/To	X	Y	Z
X	-	0	80
Y	30	-	150
Z	100	130	-

130. What is the distance (in meters) from area III to area I of this new facility?
A. 0
B. 10
C. 20
D. 30
E. 40

131. What is the total flow (loads per week) between department Y and department Z?
A. 130
B. 150
C. 180
D. 230
E. 280

132. If the company were to locate departments X, Y, and Z in areas 1, 2, and 3, respectively, what would be the total distance (in meters) loads would be moved each week?
A. 3,100
B. 3,600
C. 6,200
D. 7,200
E. 8,200

133. What is the layout that will minimize the total distance loads will be moved each week?
A. X in 1; Y in 2; Z in 3
B. X in 1; Z in 2; Y in 3
C. Y in 1; X in 2; Z in 3
D. Z in 1; X in 2; Y in 3
E. Z in 1; Y in 2; X in 3

134. What are total weekly costs for an optimum layout?
A. $3,100
B. $3,600
C. $6,200
D. $7,200
E. $8,200

135. Which of the following process types would be more likely to be used in the introductory phase of a product's life-cycle?
A. continuous
B. intermittent
C. project
D. batch
E. job shop

136. Which of the following process types would be more likely to be used in the maturity phase of a product's life-cycle?
A. continuous
B. intermittent
C. project
D. batch
E. job shop

137. What is it about job shops that make them appropriate for products in the introductory phase of their life-cycle?
A. efficiency
B. technology
C. flexibility
D. high volume capacity
E. rigidity

138. What is it about continuous processes that make them appropriate for products in the maturity phase of their life-cycle?
A. efficiency
B. general-purpose technology
C. possible variety
D. low risk
E. flexibility

139. Although they do not guarantee optimal solutions, _____ are useful in finding reasonable solutions when the number of possible options is overwhelming.
A. cellular layouts
B. heuristics
C. logistics
D. CAM
E. CAD

Given the following line balance data:

Task	Predecessor	Time (seconds)
t	none	15
u	t	14
v	t	7
w	u	6
x	v	8
y	w, x	10
z	y	21

140. What is the minimum possible cycle time?

141. What is the maximum possible cycle time?

142. What is the appropriate cycle time for eight hours of operating time per day and a desired output rate of 960 units per day?

143. For eight hours of operating time per day and a desired output rate of 960 units per day, what is the minimum number of stations needed to achieve the appropriate cycle time?

144. For eight hours of operating time per day and a desired output rate of 960 units per day, what balance (if any) will yield the minimum number of stations?

145. For eight hours of operating time per day and a desired output rate of 960 units per day, what is the percentage of idle time for the balance which uses the minimum number of stations?

146. For eight hours of operating time per day and a desired output rate of 960 units per day, what is the efficiency for the balance which uses the minimum number of stations?

Given the following process layout data for locating four departments (A, B, C, and D) in four areas (1, 2, 3, and 4):

Distances (meters)

From/To	1	2	3	4
1	-	50	100	150
2		-	50	100
3			-	50
4				-

Flows (loads per week

From/To	A	B	C	D
A	-	10	40	50
B	30	-	10	70
C	60	10	-	40
D	30	50	20	-

147. What is the distance from area 3 to area 1?

148. What is the total flow between departments B and D?

149. If departments A through D were to be located in areas 1 through 4, respectively, what would be the total distance loads would be moved each month?

150. If department C must be located in area 1, what layout will minimize the total distance loads will be moved each month?

151. If transportation costs are $.25 per load per foot moved, what are total monthly costs for an optimum layout?

ch6 Key

1. Continuous processing is the best way to produce customized output.
FALSE

Continuous processing is best for standardized output.

AACSB: Reflective Thinking
Blooms: Understand
Difficulty: Easy
Learning Objective: 06-02 Describe the influence that process selection has on an organization.
Stevenson - Chapter 06 #1
Topic Area: Process Selection

2. As a general rule, continuous processing systems produce products for inventory rather than for customer order.
TRUE

Continuous processing systems tend to be used in make-to-stock scenarios.

AACSB: Reflective Thinking
Blooms: Remember
Difficulty: Medium
Learning Objective: 06-03 Compare the basic processing types.
Stevenson - Chapter 06 #2
Topic Area: Process Selection

3. A Job-Shop processing system generally requires less skilled workers than a continuous processing system.
FALSE

Job shops require greater skill on the part of their workers.

AACSB: Reflective Thinking
Blooms: Understand
Difficulty: Medium
Learning Objective: 06-03 Compare the basic processing types.
Stevenson - Chapter 06 #3
Topic Area: Process Selection

4. Avoiding bottlenecks is the primary goal of product design.
FALSE

Avoiding bottlenecks is a primary consideration in facilities layout.

AACSB: Reflective Thinking
Blooms: Understand
Difficulty: Easy
Learning Objective: 06-05 List some reasons for redesign of layouts.
Stevenson - Chapter 06 #4
Topic Area: Process Strategy

5. In general, Job-Shop systems have a lower unit cost than continuous systems do because continuous systems use costly specialized equipment.
FALSE

Specialized equipment can lead to lower unit cost.

AACSB: Reflective Thinking
Blooms: Understand
Difficulty: Hard
Learning Objective: 06-03 Compare the basic processing types.
Stevenson - Chapter 06 #5
Topic Area: Process Selection

6. A robot consists of three parts: a power supply, a controller, and a mechanical arm.
TRUE

Robots consist of a few broad components.

AACSB: Reflective Thinking
Blooms: Remember
Difficulty: Medium
Learning Objective: 06-04 Explain the need for management of technology.
Stevenson - Chapter 06 #6
Topic Area: Technology

7. Continuous production has been a significant factor underpinning the U.S. standard of living over the last century.
TRUE

Continuous production has led to substantial productivity gains.

AACSB: Reflective Thinking
Blooms: Remember
Difficulty: Medium
Learning Objective: 06-03 Compare the basic processing types.
Stevenson - Chapter 06 #7
Topic Area: Process Selection

8. Right-sized equipment tends to be larger than equipment used in traditional process layout.
FALSE

Right-sizing can lead to smaller equipment.

AACSB: Reflective Thinking
Blooms: Understand
Difficulty: Easy
Learning Objective: 06-04 Explain the need for management of technology.
Stevenson - Chapter 06 #8
Topic Area: Process Selection

9. Intermittent processing can take the form of batch processing or a job shop.
TRUE

A job shop is a batch processer with a standard batch size of one.

AACSB: Reflective Thinking
Blooms: Remember
Difficulty: Easy
Learning Objective: 06-03 Compare the basic processing types.
Stevenson - Chapter 06 #9
Topic Area: Process Selection

10. The term computer aided manufacturing (CAM) refers primarily to the use of robotics in process control.
FALSE

CAM involves using computer technology to control various facets of the manufacturing process.

AACSB: Reflective Thinking
Blooms: Understand
Difficulty: Medium
Learning Objective: 06-04 Explain the need for management of technology.
Stevenson - Chapter 06 #10
Topic Area: Technology

11. Flexible manufacturing systems (FMS) bring the benefits of automation to continuous processes.
FALSE

FMS can bring the benefits of flexibility to continuous processes.

AACSB: Reflective Thinking
Blooms: Understand
Difficulty: Hard
Learning Objective: 06-04 Explain the need for management of technology.
Stevenson - Chapter 06 #11
Topic Area: Technology

12. Repetitive processing systems usually produce goods specifically for customer orders rather than for inventory.
FALSE

Repetitive processing systems usually produce goods for inventory.

AACSB: Reflective Thinking
Blooms: Understand
Difficulty: Easy
Learning Objective: 06-03 Compare the basic processing types.
Stevenson - Chapter 06 #12
Topic Area: Process Selection

13. Morale problems can be a reason for redesign of a facility layout.
TRUE

A layout redesign can lead to improved morale.

AACSB: Reflective Thinking
Blooms: Remember
Difficulty: Easy
Learning Objective: 06-05 List some reasons for redesign of layouts.
Stevenson - Chapter 06 #13
Topic Area: Strategic Resource Organization: Facilities Layout

14. There are three basic process types - Input, Processing and Output.
FALSE

There are five basic process types: job shop, batch, repetitive, continuous and project.

AACSB: Reflective Thinking
Blooms: Remember
Difficulty: Easy
Learning Objective: 06-03 Compare the basic processing types.
Stevenson - Chapter 06 #14
Topic Area: Process Selection

15. A cafeteria line would be an example of a process focused layout.
FALSE

This would be an example of a product focused layout.

AACSB: Reflective Thinking
Blooms: Remember
Difficulty: Medium
Learning Objective: 06-06 Describe the basic layout types; and the main advantages and disadvantages of each.
Stevenson - Chapter 06 #15
Topic Area: Strategic Resource Organization: Facilities Layout

16. A possible disadvantage of a product layout is an inflexible system.
TRUE

Product layouts are inherently inflexible.

AACSB: Reflective Thinking
Blooms: Remember
Difficulty: Easy
Learning Objective: 06-06 Describe the basic layout types; and the main advantages and disadvantages of each.
Stevenson - Chapter 06 #16
Topic Area: Strategic Resource Organization: Facilities Layout

17. Product layouts involve high utilization of labor and equipment.
TRUE

They're used in high volume, standardized operations.

AACSB: Reflective Thinking
Blooms: Remember
Difficulty: Medium
Learning Objective: 06-06 Describe the basic layout types; and the main advantages and disadvantages of each.
Stevenson - Chapter 06 #17
Topic Area: Strategic Resource Organization: Facilities Layout

18. A manufacturing cell allows the production of a wide-range of very different products.
FALSE

A cell is for a modest variety of output within a product family.

AACSB: Reflective Thinking
Blooms: Understand
Difficulty: Medium
Learning Objective: 06-06 Describe the basic layout types; and the main advantages and disadvantages of each.
Stevenson - Chapter 06 #18
Topic Area: Strategic Resource Organization: Facilities Layout

19. Product layouts can more easily adapt to variations in product requirements than process layouts can.
FALSE

Process layouts are more adaptable.

AACSB: Reflective Thinking
Blooms: Understand
Difficulty: Easy
Learning Objective: 06-06 Describe the basic layout types; and the main advantages and disadvantages of each.
Stevenson - Chapter 06 #19
Topic Area: Strategic Resource Organization: Facilities Layout

20. Process layouts feature departments or other functional groupings of personnel or equipment.
TRUE

Departmental or functional grouping is an example of process layout.

AACSB: Reflective Thinking
Blooms: Remember
Difficulty: Easy
Learning Objective: 06-06 Describe the basic layout types; and the main advantages and disadvantages of each.
Stevenson - Chapter 06 #20
Topic Area: Strategic Resource Organization: Facilities Layout

21. Information technology refers to competitive data.
FALSE

Information technology refers to both data and systems.

AACSB: Reflective Thinking
Blooms: Remember
Difficulty: Medium
Learning Objective: 06-04 Explain the need for management of technology.
Stevenson - Chapter 06 #21
Topic Area: Technology

22. A process layout is more susceptible to shutdowns caused by equipment breakdowns than a product layout.
FALSE

A product layout is more susceptible to these.

AACSB: Reflective Thinking
Blooms: Understand
Difficulty: Medium
Learning Objective: 06-06 Describe the basic layout types; and the main advantages and disadvantages of each.
Stevenson - Chapter 06 #22
Topic Area: Strategic Resource Organization: Facilities Layout

23. Accounting, purchasing, and inventory control are fairly routine with process layouts.
FALSE

They are more routine in product layouts.

AACSB: Reflective Thinking
Blooms: Remember
Difficulty: Medium
Learning Objective: 06-06 Describe the basic layout types; and the main advantages and disadvantages of each.
Stevenson - Chapter 06 #23
Topic Area: Strategic Resource Organization: Facilities Layout

24. A disadvantage of a product layout can be high in-process inventory costs.
FALSE

In-process inventory is low with a product layout.

AACSB: Reflective Thinking
Blooms: Remember
Difficulty: Hard
Learning Objective: 06-06 Describe the basic layout types; and the main advantages and disadvantages of each.
Stevenson - Chapter 06 #24
Topic Area: Strategic Resource Organization: Facilities Layout

25. In cellular manufacturing, machines and equipment are grouped by type (e.g., all grinders are grouped into a cell).
FALSE

In cellular layouts, machines and equipment are grouped by the needs of the product family.

AACSB: Reflective Thinking
Blooms: Remember
Difficulty: Hard
Learning Objective: 06-06 Describe the basic layout types; and the main advantages and disadvantages of each.
Stevenson - Chapter 06 #25
Topic Area: Strategic Resource Organization: Facilities Layout

26. Among the benefits claimed for cellular manufacturing are less material handling and reduced setup time.
TRUE

These are lower in cellular manufacturing.

AACSB: Reflective Thinking
Blooms: Remember
Difficulty: Medium
Learning Objective: 06-06 Describe the basic layout types; and the main advantages and disadvantages of each.
Stevenson - Chapter 06 #26
Topic Area: Strategic Resource Organization: Facilities Layout

27. Group technology is closely connected to cellular manufacturing.
TRUE

Both require a systematic analysis of parts to identify the part families.

AACSB: Reflective Thinking
Blooms: Remember
Difficulty: Medium
Learning Objective: 06-06 Describe the basic layout types; and the main advantages and disadvantages of each.
Stevenson - Chapter 06 #27
Topic Area: Strategic Resource Organization: Facilities Layout

28. The percentage of idle time in an assembly line is called cycle time.
FALSE

This is called balance delay.

AACSB: Reflective Thinking
Blooms: Remember
Difficulty: Medium
Learning Objective: 06-07 Solve simple line-balancing problems.
Stevenson - Chapter 06 #28
Topic Area: Designing Product Layouts: Line Balancing

29. Mismatches between operational capabilities and market demand can have a negative impact on an organization.
TRUE

These can lead to changes in processes.

AACSB: Reflective Thinking
Blooms: Remember
Difficulty: Medium
Learning Objective: 06-02 Describe the influence that process selection has on an organization.
Stevenson - Chapter 06 #29
Topic Area: Process Strategy

30. Service layouts must be visually pleasing as well as functional.
TRUE

The service layout is often perceived by the customer.

AACSB: Reflective Thinking
Blooms: Remember
Difficulty: Medium
Learning Objective: 06-06 Describe the basic layout types; and the main advantages and disadvantages of each.
Stevenson - Chapter 06 #30
Topic Area: Strategic Resource Organization: Facilities Layout

31. "Balance delay" is another name for the percentage of idle time in a product layout.
TRUE

Greater utilization implies a smaller balance delay.

AACSB: Reflective Thinking
Blooms: Remember
Difficulty: Easy
Learning Objective: 06-07 Solve simple line-balancing problems.
Stevenson - Chapter 06 #31
Topic Area: Designing Product Layouts: Line Balancing

32. "Balance delay" is another name for the percentage of idle time in a process layout.
FALSE

Balance delay is applicable in product layouts.

AACSB: Reflective Thinking
Blooms: Remember
Difficulty: Hard
Learning Objective: 06-07 Solve simple line-balancing problems.
Stevenson - Chapter 06 #32
Topic Area: Designing Product Layouts: Line Balancing

33. For a production line, daily capacity can be determined by dividing the daily operating time by the line's cycle time.
TRUE

The line's cycle time represents the time between units. Thus, dividing the time available by the cycle time gives the daily capacity.

AACSB: Reflective Thinking
Blooms: Remember
Difficulty: Hard
Learning Objective: 06-07 Solve simple line-balancing problems.
Stevenson - Chapter 06 #33
Topic Area: Designing Product Layouts: Line Balancing

34. The minimum number of workstations for a production line is determined in part by the desired output rate.
TRUE

The desired output rate is used to find the required cycle time.

AACSB: Reflective Thinking
Blooms: Remember
Difficulty: Easy
Learning Objective: 06-07 Solve simple line-balancing problems.
Stevenson - Chapter 06 #34
Topic Area: Designing Product Layouts: Line Balancing

35. The goal of line balancing is to assign tasks to workstations in such a way that the workstations have approximately equal time requirements.
TRUE

This is why it is called line balancing.

AACSB: Reflective Thinking
Blooms: Remember
Difficulty: Hard
Learning Objective: 06-07 Solve simple line-balancing problems.
Stevenson - Chapter 06 #35
Topic Area: Designing Product Layouts: Line Balancing

36. An idle percentage of zero means a line is perfectly balanced.
TRUE

All workstations would be occupied 100% of the time.

AACSB: Reflective Thinking
Blooms: Remember
Difficulty: Medium
Learning Objective: 06-07 Solve simple line-balancing problems.
Stevenson - Chapter 06 #36
Topic Area: Designing Product Layouts: Line Balancing

37. None of the approaches to line balancing, manual or computerized, guarantees an optimal solution.
TRUE

Optimal solutions cannot be guaranteed through the use of heuristics.

AACSB: Reflective Thinking
Blooms: Remember
Difficulty: Hard
Learning Objective: 06-07 Solve simple line-balancing problems.
Stevenson - Chapter 06 #37
Topic Area: Designing Product Layouts: Line Balancing

38. Heuristic approaches to line balancing are the only approach that will guarantee an optimal solution.
FALSE

Heuristic approaches cannot guarantee an optimal solution.

AACSB: Reflective Thinking
Blooms: Understand
Difficulty: Medium
Learning Objective: 06-07 Solve simple line-balancing problems.
Stevenson - Chapter 06 #38
Topic Area: Designing Product Layouts: Line Balancing

39. The main issue in the design of process layouts concerns the relative positioning of the departments involved.
TRUE

Designing process layouts involves the relative positioning of the departments involved.

AACSB: Reflective Thinking
Blooms: Remember
Difficulty: Easy
Learning Objective: 06-08 Develop simple process layouts.
Stevenson - Chapter 06 #39
Topic Area: Designing Process Layouts

40. An advantage of a U-shaped production line is that it facilitates teamwork and flexibility in work assignments.
TRUE

These are key factors in favor of U-shaped layouts.

AACSB: Reflective Thinking
Blooms: Remember
Difficulty: Easy
Learning Objective: 06-06 Describe the basic layout types; and the main advantages and disadvantages of each.
Stevenson - Chapter 06 #40
Topic Area: Strategic Resource Organization: Facilities Layout

41. The goal in line balancing is to obtain a reasonable allocation of work to each station.
FALSE

The goal in line balancing is to arrive at a reasonable balance of work across the stations.

AACSB: Reflective Thinking
Blooms: Understand
Difficulty: Medium
Learning Objective: 06-07 Solve simple line-balancing problems.
Stevenson - Chapter 06 #41
Topic Area: Designing Product Layouts: Line Balancing

42. Cycle time is the maximum time allowed for each workstation to complete its work on each unit.
TRUE

Cycle time paces the production line.

AACSB: Reflective Thinking
Blooms: Understand
Difficulty: Medium
Learning Objective: 06-07 Solve simple line-balancing problems.
Stevenson - Chapter 06 #42
Topic Area: Designing Product Layouts: Line Balancing

43. The design of service layouts, e.g., warehouse and supermarket layouts, focuses on cost minimization and product flow.
FALSE

Often these are low-priority considerations.

AACSB: Reflective Thinking
Blooms: Understand
Difficulty: Medium
Learning Objective: 06-06 Describe the basic layout types; and the main advantages and disadvantages of each.
Stevenson - Chapter 06 #43
Topic Area: Strategic Resource Organization: Facilities Layout

44. Process layouts allow greater flexibility in processing than product layouts.
TRUE

Process layouts are more flexible.

AACSB: Reflective Thinking
Blooms: Remember
Difficulty: Medium
Learning Objective: 06-06 Describe the basic layout types; and the main advantages and disadvantages of each.
Stevenson - Chapter 06 #44
Topic Area: Strategic Resource Organization: Facilities Layout

45. Process layouts tend to have low in-process inventories.
FALSE

In-process inventories are relatively high in process layouts.

AACSB: Reflective Thinking
Blooms: Remember
Difficulty: Hard
Learning Objective: 06-06 Describe the basic layout types; and the main advantages and disadvantages of each.
Stevenson - Chapter 06 #45
Topic Area: Strategic Resource Organization: Facilities Layout

46. Flexibility can be used as a competitive strategy.
TRUE

Flexibility is a key competitive dimension.

AACSB: Reflective Thinking
Blooms: Remember
Difficulty: Easy
Learning Objective: 06-01 Explain the strategic importance of process selection.
Stevenson - Chapter 06 #46
Topic Area: Process Strategy

47. Poor layouts are found in both manufacturing and service organizations.
TRUE

Both manufacturers and service firms benefit from improved layouts.

AACSB: Reflective Thinking
Blooms: Remember
Difficulty: Easy
Learning Objective: 06-06 Describe the basic layout types; and the main advantages and disadvantages of each.
Stevenson - Chapter 06 #47
Topic Area: Strategic Resource Organization: Facilities Layout

48. Numerically controlled (N/C) machine and some robots are applications of programmable automation.
TRUE

N/C machines and robots can be used in flexible manufacturing systems (FMS).

AACSB: Reflective Thinking
Blooms: Remember
Difficulty: Medium
Learning Objective: 06-04 Explain the need for management of technology.
Stevenson - Chapter 06 #48
Topic Area: Technology

49. Which of the following is not a process commonly considered in making products or delivering services?
A. continuous
B. batch
C. repetitive
D. job shop
E. subcontracting

Subcontracting isn't a process type.

AACSB: Reflective Thinking
Blooms: Understand
Difficulty: Medium
Learning Objective: 06-03 Compare the basic processing types.
Stevenson - Chapter 06 #49
Topic Area: Process Selection

50. The type of processing system which is used for highly standardized products is:
A. continuous
B. intermittent
C. project
D. batch
E. unit

Continuous processing is for highly standardized products.

AACSB: Reflective Thinking
Blooms: Remember
Difficulty: Easy
Learning Objective: 06-03 Compare the basic processing types.
Stevenson - Chapter 06 #50
Topic Area: Process Selection

51. Cellular layout is a term associated with:
A. wireless telecommunication
B. part families
C. functional (or process) layouts
D. assembly lines
E. job shops

Part families are produced on cells.

AACSB: Reflective Thinking
Blooms: Remember
Difficulty: Hard
Learning Objective: 06-06 Describe the basic layout types; and the main advantages and disadvantages of each.
Stevenson - Chapter 06 #51
Topic Area: Strategic Resource Organization: Facilities Layout

52. The substitution of machinery that has sensing and control devices for human labor is best described by the term:
A. automation
B. feedback control
C. computer-aided manufacturing
D. computer-integrated manufacturing
E. flexible manufacturing system

Automation involves the substitution of machinery that has sensing and control devices for human labor.

AACSB: Reflective Thinking
Blooms: Remember
Difficulty: Medium
Learning Objective: 06-04 Explain the need for management of technology.
Stevenson - Chapter 06 #52
Topic Area: Technology

53. Computer-aided manufacturing (CAM) refers to the use of computers in:
A. product design
B. decision making
C. data analysis
D. quality control
E. process control

CAM automates process control.

AACSB: Reflective Thinking
Blooms: Remember
Difficulty: Medium
Learning Objective: 06-04 Explain the need for management of technology.
Stevenson - Chapter 06 #53
Topic Area: Technology

54. A group of machines including supervisory computer control, automatic material handling, and possibly robots is called:
A. computer aided design
B. a manufacturing cell
C. computer-aided manufacturing
D. computer-integrated manufacturing
E. a flexible manufacturing system

FMS involve all these things.

AACSB: Reflective Thinking
Blooms: Remember
Difficulty: Hard
Learning Objective: 06-04 Explain the need for management of technology.
Stevenson - Chapter 06 #54
Topic Area: Technology

55. In which type of operations are you likely to see, at most, only minor variations in the product or service being produced using the same process and the same equipment?
A. a project
B. a job shop
C. repetitive production
D. batch processing
E. continuous production

In continuous production there is no variation in the product or service being produced.

AACSB: Reflective Thinking
Blooms: Remember
Difficulty: Medium
Learning Objective: 06-06 Describe the basic layout types; and the main advantages and disadvantages of each.
Stevenson - Chapter 06 #55
Topic Area: Process Selection

56. The process of assigning tasks to workstations in such a way that the workstations have approximately equal time requirements is called:
A. fair employment practices
B. idle time analysis
C. line balancing
D. cycle time optimization
E. none of the above

The goal is to reasonably balance work across the workstations.

AACSB: Reflective Thinking
Blooms: Remember
Difficulty: Medium
Learning Objective: 06-07 Solve simple line-balancing problems.
Stevenson - Chapter 06 #56
Topic Area: Designing Product Layouts: Line Balancing

57. An operations strategy for process selection should recognize that:
A. process selection seldom requires technical expertise
B. engineering "white elephants" are uncommon
C. there is little need to manage technology
D. flexibility is not always the best choice
E. most technical skills can be contracted out to consultants

Flexibility isn't so valuable if efficiency is at a premium.

AACSB: Reflective Thinking
Blooms: Understand
Difficulty: Medium
Learning Objective: 06-01 Explain the strategic importance of process selection.
Stevenson - Chapter 06 #57
Topic Area: Process Strategy

58. Layout planning is required because of:
(I) Efficient operations
(II) Accidents or safety hazards
(III) New products or services
(IV) Morale problems
A. I and II
B. II and IV
C. I and III
D. II, III, and IV
E. I, II, III, and IV

A number of factors affect layout planning.

AACSB: Reflective Thinking
Blooms: Understand
Difficulty: Hard
Learning Objective: 06-05 List some reasons for redesign of layouts.
Stevenson - Chapter 06 #58
Topic Area: Strategic Resource Organization: Facilities Layout

59. The advantages of automation include:
(I) Reduced output variability.
(II) Reduced variable costs.
(III) Machines don't strike or file grievances.
(IV) Machines are always less expensive than human labor.
A. I and IV
B. II and III
C. I, II, and III
D. I and III
E. II and IV

Machines can be more expensive than human labor.

AACSB: Reflective Thinking
Blooms: Understand
Difficulty: Medium
Learning Objective: 06-04 Explain the need for management of technology.
Stevenson - Chapter 06 #59
Topic Area: Technology

60. The benefits of flexible manufacturing systems (FMS) include:
A. reduced labor costs
B. higher flexibility than automation
C. quick changeover from part to part
D. significantly lower unit costs
E. all of the above

Reduced labor costs and consistent quality and quick changeover time provide lower unit costs.

AACSB: Reflective Thinking
Blooms: Understand
Difficulty: Medium
Learning Objective: 06-04 Explain the need for management of technology.
Stevenson - Chapter 06 #60
Topic Area: Technology

61. Which type of processing system tends to produce the most product variety?
A. Assembly
B. Job-Shop
C. Batch
D. Continuous
E. Project

A Job-Shop provides low volume of high-variety goods.

AACSB: Reflective Thinking
Blooms: Remember
Difficulty: Medium
Learning Objective: 06-03 Compare the basic processing types.
Stevenson - Chapter 06 #61
Topic Area: Process Selection

62. In which type of processing system would gasoline be produced from crude oil?
A. Job Shop
B. Batch
C. Assembly
D. Continuous
E. Project

Oil refining is an example of a continuous process.

AACSB: Reflective Thinking
Blooms: Understand
Difficulty: Easy
Learning Objective: 06-03 Compare the basic processing types.
Stevenson - Chapter 06 #62
Topic Area: Process Selection

63. Which of the following is not a characteristic of layout decisions in system design?
A. substantial investment of both money and effort
B. long-term commitment
C. significant impact on short-term efficiency
D. usually well-received by operative personnel
E. all of the above

Layout decisions can lead to conflict from those who are affected by them.

AACSB: Reflective Thinking
Blooms: Understand
Difficulty: Medium
Learning Objective: 06-05 List some reasons for redesign of layouts.
Stevenson - Chapter 06 #63
Topic Area: Strategic Resource Organization: Facilities Layout

64. An example of automated services is
A. on-line banking
B. build your own pizza
C. haircuts
D. massage parlors
E. all are examples of automated services

On-line banking has almost no human to human interaction.

AACSB: Reflective Thinking
Blooms: Remember
Difficulty: Easy
Learning Objective: 06-04 Explain the need for management of technology.
Stevenson - Chapter 06 #64
Topic Area: Technology

65. Which one of the following is not common to product layouts?
A. a high rate of output
B. specialization of labor
C. low unit costs
D. ability to adjust to changes in demand
E. all are common

Product layouts are not flexible with respect to volume.

AACSB: Reflective Thinking
Blooms: Understand
Difficulty: Easy
Learning Objective: 06-06 Describe the basic layout types; and the main advantages and disadvantages of each.
Stevenson - Chapter 06 #65
Topic Area: Strategic Resource Organization: Facilities Layout

66. Which one of the following is not considered an important factor in service layout design?
A. cost minimization and product flow
B. frequency of orders
C. customer attitude and image
D. all are important
E. none are important

Service layout design is generally not all that focused on cost minimization.

AACSB: Reflective Thinking
Blooms: Remember
Difficulty: Medium
Learning Objective: 06-06 Describe the basic layout types; and the main advantages and disadvantages of each.
Stevenson - Chapter 06 #66
Topic Area: Strategic Resource Organization: Facilities Layout

67. The type of layout which features departments or other functional groupings in which similar activities are performed is:
A. process
B. product
C. fixed-position
D. mass
E. unit

Process layouts group similar activities.

AACSB: Reflective Thinking
Blooms: Remember
Difficulty: Easy
Learning Objective: 06-06 Describe the basic layout types; and the main advantages and disadvantages of each.
Stevenson - Chapter 06 #67
Topic Area: Strategic Resource Organization: Facilities Layout

68. Which of the following is not true about process layouts when they are compared to product layouts?
A. higher in-process inventories
B. lower span of supervision
C. lower rates of output
D. more involved cost accounting
E. lower unit costs

Process layouts are not inherently more efficient that product layouts.

AACSB: Reflective Thinking
Blooms: Understand
Difficulty: Hard
Learning Objective: 06-06 Describe the basic layout types; and the main advantages and disadvantages of each.
Stevenson - Chapter 06 #68
Topic Area: Strategic Resource Organization: Facilities Layout

69. The type of layout in which workers, materials, and equipment are moved to the product as needed is:
A. process
B. product
C. fixed-position
D. batch
E. mass

The fixed position layout brings the processes to the product.

AACSB: Reflective Thinking
Blooms: Remember
Difficulty: Easy
Learning Objective: 06-06 Describe the basic layout types; and the main advantages and disadvantages of each.
Stevenson - Chapter 06 #69
Topic Area: Strategic Resource Organization: Facilities Layout

70. The grouping of equipment by the operations needed to perform similar work for part families is:
A. product layout
B. cellular manufacturing layout
C. functional layout
D. fixed-position layout
E. process layout

Cellular layouts are organized around part families.

AACSB: Reflective Thinking
Blooms: Remember
Difficulty: Medium
Learning Objective: 06-06 Describe the basic layout types; and the main advantages and disadvantages of each.
Stevenson - Chapter 06 #70
Topic Area: Strategic Resource Organization: Facilities Layout

71. Which term is most closely associated with cellular manufacturing?
A. part families
B. assembly line
C. robotics
D. CAD
E. CAM

Part families are central to cellular manufacturing.

AACSB: Reflective Thinking
Blooms: Remember
Difficulty: Medium
Learning Objective: 06-06 Describe the basic layout types; and the main advantages and disadvantages of each.
Stevenson - Chapter 06 #71
Topic Area: Strategic Resource Organization: Facilities Layout

72. Laser technology used in surgical procedures is an example of technological advances in:
A. Product
B. Service
C. Process
D. Information
E. Reverse Engineering

Laser technology represents a change in the fundamental surgical process.

AACSB: Reflective Thinking
Blooms: Remember
Difficulty: Medium
Learning Objective: 06-04 Explain the need for management of technology.
Stevenson - Chapter 06 #72
Topic Area: Technology

73. Product profiling links key product or service requirements to:
A. Market conditions
B. Order sizes
C. Pricing strategies
D. Schedule changes
E. Process capabilities

Product profiling allows firms to match what they should (or must) do with respect to product or service requirements.

AACSB: Reflective Thinking
Blooms: Remember
Difficulty: Hard
Learning Objective: 06-02 Describe the influence that process selection has on an organization.
Stevenson - Chapter 06 #73
Topic Area: Process Strategy

74. Layout design has many objectives, one of which is _____.
A. reduce bottlenecks
B. move materials and workers simultaneously
C. use workers and space efficiently
D. hold material handling costs to 27% or less
E. install computer terminals every 500 feet

Layout design is focused on the efficient placement of human and other assets.

AACSB: Reflective Thinking
Blooms: Remember
Difficulty: Hard
Learning Objective: 06-05 List some reasons for redesign of layouts.
Stevenson - Chapter 06 #74
Topic Area: Strategic Resource Organization: Facilities Layout

75. Which phrase most closely describes flexible manufacturing systems?
A. a variation of CAD
B. a more fully automated version of cellular manufacturing
C. manufacturing resource planning
D. a process layout with a manufacturing overlay
E. an approach that allows workers to begin work at a time of their choosing

Flexible automation allows for greater variety within or across product families.

AACSB: Reflective Thinking
Blooms: Remember
Difficulty: Medium
Learning Objective: 06-04 Explain the need for management of technology.
Stevenson - Chapter 06 #75
Topic Area: Technology

76. A service organization (for example, a hospital) is likely to use a _____ layout because of variability in customer processing requirements.
A. project
B. process
C. flow
D. assembly
E. non-repetitive

A process layout is capable of providing more variety.

AACSB: Reflective Thinking
Blooms: Remember
Difficulty: Hard
Learning Objective: 06-06 Describe the basic layout types; and the main advantages and disadvantages of each.
Stevenson - Chapter 06 #76
Topic Area: Designing Product Layouts: Line Balancing

77. In a product layout, the task of deciding how to assign work to specific stations is referred to as:
A. process balancing
B. task allocation
C. line balancing
D. work allocation
E. station balancing

Line balancing allocates work to work stations.

AACSB: Reflective Thinking
Blooms: Remember
Difficulty: Easy
Learning Objective: 06-07 Solve simple line-balancing problems.
Stevenson - Chapter 06 #77
Topic Area: Designing Product Layouts: Line Balancing

78. The minimum possible cycle time in a product layout is determined by the:
A. longest task time
B. shortest task time
C. average task time
D. total task time
E. none of the above

The longest task time represents the minimum cycle time.

AACSB: Reflective Thinking
Blooms: Remember
Difficulty: Medium
Learning Objective: 06-07 Solve simple line-balancing problems.
Stevenson - Chapter 06 #78
Topic Area: Designing Product Layouts: Line Balancing

79. A production line is to be designed for a job with three tasks. The task times are 0.4 minutes, 1.2 minutes, and 0.5 minutes. The maximum cycle time in minutes is:
A. 0.3
B. 0.7
C. 1.4
D. 2.1
E. 0.8

This assumes only one workstation.

AACSB: Analytic
Blooms: Apply
Difficulty: Hard
Learning Objective: 06-07 Solve simple line-balancing problems.
Stevenson - Chapter 06 #79
Topic Area: Designing Product Layouts: Line Balancing

80. A production line is to be designed for a job with three tasks. The task times are 0.3 minutes, 1.4 minutes, and 0.7 minutes. The minimum cycle time in minutes is:
A. 0.3
B. 0.7
C. 1.4
D. 2.4
E. 0.8

The longest task time equals the minimum cycle time.

AACSB: Analytic
Blooms: Apply
Difficulty: Hard
Learning Objective: 06-07 Solve simple line-balancing problems.
Stevenson - Chapter 06 #80
Topic Area: Designing Product Layouts: Line Balancing

81. Daily capacity of a product layout is determined by:
A. cycle time divided by operating time
B. operating time divided by cycle time
C. operating time divided by total task time
D. total task time divided by cycle time
E. cycle time divided by total task time

This represents how many units are possible per day.

AACSB: Reflective Thinking
Blooms: Remember
Difficulty: Hard
Learning Objective: 06-07 Solve simple line-balancing problems.
Stevenson - Chapter 06 #81
Topic Area: Designing Product Layouts: Line Balancing

82. The maximum allowable cycle time is computed as:
A. daily operating time divided by the desired output
B. desired output divided by the daily operating time
C. daily operating time divided by the product of the desired output and the sum of job times
D. the product of desired output and the sum of job times divided by daily operating time
E. 1.00 minus station time

If this is smaller than the minimum cycle time, extra workstations will be necessary.

AACSB: Reflective Thinking
Blooms: Remember
Difficulty: Hard
Learning Objective: 06-07 Solve simple line-balancing problems.
Stevenson - Chapter 06 #82
Topic Area: Designing Product Layouts: Line Balancing

83. If a line is balanced with 80 percent efficiency, the "balance delay" would be:
A. 20 percent
B. 80 percent
C. 100 percent
D. unknown, since balance delay isn't related to efficiency
E. depends on the next operation

Efficiency equals 100% minus balance delay.

AACSB: Analytic
Blooms: Apply
Difficulty: Easy
Learning Objective: 06-07 Solve simple line-balancing problems.
Stevenson - Chapter 06 #83
Topic Area: Designing Product Layouts: Line Balancing

84. The main issue in the design of process layouts for service operations concerns the relative positioning of:
A. workstations.
B. processing components.
C. departments.
D. entrances, loading docks, etc.
E. manufacturing cells.

In process layouts, departments and their relative locations are of primary concern.

AACSB: Reflective Thinking
Blooms: Remember
Difficulty: Medium
Learning Objective: 06-08 Develop simple process layouts.
Stevenson - Chapter 06 #84
Topic Area: Designing Process Layouts

85. Which of the following is not an information requirement for the design of a process layout?
A. a list of departments or work centers
B. a projection of work flows between the work centers
C. the distance between locations
D. the cost per unit of distance to move loads
E. a list of product cycle times for every product manufactured

Cycle times do not enter into the design of process layouts.

AACSB: Reflective Thinking
Blooms: Remember
Difficulty: Easy
Learning Objective: 06-08 Develop simple process layouts.
Stevenson - Chapter 06 #85
Topic Area: Designing Process Layouts

86. Which of the following is not an approach that companies use to achieve a smooth flow of production?
A. line balancing heuristics
B. parallel workstations
C. dynamic line balancing (Cross train workers)
D. mixed model line
E. Companies use all of these.

Any of these is a means to achieve smooth flow.

AACSB: Reflective Thinking
Blooms: Remember
Difficulty: Medium
Learning Objective: 06-06 Describe the basic layout types; and the main advantages and disadvantages of each.
Stevenson - Chapter 06 #86
Topic Area: Strategic Resource Organization: Facilities Layout

87. A common goal in designing process layouts is:
A. minimizing the number of workers
B. minimizing idle time
C. minimizing transportation costs
D. maximizing work-station productive time
E. maximizing transportation distances

An efficient process layout minimizes transportation costs.

AACSB: Reflective Thinking
Blooms: Remember
Difficulty: Medium
Learning Objective: 06-08 Develop simple process layouts.
Stevenson - Chapter 06 #87
Topic Area: Designing Process Layouts

88. In the use of closeness ratings for process layouts, the code "U" means the closeness between two departments is:
A. (U)nknown
B. (U)nusually important
C. of (U)sual importance
D. (U)nimportant
E. (U)ndesirable

Close department pairings denoted "U" should be avoided.

AACSB: Reflective Thinking
Blooms: Remember
Difficulty: Medium
Learning Objective: 06-08 Develop simple process layouts.
Stevenson - Chapter 06 #88
Topic Area: Designing Process Layouts

89. Which closeness rating reflects the undesirability of having two departments located near each other?
A. A
B. E
C. I
D. U
E. X

Close department pairings denoted "U" should be avoided.

AACSB: Reflective Thinking
Blooms: Remember
Difficulty: Easy
Learning Objective: 06-08 Develop simple process layouts.
Stevenson - Chapter 06 #89
Topic Area: Designing Process Layouts

90. Which closeness rating reflects the highest importance for two departments being close to each other?
A. A
B. E
C. I
D. U
E. X

Closeness ratings denoted "A" should be encouraged.

AACSB: Reflective Thinking
Blooms: Remember
Difficulty: Easy
Learning Objective: 06-08 Develop simple process layouts.
Stevenson - Chapter 06 #90
Topic Area: Designing Process Layouts

91. Which closeness rating reflects indifference on the nearness or lack of nearness of two departments?
A. A
B. E
C. I
D. U
E. X

Closeness ratings denoted "U" are neither desirable nor undesirable.

AACSB: Reflective Thinking
Blooms: Remember
Difficulty: Medium
Learning Objective: 06-08 Develop simple process layouts.
Stevenson - Chapter 06 #91
Topic Area: Designing Process Layouts

92. Heuristic rules are used primarily in which of these types of layouts?
(I) Product
(II) Process
(III) Fixed-position
A. I
B. II
C. I and III
D. I and II
E. II and III

Heuristics help in formulating reasonably good product and process layouts.

AACSB: Reflective Thinking
Blooms: Remember
Difficulty: Hard
Learning Objective: 06-07 Solve simple line-balancing problems.
Stevenson - Chapter 06 #92
Topic Area: Designing Product Layouts: Line Balancing

93. Heuristic rules are usually applied when:
A. an optimum is necessary
B. a computer program isn't available
C. a problem has a small number of alternatives
D. a problem has a large number of alternatives
E. other approaches have failed

As the number of alternatives grows, the use of heuristics becomes more attractive.

AACSB: Reflective Thinking
Blooms: Remember
Difficulty: Medium
Learning Objective: 06-07 Solve simple line-balancing problems.
Stevenson - Chapter 06 #93
Topic Area: Designing Product Layouts: Line Balancing

94. An advantage of a U-shaped production line is that it:
A. is more compact.
B. permits better communication among employees.
C. facilitates teamwork among workers.
D. increases flexibility of work assignments.
E. all of the above

All of these are advantages of U-shaped lines.

AACSB: Reflective Thinking
Blooms: Remember
Difficulty: Medium
Learning Objective: 06-06 Describe the basic layout types; and the main advantages and disadvantages of each.
Stevenson - Chapter 06 #94
Topic Area: Strategic Resource Organization: Facilities Layout

95. Which of these items would be most likely to be made with a fixed position layout?
A. a Boeing 777 jet aircraft
B. applesauce
C. a computer chip
D. toothpaste
E. all of these

A fixed position layout brings the process to the product.

AACSB: Reflective Thinking
Blooms: Remember
Difficulty: Hard
Learning Objective: 06-06 Describe the basic layout types; and the main advantages and disadvantages of each.
Stevenson - Chapter 06 #95
Topic Area: Process Selection

96. A product focused, single piece flow, pull production system would be called a:
A. cellular layout
B. job shop
C. assembly line
D. non-repetitive process
E. continuous flow

These are characteristics of cellular layouts.

AACSB: Reflective Thinking
Blooms: Remember
Difficulty: Hard
Learning Objective: 06-06 Describe the basic layout types; and the main advantages and disadvantages of each.
Stevenson - Chapter 06 #96
Topic Area: Process Selection

97. Which one of these is a tool used to tell a machine the details of the operations to be performed?
A. CNC
B. CIM
C. CAD
D. CAM
E. automation

CNC stores and transmits instructions on operations that are to be performed.

AACSB: Reflective Thinking
Blooms: Remember
Difficulty: Hard
Learning Objective: 06-04 Explain the need for management of technology.
Stevenson - Chapter 06 #97
Topic Area: Technology

98. Which of the following is a primary concern for process selection?
A. variety in products/services
B. flexibility of equipment
C. volume of output
D. all of the above
E. none of the above

All of these enter into the process selection decision.

AACSB: Reflective Thinking
Blooms: Remember
Difficulty: Medium
Learning Objective: 06-01 Explain the strategic importance of process selection.
Stevenson - Chapter 06 #98
Topic Area: Process Selection

99. Management wants to design an assembly line that will turn out 800 videotapes per day. There will be eight working hours in each day. The industrial engineering staff has assembled the information below:

Task	Time (min.)	Immediate Predecessor
a	.2	none
b	.2	a
c	.4	none
d	.1	none
e	.3	c, d
f	.2	b, e
g	.1	none
h	.2	f, g
I	.6	h

(A) Determine the maximum and minimum cycle times.
(B) Determine the optimum cycle time.
(C) What is the minimum number of stations needed?
(D) Draw the precedence diagram.
(E) Assign tasks to stations in order of most following tasks first.

(A) Maximum cycle time is 2.3 minutes; minimum cycle time is .6 minutes.

B) $CT = \frac{\text{operating time}}{\text{desired output}} = \frac{480 \text{ minutes per day}}{800 \text{ units per day}} = \frac{.6 \text{ minutes per}}{\text{cycle}}$

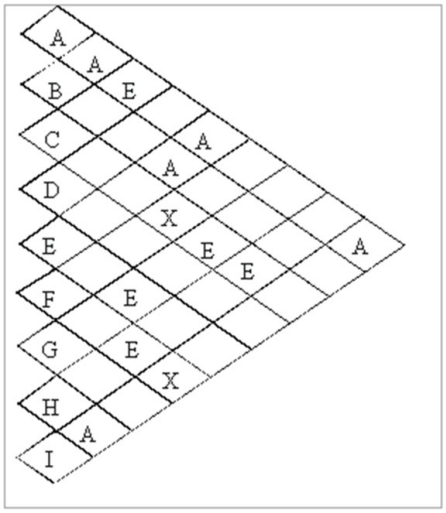
C) $N = \frac{\text{desired output}}{\text{operating time}} = \frac{800\,(2.3)}{480} = 3.83$, which becomes 4

D) Refer to the diagram above.
E) Refer to the diagram above.

Feedback: Use of this heuristic leads to this solution.

AACSB: Analytic
Blooms: Apply
Difficulty: Medium
Learning Objective: 06-07 Solve simple line-balancing problems.
Stevenson - Chapter 06 #99
Topic Area: Designing Product Layouts: Line Balancing

100. Given the information below, assign departments to locations in a 3 x 3 grid, with department F in the lower right hand corner.



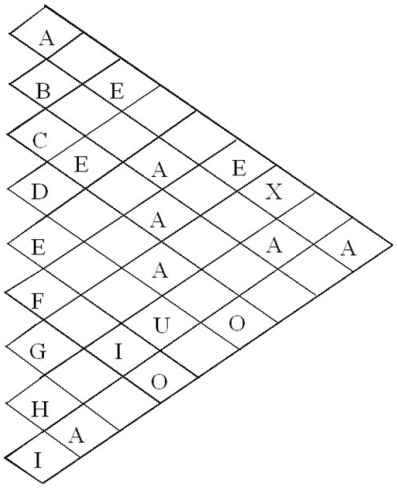
Example solution:

C	G	E
H	A	B
I	D	F

Feedback: Use of location rules leads to this decision. Note how C and F are as far apart as possible.

AACSB: Analytic
Blooms: Apply
Difficulty: Medium
Learning Objective: 06-08 Develop simple process layouts.
Stevenson - Chapter 06 #100
Topic Area: Designing Process Layouts

101. Given the information below, assign the departments A through I to locations in a 3 x 3 grid, with department E fixed in the lower right-hand corner.



Example solution:

H	I	A
HB	F	C
G	D	E

Feedback: Location rules lead to this solution. Note that A and G are well removed from one another.

AACSB: Analytic
Blooms: Apply
Difficulty: Medium
Learning Objective: 06-08 Develop simple process layouts.
Stevenson - Chapter 06 #101
Topic Area: Designing Process Layouts

102. Determine the minimum number of workstations needed for this situation:
Operating time is 450 minutes per day.
Desired output is 80 units per day.
The sum of task times is 56 minutes.

$$N = \frac{Desired\_output \times \sum task\_times}{Operation\_Time\_per\_day} = \frac{80\_units \times 56\_\text{min}/\,cycle}{450\_\text{min}/\,day} = 9.96$$

Feedback: Round up to find that 10 stations are needed.

AACSB: Analytic
Blooms: Apply
Difficulty: Medium
Learning Objective: 06-07 Solve simple line-balancing problems.
Stevenson - Chapter 06 #102
Topic Area: Designing Product Layouts: Line Balancing

103. Given the following data:

Station	Station time(min)
1	4.2
2	4.7
3	4.4
4	4.8

Cycle time = 5.1 minutes

Determine the percentage idle time.

(1.) Compute the station idle time and the total idle time per cycle:

Station	Station time	Idle time
1	4.2	.9
2	4.7	.4
3	4.4	.7
4	4.8	.3
		2.3

(2.) Percent idle time = $\frac{Idle\_time\_per\_cycle}{N \times cycle\_time} = \frac{2.3}{4 \times 5.1} = .1127$

Feedback: With these four workstations, the maximum efficiency is approximately 88.7%.

AACSB: Analytic
Blooms: Apply
Difficulty: Medium
Learning Objective: 06-07 Solve simple line-balancing problems.
Stevenson - Chapter 06 #103
Topic Area: Designing Product Layouts: Line Balancing

104. Given the following process layout data for locating six departments in the six areas shown:

Department	I	II	III	IV	V	VI
I	-	I	U	X	E	A
II		-	O	E	I	O
III			-	A	E	X
IV				-	I	U
V					-	O
VI						-

FACILITY		
1	2	3
4	5	6

What process layout(s) satisfy(ies) these closeness ratings?

Any layout with I and VI at one end of the facility, III and IV at the other end, and II and V in the middle.

Feedback: I and VI should be close together. III and IV should be close together.

AACSB: Analytic
Blooms: Apply
Difficulty: Medium
Learning Objective: 06-08 Develop simple process layouts.
Stevenson - Chapter 06 #104
Topic Area: Designing Process Layouts

A company is designing a product layout for a new product. It plans to use this production line eight hours a day in order to meet projected demand of 480 units per day. The tasks necessary to produce this product:

Task	Time (secs)	Immediate Predecessor
u	30	none
v	30	u
w	6	u
x	12	w
y	54	x
z	30	v, y

Stevenson - Chapter 06

105. Without regard to demand, what is the minimum possible cycle time (in seconds) for this situation?
A. 162
B. 72
C. 54
D. 12
E. 60

The longest task time represents the minimum cycle time.

AACSB: Analytic
Blooms: Apply
Difficulty: Medium
Learning Objective: 06-07 Solve simple line-balancing problems.
Stevenson - Chapter 06 #105
Topic Area: Designing Product Layouts: Line Balancing

106. If the company desires that output rate equal demand, what is the desired cycle time (in seconds)?
A. 162
B. 72
C. 54
D. 12
E. 60

Divide the demand rate (480) by the number of hours per day (8). This means we need one unit every minute.

AACSB: Analytic
Blooms: Apply
Difficulty: Medium
Learning Objective: 06-07 Solve simple line-balancing problems.
Stevenson - Chapter 06 #106
Topic Area: Designing Product Layouts: Line Balancing

107. If the company desires that output rate equal demand, what is the minimum number of workstations needed?

A. 3
B. 4
C. 5
D. 6
E. 7

Divide the summed task times by the minimum necessary cycle time. Round up to find the theoretical minimum.

AACSB: Analytic
Blooms: Apply
Difficulty: Medium
Learning Objective: 06-07 Solve simple line-balancing problems.
Stevenson - Chapter 06 #107
Topic Area: Designing Product Layouts: Line Balancing

108. If the company desires that output rate equal demand, what would be the efficiency of this line with the minimum number of workstations?

A. 100%
B. 92.5%
C. 75%
D. 87.5%
E. 90%

With three workstations, 10% of their time is idle.

AACSB: Analytic
Blooms: Apply
Difficulty: Medium
Learning Objective: 06-07 Solve simple line-balancing problems.
Stevenson - Chapter 06 #108
Topic Area: Designing Product Layouts: Line Balancing

109. If the company desires that output rate equal demand, what is the last task performed at the second workstation in the balance which uses the minimum number of workstations?
A. u
B. v
C. w
D. x
E. y

Make sure task interrelationships are not ignored.

AACSB: Analytic
Blooms: Apply
Difficulty: Medium
Learning Objective: 06-07 Solve simple line-balancing problems.
Stevenson - Chapter 06 #109
Topic Area: Designing Product Layouts: Line Balancing

QRS Corp. is designing a product layout for a new product. They plan to use this production line ten hours a day in order to meet forecasted demand of 900 units per day. The following table describes the tasks necessary to produce this product:

Task	Time (secs)	Immediate Predecessor
a	34	none
b	20	a
c	10	b
d	16	b
e	10	c
f	24	d, e
g	38	f

Stevenson - Chapter 06

110. Without considering forecasted demand, what is the minimum possible cycle time for this production line?
A. 10 seconds
B. 20 seconds
C. 34 seconds
D. 38 seconds
E. 152 seconds

The minimum cycle time is equal to the longest task time.

AACSB: Analytic
Blooms: Apply
Difficulty: Medium
Learning Objective: 06-07 Solve simple line-balancing problems.
Stevenson - Chapter 06 #110
Topic Area: Designing Product Layouts: Line Balancing

111. For output to equal forecasted demand, what should be the actual cycle time for this production?
A. 32 seconds
B. 38 seconds
C. 40 seconds
D. 76 seconds
E. 152 seconds

Divide the number of minutes available (600) by the desired demand rate per day (900). The cycle time would have to be two-thirds of a minute.

AACSB: Analytic
Blooms: Apply
Difficulty: Medium
Learning Objective: 06-07 Solve simple line-balancing problems.
Stevenson - Chapter 06 #111
Topic Area: Designing Product Layouts: Line Balancing

112. For output to equal forecasted demand, what is the minimum number of workstations needed?
A. 1
B. 3
C. 3.75
D. 4
E. 5

Divide the total work content by the minimum cycle time.

AACSB: Analytic
Blooms: Apply
Difficulty: Medium
Learning Objective: 06-07 Solve simple line-balancing problems.
Stevenson - Chapter 06 #112
Topic Area: Designing Product Layouts: Line Balancing

113. For output to equal forecasted demand, what will be the efficiency of the production line that uses the least number of workstations?
A. 81%
B. 90%
C. 95%
D. 85%
E. 100%

This is the amount of idle time left after the line has been balanced.

AACSB: Analytic
Blooms: Apply
Difficulty: Medium
Learning Objective: 06-07 Solve simple line-balancing problems.
Stevenson - Chapter 06 #113
Topic Area: Designing Product Layouts: Line Balancing

114. For output to equal forecasted demand, what will be the second task performed at the second workstation of the production line that uses the fewest number of stations?
A. a
B. b
C. c
D. d
E. e

Take care to ensure that task interrelationships are not overlooked.

AACSB: Analytic
Blooms: Apply
Difficulty: Medium
Learning Objective: 06-07 Solve simple line-balancing problems.
Stevenson - Chapter 06 #114
Topic Area: Designing Product Layouts: Line Balancing

The maker of the world-famous Chocolate Chip Cookies needs to design a product layout for a new product, Mint Chocolate Chip. The company plans to use this new production line eight hours a day in order to meet projected demand of 1,440 cases per day. The following table describes the tasks involved in the production of a Mint Chocolate Chip Cookie.

Task	Time (secs)	Immediate Predecessor
u	4	none
v	14	u
w	12	v
x	12	v
y	6	w
z	8	x, y

Stevenson - Chapter 06

115. Without considering projected demands, what is the minimum possible cycle time for this production line?
A. 54 seconds
B. 14 seconds
C. 12 seconds
D. 10 seconds
E. 4 seconds

The minimum possible cycle time equals the longest task time.

AACSB: Analytic
Blooms: Apply
Difficulty: Medium
Learning Objective: 06-07 Solve simple line-balancing problems.
Stevenson - Chapter 06 #115
Topic Area: Designing Product Layouts: Line Balancing

116. For output to equal projected demand, what should be the actual cycle time for this production line?
A. 54 seconds
B. 27 seconds
C. 20 seconds
D. 18 seconds
E. 14 seconds

Divide the number of seconds available by the desired production.

AACSB: Analytic
Blooms: Apply
Difficulty: Medium
Learning Objective: 06-07 Solve simple line-balancing problems.
Stevenson - Chapter 06 #116
Topic Area: Designing Product Layouts: Line Balancing

117. For output to equal projected demand, what is the minimum number of workstations needed?
A. 6
B. 4.5
C. 3
D. 2.7
E. 2

Divide the sum of the task times by the minimum cycle time.

AACSB: Analytic
Blooms: Apply
Difficulty: Medium
Learning Objective: 06-07 Solve simple line-balancing problems.
Stevenson - Chapter 06 #117
Topic Area: Designing Product Layouts: Line Balancing

118. For output to equal projected demand, what will be the efficiency of the production line that uses the minimum number of workstations?

A. 90%
B. 95%
C. 97%
D. 99%
E. 100%

Of the total workstation time available, 10% will be idle.

AACSB: Analytic
Blooms: Apply
Difficulty: Medium
Learning Objective: 06-07 Solve simple line-balancing problems.
Stevenson - Chapter 06 #118
Topic Area: Designing Product Layouts: Line Balancing

119. For output to equal projected demand, what will be the first task performed at the third workstation of the production line which uses the minimum number of stations?

A. u
B. v
C. w
D. x
E. y

Take care that task interdependencies aren't overlooked.

AACSB: Analytic
Blooms: Apply
Difficulty: Medium
Learning Objective: 06-07 Solve simple line-balancing problems.
Stevenson - Chapter 06 #119
Topic Area: Designing Product Layouts: Line Balancing

A company needs to rebalance a product layout for producing new plastic license plates. They plan to use the assembly line 6 hours in order to meet projected demand of 2,160 license plates each day. The following table describes the tasks involved in the production of this product:

Task	Time (secs)	Immediate Predecessor
a	3	none
b	4	none
c	5	a, b
d	7	none
e	9	c, d

Stevenson - Chapter 06

120. Without regard to projected demand, what is the minimum possible cycle time for this assembly line?
A. 0 seconds
B. 3 seconds
C. 9 seconds
D. 10 seconds
E. 28 seconds

This is equal to the longest task time.

AACSB: Analytic
Blooms: Apply
Difficulty: Medium
Learning Objective: 06-07 Solve simple line-balancing problems.
Stevenson - Chapter 06 #120
Topic Area: Designing Product Layouts: Line Balancing

121. For output to equal projected demand, what should be the actual cycle time for this assembly line?
A. 0 seconds
B. 3 seconds
C. 9 seconds
D. 10 seconds
E. 28 seconds

Divide the number of seconds available by the desired output rate.

AACSB: Analytic
Blooms: Apply
Difficulty: Medium
Learning Objective: 06-07 Solve simple line-balancing problems.
Stevenson - Chapter 06 #121
Topic Area: Designing Product Layouts: Line Balancing

122. For output to equal projected demand, what is the minimum number of workstations needed?
A. 2
B. 2.8
C. 3
D. 4
E. 5

Divide the total work content by the minimum cycle time.

AACSB: Analytic
Blooms: Apply
Difficulty: Medium
Learning Objective: 06-07 Solve simple line-balancing problems.
Stevenson - Chapter 06 #122
Topic Area: Designing Product Layouts: Line Balancing

123. For output to equal projected demand, what will be the efficiency of the assembly line that uses the minimum number of workstations?
A. 0.0%
B. 6.7%
C. 70.0%
D. 93.3%
E. 100%

This line will be idle 6.7% of the time.

AACSB: Analytic
Blooms: Apply
Difficulty: Medium
Learning Objective: 06-07 Solve simple line-balancing problems.
Stevenson - Chapter 06 #123
Topic Area: Designing Product Layouts: Line Balancing

124. For output to equal projected demand, what will be the idle time at the second workstation of the assembly line that uses the minimum number of workstations?
A. 0 seconds
B. 1 second
C. 2 seconds
D. 3 seconds
E. 5 seconds

Take care that task interrelationships are not overlooked.

AACSB: Analytic
Blooms: Apply
Difficulty: Medium
Learning Objective: 06-07 Solve simple line-balancing problems.
Stevenson - Chapter 06 #124
Topic Area: Designing Product Layouts: Line Balancing

A company needs to locate three departments (X, Y, and Z) in the three areas (I, II, and III) of a new facility. They want to minimize interdepartmental transportation costs, which are expected to be $.50 per load per meter moved. An analyst has prepared the following distances and flow matrices:

Distances (meters)

From/To	I	II	III
I	-	10	20
II		-	10
III			-

Flows (loads per week

From/To	X	Y	Z
X	-	60	90
Y	40	-	160
Z	110	140	-

Stevenson - Chapter 06

125. What is the distance (in meters) from area III to area I in this new facility?
A. 0
B. 10
C. 20
D. 30
E. 40

This information is presented in the distance matrix.

AACSB: Analytic
Blooms: Apply
Difficulty: Medium
Learning Objective: 06-08 Develop simple process layouts.
Stevenson - Chapter 06 #125
Topic Area: Designing Process Layouts

126. What is the total flow (loads per week) between department Y and department Z?
A. 140
B. 160
C. 200
D. 250
E. 300

This information is presented in the flow matrix.

AACSB: Analytic
Blooms: Apply
Difficulty: Medium
Learning Objective: 06-08 Develop simple process layouts.
Stevenson - Chapter 06 #126
Topic Area: Designing Process Layouts

127. If departments X, Y, and Z were to be located in areas I, II, and III, respectively, what would be the total distance (in meters) loads would be moved each week?
A. 4,000
B. 4,500
C. 7,000
D. 8,000
E. 9,000.

Multiple the loads conveyed by the distance traveled.

AACSB: Analytic
Blooms: Apply
Difficulty: Medium
Learning Objective: 06-08 Develop simple process layouts.
Stevenson - Chapter 06 #127
Topic Area: Designing Process Layouts

128. What are total weekly costs for the least costly process layout?
A. $2,800
B. $3,150
C. $3,500
D. $4,000
E. $4,500

Multiple each load-meter by the cost per load-meter.

AACSB: Analytic
Blooms: Apply
Difficulty: Medium
Learning Objective: 06-08 Develop simple process layouts.
Stevenson - Chapter 06 #128
Topic Area: Designing Process Layouts

129. How many least costly process layouts are there?
A. 1
B. 2
C. 3
D. 4
E. 5

There are two layouts that have exactly the same cost.

AACSB: Analytic
Blooms: Apply
Difficulty: Medium
Learning Objective: 06-08 Develop simple process layouts.
Stevenson - Chapter 06 #129
Topic Area: Designing Process Layouts

A company needs to locate three departments (X, Y, and Z) in the three areas (I, II, and III) of a new facility. They want to minimize interdepartmental transportation costs, which are expected to be $.50 per load meter moved. An analyst has prepared the following flow and distance matrices:

Distances (meters)

From/To	I	II	III
I	-	10	20
II		-	10
III			-

Flows (loads per week

From/To	X	Y	Z
X	-	0	80
Y	30	-	150
Z	100	130	-

Stevenson - Chapter 06

130. What is the distance (in meters) from area III to area I of this new facility?
A. 0
B. 10
C. 20
D. 30
E. 40

This is found in the distances matrix.

AACSB: Analytic
Blooms: Apply
Difficulty: Medium
Learning Objective: 06-08 Develop simple process layouts.
Stevenson - Chapter 06 #130
Topic Area: Designing Process Layouts

131. What is the total flow (loads per week) between department Y and department Z?
A. 130
B. 150
C. 180
D. 230
E. 280

Flows go either from Y to Z or from Z to Y.

AACSB: Analytic
Blooms: Apply
Difficulty: Medium
Learning Objective: 06-08 Develop simple process layouts.
Stevenson - Chapter 06 #131
Topic Area: Designing Process Layouts

132. If the company were to locate departments X, Y, and Z in areas 1, 2, and 3, respectively, what would be the total distance (in meters) loads would be moved each week?
A. 3,100
B. 3,600
C. 6,200
D. 7,200
E. 8,200

Multiply the loads conveyed by the distance traveled.

AACSB: Analytic
Blooms: Apply
Difficulty: Medium
Learning Objective: 06-08 Develop simple process layouts.
Stevenson - Chapter 06 #132
Topic Area: Designing Process Layouts

133. What is the layout that will minimize the total distance loads will be moved each week?
A. X in 1; Y in 2; Z in 3
B. X in 1; Z in 2; Y in 3
C. Y in 1; X in 2; Z in 3
D. Z in 1; X in 2; Y in 3
E. Z in 1; Y in 2; X in 3

This is the minimum load-distance layout.

AACSB: Analytic
Blooms: Apply
Difficulty: Medium
Learning Objective: 06-08 Develop simple process layouts.
Stevenson - Chapter 06 #133
Topic Area: Designing Process Layouts

134. What are total weekly costs for an optimum layout?
A. $3,100
B. $3,600
C. $6,200
D. $7,200
E. $8,200

Multiple the load-meters by the cost per load-meter.

AACSB: Analytic
Blooms: Apply
Difficulty: Medium
Learning Objective: 06-08 Develop simple process layouts.
Stevenson - Chapter 06 #134
Topic Area: Designing Process Layouts

135. Which of the following process types would be more likely to be used in the introductory phase of a product's life-cycle?
A. continuous
B. intermittent
C. project
D. batch
E. job shop

Job shop processes are more appropriate for relatively new products.

AACSB: Reflective Thinking
Blooms: Remember
Difficulty: Easy
Learning Objective: 06-03 Compare the basic processing types.
Stevenson - Chapter 06 #135
Topic Area: Process Selection

136. Which of the following process types would be more likely to be used in the maturity phase of a product's life-cycle?
A. continuous
B. intermittent
C. project
D. batch
E. job shop

Continuous processes are more appropriate for highly standardized products in their maturity phase.

AACSB: Reflective Thinking
Blooms: Remember
Difficulty: Easy
Learning Objective: 06-03 Compare the basic processing types.
Stevenson - Chapter 06 #136
Topic Area: Process Selection

137. What is it about job shops that make them appropriate for products in the introductory phase of their life-cycle?
A. efficiency
B. technology
C. flexibility
D. high volume capacity
E. rigidity

Job shop processes are more appropriate for relatively new products.

AACSB: Reflective Thinking
Blooms: Remember
Difficulty: Easy
Learning Objective: 06-03 Compare the basic processing types.
Stevenson - Chapter 06 #137
Topic Area: Process Selection

138. What is it about continuous processes that make them appropriate for products in the maturity phase of their life-cycle?
A. efficiency
B. general-purpose technology
C. possible variety
D. low risk
E. flexibility

Continuous processes are more appropriate for mature products, when efficiency is of paramount importance.

AACSB: Reflective Thinking
Blooms: Remember
Difficulty: Easy
Learning Objective: 06-03 Compare the basic processing types.
Stevenson - Chapter 06 #138
Topic Area: Process Selection

139. Although they do not guarantee optimal solutions, _____ are useful in finding reasonable solutions when the number of possible options is overwhelming.
A. cellular layouts
B. heuristics
C. logistics
D. CAM
E. CAD

Heuristics often provide workable solutions to complex problems.

AACSB: Reflective Thinking
Blooms: Remember
Difficulty: Easy
Learning Objective: 06-03 Compare the basic processing types.
Learning Objective: 06-07 Solve simple line-balancing problems.
Stevenson - Chapter 06 #139
Topic Area: Designing Product Layouts: Line Balancing

Given the following line balance data:

Task	Predecessor	Time (seconds)
t	none	15
u	t	14
v	t	7
w	u	6
x	v	8
y	w, x	10
z	y	21

Stevenson - Chapter 06

140. What is the minimum possible cycle time?

21 seconds

Feedback: The minimum possible cycle time is equal to the longest task time.

AACSB: Analytic
Blooms: Apply
Difficulty: Medium
Learning Objective: 06-07 Solve simple line-balancing problems.
Stevenson - Chapter 06 #140
Topic Area: Designing Product Layouts: Line Balancing

141. What is the maximum possible cycle time?

81 seconds

Feedback: This assumes only one workstation.

AACSB: Analytic
Blooms: Apply
Difficulty: Medium
Learning Objective: 06-07 Solve simple line-balancing problems.
Stevenson - Chapter 06 #141
Topic Area: Designing Product Layouts: Line Balancing

142. What is the appropriate cycle time for eight hours of operating time per day and a desired output rate of 960 units per day?

30 seconds

Feedback: Divide the desired output rate by the number of minutes available per day.

AACSB: Analytic
Blooms: Apply
Difficulty: Medium
Learning Objective: 06-07 Solve simple line-balancing problems.
Stevenson - Chapter 06 #142
Topic Area: Designing Product Layouts: Line Balancing

143. For eight hours of operating time per day and a desired output rate of 960 units per day, what is the minimum number of stations needed to achieve the appropriate cycle time?

three

Feedback: Divide the total work content by the minimum cycle time.

AACSB: Analytic
Blooms: Apply
Difficulty: Medium
Learning Objective: 06-07 Solve simple line-balancing problems.
Stevenson - Chapter 06 #143
Topic Area: Designing Product Layouts: Line Balancing

144. For eight hours of operating time per day and a desired output rate of 960 units per day, what balance (if any) will yield the minimum number of stations?

Station #1: t, v, x; Station #2: u, w, y; Station #3: z

Feedback: This is the only balanced line that features the theoretical minimum number of workstations.

AACSB: Analytic
Blooms: Apply
Difficulty: Medium
Learning Objective: 06-07 Solve simple line-balancing problems.
Stevenson - Chapter 06 #144
Topic Area: Designing Product Layouts: Line Balancing

145. For eight hours of operating time per day and a desired output rate of 960 units per day, what is the percentage of idle time for the balance which uses the minimum number of stations?

10%

Feedback: Of the total time allocated to these workstations, 10% will be idle time.

AACSB: Analytic
Blooms: Apply
Difficulty: Medium
Learning Objective: 06-07 Solve simple line-balancing problems.
Stevenson - Chapter 06 #145
Topic Area: Designing Product Layouts: Line Balancing

146. For eight hours of operating time per day and a desired output rate of 960 units per day, what is the efficiency for the balance which uses the minimum number of stations?

90%

Feedback: Of the total time allocated to these workstations, 90% of it will be occupied.

AACSB: Analytic
Blooms: Apply
Difficulty: Medium
Learning Objective: 06-07 Solve simple line-balancing problems.
Stevenson - Chapter 06 #146
Topic Area: Designing Product Layouts: Line Balancing

Given the following process layout data for locating four departments (A, B, C, and D) in four areas (1, 2, 3, and 4):

Distances (meters)

From/To	1	2	3	4
1	-	50	100	150
2		-	50	100
3			-	50
4				-

Flows (loads per week

From/To	A	B	C	D
A	-	10	40	50
B	30	-	10	70
C	60	10	-	40
D	30	50	20	-

Stevenson - Chapter 06

147. What is the distance from area 3 to area 1?

100 feet

Feedback: This information is found in the distances matrix.

AACSB: Analytic
Blooms: Apply
Difficulty: Medium
Learning Objective: 06-08 Develop simple process layouts.
Stevenson - Chapter 06 #147
Topic Area: Designing Process Layouts

148. What is the total flow between departments B and D?

120 loads per month

Feedback: From B to D there are 70 loads, from D to B there are 50 loads.

AACSB: Analytic
Blooms: Apply
Difficulty: Medium
Learning Objective: 06-08 Develop simple process layouts.
Stevenson - Chapter 06 #148
Topic Area: Designing Process Layouts

149. If departments A through D were to be located in areas 1 through 4, respectively, what would be the total distance loads would be moved each month?

40,000 feet

Feedback: Multiply the loads conveyed by the distance conveyed.

AACSB: Analytic
Blooms: Apply
Difficulty: Medium
Learning Objective: 06-08 Develop simple process layouts.
Stevenson - Chapter 06 #149
Topic Area: Designing Process Layouts

150. If department C must be located in area 1, what layout will minimize the total distance loads will be moved each month?

C in 1; A in 2; D in 3; B in 4

Feedback: This minimizes the total distance loads if C must be in area 1.

AACSB: Analytic
Blooms: Apply
Difficulty: Medium
Learning Objective: 06-08 Develop simple process layouts.
Stevenson - Chapter 06 #150
Topic Area: Designing Process Layouts

151. If transportation costs are $.25 per load per foot moved, what are total monthly costs for an optimum layout?

$7,000

Feedback: Multiply the total load-distance by this cost.

AACSB: Analytic
Blooms: Apply
Difficulty: Medium
Learning Objective: 06-08 Develop simple process layouts.
Stevenson - Chapter 06 #151
Topic Area: Designing Process Layouts

ch6 Summary

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