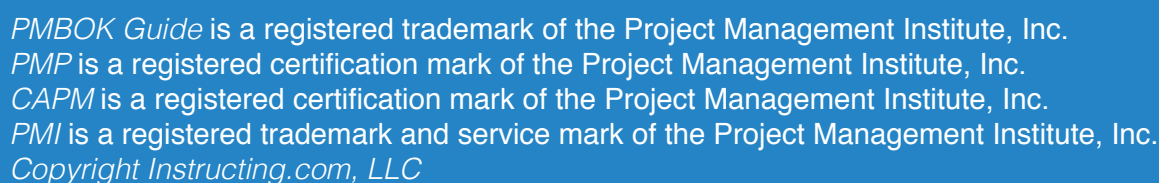# CAPM® / PMP® Memory Sheets

Everything you must know to pass the CAPM® and PMP® examinations

HOW TO CALCULATE FLOAT

Complete the Forward Pass

1. The Early Start (ES) of the first task is one. The Early Finish (EF) is a task's ES, plus the duration, minus one.
2. The ES of the next task(s) will be the EF for the previous activity, plus one.
3. The EF for the next task(s) equals its ES, plus the task duration, minus one.
4. Use caution with predecessor activities; the EF with the largest value is carried forward.

Complete the Backward Pass

1. Backward pass starts at the end of the PND. The Late Finish (LF) for the last activity in the PND equals its EF value. The Late Start (LS) is calculated by subtracting the duration of the activity from its LF, plus one.
2. The next predecessor activity's LF equals the LS of the successor activity minus one.
3. The LS is again calculated by subtracting the task's duration from the task's LF, plus one.

Calculate Float

1. To calculate float, the ES is subtracted from the LS and the EF is subtracted from the LF. The following illustration shows a completed PND with the float exposed.
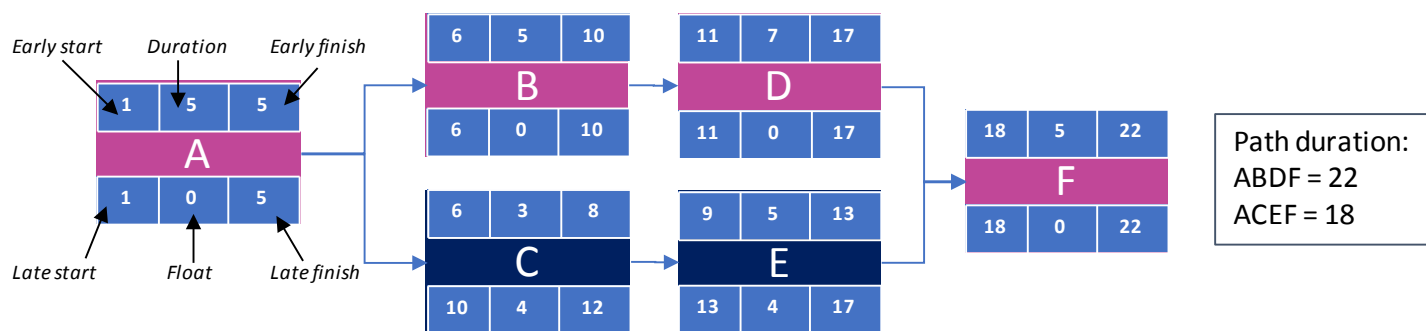
Time Facts

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.

Task Relationships

Finish-to-start (FS): This relationship means Task A must complete before Task B can begin. This is the most common relationship.

Start-to-start (SS): This relationship means Task A must start before Task B can start. This relationship allows both activities to happen in tandem.

Finish-to-finish (FF): This relationship means Task A must complete before Task B does. Ideally, two tasks must finish at exactly the same time, but this is not always the case.
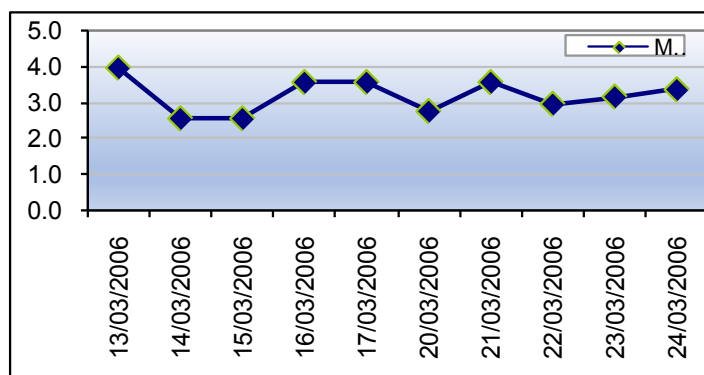
Start-to-finish (SF): This relationship is unusual and is rarely used. It requires Task A to start so that Task B may finish. It is also known as just-in-time (JIT) scheduling.
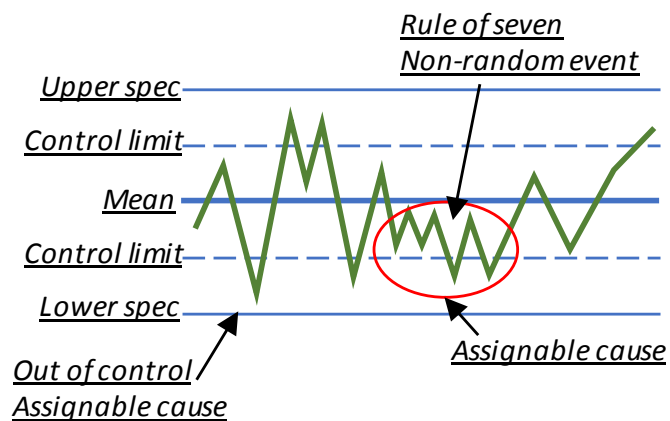
EARNED VALUE MANAGEMENT FORMULAS

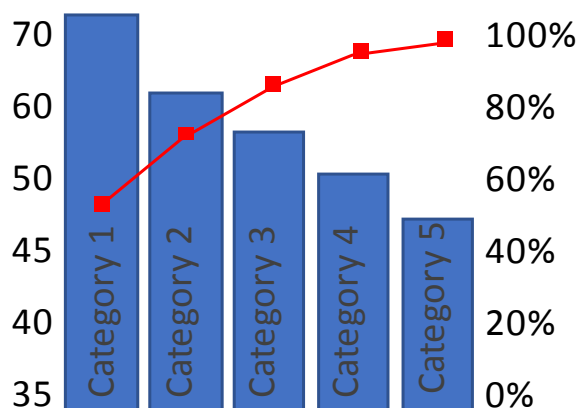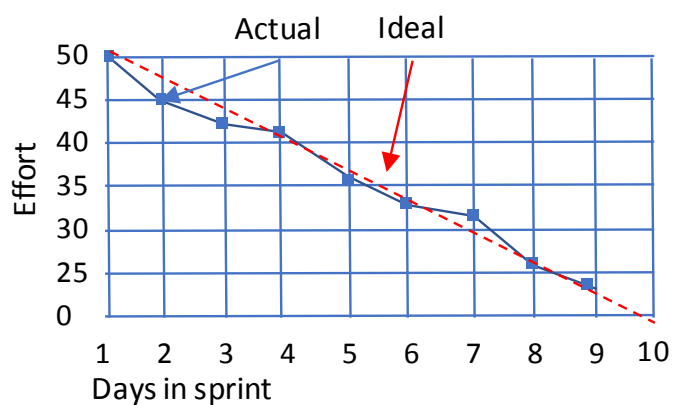| Formula	Definition	Equation	Indication
Planned value (PV)	What the project should be worth.		
Earned value (EV)	What the project is worth	Percent complete X BAC	
Actual cost (AC)	What the project has spent so far		
Budget at Completion (BAC)	What the project budget is		
Cost variance (CV)	The difference between earned value and the actual costs	EV-AC	Positive – under budget Negative – over budget
Schedule variance (SV)	The difference between earned value and planned value	EV-PV	Positive – ahead of schedule Negative – behind schedule
Variance at Completion (VAC)	Projection of being over or under budget based on current performance	BAC-EAC	Positive – under budget Negative – over budget
Cost Performance Index (CPI)	Shows overall cost efficiency on the project.	EV/AC	Greater than 1 – under budget Less than 1 – over budget
Schedule Performance Index (SPI)	Shows overall schedule adherence	EV/PV	Greater than 1 – ahead of schedule Less than 1 – behind schedule
Estimate at Completion (EAC) *Standard formula*	Forecasts final project costs based on current performance	BAC/CPI	
Estimate at Completion (EAC) *Future work at planned costs formula*	Forecasts final project costs based on current performance	AC + BAC – EV	
Estimate at Completion (EAC) *Initial costs estimates flawed*	Forecasts final project costs based on current performance	AC + Estimate for remainder of project	
Estimate at Completion (EAC) *CPI and SPI affect remainder of project*	Forecasts final project costs based on current performance	AC + [BAC-EV/ (CPI x SPI)]	
Estimate to Complete	Predict how much more the remainder of the project will costs	EAC-AC	
TCPI *Utilizing BAC*	Predicts likelihood of reaching BAC	(BAC-EV)/(BAC-AC)	Greater than 1 – harder to complete and meet BAC Less than 1 – easier to complete and meet BAC
TCPI Utilizing EAC	Predicts likelihood of reaching EAC	(BAC-EV)/(EAC-AC)	Greater than 1 – harder to complete and meet EAC Less than 1 – easier to complete and meet EAC

CHARTS

Run Chart

Control Chart

Rule of seven
Non-random event

Upper spec
Control limit
Mean
Control limit
Lower spec

Out of control
Assignable cause

Assignable cause

Pareto Chart

Burndown Chart

Actual   Ideal

Effort

Days in sprint

Kanban Board

To Do | Design | Dev | Test | Deploy | Done!

Ishikawa Chart

Effect:
Problem to solve

Major causes

Contributing causes
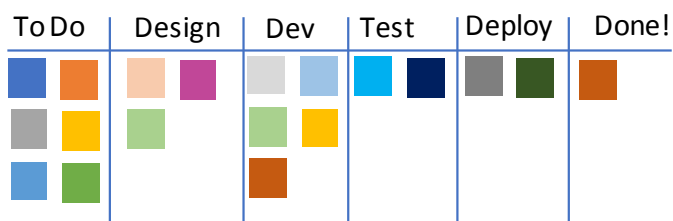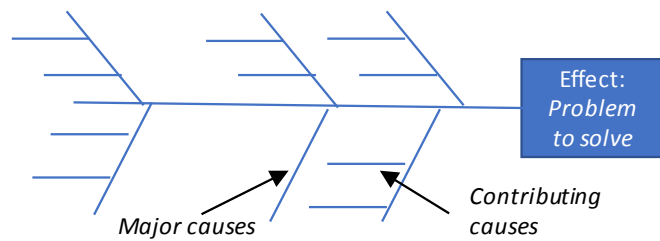
RACI CHARTS

	Jo	Sam	Mary	Mike	Alice
Task 1	R	A	C	I	I
Task 2	A	C	C	C	R
Task 3	C	C	I	A	R
Task 4	R	R	R	A	I
Task 5	I	I	R	A	C

Responsible, Accountable, Consulted, Informed
Only one person accountable per task

Quality Facts

Quality is a conformance to requirements and a fitness for use. It is fulfilling the project scope.

Grade is a category or rank given to entities having the same functional use but different technical characteristics.

Gold plating is the process of adding extra features to drive up costs and consume the budget.

Quality assurance is a prevention-driven process to do the project work right the first time.

Quality control is an inspection-driven process to keep mistakes from entering the customers' hands.

Scope creep is the addition of small, undocumented changes that bypass the scope change control system. Scope creep is sometimes called **project poison**.

Cost of poor quality, also known as the cost of nonconformance to quality, is the cost of not achieving quality: rework, loss of life or limb, loss of sales.

Prevention aims to keep errors out of the process.

Inspection aims to keep errors away from customers.

Attribute sampling shows if the results conform to requirements or not. Variable sampling shows the degree of conformity.

Tolerances demonstrate the range of acceptable results.

HUMAN RESOURCE THEORIES

Maslow's Hierarchy of Needs

Maslow believed that we have five needs; we're on a quest to satisfy these needs. The needs are, from the bottom up:

1. Physiological. We need air, food, clothing, and shelter.
2. Safety. We need safety and security.
3. Social. We need friends, approval, and love.
4. Esteem. We need respect, appreciation, and approval.
5. Self-actualization. We need personal growth, knowledge, and fulfillment.

Herzberg's Theory of Motivation

There are hygiene agents and motivating agents. Hygiene agents are expectations for employment: paycheck, insurance, safe working environment. Motivating agents are motivators for employees such as bonuses, career advancement, opportunity to grow. Hygiene agents will not motivate, but their absence will de-motivate.

Halo Effect

All opinions are formed by one component. A great engineer doesn't always make a great project manager. Parkinson's Law Individuals allow their work to consume all of their time. Work will expand to fill the amount of time allotted to it.

McGregor's X and Y

Management's perspective of employees. X people are bad, lazy, and need to be micromanaged. Y people are selfdirected. Most managers have X and Y attributes.

Ouchi's Theory Z

Workers do well if motivated. This provides participative management, familial work environment, and lifelong employment. Known as Japanese Management Style.

McClelland's Theory of Needs

Needs are acquired over time and are shaped by life experiences. Our needs are categorized as achievement, affiliation, and power. McClelland used a Thematic Apperception Test (TAT) to determine an individual's needs.

Vroom's Expectancy Theory

People behave based on what they believe (expect) their behavior to bring them.

Key Project Manager Powers

Expert: The authority of the project manager comes from experience with the technology the project focuses on.

Reward: The project manager has the authority to reward the project team.

Formal: The project manager has been assigned by senior management and is in charge of the project. Also known as positional power.

Coercive: The project manager has the authority to discipline the project team members. This is also known as "penalty power."

Referent: The project team personally knows the project manager. Referent can also mean the project manager refers to the person who assigned him the position.

Eight Risk Responses

Escalate: the risk (or opportunity) is outside of the project scope and is escalated to management.

Avoidance: Avoid the risk.

Mitigation: Reduce the probability or impact of the risk event.

Acceptance: The risk may be small so the risk may be accepted.

Transference: Risk ownership is transferred to third party, usually for a fee.

Enhance: A positive risk strategy to increase the probability/impact of the opportunity for the project.

Exploit: A positive risk that a project wants to take advantage of.

Share: A positive risk that can be shared with the organization or other projects.

Risky terms

Contingency fund: An amount of funds used to offset a project's risks.

Secondary risks: A risk response creates another risk.

Residual risks: A risk response may create small generally accepted risks.

Triggers: Condition, event, or warning sign that a risk is about to happen. Usually "triggers" a risk response.

Positive risk: Risks with a positive impact; also called opportunities.

Negative risks: Risks with a negative impact; also called threats.

Pure risk: Only offers a negative impact (injury, fire, theft, destruction).

Business risk: offer an upside or a downside.

Qualitative analysis: Qualifying the risks for legitimacy.

Quantitative analysis: Quantifies the risk exposure.

Utility function: A person's or organization's willingness to accept risk. Relative to the project priority as high-priority projects are typically risk adverse. Also known as **risk tolerance**.

INTEGRATED CHANGE CONTROL

Change requests
- Scope
- Cost
- Time
- Contract
- Corrective action
- Preventive action
- Project policies
- Procedures

Configuration management system

Change management system

(Possible) Change Control Board

Integrated Change Control

Scope
Time
Cost
Quality
Human resources
Communications
Risk
Procurement
Stakeholders

Approved, Declined, or Deferred Change Request

Project management plan updates

Project document updates

Change log updates

PROJECT PROCUREMENT

Buyer:
  Statement of Work
  Invitation to bid
  Request for quote
  Request for proposal

Sellers

Bidder conference

SOW Updates

Seller response:
  Bid
  Quote
  Proposal

Buyer

Negotiations

Source selection

Contract

Contract closure

Procurement terms

Contracts: An offer and consideration. Contracts are backed by the court system.

Cost reimbursable contracts: Risk is with the buyer as the buyer pays for cost overruns.

Fixed-price (lump-sum contracts): Risk is with the seller as seller pays for cost overruns.

Time and materials contract: Buyer pays for the time and materials of the vendor. Must have a not-to-exceed (NTE) clause.

Purchase order: A unilateral form of a contract.

Letter of intent: The buyer tells the vendor they intend to do business with them; not a binding agreement.

Letter contract: Generally short-term purchase used as a stopgap or emergency response.

Bidder conference: Vendors all meet with the buyer to discuss the details of the statement of work so they may ask questions for details.

Contract closure: contracts are closed according to the terms of the contract. This includes payment and possible contract cancellation.

49 PROJECT MANAGEMENT PROCESSES

	Initiating –2	Planning -24	Executing -10	Monitoring and Controlling -12	Closing -1
Project Integration Management	Develop Project Charter	Develop project Management plan	Direct and manage the project work Manage project knowledge	Monitor and Control Project Work Perform Integrated Change Control	Close project or phase
Project Scope Management		Plan scope management Collect requirements Define scope Create WBS		Validate scope Control scope	
Project schedule management		Plan schedule management Define activities Sequence activities Estimate activity durations Develop schedule		Control schedule	
Project cost management		Plan cost management Estimate costs Determine budget		Control costs	
Project quality management		Plan quality management	Manage quality	Control quality	
Project resource management		Plan resource management Estimate activity resources	Acquire resources Develop team Manage team	Control resources	
Project communications management		Plan communications management	Manage communications	Monitor communications	
Project risk management		Plan risk management Identify risks Perform qualitative risk analysis Perform quantitative risk analysis Plan risk responses	Implement risk responses	Monitor risks	
Project procurement management		Plan procurement management	Conduct procurements	Control procurements	
Project stakeholder management	Identify stakeholders	Plan stakeholder engagement	Manage stakeholder engagement	Monitor stakeholder engagement	