



Version 6.1 Updated for the 2021  
Project Management Professional (PMP)<sup>®</sup> Exam



## Crosswind Success Series: PMP<sup>®</sup> Exam Bootcamp Manual

[www.crosswindpm.com](http://www.crosswindpm.com)

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## 13.12. Project Quality Management Formulas and Variables

Description	Formula	Variable (Component)	Example
<b>Standard Deviation</b> shows how far the measurement is from the mean (average).	$St\ Dev = (P - O) / 6$	P = Pessimistic Estimate O = Optimistic Estimate	$(120 - 60) / 6 = 10$
<b>Sigma</b> (These values represent the pure math value, without factoring in process variance, which can be up to 1.5 sigma.)	N/A	1 sigma = <b>68.26%</b> 2 sigma = <b>95.46%</b> 3 sigma = <b>99.73%</b> 6 sigma = <b>99.9999998%</b> or <b>99.9997%</b> Memorize the values in bold for 1, 2, 3, and 6!	1 sigma = 68.26% 2 sigma = 95.46% 3 sigma = 99.73% 6 sigma = 99.9999998%
<b>Upper Specification Limit</b> is the maximum value used to determine if a process is within specification.	Data Provided	USL	USL = 10
<b>Upper Control Limit</b> is the maximum value used to determine if a process is within control.	Data Provided	UCL	UCL = 8
<b>Lower Control Limit</b> is the minimum value used to determine if a process is within control.	Data Provided	LCL	LCL = 4
<b>Lower Specification Limit</b> is the minimum value used to determine if a process is within specification.	Data Provided	LSL	LSL = 2
<b>Mean</b> is the average value of measurement.	Data Provided	Mean	Mean = 6
<b>RTY - Rolled throughput yield</b> is the probability or likelihood, measured in percentage, of a unit going through a process with no defects.	$RTY = Y_1 \times Y_2 \times Y_3 \times \dots \times Y_n$	RTY	$0.648 = .9 \times .8 \times .9$

## 13.13. Project Quality Management Terminology

Term	Description
<b>Accuracy</b>	The degree of correctness within a quality system
<b>Attribute Sampling</b>	A testing approach that involves noting the presence or lack of a characteristic (attribute) in each unit being tested and then deciding if the entire sample will be accepted, rejected, or require re-testing after the addition of additional units
<b>Audit</b>	A review of the quality system to determine that it is capable of ensuring quality project results
<b>Benchmarking</b>	The comparison of enterprise standards and practices to those used in similar organizations for the purpose of determining best practices and/or improvements and establishing a basis for performance measurements
<b>Cause-and-effect Diagram</b>	A decomposition approach used to identify the root cause of a problem; also known as a fishbone or Ishikawa diagram
<b>Central Tendency</b>	A property of the central limit theorem, which states that data tends to group around a central location; typically utilizes three measurements: the mean, the median, and the mode
<b>Checklist Analysis</b>	An evaluation of project checklists to determine their effectiveness
<b>Check Sheets</b>	Tools that can be used to capture and categorize data
<b>Common Cause</b>	A predictable source of variation in a system
<b>Compliance</b>	Conformance to a rule, standard, law, or requirement
<b>Conformance</b>	Within the quality management system, the delivery of a product or result that falls within the acceptable tolerance levels of quality requirements
<b>Conformance to Requirement</b>	The point where the project and product meet the standards of the written specifications defined at project inception (or modified through change control)
<b>Conformance Work</b>	Endeavors, typically related to prevention and inspection, that compensate for issues preventing organizations from achieving planned results
<b>Control Chart</b>	A graphic representation of process data over time that is set against documented control limits and has a center line (mean) to assist in identifying trends
<b>Control Limits</b>	The area comprised of three standard deviations that occur on either side of the mean of normal data distribution on a control chart
<b>Control Quality</b>	The process of testing a project's product, service, or result and then issuing an approval or recommendation for change
<b>Cost of Nonconformance</b>	Cost associated with not meeting quality expectations of the project or product
<b>Criteria</b>	Standards applied to a product, service, result, or process in order to make a decision or render a judgment about that product, service, result or process
<b>Customer Satisfaction</b>	Meeting or exceeding customer expectations as a result of evaluation within the quality system
<b>Defect</b>	A fault or inadequacy in a project component that must be corrected or replaced before project requirements or specifications can be met
<b>Defect Repair</b>	The correction of a fault or inadequacy in a project component
<b>Design of Experiments</b>	A statistical process used to determine the factors that may impact specific product or process variables
<b>Documentation Reviews</b>	The process of ensuring the accuracy and completeness of project exhibits

Term	Description
<b>Failure Mode and Effect Analysis (FMEA)</b>	An analytical process that examines all possible failure points, individually or in conjunction with others, to ascertain the impact on the product or system
<b>Features</b>	The characteristics that the user desires built into a product
<b>Fitness for Use</b>	A product that can be used as it was intended when designed
<b>Flowchart</b>	A graphical representation, including inputs, actions, and outputs, of one or more of the system processes
<b>Flowcharting (Technique)</b>	A decomposition approach to breaking a system or process into block steps that can be repeated by following the diagram
<b>Grade</b>	A ranking to classify products that have different functions or features
<b>Guideline</b>	An official recommendation that describes the policies, standards, or processes related to the completion of a process or activity
<b>Histogram</b>	A graphical representation, in the format of bar chart, that depicts the central tendency, dispersal, and shape of a statistical distribution
<b>Influence Diagram</b>	A graphical representation of relationship between variables and outcomes including situations with causal influence and event time sequences
<b>Inspection</b>	The evaluation of an activity, product, result, service, or component to determine that it meets the desired standards for use and conforms to requirements
<b>Interrelationship Diagrams</b>	A graphical representation of the cause-and-effect relationships of the variables of creative problem solving
<b>ISO 9000</b>	Developed by the International Organization for Standardization (ISO) as a means to plan, control, and document processes, and overall improve quality
<b>Kaizen</b>	A technique that takes a proactive stance to process development, one that makes improvements throughout a process as time evolves
<b>Manage Quality</b>	The process of converting the quality management plan into executable activities that integrate the organization's quality policies into the project
<b>Mean</b>	The average value in a measurement of a population
<b>Nonconformance Work</b>	The work associated with correcting errors, including those that arise from a failure to adhere to the policies, standards, rules, and regulations that impact the project
<b>Normal Distribution</b>	A bell-shaped curve that is in sync with the mean of the population
<b>Pareto Analysis</b>	A technique used to identify instances of frequently recurring issues that impact a system, project, or process
<b>Pareto Diagram</b>	A bar chart, ordered by occurrence frequency, depicting the number of outcomes for each identified cause
<b>Performance</b>	The level of success at which a product performs its intended use
<b>Plan Quality Management</b>	The process of identifying quality requirements and standards for the project and deliverables as well as documenting compliance with the project's quality approach and requirements
<b>Population</b>	The entire group of similar criteria (Ex: All Americans, all owners of a particular product)
<b>Precision</b>	The accuracy of the measurements used by the quality management system
<b>Prevention Cost</b>	Cost of planning and executing a project within an acceptable range of error (or error free)
<b>Preventive Action</b>	An activity performed to evade an event that would negatively impact project performance

Term	Description
<b>Prioritization Matrices</b>	A quality management tool used to identify issues and potential alternatives related to the establishment of implementation priorities
<b>Procedure</b>	A method executed to achieve a suitable performance or result
<b>Process Adjustments</b>	Adjustments made to modify the output of a process to achieve a better degree of quality
<b>Process Analysis</b>	The evaluation of a process with the goal of identifying potential improvements
<b>Process Decision Program Charts (PDPC)</b>	A graphical representation used to develop contingency plans based on possible failure points in the main plan
<b>Project Quality Management</b>	The processes defined and activities performed by the organization to identify quality related policies, aims, and responsibilities in order to ensure that the project meets its objectives
<b>Quality</b>	The degree to which a group of fundamental characteristics satisfies requirements
<b>Quality Assurance</b>	The repetitive examination of quality requirements and quality control measurements to effect the use of requisite quality control standards and operational definitions
<b>Quality Audits</b>	A formal, independent process that assesses whether project activities are in compliance with organizational and project policies, processes, and procedures
<b>Quality Checklists</b>	A tool used to verify that project work and deliverables have been completed in accordance with project requirements
<b>Quality Control Measurements</b>	The documented outcome of quality control functions
<b>Quality Management and Control Tools</b>	Mechanisms used to ensure quality products and processes, often more efficiently and at a lower cost
<b>Quality Management Plan</b>	The document, part of the project or program management plan, used to describe the execution of the organization's quality policies
<b>Quality Management System</b>	The system within a company that provides policies, processes, and resources to implement the project's quality management plan; that the quality management plan typically aligns with the company's quality system
<b>Quality Metrics</b>	The description of a project or product attribute and the measurements that must be applied to the attribute within the quality control process; examples of metrics include failure rate, defect frequency, cost control, reliability, and availability
<b>Quality Policy</b>	The organizational policies crafted to achieve quality goals
<b>Quality Report</b>	A project document that addresses quality management issues, recommendations for corrective actions, and a recap of findings from quality control activities; the report may include advice related to the improvement of process, project, and product
<b>Quality Requirement</b>	Condition designed to ensure that a deliverable conforms to its intended use
<b>Regression Analysis</b>	An analytical technique that examines a series of input variables in relation to their corresponding output results for the purpose of establishing a mathematical or statistical relationship
<b>Reliability</b>	The likelihood of a product or service to function as planned
<b>Rework</b>	Action taken to bring any component that is flawed or out of conformance into compliance with specifications or requirements
<b>Sample</b>	A part of the population used for a measurement (instead of the entire population)
<b>Scatter Diagram</b>	A graphical representation that shows the relationship between two variables by putting one on the x axis, the other on the y axis, and analyzing the intersecting points; typically used to determine root causes or the presence of a cause-and-effect relationship

Term	Description
<b>Seven Basic Quality Tools</b>	A group of devices used by quality management for quality planning and for monitoring and controlling
<b>Seven Run Rule</b>	A rule that states if seven consecutive data points are on one side of the mean (above or below) or increasing/decreasing, then the process is out of control and should be investigated
<b>Sigma</b>	A measurement of acceptability of a product or process
<b>Special Cause</b>	A non-random or intermittent variable in a system
<b>Specification</b>	An instrument that effectively defines the requirements, design, characteristics, and other attributes of a system, component, product, result or service and typically provides for procedures to determine that the provisions of the instrument have been met
<b>Specification Limits</b>	The area on either side of the mean of data distribution on a control chart
<b>Standard Deviation</b>	The measurement of variation within a distribution
<b>Statistical Sampling</b>	The selection of a part of a population for examination rather than using the entire population
<b>Test and Evaluation Documents</b>	Project Documents that delineate the activities used to determine if the product satisfies the quality objectives described in the quality management plan
<b>Tolerance</b>	The measure of acceptable variation
<b>Tree Diagram</b>	A graphical representation that uses decomposition to organize data into parent and child relationships
<b>Value Engineering</b>	An approach to efficiently and effectively execute the project to decrease life cycle costs and schedule, increase profits and market share, improve quality and use of resources, and competently resolve issues and problems
<b>Variation</b>	The difference between the baseline project management plan and actual project data at a specific point in time
<b>Verification</b>	The process, typically internal, of determining that the results of the project are in compliance with appropriate specifications, requirements, regulatory requirements, and imposed conditions
<b>Verified Deliverables</b>	Completed project deliverables that have been reviewed and confirmed for correctness through the Control Quality Process
<b>Voice of the Customer (VOC)</b>	The translation of customer requirements into requisite technical requirements in a manner that ensures the results of the project will meet the requirements of the customer

The source for the above definitions is the Glossary of the Project Management Institute, *A Guide to the Project Management Body of Knowledge, (PMBOK® Guide) – Sixth Edition*, Project Management Institute Inc., 2017

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## 13.14. Project Quality Management Tests and Exercises

### 13.14.1. Project Quality Management Practice Test

Answers are in section 13.15.1.

1. The project manager has concerns about the software developer's project work in terms of quality and has spoken to the developer about this on several occasions. This involvement derives from the relationship between project management and quality management that should complement each other. What specifically is the relationship between the two?
  - (A) Both focus on management responsibility, fulfillment of requirements, continuous improvement, prevention over inspection, and product excellence
  - (B) Both focus on management responsibility, continuous improvement, prevention over inspection, and customer satisfaction
  - (C) Both focus on management responsibility, fulfillment of requirements, continuous improvement, prevention over inspection, and customer satisfaction
  - (D) Both focus on management responsibility, continuous improvement, prevention over inspection, and product excellence
  
2. You are the project manager in the testing phase of a project. You are working with your team doing the control quality process and testing project deliverables. Which process will provide the deliverables you are testing?
  - (A) Control quality
  - (B) Direct and manage project work
  - (C) Control scope
  - (D) Create WBS
  
3. The project manager and his team are using an Ishikawa or fishbone diagram as part of the quality component for the coal extraction project. Of the following, which best describes the reason they are utilizing this diagram?
  - (A) To assess the defects which are creating quality issues
  - (B) To evaluate project activities that have the potential to create defects
  - (C) To review symptoms to determine the source of the defects
  - (D) B and C

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4. The project management team is analyzing defects and trying to isolate the cause of a problem on the project. They have isolated two variables via the data that is available. They suspect the problem is compounded by the impact of one variable on another. They want to see if there is a relationship between the two variables. Which of the following will help them verify this relationship and why?
- (A) Run chart because the closer the lower control limit is to  $\pm 3$  sigma, the more dependent the variables are
  - (B) Pareto diagram because the closer the percentages are on the separate problems, the more dependent the variables are
  - (C) Control chart because the closer the upper control limit is to  $\pm 3$  sigma, the more dependent the variables are
  - (D) Scatter diagram because the closer the output resembles a diagonal line, the more dependent the variables are
5. You are the project manager in the testing phase of a project. You are working with your team doing the control quality process and testing project deliverables. Which process will be performed next?
- (A) Control quality
  - (B) Validate scope
  - (C) Control scope
  - (D) Create WBS
6. You are the project manager on a project that will improve the manufacturing process at your company. Quality has been a big issue because there has been an excessive amount spent on inventory with a lot of waste in the building process and return of product after it has been sold. Presently, the company has a 1 sigma quality standard with its manufacturing process. There is a general belief that there are process issues behind this problem. Which of the following options appears to make the most sense in terms of making the process more consistent?
- (A) Watching for violations of the seven run rule
  - (B) Making a greater use of checklists
  - (C) Increasing the quality standard to a sigma level greater than 1
  - (D) Utilizing a fishbone diagram
7. You are the project manager on a factory retool project. The goal is to have the factory running at six sigma. The products being created are relatively inexpensive and are only used once by the customer. There will be ten assembly lines running three shifts creating the products. The quality manager wants sample testing, but the operations manager wants to test every item. Which option makes the most sense in this situation?
- (A) Sample testing because the products are inexpensive and only used once
  - (B) Population testing because they want to be extremely thorough
  - (C) Population testing because the products are inexpensive and only used once
  - (D) Sample testing because they want to be extremely thorough



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8. The finance department is building a call center for its new auto finance division. The project manager and his team completed a model project management plan. What component of the plan will they most likely reference during the project's control quality process?
- (A) Detailed process improvement plan
  - (B) Clearly defined standards of acceptable completion criteria
  - (C) Complete testing matrix developed for auto loan call centers
  - (D) Acceptable quality management methodology specifics
9. The project is going through the manage quality process. Which of the following is a key tool that will be utilized in this process?
- (A) Cost-benefit analysis, which is used to analyze how to minimize rework due to lack of quality and how to maximize satisfaction and productivity
  - (B) Quality audits, which help verify process and output compliance
  - (C) Quality analysis, which is used to optimize project execution and achieve high process quality
  - (D) Quality management plan, which provides acceptable quality management methodology information
10. You are performing the plan quality management process on a project. The sponsor puts into the project charter that the quality standard wanted on the project is  $\pm 2$  sigma. This translates to what percentage?
- (A) 68.26%
  - (B) 95.46%
  - (C) 50%
  - (D) 99.73%
11. There is a variance in the manufacturing process that is causing concern among the team. Some results have been above the specification limits, and some within the control tolerances. You want to learn more about the output of the process over the last month. Which of the following items is the most useful for this purpose?
- (A) Run chart because it indicates output over time and provides the opportunity to determine trends and variances
  - (B) Pareto diagram because the closer the percentages are on the separate problems, the easier it is to determine trends and variances
  - (C) Control chart because it indicates output and highlights trends and variances
  - (D) Scatter diagram because the closer the output resembles a diagonal line, the more obvious trends and variances

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12. You are the project manager on a project that will improve the manufacturing process at your company that has a 1 sigma quality standard with its manufacturing process. Quality has been a major issue because there has been an excessive amount spent on inventory with a lot of waste in the building process and product returns. There is talk of utilizing quality tools at the company to help minimize these problems. Which of the following options looks like the best example of a quality tool for problem isolation?
- (A) Utilizing a fishbone diagram
  - (B) Watching for violations of the seven run rule
  - (C) Increasing the quality to a sigma level greater than 1
  - (D) Making a greater use of checklists
13. The sum of all probabilities equals what?
- (A) 100
  - (B) 1.0
  - (C) 1.0 or 100%
  - (D) 100%
14. The project manager of the On-line Loan Application Interface project instructs his team to ensure that the manage quality process is performed thoroughly. What is involved in this process?
- (A) Auditing the quality processes to ensure that appropriate standards are used
  - (B) Identifying quality requirements for the project and product, and auditing them appropriately
  - (C) Implementing predefined and validated methodologies to record the results of quality activities
  - (D) Evaluating proposed quality initiatives considering factors such as expected customer satisfaction, the cost of conformance, and the cost of nonconformance
15. The project is going through the control quality process. Which of the following is a key tool that will be utilized in this process and why?
- (A) Flowcharting shows what areas are causing the most issues and point to what needs it most on the project
  - (B) A cause-and-effect diagram (also known as Ishikawa and fishbone) helps to isolate any potential problems that relate to quality on a project
  - (C) The control chart helps to verify that the process is followed accurately
  - (D) A Pareto chart shows output over time so monitoring for variance and trends can be completed

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16. The project to improve the insurance section of the customer service division is very complex in terms of updating the quality management plan. Which of the following best describes the appropriate time to update these assets?
- (A) Updates should occur during the manage quality process
  - (B) Updates should occur as validation data is available from the manage quality process
  - (C) Updates should occur as validation data is available from the plan quality management process
  - (D) Updates should occur during the control quality process
17. While establishing an overall picture of process output over time, the team plots a chart based on the data available. The plotted chart has seven consecutive data points on one side of the mean. What can be determined from the plotted chart?
- (A) The control limits are too tight
  - (B) The control limits are acceptable
  - (C) The control limits are too loose
  - (D) A seven run rule violation has occurred
18. Of the following, which is the best description of the relationship between quality control measurements and the manage quality process?
- (A) They are an output of the manage quality process
  - (B) They can be fed into the manage quality process to validate the efficiency and cost effectiveness of control quality
  - (C) They are an output of the control quality process
  - (D) Both A and C
19. The company is implementing a stricter and more proactive quality standard for projects in an attempt to improve the quality culture. Once implemented, which of the following impacts on the product support department is most likely to occur?
- (A) Increased warranty support
  - (B) Decreased warranty support
  - (C) Increased inventory requirements
  - (D) Decreased inventory requirements
20. The computer manufacturer is putting a policy in place to use Just-in-Time manufacturing. It feels this policy will help minimize excess inventory cost and improve efficiency. The amount of inventory needed for this type of process is what?
- (A) There is insufficient information to determine the answer
  - (B) 27% (3 sigma) or .0003% (6 sigma)
  - (C) Zero plus predefined organizational buffer
  - (D) Ideally, zero with supplies obtained only when the product is being built

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21. To counteract a perception in the marketplace that RM Manufacturing designs products with defects, the company hires a new project manager to head the key design project in its new initiative. The project manager's commitment to quality has earned her industry-wide respect. One of the techniques she utilizes to ensure quality results is flowcharting. Of the following, which is the best description of this technique and in what process is it typically used?
- (A) A technique used during the plan quality management process to define the components of a process and the order in which they should be performed
  - (B) A technique used during the control quality process to determine variance and trends
  - (C) A technique used during the control quality process to define the components of a process and the order in which they should be performed
  - (D) A technique used during the plan quality management process to determine variance and trends
22. Crews Manufacturing is known for producing products with consistently high quality. The project manager prefers prevention over inspection for design projects. Which of the following is the best description of this approach to quality?
- (A) A proactive approach to increase the stability and repeatability of a process
  - (B) A reactive approach to eliminate defects and potential defects from the process
  - (C) A reactive approach to increase the stability and repeatability of a process
  - (D) A proactive approach to eliminate defects and potential defects from the process
23. You are a project manager working with the quality department. They are testing your project deliverables and are organizing defects by count. You want to show this graphically to communicate it to the stakeholders. What tool will you use to show this?
- (A) Run chart
  - (B) Histogram
  - (C) Control chart
  - (D) Scatter diagram

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24. The company that won the procurement contract is providing additional functionality and reporting in an effort to win more business from the customer. Which of the following best describes this situation?
- (A) The company is gold plating, which is a good practice because it increases the prospect of being awarded future contracts with that customer
  - (B) The company is gold plating, which is not a good practice because it creates unreasonable expectations on the part of the customer
  - (C) The company is gold plating, which is a good practice because it exceeds the standard of delivering the exact product, service, or result that is finalized in the project charter
  - (D) The company is gold plating, which is not a good practice because it violates the standard of delivering the exact product, service, or result that is finalized in the project charter
25. You are the project manager on a project that will improve the manufacturing process at your company, which has a 1 sigma quality standard with its manufacturing process. Quality has been a major issue because there has been an excessive amount spent on inventory with a lot of waste in the building process and product returns. Which of the following is the best approach to increasing the quality standard?
- (A) Watching for violations of the seven run rule
  - (B) Making a greater use of checklists
  - (C) Changing the quality to a sigma level greater than 1
  - (D) Utilizing a fishbone diagram
26. In testing, special cause variations should be eliminated in a timely manner. How should common cause variations be addressed?
- (A) Common cause variations should be ignored
  - (B) Common cause variations should be addressed through long-term process improvements
  - (C) Common cause variations should also be eliminated in a timely manner
  - (D) Common cause variations should be addressed before special cause variations
27. You are a project manager working with the quality department. They are trying to isolate if there is a relationship between two test variables. You want to show this graphically to communicate it to the stakeholders. What tool will you use to show this?
- (A) Run chart
  - (B) Histogram
  - (C) Control chart
  - (D) Scatter diagram

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28. You are the project manager on a quality system upgrade project. There has been a great debate at the company about what is in and out of the scope of the quality system. Currently you are doing the manage quality process. What process will you perform next?
- (A) Plan quality management
  - (B) Perform quality assurance
  - (C) Manage quality
  - (D) Control quality
29. The company has established a control chart that has an upper control limit of five and a lower control limit of two. The customer, however, does not require such a high standard. What is the upper specification limit?
- (A) Greater than two and less than five
  - (B) Greater than five
  - (C) Between five and two
  - (D) None of the answers
30. In preparing his team for the quality improvement initiative, the project manager is holding a quality meeting. He intends to open the meeting with a brief slide show, which will include highlighting several quality concepts. Before he discusses the concepts, he asks the team to match the concept with its creator. Which of the following contains the correct matches?
- (A) TQM and Joseph Juran, Fitness for Use and W. Edwards Deming, Zero Defects and Philip Crosby
  - (B) TQM and W. Edwards Deming, Fitness for Use and Joseph Juran, Zero Defects and Philip Crosby
  - (C) TQM and W. Edwards Deming, Fitness for Use and Philip Crosby, Zero Defects and Joseph Juran
  - (D) TQM and Philip Crosby, Fitness for Use and W. Edwards Deming, Zero Defects and Joseph Juran

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## 13.15. Project Quality Management Answers for Tests and Exercises

### 13.15.1. Project Quality Management Practice Test Answers

We recommend that you download answer sheets from the Crosswind website, so you can practice the test as many times as you like.

1. The project manager has concerns about the software developer's project work in terms of quality and has spoken to the developer about this on several occasions. This involvement derives from the relationship between project management and quality management that should complement each other. What specifically is the relationship between the two?

**Correct Answer: (B) Both focus on management responsibility, continuous improvement, prevention over inspection, and customer satisfaction**

Explanation: The relationship between project management and quality management is that both focus on management responsibility, continuous improvement, prevention over inspection, and customer satisfaction. [Crosswind Manual 13.2; No *PMBOK® Guide* Reference]

2. You are the project manager in the testing phase of a project. You are working with your team doing the control quality process and testing project deliverables. Which process will provide the deliverables you are testing?

**Correct Answer: (B) Direct and manage project work**

Explanation: Project deliverables are created in the direct and manage work process. Those deliverables are tested by the team in the control quality process. Once those deliverables are deemed passing, they go to the validate scope process for customer acceptance testing. Control scope follows validate scope. Create WBS creates the scope baseline. [Crosswind Manual 13.10; *PMBOK® Guide* 8.3.1]

3. The project manager and his team are using an Ishikawa or fishbone diagram as part of the quality component for the coal extraction project. Of the following, which best describes the reason they are utilizing this diagram?

(B) To evaluate project activities that have the potential to create defects

(C) To review symptoms to determine the source of the defects

**Correct Answer: (D) B and C**

Explanation: Ishikawa diagrams are utilized in the Plan Quality Management process to evaluate project activities that have the potential to create defects. Ishikawa diagrams are utilized after the planning process to review symptoms in an effort to determine the source of the defects. The other answers are distracters. [Crosswind Manual 13.11.7; *PMBOK® Guide* 8.2.3.5]

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4. The project management team is analyzing defects and trying to isolate the cause of a problem on the project. They have isolated two variables via the data that is available. They suspect the problem is compounded by the impact of one variable on another. They want to see if there is a relationship between the two variables. Which of the following will help them verify this relationship and why?

**Correct Answer: (D) Scatter diagram because the closer the output resembles a diagonal line, the more dependent the variables are**

Explanation: The scatter diagram shows a relationship (or lack of a relationship) between two variables. The run chart (sometimes called a control chart) shows output over time. The Pareto diagram shows defect by quantity. [Crosswind Manual 13.11.5; *PMBOK® Guide* 8.3.2.6]

5. You are the project manager in the testing phase of a project. You are working with your team doing the control quality process and testing project deliverables. Which process will be performed next?

**Correct Answer: (B) Validate Scope**

Explanation: Project deliverables are created in the direct and manage work process. Those deliverables are tested by the team in the control quality process. Once those deliverables are deemed passing, they go to the validate scope process for customer acceptance testing. Control scope follows validate scope. Create WBS creates the scope baseline. [Crosswind Manual 13.10; *PMBOK® Guide* 8.3.3]

6. You are the project manager on a project that will improve the manufacturing process at your company. Quality has been a big issue because there has been an excessive amount spent on inventory with a lot of waste in the building process and return of product after it has been sold. Presently, the company has a 1 sigma quality standard with its manufacturing process. There is a general belief that there are process issues behind this problem. Which of the following options appears to make the most sense in terms of making the process more consistent?

**Correct Answer: (B) Making a greater use of checklists**

Explanation: When followed, checklists help the employee attain consistent process execution. Assuming the checklist is sufficient and that the employee follows it, the process should possess a greater degree of stability. Fishbone diagrams work with problem isolation. Increasing the quality level makes a process more consistent, but it takes tools to do that. The checklist is a good quick fix that can have standard long-term benefits, especially if the sigma level is increased and higher quality expectations are put in place. [Crosswind Manual 13.11.1; *PMBOK® Guide* 8.3.2.1]



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7. You are the project manager on a factory retool project. The goal is to have the factory running at six sigma. The products being created are relatively inexpensive and are only used once by the customer. There will be ten assembly lines running three shifts creating the products. The quality manager wants sample testing, but the operations manager wants to test every item. Which option makes the most sense in this situation?

**Correct Answer: (A) Sample testing because the products are inexpensive and only used once**

Explanation: Given that the products are relatively inexpensive and only used once, sample testing makes sense. It would generally be cost prohibitive to test everything in this case. [Crosswind Manual 13.10.2; No *PMBOK® Guide* Reference]

8. The finance department is building a call center for its new auto finance division. The project manager and his team completed a model project management plan. What component of the plan will they most likely reference during the project's control quality process?

**Correct Answer: (B) Clearly defined standards of acceptable completion criteria**

Explanation: A complete project management plan contains clearly defined standards of acceptable completion criteria that is the primary reason the project management plan is helpful during the Control Quality process. [Crosswind Manual 13.10; *PMBOK® Guide* 8.3]

9. The project is going through the manage quality process. Which of the following is a key tool that will be utilized in this process?

**Correct Answer: (B) Quality audits which help verify process and output compliance**

Explanation: The quality audit is used in Manage Quality to verify that process and output comply with organizational and project policies and procedures. The goals of quality audits are to identify best practices, identify gaps, and share best practices with all appropriate stakeholders. The other answers are distracters. [Crosswind Manual 13.9; *PMBOK® Guide* 8.2]

10. You are performing the plan quality management process on a project. The sponsor puts into the project charter that the quality standard wanted on the project is +/- 2 sigma. This translates to what percentage?

**Correct Answer: (B) 95.46%**

Explanation: The percentage for 1 sigma is 68.26%, for 2 sigma is 95.46%, and for 3 sigma is 99.73%. 50% is a distracter. [Crosswind Manual 13.8.10; No *PMBOK® Guide* Reference]

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11. There is a variance in the manufacturing process that is causing concern among the team. Some results have been above the specification limits, and some within the control tolerances. You want to learn more about the output of the process over the last month. Which of the following items is the most useful for this purpose?

**Correct Answer: (A) Run chart because it indicates output over time and provides the opportunity to determine trends and variances**

Explanation: The run chart's main purpose is to show output over time. This provides an opportunity to catch any trends and variance with the process. The Pareto diagram shows defect by count. A control chart is similar to a run chart, but the reason given is not accurate. A scatter diagram indicates dependencies between variables. [Crosswind Manual 13.11.6; *PMBOK® Guide* 8.3.2.5]

12. You are the project manager on a project that will improve the manufacturing process at your company that has a 1 sigma quality standard with its manufacturing process. Quality has been a major issue because there has been an excessive amount spent on inventory with a lot of waste in the building process and product returns. There is talk of utilizing quality tools at the company to help minimize these problems. Which of the following options looks like the best example of a quality tool for problem isolation?

**Correct Answer: (A) Utilizing a fishbone diagram**

Explanation: The fishbone diagram is a quality tool that can be used to look for the source or root cause of other symptoms you might be experiencing in an area. The seven run rule can occur on a control chart when looking at output over time. Increasing the quality level is not a tool nor will it isolate a problem. A checklist could be used as a tool but won't help isolate problems. [Crosswind Manual 13.11.7; *PMBOK® Guide* 8.3.2.5]

13. The sum of all probabilities equals what?

**Correct Answer: (C) 1.0 or 100%**

Explanation: The sum of all probabilities is equal to 1.0 or 100%. 100% is the maximum sum of all potential outcomes of a situation. [Crosswind Manual 13.8.11; No *PMBOK® Guide* Reference]

14. The project manager of the On-line Loan Application Interface project instructs his team to ensure that the manage quality process is performed thoroughly. What is involved in this process?

**Correct Answer: (A) Auditing the quality processes to ensure that appropriate standards are used**

Explanation: This is the generally-accepted definition of the manage quality process. All other answers are distracters. [Crosswind Manual 13.9; *PMBOK® Guide* 8.2]

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15. The project is going through the control quality process. Which of the following is a key tool that will be utilized in this process and why?

**Correct Answer: (B) A cause-and-effect diagram (also known as Ishikawa and fishbone) helps to isolate any potential problems that relate to quality on a project**

Explanation: A cause-and-effect diagram (also known as Ishikawa and fishbone) helps to isolate any potential problems that relate to quality on a project. The other answers are distracters because their descriptions are inaccurate. [Crosswind Manual 13.11.7; *PMBOK® Guide* 8.3.2.5]

16. The project to improve the insurance section of the customer service division is very complex in terms of updating the quality management plan. Which of the following best describes the appropriate time to update these assets?

**Correct Answer: (B) Updates should occur as validation data is available from the manage quality process**

Explanation: Updating organizational process assets should occur as validation data is available from the manage quality process. [Crosswind Manual 13.9; *PMBOK® Guide* 8.2]

17. While establishing an overall picture of process output over time, the team plots a chart based on the data available. The plotted chart has seven consecutive data points on one side of the mean. What can be determined from the plotted chart?

**Correct Answer: (D) A seven run rule violation has occurred**

Explanation: The seven run rule has been violated. This doesn't necessarily mean there is a problem, but at a minimum a situation that warrants investigation to see if there is a problem and the specific details. [Crosswind Manual 13.11.6; *PMBOK® Guide* 8.3.2.5]

18. Of the following, which is the best description of the relationship between quality control measurements and the manage quality process?

**Correct Answer: (B) They can be fed into the manage quality process to validate the efficiency and cost effectiveness of control quality**

Explanation: They can be fed into the manage quality process to validate the efficiency and cost effectiveness of the Control Quality process. They are an output of the Control Quality process, but that does not describe the relationship. The other answers are distracters. [Crosswind Manual 13.9; *PMBOK® Guide* 8.2]

19. The company is implementing a stricter and more proactive quality standard for projects in an attempt to improve the quality culture. Once implemented, which of the following impacts on the product support department is most likely to occur?

**Correct Answer: (B) Decreased warranty support**

Explanation: Typically, the result of implementing more proactive quality standards decreases the need for warranty support. The other answers are distracters. [Crosswind Manual 13.8.7; No *PMBOK® Guide* Reference]

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20. The computer manufacturer is putting a policy in place to use Just-in-Time manufacturing. It feels this policy will help minimize excess inventory cost and improve efficiency. The amount of inventory needed for this type of process is what?

**Correct Answer: (D) Ideally, zero with supplies obtained only when the product is being built**

Explanation: The amount of inventory needed for Just-in-Time (JIT) inventory is optimally zero with supplies being obtained only when product is being built. [Crosswind Manual 13.8.9; No *PMBOK® Guide* Reference]

21. To counteract a perception in the marketplace that RM Manufacturing designs products with defects, the company hires a new project manager to head the key design project in its new initiative. The project manager's commitment to quality has earned her industry-wide respect. One of the techniques she utilizes to ensure quality results is flowcharting. Of the following, which is the best description of this technique and in what process is it typically used?

**Correct Answer: (A) A technique used during the plan quality management process to define the components of a process and the order in which they should be performed**

Explanation: Flowcharting is a technique used during the Plan Quality Management process to define the components of a process and the order in which they should be performed. The other answers are distracters. [Crosswind Manual 13.8; *PMBOK® Guide* 8.1]

22. Crews Manufacturing is known for producing products with consistently high quality. The project manager prefers prevention over inspection for design projects. Which of the following is the best description of this approach to quality?

**Correct Answer: (D) A proactive approach to eliminate defects and potential defects from the process**

Explanation: Prevention versus inspection is a proactive approach to eliminate defects and potential defects from the process. Flowcharting is a proactive approach to increase the stability and repeatability of a process. The other answers are distracters. [Crosswind Manual 13.8.4; *PMBOK® Guide* 8.1.2.3]

23. You are a project manager working with the quality department. They are testing your project deliverables and are organizing defects by count. You want to show this graphically to communicate it to the stakeholders. What tool will you use to show this?

**Correct Answer: (B) Histogram**

Explanation: The histogram shows defects by count or frequency. The run and control charts show output over time. The scatter diagram shows if there is a relationship between two variables. [Crosswind Manual 13.11.3; *PMBOK® Guide* 8.3.2.5]

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24. The company that won the procurement contract is providing additional functionality and reporting in an effort to win more business from the customer. Which of the following best describes this situation?

**Correct Answer: (D) The company is gold plating, which is not a good practice because it violates the standard of delivering the exact product, service, or result that is finalized in the project charter**

Explanation: The company is gold plating, which is not a good practice because it violates the standard of delivering the exact product, service, or result that is finalized in the project charter. Gold plating is a form of scope creep. The other answers are distracters. [Crosswind Manual 13.7; *PMBOK® Guide* Chapter 8 Introduction]

25. You are the project manager on a project that will improve the manufacturing process at your company, which has a 1 sigma quality standard with its manufacturing process. Quality has been a major issue because there has been an excessive amount spent on inventory with a lot of waste in the building process and product returns. Which of the following is the best approach to increasing the quality standard?

**Correct Answer: (C) Changing the quality to a sigma level greater than 1**

Explanation: Increasing the quality standard from 1 sigma to 2 (or greater) sigma will increase the quality standard. The other answers will improve quality rather than the quality standard. [Crosswind Manual 13.8.11; No *PMBOK® Guide* Reference]

26. In testing, special cause variations should be eliminated in a timely manner. How should common cause variations be addressed?

**Correct Answer: (B) Common cause variations should be addressed through long-term process improvements**

Explanation: Common cause variations, also called normal process variations or random causes, should be addressed through long-term process improvements. [Crosswind Manual 13.10.8; No *PMBOK® Guide* Reference]

27. You are a project manager working with the quality department. They are trying to isolate if there is a relationship between two test variables. You want to show this graphically to communicate it to the stakeholders. What tool will you use to show this?

**Correct Answer: (D) Scatter diagram**

Explanation: The scatter diagram shows if there is a relationship between two variables, and if so, what kind of relationship. The histogram shows defect by count or frequency. The run and control charts show output over time. [Crosswind Manual 13.11.5 *PMBOK® Guide* 8.3.2.5]

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28. You are the project manager on a quality system upgrade project. There has been a great debate at the company about what is in and out of the scope of the quality system. Currently you are doing the manage quality process. What process will you perform next?

**Correct Answer: (D) Control quality**

Explanation: The control quality process follows the manage quality process. Plan quality management is before the manage quality process. Perform quality assurance is a distracter. [Crosswind Manual 13.10; *PMBOK® Guide* 8.3]

29. The company has established a control chart that has an upper control limit of five and a lower control limit of two. The customer, however, does not require such a high standard. What is the upper specification limit?

**Correct Answer: (B) Greater than five**

Explanation: The upper specification limit (USL) is typically greater in value than the upper control limit (UCL); therefore, with an upper control limit of five, the upper specification limit is greater than five. [Crosswind Manual 13.11.6; *PMBOK® Guide* 8.3.2.5]

30. In preparing his team for the quality improvement initiative, the project manager is holding a quality meeting. He intends to open the meeting with a brief slide show, which will include highlighting several quality concepts. Before he discusses the concepts, he asks the team to match the concept with its creator. Which of the following contains the correct matches?

**Correct Answer: (B) TQM and W. Edwards Deming, Fitness for Use and Joseph Juran, Zero Defects and Philip Crosby**

Explanation: TQM was conceived by W. Edwards Deming, Fitness for Use was conceived by Joseph Juran, and Zero Defects was conceived by Philip Crosby. [Crosswind Manual 13.3, 13.4, and 13.5; *PMBOK® Guide* Chapter 8 Introduction]