

# PROJECT RISK MANAGEMENT

## STUDY NOTES

**PMBOK 2000 based, Version 6**

In Preparation For  
PMP® Certification Exam



IBM Education and Training  
Worldwide Certified Material

## **Publishing Information**

This publication has been produced using Lotus Word Pro 96.

## **Trademarks**

The following are trademarks of International Business Machines Corporation in the United States, or other countries, or both: IBM

Lotus, Lotus Notes, Lotus Word Pro, and Notes are trademarks of Lotus Development Corporation in the United States, or other countries, or both.

Microsoft, Windows, Windows NT, and the Windows logo are trademarks of Microsoft Corporation of the United States, or other countries, or both.

The following are certification, service, and/or trademarks of the Project Management Institute, Inc. which is registered in the United States and other nations: "PMI" is a service and trademark, PMI® Logo and "PMBOK", are trademarks, "PMP" and the PMP® logo are certification marks.

Other company, product, and service names may be trademarks or service marks of others.

## **Disclaimer**

PMI makes no warranty, guarantee, or representation, express or implied, that the successful completion of any activity or program, or the use of any product or publication, designed to prepare candidates for the PMP® Certification Examination, will result in the completion or satisfaction of any PMP® Certification eligibility requirement or standard., service, activity, and has not contributed any financial resources.

**Initially Prepared By:** Kim Ulmer

**Edited By:** Peter Dapremont

## **July 2002 Edition**

The information contained in this document has not been submitted to any formal IBM test and is distributed on an "as is" basis without any warranty either express or implied. The use of this information or the implementation of any of these techniques is a customer responsibility and depends on the customer's ability to evaluate and integrate them into the customer's operational environment. While each item may have been reviewed by IBM for accuracy in a specific situation, there is no guarantee that the same or similar results will result elsewhere. Customers attempting to adapt these techniques to their own environments do so at their own risk.

**© Copyright International Business Machines Corporation 2002. All rights reserved. IBM and its logo are trademarks of IBM Corporation. This document may not be reproduced in whole or in part without the prior written permission of IBM.**

Note to U.S. Government Users--Documentation related to restricted rights--Use, duplication or disclosure is subject to restrictions set forth in GSA ADP Schedule Contract with IBM Corp.

## Project Risk Management Study Notes

### Reference Material to study:

- ✓ *A Guide to the Project Management Body of Knowledge (PMBOK® Guide)*, Chapter 11 (2000 edition)
- ✓ *Project and Program Risk Management, A Guide to Managing Project Risks and Opportunities*, PMI®, Edited by R. Max Wideman, 1992
- ✓ *Project Management, A Managerial Approach, Meridith*, Jack R. 1995, Chapter 2, 2.4
- ✓ *PMP® Exam Practice Test and Study Guide*, 4th Edition, by Ward, J. LeRoy, PMP®, 2001
- ✓ *PMP® Exam Prep, 3rd Edition*, by Mulcahy, Rita, PMP®, 2001
- ✓ *ESI PMP® Challenge!*, 3rd Edition, Risk Section, Ward, J. LeRoy, 2001

### What to Study?

- ✓ The PMBOK® phases of Project Risk Management: Risk Management Planning, Risk Identification, Qualitative Risk Analysis, Quantitative Risk Analysis, Risk Response Planning, and Risk Monitoring and Control (Be familiar with Inputs, Tools and Techniques, and Outputs for each phase)
- ✓ The means for determining the value of a risk event:  $R=P*I$  where "R" is the calculated value of the risk event, "P" is the probability of the occurrence of the risk event, and "I" is the impact of the risk event should it occur. (A risk event is a discrete occurrence that could affect the project for better or worse.)
- ✓ The relationship of risk and the project life cycle: the amount of uncertainty and risk is highest at the start of the project and lowest at the end of the project
- ✓ Positive risk as defined by opportunities and negative risk as defined by threats
- ✓ The various means of classifying risk: business, pure (insurable), known, unknown
- ✓ Risk assessment using Decision Trees and Expected Monetary Value
- ✓ Monte Carlo Analysis, Delphi Technique, Cause-and-effect (also called *Ishikawa* or fishbone) diagrams
- ✓ The different types of scales used in risk analysis: ordinal and cardinal

"PMBOK" is a trademark of the Project Management Institute, Inc. which is registered in the United States and other nations.

"PMI" is a service and trademark of the Project Management Institute, Inc. which is registered in the United States and other nations.

"PMP" and the PMP logo are certification marks of the Project Management Institute which are registered in the United States and other nations.

## Key Definitions

<b>Amount at Stake</b>	The extent of adverse consequences which could occur to the project. (Also referred to as risk impact).
<b>Assumptions</b>	Factors that for planning purposes are considered to be true, real, or certain. Assumptions affect all aspects of project planning and are part of the progressive elaboration of the project. Project teams frequently identify, document, and validate assumptions as part of their planning process. Assumptions generally involve a degree of risk.
<b>Assumptions analysis</b>	A technique that explores the accuracy of the assumptions and identifies risks to the project from inaccuracy, inconsistency, or incompleteness of assumptions.
<b>Brainstorming</b>	A general creativity technique that can be used to identify risks using a group of team members or subject-matter experts. Typically, a brainstorming session is structured so that each participant's ideas are recorded for later analysis.
<b>Business Risk</b>	The inherent chances for both profit or loss associated with a particular endeavor or line of business.
<b>Checklist</b>	A comprehensive listing of many possible risks that might occur on a project. Several types of risk that have been encountered on previous projects are included.
<b>Contingency Planning</b>	The development of a management plan that identifies alternative strategies to be used to ensure project success if specified risk events occur.
<b>Contingency Reserve</b>	The amount of money or time needed above the estimate to reduce the risk of overruns of project objectives to a level acceptable to the organization.
<b>Decision Tree Analysis</b>	A diagram that describes a decision under consideration and the implications of choosing one or another of the available alternatives. It incorporates probabilities or risks and the costs or rewards of each logical path of events and future decisions.
<b>Deflection</b>	The act of transferring all or part of a risk to another party, usually by some form contract provision, insurance policy, or warranty. Also called <b>risk transference</b> .
<b>Expected Monetary Value</b>	The product of an event's probability of occurrence and the gain or loss that will result. <b>Expected Monetary Value = Money at Risk x probability</b> . For example, if there is a 50% probability it will rain, and rain will result in a \$100 loss, the expected monetary value of the rain event is \$50 (.5 * \$100).

## Key Definitions, cont.

<b>Impact Analysis</b>	The mathematical examination of the nature of individual risks on the project, as well as potential arrangements of interdependent risks. It includes the quantification of their respective impact severity, probability, and sensitivity to changes in related project variables, including the project life cycle. To be complete, the analysis should also include an examination of the external <i>status quo</i> prior to project implementation as well as the project's internal intrinsic worth as a reference baseline. A determination should also be made as to whether all risks identified are within the scope of the project's response planning process.
<b>Insurable Risk</b>	A particular type of risk which can be covered by an insurance policy. (i.e., floods, fire, etc.) Also called a <b>pure risk</b> .
<b>Management Reserve</b>	A separately planned quantity used to allow for future situations which are impossible to predict. Management reserves are intended to reduce the risk of missing cost or schedule objectives. Use of management reserves requires a change to the project's cost baseline. Management reserves are not included in the project's cost and schedule baseline. Also used to manage " <b>unknown unknowns</b> " types of risk.
<b>Mitigation</b>	Taking steps to lessen risk by lowering the probability of a risk event's occurrence or reducing its effect should it occur.
<b>Monte Carlo Analysis</b>	A technique that performs a project simulation many times in order to calculate a distribution of likely results.
<b>Opportunities</b>	Future events or series of events that if they occur will have a positive impact on the project. Benefits which can be realized from undertaking a project. As related to risk, positive outcomes of risk events.
<b>Probability</b>	The likelihood of occurrence. The ratio of the number of chances by which an event may happen (or not happen) to the sum of the chances of both happening and not happening.
<b>Probability and Impact Matrix</b>	A common way to determine whether a risk is considered low, moderate, or high by combining the two dimensions of a risk: its probability of occurrence and its impact on objectives if it occurs.
<b>Project Risk Management</b>	Includes the processes concerned with identifying, analyzing, and responding to project risk.
<b>Reserve</b>	A provision in the project plan to mitigate cost and/or schedule risk. Often used with a modifier (e.g., management reserve, contingency reserve) to provide further detail on what types of risk are meant to be mitigated. The specific meaning of the modified term varies by application area.
<b>Residual Risk</b>	A risk that remains after risk responses have been implemented.
<b>Risk</b>	An uncertain event or condition that, if occurs, has a positive or negative effect on a project objective.
<b>Risk Event</b>	A discrete occurrence that may affect the project for better or worse.

## Key Definitions, cont.

<b>Risk Management Plan</b>	A subsidiary element of the overall project plan which documents the procedures that will be used to manage risk throughout the project. Also covers who is responsible for managing various risk areas; how contingency plans will be implemented, and how reserves will be allocated.
<b>Risk Response Plan</b>	A document detailing all identified risks, including description, cause, probability of occurrence, impacts on objectives, proposed responses, owners, and current status. Also known as the <b>risk register</b> .
<b>Threats</b>	As related to risk, negative outcomes of risk.
<b>Total Certainty</b>	All information is known.
<b>Total Uncertainty</b>	No information is available and nothing is known. By definition, total uncertainty cannot be envisaged.
<b>Triggers</b>	Indications that a risk has either occurred or is about to occur. (Also referred to as risk symptoms or warning signs)
<b>Uncertainty</b>	The possibility that events may occur which will impact the project either favorably or unfavorably. Uncertainty gives rise to both opportunity and risk.
<b>Workaround</b>	A response to a negative risk event. Distinguished from contingency plan in that a workaround is not planned in advance of the occurrence of the risk event.

## Project Risk Management Concepts

### Project Risk Management:

- Is the systematic process of identifying, analyzing, and responding to project risk.
- Includes maximizing the probability and consequences of positive events and minimizing the probability and consequences of adverse events to project objectives.

### Project Risk:

- Is an uncertain event or condition that, if occurs, has a positive or negative effect on a project objective.
- Has its origins in the uncertainty that is present in all projects.
- Includes both threats (negative effects) to the project's objectives and opportunities (positive effects) to improve on those objectives.
- A risk has a cause and, if it occurs, a consequence.
- **Known risks** are those that have been identified and analyzed and may be possible to plan for their occurrence and mitigation.
- **Unknown risks** cannot be managed, although project managers may address by applying a general contingency based on past experience with similar projects.
- Risks that are threats to the project may be accepted if they are in balance with the reward that may be gained by taking the risk. Likewise, risks that are opportunities may be pursued to benefit the project's objectives.
- Organizations must be committed to addressing risk management throughout the project. One measure of an organization's commitment is its dedication to gathering high-quality data on project risks and the characteristics of the risks.

## Project Risk Management Processes

### Risk Management Planning (11.1): (Process Group: Planning)

- Is the process of deciding how to approach and plan the risk management activities for a project.
- Planning for subsequent risk management processes helps ensure that the level, type, and visibility of risk management are commensurate with both the risk and importance of the project to the organization.
- Inputs include:
  - **Project charter**
  - **Organization's risk management policies** (predefined approaches to risk analysis and response)
  - **Defined roles and responsibilities** (predefined roles, responsibilities, and authority levels for decision-making will influence planning)
  - **Stakeholder risk tolerances:**
    - Different organizations and different individuals have different tolerances for risk.
    - These may be expressed in policy statements or revealed in actions.
  - **Template for the organization's risk management plan**
  - **WBS.**
- Methods used during risk management planning include: planning meetings
- Outputs include: *Risk Management Plan*.
  - Describes how risk identification, qualitative and quantitative analysis, response planning, monitoring, and control will be structured and performed during the project life cycle.
  - Does not address responses to individual risks -- this is accomplished in the risk response plan.
  - May include:
    - **Methodology:** Defines the approaches, tools, and data sources that may be used to perform risk management on the project. Different types of assessments may be appropriate, depending upon the project stage, amount of information available, and flexibility remaining in risk management.
    - **Roles and responsibilities:** Defines the lead, support, and risk management team membership for each type of action in the risk management plan. Risk management teams organized outside of the project office may be able to perform more independent, unbiased risk analyses of project than those from the sponsoring project team.
    - **Budgeting:** Establishes a budget for risk management for the project.
    - **Timing:** Defines how often the risk management process will be performed throughout the project life cycle. Results should be developed early enough to affect decisions. The decisions should be revisited periodically during a project execution.
    - **Scoring and interpretation:** The scoring and interpretation methods appropriate for the type and timing of the qualitative and quantitative risk analysis being performed. Methods and scoring must be determined in advance to ensure consistency.

## Project Risk Management Processes, cont.

- **Thresholds:** The “boundaries” that identify which risks will be acted upon, by whom, and in what manner. The project owner, customer, or sponsor may have a different risk threshold. The acceptable threshold forms the target against which the project team will measure the effectiveness of the risk response plan execution.
- **Reporting formats:** Describes the content and format of the risk response plan. Defines how the results of the risk management processes will be documented, analyzed, and communicated to the project team, internal and external stakeholders, sponsors, and others.
- **Tracking:** Documents how all facets of risk activities will be recorded for the benefit of the current project, future needs, and lessons learned. Documents if and how risk processes will be audited.

### Risk Identification (11.2): (Process Group: Planning)

- The process of determining which risks are likely to affect the project and documenting the characteristics of each.
- Where feasible, participants in the risk identification process generally include: the project team, the risk management team, subject matter experts from other parts of the company, customers, end users, other project managers, stakeholders, and outside experts.
- Risk identification is an iterative process.
- Inputs include:
  - **Risk Management Plan**
  - **Project planning outputs:**
    - Risk identification requires an understanding of the project’s mission, scope, and objectives of the owner, sponsor, or stakeholders.
    - Outputs of other processes should be reviewed to identify possible risks across the entire project. These may include, but are not limited to: the project charter, WBS, product description, schedule and cost estimates, resource plan, procurement plan, and assumption and constraint lists.
  - **Risk categories.** These categories should be well defined and should reflect common sources of risk for the industry or application area. These categories include the following:
    - **Technical, quality or performance risks** - such as reliance on unproven or complex technology, unrealistic performance goals, changes to the technology used or to industry standards during the project.
    - **Project-management risks** - such as poor allocation of time and resources, inadequate quality of the project plan, poor use of project management disciplines.
    - **Organizational risks** - such as cost, time, and scope objectives that are internally inconsistent, lack of prioritization of projects, inadequacy or interruption of funding, and resource conflicts with other projects in the organization.

## Project Risk Management Processes, cont.

- **External risks** - such as shifting legal or regulatory environment, labor issues, changing owner priorities, country risk, and weather. *Force majeure* risks such as earthquakes, floods, and civil unrest generally require disaster recovery actions rather than risk management.
- **Historical information** - information on prior projects may be available from project files or published information through commercial or academic sources.
- Methods used during risk identification:
  - **Documentation reviews** - includes a structured review of the project plans and assumptions, both at the total project and detailed scope levels as well as reviews of prior project files and other informational sources.
  - **Information-gathering techniques:**
    - **Brainstorming:** Probably the most frequently used risk identification technique. Generally performed by the project team although a multidisciplinary set of experts can also perform this technique. The goal is to obtain a comprehensive list of risks that can be addressed later in the qualitative and quantitative risk analysis processes. Under the leadership of a facilitator, the team generates ideas about project risk. Sources of risk are identified in broad scope, posted, categorized by type of risk, and then the definitions sharpened.
    - **Delphi technique:** A means for achieving a consensus of experts on a subject such as project risk. Project risk experts are identified but participate anonymously. A facilitator uses a questionnaire to solicit ideas about the important project risks. The responses are submitted and then circulated to the experts for further comment. Consensus may be reached in a few rounds of this process. This technique helps reduce bias in the data and keeps any person from having undue influence on the outcome.
    - **Interviewing:** Risks are identified by interviewing experienced project managers or subject-matter experts. The person in charge of risk identification identifies the appropriate individuals, briefs them on the project, and provides information such as the WBS and the list of assumptions. The interviewees then identify risks.
    - **Strengths, weaknesses, opportunities, and threats (SWOT) analysis:** Ensures examination of the project from each of the SWOT perspectives to increase the breadth of the risks considered.
  - **Checklists:**
    - Lists based on historical information and knowledge that has been accumulated from previous similar projects and other sources of information.
    - An advantage of using a checklist is that the risk identification is quick and simple.
    - The disadvantage of using a checklist is that building a checklist with every possible risk is impossible, and the user may be limited to the categories that appear on the list.

- Care should be taken to explore relevant items that do not appear on a standard checklist.
- The checklist should itemize all types of possible risks to the project.
- The checklist should be formally reviewed at every project-closing to improve the list of potential risks and to improve the description of risks.
  
- **Assumptions analysis:**
  - Every project is conceived and developed based on a set of hypotheses, scenarios, or assumptions. Assumptions analysis is a technique that explores whether or not the assumptions are valid.
  - Identifies project risks from inaccuracy, inconsistency, or incompleteness of assumptions.
- **Diagramming techniques:**
  - Cause-and-effect diagrams (also known as *Ishikawa* or fishbone diagrams)
  - System or process flow charts
  - Influence diagrams - a graphical representation of a problem showing causal influences, time ordering of events, and other relationships among variables and outcomes.
- Outputs include:
  - **Risks:** Uncertain events or conditions that, if occur, have a positive or negative effect on project objectives.
  - **Triggers:** Indications that a risk has occurred or is about to occur. Also called risk symptoms or warning signs. For example, failure to meet intermediate milestones may be an early warning of an impending schedule delay.
  - **Inputs to other processes:** Risk identification may identify a need for further action in another area. For example, the WBS may not have sufficient detail to allow adequate identification of risks, or the schedule may not be complete or entirely logical.

### Qualitative Risk Analysis (11.3): (Process Group: Planning)

- The process of assessing the impact and likelihood of identified risks.
- Prioritizes risks according to their potential effect on project objectives.
- A means for determining the importance of addressing specific risks and guiding risk responses.
- Requires that the probability and consequences of the risks be evaluated using established qualitative-analysis methods and tools.
- The importance of a risk may be magnified due to time-criticality of risk-related actions.
  
- Trends in the results when qualitative analysis is repeated can indicate the need for more or less risk-management action.
- Use of these tools helps correct biases that are often present in a project plan.
- Should be revisited during the project's life cycle to stay current with changes in the project plan.

## Project Risk Management Processes, cont.

- Inputs include:
  - **Risk Management Plan**
  - **Identified risks** from the risk identification process.
  - **Project status:** The uncertainty of a risk often depends on the project's progress through its life cycle. For instance, in the early stages of the project, the design may be immature and changes are likely to occur, making it likely that more risks will be discovered.
  - **Project type:** More common or recurrent type projects tend to have better understood probability of occurrence of risk events and their consequences versus state-of-the-art or leading-edge technology projects.
  - **Data Precision:** Describes the extent to which a risk is known and understood by measuring the extent of data available as well as the reliability of the data. The source of the data that was used to identify the risk must be evaluated.
  - **Scales of probability and impact:**
    - **Probability scale:** Scale runs from 0.0 (no probability) to 1.0 (certainty). Assessing risk may be difficult because historical data is not often available. An *ordinal* scale representing relative probability values from very unlikely to almost certain, or, a general scale with specific probabilities such as 0.1, 0.3, 0.5, 0.7, etc., could be used.
    - **Impact scale:** Scale reflects the severity of its effect on the project objective. Impact can be *ordinal* or *cardinal*, depending on the culture of the organization performing the analysis. *Ordinal scales* are ranked-order values such as very low, low, moderate, high, and very high. *Cardinal scales* assign values, either linear or nonlinear, to these impacts. Example of linear values: 0.1, 0.3, 0.5, 0.7, 0.9. Example of nonlinear values: 0.05, 0.1, 0.2, 0.4, 0.8. Nonlinear values may be used when an organization desires very much to avoid high-impact risks.
  - **Assumptions** identified during the risk identification process are evaluated as potential risks.
- Methods used during qualitative risk analysis include:
  - **Risk probability and impact:**
    - Risk probability is the likelihood that a risk will occur. Risk impact (or consequences) is the effect on project objectives if the risk event occurs.
    - These two dimensions of risk are applied to specific risk events, not to the overall project.
    - This technique helps identify those risks that should be managed aggressively.

## Project Risk Management Processes, cont.

- **Probability-impact risk rating matrix:**
  - A matrix that assigns risk ratings (very low, low, moderate, high, and very high) to risks or conditions based on combining probability and impact scales.
  - The risk rating is determined using a matrix and risk scales for each risk.
  - The organization must determine which combinations of probability and impact result in a risk's being classified as a high risk (red condition), moderate risk (yellow condition), and low risk (green condition) for either a cardinal or ordinal approach.
  - The risk score helps put the risk into a category that will guide risk response actions.
- **Project assumptions testing:** Identified assumptions must be tested against two criteria: assumption stability and the consequences on the project if the assumption is false.
- **Data precision ranking:** A technique used to evaluate the degree to which the data about risks is useful for risk management. It involves examining:
  - Extent of understanding of the risk.
  - Data available about the risk.
  - Quality of the data.
  - Reliability and integrity of the data.
- Outputs include:
  - **Overall risk ranking for the project:**
    - Indicates the overall risk position of a project relative to other projects by comparing the risk scores.
    - Can be used to assign personnel or other resources to projects with different risk rankings, to make a benefit-cost analysis decision about a project, or to support a recommendation for project initiation, continuation, or cancellation.
  - **List of prioritized risks:** Risks and conditions can be prioritized or grouped by a number of criteria including:
    - Risk rank or WBS level
    - Urgency (risks requiring an immediate response versus those which can be handled later)
    - Risk impact type (cost, schedule, functionality, quality, etc.)
  - **List of risks for additional analysis and management:** Risks classified as high or moderate would be prime candidates for more analysis, including quantitative risk analysis, and for risk management action.
  - **Trends in qualitative risk analysis results:** As the analysis is repeated, a trend of results may become apparent, and can make risk response or further analysis more or less urgent and important.

## Project Risk Management Processes, cont.

### Quantitative Risk Analysis (11.4): (Process Group: Planning)

- The process of measuring the probability and consequences of risks and estimating their implications for project objectives.
- Aims to analyze numerically the probability of each risk and its consequence on project objectives, as well as the extent of overall project risk.
- Uses techniques such as Monte Carlo simulation and decision analysis to:
  - Determine the probability of achieving a specific project objective.
  - Quantify the risk exposure for the project and determine the size of cost and schedule contingency reserves that may be needed.
  - Identify risks requiring the most attention by quantifying their relative contribution to project risk.
  - Identify realistic and achievable cost, schedule, or scope targets.
- The quantitative and qualitative risk analysis processes can be used separately or together.
- Trends in the results when quantitative analysis is repeated can indicate the need for more or less risk management action.
- Inputs include:
  - **Risk Management Plan**
  - **Identified risks**
  - **List of prioritized risks**
  - **List of risks for additional analysis and management**
  - **Historical information**
  - **Expert judgment**
  - **Other planning outputs**
- The methods used in quantitative risk analysis include:
  - **Interviewing:**
    - Interviewing techniques are used to quantify the probability and consequences of risks on project objectives.
    - A risk interview with project stakeholders and subject-matter experts may be the first step in quantifying risks.
    - The information needed depends upon the type of probability distributions that will be used. For instance, information would be gathered on the optimistic (low), pessimistic (high) and the most likely scenarios if triangular distributions are used, or on mean and standard deviation for the normal and log normal distributions. (see *PMBOK<sup>®</sup> Guide* Figures 11-4, 11-5, and 11-7)
    - For effective risk response strategies, it is important to document the rationale of the risk ranges.
  - **Sensitivity analysis:**
    - Helps determine which risks have the most potential impact on the project.
    - Examines the extent to which the uncertainty of each project element affects the objective being examined when all other uncertain elements are held at their baseline values.

## Project Risk Management Processes, cont.

- **Decision tree analysis:**
  - Usually structured as a decision tree.
  - The decision tree is a diagram that describes a decision under consideration and the implications of choosing one or another of the available alternatives.
  - Decision tree analysis attempts to break down a series of events into smaller, simpler, and more manageable segments.
  - Incorporates probabilities of risks and the costs or rewards of each logical path of events and future decisions.
  - Solving the decision tree indicates which decision yields the greatest expected value to the decision-maker when all the uncertain implications, costs, rewards, and subsequent decisions are quantified.
- **Simulation:**
  - Uses a model that translates the uncertainties specified at a detailed level into their potential impact on objectives that are expressed at the level of the total project.
  - Project simulations are typically performed using the Monte Carlo technique.
  - For a cost risk analysis, a simulation may use the traditional project WBS as its model. For a schedule risk analysis, the Precedence Diagram Method (PDM) schedule is used.
- Outputs include:
  - **Prioritized list of quantified risks:** List of risks that includes those which pose the greatest threat or present the greatest opportunity to the project together with the measure of the impact for each quantified risk.
  - **Probabilistic analysis of the project:** Forecasts of potential project schedule and cost results listing the possible completion dates/project duration and costs with their associated confidence levels.
  - **Probability of achieving the cost and time objectives:** The probability of achieving the project objectives under the current plan and with the current knowledge of the project risks can be estimated using quantitative risk analysis.
  - **Trends in quantitative risk analysis results:** As the analysis is repeated, a trend in the results may become apparent.

### Risk Response Planning (11.5): (Process Group: Planning)

- The process of developing options and determining actions to enhance opportunities and reduce threats to the project's objectives.
- Includes the identification and assignment of individuals or parties to take responsibility for each agreed risk response.
- Ensures that identified risks are properly addressed.
- The effectiveness of response planning will directly determine whether risk increases or decreases for the project.

## Project Risk Management Processes, cont.

- Risk response planning must be:
  - Appropriate for the severity of the risk
  - Cost effective in meeting the challenge
  - Timely to be successful
  - Realistic within the project context
  - Mutually agreed upon by all involved parties
  - Owned by a responsible person
- Selects the best risk response from the available options
- Inputs to risk response planning include:
  - **Risk Management Plan**
  - **List of prioritized risks**
  - **Risk ranking of the project**
  - **Prioritized list of quantified risks**
  - **Probabilistic analysis of the project**
  - **Probability of achieving the cost and time objectives**
  - **List of potential responses:** In the risk identification process, actions may be identified that respond to individual risks or categories of risks.
  - **Risk thresholds:** The level of risk that is acceptable to the organization will influence risk response planning.
  - **Risk owners:** A list of project stakeholders able to act as owners of risk responses. Risk owners should participate in the development of risk responses.
  - **Common risk causes:** Several risks may be driven by a common cause and may be able to be mitigated with a generic response.
  - **Trends in qualitative and quantitative risk analysis results**
- Methods for risk response planning include:
  - **Avoidance:**
    - Changes the project plan to eliminate the risk or protect the project objectives from the risk impact.
    - Some risk events that arise early in the project can be avoided by clarifying requirements, obtaining information, improving communication, acquiring expertise, etc.
    - Other examples of avoidance include: reducing scope, adding resources, extending project time, adopting familiar approaches, avoiding unfamiliar subcontractors, etc.
  - **Transference:**
    - Shifts the consequence of a risk to a third party together with ownership of the response.
    - Most effective in dealing with financial risk exposure. Nearly always involves payment of a risk premium to the party taking on the risk.
    - Examples include: use of insurance, performance bonds, warranties, and guarantees.
    - Different types of contracts may also be used to transfer risk. For example, a fixed-price contract places most of the risk on the seller of the product/services whereas a cost-plus contract places most of the risk on the buyer or customer.

## Project Risk Management Processes, cont.

- **Mitigation:**
  - Seeks to reduce the probability and/or consequences of an adverse risk event to an acceptable threshold.
  - Taking early action helps reduce the probability of an adverse risk occurring and/or the severity of the impact and is more effective than repairing the consequences after the risk has occurred.
  - Must take into consideration the mitigation costs given the likely probability of the risk and its consequences.
  - Examples of mitigation include: adopting less complex processes, conducting more engineering tests, choosing a more stable seller, developing prototypes, adding more skilled resources, etc.
- **Acceptance:**
  - Project team makes a conscious decision to not change the project plan to handle the risk.
  - Project team may not be able to identify any other suitable response strategy other than accepting the risk.
  - **Active acceptance** may include developing a contingency plan to execute, should a risk occur.
  - **Passive acceptance** requires no action, leaving the project team to deal with the risks as they occur.
  - A **contingency plan** is applied to identified risks that arise during the project. Developing a plan in advance can greatly reduce the cost of an action should the risk occur.
  - A **fallback plan** is developed if the risk has a high impact, or if the selected strategy may not be fully effective. This could include allocation of a contingency amount, development of alternative options, or changing the project scope.
  - The most usual risk acceptance response is to establish a **contingency allowance** or reserve which includes amounts of time, money, or resources to account for known\*\* risks. The allowance should be determined by the impacts, computed at an acceptable level of risk exposure, for the accepted risks.

\*\* Author's note: In the *Project and Program Risk Management* by Max Wideman, these types of risk are referred to as *known unknowns*.

## Project Risk Management Processes, cont.

- Outputs include:
  - **Risk response plan:** a detailed plan which describes the actions that will be taken in regards to handling/accepting risk. It is also called the **risk register** and should include some or all of the following:
    - Identified risks and descriptions, areas of the affected project (e.g., WBS element), causes of identified risks, and impact on project objectives.
    - Risk owners and assigned responsibilities.
    - Results from the qualitative and quantitative risk analysis processes.
    - Agreed responses including avoidance, transference, mitigation, or acceptance for each risk in the risk response plan.
    - The level of residual risk expected to be remaining after the strategy is implemented.
    - Specific actions to implement the chosen response strategy.
    - Budget and times for responses.
    - Contingency plans and fallback plans.
  - **Residual risks:**
    - Risks that remain after the execution of avoidance, transfer, or mitigation responses.
    - Also include minor risks that have been accepted and addressed via contingency planning.
  - **Secondary risks:**
    - Risks that arise as a direct result of implementing a risk response.
    - Should be identified and have responses planned.
  - **Contractual agreements:** Should specify each party's responsibility for specific risks. (example: insurance)
  - **Contingency reserve amounts needed:** the amount of buffer or contingency needed to reduce the risk of overruns of project objectives to a level acceptable to the organization.
  - **Inputs to other processes:** Alternative strategies must be fed back into the appropriate processes in other knowledge areas.
  - **Inputs to a revised project plan:** Results of risk response planning should be incorporated into the project plan.

### Risk Monitoring and Control (11.6): (Process Group: Controlling)

- The process of keeping track of the identified risks, monitoring residual risks and identifying new risks, ensuring the execution of risk plans, and evaluating their effectiveness in reducing risks.
- Records risk metrics that are associated with the implementation of contingency plans.
- Is an ongoing process for the life of the project.
- Provides information that assists with effective decision making in advance of the risk occurrence.
- The purpose of risk monitoring is to determine whether or not:
  - Risk responses have been implemented as planned.
  - Risk response actions are as effective as expected, or if new responses should be developed.

## Project Risk Management Processes, cont.

- Project assumptions are still valid.
- Risk exposure has changed from its prior state, with analysis of trends.
- A risk trigger has occurred.
- Proper policies and procedures are followed.
- Risks have occurred or arisen that were not previously identified.
- Risk control may involve choosing alternative strategies, implementing a contingency plan, taking corrective action, or replanning the project.
- The risk response owner should report periodically to the project manager and the risk team leader on the effectiveness of the plan, any unanticipated effects, and any midcourse correction needed to mitigate the risk.
  
- Inputs to risk response control include:
  - **Risk Management Plan**
  - **Risk response plan**
  - **Project communication:** work results, issue logs, action-item lists, escalation notices, project records, etc.
  - **Additional risk identification and analysis:** As project performance is measured and reported, potential risks not previously identified may surface. Should follow cycle of six risk management processes.
  - **Scope changes:** Changes to the scope often require new risk analysis and response plans.
- Methods used during risk monitoring and control:
  - **Project risk response audits:**
    - Risk auditors examine and document the effectiveness of the risk response in avoiding, transferring, or mitigating risk occurrence as well as the effectiveness of the risk owner.
    - Risk audits are performed during the project life cycle to control risk.
  - **Periodic project risk reviews:**
    - Should be regularly scheduled.
    - Project risk should be an agenda topic at all team meetings.
    - Risk ratings and priorities may change during the course of the project and may require additional qualitative or quantitative analysis.
  - **Earned value analysis:**
    - Used for monitoring overall project performance against a baseline plan.
    - If earned value analysis (or comparable tool) shows a significant deviation from the baseline, updated risk identification and analysis should be performed.
  - **Technical performance measurement:**
    - Compares technical accomplishments during project execution to the project plan's schedule of technical achievement.
    - Deviation can imply a risk to achieving the project's objectives.
  - **Additional risk response planning:** May be required for unanticipated risks or for risks where the impact was greater than expected.

## Project Risk Management Processes, cont.

- Outputs include:
  - **Workaround plans:**
    - Unplanned responses to emerging risks that were previously unidentified or accepted.
    - Must be properly documented and incorporated into the project plan and risk response plan.
  - **Corrective action:** Execution of the contingency plan or workaround.
  - **Project change requests:** Change requests to the project plan as a result of implementing contingency plans or workarounds.
  - **Updates to the risk response plan:**
    - Risk events that do occur should be documented as such and evaluated.
    - Implementation of risk controls may reduce the impact or probability of identified risks.
    - Risk rankings must be reassessed so that new, critical risks may be properly controlled.
    - Risk events that do *not* occur should be documented as such and closed in the risk response plan.
  - **Risk database:**
    - A repository that provides for collection, maintenance, and analysis of data gathered and used in the risk management processes.
    - Use of this database will assist risk management throughout the organization and form the basis of a risk lessons learned program over time.
  - **Updates to risk identification checklists:** Checklists updated from experience will help risk management of future projects.

## Project Risk Management Concepts

Event Probabilities: (ref: *Project and Program Risk Management* by Wideman from PMI®, pg. IV-7.)

Determining probabilities of related events using simple probabilities:

- Probability of Event 1 multiplied by Probability of Event 2 = Probability of both Events
- The probability of an event occurring plus the probability of the same event not occurring should always equal one.
- Example: Given an 0.80 probability that the project scope will be defined by next month and a 0.70 probability that the scope will be approved, what is the probability of both events occurring? Answer:  $0.8 \times 0.7$ , or 56%.
- Given that only one of the above events needs to occur before project planning begins, what is the probability that project planning will occur? Answer: Consider that project planning will not occur if neither event occurs. Therefore, the Probability (Scope not defined) X Probability (Scope not approved) =  $0.2 \times 0.3 = 0.06$ . Therefore, there is a 94% chance of project planning beginning.

Scope of Project Risk Management: (ref: *Project and Program Risk Management* by Wideman from PMI®, pg. I-2)

- Scope of project risk management lies somewhere between the two extremes of total certainty and total uncertainty
  - Spectrum: Total Uncertainty, General Uncertainty, Specific Uncertainty, and Total Certainty
  - Spectrum: Unknown Unknowns (no information), Known Unknowns (partial information), and Knowns (complete information)
  - **Management Reserves** handle unknown unknowns while **contingency reserves** handle known unknowns\*\*
- \*\* PMBOK® Guide considers these as “knowns”.

## Sample Questions

1. Which of the following processes is not part of Project Risk Management?
  - A. Qualitative Risk Analysis
  - B. Risk Identification
  - C. Risk Analysis
  - D. Risk Response Planning
  
2. Using the PMBOK® Guide definition of contingency reserve, which of the following statements about contingency reserves is false?
  - A. A contingency reserve is a separately planned quantity of money or time that has been set aside to allow for future situations which may be planned for only in part.
  - B. Contingency reserves are used to reduce the risks of overruns of project objectives to a level acceptable to the organization.
  - C. Contingency reserves may be set aside for known risks.
  - D. Contingency reserves can be included in the project's cost and schedule estimates without any identifying documentation.
  
3. Which of the following is not a tool or technique used during the Quantitative Risk Analysis process?
  - A. Earned value analysis
  - B. Interviewing
  - C. Decision Trees
  - D. Sensitivity Analysis
  
4. Which of the following statements regarding *pure risk* is false?
  - A. The risk can be deflected or transferred to another party through a contract or insurance policy. Also referred to as *insurable risk*.
  - B. Pure risks involve the chance of both a profit and a loss.
  - C. No opportunities are associated with pure risk, only threats.
  - D. Pure risk could be classified as a known-unknown risk.
  
5. A contingency plan is:
  - A. A planned response that defines the steps to be taken if an identified risk event should occur.
  - B. A workaround
  - C. A comprehensive listing of many possible risks that might occur on a project.
  - D. a and b
  
6. The inherent chances for both profit or loss associated with a particular endeavor is called:
  - A. Favorable risk
  - B. Opportunity risk
  - C. Pure risk
  - D. Business risk

## Sample Questions, continued

7. A risk response which involves eliminating a threat is called:
  - A. Mitigation
  - B. Deflection
  - C. Avoidance
  - D. Transfer
  
8. Deflection or transfer of a risk to another party is part of which of the following risk response categories?
  - A. Mitigation
  - B. Acceptance
  - C. Avoidance
  - D. Transference
  
9. When should risk identification be performed? (select best answer)
  - A. During Concept Phase
  - B. During Development Phase
  - C. During Implementation Phase
  - D. Risk identification should be performed on a regular basis throughout the project.
  
10. Which of the following statements is false?
  - A. Uncertainty and risk are greatest at the start of the project and lowest at the end.
  - B. The amount at stake is lowest at the end of the project and greatest at the start.
  - C. Analysis of risks using probability and consequences helps identify those risks that should be managed aggressively.
  - D. Opportunities are positive outcomes of risk.
  
11. A contingency plan is executed when:
  - A. A risk is identified.
  - B. An identified risk event occurs.
  - C. When a workaround is needed.
  - D. All of the above
  
12. A risk probability or impact scale that uses rank-ordered values such as *very low*, *low*, *moderate*, *high*, and *very high* is called:
  - A. An ordinal scale
  - B. A cardinal scale
  - C. A nonlinear scale
  - D. All of the above
  
13. Organizations that desire very much to avoid high-impact risks may use which of the following techniques during qualitative risk analysis? Choose the best answer.
  - A. Avoidance
  - B. Data precision ranking with low precision
  - C. A probability-impact risk rating matrix using nonlinear scales
  - D. The organization would not use any techniques

## Sample Questions, continued

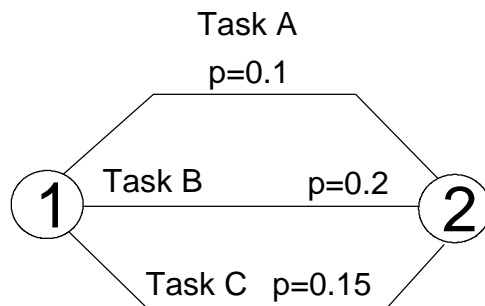
14. What is the Delphi technique as it relates to the risk identification process?
- A. An information-gathering technique where experts perform a Strengths, Weaknesses, Opportunities, Threats (SWOT) analysis.
  - B. An information-gathering technique where experts are briefed about the project and then interviewed for their opinions.
  - C. An information-gathering technique where experts meet and generate ideas about project risk.
  - D. An information-gathering technique where experts participate anonymously and ideas about project risk are gathered via a circulated questionnaire.
15. Which of the following are considered tools and techniques for qualitative risk analysis?
- A. Risk probability and impact, probability-impact risk rating matrix, and data precision ranking
  - B. Interviewing, sensitivity analysis, decision tree analysis, and simulation
  - C. Avoidance, transference, mitigation, and acceptance
  - D. Checklists, sensitivity analysis, and simulation
16. A contingency plan has a 20% chance of failing. The corresponding risk event has a 30% chance of occurring. What's the probability for the risk to occur AND the contingency plan to fail?
- A. 50%
  - B. 25%
  - C. 6%
  - D. 10%
17. The independence of two events in which the occurrence of one is not related to the occurrence of the other is called:
- A. Event phenomenon
  - B. Independent probability
  - C. Statistical independence
  - D. Statistical probability
18. Which of the following documents is primarily used as an input into the Risk Identification Process?
- A. Risk Management Plan
  - B. WBS
  - C. Scope Statement
  - D. Contingency Plan

Risks are accepted when:

- A. The project team decides to transfer the risk to a third party.
- B. The project team decides not to change the project plan to deal with a risk or is unable to identify any other suitable response strategy.
- C. The project team reduces the probability and consequences of an adverse risk event to an acceptable threshold.
- D. Risks are never accepted.

## Sample Questions, continued

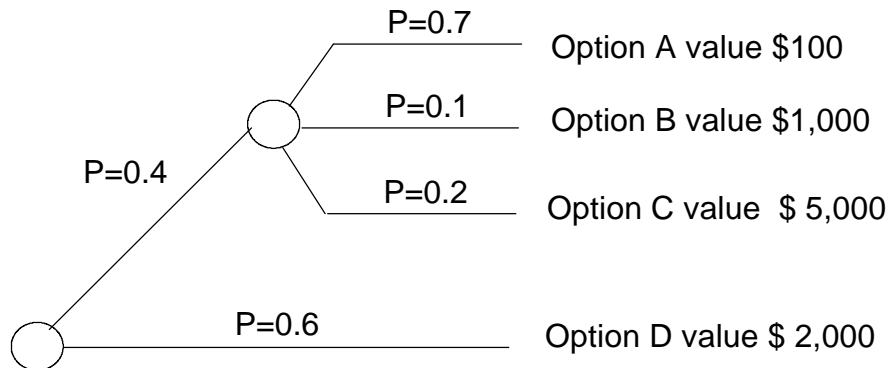
20. The amount of money or time needed above the estimate to reduce the risk of overruns of project objectives to a level acceptable to the organization is usually called the:
- A. Executive reserve
  - B. Project manager slush fund
  - C. Contingency reserve
  - D. Mitigation buffer
21. By using Project Risk Management techniques, project managers can develop strategies that do all but which of the following:
- A. Significantly reduce project risks
  - B. Eliminate project risks
  - C. Provide a basis for better decision making on overruns
  - D. Identify risk, their impact(s) and any appropriate responses
22. In the following network, all three tasks, A, B and C, each have a duration 5 days. The value 'p' indicates the probability of each task finishing on schedule. If all 3 tasks start on day 1, what is the probability that all 3 tasks will finish in 5 days?
- A.  $p = .4$
  - B.  $p = .003$
  - C.  $p = .014$
  - D. Probability cannot be determined from the data given



23. A risk event is defined as :
- A. The severity of the consequences of a loss
  - B. How likely the event is to occur
  - C. A discrete occurrence that may affect the project for better or worse
  - D. A symptom of a risk

## Sample Questions, continued

24. An analysis has identified four different options for reducing project costs. Given the following decision tree, which option should be selected ?



- A. Option A
  - B. Option B
  - C. Option C
  - D. Option D
25. Risk avoidance involves:
- A. Accepting the consequences
  - B. Developing a contingency plan
  - C. Eliminating a specific threat, usually by eliminating the cause
  - D. Reducing the effect of the risk event by reducing the probability of the occurrence
26. Examples of probability distributions used in quantitative risk analysis are:
- A. Six-sigma distributions
  - B. Probability-impact matrix distributions
  - C. Delphi distributions
  - D. Beta and triangular distributions
27. When developing a risk response plan, which risks should you focus on first? Choose the best answer.
- A. Near term risks with a high probability of occurrence
  - B. High impact risks with a low probability of occurrence
  - C. Risks with a high risk score
  - D. a and c

## Sample Questions, continued

28. Warning signs that indicate a risk has occurred or is about to occur are called:
- A. Risks
  - B. Triggers
  - C. Sign posts
  - D. Stop gaps
29. What is risk event probability? Choose the best answer.
- A. The value used in mitigation and deflection
  - B. An estimate of the probability that a given risk event will occur
  - C. The probability of the risk not occurring at this time
  - D. An estimate of the probability that an uncontrollable event will occur
30. A project of \$1.5 million has an adverse event that has a probability of 0.07 of occurring and a potential loss of \$15,000. This represents an expected negative monetary value of how much?
- A. \$100,500
  - B. \$105
  - C. \$1,050
  - D. \$15,000

## Answer Sheet

- |     |                            |                            |                            |                            |     |                            |                            |                            |                            |
|-----|----------------------------|----------------------------|----------------------------|----------------------------|-----|----------------------------|----------------------------|----------------------------|----------------------------|
| 1.  | <input type="checkbox"/> a | <input type="checkbox"/> b | <input type="checkbox"/> c | <input type="checkbox"/> d | 16. | <input type="checkbox"/> a | <input type="checkbox"/> b | <input type="checkbox"/> c | <input type="checkbox"/> d |
| 2.  | <input type="checkbox"/> a | <input type="checkbox"/> b | <input type="checkbox"/> c | <input type="checkbox"/> d | 17. | <input type="checkbox"/> a | <input type="checkbox"/> b | <input type="checkbox"/> c | <input type="checkbox"/> d |
| 3.  | <input type="checkbox"/> a | <input type="checkbox"/> b | <input type="checkbox"/> c | <input type="checkbox"/> d | 18. | <input type="checkbox"/> a | <input type="checkbox"/> b | <input type="checkbox"/> c | <input type="checkbox"/> d |
| 4.  | <input type="checkbox"/> a | <input type="checkbox"/> b | <input type="checkbox"/> c | <input type="checkbox"/> d | 19. | <input type="checkbox"/> a | <input type="checkbox"/> b | <input type="checkbox"/> c | <input type="checkbox"/> d |
| 5.  | <input type="checkbox"/> a | <input type="checkbox"/> b | <input type="checkbox"/> c | <input type="checkbox"/> d | 20. | <input type="checkbox"/> a | <input type="checkbox"/> b | <input type="checkbox"/> c | <input type="checkbox"/> d |
| 6.  | <input type="checkbox"/> a | <input type="checkbox"/> b | <input type="checkbox"/> c | <input type="checkbox"/> d | 21. | <input type="checkbox"/> a | <input type="checkbox"/> b | <input type="checkbox"/> c | <input type="checkbox"/> d |
| 7.  | <input type="checkbox"/> a | <input type="checkbox"/> b | <input type="checkbox"/> c | <input type="checkbox"/> d | 22. | <input type="checkbox"/> a | <input type="checkbox"/> b | <input type="checkbox"/> c | <input type="checkbox"/> d |
| 8.  | <input type="checkbox"/> a | <input type="checkbox"/> b | <input type="checkbox"/> c | <input type="checkbox"/> d | 23. | <input type="checkbox"/> a | <input type="checkbox"/> b | <input type="checkbox"/> c | <input type="checkbox"/> d |
| 9.  | <input type="checkbox"/> a | <input type="checkbox"/> b | <input type="checkbox"/> c | <input type="checkbox"/> d | 24. | <input type="checkbox"/> a | <input type="checkbox"/> b | <input type="checkbox"/> c | <input type="checkbox"/> d |
| 10. | <input type="checkbox"/> a | <input type="checkbox"/> b | <input type="checkbox"/> c | <input type="checkbox"/> d | 25. | <input type="checkbox"/> a | <input type="checkbox"/> b | <input type="checkbox"/> c | <input type="checkbox"/> d |
| 11. | <input type="checkbox"/> a | <input type="checkbox"/> b | <input type="checkbox"/> c | <input type="checkbox"/> d | 26. | <input type="checkbox"/> a | <input type="checkbox"/> b | <input type="checkbox"/> c | <input type="checkbox"/> d |
| 12. | <input type="checkbox"/> a | <input type="checkbox"/> b | <input type="checkbox"/> c | <input type="checkbox"/> d | 27. | <input type="checkbox"/> a | <input type="checkbox"/> b | <input type="checkbox"/> c | <input type="checkbox"/> d |
| 13. | <input type="checkbox"/> a | <input type="checkbox"/> b | <input type="checkbox"/> c | <input type="checkbox"/> d | 28. | <input type="checkbox"/> a | <input type="checkbox"/> b | <input type="checkbox"/> c | <input type="checkbox"/> d |
| 14. | <input type="checkbox"/> a | <input type="checkbox"/> b | <input type="checkbox"/> c | <input type="checkbox"/> d | 29. | <input type="checkbox"/> a | <input type="checkbox"/> b | <input type="checkbox"/> c | <input type="checkbox"/> d |
| 15. | <input type="checkbox"/> a | <input type="checkbox"/> b | <input type="checkbox"/> c | <input type="checkbox"/> d | 30. | <input type="checkbox"/> a | <input type="checkbox"/> b | <input type="checkbox"/> c | <input type="checkbox"/> d |

## Answers

1	C	PMBOK® Guide, pg. 127
2	D	PMBOK® Guide, Glossary and pg. 143, pg. 73
3	A	PMBOK® Guide, pg. 128 Earned value analysis is used as part of Risk Monitoring and Control
4	B	<i>Project &amp; Program Risk Management</i> by R. Max Wideman, Editor
5	A	A workaround is an unplanned response to a negative risk event. Option C is the definition of a checklist.
6	D	<i>Project &amp; Program Risk Management</i> by R. Max Wideman, Editor. glossary
7	C	PMBOK® Guide, pg. 142
8	D	PMBOK® Guide, pg. 142
9	D	PMBOK® Guide, pg. 131
10	B	
11	B	PMBOK® Guide, glossary
12	A	PMBOK® Guide, pg. 135
13	C	PMBOK® Guide, pgs. 134-136. A nonlinear scale can provide a greater risk score for risks with high impacts and probabilities. This allows the organization with high-impact risk aversion to better rank and focus on these risks. The use of data with low precision as suggested in Option B may lead to qualitative risk analysis of little use to the project manager. Option A is a type of risk response.
14	D	PMBOK® Guide, pgs. 132-133
15	A	PMBOK® Guide, pg. 128
16	C	$0.2 \times 0.3 = 0.06$ , <i>Project &amp; Program Risk Management</i> by R. Max Wideman, Editor, decision tree analysis
17	C	
18	A	PMBOK® Guide, pg. 128.
19	B	PMBOK® Guide, pg. 143. Option A is transference; Option C is mitigation.
20	C	PMBOK® Guide, pg. glossary
21	B	Risks can never be completely eliminated on a project.
22	B	$0.1 \times .2 \times .15 = .003$
23	C	PMBOK® Guide, glossary
24	D	a. Option A Expected value of Opportunity = $(.4)(.7)(\$100) = \$ 28$ c. Option B Expected value of Opportunity = $(.4)(.1)(\$1000) = \$ 40$ b. Option C Expected value of Opportunity = $(.4)(.2)(\$5000) = \$ 400$ d. Option D Expected value of Opportunity = $(.6)(\$2000) = \$1200$
25	C	PMBOK® Guide, pg. 142
26	D	PMBOK® Guide, pg. 140
27	D	
28	B	PMBOK® Guide, pg. 133
29	B	PMBOK® Guide, pg. 134, Wideman pg. VII-2
30	C	$\$15,000 \times .07 = \$1,050$

## PMP® Certification Exam Preparation

### What did I do wrong ?

I would have answered a larger number of questions correctly if I had _____.	Number
1. Read the question properly and identified the keywords	_____
2. Read the answer properly and identified the keywords	_____
3. Read ALL the answers before answering the question	_____
4. Used a strategy of elimination	_____
5. Known the formula	_____
6. Known the PMBOK® definition	_____
7. Checked the mathematics	_____
8. Used the PMI® rather than my own perspective	_____
9. Reviewed my answer after reading the other questions	_____
10. NOT rushed to finish	_____
Total	_____