

# **American Society for Quality (ASQ) 2022 CERTIFIED SIX SIGMA YELLOW BELT (SSYB) BODY OF KNOWLEDGE**

The topics in this Body of Knowledge include additional detail in the form of subtext explanations and the cognitive level at which test questions will be written. This information will provide guidance for the candidate preparing to take the exam. The subtext is not intended to limit the subject matter or be all-inclusive of what might be covered in an exam. It is meant to clarify the type of content to be included in the exam. The descriptor in parentheses at the end of each entry refers to the maximum cognitive level at which the topic will be tested. A complete description of cognitive levels is provided at the end of this document.

## **I. Six Sigma Fundamentals (20 Questions)**

### **A. Six sigma foundations and principles**

Describe the purpose of six sigma (reducing variation), its methodology (DMAIC) and its evolution from quality. Describe the value of six sigma to the organization as a whole. (Understand)

### **B. Lean foundations and principles**

Describe the purpose of lean (waste elimination) and its methodologies (just-in-time, poka-yoke, kanban, value-stream mapping). Describe the value of lean to the organization as a whole. (Understand)

### **C. Six sigma roles and responsibilities**

Define and describe the roles and responsibilities of six sigma team members (i.e., individual team members, yellow belt, green belt, black belt, master black belt, process owner, champion, sponsor). (Understand)

### **D. Team basics**

#### **1. Types of teams**

Identify the various types of teams that operate within an organization (i.e., continuous improvement, self-managed and cross-functional) and their value. (Understand)

#### **2. Stages of development**

Describe the various stages of team evolution: forming, storming, norming, performing, and adjourning. (Understand)

#### **3. Decision-making tools**

Define and apply decision making tools such as brainstorming, multivoting, and nominal group technique (NGT). (Apply)

#### **4. Communication methods**

Explain how teams use agendas, meeting minutes, and project status reports, and how they support project success. (Apply)

### **E. Quality tools and six sigma metrics**

#### **1. Quality tools**

Select and use these tools throughout the DMAIC process: Pareto charts, cause and effect diagrams, flowcharts, run charts, check sheets, scatter diagram, and histograms. (Apply)

2. Six sigma metrics  
Select and use these metrics throughout the DMAIC process: defects per unit (DPU), defects per million opportunities (DPMO), rolled throughput yield (RTY), cycle time, and cost of poor quality (COPQ). (Apply)

## **II. Define Phase (14 Questions)**

### **A. Project identification**

1. Voice of the customer  
Define the voice of the customer and describe how customer needs are translated into quantifiable, critical-to-quality (CTQ) characteristics. (Understand)
2. Project selection  
Describe how projects are identified and selected as suitable for a six sigma project using the DMAIC methodology. (Understand)
3. Stakeholder analysis  
Identify end users, subject matter experts, process owners and other people or factors that will be affected by a project, and describe how each of them can influence the project. (Understand)
4. Process inputs and outputs  
Use SIPOC (suppliers, inputs, process, outputs, customers) to identify and define important elements of a process. (Apply)
5. Supply chain management  
Understand supply chain management and how it relates to project management. (Understand)

### **B. Project management (PM) basics**

1. Project charter  
Describe the purpose of a charter and its components: problem statement, project scope, baseline data, and project goal. (Understand)
2. Communication plan  
Explain the purpose and benefits of a communication plan and how it can impact the success of the project. (Understand)
3. Project planning  
Define work breakdown structure (WBS) and Gantt charts and describe how they are used to plan and monitor projects. (Understand)
4. Project management tools  
Select and use various PM tools: activity network diagrams, affinity diagrams, matrix charts, relations charts, and tree diagrams. (Understand)
5. Phase reviews  
Explain how tollgate or phase reviews are used throughout the DMAIC lifecycle. (Understand)

## **III. Measure Phase (15 Questions)**

### **A. Basic statistics**

Define, calculate, and interpret measures of central tendency (mean, median, mode) and understand measures of dispersion (standard deviation, range, variance). (Apply)

## **B. Data collection**

### 1. Data collection plans

Describe the critical elements of a data collection plan, including an operational definition, data sources, the method to be used for gathering data, and how frequently it will be gathered. Describe why data collection plans are important. (Understand)

### 2. Qualitative and quantitative data

Define and distinguish between these types of data. (Understand)

### 3. Data collection techniques

Use various data collection techniques, including surveys, interviews, check sheets, and checklists to gather data that contributes to the process being improved. (Apply)

## **C. Measurement system analysis (MSA)**

### 1. MSA terms

Define precision, accuracy, bias, linearity, and stability, and describe how these terms are applied in the measurement phase. (Understand)

### 2. Gauge repeatability & reproducibility (GR&R)

Describe and distinguish between repeatability and reproducibility and describe how and why GR&R is used in the measurement phase. (Understand)

## **IV. Analyze Phase (17 Questions)**

### **A. Process analysis tools**

#### 1. Lean tools

Define how 5S and value analysis can be used to identify and eliminate waste. (Understand)

#### 2. Failure mode and effect analysis (FMEA)

Relate the elements of severity, occurrence, and detection, and determine how they are used to calculate the risk priority number. Demonstrate how FMEA can be used to identify potential failures in a process. (Apply)

### **B. Root cause analysis**

Describe how the 5 Whys, process mapping, 8D, force-field analysis and matrix charts can be used to identify the root causes of a problem. (Understand)

### **C. Corrective action**

Explain and apply elements of the corrective action process: identify the problem, contain the problem (interim action), determine the causes of the problem and propose solutions to eliminate it or prevent its recurrence (permanent action), verify that the solutions are implemented, and confirm their effectiveness (validation). (Apply)

### **D. Preventive action**

Explain and apply elements of a preventive action process: understand various process analysis techniques to identify potential failures, defects, or process deficiencies; improve the process (e.g., understand error- or mistake-proofing devices or methods, initiate procedural changes), and verify the effectiveness of the preventive action. (Apply)

### **E. Data analysis**

1. Basic distribution types  
Define and distinguish between normal and binomial distributions and describe how their shapes (skewed and bimodal) can affect data interpretation. (Understand)
2. Common and special cause variation  
Describe and distinguish between these types of variation. (Understand)

### **F. Correlation and regression**

1. Correlation  
Describe how correlation is used to identify relationships between variables. (Understand)
2. Regression  
Describe how regression analysis is used to predict outcomes. (Understand)

### **G. Hypothesis testing**

Define and distinguish between hypothesis terms (i.e., null and alternative, type I and type II error, p-value and power). (Understand)

## **V. Improve and Control Phases (14 Questions)**

### **A. Improvement techniques**

1. Kaizen and kaizen blitz  
Define and distinguish between these two methods and describe how they can be used to make improvements to any process in an organization. (Understand)
2. Plan-do-check-act (PDCA) cycle  
Define and distinguish between the steps in this process improvement tool. (Understand)
3. Cost-benefit analysis  
Explain the importance of this analysis and how it is used in the improve phase. (Understand)

### **B. Control tools and documentation**

1. Control plan  
Describe the importance of a control plan for maintaining improvements. (Understand)
  2. Control charts  
Describe how  $\bar{X} - R$  charts are used for monitoring and sustaining improved processes. (Understand)
  3. Document control  
Describe the importance of documenting changes to a process and communicating those changes to stakeholders. (Understand)
  4. Work instructions and standard operating procedures (SOPs)  
Understand the purpose and use of work instructions and SOPs. (Understand)
-

## **Levels of Cognition** **Based on Bloom's Taxonomy – Revised (2001)**

In addition to **content** specifics, the subtext for each topic in this BOK also indicates the intended **complexity level** of the test questions for that topic. These levels are based on “Levels of Cognition” (from Bloom's Taxonomy – Revised, 2001) and are presented below in rank order, from least complex to most complex.

### **Remember**

Recall or recognize terms, definitions, facts, ideas, materials, patterns, sequences, methods, principles, etc.

### **Understand**

Read and understand descriptions, communications, reports, tables, diagrams, directions, regulations, etc.

### **Apply**

Know when and how to use ideas, procedures, methods, formulas, principles, theories, etc.

### **Analyze**

Break down information into its constituent parts and recognize their relationship to one another and how they are organized; identify sublevel factors or salient data from a complex scenario.

### **Evaluate**

Make judgments about the value of proposed ideas, solutions, etc., by comparing the proposal to specific criteria or standards.

### **Create**

Put parts or elements together in such a way as to reveal a pattern or structure not clearly there before; identify which data or information from a complex set is appropriate to examine further or from which supported conclusions can be drawn.