



Breakthrough Performance Group

# LEAN SIX SIGMA BLACK BELT EXAM

## 2020

Name \_\_\_\_\_

Date \_\_\_\_\_

Instructor \_\_\_\_\_

Grade \_\_\_\_\_

**QUESTIONS / SELECT FROM A, B, C, or D**

- 1 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. A detailed process map must be developed
- 2 Increasing performance in a Six Sigma corporation from 3 sigma to 4 sigma (based on the table with the 1.5 standard deviation shift) would reduce defects per million by a factor of approximately:
- A. 2
  - B. 8
  - C. 10
  - D. 16
- 3 Example(s) of Waste are:
- A. Producing more than you need
  - B. Excess office garbage
  - C. Not utilizing suggestions from the workforce
  - D. A and C
- 4 In what areas would upper management be most helpful in the initiation of a Six Sigma effort?
- I. Providing direct training to black belts
  - II. Planning and supporting the deployment effort
  - III. Providing key resources to the organization
  - IV. Leading the project improvement teams
- A. I and III only
  - B. II and III only
  - C. I and IV only
  - D. II, III and IV only
- 5 The defect levels, as reported by Motorola in their Six Sigma program, are higher than one might expect from use of a standard normal table or traditional capability calculations. Why is this true?
- A. Motorola found their processes followed the exponential distribution
  - B. Motorola allowed for failure on one tail only
  - C. Motorola allowed for a 1.5 sigma shift in the mean
  - D. Motorola found that six sigma efforts increased process variation

- 6 Why has Six Sigma been successful in many organizations?
- I. Bottom line results are enhanced
  - II. A plus or minus 1.5 sigma shift is included
  - III. A disciplined approach is used
  - IV. A sound statistical approach is used
- A. I, II and III only
  - B. I, III and IV only
  - C. I, II and IV only
  - D. II, III and IV only
- 7 Variable data:
- A. Requires more samples than attribute data
  - B. Can be defined by the "half rule"
  - C. Can predict trends
  - D. Both B & C
- 8 If the available work time at the Widget Company is 72 hours per week and the customer requirement for widgets is 144 per week, what is the Takt time for the production of widgets?
- A. 15 Minutes
  - B. 30 Minutes
  - C. 1 Hour
  - D. 2 Hours
- 9 Stratification Factors for data include:
- A. Who, What, When and Why
  - B. Who, What, When and Where
  - C. Who What, When and How
  - D. None of the above
- 10 To run an effective Gage R&R you:
- A. Only use one operator
  - B. You should use only good samples from your output
  - C. Both
  - D. Neither

- 11 A subset selected from a population is called a:
- A. Census
  - B. Sample
  - C. Statistic
  - D. Population
- 12 In a normal distribution, the area between -2 and +1 standard deviations contains:
- A. 79% of the data
  - B. 81.9% of the data
  - C. 54.5% of the data
  - D. 50% of the data
- 13 Run a Capability test on the following numbers: 10.6, 9.4, 11.3, 9.0, 13.7, 14.1, and 10.2. The upper specification limit is 13 and lower specification limit is 8.5. The sub-group size is 1. The Cp and sigma levels are:
- A. 0.35 and 2.07
  - B. -0.35 and 0.0
  - C. 0.94 and 4.09
  - D. None of the above
- 14 When using the SIPOC model, any change in process outputs will be related to one or more changes in:
- I. Suppliers
  - II. Inputs
  - III. Process actions
  - IV. Customer actions
- A. I and II only
  - B. I and IV only
  - C. I, II and III only
  - D. I, II, III and IV

**15 Run an XmR Individuals chart on the following numbers:**

10.5  
11.8  
10.7  
11.7  
11.1  
9.6  
15.1  
19.7  
11.8  
11.0

- A. The process is out of control**
- B. The process is in control**
- C. We should throw out point #7 and re-run the test**
- D. There is not enough information to draw a conclusion**

**16 In an FMEA with a low RPN you would:**

- A. Do nothing**
- B. Check to make sure the severity level is low**
- C. Revise you ranking to make the number lower**
- D. None of the above**

**17 A Histogram:**

- A. Is a snapshot of the process**
- B. Shows the shape of the data**
- C. Tells you nothing about the trends in the data**
- D. All of the above**

**18 The key difference between internal and external customers is:**

- A. Their interest in the product or service**
- B. Internal customers can influence the design of the product/service**
- C. External customers usually influence the design of the product/service**
- D. External customer's best determine the true quality of the product/service**

19 Construct a Simple Linear Regression (SLR) using the following data:

Input	Output
6.1	11.9
6.5	13.3
3.2	6.3
8.1	15.7
8.2	17.1
7.7	15.3

- A. The  $R^2$  value is 98.8% (0.988)  
B. The point at which the line intercepts the Y axis is 2.04  
C. An input value of 4.7 would yield an output of 9.856  
D. All of the above
- 20 For a customer-driven company with high quality and value, we need to:
- I. Know our customers
  - II. Analyze our service performance
  - III. Keep cost reduction programs going
  - IV. Have strict rules and procedures that employees must follow
- A. I and II only  
B. II and III only  
C. I and IV only  
D. I, II, III and IV
- 21 How many defects per million opportunities would be reduced if a company increased their Six Sigma performance (based on the table with the 1.5 standard deviation shift) from 4.5 to 5.44?
- A. 1402  
B. 1398  
C. 1350  
D. 1310
- 22 In hypothesis testing, if the  $\alpha$  value is 5% you would be looking for:
- A. A p-value of 0.95  
B. A low sample size  
C. A p-value of 0.05  
D. B and C

23 Does grade level matter on whether a student likes or dislikes sports? A poll was run and the following data was collected. Run the appropriate hypothesis test to make your decision.

	5th Grade	7th Grade	9th Grade
Like	27	23	19
Undecided	15	14	8
Dislike	12	15	10

- A. It doesn't matter what grade they are in
- B. It does matter what grade they are in
- C. The expected value for undecided 5<sup>th</sup> graders is approximately 1.0 less than the actual value
- D. Both A and C

24 Lean enterprise may be summarized as:

- A. An entire organization involved with improvement
- B. Implementation of SMED cycle-time techniques
- C. Poka-yoke techniques in action
- D. Ergonomics principles in the workplace

25 Lean thinking enables companies to:

- I. Find the best way to specify value for the customer
- II. Identify the value stream for each product/service
- III. Permit the customer to pull value as needed from the producer
- IV. Reduce waste

- A. I and IV only
- B. II and III only
- C. I, III and IV only
- D. I, II, III, and IV

26 Which of the following is a non-value-added activity?

- A. Design reviews
- B. Vendor assessments
- C. Inventory reductions
- D. Repeated inspections to ensure quality

- 27 Lean enterprise would be most concerned with:
- I. Reducing waste
  - II. Reducing people
  - III. Reducing management layers
  - IV. Eliminating bottlenecks and improving flow in a process
- A. I and IV only  
B. I, II, III and IV  
C. I, II and IV only  
D. I and III only
- 28 Value stream mapping is:
- A. A method of flow charting each step of the process
  - B. A method for the identification of inputs, tasks and outputs
  - C. A pictorial view that identifies process steps
  - D. A graphical flow-charting technique that shows material and information flows
- 29 The boundaries of a project are contained in the:
- A. Problem statement
  - B. Project scope
  - C. Goal statement
  - D. Resources required
- 30 In a Pareto Analysis:
- A. The 20:80 rule is always true in every process
  - B. 80% of business problems were generated by just 20% of the related causes
  - C. 20% of the issues are generated by 80% of the process steps
  - D. The percent of business problems added to the causes always adds up to 100
- 31 What is the best definition of RTY?:
- A. The number of defects divided by the number of process steps
  - B. The drop in yield at the worst process step
  - C. The cumulative calculation of yield through multiple steps
  - D. The total yield in a process regardless of the individual process steps
- 32 When using an Impact/Effort matrix, the best ideas are typically ones that:
- A. Require the most effort and yield the least impact
  - B. The opposite of answer A
  - C. Have the least effort regardless of impact
  - D. None of the above



- 33 Control Limits are:
- A. The same as customer specification limits
  - B. Are set by the customer
  - C. Based on the variation within the data
  - D. Both A and B
- 34 Six Sigma project improvement teams would be LEAST likely to be assigned to:
- A. An area in great need of improvement
  - B. A major new equipment installation
  - C. A major source of customer complaints
  - D. An area requiring internal cost reduction
- 35 Arrange the following CTQ elements in appropriate time sequence from start to finish:
- I. Add additional levels as needed
  - II. Identify the customer's needs
  - III. Identify the customers
  - IV. Validate the requirements with the customer
  - V. Identify the customer's basic requirements
- A. III, II, IV, V, I
  - B. II, III, IV, I, V
  - C. II, III, V, IV, I
  - D. III, II, V, I, IV
- 36 In addition to detail of the issue that the team wants to improve, the problem statement should contain:
- A. The critical-to-quality tree
  - B. A reference to the pain caused by the problem
  - C. An identification of team composition
  - D. Any other pertinent steps in the Define phase
- 37 Which of the following items is the LEAST likely candidate to assist the problem definition stage of Six Sigma?
- A. SIPOC diagrams
  - B. SWOT analysis
  - C. High level process map
  - D. Control techniques

- 38 How many of the following items should be known at the end of the Define phase?
- I. The key process(s) involved in the project
  - II. The importance of the project to the business
  - III. The goals of the project
  - IV. The scope of the project
- A. I, II and III only
  - B. I, III and IV only
  - C. II, III and IV only
  - D. I, II, III and IV
- 39 A Pareto analysis would most likely focus on:
- I. Value add in the process
  - II. Lost time related to safety issues
  - III. Solutions for economic losses
  - IV. Occurrences of customer complaints
- A. I, II and III only
  - B. II, III and IV only
  - C. II and III only
  - D. II and IV only
- 40 Value Stream Maps include:
- A. Stratification factors
  - B. Steps with decision trees
  - C. Inventory levels
  - D. All of the above
- 41 Using the DMAIC approach to process improvement, approximately what percentage of time is typically spent by the team in the Define and Measure phases.
- A. 15%
  - B. 30%
  - C. 50%
  - D. 65%
- 42 A matrix, developed during the Six Sigma define stage that plots levels of commitment versus key stakeholders is called:
- A. Stakeholder Analysis
  - B. House of quality
  - C. A conflict resolution matrix
  - D. A customer data analysis

- 43 The business case portion of a project charter would be likely to contain:
- A. A summary of the strategic reasons for the project
  - B. A problem or goal statement
  - C. The project schedule
  - D. The boundaries of the project team
- 44 As it relates to the delivery of a meal, what would the topics of speed, economical price and good taste represent?
- I. General needs
  - II. CTQ areas
  - III. Quality drivers
  - IV. Specific needs
- A. I and II only
  - B. II and IV only
  - C. II and III only
  - D. III and IV only
- 45 Which of the following is the LEAST likely element to be contained in a project charter?
- A. Identification of the team members
  - B. The business case
  - C. The causes of the problem
  - D. The project scope
- 46 The Kano model is used to:
- A. Measure supplier performance
  - B. Analyze customer requirements
  - C. Describe takt time
  - D. Calculate rolled throughput time
- 47 Overall Equipment Effectiveness (OEE) can be calculated as:
- A. Worker Availability X Performance X Defect Rate
  - B. The amount of product produced per person
  - C. Equipment Availability X Performance Efficiency X Rate of Quality Products
  - D. None of the above
- 48 Identify the element that is NOT associated with excess inventory:
- A. Storage space
  - B. Additional labor
  - C. Transportation vehicles
  - D. Expensive poka-yoke devices

- 49      **Concepts of the Theory of Constraints include:**
- A. **Make the flow of the product equal to plant capacity**
  - B. **Look to expand the capacity of the constraints**
  - C. **Subordinate the bottleneck to the fastest process**
  - D. **None of the above**
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- 50      **A team has undertaken a project to reduce scrap for a particular defect from 6% to 2%. However, recent data indicates that the scrap rate is really closer to 7.5%. What action steps should the team take now?**
- I. **Accumulate sufficient information to confirm the 7.5% rate**
  - II. **Abandon the project because the reduction to 2% is now unlikely**
  - III. **Modify the project statement with the best available information**
  - IV. **Advise the project sponsor of any proposed problem statement changes**
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- A. **II and IV only**
  - B. **I and IV only**
  - C. **I, III and IV only**
  - D. **III and IV only**