**Solution Chapter 9 exercises**

**(9.5,9.17)**

**9.5**

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| --- |
| Interstation Distance Matrix—Original Layout |
|  | Pick Up |  | Pick Up | Verification |
|  | Paperwork | Advising | Class | of Status |
|  | and Forms | Station | Cards | and Payment |
|  | (A) | (B) | (C) | (D) |
| Paperwork/ Forms (A) |  0 | 30 | 60 | 90 |
| Advising (B) | 30 |  0 | 30 | 60 |
| Class Cards (C) | 60 | 30 |  0 | 30 |
| Verification/ Payment (D) | 90 | 60 | 30 |  0 |

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| --- |
| Load × Distance |
| A → B: | 450 × 30 = | 13,500 |
| A → C: | 550 × 60 = | 33,000 |
| A → D: |  50 × 90 = |  4,500 |
| B → A: | 350 × 30 = | 10,500 |
| B → C: | 200 × 30 = |  6,000 |
| C → D: | 750 × 30 = | 22,500 |  |
|  |  | 90,000 |

Note: Work areas are “fixed” if using the software to reach this initial answer.

(a) Initial layout:

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| Interstation Distance Matrix—Improved Layout |
|  | Pick Up |  | Pick Up | Verification |
|  | Paperwork | Advising | Class | of Status |
|  | and Forms | Station | Cards | and Payment |
|  | (A) | (B) | (C) | (D) |
| Paperwork/ Forms (A) |  0 | 30 | 30 | 60 |
| Advising (B) | 30 |  0 | 60 | 90 |
| Class Cards (C) | 30 | 60 |  0 | 30 |
| Verification/ Payment (D) | 60 | 90 | 30 |  0 |

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| --- |
| Load × Distance |
| A → B: | 450 × 30 = | 13,500 |
| A → C: | 550 × 30 = | 16,500 |
| A → D: |  50 × 60 = |  3,000 |
| B → A: | 350 × 30 = | 10,500 |
| B → C: | 200 × 60 = | 12,000 |
| C → D: | 750 × 30 = | 22,500 |
|  |  | 78,000 |  |

(b) Improved layout:



|  |  |  |  |
| --- | --- | --- | --- |
| 9.17 |  | Performance Time | Task Must Follow |
|  | Task | (in minutes) | This Task |
|  | A |  1 | — |
|  | B |  1 | A |
|  | C |  2 | A |
|  | D |  1 | C |
|  | E |  3 | C |
|  | F |  1 | C |
|  | G |  1 |   D, E, F |
|  | H |  2 | B |
|  | I |  1 |   G, H |
|  |  |  | 13 |  |  |



 (a)

(b)

or Efficiency 78% with a cycle time of 3.33. Multiple layouts with this efficiency exist.

 

 (d) Idle time = 1 + 1 = 2 min per cycle

 = 60 cycles (boats) × 2 min

 = 120 min; so it’s 2 hours per day