



## SAMPLE EXAMINATION

**The purpose of the following sample examination is to provide an example of what is provided on exam day by ASQ, complete with the same instructions that are provided on exam day.**

**The test questions that appear in this sample examination are retired from the CSSBB pool and have appeared in past CSSBB examinations. Since they are now available to the public, they will NOT appear in future SSBB examinations. This sample examination WILL NOT be allowed into the exam room.**

**Appendix A contains the answers to the sample test questions. ASQ will not provide scoring and analysis for this sample examination. Remember: These test questions will not appear on future examinations so your performance on this sample examination may not reflect how you perform on the formal examination. A self-appraisal of how well you know the content for the specific areas of the body of knowledge (BOK) can be completed by using the worksheet in Appendix B.**

**On page 2 of the instructions, it states “There are 150 questions on this 4-hour examination.” Please note that this sample exam only contains 75 questions.**

If you have any questions regarding this sample examination, please email [cert@asq.org](mailto:cert@asq.org)

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## CERTIFIED SIX SIGMA BLACK BELT

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### General Instructions

All answers **must** be recorded on the Scantron Answer Sheet; no exam will be graded with the answers marked in the exam booklet.

1. Using a soft lead pencil (#2 or softer) only, blacken the circle of the correct answer. **Do not use ink.** If you change your answer, be sure to erase the previous answer completely.
2. Each question has **ONE** correct answer only.
3. This is a timed test, so do not linger over difficult questions. Instead, skip the questions that you are unsure of and return to them if you have time when you reach the end of the test.
4. Do not fold, staple, or tear the answer sheets.
5. Although this is an open-book examination and personally generated materials/notes from training or refresher courses **are** allowed, the following conditions apply:
  - Each examinee must make his/her reference materials available to the proctor for review.
  - Absolutely no collections of questions and answers or weekly refresher course quizzes are permitted. Reference sources that contain such copy are not allowed unless the questions and answers are removed or obscured.  
**Examples of such sources include but are not limited to refresher and preparatory primers.**
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  - No laptop or palmtop computers are allowed.
  - Reference materials and calculators may not be shared.
6. When you have finished, check your answer sheet to be sure it is properly identified with your name and member number. Return your examination booklet, answer sheet, and scratch paper to your proctor. You must sign the roster sheet to signify the return of your test booklet.
7. It is strictly forbidden to copy or remove examination materials. You will be disqualified from the examination and not certified by ASQ if you breach this trust.
8. TEST Results – you can check your test results 7 – 10 days after the exam date by logging into [www.asq.org](http://www.asq.org) website and navigating to the Certification webpage. Otherwise, your exam results will be mailed in approximately two weeks. Please Be Patient we do not answer telephone requests for results



## CERTIFIED SIX SIGMA BLACK BELT Test

Directions: Each of the questions or incomplete statements below is followed by four suggested answers or completions. Select the one that is best in each case and then fill in the corresponding space on the answer sheet.

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1. Which of the following tools should be used when a team is generating and prioritizing a list of options that include highly controversial issues?
  - (A) Brainstorming
  - (B) Affinity diagrams
  - (C) Nominal group technique
  - (D) 5 whys
2. The primary factor in the successful implementation of six sigma is to have
  - (A) the necessary resources
  - (B) the support and leadership of top management
  - (C) explicit customer requirements
  - (D) a comprehensive training program
3. Which of the following tools would be most appropriate for collecting data to study the symptoms of a problem?
  - (A) Check sheet
  - (B) Flow diagram
  - (C) Force-field analysis
  - (D) Activity network diagram
4. Positional, cyclical, and temporal variations are most commonly analyzed in
  - (A) SPC charts
  - (B) multi-vari charts
  - (C) cause and effect diagrams
  - (D) run charts
5. The most important aspect of functional requirements is that they
  - (A) describe a single, measurable performance
  - (B) describe how a product or service should operate
  - (C) be traceable to the voice of the customer
  - (D) provide upper and lower performance limits
6. Which of the following control charts is most appropriate for monitoring the number of defects on different sample sizes?
  - (A)  $\bar{u}$
  - (B) np
  - (C) c
  - (D) p
7. Which of the following is most important in evaluating and understanding design intent?
  - (A) Identifying the functional requirement
  - (B) Brainstorming failure modes
  - (C) Conducting computer simulations
  - (D) Developing FMEA
8. If a process follows an exponential distribution with a mean of 25, what is the standard deviation for the process?
  - (A) 0.4
  - (B) 5.0
  - (C) 12.5
  - (D) 25.0

9. Which of the following activities is value-added?
- (A) Setup
  - (B) Process
  - (C) Storage
  - (D) Inspection
10. A black belt plans to test the performance of workers before and after training. Which of the following hypothesis tests should be used to determine whether the training actually improved the workers' performance?
- (A) 2-sample z test
  - (B) 2-sample t test
  - (C) Paired t test
  - (D) F test
11. The purpose of using control charts is to
- (A) determine if the process is performing within specifications
  - (B) evaluate process performance over time
  - (C) determine how to recreate the process
  - (D) detect the causes of nonconformities
12. Data being used in the initial set-up of a process are assumed to have a normal distribution. If the nominal (target) is set at the center of the distribution, and the specification limits are set at  $\pm 3\sigma$  from the center, then the  $C_{pk}$  is equal to
- (A) -0.25
  - (B) 1.00
  - (C) 1.33
  - (D) 1.67
13. Which of the following is defined as continuous, incremental improvement?
- (A) Kanban
  - (B) Kaizen
  - (C) JIT
  - (D) Kaikaku
14. To assess the significance of factors in either a fractional- or a full-factorial experiment structure, a black belt can use
- (A) analysis of variance (ANOVA)
  - (B) fault tree analysis (FTA)
  - (C) failure mode and effects analysis (FMEA)
  - (D) evolutionary operation (EVOP)
15. Which of the following performance measures is most appropriate for evaluating the tangible effects of a six sigma project?
- (A) Cycle time
  - (B) Team member absentee rate
  - (C) Employee morale
  - (D) Unsolicited compliments from customers
16. Which of the following is the best way to enhance the long-term availability of a machine?
- (A) Machine repair
  - (B) Total productive maintenance
  - (C) Computerized SPC systems
  - (D) Increased operator training
17. Typically, which of the following activities is done earliest in the formation of a project team?
- (A) Select the team
  - (B) Identify the objective
  - (C) Identify the sponsor
  - (D) Allocate the resources

18. A black belt is developing a failure mode and effects analysis (FMEA) for the hamburger preparation station in a fast-food restaurant. The following ratings were developed for the low-heat temperature failure mode.

Severity = 9  
 Occurrence = 2  
 Detection = 1

What is the risk priority number (RPN) for this FMEA?

- (A) 4
- (B) 6
- (C) 12
- (D) 18

19. Which of the following statements is true about the theory of constraints?

- (A) It views a system in terms of discrete processes.
- (B) Most constraints are physical.
- (C) Most constraints are the result of policies.
- (D) It focuses on continuous improvement.

20. Which of the following describes the 95% confidence interval of a 20% absentee rate in a department with 30 people?

- (A) 6% to 34%
- (B) 8% to 32%
- (C) 13% to 27%
- (D) 17% to 23%

21. A system that delivers products or services at the correct time and in the correct quantities is referred to as

- (A) takt time
- (B) kaizen
- (C) just-in-time
- (D) single-piece flow

22. Poka-yoke is best defined as

- (A) improving machine efficiency
- (B) reducing field failures to virtually zero
- (C) capturing the voice of the customer
- (D) preventing controllable defects

23. A measurement system analysis is designed to assess the statistical properties of

- (A) gage variation
- (B) process performance
- (C) process stability
- (D) engineering tolerances

24. Which of the following best describes a controlled variable whose influence on a response is being studied?

- (A) Replicate
- (B) Version
- (C) Level
- (D) Factor

25. For a process,  $\bar{X} = 35.0$  and  $\sigma = 5.00$ . If the subgroup size is  $n = 5$ , what is the value for the upper control limit for the process?

- (A) 37.24
- (B) 37.89
- (C) 41.71
- (D) 52.50

26. Which of the following tools can be used to identify waste or non-value-added activities?

- (A) Force field analysis
- (B) Pareto analysis
- (C) Scatter diagram
- (D) Process map

27. A six sigma project to reduce billing statement expenses has shown the need to hire two additional mailroom clerks. Based on this information, which of the following metrics should be used to measure the financial benefits of the project?
- (A) Cost of poor quality
  - (B) Return on investment
  - (C) Net present value
  - (D) Internal rate of return
28. A tree diagram can be used to do which of the following?
- (A) Allow a team to identify root causes even when no credible data exist
  - (B) Show a causality relationship
  - (C) Present data from a check sheet
  - (D) Reveal the true level of a problem's complexity
29. Which of the following terms is used to describe the risk of a type I error in a hypothesis test?
- (A) Power
  - (B) Confidence level
  - (C) Level of significance
  - (D) Beta risk
30. Which of the following is a component of a visual factory?
- (A) Product specifications
  - (B) Zero defect policies
  - (C) Just-in-time policies
  - (D) Equipment service manuals
31. When  $\sigma = 10$ , what sample size is needed to specify a 95% confidence interval of  $\pm 3$  units from the mean?
- (A) 7
  - (B) 11
  - (C) 32
  - (D) 43
32. A company has installed a system that prevents orders with incorrect information from being forwarded to production scheduling. This is an example of which of the following lean tools?
- (A) Standard work
  - (B) Kanban
  - (C) Poka-yoke
  - (D) Visual factory
33. After the major headings of a tree diagram have been broken into greater detail, what is the next step that should be taken?
- (A) Assemble the right team
  - (B) Review the diagram for logical flow and completeness
  - (C) Revise the problem statement
  - (D) Choose the tree diagram goal statement
34. A six sigma team has been formed to improve an existing process. Which of the following tools should the team use first to gain a clear understanding of the current process?
- (A) Flowchart
  - (B) Pareto chart
  - (C) Process FMEA
  - (D) Latin square DOE
35. Which of the following techniques dramatically shortens changeover times?
- (A) Continuous flow
  - (B) Standard work
  - (C) Work in process (WIP)
  - (D) Single minute exchange of dies (SMED)

36. Correction, over-production, inventory, and motion are all examples of

- (A) waste
- (B) 5S target areas
- (C) noise
- (D) value-added activities

37. A store uses signs at specific points in its storage area to indicate when products need to be ordered. This practice is an example of

- (A) kanban
- (B) poka-yoke
- (C) checkpoints
- (D) hoshin

38. A method that changes data without significantly reducing accuracy or precision is known as

- (A) bias adjustment
- (B) statistical efficiency
- (C) blocking
- (D) coding

39. A company's accounts payable department is trying to reduce the time between receipt and payment of invoices. If the team has just completed a flowchart of the process and identified the critical steps, which of the following tools should be used next?

- (A) Fishbone diagram
- (B) Scatter diagram
- (C) Box and whisker plot
- (D) Histogram

40. When a team consists of five black belts and eight quality engineers, how many unique meetings could be held consisting of one black belt and two quality engineers?

- (A) 40
- (B) 80
- (C) 140
- (D) 280

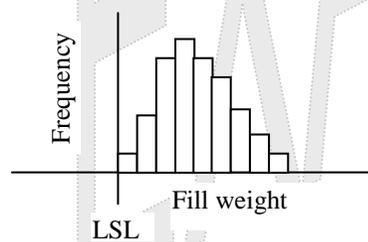
41. The primary reason that most companies implement six sigma is to

- (A) reduce defects
- (B) improve processes
- (C) improve profit
- (D) increase customer satisfaction

42. For consumer products, an increase in the percentage of returned goods most likely equates to an increase in

- (A) product not meeting specifications
- (B) end-user dissatisfaction
- (C) internal reject rates
- (D) nonconforming material costs

43. Legal requirements specify that a bottled product must contain at least the volume printed on the label. A bottling company wants to reduce the amount of overfilled bottles.



On the basis of the data above, what is the most effective strategy to accomplish this task?

- (A) Decrease the target fill volume only
- (B) Decrease the target fill variation only
- (C) First decrease the target fill volume, then decrease the target fill variation
- (D) First decrease the target fill variation, then decrease the target fill volume

44. In measurement system analysis, which of the following pairs of data measures is used to determine total variance?
- (A) Process variance and reproducibility
  - (B) Noise system and repeatability
  - (C) Measurement variance and process variance
  - (D) System variance and bias
45. If the number of runs required for a full-factorial experiment is cost-prohibitive, which of the following experiments would have the same number of variables but fewer runs?
- (A) Completely randomized factorial
  - (B) Replicated factorial
  - (C) Multilevel factorial
  - (D) Fractional factorial
46. A six sigma team has been chartered to improve the way in which a company takes orders for its products. Which of the following tools should the team use to determine all of the potential pitfalls and the actual defects that occur?
- (A) Process failure mode and effects analysis
  - (B) Process map
  - (C) Design for six sigma
  - (D) Supplier input process output control
47. According to Juran, anyone is a customer of a product or service if that person
- (A) purchases it
  - (B) uses it
  - (C) is affected by it
  - (D) produces it
48. In regression analysis, which of the following techniques can be used to reduce the higher-order terms in the model?
- (A) Large samples
  - (B) Dummy variables
  - (C) Transformations
  - (D) Blocking

49. Which of the following is the correct formula for DPMO?
- (A)  $D/TOP$
  - (B)  $DPO \times 1,000,000$
  - (C)  $D \times U \times OP$
  - (D)  $DPU/DPO$
50. Which of the following will have the most influence on consumers' perception of quality?
- (A) Industry standards
  - (B) Company financial performance
  - (C) Audit results
  - (D) Service and repair policies
51. "Forming, Storming, Norming, and Performing" are terms that describe
- (A) process variation reduction and improvement phases
  - (B) root cause identification and corrective action
  - (C) stages of team growth
  - (D) steps of the brainstorming process

52. The following contingency table was developed for an organization.

	Station 1	Station 2	Station 3	Total
Oil changes	100	36	92	228
Tire rotations	50	35	102	187
Tune-ups	60	40	85	185
Total	210	111	279	600

On the basis of this information, what is the expected number of oil changes for Station 1 ?

- (A) 70
- (B) 76
- (C) 80
- (D) 100

53. A change agent is responsible for helping the organization do which of the following?
- (A) Overcome fear of the unknown
  - (B) Reorganize departments
  - (C) Determine performance criteria
  - (D) Identify which group is responsible for failures
54. The process of having a six sigma team develop a problem statement helps the team
- (A) agree on key dates associated with completing major project phases
  - (B) achieve consensus and ownership of the process
  - (C) determine solutions
  - (D) determine how often it should meet
55. Which of the following is an element of standard work?
- (A) Takt time
  - (B) Product cost
  - (C) Product value
  - (D) Maximum inventory
56. An important aspect of data collection is that the data collector should
- (A) determine the dispersion of the data
  - (B) know how the data are to be used
  - (C) use a control chart to analyze the data
  - (D) use a stratified sampling plan
57. A process produces nonconformities according to a Poisson distribution. If the mean of the nonconformities is 25, what is the standard deviation?
- (A) 2.5
  - (B) 5.0
  - (C) 12.5
  - (D) 25.0
58. Which of the following charts plots the mean of a set of values and recalculates the mean with each new value?
- (A) Moving range
  - (B) Moving average
  - (C)  $\bar{X}$  and s
  - (D) c
59. Which of the following tools is appropriate to use with multiple criteria requiring a single option to be selected?
- (A) Pugh matrix
  - (B) Kano model
  - (C) Hypothesis testing
  - (D) PDCA
60. In order for a problem to be solved correctly, which of the following must occur first?
- (A) The problem must be defined.
  - (B) Relevant data must be gathered.
  - (C) The measurement system must be validated.
  - (D) The process must be mapped.
61. In comparison to a full-factorial design of experiment (DOE), a traditional, one-at-a-time approach will
- (A) miss interactions
  - (B) gain efficiencies
  - (C) save time
  - (D) cost less
62. Which of the following tools is used extensively in quality function deployment (QFD)?
- (A) Affinity diagram
  - (B) Matrix diagram
  - (C) Cause and effect diagram
  - (D) Activity network diagram

63. A six sigma team has gathered data for a project proposal and is using the following notations.

- I = Initial investment
- C = Periodic maintenance cost
- B = Benefits to be accrued

On the basis of the information above, which of the following is the criteria used to select a project?

- (A)  $\frac{B}{I+C} > 0$
- (B)  $\frac{B}{I+C} > 1$
- (C)  $\frac{B}{I+C} \leq 1$
- (D)  $\frac{B}{I+C} \leq 0$

64. Which of the following best describes a team that has members with different skills or roles from different areas within the organization?

- (A) Self-directed
- (B) Cross-functional
- (C) Parallel
- (D) Process

65. The time for a fail-safe device to trip is thought to be a discrete uniform distribution from 1 to 5 seconds. To test this hypothesis, 100 tests are conducted with results as shown below.

Trip time seconds (j)	Actual (O <sub>j</sub> )	Theoretical (E <sub>j</sub> )	(O <sub>j</sub> -E <sub>j</sub> ) <sup>2</sup>	
1	10	20	100	
2	15	20	25	
3	50	20	900	
4	15	20	25	
5	10	20	100	
	100	100		$\chi^2 =$
				df =

On the basis of these data, what are the chi square ( $\chi^2$ ) value and the number of degrees of freedom (df)?

	$\chi^2$	df
(A)	57.5	4
(B)	57.5	5
(C)	1,150.0	4
(D)	1,150.0	5

66. Which of the following methods is used to develop an exhaustive list of ideas about a subject?

- (A) Benchmarking
- (B) Brainstorming
- (C) Goal-setting
- (D) Problem-solving

67. Which of the following techniques would help increase process stability when the cause of variation is a cluttered work station?

- (A) 5S
- (B) SMED
- (C) Preventive maintenance
- (D) Visual factory

68. Benchmarking is difficult to perform on processes that
- (A) can be identified and researched easily
  - (B) are practiced in many different industries
  - (C) have a major impact on the success of the business
  - (D) have not been documented
69. Which of the following tools is commonly used in the define phase of a project?
- (A) Affinity diagram
  - (B) Control chart
  - (C) Failure mode and effects analysis
  - (D) Data collection checklist
70. One characteristic of attributes data is that it is always
- (A) continuous
  - (B) discrete
  - (C) expensive to collect
  - (D) read from a scale of measurement
71. Which of the following best describes internal failure costs?
- (A) The economic costs associated with a catastrophic failure of an internal subsystem.
  - (B) The unavoidable quality system costs associated with the production of any product or service.
  - (C) The opposite of external failure costs.
  - (D) The costs resulting from a nonconformance detected before a product or service is provided.
72. According to Juran, when a major quality improvement project is launched, which of the following describes the desired change in performance level?
- (A) Six sigma
  - (B) Continuous
  - (C) Breakthrough
  - (D) Sporadic
73. Which of the following is an important responsibility of a project champion?
- (A) Leading the team
  - (B) Documenting the overall progress of the team
  - (C) Allocating resources to support the team
  - (D) Coaching the team on the DMAIC process
74. A black belt would use non-parametric statistical methods when
- (A) knowledge of the underlying distribution of the population is limited
  - (B) the measurement scale is either nominal or ordinal
  - (C) the statistical estimation is required to have higher assurance
  - (D) management requires substantial statistical analysis prior to implementing
75. For a normal distribution, two standard deviations on each side of the mean would include what percentage of the total population?
- (A) 47%
  - (B) 68%
  - (C) 95%
  - (D) 99%

**STOP.**

**IF YOU FINISH BEFORE TIME IS CALLED, YOU MAY GO BACK AND CHECK YOUR WORK ON THIS TEST.**

**APPENDIX A: Answer Sheet**

For each sample test question, the correct answer is provided below along with the area of the body of knowledge (BOK) that the item is classified to. This sample examination is not intended to represent all areas of the BOK but to provide a sampling from each major topic area. All ASQ examinations are based on the BOK for that particular exam. To view the BOK for CSSBB, please go to <http://www.asq.org/certification/six-sigma/bok-07.html>

Question	BOK	Correct Answer
1	III.E.	C
2	I.B.1	B
3	V.B.4	A
4	VI.A.4	B
5	IV.A.3	C
6	VIII.A.4	A
7	IV.A.3	A
8	V.E.3	D
9	VII.B.	B
10	VI.B.5	C
11	VIII.A.1	B
12	V.F.1	B
13	VII.D.	B
14	VII.A.6	A
15	V.A.2	A
16	VIII.B.1	B
17	III.A.4	B
18	VI.C.	D
19	VII.E.	C
20	VI.B.4	A
21	VI.D.3	C
22	VII.B.	D
23	VIII.C.1	A
24	VII.A.1	D
25	VIII.A.4	C
26	V.A.2	D
27	II.E.	B
28	III.F.	D
29	VI.B.1	C
30	VIII.B.2	A
31	VI.B.4	D
32	VII.B.5	C
33	III.F.	B
34	V.A.3	A
35	VII.C.	D
36	VI.D.3	A
37	VII.B.	A
38	V.B.4	D

Question	BOK	Correct Answer
39	VI.D.2	A
40	V.E.1	C
41	I.A.2	C
42	IV.A.2	B
43	V.D.4	D
44	V.C.2	C
45	VII.A.5	D
46	VI.C.	A
47	IV.A.1	C
48	VI.A.2	C
49	V.F.7	B
50	IV.A.2	D
51	III.B.2	C
52	VI.B.8	C
53	I.B.3	A
54	III.A.4	B
55	VII.B.	A
56	V.B.4	B
57	V.E.2	B
58	VIII.A.4	B
59	IX.D.2	A
60	IV.B.1	A
61	VII.A.3	A
62	III.F.	B
63	IV.B.4	B
64	III.A.1	C
65	VI.B.7	A
66	III.E.	B
67	VII.B.	A
68	II.C.	D
69	III.F.	A
70	V.B.1	B
71	II.E.	D
72	I.A.1	C
73	I.B.5	C
74	VI.B.9	A
75	V.E.2	C

**APPENDIX B: Analyzing Body of Knowledge (BOK) Content**

The following worksheet can be used to help you analyze the results of your answers on this sample examination. It can be used to determine which areas of the body of knowledge (BOK) you may want to study.

After learning which sample test questions you had correct, total the number you had correct and enter that number into the 2<sup>nd</sup> column of the worksheet. The 3<sup>rd</sup> column provides the total number of test questions that are in this sample examination for that major area of the BOK. The last column provides the total number of test questions that appear in a formal ASQ examination for that area of the BOK.

<b>2011 BOK Topic Area</b>	<b>Total You Had Correct on Sample Exam</b>	<b>Total in the Sample Exam</b>	<b>Total in Formal ASQ Exam</b>
I. Enterprise-wide Deployment		5	<b>9</b>
II. Organizational Process Management and Measures		3	<b>9</b>
III. Team Management		10	<b>16</b>
IV. Define		7	<b>15</b>
V. Measure		15	<b>26</b>
VI. Analyze		14	<b>24</b>
VII. Improve		13	<b>23</b>
VIII. Control		7	<b>21</b>
IX. Design for Six Sigma (DFSS) Frameworks and Methodologies		1	<b>7</b>
<b>GRAND TOTAL</b>		<b>75</b>	<b>150</b>