Read This Cheat Sheet By K.A. Just 2 Hours Before The Exam

The purpose of this cheat sheet is to summarize what you studied during your preparation for the PMP exam. These are essential points on each knowledge areas of PMBOK and Agile Section. It is like reading whole PMBOK in 30 minutes. Read this every night before going to bed. This will help you summarize what you studied during the day as well as what you already studied earlier or about to study.

Also, review these important points just two hours before the exam then relax and feel the fun of passing the exam before entering the test center. It will increase your confidence level, speed the flow of blood in your body and help you remember during the test.

So here we go:

BASIC FUNDAMENTALS OF PROJECT MANAGEMENT

- According to the PMBOK, a "**Project**" is a temporary endeavor undertaken to create a unique product or service.
- A **Portfolio** is a collection of projects or programs and other work that are grouped together to facilitate effective management of that work to meet strategic business objectives. The projects or programs in the portfolio may not necessarily be interdependent or directly related.
- **Project Portfolio Management** is a management process to select the projects that should be invested in. Specifically, it is the selection process based on the need, profitability, and affordability of the proposed projects.
- A **project management office (PMO)** is an organizational unit to centralize and coordinate the management of projects under its domain. A PMO can also be referred to as a "program management office," "project office," or "program office." A PMO oversees the management of projects, programs, or a combination of both

- Project management is the application of knowledge, skills, tools, and techniques to project activities to meet the project requirements
- The contract between the organization and the vendor super cedes all other work related documents
- **Customers, internal or external**, are the **most important stakeholders** in a project
- **Scope verification** must take place at the end of each phase
- Money already spent on a project is called sunk cost and should not be taken into consideration when determining if a project should continue. Instead, the cost of the work to complete is one of the elements that should be taken into consideration when considering to kill a project
- **Phase end** reviews are also called phase exits, milestones, phase gates, stage gates or kill points.
- The project life cycle goes through a series of phases to create the product
- Project managers manage things, but lead people.
- Project
  - Projects don't last forever. They are temporary and unique
  - Projects pass through logical phases to reach their completion
  - Purpose of Project is to attain its objective and then terminate
- Operations
  - Operations, however, do go on and on. They are ongoing and repetitive
  - Operations may be influenced, or even created, by the outcome of a project
  - Objective of an ongoing operation is to sustain business
- Once objectives have been met, new directions are followed to support the organization's plans

- Organization Structure
  - Functional
  - Matrix
  - Weak
  - Balanced
  - Strong
  - Projectized
- The WBS is a decomposition of all the deliverables the project will create

KNOWLEDGE AREA – Project Integration Management

- Project charter formally authorizes the project and allows the PM to apply organizational resources to project activities.
- Charter contains requirements, business needs, justification, assumptions and constraints and summary budget and schedule.
- Sponsor input is critical to charter
- Early identification of stakeholders is critical to successful project management
- Enterprise Environmental Factors can be internal or external, and include things like organizational culture, government regulations, stakeholder risk tolerance, PMIS and commercial databases.
- Organizational Process Assets include the organizations processes and procedures for conducting work and the corporate knowledge base for storing and retrieving information, as well as historical information about past work.
- **Project Selection:** Mathematical methods (linear programming) vs. Comparative methods (peer review, cost-benefit analysis).
- **Project Management Methodology:** Methodology contains guiding processes for those who are doing project management.

There are several project management methodologies; some of them are Agile, Traditional, Waterfall, Adaptive, Critical Path, Perth, Rational Unified Process, Critical Chain, Extreme, Scrum, Six Sigma and more.

- **Project Management Information System:** Software that helps you manage project. This includes the configuration management system and the change control system.

- **Management Plans:** Management Plans specify how you will define, plan, manage and control each knowledge area. These all become part of the Project Management Plan.

- **Project Management Plan:** Remember this is not just a bar chart!

  It's all the subsidiary management plans plus baselines for cost, scope, quality and schedule (and possible resources). The project will be measured against these baselines.

- **Corrective Action:** A change to bring the project performance back in line with the plan. Recommended Corrective Actions are generally outputs of the Monitoring and Controlling Process Group Processes. Recommended Corrective Actions must be approved and implemented.

- **Preventative Action:** Preventative actions are done in anticipation of problems that could cause project performance to deviate from the baseline. If these problems actually occurred, they would need Corrective Actions, but we're trying to head off this situation.

- **Defect Repair:** This is rework required when an output of the project does not meet specifications.

- **Perform Integrated Change Control:** All changes, no matter how small, must go through integrated change control for approval. The project manager's job when changes are suggested are to:
  - Evaluate change impact
  - Create options for minimizing change impact

- o Get approval from Change Control Board
- o Get approval from customer (where required)
- **Close Project** must always be done, even for cancelled or failed projects. It involves developing and executing the administrative closure procedure, and developing the contract closure procedure.

  Contract Closure process was eliminated in PMBOK 6th edition and is now part of Close Project process.

KNOWLEDGE AREA – Project Scope Management

- **Collect Requirements:** Describe how to define, verify and control scope and how to create WBS.
- **Define Scope:** Create scope statement; this will guide future decisions. Describes deliverables and work required to create them.
- **Create WBS:** Deliverable oriented hierarchy that breaks down the work to be done.
- **Validate Scope:** Validating and approving project deliverables against the baseline and gaining acceptance from the customer.
- **Control Scope:** Controlling changes related to scope. Approved scope must be exactly what is implemented, no more, no less.
- **Product scope** is requirements that relate to the production of a product; project scope is the work required to complete the project.
- **Scope baseline:** Project scope statement, WBS, WBS Dictionary.
- **WBS is** broken down from the top. The lowest level in the WBS is a work package, but even this is broken down further into schedule activities during activity definition. Work packages are charged to control accounts for cost management. The word task is not used in the PMI vocabulary; think "work package" and "schedule activity" instead.

- The WBS is just numbers and titles; the WBS dictionary provides the textual explanations required (statement of work, defined deliverables, responsible individuals, milestones, etc.)
- WBS is the most important element in project management planning. It should exist for every project.
- WBS identifies all work to be performed; if it's not in the WBS, it shouldn't be in the project. Beware of scope creep and gold plating!
- WBS is a tool to assist the project manager in decomposition.
- WBS does not show dependencies the way a network diagram does

KNOWLEDGE AREA – Project Schedule Management

- **Define Activities:** Breaking down the work packages in the WBS to activities that can be completed in two weeks or less.
- **Sequence Activities:** Creating a network diagram from activities, showing the dependencies. When durations are added (next step), the network diagram also shows the critical path.
- **Estimate Activity Durations:** Determine how long each activity will take.
- **Develop Schedule:** Analyzing activity sequences, durations and resource requirements to create the project schedule.
- **Control Schedule:** Managing changes to the schedule. Remember all changes must go through Integrated Change Control.
- **Precedence Diagramming Method** (PDM) or **Activity on Node** (AON) style network diagrams have nodes representing activities and arrows representing dependencies. Four dependencies can be shown: finish to start, start-to-start, finish-to-finish and start to finish.
- **Arrow Diagramming Method** (ADM) or **Activity on Arrow** (AOA) style network diagrams have arrows representing activities and nodes representing dependencies. This type of diagram can only show finish to start relationships.

- **Types of Dependencies:** Hard logic - mandatory dependency, or soft logic - discretionary dependency, external dependency.
- **Leads and Lags:** A lag is a delay in starting a successor. A lead is when the successor can be started before the current task is complete.
- **Estimating methods:** One time estimate, analogous estimate, parametric estimate, heuristics, and three-point estimate.
- **Reserve analysis** should be done for estimates (time and cost). Contingency reserve covers known unknowns; Management Reserve covers unknown unknowns.
- **PERT - Formulas are:**
  - Activity Length = (P+4M+O) / 6
  - Activity Std. Dev = (P-O) / 6
  - Activity Variance = ((P-O) / 6) 2
- Where P is the pessimistic estimate, O is the optimistic estimate and M is the most likely estimate. Remember that you cannot simply add standard deviations; you must calculate variances (the standard deviation squared), sum them and then take the square root.
- Critical path - Determine the longest duration path through a network; this will be the shortest time in which the project can be completed.
- **Activity duration** is EF - ES or LF – LS
- **Activity float** is LS - ES or LF - EF
- **Total Float:** amount of time an activity can be delayed without delaying the project.
- **Free Float:** amount of time an activity can be delayed without delaying its successor.
- **Project Float:** amount of time the project can be delayed without delaying the date requested by the customer or senior management.
- Activities with zero floats are on the critical path.

- **CPM** is deterministic, using specific durations; PERT is probabilistic, using statistical estimates of durations.
- **PERT** uses weighted averages; CPM just sums up activity durations.
- **Schedule compression** techniques include crashing (adding resources) and fast tracking (performing activities in parallel that would normally be done sequentially).
- What-if - Monte Carlo analysis performed by computer allows us to evaluate the likelihood of various outcomes.
- **Resource Leveling:** Allowing schedule and cost slip in order to deal with limited resources.
- **Critical Chain:** Adding duration buffers to various milestones to increase the probability of success.
- **Chart types**
  1. Milestone Charts - good for reporting to management, customer. Shows only major events.
  2. Bar Charts (or Gantt Charts) - Shows durations (but not dependencies). Good for progress reporting and discussions with the team.
  3. PERT charts - similar to AON, but generally done at a higher level. (Remember AON is done at the activity level, which is below the work package level.) Shows dependencies, unlike Gantt.
- Remember that a bar chart is not a WBS or a project management plan.
- Progress Reporting: How team members report percent complete.
- 50/50, 0/100, 0-50-100 are common ways.

KNOWLEDGE AREA – Project Cost Management
- Cost variances can be caused by many factors. Triple constraint provides a basis for cost management tradeoffs.
- Cost management plan: states how costs will be controlled, estimating units of measure, estimating precision, permissible variance thresholds, earned value rules and reporting formats.

- Learning curve theory: costs decline by a fixed percentage every time unit production doubles.
- Sum of year's digits depreciation: sum the total number of years of an asset's life (10 years: 1+2+3...+10=55). Then take the highest year's number and divide by the total - so in year 1, the depreciation would be 10/55, in year 2 it would be 9/55, etc.
- Double declining depreciation: Depreciate a fixed rate over the life of the asset, but only depreciate the depreciated value. If the rate is 50%, year 1 depreciate 50% of the cost, in year 2, depreciate 50% of 50% of the cost, and so forth down to 0.
- Overhead rate = (charge rate per hour - pay rate per hour) / pay rate per hour.
- Cost baseline is a time-phased budget that is used to control cost performance. S-curve shaped.
- **Cost account codes:** one level above the WBS work packages.
  Work package costs are rolled up to this level and compared with budget.
- **Estimating methods:** Rough order of magnitude, definitive (bottom up), parametric, analogous. As estimate accuracy increases, so does the cost of estimate preparation.
- ROM estimates are between -50% to +100% of actual, later estimates are between -10% and +15%. These are PMBOK definitions; other authorities use the following definitions: order of magnitude (-25% to +75%), preliminary estimate (-15% to +50%), budget estimate (-10% to +25%) and definitive estimate (-5% to +10%).
- Rolling wave planning can be used to estimate risky projects. Re-estimate as you move forward.
- **Life Cycle Costing:** consider the full product life, not just project life, when doing costing.

- **Cost aggregation:** roll up activity costs to work package, work package costs to control account, control account costs to project.
  Project plus contingency reserve = cost baseline, cost baseline plus management reserve = cost budget.
- Contingency reserve is included in cost baseline; management reserve is not.
- Budget must be checked against cash flow. This is also called funding limit reconciliation
- **Progress formulas:**
  o CV = EV - AC
  o SV = EV − PV
- **Efficiency indicators:**
  o CPI = EV/AC
  o SPI = EV/PV
- **Forecasting formulas**
  o EAC = BAC/CPI (typical or no variances)
  o EAC = AC + ETC (if ETC had to be re-estimated)
  o ETC = BAC − EV (current variances are not typical)
  o ETC = (BAC - EV) / CPI (current variances are typical)
- **Older acronyms:** BCWS (PV), BCWP (EV), ACWP (AC).
- **Value analysis:** Decreasing project cost while maintaining scope and performance.
- Earned value measurement can give you a true picture of project status.
- Reporting earned value percent complete: 50/50 method (report half when started, the rest when done), 0/50/100 method, 0/100 method, by milestones. Other methods are cost formula, equivalent units, level of effort.
- **Present value:** PV = FV/ $(1 + r)$ n, where r is the interest rate and n is the number of time periods. Don't worry about the formula, just remember

that the present value of money is greater than the future value of money, and this formula describes how much greater (the variables being the interest rate and the time involved).

- **Payback period:** The time it takes to recover the initial investment, computed by summing the investment's cash inflows. This is considered a very rough tool because it does not take into account the time value of money. Remember that a shorter payback period is preferred to a longer one.

- **Net Present Value:** The sum of all the present values for the required time periods.

- **NPV equation:** Just remember that a higher net present value is better than a lower one. NPV is a much more precise capital budgeting method than payback period.

- **Internal rate of return:** The interest rate at which the present value of the cash flows equals the initial investment. Just remember that a higher IRR is better than a lower one. IRR is a more precise (and more conservative) capital budgeting method than NPV.

- The four methods just discussed for capital budgeting (present value, payback period, NPV, IRR) are all used to in the project selection process. Risk is also a factor – near term cash flows are considered less risky than cash flows far in the future.

- **Formulas You Must Know**

Acronym's used in Formulas:

AC	Actual Cost of the Work Performed
BAC	Budget at Completion (Project budget)
CV	Cost Variance
CPI	Cost Performance Index
EAC	Estimate at Completion

ETC   Estimate to Complete

EV   Earned Value (Budgeted Cost of the Work Performed)

PV   Planned Value (Budgeted Cost of the Work Scheduled)

SV   Schedule Variance

SPI   Schedule Performance Index

VAC   Variance at Completion

Cost and Schedule Formulas

$CV = EV - AC$

$SV = EV - PV$

$CPI = EV / AC$

$SPI = EV / PV$

CV and SV are also known as progress formulas. CPI and SPI are also known as efficiency indicators.

CV (cost variance) measures money. SV (schedule variance) measures time.

To get from CV to CPI or SV to SPI, just change the minus sign to a division sign. CPI and SVI are efficiency indicators.

With CV and SV, positive values are good (under budget, ahead of schedule). Similarly, with CPI and SPI, values greater than 1 are good.

Remember that in the cost and schedule formulas, EV is always the first value.

- **Forecasting Formulas**

(Typical or no variances) $EAC = BAC / CPI$

(atypical variances) $EAC = AC + (BAC - EV)$

(typical variances) $EAC = AC + (BAC - EV) / CPI$

(atypical variances) $ETC = BAC - EV$

(typical variances) $ETC = (BAC - EV) / CPI$

Note that the second formulation for EAC could be restated as

EAC = AC + ETC

ETC (estimate to complete) measures work that is still outstanding.

EAC (estimate at completion) measures total work when the project is complete.

Both are calculated differently depending on whether the variances so far are typical or atypical.

- **PERT Formulas for Activity Duration Estimating**
  Activity Length = (P+4M+O) / 6

  Activity Std. Dev = (P-O) / 6

  Activity Variance = ((P-O) / 6) 2

  Where P is the pessimistic estimate, O is the optimistic estimate and M is the most likely estimate.

  The Activity Length formula is also known as the "three point estimate."

  Remember that you cannot simply add standard deviations; you must calculate variances (the standard deviation squared), sum them and then take the square root.

- **Critical Path Formulas for Activity Duration Estimating**
  Activity Duration = EF - ES or LF - LS

  Activity Float = LS - ES or LF - EF

  Remember CPM is deterministic, using specific durations; PERT is probabilistic, using statistical estimates of durations.

- **Quality Formulas (Normal Distribution)**
  1 sigma = 68.26%

  2 sigma = 95.46%

  3 sigma = 99.73%

  6 sigma = 99.99985%

- **Financial Formulas**

  These formulas are used in budgeting and project selection.

  Payback period: number of years until the sum of future cash flows equals the initial investment.

  PV equation

  NPV equation

  IRR equation

- **Examples of using the financial formulas**

  Payback Period: Obviously this is an extremely rough calculation, which does not take into account the time value of money. If the initial investment is $10,000, and the cash flows are:

  Year Amount (FV)

  1 $2000

  2 $2000

  3 $2000

  4 $2000

  5 $2000

  6 $2000

  7 $2000

  8 $2000

  then the payback period is 5 years.

- **PV:** The present value is the discounted value of a future cash flow.

  A "discount" is required because the present value of money is greater than the future value of money.

  It is expressed: $PV = FV/(1 + r)^n$, where r is the interest rate (or cost of capital) and n is the years.

  What is the present value of an investment that pays $10,000 five years from now with an interest rate of 10%?

  $10,000 / (1 + .1)^5 = $6209

- **NPV:** The net present value is the sum of all future discounted cash flows. Using the calculations from the payback period example, and assuming a 10% cost of capital

Year	Amount (FV)	PV
1	$2000	$1818
2	$2000	$1653
3	$2000	$1503
4	$2000	$1366
5	$2000	$1242
6	$2000	$1129
7	$2000	$1026
8	$2000	$933

so the present value of the next 8 years of cash flows is $10,670.

- Also remember NPV is *net*, so if there is an initial investment, it must be subtracted. In other words, if this investment cost $10,000, the NPV would be $670, not $10,670.

- **IRR:** the Internal Rate of Return is the discount rate when the present value of cash flows is the same as the initial investment. Higher IRRs are preferred to lower ones. IRR is determined by trial and error, computing NPV with various interest rates.

- **Other Formulas**

EV = (% complete) * BAC

VAC = BAC - EAC

Communication Channels = (N*(N-1))/2 [where N is no. of parties]

Overhead rate = (charge rate per hour - pay rate per hour)

Pay rate per hour

KNOWLEDGE AREA – Project Quality Management

- Quality is the degree to which a project meets its requirements.
- Quality should be planned in, not inspected in.

- **Quality Planning:** Determining a plan for quality. Identifying applicable standards, specifying how quality will be measured, creating quality management plan.
- **Quality Assurance:** Determining if the project is following organizational and project policies and procedures. Performing continuous improvement, quality audits, recommended changes and corrective actions.
- **Quality Control:** Measuring specific project results against standards. Testing, repairing defects, validating deliverables.
- Quality is not grade; grade is assigned to products with the same functional use but different technical characteristics.
- **Costs of conformance to quality:** training, studies, surveys, etc.
  Costs of non-conformance: rework, scrap, warranty costs, etc.
- **Sigma:** Another name for standard deviation; indicates how much of the curve is within control limits. 1 sigma = 68.26%, 2 sigma = 95.46%, 3 sigma = 99.73%, 6 sigma = 99.99985%.
- **Quality Baseline:** records quality objectives; basis for reporting quality performance as part of the performance measurement baseline
- **Tolerance:** result is acceptable if it falls within tolerance. Control limits: process is in control if results fall within control limits. Specification limits: customer's expectation of quality. Specification limits must be outside control limits or the performing organization will have trouble meeting the contract terms.
- **Cost of Quality:** The expense associated with the quality processes.
  Also called "cost of acceptance."
- **Variable inspection:** an actual measurement of a part. Attribute inspection: a yes or no determination of whether a part is good or bad.

- **Kaizen:** continuous improvement - small improvements in products or processes. The cumulative effect of these small changes over time can be quite large.
- **First Time Yield:** Is the probability that 1 unit can pass through the process without defects (the product of all probabilities).
- **Rolled Through Yield:** Is the ratio of good outputs to good inputs.

  For a multiphase process, it is the product of all these ratios.
- **Quality Control Tools:** Seven basic tools of Quality:

  1. Cause and effect diagram (fishbone, Ishikawa) - creative way to look at possible problem causes.

  2. Control charts - shows how a process behaves over time; plots results against control limits (usually +/- 3 sigma). Data within limits indicate the process is in control, but watch for rule of 7: 7 consecutive results on one side of the mean could indicate a problem. X bar is the average of a series of measurements; R is the difference between the highest and lowest values for a period, R bar is the average of all the R-values.

  3. Flowcharting - graphical representation of a process.

  4. Histogram - bar chart showing distribution of variables. Each column is an attribute of a problem; height of the column shows its frequency.

  5. Pareto chart: type of histogram ordered by frequency of occurrence. Problems are on the X-axis and frequency is on the Y-axis. Summarizes 80/20 analyses.

  6. Run Chart: Shows history and patterns of variation; used for trend analysis and predicting future outcomes based on historical results. Similar to a control chart but without the upper and lower limits.

  7. Scatter Diagram: Tracks two variables to see if they are related. If the points form a diagonal line, they are related.

- **Estimate Activity Resources:** After sequencing, resource needs must be determined. Resources may be people, equipment or materials.
- **Human Resource Planning:** Consider enterprise environmental factors, organizational process assets, project organizational charts & position descriptions, staffing management plan, resource histograms, and recognition and reward system.
- **Project organizational charts & position descriptions:**
- responsibility assignment matrix, organizational breakdown structure, resource breakdown structure, and position description.
- **Acquire Resources:** Acquiring Resources is the process of securing team members, equipment, materials or other resources required to deliver the project.
- **Develop Team:** training, team building, ground rules, collocation, giving out recognition and rewards.
- **Manage Team:** manage and measure performance.
- **Control Resources:** is the process of ensuring that the resources assigned and allocated to the project are available as planned and on right time and place

  An output of Develop Team process is the team performance assessment and same becomes input to Manage Team process.
- **Powers of the Project Manager:** Some of them are reward, penalty (coercive), expert, formal (legitimate) and referent
- **Leadership:** Consensus decision-making is not always best; in the early stages, the project manager has the most knowledge about the project and is best positioned to make decisions.
- Conflict is unavoidable because of limited resources. The top causes of conflict are not personality, but rather schedules, project priorities, resources and technical opinions.

- **Conflict resolution techniques:** confronting (problem-solving), compromising, withdrawing, smoothing, forcing.
- **Motivational theories:**
  - **McGregor's** theory of X and Y: theory X says people seek to avoid work; theory Y says they want to achieve.
  - **Maslow's** Hierarchy of Needs: Self-actualization, esteem, social, safety and physiological.
  - **Herzberg's** theory of Hygiene factors: poor factors destroy motivation, but improving good ones doesn't help; motivating agents are growth and recognition

KNOWLEDGE AREA – Project Communication Management

- **Methods:** formal written, formal verbal, informal written, informal verbal
- 90% of a project manager's time is spent in communication.
- Formula for Number of Communication Channels: N*(N-1)/2
- **Plan Communications Management:** what, why, whom, how, when.
- Information distribution: this is the implementation of the communications management plan.
- Creating lessons learned is part of communication. Capture what was done right, wrong, and what would be done differently if it were done again. Lessons learned documents become part of the organizational process assets.
- **Performance Reporting:** Updating stakeholders with various types of performance data (status, earned value, variance, trends, progress, etc.)
- Performance is always reported against the baseline established in the project management plan.
- **Manage Stakeholders:** Make stakeholders feel their needs and concerns are being considered, even if not agreed to.
- **Things that impede communication:** noise, distance, language, culture, etc.

- Approved change requests is output of Perform Integrated Change Control process and of Manage Stakeholders Engagement process

KNOWLEDGE AREA – Project Risk Management

- The purpose of risk management is to increase the probability and impact of positive risks (opportunities), while decreasing the probability and impact of negative risks (threats).
- Risk can be seen as a function of likelihood and impact, or a function of hazard and safeguard. You must also consider the timing of the risk event, and the frequency.
- **Risk Tolerance:** stakeholders may be risk averse, risk neutral, or risk seeking.
- Risk Management starts with Plan Risk Management and the creation of the Risk Management Plan. This plan identifies the risk management methodology, roles and responsibilities, reporting format, and definitions of probability and impact.
- **Techniques for Risk Identification:** nominal group technique, Delphi technique, brainstorming, and root cause analysis.
- Qualitative risk analysis focuses on probability time impact. This leads to risk prioritization.
- Quantitative risk analysis uses mathematical models to further refine risk prioritization.
- Risk Response planning for threats:
    - Avoid
    - Transfer (Deflect, Allocate)
    - Mitigate
    - Accept (passively or actively)

- Risk Response planning for opportunities:
  - Exploit
  - Enhance
  - Share
  - Accept (passively or actively)
- **Risk categories:** external - unpredictable, external - predictable, internal nontechnical, internal - technical, legal.
- Another broad categorization: insurable risk and business risk
- Risk identification (or risk assessment) begins as early as the charter but is not complete until the end of planning. Even then we must continually monitor for new risks as things change, so risk identification will be done in the monitoring and controlling process group.
- Risk Register is the chief output of Identify Risk process. After Risk Identification, it would contain a list of risks, potential responses, root causes and categories.
- Risk Register is also updated and refined by other risk processes.
- After Qualitative Analysis, the risks have priorities, and probability and impact ratings.
- After quantitative analysis, risks have contingency time and cost reserves.
- After Risk Response Planning, risks have specific named owners. Contingency and fallback plans are also created at this point.
- Perform Qualitative Analysis is a subjective analysis of project risks:
  - Probability and impact ratings
  - Assessment of the quality and reliability of risk data
  - Updating the risk categories - if you slice and dice the risks differently, do you get different answers?
  - Risk urgency evaluation.
  - Overall project risk ranking.

- Perform Quantitative Analysis is a numerical analysis of project risks:
    - Quantifies probability and impact ratings.
    - Quantifies cost and schedule reserves.
    - Techniques include expert judgment, data gathering, interpersonal and team skills, representations of uncertainty and data analysis.
- Implement Risk Responses is the process of implementing agree-upon risk response plans
- Eliminating risks
- Decreasing probability/impact of risk
- Make a contingency plan if the risk occurs
- Make a fallback plan if the contingency plan fails
- Risk triggers indicate that a risk is about to occur or has occurred. These can also be tracked in the Risk Register.
- Expected monetary value and decision tree scenarios are important - you should know how to solve them.

KNOWLEDGE AREA – Project Procurement Management

- All requirements must be stated in the contract. Contracts are formal documents that are legally binding.
- If it's in the contract, it must be done. If it's not in the contract, it can only be done if both parties sign a change order.
- Most organizations have contract managers who are primarily responsible for contracts. They may also be called procurement officers or contract officers.
- Project managers must help contract managers by ensuring that the contract contains all product requirements and all project management requirements (status reports, meeting attendance, etc.).

- In some companies, contract management staffs are centralized; in others, they are distributed. The advantages and disadvantages of these approaches are analogous to Functional vs. Projectized organizations.
- Inputs to procurement management include enterprise environmental factors, organizational process assets, baselines for project scope, schedule and cost, and risk register.
- **Make or buy analysis:** buying may reduce triple constraint risk, but consider whole costs of buying, including costs of managing procurement. Building may be appropriate if you have extra capacity or want to maintain control.
- A "buy or lease" problem is similar to a "make or buy" problem - consider all costs and see where it becomes more expensive to lease.
- **Contract types:** Fixed price, time and materials, cost reimbursable.
- **Fixed price:** the cost of the contract is set when the contract is signed; the risk of higher costs is borne by the seller. A purchase order is an example of a fixed price contract. Sometimes fixed price contracts include incentive fees for early completion or price adjustments over time.
- **Time and materials:** Have elements of fixed price (fixed hourly rate) and cost reimbursable (total costs are unknown).
- **Cost reimbursable:** seller's costs are reimbursed plus an additional amount, usually a percentage of cost. Research projects where there are many unknowns are well suited to cost reimbursable contracts.
- Other examples of cost reimbursable contracts:
    - Cost plus fixed fee (fee fixed so seller not rewarded for cost overrun; fee only changes with approved change order)
    - Cost plus percentage of costs/cost plus fee - buyer pays all costs plus a percentage of costs or a fee
    - Cost plus incentive fee (bonus for beating performance objectives)

- o Cost plus award fee (bonus determined in advance and disbursed over time)
- Contract type selection determines how the risk will be distributed between the buyer and the seller. Fixed price is most risky to the seller; cost reimbursable is most risky to the buyer.
- Contract Statement of Work is critical. Having a complete statement of work prevents problems down the road.
- Contract SOW goes with contract type; SOW for FP will be very complete and focus on design of solution; SOW for CR will leave room for interpretation and will focus on the functional and performance attributes of the desired product - the design will be left up to the seller.
- Procurement Management Plan describes how procurement will be planned, managed and executed.
- Plan Contracting: Creating procurement documents (RFP, RFQ, IFB, etc.)
- Procurement documents and contract types (generally) go together:
RFPs are well suited for CR contracts; RFQs are well suited for FP contracts.
- IFBs are generally used in government contracts.
- **Request Seller Responses:** Get the procurement documents to the sellers, let them respond. Note that sometimes the sellers are prequalified in this process.
- **Select Sellers:** try to make evaluation criteria measurable to minimize halo effect, personal bias, etc.
- Contract SOW is the main part of the contract, but not the only part.
All important terms and conditions must be specified in the contract.
- Legal contract = offer, acceptance, consideration, legal capacity, legal purpose.

- **Contract Management Plan:** specific to one contract, talks about contract administration, contains a list of major to-do items. This is an output of Select Sellers for significant purchases or acquisitions.
- **Contract Administration:** Making sure both parties adhere to the contract. Extra work is required in T & M and CR contracts to be sure invoices are reasonable.
- The number of people who may speak to the seller may be limited.
  The number of people who can change the contract is almost certainly limited to the contract administrator; the project manager probably doesn't have the authority.
- **Contract Change Control System** is the process for modifying the contract. If there are too many changes, it may be wise to cancel the original contract and make a new one (both parties must agree).
- **Claims:** a claim in a seller's change request - the seller says the buyer did something that was harmful and requesting compensation.
- Records management is important in contract administration - correspondence and logs must be kept in a way that makes them accessible if they are need in the future.
- **Contract Closure:** may be when the contract ends or it may be when the contract is terminated prior to the completion of work.
- Contract closure is considered as part of the Project Integration Management Knowledge Area in PMBOK 6th edition instead of Project Procurement Management Knowledge Area

KNOWLEDGE AREA – Project Stakeholder Management

- Who are they, what are they, and why you should care?
- A stakeholder is someone who is or can be affected by your business. It can be a person, a group or another organization and they can either affect you positively or negatively.

- Some of the examples are clients, employees, shareholders, contractors, suppliers, unions, media, etc. Think about whom you deal every day, they all are your stakeholders.
- Prioritize your stakeholders by analyzing their influence and interests
- **Project Managers role:**
  - Identify stakeholders and also distinguish those who:
    - Has ability to impact your project
    - Has ability to remove the impediments
    - Can enhance your project
    - Can slow down your project
    - Can lead the opinions and
    - Can facilitate the change.
  - Develop relationships and trust among stakeholders and individuals
  - Manage relationships among your stakeholders
  - Benefit from powerful stakeholders
- **Challenges with Stakeholders:**
  - Unidentified stakeholders – those who were not identified early in the project
  - Unreasonable stakeholders – those who do not embrace the feature as required
  - Unclear stakeholders – those who do not clearly articulate – those who are not open and honest about their interests and expectations

AGILE IN A NUTSHELL

- It is a known fact that fewer than a third of all traditional projects are successfully completed on time and on budget

- Traditional Project Management, also called Waterfall Project Management Methodology, assumes that once documented, the requirements will not change - at least not without potential project delays or budget overruns.

- Currently, according to Price Waterhouse Coopers (PwC), Agile projects are more 28% successful that traditional projects.

- Agile is actually a mindset defined by values, guided by principles and manifested through many different practices. Agile practitioners select practices based on their need. There are 4 values, 12 principles and several practices.

- Agile is a software development philosophy that emphasizes on (4 values):
    - Individuals and Interactions over processes and tools
    - Working Software over Comprehensive documentation
    - Customer collaboration over contract negotiation
    - Responding to change over following a plan

- Below are the 12 Guided Principles Practice Guide for 12 guided principles:

  1. Customer satisfaction through continuous delivery

  2. Accept changing requirements

  3. Release Frequently

  4. Collaboration between business people and developers

  5. Motivate and Support Individuals throughout the project

  6. Making face-to-face conversation a norm

  7. Progress is continuously measured

8. Sponsors, developers and users should be able to maintain a sustainable pace for unlimited

9. Technical Excellence and good design enhances agility

10. Keeping things as simple as possible is a great ethic to streamline your process

11. Build a best team so they are independent and quick in their decision and so are in quick to adopt

12. Stop, reflect and tweak the way you do things throughout the course of the project

- This philosophy has its own subset of project management methodologies and some the famous methodologies in use are Adaptive Software Development (ASD), Crystal Dynamic Systems Development Method (DSDM) Extreme Programming (XP), Feature Driven Development (FDD), Kanban, Lean, Scrum and more.

- Although Agile is mostly used in software development projects, still around quarter of the manufacturing organizations rely solely on Agile

- PMI considers Agile as ever increasing Project Management Technique.

- The Agile concept is incorporated in all 10 knowledge areas. Each knowledge area contains a section entitled Approaches for Agile, Iterative and Adaptive Environments, describing how these practices integrate in project settings.

- Agile methodologies such as eXtreme Programming (XP), SCRUM and Feature-Driven Development (FDD) strive to reduce the cost of change throughout the software development process. For example, uses rapid iterative planning and development cycles in order to force trade-offs and deliver the highest value features as early as possible. In addition, the constant, systemic testing that is part of XP ensures high quality via early defect detection and resolution

- Agile is basically to measure and consider the unknown before it is too late
- Agile Practice Guide, which was published by PMI along with the PMBOK Sixth Edition, consists off:
    - Introduction to Agile and why it is more adaptive than
    - Traditional Project Management
    - The Agile Manifesto mindset, values, and principles
    - Definable and high-uncertainty work
    - The correlation between Lean, the Kanban Method and Agile approaches
    - Characteristics of project life cycles and selections
    - Suitability filters
    - Tailoring guidelines
    - Common combinations of approaches
    - Implementing Agile: Creating and Delivering in an Agile Environment
    - Organizational Considerations for Project Agility
    - And A Call to Action
- Top seven benefits of Agile are:
    - Release to market in the quickest time possible
    - Minimize risk of failing to release on budget
    - Stable platform through automated testing
    - Rapid, iterative releases to improve the product
    - Ability to change requirements based on user feedback
    - Highly transparent process
    - One high motivated team is formed from agency and client

VERY IMPORTANT POINTS TO REMEMBER ABOUT PROFESSIONAL RESPONSIBILITY

- This process group is merged with other 5 process groups for the exam questions. Questions won't be asked as separate process group.
- Conduct yourself professionally in your work with clients. This includes the following:
  - Doing the "right" thing
  - Being respectful and cooperative and treating everyone fairly
  - Following the correct procedures
  - Being assertive and taking responsibility of any issue or problem
  - Being cognizant and avoiding any conflict-of interest issues
- Ways to increase the professionalism of project management include the following:
  - Maintaining high standards of personal integrity
  - Continually striving to improve and become more
  - knowledgeable
  - Continually looking for ways to improve the project
  - management practice and the project management knowledge base.

this every night during the preparation of the PMP Exam and lastly 2

hours before the exam.