

## Sample Champion Certification Examination Questions with Answers

**QUESTION:** A service has 10 steps and each step has only one defect opportunity. If the DPMO is 2,700 for each step, then what is Rolled Throughput Yield of the final service? What is the process sigma for the final service?

*Answer:* Yield at each step = 0.9973,  $RTY = 0.9973^{10} = 0.973326$ ,  $DPO = 1 - RTY = 0.026674$ ,  $DPMO = 26,674$ , Process sigma = between 3.4 and 3.5.

**QUESTION:** Define special causes of variation.

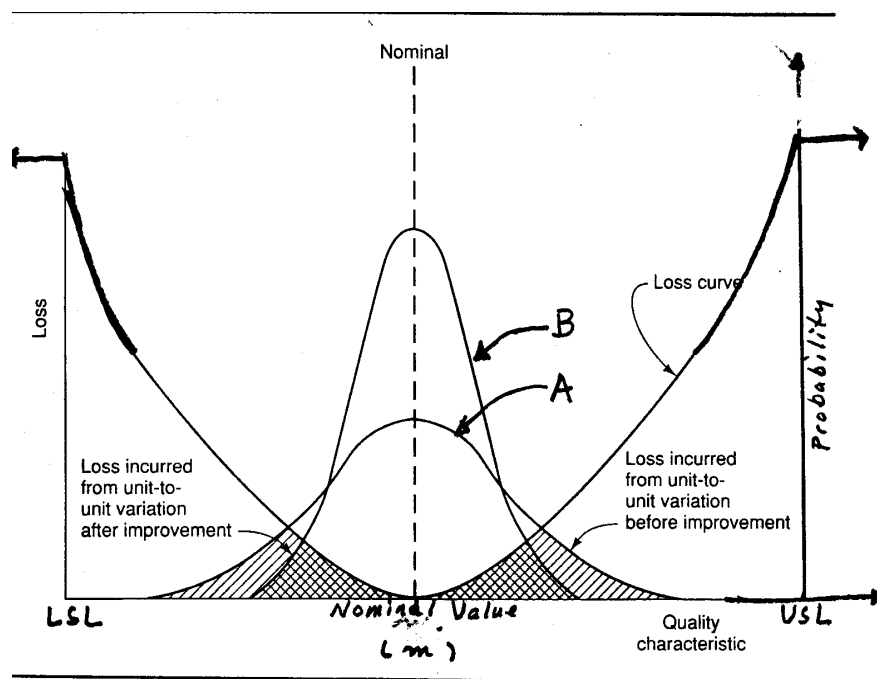
*Answer:* Special causes of variation are due to factors that are external to the system.

**QUESTION:** Define common causes of variation. Give a few examples.

*Answer.* Common causes of variation are due to the system itself. Examples include: hiring, training and supervisory practices, management style and stress level.

**QUESTION:** Explain the Taguchi loss function view of quality. Draw a picture.

*Answer:* Dr. Genichi Taguchi developed the continuous improvement view of quality when he invented the Taguchi loss function. The Taguchi Loss Function explains that losses begin to accrue as soon as a product or service deviates from nominal. Under his loss function the never-ending reduction of process variation around nominal without capital investment makes sense.



Losses incurred from unit-to-unit variation before process improvement (see distribution A) is greater than the losses incurred from unit-to-unit variation after process improvement (see distribution B). As you can see, the Taguchi loss function promotes the continual reduction of variation of the output of a process around the nominal value, absent capital investment.

**QUESTION: Explain the origin of the 1.5 sigma shift on the process mean to the definition of Six Sigma management.**

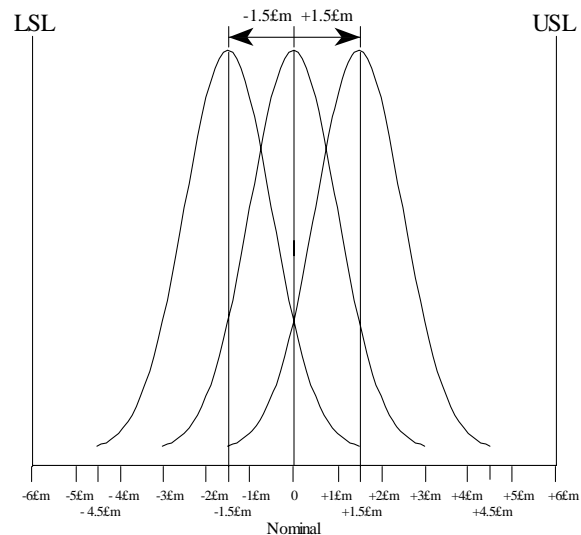
*Answer: Through experience, managers have discovered that it is typical for process variation to increase over time. This variation increase has been shown to be similar to a process mean to shift between 1 and 2 sigma over time. Hence, 1.5 sigma has been established as an industrial standard for describing typical process shift.*

**QUESTION: Explain how the DMAIC model promotes Six Sigma management.**

*Answer: The DMAIC model is a roadmap for improving chronic problems or performance gaps that exist in a process. It is used to determine the key upstream variables (Xs) in a process that impact the outcome performance of CTQs, optimize the relationships between these upstream variables (Xs) and the outcomes (CTQ's), and improve the process based on the discovered relationships.*

**QUESTION: Explain the origin of the 3.4 DPMO in Six Sigma management. .**

*Answer: If a process generates output that is stable, normally distributed and centered on the nominal value which occupies only one half the distance allowed by specifications (see center normal distribution), then the process will produce only 2 defective parts per billion opportunities. If the process mean is allowed to vary 1.5 standard deviations in either direction for the above process (see right and left normal distributions), then the process will produce 3.4 defects per million opportunities at the closest specification limit.*



**QUESTION: Construct a dashboard explaining the relationship between the mission statement and Six Sigma projects. Make sure you include objectives and indicators in your answer.**

*Answer:*

| <i>Mission: To be A, B and C</i> |                            |                                 |                                 |                                 |                                 |                             |
|----------------------------------|----------------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|-----------------------------|
| <i>President</i>                 |                            | <i>Vice Presidents (V.P.)</i>   |                                 | <i>Direct Reports (D.R.)</i>    |                                 |                             |
| <i>Business Objectives</i>       | <i>Business Indicators</i> | <i>V.P. Business Objectives</i> | <i>V.P. Business Indicators</i> | <i>D.R. Business Objectives</i> | <i>D.R. Business Indicators</i> | <i>DMAIC DMADV Projects</i> |
| <i>A</i>                         | <i>A1</i>                  | <i>A11</i>                      | <i>A111</i>                     |                                 |                                 |                             |
|                                  | <i>A2</i>                  | <i>A21</i>                      | <i>A211</i>                     |                                 |                                 |                             |
|                                  |                            |                                 | <i>A212</i>                     |                                 |                                 |                             |
|                                  |                            | <i>A22</i>                      | <i>A221</i>                     |                                 |                                 |                             |
| <i>B</i>                         | <i>B1</i>                  |                                 |                                 |                                 |                                 |                             |
| <i>C</i>                         | <i>C1</i>                  |                                 |                                 |                                 |                                 |                             |

**QUESTION: What is the purpose of Dr. Deming’s theory of management, called the “System of Profound Knowledge?”**

*Answer: To promote “joy in work” to accomplish the organizational mission.*

**QUESTION: What are the four (4) assumptions of Dr. Deming’s theory of management?**

*Answer: (1) Optimize the entire system, not just your component of the system, (2) Improve a process (person) to get results, do not just demand results from a process (person), (3) Cooperate, do not compete, if the mission of the system is not to win, and (4) Balance extrinsic and intrinsic motivators, do not only use extrinsic motivators.*

**QUESTION: What are steps of the Define Phase of the DMAIC model?**

*Answer: The define phase of the DMAIC model has three components. First, prepare the background material for a project charter. This material includes a business case, problem statement, goal statement, scope, milestones and schedule, benefits, roles, and project objective. Second, conduct a SIPOC analysis. Third, perform a “Voice of the Customer” analysis.*

**QUESTION: What are steps of the Measure Phase of the DMAIC model?**

*Answer: The activities required in the Measure phase of the DMAIC model include: operationally defining the CTQ(s), establishing the validity of the measurement system for each CTQ, collecting baseline data for each CTQ, and establishing baseline capabilities for each CTQ (RTY, DPMO, and process sigma). The Measure phase often includes analysis of well understood X’s as DMAIC addresses chronic problems in existing processes which implies there is likelihood of some knowledge of some of the X’s.*

**QUESTION: What are steps of the Analyze Phase of the DMAIC model?**

*Answer: The steps required by the Analyze phase of the DMAIC model include:*  
*(1) Identify the Xs for each CTQ using process maps, QFD and / or Cause and Effect matrices.*  
*(2) Reduce the number of Xs using FMEA analysis*  
*(3) Develop operational definitions for the high risk Xs*

- (4) Establish the validity of the measurement system for each critical X
- (5) Collect baseline data for the high risk Xs
- (6) Estimate process capability for the high risk Xs  
(Many practitioners would include steps 1 through 6 above in the Measure phase.)
- (7) Control high risk Xs with control charts
- (8) Identify major noise variable with data mining
- (9) Use screening designs to reduce the number of Xs
- (10) Develop hypotheses relating the Xs to the CTQs

**QUESTION: What are steps of the Improve Phase of the DMAIC model?**

*Answer: The steps required in the Improve phase include:*

- (1) Conduct a designed experiment to understand the relationship between the Xs and the CTQ
- (2) Optimize the relationship between the Xs and the CTQ
- (3) Avoid potential problems in the optimized Xs
- (4) Conduct a pilot test
- (5) Identify the actions required to realize the optimized relationship between the Xs and the CTQ.

**QUESTION: What are steps of the Control Phase of the DMAIC model?**

*Answer: The Control phase of the DMAIC model includes:*

- (1) Reduce the Effects of Collateral Damage to Related Processes
- (2) Standardize Improvements (International Standards Organization [ISO])
- (3) Develop a Control Plan for the Process Owner
- (4) Identify and Document Benefits and Costs of a Project
- (5) Turn the improved process over to the process owner for continual turning of the PDSA cycle.
- (6) Input Project into Six Sigma Database
- (7) Diffuse the Improvements throughout the Organization
- (8) Team disbands and celebrates their success