



***The Lean Six Sigma Orange Belt Examination***  
**Mock Exam V1.1**

**Multiple Choice**

**1 Hour Paper**

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**Instructions**

1. All 50 questions should be attempted.
2. All answers are to be marked on the answer grid provided.
3. Please use a pencil and NOT ink to mark your answers in the Answer sheet provided.
4. There is only one correct answer per question.
5. You have 60 minutes for this paper.
6. You must get 32 or more correct to pass.

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- 1 Which description outlines a purpose of a 'Project Charter'?**
- a) Help the team understand and prioritize customer requirements
  - b) Analyze the people who will be affected by the project
  - c) Plan and record the steps needed to complete the project
  - d) Clarify what the team is to accomplish and what needs discussion
- 2 What measure is used to evaluate the utilization of a manufacturing operation in terms of availability, performance and quality?**
- a) Takt Time
  - b) Overall Equipment Effectiveness
  - c) Cycle Time
  - d) Process Capability Analysis
- 3 Why is visualization of data useful?**
- a) Enables the organization to be 80% correct today, rather than 100% correct in 6 months
  - b) Identifies and eliminates the root cause of faults or problems
  - c) Encourages out-of-the-box thinking to generate as many ideas as possible
  - d) Allows conclusions to be drawn from graphical data analysis
- 4 A company employs 5 members of staff who work 36 productive hours per 5-day week, producing 360 completed units between them. The Sales Manager forecasts that demand is going to increase by 50%. How many additional members of staff does the company need to employ to ensure that the Average Lead Time will be maintained?**
- a) 3.5
  - b) 7
  - c) 5
  - d) 2.5

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**5 Which approach to change reflects a traditional management style where objectives are established by senior staff as well as guidelines, information timing and budgets?**

- a) Bottom-Up
- b) Top-Down
- c) Peer-to-Peer
- d) Collaborative

**6 Repeated failures of an expensive new water pump have caused costly shut downs resulting in lost profit to the organization. The failures were caused by a leak, which resulted from a single mechanical seal. The single seal was specified because it was less expensive than the double seal option. The project team were unaware that a single seal might prove insufficient in this particular pumping process. No-one sought advice about the most effective design criteria for the process and equipment requirements. Guidelines for the purchase of capital equipment do not call for a reliability assessment. The project team were tasked to control costs and to complete the project quickly in order to get the product to market sooner. What is the root cause of this problem?**

- a) Guidelines are missing a reliability assessment step
- b) Cost and time constraints on the project
- c) Using only a single mechanical seal on the pump
- d) Unplanned shutdowns of the new pump

**7 What term is given to the discrete probability distribution of the number of successes in a sequence of Yes/No experiment?**

- a) Poisson distribution
- b) Binomial distribution
- c) Cumulative distribution
- d) Normal distribution

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**8 Which statement BEST describes a Critical to Quality (CTQ) measure?**

- a) Must rank its importance to the customer
- b) Can be built into quality control processes
- c) Is a specific and measurable requirement
- d) Expresses who to contact if there are concerns

**9 Quality control issued a 'non-conformance' due to an incorrect bolt pattern (34 holes drilled instead of 36). The causes were a combination of engineering oversight and a lack of quality checking by the machinist. What should be documented in the problem statement when attempting to resolve this issue?**

- a) A procedure to ensure that 36 holes are drilled every time according to the design
- b) The problem would not occur if a template was used to ensure all holes are drilled
- c) An issue in the quality control procedure needs to be addressed on the shop floor
- d) The error occurred during the last part of the shift when the operator was rushing

**10 Which is the MOST likely reason to use a 'transportation / Spaghetti (workflow) Diagram'?**

- a) Identify the different people or job functions involved in the process
- b) Improve the physical layout of a workspace
- c) Help a team and its sponsor(s) agree on project boundaries and scope
- d) Capture all key flows in a process and important process metrics

**11 Which feature is NOT shared by both Lean and Six Sigma?**

- a) Focus on continuous improvement
- b) Commitment from top management
- c) Focus on customer satisfaction
- d) Long learning curve

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**12 Which of the following represents a good measurement system?**

1. Process being measured is stable
2. Measuring instrument is regularly calibrated
3. Minimal variation caused by different people measuring
4. Measurement procedure is clear and used

- a) 1, 2, 3
- b) 1, 2, 4
- c) 1, 3, 4
- d) 2, 3, 4

**13 A two-stage brainstorm session is being facilitated with a group of production line staff to identify potential reasons for a continued increase in the number of defects from a production line. What actions should be taken to support brainstorming techniques?**

1. Invite the production manager to lead the discussion
2. Ask staff to note their suspected reasons individually
3. Sort reasons into common groups and expand ideas
4. Highlight those reasons that need further investigation

- a) 1, 2, 3
- b) 1, 2, 4
- c) 1, 3, 4
- d) 2, 3, 4

**14 An analyst has gathered data from a population to gain an understanding of whether there is any relationship between a person's age and their level of income. Calculating the Pearson Correlation Coefficient results in a value of 0.20. Which conclusion CANNOT be drawn about the relationship between a person's age and their level of income?**

- a) Income is the response variable
- b) Income increases with age
- c) Income is completely independent of age
- d) There is a weak correlation between age and income

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**15 Which customer group is MOST likely to voice requirements about operating hours, health and safety and working conditions?**

- a) General public
- b) Quality management
- c) Operational staff
- d) External clients

**16 What action represents a Type I Error in a hypothesis test?**

- a) Accepting the null hypothesis when it is actually true
- b) Making an assumption about a population parameter
- c) Rejecting the null hypothesis when it is actually true
- d) Accepting the null hypothesis when it is actually false

**17 What company first developed 'Lean Thinking' or 'Lean Management'?**

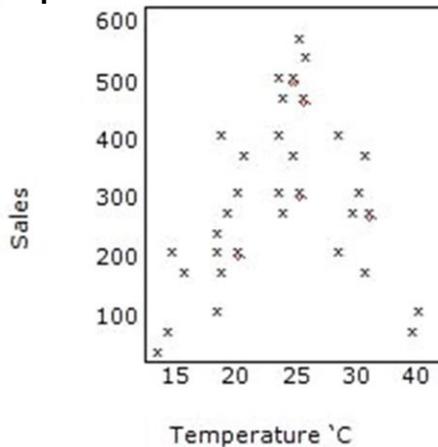
- a) Honda
- b) Mitsubishi
- c) Toyota
- d) Subaru

**18 What does Value Stream Mapping (VSM) aim to achieve?**

- a) Visualize patterns (trends, cycles etc.)
- b) Generate a large number of ideas in a short time
- c) Eliminate Waste and reduce Lead Time
- d) Prioritize knowledge and opinions based on existing data

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**19 Regression Analysis is carried out on the sales of a product in relation to temperature.**



**Which observations can be determined about the relationship between these two factors?**

- a) There is no direct linear correlation between sales and temperature
- b) An increase in temperature has a strong positive correlation to an increase in sales
- c) An increase in temperature causes only a decrease in sales
- d) There is both a high positive correlation and low negative correlation between the factors

**20 The temperature in a computer server room was reaching an uncomfortable level. A technical engineer, working in this room, decided to open the fire door to let some air in. The sudden rush of air forced the technical engineer backwards, landing on the emergency power stop button, cutting all power to the servers. Which activity would NOT have helped to prevent this problem in the workplace?**

- a) Adding an Emergency Use Only sign on the fire door
- b) Linking manual release of the door to activation of the fire alarm
- c) Introducing Kanban cards within the server environment
- d) Installing a protective casing over the emergency power button

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**21 Which observation indicates the presence of a constraint in a process?**

- a) Buildup of a queue of people
- b) Unnecessary movement of people in the workplace
- c) Items in workplace have been 'red tagged'
- d) Preventive maintenance schedule in place

**22 What level of Lean Six Sigma 'Belt' is an expert in executing improvement projects which involve more than one department or organization?**

- a) Black
- b) Green
- c) Orange
- d) Yellow

**23 When searching for a replacement part in a mountain of boxes, a member of a production team has found several boxes of other parts that have been stored in the warehouse area for months. What two types of operational Waste are evident in this situation?**

- a) Over-production and over-processing
- b) Movement and transport
- c) Inventory and movement
- d) Defects and unused expertise

**24 In which types of organizations is Operational Excellence applicable?**

- a) Both manufacturing and service industries
- b) Only those that are transaction based
- c) Limited to those with physical processes
- d) Service management only

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**25 When using a Go/No go Gage to measure a critical product dimension, what will the result directly indicate?**

- a) Pass or fail
- b) Percentage of accuracy
- c) Deviation from target
- d) Adherence to quality

**26 If the current operational availability of an automated assembly machine is not enough to meet an increase in customer demand, what is the BEST way to improve the machine's availability?**

- a) Maximize the speed of the machine
- b) Increase the number of operators
- c) Reduce breakdowns and delays
- d) Hire specialist maintenance personnel

**27 Which of the following reasons explain why Design of Experiments (DOE) would be used?**

1. Factors can be varied simultaneously
2. Trials can be performed quickly
3. One influencing factor is changed at a time
4. Connections between factors can be revealed

- a) 1, 2, 3
- b) 1, 2, 4
- c) 1, 3, 4
- d) 2, 3, 4

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**28 What type of quality activity is carried out on the final product to ensure it is fit for purpose when delivered to the customer?**

- a) Quality assurance
- b) Quality insurance
- c) Quality control
- d) Quality procedures

**29 Which describes a 'systematic' approach to collecting a representative sample of population data?**

- a) Take all of the objects in a population
- b) Arrange objects in a list and then select every fifth entry after a random start
- c) Sort into categories then take two random objects from each group
- d) Assume all objects are equal and select a random sample

**30 How will a Future State Value Stream Map differ to the Current State Value Stream Map of the same process?**

- a) Shows the increased cost of production
- b) Contains an improved efficiency of flow
- c) Defines a better product design and output
- d) Is limited to only the operational processes

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**31 Why are review sessions scheduled between each of the five 'Define, Measure, Analyze, Improve and Control' (DMAIC) phases of a Lean Six Sigma project?**

- a) Assess the profit to the organization
- b) Opportunity to delay the project end date
- c) Present progress and gain authorization to proceed
- d) Perform any outstanding tasks from phase

**32 If a process has a Capability Index of  $C_p = 1$  for a specific parameter, what percentage of units produced fit within the tolerance range?**

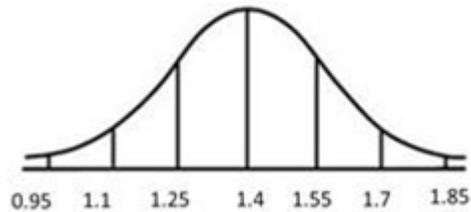
- a) 100%
- b) 95.45%.
- c) 98.76%
- d) 99.73%

**33 A Kaizen Blitz is being carried out in a small retail outlet. What is the first action that should be taken by the facilitator?**

- a) Spend time gathering and analysing data
- b) Ask the retail staff for their ideas
- c) Determine the solution and prepare a plan
- d) Prepare a problem statement and long term strategy

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**34**



**The weights of 100 units have the above normal distribution. How many standard deviations is 1.85 away from the mean?**

- a) -1
- b) 0
- c) 1
- d) 3

**35 What is implemented last in a process improvement project when following the 'Define, Measure, Analyze, Improve and Control' (DMAIC) roadmap?**

- a) Disciplines to sustain any changes
- b) Lessons learned from other projects
- c) Validation of the new process solution
- d) Updates to the Value Stream Map

**36 What needs to be reduced if productivity is less than demand?**

- a) Delivery Time
- b) Cycle Time
- c) Queue Time
- d) Takt Time

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**37 What type of variation suggests that a process is 'Out-of-Control'?**

- a) Random variation
- b) Common cause
- c) Special cause
- d) Natural variation

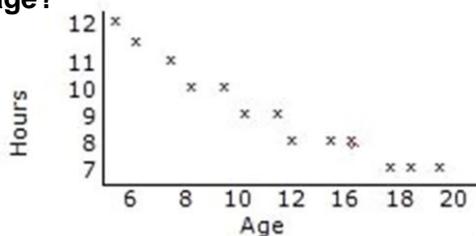
**38 Which objective does NOT relate to bringing a process into a state of statistical control?**

- a) Establish a tolerance for common cause variations
- b) Understand the acceptable level of special cause variations
- c) Regulate performance so that capability can be assessed
- d) Engineer the best performance of the process itself

**39 Which attribute is required of all Lean Six Sigma team members?**

- a) Ability to manage people
- b) Statistical analysis experience
- c) Full time commitment
- d) Active listening skills

**40 Which conclusion can be determined about the amount of sleep needed per day by age?**



- a) Seven year olds need 20 hours
- b) Twelve year olds need 12 hours
- c) Younger people need less sleep
- d) Older people need less sleep

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**41 A pharmaceutical company has recently removed a number of surplus items from a laboratory, clearing some much-needed space. Keen to utilize this new space, technicians have begun to store various materials in this area. Three separate employees have since been taken ill due to contaminated surfaces. Which step in the 5S technique would determine where each item should be stored?**

- a) Standardize
- b) Shine
- c) Sustain
- d) Straighten

**42 What concept is being applied in the Control phase of a Lean Six Sigma project, when a Belt identifies key metrics that can be monitored and analyzed to indicate when a process has an unusual drift or variation?**

- a) Kanban analysis
- b) Statistical process control
- c) Poisson distribution
- d) Inferential statistics

**43 Which of the following statements are about the use of 'Pull' production?**

1. Items are made to order
2. Items are ready earlier than required
3. Raw materials are ordered as needed
4. Customer demand drives production

- a) 1, 2, 3
- b) 1, 2, 4
- c) 1, 3, 4
- d) 2, 3, 4

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**44 Which is a use of Critical to Quality (CTQ) measures in a Cause & Effect Matrix?**

- a) Indicating the importance of each output variable for the customer
- b) Providing the acceptable tolerance levels for each output variable
- c) Entering the factors of influence or causes
- d) Correlating between the inputs and outputs

**45 Traditional printing involves converting words into a printable form, called a printing plate, which is covered in ink and then pressed against pieces of paper. The machine into which the plate is installed is called a printing press. To print a whole book several plates will be installed in succession into the press. Which step in the printing process is LEAST likely to require the press to be stopped before a changeover of the plate can be conducted?**

- a) Go and get a new plate and appropriate tools
- b) Removal of machine's safety cover
- c) Replace the current plate with the next one
- d) Clear hoppers and material feeders

**46 Which of the following are Six Sigma metrics?**

1. Precision to tolerance ratio
2. Rolled Throughput Yield
3. Proportion of defective products
4. Process Capability index

- a) 1, 2, 3
- b) 1, 2, 4
- c) 1, 3, 4
- d) 2, 3, 4

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**47 Which characteristic of a company is MOST likely to influence the success of a Lean Six Sigma project?**

- a) Organizational culture
- b) Financial security
- c) Geographic location
- d) Market sector

**48 Which is a purpose of the Eight Disciplines (8D) Problem solving method?**

- a) Champions change
- b) Challenges standards
- c) Creates contingency
- d) Communicates progress

**49 What is the purpose of calculating Risk Priority Numbers (RPN) in a Failure Mode and Effects Analysis (FMEA)?**

- a) Indicates the level of authority required to implement the proposed action
- b) Prioritizes items for additional quality planning or action
- c) Summarizes the cost of carrying out the detection or prevention actions
- d) Makes responsibility clear-cut and facilitates tracking

**50 What document is formally required in a quality system to describe the sequence of activities together with necessary tools and the timings for how long each item should take?**

- a) Quality Strategy
- b) Standard Operating Procedures
- c) Work Instructions
- d) Records and Forms

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