ASQ CSSGB - Quiz Questions with Answers

I. Overview: Six Sigma and the Organization

1.

In which phase of 5S would you move rarely used items out of the way of the work area?

- **Set in Order**
- Sort
- Standardize
- Sustain

Correct answer: Set in Order

During the Set in Order phase of 5S, both the regularly and the rarely used items are organized for ease of accessibility.

In the Sort phase, items are organized into those that are needed or unneeded. During the Standardize phase, checklists, standards, and work instructions are developed to maintain a clean and organized work area. Sustain is focused on maintaining the organization over the long term.

2.

At what point in a Six Sigma project would a traceability matrix likely be utilized?

Control

Improve

Analyze

Measure

Correct answer: Control

A traceability matrix is used to prove that tests and/or checks have been run. It documents test cases, test runs, and test results. While it is most commonly used in software development, the concept can be successfully applied to many types of improvement projects. It is especially effective in the Control phase, where verification that procedures are being run is of paramount importance. Early Six Sigma project steps, including Improve, Analyze, and Measure, are not purposed to need such verification.

3.

If a green belt was to make provision for performing tests earlier in the production cycle rather than determining the functionality of a finished assembly or subassembly, they would be doing which of the following?

Design for test

Design for maintainability

Design for robustness

Design for usability

Correct answer: Design for test

If a green belt was to make provision for performing tests earlier in the production cycle rather than determining the functionality of a finished assembly or subassembly, it would be doing a design for test change. This is commonly used for in-process testing. Design for test is one of the factors of the design phase of DMADV. DMADV is the approach used when a process needs to be designed and includes defining, measuring, analyzing, designing, and verifying.

Design for maintainability determines downtime and repair time. Design for robustness is used during the life cycle test of all parts and assemblies. Design for usability is used to validate the product works for the prescribed purpose.

4.

The three standard components of standardized work include all **except** which of the following?

Standard range

Standard time

Standard inventory

Standard sequence

Correct answer: Standard range

Standard range is not considered one of the three components of standardized work.

Standard work is used to train new equipment operators and also used to reduce variation in processes. It is coupled with the appropriate equipment, tools, and layout to reduce variation in a process. The three components of standardized work include standard time, standard inventory, and standard sequence. ISO 9001 is a quality management system used to incorporate standardized work as an aspect of an organization's controlled documentation.

5.

In a feedback loop, the input informs the process step, and the process step informs:

Output

Subprocess

Feedback

Systems

Correct answer: Output

The input informs the process step, and the process step informs the output, which in turn informs the input to the next step of the process.

Subprocess is incorrect because, in a feedback loop, we do not break down the relationship between systems, processes, and subprocesses. Feedback is also incorrect because the focus is on inputs and outputs to create a feedback loop. Systems is incorrect, as the systems supersede the processes in a business system.

6.

Oscar has been reviewing design changes on an existing product and reviews the current value stream map to assess potential impacts. What part of the map is he most likely to be concerned about?

Inventory

Process time

Takt time

Supplier delivery lead time

Correct answer: Inventory

Design changes can take longer to deliver to the marketplace if inventories are high. Unless the design changes are major, they likely don't have a significant impact on process time. Design changes are made for a number of Design For Six Sigma (DFSS) reasons and may or may not be intended to increase demand. With no information on what motivated these changes, we cannot imply that takt time is of concern. This consideration also applies to supplier delivery lead time, as we don't know if the design changes require new materials.

7.

Mistake-proofing is performed under which DMAIC phase?

Control

Measure

Analyze

Improve

Correct answer: Control

Mistake-proofing is performed under the control phase of the DMAIC model. The control phase consists of monitoring the system in order to sustain the gains. The control phase consists of management commitment, control plan, dynamic control plan, long-term MSA, mistake-proofing, process behavior charts, and update lessons learned.

The measure phase consists of management commitment, identify a data collection plan, measurement systems analysis, collect data, identify variability, benchmark, and start cost of quality. The analyze phase consists of management commitment, continual improvement, preventive maintenance, cleanliness, benchmark, central limit theorem, geometric dimensioning, shop audit, and experiments. The improve phase consists of management commitment, process improvement, organizational development, variation reduction, problem-solving, brainstorm alternatives, FMEA, cost of quality, and design of experiments.

8.

Donala has been given responsibility by the product manager of an environmentally safe, cyanobacteria killing agent. Sales growth has doubled in the past three months and is expected to triple over the next year. What type of DMADV project should she employ to adapt the product for the planned sales trajectory?

Design for scalability

Design for agility

Design for usability

Design for efficiency

Correct answer: Design for scalability

Design for scalability is used where products are anticipated to be in a growth market, such as the bactericide Donala is managing.

Design for agility is used where businesses require approaches which can be rapidly adjusted based on the of the customer.

Design for efficiency is a design where a product consumes minimal resources.

Design for usability is an implied need in a product not normally stated explicitly in the requirements, but the user expects it to be there and its absence will impact the business.

9.

How many key drivers form the backbone of any business's effort to present performance information to executives and staff?

A number of key drivers

One key driver

3-5 key drivers

Two key drivers

Correct answer: A number of key drivers

A number of key drivers is correct because it can take many drivers to form the backbone of any business's effort to present performance information to executives and staff.

One driver is incorrect, because it is too limited for most businesses. 3-5 is incorrect because that is too limiting for many businesses, as are two key drivers.

10.

What is not considered a DFSS process?

DMAIC

DMADV

IDOV

ICOV

Correct answer: DMAIC

DFSS, or Design For Six Sigma, is a strategic process that focuses on proactive quality that meets or exceeds customer expectations.

Well known and employed processes within this definition include Define, Measure Analyze, Design (DMADV), Identify, Design, Optimize, Verify (IDOV), and Identify, Characterize, Optimize, Validate (ICOV).

Define, Measure, Analyze, Improve, and Control (DMAIC) is a defect improvement method for existing processes.

11.

The achievement of aggressive benchmarks or breakthrough on a consistent basis is developed in which of the following?

Design for performance

Design for robustness

Design for manufacturing

Design for maintainability

Correct answer: Design for performance

In the design for performance, the latest and greatest technology is developed in a constant challenge of exceeding unachievable levels of delivery by meeting aggressive benchmarks on a consistent basis. A historical example of design for performance is when an aircraft was designed to travel faster than the speed of sound.

Design for robustness is used to test parts and assemblies. Design for manufacturing is used to determine tolerance in design and savings in processes, tooling, and gauging. Design for maintainability indicates the ability during the process to perform routine maintenance.

12.

Six Sigma is a large collection of which of the following?

Tools

Processes

Statistical calculations

Best practices

Correct answer: Tools

Six Sigma is a large collection of tools. These tools consist of items such as diagrams, teams, charts, interviews, plans, processes, communication, and individuals to lead the teams. Six Sigma itself has come to be widely considered a best practice in the continuous improvement space, rather than an amalgam of best practices. One could legitimately consider various Six Sigma methods, such as Define, Measure, Analyze, Improve, and Control (DMAIC) as a process. But Six Sigma is best considered a vast collection of tools by which to effect continuous improvement upon an external process. Statistical calculations only make up a small portion of Six Sigma.

13.

In regard to performing an FMEA, the occurrence rating corresponds with which of the following?

Likelihood at which the cause can happen

Each effect the failure mode can cause

Willingness to correct the failure

Ability to notice the occurrence of the failure mode

Correct answer: Likelihood at which the cause can happen

In regard to performing an FMEA, the occurrence rating corresponds with the likelihood at which the cause can happen. The occurrence rating is rated using a scale from 1 to 10, with 10 being the highest occurrence. The occurrence rating is used in conjunction with the severity rating and the detection rating to come up with the risk priority number, which is used to determine which process design carries the highest risk.

The severity rating corresponds with each effect the failure mode can cause. The detection rating corresponds with the ability to notice the occurrence of the failure mode. The willingness to correct the failure is incorrect, as it does not describe the occurrence rating.

14.

Which DMAIC phase includes identifying the inputs that are affecting the outputs of the process?

Improve

Measure

Analyze

Define

Correct answer: Improve

The DMAIC model represents define, measure, analyze, improve, and control. The improve phase is used to act on data to enhance or perfect (improve) the process. The improve phase utilizes management commitment, process improvement, organizational development, variation reduction, problem-solving, brainstorm alternatives, "should be" flowchart creation, FMEA, cost of quality, and design of experiments. All of these activities help the team to understand specific inputs that are affecting the outputs of the process being studied.

The measure phase is used to collect data from the process.

The analyze phase is used to study the process and data to determine problems.

The define phase is used to identify causes of issues and customer satisfaction problems.

15.

In a visual factory, which of the following lean tools would **not** apply?

Hoshin Kanri

Andon

Kanban

5S

Correct answer: Hoshin Kanri

Hoshin Kanri is not part of a visual factory, as it is a policy practice to align the strategy of a company with the way middle management works and how the operations floor performs the work.

Andon is a visual display—typically red, yellow, and green lights at the work site—showing the status of production. Kanban is also a visual system using cards to show replenishment quantity as a minimum level is achieved. 5S is a visual system whose results can be seen once implemented at workstations.

16.

Which term is the **most** important concept that has been brought to business awareness in recent years and is defined by the customer based on the perception of usefulness of a product or service?

Value

Quality

Safety

Economic range

Correct answer: Value

Value is the term in the business community, which is the single most important concept defined by the customer based on the perception of the usefulness of a given product or service. The ultimate value of a product or service is defined by customers. Value-added process steps include steps recognized as value by the customer, steps that change the product, or steps that make sure the product or service is done right the first time.

Quality, safety, and economic range are incorrect as they are not customer based perceptions for the usefulness and necessity of a product.

17.

Arranging the required and rarely used items for use and ease of accessibility would be accomplished during which step of a 5S?

Set-in-order (straighten)

Sort

Shine

Standardize

Correct answer: Set-in-order (straighten)

In set-in-order (also known as straighten), required and rarely used items are arranged for use and ease of accessibility. Items used frequently are kept in convenient areas. Items used less frequently are kept out of the way. 5S is a organization tool that improves overall efficiency by making sure work areas are kept organized and clean of clutter. 5S represents sort, set-in-order (straighten), shine, standardize, and sustain.

Sort is incorrect as this phase removes unneeded items. Shine involves cleaning the work area and equipment. Standardize involves developing checklists and work instructions to help keep the work area clean and organized.

18.

Which financial tool is used to report how quality levels are being sustained on the shop floor?

Cost-benefit analysis

Voice of the customer

Balanced scorecard

Dashboard

Correct answer: Cost-benefit analysis

The cost-benefit analysis is used to report how quality levels are being sustained on the shop floor. The actions that take place on the shop floor can generally be categorized into prevention costs, appraisal costs, internal failure costs, and external failure costs. The cost-benefit analysis tool allows an organization to look at its trends over time in order to rate how it is doing.

Voice of the customer is a process used for obtaining information regarding the requirements, needs, expectations, and preferences of customers. Balanced scorecard is a metric that an organization uses to measure financial, customer, internal processes, and employee learning in order to ensure it is meeting customer and business needs. Dashboard is a visual representation of a company's real-time performance.

19.

In which phase of IDOV are Critical To Quality (CTQ) variables first utilized?

Identify

Design

Optimize

Validate

Correct answer: Identify

As part of the Identify phase, the Green Belt will identify critical to quality (CTQ) variables, customer requirements, and project roles and responsibilities, among other things.

While CTQs are important throughout Design, Optimize, and Validate, CTQs are first utilized in Identify.

20.

What is the main difference between a Design FMEA and a Process FMEA?

A Design FMEA is focused on issues in creating designs while a Process FMEA should be done prior to developing a process layout.

The Process FMEA focuses on the producibility of the product.

The Process FMEA is completed prior to the Design FMEA.

They are essentially the same document.

Correct answer: A Design FMEA is focused on issues in creating designs while a Process FMEA should be done prior to developing a process layout.

A Design FMEA is about product design and typically is completed by designers and process engineers included in the team.

A Process FMEA is used to develop the layout for a manufacturing setup or how to configure parts or components. It doesn't focus on producibility as its primary function. That is the domain of the Design FMEA.

All FMEAs have a severity rating and consider severity of impact. The Process FMEA is completed after the Design FMEA.

21.

When using Define, Measure, Analyze, Improve, & Control) (DMAIC), which phase is the least likely to be a logical point to apply 5S?

Measure

Analyze

Improve

Control

Correct answer: Measure

In the Measure phase, the Green Belt establishes the data collection plan and starts to gather data. 5S is therefore not needed.

During the Analyze phase, the 5S process is applied to organize items that are needed and discard items that are not.

During the Improve phase, various forms of 5S can be experimented with to determine the optimum implementation of this technique.

In the Control phase, 5S is used to sustain improvements.

22.

When conducting a Design FMEA, what would a green belt use when reviewing the design?

Schematic diagram

Flowchart

Cause-and-effect diagram

Nominal group technique

Correct answer: Schematic diagram

When conducting a Design FMEA, a green belt would use a schematic diagram when reviewing the design. The green belt may also choose to use a functional block diagram. These tools are used to identify each of the design's main components and to determine the component's function(s) and interfaces.

Flowchart is used when performing a Process FMEA when reviewing the process, not a Design FMEA. Cause-and-effect diagram and nominal group technique are both brainstorming tools that may or may not be used during the brainstorming step of Design FMEA.

23.

In Six Sigma, what is the purpose of a business system?

To implement a process or set of processes

To facilitate business development

To map out tasks and project deliverables

To implement financial plans and strategic goals

Correct answer: To implement a process or set of processes

In Six Sigma, the purpose of a business system is to implement a process or set of processes. Business systems ensure process inputs are in the right place at the right time so the entire process has the resources it needs. One of the most important items that a business system must have is a goal to continually improve its "processes, products, and services."

To facilitate business development is an improper descriptor of a business system. To map out tasks and project deliverables is not a purpose of the business process. To implement financial plans and strategic goals are terms related to the balanced scorecard, not a business system.

24.

W. Edwards Deming is considered a quality pioneer and is credited with all of the following, except:

Pareto principle

Fourteen Points

Seven Deadly Diseases

Deming Prize

Correct answer: Pareto principle

The Pareto principle was developed by Joseph M. Juran. It implies that roughly 80% of consequences come from about 20% of the causes.

W. Edwards Deming created a list of "Fourteen Points" of change in management structures and attitudes. He also created "Seven Deadly Diseases," which refers to leadership behavior. The Japanese created the Deming Prize in honor of his work in quality.

25.

The definition of the Six Sigma philosophy includes all of the following common themes, **except**:

Emphasis on Design for Six Sigma approach to problem-solving

Teams assigned to projects that are well-defined with known impact on the organization's benefits

Training in statistical methodology at all levels, with key people trained as Black Belts

Leadership environment which supports these initiatives as part of their business strategy

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Correct answer: Emphasis on Design for Six Sigma approach to problem-solving

The definition of the Six Sigma philosophy does not include an emphasis on Design for Six Sigma; instead, its emphasis is on the DMAIC approach.

Assigning teams to projects that are well-defined with known impact on the organization's benefits is a key element of a successful Six Sigma philosophy. With Six Sigma, training at all levels is required, and Black Belts are needed to guide the Green Belts. A leadership environment which supports these initiatives as part of their business strategy is necessary for the buy-in and long-term support required to make Six Sigma a sustained effort.

26.

The *y = f(x)* concept is used to represent all except which of the following?

When a process is in control

That for every "y", there exists an "x."

The relationship between cause and effect

Controlled inputs and outputs

Correct answer: When a process is in control

The y = f(x) concept is fundamental to Six Sigma and is a basic mathematical concept that events are not random, but are caused by various influencing factors. The concept assures that for every y there exists at least one x. It is commonly used to represent controlled inputs and outputs.

The y = f(x) concept does not represent out-of-control processes, which are defined by customer expectations and design standard.

27.

A purchase order to a supplier or internal work order would be an example of which part of a value stream?

Flow of information

Flow of materials

Transportation of raw materials

Transfer of funds

Correct answer: Flow of information

A purchase order to a supplier or internal work order would be an example of the flow of information in a value stream. The three main components of the value stream are the flow of materials, the transformation of raw materials, and the flow of information.

Flow of materials is incorrect as an example of this would be raw material shipped from the supplier. Transportation of raw materials is incorrect as this would include production steps such as welding or assembling. Transfer of funds is incorrect because it is not a component of the value stream.

28.

Which Six Sigma tool would a project team use to identify supplier and customer relationships?

SIPOC

Stakeholder analysis

Kano model analysis

House of quality

Correct answer: SIPOC

A SIPOC (suppliers, inputs, process, outputs, and customers) is the Six Sigma tool a project team would use to identify supplier and customer relationships. SIPOC diagrams are used to visualize a process and evaluate the relations between suppliers, inputs, process, outputs, and customers. Six Sigma uses SIPOC to define the boundaries to be studied by the team.

Stakeholder analysis is used to determine the appropriate level of communication for project stakeholders.

Kano model analysis is a way of determining customer preferences.

The house of quality is incorrect as it is used to determine customer needs.

29.

What are the phases of DMADV?

Define, Measure, Analyze, Design, Verify

Define, Measure, Analyze, Define, Validate

Design, Measure, Analyze, Design, Verify

Design, Manufacture, Analyze, Define, Verify

Correct answer: Define, Measure, Analyze, Design, Verify

DMADV is comprised of five phases: Define, Measure, Analyze, Design, and Verify. The DMADV process is used to design a product or a process with a particular attribute in mind or when improving an existing process will not produce the desired amount of success, requiring a redesign.

The phases of Define, Measure, and Analyze are similar to in DMAIC: in Define, the design objectives are evaluated. In Measure, the technical and product/process design criteria set forth by the industry and the customer are analyzed. In Analyze, the statistical approaches begin to design priorities.

The difference between DMAIC and DMADV becomes more noticeable in the Design phase, when the team works with designers to bring in the final design requirements and to test and pilot a solution. In the Verify phase, the design of the new product or process is confirmed through objective evidence or through the customer prior to the full production phase or release of the product or process.

30.

Which organizational metric measures across four areas that include financial, customer, internal processes, and employee growth?

Balanced scorecard

Voice of the customer

Dashboard

Key process indicator

Correct answer: Balanced scorecard

The balanced scorecard is the organizational metric measures across four areas that include financial, customer, internal processes, and employee growth. Managers started using the balanced scorecard in the early 1990s to monitor results in key areas. The balance scorecard allows organizations to focus on their vision and translate it into actions.

Voice of the customer is the metric that focuses on customer-related information such as requirements, needs, expectations, and preferences. Dashboard is a visual metric that allows organizations to instantly see how the company is performing in real time. Key process indicator is a quantifiable measurement that reflects a department's critical success factors.

31.

The metric, "OEE" is an important performance indicator in which lean program?

TPM

JIT

Hoshin Kanri

A3

Correct answer: TPM

Total Productive Maintenance (TPM) focuses on equipment reliability, which translates into equipment availability for production. Overall Equipment Effectiveness (OEE) is therefore a key metric within this lean program.

Just-in-Time (JIT) has the focus of delivering finished goods exactly when a customer requires them. Flow metrics are important in this approach.

Hoshin Kanri is a strategy deployment approach and therefore is primarily interested in financial performance.

A3 is a method for summarizing key aspects of a project on a single A3-sized sheet of paper.

32.

Descriptors related to the Six Sigma philosophy include all **except** which of the following?

Requires a minimum number of team members for a project

Use of teams assigned well-defined projects

Involves training in statistical thinking at all levels

Emphasizes the DMAIC approach of define, measure, analyze, improve, and control

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Correct answer: Requires a minimum number of team members for a project

There is no specific member requirement for a Six Sigma team as long as the team incorporates subject matter experts and is a multidisciplinary team.

The remaining choices are correct for Six Sigma philosophy including the use of teams assigned well-defined projects, training in statistical thinking at all levels, use of the DMAIC approach of define, measure, analyze, improve, and control. The Six Sigma philosophy also proposes that an organization maintains the support of its management team and maintains a continual goal of reducing variation in all organizational processes.

33.

All of the following are components of a value stream, **except**:

The flow of projects

The flow of information

The flow of materials

The transformation of raw materials

Correct answer: The flow of projects

The flow of projects is not a component of a value stream, but as a result of a value stream analysis, wastes will be uncovered and potential projects to eliminate them will be identified.

The flow of materials is a critical element of the value stream that begins with receiving materials from the supplier and continues all the way through delivering them as finished goods and services to the end customers. The transformation of raw materials is also a component of the value stream, as production steps create value by turning materials into finished goods. The flow of information is a main part of a value stream, needed to support the previous two steps.

34.

Which of the following is an example of process suboptimization?

Ignoring downstream impacts of decisions for short-term gains

Improving manufacturing layout to minimize parts inventory

Automating order processing through the entire supply chain

Investing in two process improvements that improve the entire workflow

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Correct answer: Ignoring downstream impacts of decisions for short-term gains

Suboptimization occurs when a system is operating at less than its best and also not considering the effects of changes on the company as a result of projects. By ignoring downstream impacts of decisions for short-term gains, the overall system of an organization may be placed in jeopardy.

An optimized manufacturing layout to minimize or eliminate inventory is incorrect because it is part of an optimized systems approach. Automating order processing through the entire supply chain is also incorrect because it considers the entire system in developing the order. Investing in process improvements that improve the entire workflow is incorrect because it is an example of optimizing the systems approach, instead of investing in one area at the expense of decreasing performance in another.

35.

Walter has invited several top clients to visit his development laboratory and test the cockpit controls of his company's new VTOL flying car. What type of DFSS project is Walter working on?

DMADV; Design for Usability

DMADV; Design for Manufacturing

DMAIC; DOE

DMAIC; Design for Maintainability

Correct answer: DMADV; Design for Usability

In DMADV, the design for usability is determined by validation and whether it meets the prescribed purpose for the user. Hence, Walter is seeking validation from a select group of customers on the VTOL cockpit design.

Design for manufacturing includes identifying design changes that lead to reduction in manufacturing costs and efficiency improvements. DMAIC projects are intended to correct defects in existing processes.

36.

Which quality pioneer is credited with identifying the concept of the “hidden” plant?

Armand Feigenbaum

Joseph M. Juran

Walter Shewart

Genichi Teguchi

Correct answer: Armand Feigenbaum

Armand Feigenbaum identified the concept of the “hidden” plant where significant amounts of rework occur, correcting mistakes inside any existing plant.

One of Joseph M. Juran's major contributions was the Pareto principle. Walter Shewart is known as the creator of Plan-Do-Check-Act (PDCA). Genichi Teguchi is best known for the Taguchi loss function, which focuses on reducing variation around a target versus focusing on specification limits.

37.

Which of the following types of costs is not included in the cost-benefit analysis?

Interest costs

Internal failure costs

Appraisal costs

Prevention costs

Correct answer: Interest costs

The cost-benefit analysis includes prevention costs, appraisal costs, internal failure costs, and/or external failure costs. It does not include interest costs.

A cost-benefit analysis may also track the cost of quality, cost of poor quality, and cost of current quality.

38.

Walt has been studying how to improve a custom adhesive production process. After detailed cycle time analysis, he has identified the drum of the operation. Which problem-solving methodology should Walt employ to carefully manage flow through this unit?

Theory of constraints

Total productive maintenance

Value stream mapping

Kaikaku

Correct answer: Theory of constraints

The theory of constraints is a problem-solving methodology, which focuses on the weakest link in a chain of processes. The constraint is the slowest part of the process, which decreases the flow in a system that cannot be increased unless the constraint is removed or increases speed. The theory of constraints is composed of five system improvement steps: identify, exploit, subordinate, elevate, and repeat.

Total productive maintenance is a methodology that helps assure top productivity in every unit. This is not well-suited to managing a drum, which may require subordinate processes to experience downtime in order to limit WIP in front of the drum.

Value stream mapping develops a product flow map from supplier to customer in order to optimize flow. This tool was likely used by Walt to identify the drum.

Kaikaku involves rethinking component, manufacturing, or layout designs to obtain an evolutionary step change in performance, quality, or other important factor. Walt may ultimately conduct Kaikaku in a de-bottlenecking project, but this is not his initial focus.

39.

If a green belt were using a SWOT analysis, aging equipment would be categorized under which area?

Weaknesses

Strengths

Opportunities

Threats

Correct answer: Weaknesses

In a SWOT analysis, aging equipment is categorized under weaknesses. A SWOT analysis stands for strengths, weaknesses, opportunities, and threats. It is used to develop a focus for businesses as priorities. Since aging equipment is more likely to cause downtime issues, it would be considered a weakness. Other weaknesses may include high employee turnover and pricing.

Strengths would include concepts such as product mix, high-quality products, and online interfaces. Opportunities would include concepts such as long-term contracts, growth, and potential industry leadership. Threats would include components such as unstable market, unstable labor force, or competition from startups.

40.

Which of the following is a tool that defines the interaction between man and machine in producing a part, is useful in training new operators, and is useful in reducing variation in a process?

Standard work

Kaizen

Pull system

Total productive maintenance

Correct answer: Standard work

Standard work is a tool that defines the interaction between man and machine in producing a part, is useful in training new operators, and is useful in reducing variation in a process. Standard work is used to standardize time, inventories, and sequences of a process. ISO 9001 is a quality management system used to incorporate standardized work as an aspect of an organization's controlled documentation.

Kaizen is a term for improvement that involves short durations of intense process improvement over 3 to 5 days. Pull system is based on the pull, which is signaled by an empty bin or Kanban card. Total productive maintenance partners maintenance technicians with line workers to work as a team to reduce machine down time in a manufacturing or service environment.

41.

A system that uses a visual indicator to indicate the quantity of a supply is low or requires replenishment is called which of the following?

Kanban

Poka-yoke

TPM

Standard work

Correct answer: Kanban

Kanban is a system, which uses a visual indicator to indicate the quantity of a supply is low or requires replenishment. This system uses a kanban card, which is the signal for production to pull material from the previous step. The kanban system is also known as the pull system.

Poka-yoke stands for mistake proofing or error proofing. TPM stands for total productive maintenance, which is a maintenance program used to reduce machine down time. Standard work is used to standardize time, inventories, and sequences, of a process.

42.

Bryan, a green belt, is developing his project charter. Which element is not appropriate to include in this document?

How data will be collected

Success measures

A description of pain points

Expected project cost

Correct answer: How data will be collected

Requirements for a proper project plan include: project goals, stakeholders and sponsors, project cost and timeline, success measures, project costs, team members, deliverables, and milestones. A data collection plan is developed in the Define phase.

43.

In which phase of the DMAIC methodology would a green belt run a force-field analysis?

Define phase

Measure phase

Improve phase

Control phase

Correct answer: Define phase

In the Define phase, a Force Field analysis is used to help the team identify key factors that influence an outcome that is relevant to the project.

The measure phase includes management commitment, data collection plan identification, measurement systems management, data collection, variability identification, benchmarking, and the start cost of quality.

Improve phase is incorrect as it is characterized by use of improvement tools such as brainstorming.

Control phase sets controls into place and consists of the control plan.

44.

The philosophy of “management by walking around” is known as:

Gemba

A3

Jidoka

Kanban

Correct answer: Gemba

Gemba encourages firsthand observation of operational processes, and is also known as “Look and See.” A Green Belt should consider the location where an issue is occurring as a starting point for an improvement project.

A3 is a tool to give leadership a one-sheet review of a project, named for the size of paper used in Europe. Jidoka refers to automating repetitive jobs that potentially cause people injury over time. Kanban is a just-in-time inventory tool used to create a flow of materials through a process, usually through the use of a kanban cards.

45.

To increase the likelihood of success, what tool should leadership use to prepare for a Six Sigma deployment?

Advanced Quality Planning (AQP)

Quality Control/Quality Assurance (QC/QA)

Statistical Process Control (SPC)

Measurement System Analysis (MSA)

Correct answer: Advanced Quality Planning (AQP)

By using AQP, managers begin learning the methodology and tools themselves and engage the organization to make decisions based on data. They focus on training Green Belts to work on smaller projects, allowing Black Belts to be trained and utilized appropriately.

Quality control/quality assurance (QC/QA) is a type of specialist created to check for errors or defects at the end of a production process. Statistical process control (SPC) is the application of statistical methods to control a process and does not apply to how leadership does or does not work. Measurement system analysis (MSA) is a statistical tool used to assess the quality of data and does not apply to how leadership works.

46.

In regard to Takt Time, what sets the pace at which a product needs to be produced?

Expected customer demand

Production scheduling department

The production drum

Management planning

Correct answer: Expected customer demand

Takt Time is used to create the pace of manufacturing lines and production cycle times to ensure they are equivalent to demand rates from customers, and expected customer demand then creates the rate at which the product is produced.

The production scheduling department determines what is needed when shipping to the customer, but does not determine the pace.

The production drum, or the slowest production unit on the floor, may actually be a bottleneck and will need careful management as well as de-bottlenecking actions if this is the case.

Management planning impacts the production schedule for all aspects of production but does not set the pace.

47.

In regard to the theory of constraints, the adjustment of the rate of other processes in a process chain to match the pace of the constraint is known as which of the following?

Subordinate

Elevate

Repeat

Exploit

Correct answer: Subordinate

Subordinate is the adjustment of the rate of other processes in a process chain to match the pace of the constraint. This is also the adjustment required in quality improvement. The theory of constraints is a problem-solving methodology that contains five steps to system improvement, which include identify, exploit, subordinate, elevate, and repeat.

Elevate is a step in the theory of constraints where the constraints may require revision. Repeat is the step theory of constraint where the process is no longer the constraint. Exploit is the step of the theory of constraint where the rate of the constraint requires improvement.

48.

The cost-benefit analysis includes prevention costs, external failure costs, internal failure costs, and which of the following?

Appraisal costs

Markup costs

Rework costs

Environmental costs

Correct answer: Appraisal costs

The cost-benefit analysis includes prevention costs, external failure costs, internal failure costs, and appraisal costs. The cost-benefit analysis is also referred to as the cost of quality, quality cost, cost of poor quality, or cost of current quality. The cost-benefit analysis is a financial tool that allows an organization to look at its trends over time to see what it is doing.

Rework costs are not included in the cost-benefit analysis. Markup costs an economic cost, not a cost-benefit analysis component. Environmental costs are not included in a cost-benefit analysis.

49.

Which of the following is not likely to be Muda?

Management walking around the factory

Work-in-process

A borrowed tool from another bench

3.4 defects in a million pieces

Correct answer: Management walking around the factory

Muda is the Japanese term used to describe the eight categories of waste. The eight categories of waste include overproduction, excess motion, waiting, excess movement, rework, inventories, excess processing, and lost creativity. This includes work-in-process, borrowing tools from another bench (excess motion), and 3.4 defects per million pieces. Yes, even a six sigma process produces waste.

Management walking the factory floor, however, is likely a practice of Gemba.

Gemba is the Japanese term that means the real place. Visible presence of management often leads to improved employee morale and performance.

50.

Which of these would reduce time waiting?

Total productive maintenance

Additional employees

Delayed scheduling

Excess motion

Correct answer: Total productive maintenance

Total productive maintenance would reduce wait times by reducing equipment downtime or failure. Total productive maintenance is a program that organizations use to encourage maintenance technicians and line workers to work together to ensure that the equipment is well maintained in order to prevent downtime.

Additional employees would not remove constraints given the same number of lanes. Delayed scheduling has no control on volume. Excess motion is another form of non-value added activity.

51.

A website crashes during peak periods because it is unable to handle the load or volume. This example falls under what design factor in Six Sigma?

Design for scalability

Design for performance

Design for efficiency

Design for usability

Correct answer: Design for scalability

Design for scalability would include an example where a website crashes during peak periods because it is unable to handle the load or volume. In this example, the product or system was deployed without adequate scalability or anticipation of expansion or rapid adoption by users. The service needs surpassed the threshold for simultaneous users and surpassed the scope of the website.

Design for performance is compared to "cutting edge" and "latest and greatest" technology. Design for efficiency is a design where a product consumes minimal resources. Design for usability is an implied need in a product not normally stated explicitly in the requirements, but the user expects it to be there and its absence will impact the business. A website crash is not an example of usability; rather, design scalability.

52.

A problem-solving methodology that focuses on the weakest link in a chain of processes is known as:

Theory of Constraints

Lean

Value Stream Mapping

Kaizen

Correct answer: Theory of Constraints

The Theory of Constraints focuses on the removal of constraints, usually the slowest process in a sequence of processes, to increase throughput.

Lean is a methodology focused on adding value while eliminating waste. Value Stream Mapping is used to illustrate the movement of information, inventory, and material based on customer demand. Kaizen is improving processes through small incremental steps.

53.

The following components are commonly found in a just-in-time except which choice?

Heijunka

Kanban

Takt time

Standard work

Correct answer: Heijunka

While JIT aims to meet demand just as it comes in, heijunka works to level demand first. This makes production volume and mix more predictable despite changes or fluctuations in customer orders. As such, some work in process (WIP) will be experienced using heijunka, whereas it will not in JIT.

Kanban is another name used to represent a pull system. In this system, a kanban card is used to notify a buyer when an item needs to be purchased as the card indicates the quantity that should be ordered once a minimum level has been reached.

Takt time is a key enabler for JIT to work properly, as is standard work, which is a foundational element to all lean production systems.

54.

In Design for Six Sigma, the term "noise" refers to all of the following, **except**:

Sounds that occur during the production process

Things you can’t control in a manufacturing process

How customers use your product

A hurricane delaying shipment of the product

Correct answer: Sounds that occur during the production process

Noise in Design for Six Sigma is not considered sounds that occur during the production process.

Things you can’t control in a manufacturing process is incorrect as noise is considered uncontrollable. How customers use your product is also incorrect as this is an uncontrollable occurrence. A hurricane delaying shipment of your product is incorrect because this is also an item outside of your control.

55.

Which phase of 5S would involve a green belt developing work instructions in order to keep the work area clean and orderly?

Standardize

Sustain

Shine

Sort

Correct answer: Standardize

5S is an organizational tool used to improve the efficiency and management of workplace operations. 5S represents sort, set in order, shine, standardize, and sustain. During the Standardize phase of the 5S process, the green belt would develop a checklist following standards and work instructions in order to help keep the work area clean and orderly. This ensures progress achieved in previous stages is maintained and the benefits of 5S methodology can be maintained long-term.

The sustainment portion takes time and does not include developing checklists.

Shine simply involves cleaning the work area or equipment while sort means to remove unneeded items and remove those rarely used or not needed at all.

56.

What is a key feature distinguishing a process FMEA from a product FMEA?

Many times in manufacturing, an engineer or manager must work with what they have without knowing all aspects of the design intent

A product FMEA does not include impact

A process FMEA does not include detection

There really is no difference

Correct answer: Many times in manufacturing, an engineer or manager must work with what they have without knowing all aspects of the design intent

The correct answer is that many times in manufacturing, an engineer or manager must work with what they have without knowing all aspects of the design intent, whereas a product FMEA is usually conducted with full knowledge of design intent.

A product FMEA does not include impact and a process FMEA does not include detection are incorrect because they are included in all kinds of FMEAs. There really is no difference is incorrect because there are differences.

57.

What is the fundamental reason for doing an FMEA?

Forecast the highest likelihood of factors that could go amiss

Linkage of the design to the voice of the customer

Develop detailed design elements

Test and validate the design for design improvements

Correct answer: Forecast the highest likelihood of factors that could go amiss

The fundamental reason for doing an FMEA is to forecast the highest likelihood of factors that could go amiss. FMEA is a failure mode and effects analysis that studies the risks that are associated with a process. The aspects of risk include impact, probability, and event.

"Linkage of the design to the voice of the customer", "Develop detailed design elements", and "Test and validate the design for design improvements " are not reasons to perform an FMEA.

58.

When using the IDOV methodology, in which phase would you complete error proofing?

Optimize

Design

Identify

Validate

Correct answer: Optimize

When using the IDOV methodology you would complete error proofing in the optimize phase. The optimize phase develops detailed design elements to predict performance and it is when the team will assess process capabilities, optimize the design, error-proof the design, establish the statistical tolerance, and optimize sigma and cost.

Design phase is used to determine critical to quality variables. Identify phase is used to link the design to the voice of the customer. Validate phase is used for testing and validating the design.

59.

Which of the following is **not** a philosophical aspect of Six Sigma?

A management concept that helps managers at all levels monitor their results in their key areas

Use of teams that are assigned well-defined projects that have direct impact on the organization’s bottom line

Training in “statistical thinking” at all levels

Continual effort to reduce variation in all processes within the organization

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Correct answer: A management concept that helps managers at all levels monitor their results in their key areas

A management concept that helps managers at all levels monitor their results in their key areas is a description of a Balanced Scorecard approach, not Six Sigma.

Use of teams that are assigned well-defined projects that have direct impact on the organization’s bottom line, training in “statistical thinking” at all levels, and continual effort to reduce variation in all processes within the organization are all philosophical aspects of Six Sigma.

60.

For a process FMEA, what is an effect of failure?

The impact on the process outcome and product quality due to the failure mode

Something that causes the process to go bad

Any noise or light emitted from the process

The likelihood or frequency at which occurrence the cause can occur

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Correct answer: The impact on the process outcome and product quality due to the failure mode

The impact on the process outcome and product quality due to the failure mode is correct because it is a manner in which the process step could fail to perform its intended function.

Something that causes the process to go bad is incorrect because that is something that affects the process, it isn't an effect of the process. Any noise or light emitted from the process are special effects. The likelihood or frequency at which occurrence the cause can occur is the occurrence rating.

61.

Carl and his improvement team have decided to build a value stream map. He has directed his team members to measure all the activities below. Which measurement is the least valuable in building the map?

Quality summary

Production steps

Information flow

Semi-finished Inventory

Correct answer: Quality summary

A value stream map depicts the series of activities that occur within a value stream, which begins with the supplier(s) and ends with the customer(s). It is a method to show the flow of materials and information across the value stream and to highlight key areas where waste of time and materials occurs. Production steps, information flow, and semifinished inventory (work-in-process) are all valuable components of such a map. A quality summary has no real value in the map.

62.

Which of these is a value-added activity?

Product transformation

Defect correction

Overproduction

Inventory

Correct answer: Product transformation

Product transformation is a value-added activity because it changes or transforms a product into a form that has value for a customer. Value-added items are those in which the customer recognizes the value, product transformation occurs, or when the product or service is done right the first time.

Defect correction is a non-value added activity requiring rework. Overproduction is a non-value added activity, which involves storage and inventory. Inventory adds costs of storage, retrieval, and record keeping. Non-value-added processes are described by the Japanese concept of being useless, unnecessary, or idle called Muda.

63.

In a SWOT analysis, which area would a long-term contract be categorized?

Opportunity

Strength

Weakness

Threat

Correct answer: Opportunity

In a SWOT analysis, a long-term contract would be categorized as an opportunity. A long-term contract provides an organization with a long-term relationship with a customer, which will allow the organization an opportunity to grow. A SWOT analysis is a business tool used to list an organization's strengths, weaknesses, opportunities, and threats.

Strength would include components such as high-quality products and an online interface. Weakness would include items such as high employee turnover and aging equipment. Threat would include items such as competition from startups and an unstable market.

64.

In regard to performing an FMEA, the detection rating corresponds with which of the following?

Ability to notice the occurrence of the failure mode

Each effect the failure mode can cause

Willingness to correct the failure

Likelihood at which the cause can happen

Correct answer: Ability to notice the occurrence of the failure mode

In regard to performing an FMEA, the detection rating corresponds with the ability to notice the occurrence of the failure mode. The detection rating is rated using a scale from 1 to 10. A 1 would represent automated detection that rarely fails and a 10 would be no detection at all. The detection rating is used in conjunction with the severity rating and the occurrence rating to come up with the risk priority number, which is used to determine which process design carries the highest risk.

The severity rating corresponds with each effect the failure mode can cause. The occurrence rating corresponds with the likelihood at which the cause can happen. The willingness to correct the failure is incorrect, as it does not describe the detection rating.

65.

In the IDOV process, which phase of the model includes performing the FMEA?

Design

Optimize

Validate

Identify

Correct answer: Design

The FMEA is performed under the design phase of the IDOV model. It also includes formulating the concept design and developing the technical requirements and design parameters. IDOV is a four-phase process composed of the following phases: identify, design, optimize, and verify.

Optimize is characterized by an error proofing and optimizing design. Validate is used for prototype and test validation. Identify is used to identify customer and product requirements.

66.

Overall Equipment Effectiveness (OEE) is a product of all **except** which of the following?

Time

Availability

Performance

Quality

Correct answer: Time

The product of overall equipment effectiveness (OEE) does not include time.

OEE is measured by overall equipment availability, performance, and quality of output (OEE = A x P x Q). This is a standard metric used in organizations that have an established total productive maintenance program. Its purpose is to be a benchmark for an organization's continual improvement efforts.

67.

What three concepts are fundamental to understanding lean thinking?

Value, waste, creating value without waste

Lean, waste, value

Value stream, creating value without waste, mistake-proofing

Value, waste, mistake-proofing

Correct answer: Value, waste, creating value without waste

Lean thinking is based on the understanding of value, waste, and creating value without waste. Lean focuses on reducing waste and adding customer-defined value to products and services while promoting a culture of continuous improvement and development of all people in the organization.

The value stream is a series of activities that are performed in an organization and is not a fundamental concept. Mistake-proofing is a method of preventing errors.

68.

The quality function deployment (QFD) matrix aids in illustrating the linkage between the voice of the customer (VOC) and which of the following?

Resulting technical requirements

Return on investment

Capital requirements

Tasks and deliverables

Correct answer: Resulting technical requirements

The QFD matrix aids in illustrating the linkage between the VOC and the resulting technical requirements. QFD stands for quality function deployment. Quality function deployment links customer requirements to the features of products and processes. QFD is also referred to as the house of quality and its input is the VOC.

Return on investment is not a linkage to the voice of the customer. Capital requirements is irrelevant to the voice of the customer in terms of quality. Tasks and deliverables is incorrect as a linkage of the voice of customer; however, they are important for project management.

69.

Carl has been asked to improve the flow of the hamburger stand at 5th and Colfax, which has persistently been the lowest performer in the state. What is Carl's best initial action among the following selections?

Value stream mapping

Value stream analysis

Cost-benefit analysis

SIPOC

Correct answer: Value stream mapping

Value stream mapping is Carl's first and best choice to understand the current flow of the operation.

A value stream analysis is performed after value stream mapping and is used to determine hidden waste within an organization.

Cost-benefit analysis involves determining costs in terms of production.

A SIPOC would not provide the kind of flow information that Carl is seeking.

70.

In which phase of DMAIC would a Green Belt monitor the process to sustain gains?

Control

Measure

Analyze

Improve

Correct answer: Control

When the Control phase is reached, the initial identified issue has been resolved through robust data analysis and process changes, and the process will be monitored to ensure the improvements are sustained.

In the Measure phase, the data is collected from the process being studied. In the Analyze phase, the process is reviewed and data is analyzed for indications about the root causes. The Improve phase is focused on acting upon the conclusions determined from the Analyze phase to improve the process.

71.

What is the biggest initial opportunity target of a value stream analysis?

Inventory

Flow

Unneeded steps

Quality

Correct answer: Inventory

A value stream analysis helps a project team uncover hidden waste within an organization's process. A value stream represents the series of activities performed during a process. A value stream starts at the supplier's supplier and ends at the customer's customer. The first key revelation is the amount of inventory in the system. In lean production systems, inventory is considered a waste.

Secondary opportunities can then be the team's focus: flow optimization, removing unneeded steps in the process, and improvement of quality are all logical targets.

72.

The Risk Priority Number (RPN) in an FMEA provides data and direction on all the following considerations, except:

Which failure mode to work on first

The multiplied sum of Severity, Occurrence, and Detection

The failure modes that have the biggest potential for issues

A starting point for analyzing and selecting which failure modes to work on first

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Correct answer: Which failure mode to work on first

The Risk Priority Number (RPN) provides a value calculated by multiplying the Severity, Occurrence, and Detection numbers that directs teams to a point where they may begin their analysis.

The RPN identifies the failure modes that have the greatest potential for issues because the items with higher RPNs usually require attention.

The RPN also pinpoints where to begin analyzing which failure modes to work on first because a higher RPN directs the Green Belt to investigate further.

The RPN does not definitively tell you which failure mode to work on first because, based on rules for your industry or your organization, further analysis may be required. For example, an item with a low RPN number, but with a high Severity number may be the most critical item to address.

73.

Carlos and team celebrate the infusion of an artificial intelligence application, which was programmed to oversee the assemblage of a specific aircraft jet engine and ensure all fittings conform to tight military specifications. What lean tool was practiced in this circumstance?

Poka-yoke

Heijunka

Standard work

Andon

Correct answer: Poka-yoke

Poka-yoke is a Japanese term used to describe mistake proofing or error proofing and methods. This involves using items, tools, signs, or reminders that reduce the risk of human error. Using artificial intelligence helps to reduce this risk, which qualifies it as a poka-yoke approach.

Heijunka is a Lean method for reducing the unevenness in a production process and minimizing the chance of overburden.

Standard work is used to standardize time, inventories, and sequences of a process.

Andon is a visual management system used in Lean manufacturing to alert workers to production line issues in real time.

74.

All **except** which of the following activities are examples of one of the value stream components?

Placing an order for one metric ton of soda ash

Receiving a barge of acetone at the plant dock

Grinding old rubber tires into 5 mm pellets

Sending shipping advice to the customer's electronic portal

Correct answer: Placing an order for one metric ton of soda ash

Pricing and ordering from the supplier are not considered parts of the value stream as the value stream begins when materials are received from the supplier, not prior to order.

Receiving a barge of acetone at the dock is an example of flow of materials from receipt of supplier to delivery of finished goods.

Grinding old rubber tires into pellets is an example of the transformation of raw materials into finished goods.

Sending shipping advice to the customer's electronic portal is an example of the flow of information required to support the flow of material and transformation of goods.

75.

The risk priority number (RPN) is generated by calculating the detection, occurrence, and which of the following?

Severity

Criticality

Financial harm

Reduction

Correct answer: Severity

The RPN is generated by calculating the detection, occurrence, and severity. The risk priority number will determine which priorities should be addressed first and subsequent actions are developed to reduce the RPN. The RPN is calculated when completing an FMEA. The RPN is calculated by multiplying the severity, occurrence, and detection.

Criticality is a consideration of severity, but is not a stand-alone consideration.

Financial harm may also be a severity consideration.

Reduction does not factor in the calculation of RPN.

76.

All **except** which of the following would define a value-added step in lean?

The product has to be reworked

The customer recognizes a product's value

The process step transforms the product

The job is done properly the first time

Correct answer: The product has to be reworked

When a product has to be reworked, it is not considered a value-added step because it is causing waste. Customers do not want to have to pay for or wait on an item to be fixed when the rework is not changing the form or function of the item.

The remaining choices define value-added steps in a lean process. This includes the customer recognizes a product's value, the process step transforms the product, and the job is done properly the first time. A customer determines an item's value by its usefulness and necessity.

77.

Which of these is **not** an aspect of what Takt Time measures?

How much time it takes an operator to touch a product

Rate at which products must be finished to match customer demand

A measure of customer demand

The time between the completion of the products

Correct answer: How much time it takes an operator to touch a product

How much time it takes an operator to touch a product is not an aspect of Takt time. Takt time, often referred to by lean practitioners as the heartbeat of the process, is a measure of customer demand.

Takt time can be the rate at which products must be finished to match customer demand, can be a measure of customer demand, and can be the time between the completion of the products.

78.

Which of these is likely to be the most fundamental challenge to a Six Sigma project?

Lack of organizational support or commitment

Lack of technical proficiency

Lack of change management support

Insufficient data

Correct answer: Lack of organizational support or commitment

Lack of organizational support or commitment is correct because without organizational support, projects simply cannot get moving.

Technical proficiency is often a concern, however, with organizational support, the challenge is commonly solved.

The next largest challenge to a Six Sigma project has to be change management support. Too often worthy projects are completed and in the Control phase when management focus changes and control procedures become lost.

Insufficient data is the least of concerns, as this challenge almost always exists. With support and using the process of Six Sigma, proper data is generated.

79.

Which of the following is a lean tool that provides visual feedback using red, yellow, and green lights to indicate production status?

Andon

A3

5S

Poka-yoke

Correct answer: Andon

Andon is a lean tool that provides visual feedback using red, yellow, and green lights to indicate production status. An andon provides supervisors and operators an alerting system when a process is not functioning appropriately.

An A3 is a lean tool used to provide management a one-sheet overview of a project's key issues. 5S is a lean tool used for workplace organization and represents sort, set in order, shine, standardize, and sustain. Poka-yoke is a lean tool used for mistake-proofing or error-proofing a process.

80.

The theory of constraints includes all **except** which of the following steps to system improvement?

Measure

Exploit

Subordinate

Elevate

Correct answer: Measure

Measure is incorrect as it is not included in the five steps of the theory of constraints. Measure is a step of the DMAIC process.

The theory of constraints includes identify, exploit, subordinate, elevate, and repeat. The theory of constraints is a problem-solving tool that identifies and focuses on the weakest element within a process.

81.

Which model is used when a product or process is **not** in existence and needs to be developed?

DMADV

Design For Manufacturing

DOE

CTQ

Correct answer: DMADV

DMADV is used when a product or process is not in existence and needs to be developed. DMADV stands for define, measure, analyze, design, and verify. During the design phase of DMADV, the team will design for cost, manufacturing, test, maintainability, robustness, usability, extended functionality, efficiency, performance, security, scalability, agility, and compliance.

Design For Manufacturing might well be part of DMADV project, but by itself it doesn't constitute an improvement model.

DOE stands for design of experiments and is an analysis tool.

CTQ is not a methodology; it stands for critical to quality, which are elements important to the customer.

82.

In regard to DMADV's design for robustness, life cycle tests are performed on parts and assemblies, and suppliers should document which of the following?

Mean time between failures

Robustness of the process

Mean time to next piece

Mean time after failures

Correct answer: Mean time between failures

In regard to DMADV's design for robustness, life cycle tests are performed on parts and assemblies, and suppliers should document the mean time between failures or the mean time to failures. Mean time to failures is used for non-repairable items and mean time between failures is used for repairable items. The DMADV approach is used instead of the DMAIC approach when a process needs to be developed.

Robustness of the process is not required to be documented for the design for robustness. Mean time to next piece is not a supplier metric. Mean time after failures is not a supplier metric.

83.

Which of these quality approaches is a management concept that helps managers at all levels to monitor the results in their key areas?

Balanced scorecard

Benchmarking

Six Sigma

TQM

Correct answer: Balanced scorecard

Balanced scorecard is a management concept that helps managers at all levels to monitor the results in their key areas. The balanced scorecard is a commonly used quality approach used by businesses to measure critical business measures chosen by the organization. The four key areas measured on the balanced scorecard are financial, customer, internal processes, and employee learning and growth.

Benchmarking is an improvement process where a company measures their performance against best-in-class companies.

Six Sigma is a methodology for improvement of processes, not a monitor.

TQM, or Total Quality Management, focuses on continuously improving an organization's products and services and thus is not as broad an approach as balanced scorecard in its performance metrics.

84.

What is the main purpose of analyzing the value stream?

Identify wastes in the process

Improve the profitability of the process

Calculating the takt time

Understanding machine uptime

Correct answer: Identify wastes in the process

Analyzing the value stream is an opportunity to identify non-value-added steps, or wastes, which are usually hidden until the analysis occurs.

Improving the profitability of the process is incorrect because, while eventually this may occur based on the removal of wastes, it is not the purpose of the analysis.

While calculating takt time and understanding machine uptime are valuable outcomes of value stream mapping, the main outcome sought after is the identification of waste in the system.

85.

The concept of linking company goals and work plans to long-term strategies of the organization is known as:

Hoshin planning

SMART goals

Poka-yoke

Deming cycle

Correct answer: Hoshin planning

With Hoshin planning, a company develops multiple vision statements that suggest where they should be in the next five years. Goals and work plans for the company are created based on each of the vision statements.

SMART goals are a guide for how to write goals — SMART is an acronym that stands for Specific, Measurable, Achievable, Realistic, and Time-bound. Poka-yoke is the practice of "mistake-proofing" a design or process to eliminate the possibility of making an error. The Deming cycle is the evolution of Plan-Do-Check-Act into W. Edward Deming's version of Plan-Do-Study-Act.

86.

Which phase(s) of the DMAIC methodology would a green belt conduct an FMEA?

Measure, Improve and Control phases

Analyze phase

Define and Analyze phases

Define phase

Correct answer: Measure, Improve and Control phases

The FMEA is used to identify failure modes and their causes and effects for systems and processes. The DMAIC model represents define, measure, analyze, improve, and control. The FMEA can be used in the Measure, Improve or Control phases.

The Analyze phase is used to find root causes. Define phase consists of the project charter and defining the problem using systems thinking.

87.

Carl has spent two weeks measuring takt time in his polyester yarn production facility. What is the most likely reason Carl has developed this measurement?

To identify the appropriate production rate

To determine the total resources required for a production line

To identify unnecessary handling steps that are wasteful of company money

To determine pipeline capacity

Correct answer: To identify the appropriate production rate

Takt time is the measurement of customer demand. In other words, how quickly a production facility's output is consumed in the marketplace. Carl is attempting to level the plant's production in order to maximize customer service while minimizing company investment in inventory.

Determining total resources required for a production line is not the purpose of takt time.

Optimizing handling steps is an important part of leaning out floor production, but is not directly connected to takt time.

Determining pipeline capacity is incorrect because is an engineering analysis not connected with takt time.

88.

Which of the following occurs when a kanban system is used?

The process produces when there is a pull from the subsequent process

The process produces when there is a push from the subsequent process

Both a push and a pull must occur

None of these

Correct answer: The process produces when there is a pull from the subsequent process

The kanban system is also known as the pull system. The process produces based on the pull, which is signaled by an empty bin or kanban card. The kanban card will indicate what and how much should be ordered once the minimum quantity has been reached. This prohibits waiting and overproduction.

The process produces when there is a push from the subsequent process is incorrect because it must be a pull. Both a push and a pull must occur is incorrect because it is only a pull.

89.

Which of the following is **not** true when dealing with both Process FMEAs and Product FMEAs?

Rare occurrences are rated differently

Process experts should be present when creating design FMEAs and design experts should be present in creating process FMEAs

A team approach has proven to be the most effective method for both

Each Process FMEA and Product FMEA has a Risk Priority Number

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Correct answer: Rare occurrences are rated differently

Both Process FMEA and Product FMEA rate occurrence in a similar manner.

It is important to have process experts present in design FMEA and design experts in process FMEA. A team approach has proven to be the most effective method for both Process and Product FMEAs. Each Process FMEA and Product FMEA does have a Risk Priority Number.

90.

Using a traceability matrix, which example would be used with a design objective of maintainability?

A modular approach

Point of sale transaction system

Password encryption

User applying software

Correct answer: A modular approach

A modular approach is an example of a design objective of maintainability. In maintainability, a user would be able to replace modules faster themselves. The replacement would become the design objective.

Point of sale transaction system and the design objective would be efficiency. Password encryption and the design objective would be security. A user applying his own software would be associated with the design objective of extended functionality.

91.

Which of these activities would be performed in the optimize phase of the IDOV process?

Design for robust performance and reliability

Identify the customer requirements

Formulate the concept design

Prototype and test

Correct answer: Design for robust performance and reliability

Design for robust performance and reliability is performed in the optimize phase of the IDOV process. The optimize phase develops detailed design elements to predict performance, and it is when the team will assess process capabilities, optimize the design, error-proof the design, establish the statistical tolerance, and optimize sigma and cost.

Identify the customer requirements is done in the identify phase. Formulate the concept design is done in the design phase. Prototype and test is done in the validate phase.

92.

The five steps of the theory of constraints include all **except** which of the following?

Reprocess

Identify

Exploit

Elevate

Correct answer: Reprocess

Reprocess is not one of the five steps in the theory of constraints.

The theory of constraints (TOC) is a management paradigm that views any manageable system as being limited in achieving more of its goals by a very small number of constraints. The steps in the theory of constraints include identify, exploit, subordinate, elevate, and repeat. Identify finds the process that limits the system. Exploit uses methods to improve the process. Subordinate alters the rates of processes in the chain to match the constraint. Elevate is used if the system needs further improvement. The steps are repeated until the constraint no longer exists.

93.

What are the two primary focuses for an FMEA?

Design and process

Develop and verify

Identify and process

Develop VOC and determine risk

Correct answer: Design and process

The two primary focuses for a Failure Mode and Effects Analysis (FMEA) are design and process. An FMEA is used to ensure the design can be produced in a cost-effective manner. Both the design and the process should be analyzed to improve both the process and design cost and reliability are optimal. An FMEA is used in order to predict the highest likelihood of the factors that could go amiss during the design or process.

The primary focuses of an FMEA do not include develop, verify, identify, or develop VOC. An FMEA is a risk analysis tool, so it does focus on determining risk but not developing VOC.

94.

A process is **not** considered value-added if:

It requires rework

Finished product from the process doesn't sell well in the marketplace

It changes or transforms the product

It is done right the first time

Correct answer: It requires rework

Any process that requires corrections caused by errors is not considered value-added; they are considered non-value-added.

Value-added process steps include the customer recognizing the value of the steps, the process changing or transforming the product itself, and the process being completed correctly the first time. Even if products from the process may not sell well in the marketplace, that is not the fault of the process.

95.

Quality pioneer, Taguchi, taught that any departure from the nominal or target value for a characteristic represents which of the following?

A loss to society

An opportunity

A statistical change

A design integrity flaw

Correct answer: A loss to society

Taguchi taught that any departure from the nominal or target value for a characteristic represents a loss to society. He identified that any rework was a loss to society as there was an associated cost for the rework of an inferior product. Taguchi's key contributions to Six Sigma included the Taguchi loss function, the philosophy of off-line quality control, and the innovations in the statistical design of experiments.

Opportunity, statistical change, and design integrity flaw are incorrect as they were not terms that Taguchi associated with the departure from the nominal or target value.

96.

In regard to performing an FMEA, the severity rating corresponds with which of the following?

Each effect the failure mode can cause

Willingness to correct the failure

Likelihood at which the cause can happen

Ability to notice the occurrence of the failure mode

Correct answer: Each effect the failure mode can cause

In regard to performing an FMEA, the severity rating corresponds with each effect the failure mode can cause. The severity rating is rated using a scale from 1 to 10, with 10 being the highest severity. The severity rating is used in conjunction with the occurrence rating and the detection rating to come up with the risk priority number, which is used to determine which process design carries the highest risk.

The occurrence rating corresponds with the likelihood at which the cause can happen. The detection rating corresponds with the ability to notice the occurrence of the failure mode. The willingness to correct the failure is incorrect, as it does not describe the severity rating.

97.

Which of these quality pioneers is credited with developing the "Fourteen Points" and PDCA?

W. Edwards Deming

Walter Shewhart

Philip Crosby

Armand Feigenbaum

Correct answer: W. Edwards Deming

W. Edwards Deming developed the Fourteen Points and PDCA cycle and emphasized the need for changes in management structure and attitude. Deming's Fourteen Points were published in his book Out of the Crisis. Deming is also known for his Seven Deadly Diseases, the red bead experiment, the Deming Prize, and his system of profound knowledge.

Walter Shewhart developed control charts for processes. Philip Crosby wrote the book called Quality is Free and originated the zero defects concept. Armand Feigenbaum originated total quality control and wrote a book called Total Quality Control in 1950.

98.

Installing alarms when machines overheat and automatic switches to turn off home coffee makers after a period of time are examples of which lean tool?

Poka-yoke

Standard work

Single-Minute Exchange of Die (SMED)

Drum-Buffer-Rope (DBR)

Correct answer: Poka-yoke

Poka-yoke is a Japanese term for mistake-proofing or error-proofing. It includes using tools to prevent errors from occurring.

Standard work is work instructions that define how people and machines producing a part interact. Single-Minute Exchange of Die (SMED) is the rapid changeover to convert one operating process to the next. Drum-Buffer-Rope (DRM) is a tool used to prevent long lead times by slowing the entire process to the rate of the slowest with a buffer based on the specific processes.

99.

What waste is typically caused by poor workplace layout, which may include awkward placement of supplies and equipment?

Excess motion

Inventory

Waiting

Excess movement of materials/transportation

Correct answer: Excess motion

Excess motion is waste, or muda, that may be a result of poor workplace layout, which creates wasted time searching for equipment and supplies, or moving items between locations.

Inventory is waste resulting from incurred costs to store and maintain in-process or finished goods and raw materials. Waiting may be caused by shipment delays, setup times that are long, or missing resources. Excess movement of materials/transportation may be caused by poor facility layout.

100.

A data collection plan should be part of which phase of your DMAIC project?

Measure

Define

Analyze

Improve

Correct answer: Measure

A data collection plan must be identified during the Measure phase in order to adequately determine what data is needed, who will collect it, and how, where, and when it will be gathered.

The Define phase is dedicated to understanding the problem itself — data should not be collected until the problem is clear. In the Analyze phase, the data is ready to be reviewed and examined. In the Improve phase, the focus is on taking action to correct the initial problems.