PERT Path Duration and Probability of Completion

Expected duration and variance of up to five critical-path activities from optimistic, most likely and pessimistic times, and the chance of finishing by a target.

Method: Industrial engineering practice (work study, line balancing, quality and project management)

Input parameters

Unit system: SI

Parameter	Value	Unit
Activity 1 optimistic	2.0000	d
Activity 1 most likely	4.0000	d
Activity 1 pessimistic	6.0000	d
Activity 2 optimistic	3.0000	d
Activity 2 most likely	5.0000	d
Activity 2 pessimistic	9.0000	d
Activity 3 optimistic	4.0000	d
Activity 3 most likely	6.0000	d
Activity 3 pessimistic	8.0000	d
Activity 4 optimistic (0 = none)	1.0000	d
Activity 4 most likely	2.0000	d
Activity 4 pessimistic	3.0000	d
Activity 5 optimistic (0 = none)	5.0000	d
Activity 5 most likely	7.0000	d
Activity 5 pessimistic	12.000	d
Target completion time	26.000	d

Calculated results

Parameter	Value	Unit
Expected path duration	24.833	d
Standard deviation of the path	1.8333	d
Standard normal value	0.63636	
Probability of finishing by the target	73.773	%

Notes for this case

• PERT treats each activity time as a beta distribution with mean (a + 4m + b)/6 and standard deviation (b − a)/6. Along the critical path the means and variances add, and by the central limit theorem the path duration is taken as normal, giving the probability of finishing by the target date as Φ((T_s − T_e)/σ). Near-critical paths can also finish late, so the true probability is somewhat lower.

Formula and method

$$t_e = \frac{a + 4m + b}{6}, \quad \sigma^2 = \sum \left(\frac{b - a}{6}\right)^2, \quad P = \Phi\left(\frac{T_s - T_e}{\sigma}\right)$$

Variables

a_1	Activity 1 optimistic	s
m_1	Activity 1 most likely	s
b_1	Activity 1 pessimistic	s

a_2	Activity 2 optimistic	s
m_2	Activity 2 most likely	s
b_2	Activity 2 pessimistic	s
a_3	Activity 3 optimistic	s
m_3	Activity 3 most likely	s
b_3	Activity 3 pessimistic	s
a_4	Activity 4 optimistic (0 = none)	s
m_4	Activity 4 most likely	s
b_4	Activity 4 pessimistic	s
a_5	Activity 5 optimistic (0 = none)	s
m_5	Activity 5 most likely	s
b_5	Activity 5 pessimistic	s
T_s	Target completion time	s
T_e	Expected path duration	s
σ	Standard deviation of the path	s
z	Standard normal value	-
P	Probability of finishing by the target	-

Method and standards

PERT.

Assumptions and limits

- Independent activities; normal path duration.

References

Industrial engineering practice (work study, line balancing, quality and project management)

Report details

Report reference	FCC-09RQ-8F5Y (the same inputs always give the same reference)
Generated	23 November 2026, 17:50 UTC
Calculator	PERT Path Duration and Probability of Completion
Method last reviewed	17 November 2026
Software release	FireCAD Calc, release of 22 November 2026
Release checks	3 reference cases of this calculator, computed independently, are checked on every release

Results are for engineering estimation. Verify critical designs against the referenced standards and your own data.

This calculator online

https://calc.firecad.com/general/economics/pert-three-time-estimate

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.