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True/False

1. Six Sigma quality is a statistical measure that equates to only 3.4 defects per million.

Ans: True
Difficulty: Moderate
Feedback: Six Sigma

2. Before Six Sigma quality levels in the United States were generally measured in defects per hundred.

Ans: True
Difficulty: Moderate
Feedback: Six Sigma

3. Six Sigma is a recognized quality program based strictly on statistical process control.

Ans: False
Difficulty: Easy
Feedback: Six Sigma

4. Companies that have adopted Six Sigma view it as a short-term strategy for quality improvement.

Ans: False
Difficulty: Easy
Feedback: Six Sigma

5. The fundamental objective of Six Sigma is to focus on improvement through by reducing process variation.

Ans: True
Difficulty: Moderate

Feedback: Six Sigma

6. Globalization and foreign competition began to change consumer's attitudes towards quality in the 1950s.

Ans: False
Difficulty: Easy
Feedback: The Focus of Quality Management

7. Toyota achieved high product quality by adapting many of the quality management principles that had first been developed in the United States.

Ans: True
Difficulty: Moderate
Feedback: Quality Management Systems

8. From the producer's perspective quality is determined by what the consumer wants and is willing to pay for.

Ans: False
Difficulty: Easy
Feedback: Quality Management Systems

9. How well the product or service does what it is intended to do is known as quality of design.

Ans: False
Difficulty: Easy
Feedback: What is Quality?

10. The degree to which quality characteristics are designed into the product is known as quality of design.

Ans: True
Difficulty: Easy
Feedback: What is Quality?

11. Quality of performance relates to the basic operating characteristics of a product.

Ans: True
Difficulty: Easy
Feedback: What is Quality?

12. The degree to which a product meets preestablished standards is known as quality of conformance.

Ans: True
Difficulty: Easy
Feedback: What is Quality?

13. The courtesy and competence of the repair person can be one aspect of maintainability.

Ans: False
Difficulty: Easy
Feedback: What is Quality?

14. The probability that a product will operate properly within an expected time frame is known as quality of performance.

Ans: False
Difficulty: Moderate
Feedback: What is Quality?

15. The dimension of quality related to the life-span of a product before replacement is known as durability.

Ans: True
Difficulty: Moderate
Feedback: What is Quality?

16. Service quality is more directly related to the interaction between customer and employee than is manufacturing quality.

Ans: True
Difficulty: Moderate
Feedback: Quality in Services

17. Training, supervision, and control are important elements in achieving quality of conformance.

Ans: True
Difficulty: Easy
Feedback: What is Quality?

18. The consumer makes the final judgment regarding quality.

Ans: True
Difficulty: Easy
Feedback: What is Quality?

19. Quality characteristics included in the product's design must be balanced against production costs.

Ans: True
Difficulty: Moderate
Feedback: The Focus of Quality Management

20. Deming advocated continuous process improvement to reduce variability and achieve conformance to design specifications.

Ans: True
Difficulty: Moderate
Feedback: Quality Management Systems

21. Deming emphasized final product inspection as a way to improve process quality.

Ans: False
Difficulty: Easy
Feedback: Quality Management Systems

22. Deming advocated the elimination of both common cause and special cause variation as a way to improve a process.

Ans: True
Difficulty: Moderate
Feedback: Quality Management Systems

23. Deming emphasized the use of statistical quality control techniques to reduce variability in the output of a process..

Ans: True
Difficulty: Easy
Feedback: Quality Management Systems

24. Deming believed that only employees are responsible for improving quality.

Ans: False
Difficulty: Easy
Feedback: Quality Management Systems

25. The Deming Wheel is also known as the plan-do-check-act (PDCA) cycle.

Ans: True
Difficulty: Easy
Feedback: Quality Management Systems

26. Total quality management represents a set of management principles that focus on quality improvement in all the functional areas within a company.

Ans: True
Difficulty: Easy
Feedback: TQM and QMS

27. The training and education of all employees on quality improvement is a basic principle of total quality management.

Ans: True
Difficulty: Easy
Feedback: The Role of Employees

28. One principle of total quality management (TQM) is that middle management is solely responsible for providing the leadership for quality.

Ans: False
Difficulty: Moderate
Feedback: The Role of Employees

29. With Six Sigma the project team leader is known as a Black Belt

Ans: True
Difficulty: Hard
Feedback: Six Sigma

30. With Six Sigma a teacher and mentor is known as a Green Belt

Ans: False
Difficulty: Moderate
Feedback: Six Sigma

31. The cost of measuring, testing, and analyzing are collectively known as appraisal costs.

Ans: True
Difficulty Hard
Feedback: The Cost of Quality

32. Customer complaint costs are an example of external failure costs

.Ans: True
Difficulty: Moderate
Feedback: The Cost of Quality

33. ISO 9000 certification is a major consideration for doing business within the United States.

Ans: False
Difficulty: Moderate
Feedback: ISO 9000

35. Statistical process control monitors and controls quality for both qualitative and quantitative variables.

Ans: True
Difficulty: Hard
Feedback: Quality Tools

36. Today total quality management has been displaced by quality management systems.

Ans: True
Difficulty: Hard
Feedback: TQM and QMS

37. Six Sigma is a one of several well known quality management systems.

Ans: True
Difficulty: Easy
Feedback: TQM and QMS

38. Companies that satisfy its customer quality requirements often require the commitment of their suppliers.

Ans: True
Difficulty: Hard
Feedback: The Focus of Quality Management

39. Most members of a supply chain understand the importance of high quality because they are both customers and suppliers.

Ans: True
Difficulty: Moderate
Feedback: The Focus of Quality Management

40. Some companies enter into long term relationships with suppliers who in return commit to meeting only delivery deadlines.

Ans: False
Difficulty: Easy
Feedback: The Focus of Quality Management

41. Employees' role in quality management is becoming less important because of the implementation of strong quality management systems.

Ans: False
Difficulty: Moderate
Feedback: The Role of Employees

42. Two team approaches to improvement are quality circles and process improvement teams.

Ans: True
Difficulty: Moderate
Feedback: The Role of Employees

43. Benchmarking involves comparing a company's quality to the best level of quality achieved by another company in the same industry.

Ans: True

Difficulty: Moderate
Feedback: Quality in Services

44. McDonald's has a reputation for high-quality service resulting from the application of quality management principles.

Ans: True
Difficulty: Moderate
Feedback: Quality in Services

45. Quality management principles often do not apply to services because the customer has lower quality expectations.

Ans: False
Difficulty: Moderate
Feedback: Quality in Services

Multiple Choice

34. Which of the following is not a dimension of quality for a manufactured good?
    a. performance
    b. reliability
    c. courtesy
    d. durability

Ans: c
Difficulty: Easy
Feedback: What is Quality?

35. The probability that a product will operate properly within an expected time frame is the dimension of quality known as
    a. durability
    b. reliability
    c. performance
    d. serviceability

Ans: b
Difficulty: Easy
Feedback: What is Quality?

36. The degree to which a product meets preestablished standards is known as
    a. conformance
    b. performance
    c. reliability
    d. none of the above

Ans: a
Difficulty: Easy
Feedback: What is Quality?

37. Making sure that the product meets the design specifications during production is referred to as
    a. quality of design
    b. process capability
    c. fitness for use
    d. quality of conformance

Ans: d
Difficulty: Easy
Feedback: What is Quality?

38. _____ advocated continuous improvement to the production process to achieve conformance to specifications and reduce variability.
    a. W. Edwards Deming
    b. Philip Crosby
    c. Kaoru Ishikawa
    d. Frederick Taylor

Ans: a
Difficulty: Moderate
Feedback: Quality Management System

39. W. Edwards Deming believed that primary responsibility for quality improvement rested with

a. the firm's employees only
b. the form's management only
c. research engineers and consulting statisticians only
d. both the employees and management of the firm

Ans: d
Difficulty: Moderate
Feedback: Quality Management System

40. W. Edwards Deming's overall philosophy for achieving quality is embodied in
a. his 14 points
b. his statement of purpose
c. his use of statistical control
d. none of the above

Ans: a
Difficulty: Easy
Feedback: Quality Management Systems

41. A relationship between a firm and its supplier where the supplier agrees to meet the firms' quality standards and the firm enters into a long-term purchasing agreement with the supplier is known as
a. outsourcing.
b. vertical integration.
c. partnering.
d. conformance.

Ans: c
Difficulty: Moderate
Feedback: The Focus of Quality Management - Customers

42. Directly involving employees in the quality-management process is referred to as
a. partnering
b. a quality circle
c. Six Sigma
d. participative problem solving

Ans: d
Difficulty: Easy
Feedback: The Role of Employees in Quality Improvement

43. A production process consists of the following four stages with the average percentage of good quality at each stage as shown

| Stage | Average Percentage of Good Quality |
|---|---|
| 1 | 0.92 |
| 2 | 0.95 |
| 3 | 0.96 |
| 4 | 0.93 |

What is the daily production yield for the company if daily input is 200 units?

a. 192 units
b. 188 units
c. 184 units
d. 156 units

Ans: d
Difficulty: Hard
Feedback: The Effect of Quality Management on Productivity

44. A production process consists of the following four stages with the average percentage of good quality at each stage as shown

| Stage | Average Percentage of Good Quality |
|---|---|
| 1 | 0.92 |
| 2 | 0.95 |
| 3 | 0.96 |
| 4 | 0.93 |

How many units must the company put into production each day to achieve a daily yield of 100 good units?

a. approximately 128 units
b. approximately 108 units
c. approximately 106 units
d. approximately 104 units

Ans: a
Difficulty: Hard
Feedback: The Effect of Quality Management on Productivity

45. A production process consists of the following four stages with the average percentage of good quality at each stage as shown

| Stage | Average Percentage of Good Quality |
|---|---|
| 1 | 0.95 |
| 2 | 0.95 |
| 3 | 0.93 |
| 4 | 0.97 |

What is the daily production yield for the company if daily input is 500 units?

a. 485 units
b. 465 units
c. 407 units
d. 400 units

Ans: c
Difficulty: Hard
Feedback: The Effect of Quality Management on Productivity

46. A production process consists of the following four stages with the average percentage of good quality at each stage as shown

| Stage | Average Percentage of Good Quality |
|---|---|
| 1 | 0.95 |
| 2 | 0.95 |
| 3 | 0.93 |
| 4 | 0.97 |

How many units must the company put into production each day to achieve a daily yield of 350 good units?

a. approximately 430 units
b. approximately 415 units
c. approximately 468 units
d. approximately 361 units

Ans: a
Difficulty: Hard
Feedback: The Effect of Quality Management on Productivity

47. All of the following are dimensions of quality for manufactured products, except:
a. Conformance
b. Reliability
c. Durability
d. Feasibility

Ans: d.
Difficulty: Moderate
Feedback: What is Quality?

48. All of the following are parts of DMAIC, except:
a) Define
b) Measure
c) Analyze
d) Improvise

Ans: d.
Difficulty: Moderate
Feedback: Six Sigma

49. All of the following are part of DMAIC except:
a) Improve
b) Control
c) Measure
d) Implement

Ans: d.
Difficulty: Moderate
Feedback: Six Sigma

50. The costs associated with developing a quality management system are known as:
a) Training costs
b) Design costs
c) Quality planning costs
d) Information costs

Ans: c.
Difficulty: Moderate
Feedback: The Cost of Quality

51. _____ failure costs include scrap, rework, and downtime.
a) External
b) Internal
c) Process
d) System

Ans: b.
Difficulty: Moderate
Feedback: The Cost of Quality

52. Which of the following quality tools display major causes of poor quality on a graph?
a. Process flow chart
b. Fishbone diagram
c. Histogram
d. Scatter diagram

Ans: b
Difficulty: Moderate
Feedback: Quality Tools

53. Which of the following quality tools display the frequency of data related to a quality problem?
a. Fishbone diagram
b. Histogram
c. Scatter diagram
d. Process flow chart

Ans: b
Difficulty: Moderate
Feedback: Quality Tools

54. Which of the following quality tools display the relationship between two variables on a graph
a. Process flow chart
b. Fishbone diagram
c. Histogram
d. Scatter diagram

Ans: d
Difficulty: Moderate
Feedback: Quality Tools

55. Which of the following quality tools display the steps in a process on a graph
a. Process flow chart
b. Fishbone diagram
c. Histogram
d. Scatter diagram

Ans: a
Difficulty: Moderate
Feedback: Quality Tools

Short Answer

56. Briefly discuss four dimensions of quality a consumer looks for in manufactured products.

Student answers will vary depending of the dimensions they select. Among the dimensions that could be discussed are:
a. Performance: the basic operating characteristics of a product.
b. Features: the extra items added to the basic features
c. Reliability: the probability that a product will operate properly within an expected time frame.
d. Conformance: the degree to which a product meets preestablished standards.
e. Durability: how long the product lasts before it must be replaced.
f. Serviceability: the ease, speed, and facility of the repair process.
g. Aesthetics: how the product looks, feels, smells, sounds, or tastes.
h. Safety: assurance that the customer will not suffer injury or harm from a product.
i. Other: subjective perceptions based on brand name, advertising, etc.

57. What is quality of conformance from the producer's perspective and how can it be achieved?

Once the product design has been determined, the producer perceives quality to be how effectively the production process is able to conform to the specifications

required by the design. This is referred to as quality of conformance. What this means is quality during production focuses on making sure that the product meets the specifications required by the design. From the producer's perspective, good-quality products conform to specifications—they are well made. Achieving quality of conformance depends on a number of factors, including the design of the production process (distinct from product design), the performance level of machinery, equipment and technology, the materials used, the training and supervision of employees and the degree to which statistical quality- control techniques are used.

58. Briefly discuss the principles associated with total quality management (TQM).

Total quality management represents a set of management principles that focus on quality improvement as the driving force in all functional areas and at all levels in a company. These principles are:

a. the customer defines quality and customer satisfaction is the top priority,
b. top management must provide the leadership for quality,
c. quality is a strategic issues and requires a strategic plan,
d. quality is the responsibility of all employees in the organization,
e. all functions of the company must focus on continuous quality improvement to achieve strategic goals,
f. quality problems are solved through cooperation among employees and management,
g. problem solving and continuous quality improvement use statistical quality control methods, and
h. training and education of all employees are the basis for continuous quality improvement.

59. What is Kaizen and what role do employees play in Kaizen?

Kaizen is the Japanese word for continuous improvement, not only in the workplace but also in one's personal life. Ion the workplace kaizen means involving everyone in a process of gradual, organized, and continuous improvement. Every employee in the organization should be involved in working together to make improvements. If an improvement is not a part of a continuous, ongoing process it is not considered kaizen. Employees are most directly involved in kaizen when they are determining solutions to their own problems. Employees are the real experts in their immediate workspace. In its most basic form kaizen is a system in which employees identify many small improvements on a continual basis and implement these improvements themselves. Every employee is encouraged to be involved in the improvement process so that all employees fell that they are participating in quality improvements and remain excited about their jobs. All six sigma and TQM programs need this level of involvement to be successful.

60. What is a Six Sigma quality program?

A Six Sigma program is fundamentally a very organized and detailed process for improving quality. There is little doubt that Six Sigma is a direct descendant of the philosophy and principles of TQM. In its simplest form Six Sigma is based on Deming's PDCA cycle and Juran's assertion that "all quality improvement occurs on a project-by-project basis". Six Sigma is a process for developing and delivering near perfect products and services. The main idea is that if the number of defects in a process can be measured then it can be systematically determined how to eliminate them and get as close to zero defects as possible. In Six Sigma "as close to zero as possible" translates into a statistically-based numerical goal of 3.4 defects per million opportunities (DPMO), which means defects have been nearly eliminated. Through the reduction of variation of all processes, the overall performance of the company will be improved and significant cost savings will be realized.

61. Briefly discuss the costs are associated with achieving good quality.

The costs of a quality management program are prevention costs and appraisal costs. Prevention costs are the costs of trying to prevent poor-quality products from reaching the customer. Prevention reflects the quality philosophy of "do it right the first time", the goal of a quality management program. Examples of prevention costs include quality planning costs, product design costs, process costs, training costs, and information costs. Appraisal costs are the costs of measuring, testing, and analyzing materials, parts, products, and the production process to ensure that product quality specifications are being met. Examples of appraisal costs include inspection and testing, test equipment costs, and operator costs.

62. Briefly discuss the cost of poor quality.

Costs associated with poor quality are also referred to as the cost of nonconformance, or failure costs. The cost of poor quality can be categorized as internal failure costs or external failure costs. Internal failure costs are incurred when poor-quality products are discovered before they are delivered to the customer. Examples of internal failure costs include scrap costs, rework costs, process failure costs, process downtime costs, price-downgrading costs. External failure costs are incurred after the customer has received a poor-quality product and are primarily related to customer service. Examples of external failure costs include customer complaint costs, product return costs, warranty claims costs, product liability costs, and lost sales costs.

63. Briefly describe various six sigma tools and give an example of the use of each.
QFD, Cause and Effect Matrix, FMEA, SPC, T-Tests, and DOE should all be discussed and related to quality management in particular and as a critical part of contemporary operations and supply chain management