Three-point estimate (PERT)

Replace a single guess with a range: an expected value and a spread that show how sure the estimate is.

STEP	FORMULA	FORM TEST: 8 · 11 · 20 DAYS
Triangular mean	(O + M + P) ÷ 3	39 ÷ 3 = **13**
PERT (beta) mean	(O + 4M + P) ÷ 6	72 ÷ 6 = **12**
Standard deviation	(P – O) ÷ 6	12 ÷ 6 = **2**
Range: ±1 SD · ±2 SD	About 68% · about 95%	10–14 · 8–16 days

Illustrative: O 8, M 11, P 20. Both means lie above M, because the worst case is further from M than the best case.

WHAT IT IS

Ask the people who know the work for **three values**: optimistic (O), most likely (M) and pessimistic (P). The triangular mean is their plain average. **PERT**, the program evaluation and review technique (Malcolm and colleagues, 1959), assumes a lopsided (beta) curve that leans towards M, counts M four times, and takes a sixth of the range as the standard deviation (SD). The PMBOK® Guide (PMI's body-of-knowledge guide) calls this multipoint estimating.

HOW IT WORKS

01 Ask for O, M and P one by one, before anyone hears a target.

02 Triangular = (O + M + P) ÷ 3; PERT = (O + 4M + P) ÷ 6.

03 SD ≈ (P – O) ÷ 6: O and P lie about 3 SD either side of the mean.

04 A chain: add the means; SD = $\sqrt{\text{sum of SD}^2}$, if independent.

05 ±1 SD ≈ 68%, ±2 SD ≈ 95%: for a bell-shaped total and an honest P.

MID-LEVEL · WORKED EXAMPLE

Apply it well

The situation: A city team has eight months to move resident parking permits online. Moving the old permit data: 12 days at best, 15 most likely, 24 at worst.

PERT: (12 + 4 × 15 + 24) ÷ 6 = 96 ÷ 6 = 16 days; SD (24 – 12) ÷ 6 = 2; triangular 51 ÷ 3 = 17. The project manager plans 16 days, tells the steering group ‘14 to 18 days, about two times in three’, and records what the 24 days assume.

In the exam: Show the three values, both means and the SD; say which mean you use and why; give a range, its confidence and what P assumes.

SENIOR · WORKED EXAMPLE

Design and lead it

The situation: A city is joining 14 online services under one login over 30 months, with two main suppliers and a steering board; the base estimate is €11.5m.

Each work package gets three points from the people who will do it, before any target is shared. A simulation adds them up: a 50% chance of costing at most €12.3m, 80% at most €12.7m. The board picks 80% and funds the €1.2m gap as contingency.

In the exam: Treat the confidence level as the **sponsor's decision**: its cost, who holds the gap, and how you kept anchoring out of the three points.

WHERE IT SITS

IPMA · ICB4	PMI · *PMBOK® GUIDE* 8 · PMP® EXAM	APM · BOK 8 · PMQ EXAM
4.5.7 knowledge: three point estimation (p. 123); 4.5.4.2: effort and duration (p. 113)	Guide p. 183: multipoint estimating, the triangular formula; PERT, p. 52. Exam outline: tasks 6, 8	BoK (APM's Body of Knowledge) §5.4.1: three-point estimates give a range; assumptions feed contingency. PMQ (APM's Project Management Qualification) 20c, 22a

Sources: IPMA ICB4 (2015); Malcolm et al. (1959), PERT; PMI, PMBOK® Guide, 8th ed.; PMI, PMP® Examination Content Outline (2026); APM Body of Knowledge, 8th ed.; APM, PMQ handbook (v6, 2026)