PMP Exam Formulas Summary

Earned Value Management			
Name	**Abbr.**	**Formula**	**Note**
Budget At Completion	**BAC**	BAC = Total budget	What the project budget is
Earned Value	**EV**	EV= Actual % Complete * BAC	The value earned for the work actually completed to date. What the project is worth
Actual Cost	**AC**	AC = Cost spent	where cost spent = cost incurred. What the project has spent so far
Cost Variance	**CV**	CV = EV - AC	Positive = Under budget Negative = Over budget
Percent Complete	**PC**	PC = EV / BAC *100%	
Cost Performance Index	**CPI**	CPI = EV/AC	Shows overall cost efficiency on the project. CPI >1: under budget CPI<1 : over budget
Schedule Variance	**SV**	SV = EV - PV	Positive = ahead schedule Negative = behind schedule
Schedule Performance Index	**SPI**	SPI = EV/PV	Shows overall schedule adherence. SPI >1: ahead schedule SPI< than 1 : behind schedule
Project Future CPI	**PP**	PP = Net investment / Average annual cash flow	Payback Period = Add up the projected cash inflow minus expenses until you reach the initial investment. Shorter is better
Variance At Completion	**VAC**	VAC = BAC - EAC	Projection of being over or under budget based on current performance. Positive: under budget Negative : over budget
To Complete Performance Index - *Utilizing BAC*	**TCPI**	TCPI =(BAC – EV)(BAC-AC)	Predicts likelihood of reaching BAC TCPI >1, harder to complete & meet BAC TCPI<1, Easier to complete and meet BAC
- *Utilizing EAC*	**TCPI**	TCPI =(BAC – EV)(EAC-AC)	Predicts likelihood of reaching EAC. TCPI >1, harder to complete & meet EAC TCPI<1, Easier to complete and meet EAC

Estimate at Completion *- Standard formula*	**EAC**	EAC = BAC / CPI	Forecasts final project costs based on current performance. The CPI stays the same until the end of the project
- Future work at planned costs formula	**EAC**	EAC = AC+ BAC-EV	Forecasts final project costs based on current performance
- Initial costs estimates flawed	**EAC**	EAC= AC + Bottom-up ETC	Used when the initial plan no longer valid. Forecasts final project costs based on current performance
- CPI and SPI affect remainder of project	**EAC**	(EAC)=AC+{(BAC-EV)/(CPI*SPI)}	Used when both CPI & SPI influence the remaining work
Estimate To Complete	**ETC**	ETC = EAC - AC	Predict how much more the remainder of the project will costs

Project Selection			
Name	**Abbr.**	**Formula**	**Note**
Present Value	**PV**	PV = FV / (1+r)^n	What the project should be worth. Bigger result is better
Discounted Cash Flow	**DCF**	Cash flow*DF	
Future Value	**F**	FV = PV * (1+r)^n	The value at specified date in the future that is equivalent in value to a specified sum today
Discount Rate	**r**		
Discount Factor	**DF**		
Number of Years	**n**		
Net Present Value	**NPV**	Sum of PV of the individual cash flows	Used in Capital budgeting to analyze the profitability of a project or investment Bigger NPV is better, more precise than payback period
Return of Investment	**ROI**	ROI = Net Income / total investment	ROI = Select biggest number.
Benefit Cost Ratio	**BCR**	BCR = Benefit / Cost	Bigger is better. Represent return for every $1
Cost Benefit Ratio	**CBR**	CBR = Cost / Benefit	
Internal Rate of Return	**IRR**	The interest rate at which the PV equals the initial invst	Bigger IRR is better, more precise than NPV
Payback Period	**PP**	PP = Net investment / Average annual cash flow	Payback Period = Add up the projected cash inflow minus expenses until you reach the initial investment. Shorter is better
Opportunity Cost	**OC**	Opportunity Cost = The value of the project not chosen.	Smaller is better
Expected Monetary Value	**EMV**	EMV = Probability * Impact	

PERT		
Name	**Abbr.**	**Formula**
PERT 3-point	**PERT 3**	PERT3=(Pessimistic+(4*Most Likely)+Optimistic)/6
PERT α	**PERT α**	PERT α = (Pessimistic-Optimistic) / 6
PERT Activity Variance	**PAV**	PAV = ((Pessimistic - Optimistic) / 6)^2
PERT Variance all activities		(PVA)= sum((Pessimistic - Optimistic) / 6)^2

Classes of Estimates	
Type	**Note**
Order of Magnitude estimate = -25% to +75%	The estimate cost at early stage, scope not defined yet
Preliminary estimate = -15% to + 50%	Rough estimate made at the beginning of the project
Budget estimate = -10% to +25%	Made during the planning phase
Definitive estimate = -5% to +10%	The most accurate, takes time to create
Final estimate = 0%	Always zero

SIGMA	
1 sigma = 68.26%	1 standard deviation , frequently used in analyzing data
2 sigma = 95.46%	2 standard deviations , frequently used in analyzing data
3 sigma = 99.73%	3 standard deviations , frequently used in analyzing data
6 sigma = 99.99%	6 standard deviations , frequently used in analyzing data
Control Limits (CL)	3 sigma from mean, reflects the expected variation in the data

Communications	
Communication Channels	CC = n * (n-1) / 2
Communication Channels per member	(n-1)
Increased Channels	n * (n-1) / 2 After - n * (n-1) / 2 Before
Decreased Channels	n * (n-1) / 2 Before - n * (n-1) / 2 After
	C: number of communications channels n: number of stakeholders

Procurement			
Name	**Abbr.**	**Formula**	**Note**
Point of total assumption	**(PTA)**	(PTA) = [(CP-TP)]/buyer's share ratio]+TC	Determined by (FPIF) fixed price plus incentive fees contract. The seller bears all the lose of a coast overrun
Contract Savings	**(CS)**	(CS)=Target Cost – Actual Coast	The saving that is divided between the seller and the buyer based on agreed ratio for the coast saved by the seller against the original estimated coast
Contract bounce	**(CB)**	(CB)=Savings*percentage	The sum paid when the seller meets certain goals decided in the (CPIF) cost plus incentive contract
Contact Coast	**(CC)**	Bonus + Fees	
Total Coast	**(TC)**	Actual coast+ Contact coast	
Source selection criteria	**(SS)**	(SS)=(weightage*Price)+(weightage + Quality)	Used to score seller proposals
CP: Ceiling price **TP: Target price** **TC: Target cost**			

Depreciation			
Name	**Abbr.**	**Formula**	**Note**
Depreciation Expense	**(DE)**	DE = Asset Cost / Useful Life	Calculated using Straight-line Depreciation
Depreciation Rate	**(DR)**	(DR) = 100%Useful Life	Calculated using Straight-line Depreciation
Depreciation Rate	**(DR)**	(DR) = 2*(100%Useful Life)	Calculated using Double Declining Balance Method
Depreciation Rate	**(DR)**	(DR) = Useful Life + (Useful Life - 1) + (Useful Life - 2) + etc...	Calculated using Sum-of-Years' Digits Method
Book value	**(BV)**	(BV) = Book value at the beginning of the year – Depreciation Expenses	Calculated using Double Declining Balance Method

Network Diagram			
Name	**Abbr.**	**Formula**	**Note**
Float	(FLT)	(FLT) = LS –ES OR (FLT) = LF - EF	If FLT<0 , Behind schdule If FLT = 0, critical If FLT >0 , Under schdule
Free Float	(FF)	(FF) = ES -EF	
Activity duration	(AD)	(AD) = EF – ES +1 OR (AD)= LF – LS + 1	
Early Finish	(EF)	(EF) = (ES + Duration) – 1	
Early Start	(ES)	(ES) = EF + 1	
Late Finish	(LF)	(LF) = LS -1	
Late Start	(LS)	(LS) = (LF – Duration) +1	
Forward Pass		ES = EF of the predecessor node EF = ES + Dur	
Backward Pass		LF = LS of the Successor LS = LF – Dur	
Slack		= LF – EF = LS – ES	**ES** **Dur** **EF** Node **LS** **Float** **LF**

Important Values
Control Limits = 3 sigma from mean
Control Specifications = Defined by customer; less than the control limits
Float on the critical path = 0 days
Pareto Diagram = 80/20
Time a PM spends communicating = 90%
Crashing a project = Crash least expensive tasks on critical path.
JIT inventory = 0% (or very close to 0%.)
Lag: Waiting time between activities (positive time)
Lead: Activities are moved closer together or overlap (negative time).
Crashing: Adding resources to reduce the project duration. Crashing adds costs to the project.
Fast tracking: Allows project phases to overlap to reduce the project duration. Fast tracking adds risk to the project.
Free float: The amount of time an activity can be delayed without delaying the next activity's start date.
Total float: The amount of time an activity can be delayed without delaying the project's end date.

Refer to the PMBOK® Guide 6th Edition for more details.
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Please do not hesitate to contact me anytime if you have any questions, comments, and feedbacks.

Success is yours,

Prepared by: Amr Miqdadi, PMP
info@pmlead.net
https://www.pmlead.net