

**“Project Management Using Earned Value”
Case Study Solution 19.2**



19.2

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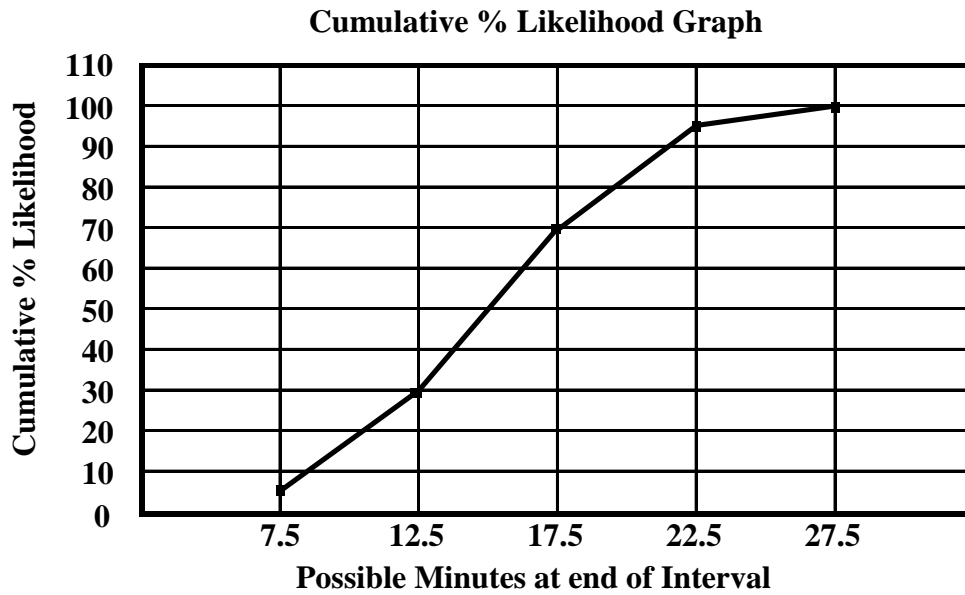
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**Combining Distributions
Along a Path**

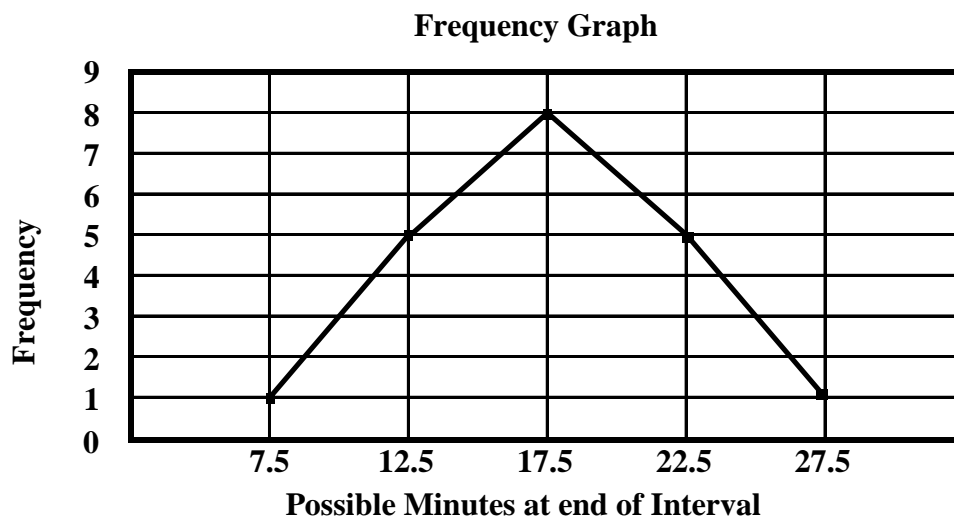
SOLUTION

1.

PARKING AND WALKING ACTIVITY



PARKING AND WALKING ACTIVITY



SOLUTION (continued)

2. The BEST guess is the mode of the distribution, 15 minutes. That is also the average, given the symmetrical distribution.

Park & Walk Activity

| <u>Midrange Minutes</u> | <u>Percent Minutes</u> | <u>Weighted Minutes</u> |
|-----------------------------|----------------------------|-----------------------------|
| 5 | .05 | .25 |
| 10 | .25 | 2.50 |
| 15 | .40 | 6.00 |
| 20 | .25 | 5.00 |
| 25 | <u>.05</u> | <u>1.25</u> |
| TOTAL | 1.00 | 15.00 |

3/4/5 Simply adding up the best guess, average, and conservative (90%) durations for each of the two activities of the project:

Duration of Getting to Work Project

| <u>Activity</u> | <u>Best Guess</u> | <u>Average (minutes)</u> | <u>90th %</u> |
|-----------------|-------------------|------------------------------|--------------------------|
| Driving | 40 | 60.5 | 95 |
| Park & Walk | <u>15</u> | <u>15.0</u> | <u>21</u> |
| TOTAL | 55 | 75.5 | 116 |

6. The low estimate for the entire project is about 35 minutes, the sum of the low estimates for the two activities. It is extremely unlikely, however, at less than 1%, and is more than 99% likely to be overrun. In fact, an 8% likelihood (92% likelihood of overrun) is achieved only at 50 minutes.
7. The high estimate of 135 minutes at 99% is extremely unlikely to be overrun.
8. The 90th percentile of the combined path duration is 104 minutes. This is considerably shorter than the 116 minutes found by adding the two activities' 90th percentile together.

The 104 minute-duration is shorter than the 116 minutes because, when one activity is at its 90th percentile, the other one is likely to take less time than its own 90th percentile (unless the two activities are highly correlated).

SOLUTION (continued)

9. The most likely value for the path is about 59 minutes, about 4 minutes longer than the sum of the most likely values of $40 + 15 = 55$ minutes.
10. The sum of the best guesses, 55 minutes, is at 15% on the S-curve. Thus, it is 85% likely to be overrun. It would be very risky to propose this as the schedule EAC.
11. A CPM network only gives one number for estimated duration. The Project Manager does not know how much contingency is in that number, so the likelihood of overrun is unknown.

Also, if the CPM estimate for each activity is the most likely, it *may* happen that the calculated path duration is quite likely to overrun.

Schedulers often propose duration estimates with triangular distributions that are asymmetrical as the Driving Activity was here. For these, overruns may be ‘expected’.

12. Given the important meeting Wednesday, Joe and Nancy should leave earlier. Nancy might want to leave a 20% likelihood of being late. In that case, she should leave 94 minutes before 8:30, or 6:56 a.m.
13. If Nancy’s presentation is first, she might want to leave 112 minutes before 8:30, or 6:38 a.m. That way she has only a 5% chance of being late.

(There is no time that she can leave to be 100% sure of being there on time. The car could be in an accident; she could go to the hospital. Even Mr. Bigg would forgive her in that case).