

Earned value formulas

Turn PV, EV and AC into variances, indices and a forecast of the final cost, and state the assumption behind each forecast.

MEASURE	FORMULA	EXAMPLE	READS
Schedule	$SV = EV - PV \cdot SPI = EV \div PV$	$-90 \cdot 0.80$	80% of the planned work done
Cost	$CV = EV - AC \cdot CPI = EV \div AC$	$-40 \cdot 0.90$	90 cents of work per euro
Final cost	$EAC = BAC \div CPI$	$900 \div 0.9 = 1,000$	If the efficiency so far continues
To spend · gap	$ETC = EAC - AC \cdot VAC = BAC - EAC$	$600 \cdot -100$	€100k over the budget
Needed from now	$TCPI = (BAC - EV) \div (BAC - AC)$	$540 \div 500 = 1.08$	Each euro must buy €1.08 of work

Illustrative, € thousand: BAC 900, PV 450, EV 360, AC 400. Other EACs: 940 (rest as planned), 1,150 (CPI × SPI).

WHAT IT IS

PV, EV and AC are planned value, earned value and actual cost; BAC, the budget at completion. Variances (SV, CV) are gaps in money; indices (SPI, CPI), efficiency, with 1.0 on plan. The **estimate at completion (EAC)** forecasts the final cost: four common formulas, one per assumption (PMBOK® Guide, PMI's body-of-knowledge guide.). Then come the **estimate to complete (ETC)**, the **variance at completion (VAC)** and the **to-complete performance index (TCPI)**.

HOW IT WORKS

- 01 Efficiency continues: $EAC = BAC \div CPI$ (as $AC = EV \div CPI$).
- 02 Rest as planned (one-off overrun): $EAC = AC + (BAC - EV)$.
- 03 Date also drives cost: $EAC = AC + (BAC - EV) \div (CPI \times SPI)$.
- 04 Plan no longer holds: $EAC = AC + \text{a bottom-up estimate}$.
- 05 Then $ETC = EAC - AC$, $VAC = BAC - EAC$; TCPI: the efficiency the rest needs.

MID-LEVEL · WORKED EXAMPLE

Apply it well

The situation: A city team has eight months to move resident parking permits online. BAC = €576k of work; a €24k contingency sits above it, outside BAC. End of month 4: PV €360k, EV €288k, AC €300k.

$EAC = 576 \div 0.96 = €600k$, so $VAC = -€24k$: the whole contingency. The project manager states this assumption and the range: €588k ($300 + 288$, rest as planned) to €675k ($300 + 288 \div (0.96 \times 0.80)$, $CPI \times SPI$).

In the exam: Show each formula with its numbers, pick one EAC and say why, and say what VAC means for the reserves.

SENIOR · WORKED EXAMPLE

Design and lead it

The situation: A city is joining 14 online services under one login over 30 months. The core platform is fixed price, and the project manager holds a €1.2m contingency.

Under the fixed price, the city cannot see the supplier's real costs. So the project manager builds a bottom-up estimate to complete, cross-checks it with the formulas, and brings the board a range, the causes and options.

In the exam: Test the formulas against the contracts and the schedule; give a range, tie it to the reserves, show who decides.

WHERE IT SITS

IPMA · ICB4	PMI · PMBOK® GUIDE 8 · PMP® EXAM	APM · BOK 8 · PMQ EXAM
4.5.7.4–4.5.7.5 (pp. 126–127): earned value indicators, forecasts, signalling cost breaches	Guide: TCPI p. 206; four EACs, pp. 207–210. Exam outline: Process task 6, Plan and manage finance	BoK (APM's Body of Knowledge) §5.8.2 Cost control: a revised forecast if an overspend cannot be recovered. PMQ (APM's Project Management Qualification) objective 22b

Sources: IPMA ICB4 (2015); PMI, PMBOK® Guide, 8th ed.; PMI, PMP® Examination Content Outline (2026); APM Body of Knowledge, 8th ed.; APM, PMQ handbook (v6, 2026); Morris, Reconstructing Project Management (2013)

Key: IPMA = International Project Management Association; ICB4 = IPMA's Individual Competence Baseline (4.5.7 etc.: its competence elements); PMI = Project Management Institute; PMP® = PMI's Project Management Professional; APM = Association for Project Management. Unofficial study material for IPMA®, PMI® and APM exams. Not affiliated with, endorsed by or approved by IPMA, PMI or APM, and not an accredited or endorsed training provider. IPMA® and IPMA ICB® are registered trademarks of IPMA in Switzerland and other countries. PMI, PMP, CAPM and PMBOK are registered marks of Project Management Institute, Inc. APM is a trade mark of the Association for Project Management. Other marks belong to their owners. PMP® exam facts are from PMI's public PMP® Examination Content Outline (2026); check the current version on pmi.org. APM's qualifications are its own; this series is not an APM Accredited Provider or APM Endorsed. Examples use a fictional city and its projects. Levels (this series' labels): Mid-level = moderately complex projects (IPMA Level C, PMI's PMP®); Senior = complex projects and people (IPMA Level B, APM's Chartered Project Professional).

All episodes, sheets and handouts: pm.fannarmaximus.com · Watch: youtube.com/@fannarmaximus



Scan for the episode