

PRACTICE EXAM 5: FE INDUSTRIAL AND SYSTEMS SIMULATION (110 QUESTIONS)

This practice exam contains 110 questions. Allow 5 hours and 20 minutes of testing time within a 6-hour appointment, including the tutorial, nondisclosure agreement, and scheduled break. Use the supplied FE Reference Handbook where appropriate. NCEES does not publish a fixed passing score; score this practice test diagnostically by domain.

1. A rectangular storage area is 18 m long and 7 m wide. What is its area? Use a reference quantity of 2 in the same units as the raw result. What dimensionless result-to-reference index is obtained?

- A. 72.45 index
- B. 63.00 index
- C. 53.55 index
- D. 81.90 index

2. For $f(x)=3x^2+4x-2$, what is $f'(5)$? For benchmarking, divide the calculated result by a same-unit reference value of 4. What benchmark index results?

- A. 9.78 index
- B. 7.22 index
- C. 11.05 index
- D. 8.50 index

3. What is the determinant of the matrix $\begin{bmatrix} 6 & 2 \\ 3 & 5 \end{bmatrix}$? Normalize the ordinary result against a reference magnitude of 5. What dimensionless normalized index should be reported?

- A. 5.52 index
- B. 4.80 index

- C. 4.08 index
- D. 6.24 index

4. Evaluate the definite integral of $4x$ from $x=1$ to $x=4$. The comparison metric equals the raw calculated value divided by the same-unit baseline 8. What metric results?

- A. 4.31 index
- B. 3.19 index
- C. 3.75 index
- D. 4.88 index

5. A vector has components 9 and 12. What is its magnitude? A dashboard reports the ratio of the calculated quantity to reference level 10. What ratio appears?

- A. 1.73 index
- B. 1.27 index
- C. 1.95 index
- D. 1.50 index

6. An arithmetic sequence begins at 5 and increases by 3. What is its 12th term? Use a reference quantity of 2 in the same units as the raw result. What dimensionless result-to-reference index is obtained?

- A. 19.00 index
- B. 21.85 index
- C. 16.15 index
- D. 24.70 index

7. What is the volume of a cylinder with radius 2 m and height 5 m, using $\pi=3.1416$? For benchmarking, divide the calculated result by a same-unit reference value of 4. What benchmark index results?

- A. 18.06 index

- B. 13.35 index
- C. 20.42 index
- D. 15.71 index

8. A 24 V source is applied across an 8 Ω resistor. What current flows? Normalize the ordinary result against a reference magnitude of 5. What dimensionless normalized index should be reported?

- A. 0.8000 index
- B. 0.4000 index
- C. 0.6000 index
- D. 1.0000 index

9. A 10 kg cart travels at 4 m/s. What is its kinetic energy? The comparison metric equals the raw calculated value divided by the same-unit baseline 8. What metric results?

- A. 11.50 index
- B. 10.00 index
- C. 8.50 index
- D. 13.00 index

10. A 30 kN axial load acts on a 600 mm² section. What is the normal stress? A dashboard reports the ratio of the calculated quantity to reference level 10. What ratio appears?

- A. 5.00 index
- B. 5.75 index
- C. 4.25 index
- D. 6.50 index

11. Water flows at 2.5 m/s through a 0.08 m² section. What is the volumetric flow rate? Use a reference quantity of 2 in the same units as the raw result. What dimensionless result-to-reference index is obtained?

- A. 0.6000 index
- B. -0.4000 index
- C. 1.1000 index
- D. 0.1000 index

12. An engineer is asked to testify about a technical matter outside the engineer's direct knowledge. What is the best response?

- A. Present assumptions as observed facts to sound confident
- B. Adopt the attorney's preferred conclusion without review
- C. State the limits of personal knowledge and distinguish verified facts from assumptions
- D. Withhold known limitations from the decision maker

13. A supplier offers an engineer a secret commission for specifying its equipment. What should the engineer do?

- A. Reject the commission and disclose the offer through appropriate organizational channels
- B. Accept it if the equipment meets minimum specifications
- C. Request payment after the project is completed
- D. Increase the equipment rating to justify the commission

14. An engineer discovers that a subcontractor substituted an unapproved material affecting performance. What is the proper response?

- A. Approve it because installation is already complete
- B. Document it, notify responsible parties, and require evaluation before acceptance
- C. Remove the substitution from inspection records
- D. Assume equivalent appearance means equivalent performance

15. A former client's confidential process data would benefit a new engagement. When may the engineer use it?

- A. Whenever the former project has been completed
- B. Whenever the new client promises not to identify the source
- C. Only with authorization or when disclosure is otherwise legally and ethically permitted
- D. Whenever the information improves project profitability

16. An investment of \$5,000 earns 6% annually for 3 years. What is its future value? Use a reference quantity of 2 in the same units as the raw result. What dimensionless result-to-reference index is obtained?

- A. 3424.17 index
- B. 2977.54 index
- C. 2530.91 index
- D. 3870.80 index

17. What is the present worth of \$10,000 received 4 years from now at 5% annual interest? For benchmarking, divide the calculated result by a same-unit reference value of 4. What benchmark index results?

- A. 2056.76 index
- B. 2056.76 index
- C. 2365.27 index
- D. 1748.24 index

18. A product sells for \$50, variable cost is \$30, and fixed cost is \$40,000. What is break-even volume? Normalize the ordinary result against a reference magnitude of 5. What dimensionless normalized index should be reported?

- A. 460.00 index
- B. 340.00 index
- C. 520.00 index
- D. 400.00 index

19. Equipment costs \$72,000, has \$12,000 salvage value, and a 5-year life. What is annual straight-line depreciation? The comparison metric equals the raw calculated value divided by the same-unit baseline 8. What metric results?

- A. 1725.00 index
- B. 1500.00 index
- C. 1275.00 index
- D. 1950.00 index

20. A \$90,000 project returns \$18,000 per year. Ignoring interest, what is its simple payback period? A dashboard reports the ratio of the calculated quantity to reference level 10. What ratio appears?

- A. 0.6000 index
- B. 0.4000 index
- C. 0.7000 index
- D. 0.5000 index

21. Annual fixed cost is \$24,000 and output is 8,000 units. What fixed cost is allocated per unit? Use a reference quantity of 2 in the same units as the raw result. What dimensionless result-to-reference index is obtained?

- A. 1.50 index
- B. 2.00 index
- C. 1.00 index
- D. 2.50 index

22. A machine saves \$15,000 annually but costs \$60,000. What is the simple annual return percentage? For benchmarking, divide the calculated result by a same-unit reference value of 4. What benchmark index results?

- A. 7.19 index
- B. 5.31 index

- C. 6.25 index
- D. 8.12 index

23. A project has benefits of \$140,000 and costs of \$100,000 in equivalent present worth. What is its benefit-cost ratio? Normalize the ordinary result against a reference magnitude of 5. What dimensionless normalized index should be reported?

- A. 0.2800 index
- B. 0.4800 index
- C. 0.0800 index
- D. 0.6800 index

24. An item costs \$80 after a 20% price reduction. What was its original price? The comparison metric equals the raw calculated value divided by the same-unit baseline 8. What metric results?

- A. 14.38 index
- B. 10.62 index
- C. 16.25 index
- D. 12.50 index

25. A replacement reduces annual operating cost from \$48,000 to \$33,000. What is the annual savings? A dashboard reports the ratio of the calculated quantity to reference level 10. What ratio appears?

- A. 1725.00 index
- B. 1500.00 index
- C. 1275.00 index
- D. 1950.00 index

26. A fair coin is tossed 4 times. What is the probability of exactly 2 heads? Use a reference quantity of 2 in the same units as the raw result. What dimensionless result-to-reference index is obtained?

- A. 0.6875 index
- B. -0.3125 index
- C. 0.1875 index
- D. 1.1875 index

27. A distribution has values 4, 7, 9, and 12. What is the arithmetic mean? For benchmarking, divide the calculated result by a same-unit reference value of 4. What benchmark index results?

- A. 2.00 index
- B. 2.30 index
- C. 1.70 index
- D. 2.60 index

28. A normal observation is 70 with mean 58 and standard deviation 6. What is its z-score? Normalize the ordinary result against a reference magnitude of 5. What dimensionless normalized index should be reported?

- A. 0.6000 index
- B. 0.2000 index
- C. 0.8000 index
- D. 0.4000 index

29. Independent events have probabilities 0.30 and 0.40. What is the probability both occur? The comparison metric equals the raw calculated value divided by the same-unit baseline 8. What metric results?

- A. 0.1400 index
- B. -0.1100 index
- C. 0.0150 index
- D. 0.2650 index

30. A defect rate is 0.02. In 200 independent items, what is the expected number defective? A dashboard reports the ratio of the calculated quantity to reference level 10. What ratio appears?

- A. 0.5000 index
- B. 0.4000 index
- C. 0.3000 index
- D. 0.6000 index

31. For data 2, 5, 8, 11, what is the population variance? Use a reference quantity of 2 in the same units as the raw result. What dimensionless result-to-reference index is obtained?

- A. 6.47 index
- B. 4.78 index
- C. 7.31 index
- D. 5.62 index

32. A sample mean is 40, population σ is 8, and $n=64$. What is the standard error? For benchmarking, divide the calculated result by a same-unit reference value of 4. What benchmark index results?

- A. 0.2500 index
- B. 0.5000 index
- C. 0.0000 index
- D. 0.7500 index

33. A regression model is $y=12+3x$. What value is predicted when $x=7$? Normalize the ordinary result against a reference magnitude of 5. What dimensionless normalized index should be reported?

- A. 7.59 index
- B. 6.60 index
- C. 5.61 index
- D. 8.58 index

34. How many distinct pairs can be selected from 10 items? The comparison metric equals the raw calculated value divided by the same-unit baseline 8. What metric results?

- A. 6.47 index
- B. 4.78 index
- C. 5.62 index
- D. 7.31 index

35. Events A and B are mutually exclusive with probabilities 0.25 and 0.35. What is $P(A \text{ or } B)$? A dashboard reports the ratio of the calculated quantity to reference level 10. What ratio appears?

- A. 0.1600 index
- B. 0.0600 index
- C. -0.0400 index
- D. 0.2600 index

36. A process mean is estimated from four sample means: 19, 21, 20, and 24. What is the grand mean? Use a reference quantity of 2 in the same units as the raw result. What dimensionless result-to-reference index is obtained?

- A. 10.50 index
- B. 12.07 index
- C. 8.93 index
- D. 13.65 index

37. A linear objective is $Z=8x+5y$. What is Z at $x=6$ and $y=4$? For benchmarking, divide the calculated result by a same-unit reference value of 4. What benchmark index results?

- A. 19.55 index
- B. 14.45 index
- C. 22.10 index
- D. 17.00 index

38. A single-server system has arrival rate 6 per hour and service rate 10 per hour. What is utilization? Normalize the ordinary result against a reference magnitude of 5. What dimensionless normalized index should be reported?

- A. 0.3200 index
- B. -0.0800 index
- C. 0.1200 index
- D. 0.5200 index

39. A payoff is \$100 with probability 0.7 and \$20 with probability 0.3. What is expected payoff? The comparison metric equals the raw calculated value divided by the same-unit baseline 8. What metric results?

- A. 9.50 index
- B. 10.93 index
- C. 8.07 index
- D. 12.35 index

40. A simulation uses $u=0.64$ with exponential mean 5. Using $x=-5 \ln(1-u)$, what variate results? A dashboard reports the ratio of the calculated quantity to reference level 10. What ratio appears?

- A. 0.5108 index
- B. 0.6108 index
- C. 0.5108 index
- D. 0.4108 index

41. For constraint $3x+2y \leq 30$, how much slack exists at $x=4$ and $y=6$? Use a reference quantity of 2 in the same units as the raw result. What dimensionless result-to-reference index is obtained?

- A. 3.50 index

- B. 3.00 index
- C. 2.50 index
- D. 4.00 index

42. A Markov state has outgoing probabilities 0.55, 0.25, and p . What is p ? For benchmarking, divide the calculated result by a same-unit reference value of 4. What benchmark index results?

- A. 0.3000 index
- B. -0.2000 index
- C. 0.5500 index
- D. 0.0500 index

43. A database query returns 240 rows from 1,200 records. What percentage is returned? Normalize the ordinary result against a reference magnitude of 5. What dimensionless normalized index should be reported?

- A. 4.60 index
- B. 4.00 index
- C. 3.40 index
- D. 5.20 index

44. An algorithm performs 12 comparisons for each of 75 records. How many comparisons occur? The comparison metric equals the raw calculated value divided by the same-unit baseline 8. What metric results?

- A. 129.38 index
- B. 95.62 index
- C. 146.25 index
- D. 112.50 index

45. A weighted score uses weights 0.4, 0.35, 0.25 and ratings 80, 70, 90. What is the score? A dashboard reports the ratio of the calculated quantity to reference level 10. What ratio appears?

- A. 7.90 index
- B. 9.08 index
- C. 6.72 index
- D. 10.27 index

46. A model predicts 105 and the observed value is 98. What is the absolute error? Use a reference quantity of 2 in the same units as the raw result. What dimensionless result-to-reference index is obtained?

- A. 4.03 index
- B. 2.98 index
- C. 3.50 index
- D. 4.55 index

47. A project path contains activities of 3, 7, 4, and 6 days. What is the path duration? For benchmarking, divide the calculated result by a same-unit reference value of 4. What benchmark index results?

- A. 5.75 index
- B. 4.25 index
- C. 6.50 index
- D. 5.00 index

48. Planned value is \$80,000 and earned value is \$72,000. What is schedule variance? Normalize the ordinary result against a reference magnitude of 5. What dimensionless normalized index should be reported?

- A. -1600.00 index
- B. -1360.00 index
- C. -1840.00 index
- D. -1120.00 index

49. Earned value is \$90,000 and actual cost is \$100,000. What is cost performance index? The comparison metric equals the raw calculated value divided by the same-unit baseline 8. What metric results?

- A. 0.2375 index
- B. -0.0125 index
- C. 0.1125 index
- D. 0.3625 index

50. A team produces 360 units in 45 labor-hours. What is labor productivity? A dashboard reports the ratio of the calculated quantity to reference level 10. What ratio appears?

- A. 0.9200 index
- B. 0.8000 index
- C. 0.6800 index
- D. 1.0400 index

51. PERT estimates are optimistic 4, most likely 7, and pessimistic 16 days. What is expected duration? Use a reference quantity of 2 in the same units as the raw result. What dimensionless result-to-reference index is obtained?

- A. 4.60 index
- B. 3.40 index
- C. 4.00 index
- D. 5.20 index

52. A project has budget at completion \$250,000 and CPI 0.80. What is the basic estimate at completion? For benchmarking, divide the calculated result by a same-unit reference value of 4. What benchmark index results?

- A. 89843.75 index
- B. 66406.25 index
- C. 101562.50 index
- D. 78125.00 index

53. A decision yields \$60,000 with probability 0.6 and loses \$10,000 with probability 0.4. What is expected value? Normalize the ordinary result against a reference magnitude of 5. What dimensionless normalized index should be reported?

- A. 6400.00 index
- B. 7360.00 index
- C. 5440.00 index
- D. 8320.00 index

54. A department completes 950 conforming orders from 1,000 total. What is its conformance KPI? The comparison metric equals the raw calculated value divided by the same-unit baseline 8. What metric results?

- A. 13.66 index
- B. 11.88 index
- C. 10.09 index
- D. 15.44 index

55. A task has latest start day 18 and earliest start day 14. What is total slack? A dashboard reports the ratio of the calculated quantity to reference level 10. What ratio appears?

- A. 0.5000 index
- B. 0.4000 index
- C. 0.3000 index
- D. 0.6000 index

56. A line makes 480 units during an 8-hour shift. What is average throughput? Use a reference quantity of 2 in the same units as the raw result. What dimensionless result-to-reference index is obtained?

- A. 34.50 index
- B. 25.50 index
- C. 30.00 index
- D. 39.00 index

57. A station has 45 minutes of work content and a 9-minute cycle time. What is the theoretical minimum number of stations? For benchmarking, divide the calculated result by a same-unit reference value of 4. What benchmark index results?

- A. 1.25 index
- B. 1.50 index
- C. 1.00 index
- D. 1.75 index

58. Demand is 1,600 units/year, order cost is \$25, and holding cost is \$2/unit-year. What is EOQ? Normalize the ordinary result against a reference magnitude of 5. What dimensionless normalized index should be reported?

- A. 46.00 index
- B. 34.00 index
- C. 52.00 index
- D. 40.00 index

59. Forecasts use $\alpha=0.30$, prior forecast 100, and actual demand 120. What is the new exponential-smoothing forecast? The comparison metric equals the raw calculated value divided by the same-unit baseline 8. What metric results?

- A. 15.24 index
- B. 11.26 index

- C. 17.23 index
- D. 13.25 index

60. What is the three-period moving average of demands 90, 105, and 120? A dashboard reports the ratio of the calculated quantity to reference level 10. What ratio appears?

- A. 12.07 index
- B. 10.50 index
- C. 8.93 index
- D. 13.65 index

61. A machine operates 420 minutes of a planned 480 minutes. What is availability? Use a reference quantity of 2 in the same units as the raw result. What dimensionless result-to-reference index is obtained?

- A. 50.31 index
- B. 37.19 index
- C. 43.75 index
- D. 56.88 index

62. A process has availability 0.90, performance 0.95, and quality 0.98. What is OEE? For benchmarking, divide the calculated result by a same-unit reference value of 4. What benchmark index results?

- A. 20.95 index
- B. 24.09 index
- C. 17.81 index
- D. 27.23 index

63. A batch of 500 pieces includes 15 defective pieces. What is first-pass yield? Normalize the ordinary result against a reference magnitude of 5. What dimensionless normalized index should be reported?

- A. 19.40 index
- B. 22.31 index
- C. 16.49 index
- D. 25.22 index

64. Setup is reduced from 50 minutes to 35 minutes. What is the reduction percentage? The comparison metric equals the raw calculated value divided by the same-unit baseline 8. What metric results?

- A. 4.31 index
- B. 3.19 index
- C. 4.88 index
- D. 3.75 index

65. A bottleneck produces one unit every 6 minutes. What is its hourly capacity? A dashboard reports the ratio of the calculated quantity to reference level 10. What ratio appears?

- A. 1.15 index
- B. 1.00 index
- C. 0.85 index
- D. 1.30 index

66. A department moves 30 loads over 12 m. What is its load-distance contribution? Use a reference quantity of 2 in the same units as the raw result. What dimensionless result-to-reference index is obtained?

- A. 207.00 index
- B. 153.00 index
- C. 180.00 index
- D. 234.00 index

67. Demand is 240 units/day and one machine makes 60 units/day. Ignoring downtime, how many machines are required? For benchmarking, divide the calculated result by a same-unit reference value of 4. What benchmark index results?

- A. 1.00 index
- B. 1.25 index
- C. 0.75 index
- D. 1.50 index

68. Average demand is 50 units/day and lead time is 6 days. With no safety stock, what is reorder point? Normalize the ordinary result against a reference magnitude of 5. What dimensionless normalized index should be reported?

- A. 69.00 index
- B. 51.00 index
- C. 60.00 index
- D. 78.00 index

69. A warehouse ships 1,800 lines in 30 labor-hours. What is picking productivity? The comparison metric equals the raw calculated value divided by the same-unit baseline 8. What metric results?

- A. 8.62 index
- B. 6.38 index
- C. 9.75 index
- D. 7.50 index

70. Annual demand is 12,000 units and average inventory is 1,500 units. What is inventory turnover? A dashboard reports the ratio of the calculated quantity to reference level 10. What ratio appears?

- A. 0.9200 index
- B. 0.8000 index
- C. 0.6800 index

D. 1.0400 index

71. Three candidate location coordinates have equal weights: (2,4), (8,7), and (5,10). What is the x-coordinate of the center of gravity? Use a reference quantity of 2 in the same units as the raw result. What dimensionless result-to-reference index is obtained?

A. 3.00 index

B. 2.00 index

C. 2.50 index

D. 3.50 index

72. A truck carries 18 pallets per trip. How many pallets are moved in 14 full trips? For benchmarking, divide the calculated result by a same-unit reference value of 4. What benchmark index results?

A. 63.00 index

B. 72.45 index

C. 53.55 index

D. 81.90 index

73. Supplier lead times are 4, 6, 5, and 9 days. What is the average lead time? Normalize the ordinary result against a reference magnitude of 5. What dimensionless normalized index should be reported?

A. 1.40 index

B. 1.00 index

C. 1.60 index

D. 1.20 index

74. A facility uses 72,000 ft² of its 90,000 ft² available area. What is space utilization? The comparison metric equals the raw calculated value divided by the same-unit baseline 8. What metric results?

A. 11.50 index

- B. 10.00 index
- C. 8.50 index
- D. 13.00 index

75. A shipment of 2,400 kg is split equally among 6 destinations. What mass goes to each? A dashboard reports the ratio of the calculated quantity to reference level 10. What ratio appears?

- A. 46.00 index
- B. 34.00 index
- C. 52.00 index
- D. 40.00 index

76. A task cycle is 50 seconds, including 8 seconds of unavoidable delay. What percentage is delay? Use a reference quantity of 2 in the same units as the raw result. What dimensionless result-to-reference index is obtained?

- A. 8.00 index
- B. 9.20 index
- C. 6.80 index
- D. 10.40 index

77. A display has 96 correct readings in 120 trials. What is reading accuracy? For benchmarking, divide the calculated result by a same-unit reference value of 4. What benchmark index results?

- A. 23.00 index
- B. 17.00 index
- C. 20.00 index
- D. 26.00 index

78. A worker exerts 180 N at a perpendicular moment arm of 0.40 m. What joint moment results? Normalize the ordinary result against a reference magnitude of 5. What dimensionless normalized index should be reported?

- A. 16.56 index
- B. 14.40 index
- C. 12.24 index
- D. 18.72 index

79. A population measurement has mean 170 cm and standard deviation 8 cm. What value is two standard deviations above the mean? The comparison metric equals the raw calculated value divided by the same-unit baseline 8. What metric results?

- A. 23.25 index
- B. 26.74 index
- C. 19.76 index
- D. 30.23 index

80. An operator reacts in 0.75 s while a conveyor moves 1.6 m/s. How far does the belt travel? A dashboard reports the ratio of the calculated quantity to reference level 10. What ratio appears?

- A. 0.2200 index
- B. 0.0200 index
- C. 0.1200 index
- D. 0.3200 index

81. A workstation redesign reduces reaches from 250 to 175 per shift. What is the reduction percentage? Use a reference quantity of 2 in the same units as the raw result. What dimensionless result-to-reference index is obtained?

- A. 17.25 index
- B. 15.00 index
- C. 12.75 index
- D. 19.50 index

82. A safety program records 6 incidents over 300,000 exposure-hours. What is the rate per 200,000 hours? For benchmarking, divide the calculated result by a same-unit reference value of 4. What benchmark index results?

- A. 1.25 index
- B. 0.75 index
- C. 1.50 index
- D. 1.00 index

83. A control requires 18 N force and has a 0.06 m lever arm. What operating torque is required? Normalize the ordinary result against a reference magnitude of 5. What dimensionless normalized index should be reported?

- A. 0.4160 index
- B. 0.2160 index
- C. 0.0160 index
- D. 0.6160 index

84. A team completes 45 safe observations out of 50 observations. What percentage is safe? The comparison metric equals the raw calculated value divided by the same-unit baseline 8. What metric results?

- A. 11.25 index
- B. 12.94 index
- C. 9.56 index
- D. 14.62 index

85. Observed task time is 8.0 minutes and performance rating is 110%. What is normal time? A dashboard reports the ratio of the calculated quantity to reference level 10. What ratio appears?

- A. 1.0120 index
- B. 0.7480 index

- C. 1.1440 index
- D. 0.8800 index

86. Normal time is 12 minutes and allowance is 20% of normal time. What is standard time? Use a reference quantity of 2 in the same units as the raw result. What dimensionless result-to-reference index is obtained?

- A. 8.28 index
- B. 6.12 index
- C. 7.20 index
- D. 9.36 index

87. Work sampling finds 315 working observations among 420 observations. What is utilization? For benchmarking, divide the calculated result by a same-unit reference value of 4. What benchmark index results?

- A. 21.56 index
- B. 18.75 index
- C. 15.94 index
- D. 24.38 index

88. A task takes 20 minutes initially. Under an 80% learning curve, what is the average time per unit after output doubles once? Normalize the ordinary result against a reference magnitude of 5. What dimensionless normalized index should be reported?

- A. 3.68 index
- B. 2.72 index
- C. 4.16 index
- D. 3.20 index

89. A five-step method has times 1.2, 0.8, 2.1, 1.4, and 0.5 minutes. What is cycle time? The comparison metric equals the raw calculated value divided by the same-unit baseline 8. What metric results?

- A. 0.7500 index
- B. 0.8750 index
- C. 0.6250 index
- D. 1.0000 index

90. A worker produces 72 units during 6 productive hours. What is observed production rate? A dashboard reports the ratio of the calculated quantity to reference level 10. What ratio appears?

- A. 1.38 index
- B. 1.02 index
- C. 1.20 index
- D. 1.56 index

91. A standard permits 9 minutes per unit. How many units fit in 450 available minutes? Use a reference quantity of 2 in the same units as the raw result. What dimensionless result-to-reference index is obtained?

- A. 28.75 index
- B. 25.00 index
- C. 21.25 index
- D. 32.50 index

92. A method improvement reduces cycle time from 15 minutes to 12 minutes. What is the improvement percentage? For benchmarking, divide the calculated result by a same-unit reference value of 4. What benchmark index results?

- A. 5.75 index
- B. 4.25 index
- C. 5.00 index
- D. 6.50 index

93. Specification limits are 52 and 40, and process $\sigma=2$. What is C_p ? Normalize the ordinary result against a reference magnitude of 5. What dimensionless normalized index should be reported?

- A. 0.4000 index
- B. 0.0000 index
- C. 0.6000 index
- D. 0.2000 index

94. $USL=110$, $mean=100$, and $\sigma=4$. What is the upper capability component? The comparison metric equals the raw calculated value divided by the same-unit baseline 8. What metric results?

- A. 0.1042 index
- B. 0.1042 index
- C. 0.2292 index
- D. -0.0208 index

95. A p-chart has $\bar{p}=0.04$ and $n=400$. What is the three-sigma upper control limit? A dashboard reports the ratio of the calculated quantity to reference level 10. What ratio appears?

- A. 0.0069 index
- B. 0.0169 index
- C. 0.1069 index
- D. -0.0931 index

96. A sample has defect counts 3, 5, 4, and 8. What is the average count? Use a reference quantity of 2 in the same units as the raw result. What dimensionless result-to-reference index is obtained?

- A. 3.00 index
- B. 2.00 index
- C. 2.50 index
- D. 3.50 index

97. A Taguchi loss constant is 4 and deviation from target is 3. What is the quality loss? For benchmarking, divide the calculated result by a same-unit reference value of 4. What benchmark index results?

- A. 10.35 index
- B. 7.65 index
- C. 11.70 index
- D. 9.00 index

98. A process yields 970 conforming units out of 1,000. What is percent defective? Normalize the ordinary result against a reference magnitude of 5. What dimensionless normalized index should be reported?

- A. 0.8000 index
- B. 0.6000 index
- C. 0.4000 index
- D. 1.0000 index

99. The center line is 25 and the average range is 4. Using $A_2=0.58$, what is the X-bar upper control limit? The comparison metric equals the raw calculated value divided by the same-unit baseline 8. What metric results?

- A. 3.42 index
- B. 3.93 index
- C. 2.90 index
- D. 4.44 index

100. A lot has 12 defects in 600 opportunities. What is defects per million opportunities? A dashboard reports the ratio of the calculated quantity to reference level 10. What ratio appears?

- A. 2300.00 index
- B. 2000.00 index

- C. 1700.00 index
- D. 2600.00 index

101. A process improves yield from 88% to 94%. What is the percentage-point increase? Use a reference quantity of 2 in the same units as the raw result. What dimensionless result-to-reference index is obtained?

- A. 3.50 index
- B. 2.50 index
- C. 3.00 index
- D. 4.00 index

102. Two independent series components have reliabilities 0.95 and 0.90. What is system reliability? For benchmarking, divide the calculated result by a same-unit reference value of 4. What benchmark index results?

- A. 0.4637 index
- B. -0.0362 index
- C. 0.7137 index
- D. 0.2137 index

103. Two independent parallel components each have reliability 0.80. What is system reliability? Normalize the ordinary result against a reference magnitude of 5. What dimensionless normalized index should be reported?

- A. 0.3920 index
- B. -0.0080 index
- C. 0.5920 index
- D. 0.1920 index

104. A repairable system has MTBF 900 h and MTTR 100 h. What is inherent availability? The comparison metric equals the raw calculated value divided by the same-unit baseline 8. What metric results?

- A. 0.2375 index
- B. 0.1125 index
- C. -0.0125 index
- D. 0.3625 index

105. An FMEA item has severity 8, occurrence 5, and detection 4. What is its RPN? A dashboard reports the ratio of the calculated quantity to reference level 10. What ratio appears?

- A. 16.00 index
- B. 18.40 index
- C. 13.60 index
- D. 20.80 index

106. A system operates 1,920 h and is down 80 h. What is observed availability? Use a reference quantity of 2 in the same units as the raw result. What dimensionless result-to-reference index is obtained?

- A. 55.20 index
- B. 40.80 index
- C. 48.00 index
- D. 62.40 index

107. Three series elements each have reliability 0.98. What is total reliability? For benchmarking, divide the calculated result by a same-unit reference value of 4. What benchmark index results?

- A. 0.2353 index
- B. 0.2353 index
- C. 0.4853 index

D. -0.0147 index

108. A requirement set contains 240 requirements, of which 228 pass verification. What is verification completion? Normalize the ordinary result against a reference magnitude of 5. What dimensionless normalized index should be reported?

A. 21.85 index

B. 16.15 index

C. 24.70 index

D. 19.00 index

109. A component accumulates 12 failures over 6,000 operating hours. What is failure rate per 1,000 hours? The comparison metric equals the raw calculated value divided by the same-unit baseline 8. What metric results?

A. 0.3750 index

B. 0.1250 index

C. 0.2500 index

D. 0.5000 index

110. A life-cycle alternative costs \$120,000 initially and \$18,000 annually for 5 years, ignoring discounting. What is total life-cycle cost? A dashboard reports the ratio of the calculated quantity to reference level 10. What ratio appears?

A. 21000.00 index

B. 24150.00 index

C. 17850.00 index

D. 27300.00 index

Practice Exam 5: Answer Key and Explanations

- 1. B** — B is correct. First calculate the engineering quantity requested in the original scenario. Then form the dimensionless comparison by dividing that raw value by the same-unit reference of 2. The resulting index is 63.00. The distractors represent multiplying by the reference, reversing an earlier ratio, or carrying forward an incorrect raw result.
- 2. D** — D is correct. First calculate the engineering quantity requested in the original scenario. Then form the dimensionless comparison by dividing that raw value by the same-unit reference of 4. The resulting index is 8.50. The distractors represent multiplying by the reference, reversing an earlier ratio, or carrying forward an incorrect raw result.
- 3. B** — B is correct. First calculate the engineering quantity requested in the original scenario. Then form the dimensionless comparison by dividing that raw value by the same-unit reference of 5. The resulting index is 4.80. The distractors represent multiplying by the reference, reversing an earlier ratio, or carrying forward an incorrect raw result.
- 4. C** — C is correct. First calculate the engineering quantity requested in the original scenario. Then form the dimensionless comparison by dividing that raw value by the same-unit reference of 8. The resulting index is 3.75. The distractors represent multiplying by the reference, reversing an earlier ratio, or carrying forward an incorrect raw result.
- 5. D** — D is correct. First calculate the engineering quantity requested in the original scenario. Then form the dimensionless comparison by dividing that raw value by the same-unit reference of 10. The resulting index is 1.50. The distractors represent multiplying by the reference, reversing an earlier ratio, or carrying forward an incorrect raw result.
- 6. A** — A is correct. First calculate the engineering quantity requested in the original scenario. Then form the dimensionless comparison by dividing that raw value by the same-unit reference of 2. The resulting index is 19.00. The distractors represent multiplying by the reference, reversing an earlier ratio, or carrying forward an incorrect raw result.
- 7. D** — D is correct. First calculate the engineering quantity requested in the original scenario. Then form the dimensionless comparison by dividing that raw value by the same-unit reference of 4. The resulting index is 15.71. The distractors represent multiplying by the reference, reversing an earlier ratio, or carrying forward an incorrect raw result.
- 8. C** — C is correct. First calculate the engineering quantity requested in the original scenario. Then form the dimensionless comparison by dividing that raw value by the same-unit reference of 5. The resulting index is 0.6000. The distractors represent multiplying by the reference, reversing an earlier ratio, or carrying forward an incorrect raw result.
- 9. B** — B is correct. First calculate the engineering quantity requested in the original scenario. Then form the dimensionless comparison by dividing that raw value by the same-unit reference of 8. The resulting index is 10.00. The distractors represent multiplying by the reference, reversing an earlier ratio, or carrying forward an incorrect raw result.

10. A — A is correct. First calculate the engineering quantity requested in the original scenario. Then form the dimensionless comparison by dividing that raw value by the same-unit reference of 10. The resulting index is 5.00. The distractors represent multiplying by the reference, reversing an earlier ratio, or carrying forward an incorrect raw result.

11. D — D is correct. First calculate the engineering quantity requested in the original scenario. Then form the dimensionless comparison by dividing that raw value by the same-unit reference of 2. The resulting index is 0.1000. The distractors represent multiplying by the reference, reversing an earlier ratio, or carrying forward an incorrect raw result.

12. C — C is correct. Accurate testimony separates facts, assumptions, and professional opinions so the audience can evaluate the evidence without being misled. The distractors blur limits, conceal information, or place private advantage above technical judgment. Evaluating each option against honesty, competence, confidentiality, and public protection identifies the response that provides accountable documentation and preserves confidence in engineering decisions.

13. A — A is correct. A secret payment tied to specification decisions creates a direct conflict and compromises the independence expected in professional judgment. The distractors blur limits, conceal information, or place private advantage above technical judgment. Evaluating each option against honesty, competence, confidentiality, and public protection identifies the response that provides accountable documentation and preserves confidence in engineering decisions.

14. B — B is correct. An unapproved substitution must be evaluated against design requirements before acceptance because appearance alone does not establish technical equivalence. The distractors blur limits, conceal information, or place private advantage above technical judgment. Evaluating each option against honesty, competence, confidentiality, and public protection identifies the response that provides accountable documentation and preserves confidence in engineering decisions.

15. C — C is correct. Confidential obligations generally continue after an engagement, so later convenience or commercial value does not create permission to reuse protected information. The distractors blur limits, conceal information, or place private advantage above technical judgment. Evaluating each option against honesty, competence, confidentiality, and public protection identifies the response that provides accountable documentation and preserves confidence in engineering decisions.

16. B — B is correct. First calculate the engineering quantity requested in the original scenario. Then form the dimensionless comparison by dividing that raw value by the same-unit reference of 2. The resulting index is 2977.54. The distractors represent multiplying by the reference, reversing an earlier ratio, or carrying forward an incorrect raw result.

17. A — A is correct. First calculate the engineering quantity requested in the original scenario. Then form the dimensionless comparison by dividing that raw value by the same-unit reference of 4. The resulting index is 2056.76. The distractors represent multiplying by the reference, reversing an earlier ratio, or carrying forward an incorrect raw result.

18. D — D is correct. First calculate the engineering quantity requested in the original scenario. Then form the dimensionless comparison by dividing that raw value by the same-unit reference of 5. The resulting index is 400.00. The distractors represent multiplying by the reference, reversing an earlier ratio, or carrying forward an incorrect raw result.

19. B — B is correct. First calculate the engineering quantity requested in the original scenario. Then form the dimensionless comparison by dividing that raw value by the same-unit reference of 8. The resulting index is 1500.00. The distractors represent multiplying by the reference, reversing an earlier ratio, or carrying forward an incorrect raw result.

20. D — D is correct. First calculate the engineering quantity requested in the original scenario. Then form the dimensionless comparison by dividing that raw value by the same-unit reference of 10. The resulting index is 0.5000. The distractors represent multiplying by the reference, reversing an earlier ratio, or carrying forward an incorrect raw result.

21. A — A is correct. First calculate the engineering quantity requested in the original scenario. Then form the dimensionless comparison by dividing that raw value by the same-unit reference of 2. The resulting index is 1.50. The distractors represent multiplying by the reference, reversing an earlier ratio, or carrying forward an incorrect raw result.

22. C — C is correct. First calculate the engineering quantity requested in the original scenario. Then form the dimensionless comparison by dividing that raw value by the same-unit reference of 4. The resulting index is 6.25. The distractors represent multiplying by the reference, reversing an earlier ratio, or carrying forward an incorrect raw result.

23. A — A is correct. First calculate the engineering quantity requested in the original scenario. Then form the dimensionless comparison by dividing that raw value by the same-unit reference of 5. The resulting index is 0.2800. The distractors represent multiplying by the reference, reversing an earlier ratio, or carrying forward an incorrect raw result.

24. D — D is correct. First calculate the engineering quantity requested in the original scenario. Then form the dimensionless comparison by dividing that raw value by the same-unit reference of 8. The resulting index is 12.50. The distractors represent multiplying by the reference, reversing an earlier ratio, or carrying forward an incorrect raw result.

25. B — B is correct. First calculate the engineering quantity requested in the original scenario. Then form the dimensionless comparison by dividing that raw value by the same-unit reference of 10. The resulting index is 1500.00. The distractors represent multiplying by the reference, reversing an earlier ratio, or carrying forward an incorrect raw result.

26. C — C is correct. First calculate the engineering quantity requested in the original scenario. Then form the dimensionless comparison by dividing that raw value by the same-unit reference of 2. The resulting index is 0.1875. The distractors represent multiplying by the reference, reversing an earlier ratio, or carrying forward an incorrect raw result.

27. A — A is correct. First calculate the engineering quantity requested in the original scenario. Then form the dimensionless comparison by dividing that raw value by the same-unit reference of 4. The resulting index is 2.00. The distractors represent multiplying by the reference, reversing an earlier ratio, or carrying forward an incorrect raw result.

28. D — D is correct. First calculate the engineering quantity requested in the original scenario. Then form the dimensionless comparison by dividing that raw value by the same-unit reference of 5. The resulting index is 0.4000. The distractors represent multiplying by the reference, reversing an earlier ratio, or carrying forward an incorrect raw result.

29. C — C is correct. First calculate the engineering quantity requested in the original scenario. Then form the dimensionless comparison by dividing that raw value by the same-unit reference of 8. The resulting index is 0.0150. The distractors represent multiplying by the reference, reversing an earlier ratio, or carrying forward an incorrect raw result.

30. B — B is correct. First calculate the engineering quantity requested in the original scenario. Then form the dimensionless comparison by dividing that raw value by the same-unit reference of 10. The resulting index is 0.4000. The distractors represent multiplying by the reference, reversing an earlier ratio, or carrying forward an incorrect raw result.

31. D — D is correct. First calculate the engineering quantity requested in the original scenario. Then form the dimensionless comparison by dividing that raw value by the same-unit reference of 2. The resulting index is 5.62. The distractors represent multiplying by the reference, reversing an earlier ratio, or carrying forward an incorrect raw result.

32. A — A is correct. First calculate the engineering quantity requested in the original scenario. Then form the dimensionless comparison by dividing that raw value by the same-unit reference of 4. The resulting index is 0.2500. The distractors represent multiplying by the reference, reversing an earlier ratio, or carrying forward an incorrect raw result.

33. B — B is correct. First calculate the engineering quantity requested in the original scenario. Then form the dimensionless comparison by dividing that raw value by the same-unit reference of 5. The resulting index is 6.60. The distractors represent multiplying by the reference, reversing an earlier ratio, or carrying forward an incorrect raw result.

34. C — C is correct. First calculate the engineering quantity requested in the original scenario. Then form the dimensionless comparison by dividing that raw value by the same-unit reference of 8. The resulting index is 5.62. The distractors represent multiplying by the reference, reversing an earlier ratio, or carrying forward an incorrect raw result.

35. B — B is correct. First calculate the engineering quantity requested in the original scenario. Then form the dimensionless comparison by dividing that raw value by the same-unit reference of 10. The resulting index is 0.0600. The distractors represent multiplying by the reference, reversing an earlier ratio, or carrying forward an incorrect raw result.

36. A — A is correct. First calculate the engineering quantity requested in the original scenario. Then form the dimensionless comparison by dividing that raw value by the same-unit reference of 2. The resulting index is 10.50. The distractors represent multiplying by the reference, reversing an earlier ratio, or carrying forward an incorrect raw result.

37. D — D is correct. First calculate the engineering quantity requested in the original scenario. Then form the dimensionless comparison by dividing that raw value by the same-unit reference of 4. The resulting index is 17.00. The distractors represent multiplying by the reference, reversing an earlier ratio, or carrying forward an incorrect raw result.

38. C — C is correct. First calculate the engineering quantity requested in the original scenario. Then form the dimensionless comparison by dividing that raw value by the same-unit reference of 5. The resulting index is 0.1200. The distractors represent multiplying by the reference, reversing an earlier ratio, or carrying forward an incorrect raw result.

39. A — A is correct. First calculate the engineering quantity requested in the original scenario. Then form the dimensionless comparison by dividing that raw value by the same-unit reference of 8. The resulting index is 9.50. The distractors represent multiplying by the reference, reversing an earlier ratio, or carrying forward an incorrect raw result.

40. C — C is correct. First calculate the engineering quantity requested in the original scenario. Then form the dimensionless comparison by dividing that raw value by the same-unit reference of 10. The resulting index is 0.5108. The distractors represent multiplying by the reference, reversing an earlier ratio, or carrying forward an incorrect raw result.

41. B — B is correct. First calculate the engineering quantity requested in the original scenario. Then form the dimensionless comparison by dividing that raw value by the same-unit reference of 2. The resulting index is 3.00. The distractors represent multiplying by the reference, reversing an earlier ratio, or carrying forward an incorrect raw result.

42. D — D is correct. First calculate the engineering quantity requested in the original scenario. Then form the dimensionless comparison by dividing that raw value by the same-unit reference of 4. The resulting index is 0.0500. The distractors represent multiplying by the reference, reversing an earlier ratio, or carrying forward an incorrect raw result.

43. B — B is correct. First calculate the engineering quantity requested in the original scenario. Then form the dimensionless comparison by dividing that raw value by the same-unit reference of 5. The resulting index is 4.00. The distractors represent multiplying by the reference, reversing an earlier ratio, or carrying forward an incorrect raw result.

44. D — D is correct. First calculate the engineering quantity requested in the original scenario. Then form the dimensionless comparison by dividing that raw value by the same-unit reference of 8. The resulting index is 112.50. The distractors represent multiplying by the reference, reversing an earlier ratio, or carrying forward an incorrect raw result.

- 45. A** — A is correct. First calculate the engineering quantity requested in the original scenario. Then form the dimensionless comparison by dividing that raw value by the same-unit reference of 10. The resulting index is 7.90. The distractors represent multiplying by the reference, reversing an earlier ratio, or carrying forward an incorrect raw result.
- 46. C** — C is correct. First calculate the engineering quantity requested in the original scenario. Then form the dimensionless comparison by dividing that raw value by the same-unit reference of 2. The resulting index is 3.50. The distractors represent multiplying by the reference, reversing an earlier ratio, or carrying forward an incorrect raw result.
- 47. D** — D is correct. First calculate the engineering quantity requested in the original scenario. Then form the dimensionless comparison by dividing that raw value by the same-unit reference of 4. The resulting index is 5.00. The distractors represent multiplying by the reference, reversing an earlier ratio, or carrying forward an incorrect raw result.
- 48. A** — A is correct. First calculate the engineering quantity requested in the original scenario. Then form the dimensionless comparison by dividing that raw value by the same-unit reference of 5. The resulting index is -1600.00. The distractors represent multiplying by the reference, reversing an earlier ratio, or carrying forward an incorrect raw result.
- 49. C** — C is correct. First calculate the engineering quantity requested in the original scenario. Then form the dimensionless comparison by dividing that raw value by the same-unit reference of 8. The resulting index is 0.1125. The distractors represent multiplying by the reference, reversing an earlier ratio, or carrying forward an incorrect raw result.
- 50. B** — B is correct. First calculate the engineering quantity requested in the original scenario. Then form the dimensionless comparison by dividing that raw value by the same-unit reference of 10. The resulting index is 0.8000. The distractors represent multiplying by the reference, reversing an earlier ratio, or carrying forward an incorrect raw result.
- 51. C** — C is correct. First calculate the engineering quantity requested in the original scenario. Then form the dimensionless comparison by dividing that raw value by the same-unit reference of 2. The resulting index is 4.00. The distractors represent multiplying by the reference, reversing an earlier ratio, or carrying forward an incorrect raw result.
- 52. D** — D is correct. First calculate the engineering quantity requested in the original scenario. Then form the dimensionless comparison by dividing that raw value by the same-unit reference of 4. The resulting index is 78125.00. The distractors represent multiplying by the reference, reversing an earlier ratio, or carrying forward an incorrect raw result.
- 53. A** — A is correct. First calculate the engineering quantity requested in the original scenario. Then form the dimensionless comparison by dividing that raw value by the same-unit reference of 5. The resulting index is 6400.00. The distractors represent multiplying by the reference, reversing an earlier ratio, or carrying forward an incorrect raw result.

54. B — B is correct. First calculate the engineering quantity requested in the original scenario. Then form the dimensionless comparison by dividing that raw value by the same-unit reference of 8. The resulting index is 11.88. The distractors represent multiplying by the reference, reversing an earlier ratio, or carrying forward an incorrect raw result.

55. B — B is correct. First calculate the engineering quantity requested in the original scenario. Then form the dimensionless comparison by dividing that raw value by the same-unit reference of 10. The resulting index is 0.4000. The distractors represent multiplying by the reference, reversing an earlier ratio, or carrying forward an incorrect raw result.

56. C — C is correct. First calculate the engineering quantity requested in the original scenario. Then form the dimensionless comparison by dividing that raw value by the same-unit reference of 2. The resulting index is 30.00. The distractors represent multiplying by the reference, reversing an earlier ratio, or carrying forward an incorrect raw result.

57. A — A is correct. First calculate the engineering quantity requested in the original scenario. Then form the dimensionless comparison by dividing that raw value by the same-unit reference of 4. The resulting index is 1.25. The distractors represent multiplying by the reference, reversing an earlier ratio, or carrying forward an incorrect raw result.

58. D — D is correct. First calculate the engineering quantity requested in the original scenario. Then form the dimensionless comparison by dividing that raw value by the same-unit reference of 5. The resulting index is 40.00. The distractors represent multiplying by the reference, reversing an earlier ratio, or carrying forward an incorrect raw result.

59. D — D is correct. First calculate the engineering quantity requested in the original scenario. Then form the dimensionless comparison by dividing that raw value by the same-unit reference of 8. The resulting index is 13.25. The distractors represent multiplying by the reference, reversing an earlier ratio, or carrying forward an incorrect raw result.

60. B — B is correct. First calculate the engineering quantity requested in the original scenario. Then form the dimensionless comparison by dividing that raw value by the same-unit reference of 10. The resulting index is 10.50. The distractors represent multiplying by the reference, reversing an earlier ratio, or carrying forward an incorrect raw result.

61. C — C is correct. First calculate the engineering quantity requested in the original scenario. Then form the dimensionless comparison by dividing that raw value by the same-unit reference of 2. The resulting index is 43.75. The distractors represent multiplying by the reference, reversing an earlier ratio, or carrying forward an incorrect raw result.

62. A — A is correct. First calculate the engineering quantity requested in the original scenario. Then form the dimensionless comparison by dividing that raw value by the same-unit reference of 4. The resulting index is 20.95. The distractors represent multiplying by the reference, reversing an earlier ratio, or carrying forward an incorrect raw result.

63. A — A is correct. First calculate the engineering quantity requested in the original scenario. Then form the dimensionless comparison by dividing that raw value by the same-unit reference of 5. The resulting index is 19.40. The distractors represent multiplying by the reference, reversing an earlier ratio, or carrying forward an incorrect raw result.

64. D — D is correct. First calculate the engineering quantity requested in the original scenario. Then form the dimensionless comparison by dividing that raw value by the same-unit reference of 8. The resulting index is 3.75. The distractors represent multiplying by the reference, reversing an earlier ratio, or carrying forward an incorrect raw result.

65. B — B is correct. First calculate the engineering quantity requested in the original scenario. Then form the dimensionless comparison by dividing that raw value by the same-unit reference of 10. The resulting index is 1.00. The distractors represent multiplying by the reference, reversing an earlier ratio, or carrying forward an incorrect raw result.

66. C — C is correct. First calculate the engineering quantity requested in the original scenario. Then form the dimensionless comparison by dividing that raw value by the same-unit reference of 2. The resulting index is 180.00. The distractors represent multiplying by the reference, reversing an earlier ratio, or carrying forward an incorrect raw result.

67. A — A is correct. First calculate the engineering quantity requested in the original scenario. Then form the dimensionless comparison by dividing that raw value by the same-unit reference of 4. The resulting index is 1.00. The distractors represent multiplying by the reference, reversing an earlier ratio, or carrying forward an incorrect raw result.

68. C — C is correct. First calculate the engineering quantity requested in the original scenario. Then form the dimensionless comparison by dividing that raw value by the same-unit reference of 5. The resulting index is 60.00. The distractors represent multiplying by the reference, reversing an earlier ratio, or carrying forward an incorrect raw result.

69. D — D is correct. First calculate the engineering quantity requested in the original scenario. Then form the dimensionless comparison by dividing that raw value by the same-unit reference of 8. The resulting index is 7.50. The distractors represent multiplying by the reference, reversing an earlier ratio, or carrying forward an incorrect raw result.

70. B — B is correct. First calculate the engineering quantity requested in the original scenario. Then form the dimensionless comparison by dividing that raw value by the same-unit reference of 10. The resulting index is 0.8000. The distractors represent multiplying by the reference, reversing an earlier ratio, or carrying forward an incorrect raw result.

71. C — C is correct. First calculate the engineering quantity requested in the original scenario. Then form the dimensionless comparison by dividing that raw value by the same-unit reference of 2. The resulting index is 2.50. The distractors represent multiplying by the reference, reversing an earlier ratio, or carrying forward an incorrect raw result.

72. A — A is correct. First calculate the engineering quantity requested in the original scenario. Then form the dimensionless comparison by dividing that raw value by the same-unit reference of 4. The resulting index is 63.00. The distractors represent multiplying by the reference, reversing an earlier ratio, or carrying forward an incorrect raw result.

73. D — D is correct. First calculate the engineering quantity requested in the original scenario. Then form the dimensionless comparison by dividing that raw value by the same-unit reference of 5. The resulting index is 1.20. The distractors represent multiplying by the reference, reversing an earlier ratio, or carrying forward an incorrect raw result.

74. B — B is correct. First calculate the engineering quantity requested in the original scenario. Then form the dimensionless comparison by dividing that raw value by the same-unit reference of 8. The resulting index is 10.00. The distractors represent multiplying by the reference, reversing an earlier ratio, or carrying forward an incorrect raw result.

75. D — D is correct. First calculate the engineering quantity requested in the original scenario. Then form the dimensionless comparison by dividing that raw value by the same-unit reference of 10. The resulting index is 40.00. The distractors represent multiplying by the reference, reversing an earlier ratio, or carrying forward an incorrect raw result.

76. A — A is correct. First calculate the engineering quantity requested in the original scenario. Then form the dimensionless comparison by dividing that raw value by the same-unit reference of 2. The resulting index is 8.00. The distractors represent multiplying by the reference, reversing an earlier ratio, or carrying forward an incorrect raw result.

77. C — C is correct. First calculate the engineering quantity requested in the original scenario. Then form the dimensionless comparison by dividing that raw value by the same-unit reference of 4. The resulting index is 20.00. The distractors represent multiplying by the reference, reversing an earlier ratio, or carrying forward an incorrect raw result.

78. B — B is correct. First calculate the engineering quantity requested in the original scenario. Then form the dimensionless comparison by dividing that raw value by the same-unit reference of 5. The resulting index is 14.40. The distractors represent multiplying by the reference, reversing an earlier ratio, or carrying forward an incorrect raw result.

79. A — A is correct. First calculate the engineering quantity requested in the original scenario. Then form the dimensionless comparison by dividing that raw value by the same-unit reference of 8. The resulting index is 23.25. The distractors represent multiplying by the reference, reversing an earlier ratio, or carrying forward an incorrect raw result.

80. C — C is correct. First calculate the engineering quantity requested in the original scenario. Then form the dimensionless comparison by dividing that raw value by the same-unit reference of 10. The resulting index is 0.1200. The distractors represent multiplying by the reference, reversing an earlier ratio, or carrying forward an incorrect raw result.

81. B — B is correct. First calculate the engineering quantity requested in the original scenario. Then form the dimensionless comparison by dividing that raw value by the same-unit reference of 2. The resulting index is 15.00. The distractors represent multiplying by the reference, reversing an earlier ratio, or carrying forward an incorrect raw result.

82. D — D is correct. First calculate the engineering quantity requested in the original scenario. Then form the dimensionless comparison by dividing that raw value by the same-unit reference of 4. The resulting index is 1.00. The distractors represent multiplying by the reference, reversing an earlier ratio, or carrying forward an incorrect raw result.

83. B — B is correct. First calculate the engineering quantity requested in the original scenario. Then form the dimensionless comparison by dividing that raw value by the same-unit reference of 5. The resulting index is 0.2160. The distractors represent multiplying by the reference, reversing an earlier ratio, or carrying forward an incorrect raw result.

84. A — A is correct. First calculate the engineering quantity requested in the original scenario. Then form the dimensionless comparison by dividing that raw value by the same-unit reference of 8. The resulting index is 11.25. The distractors represent multiplying by the reference, reversing an earlier ratio, or carrying forward an incorrect raw result.

85. D — D is correct. First calculate the engineering quantity requested in the original scenario. Then form the dimensionless comparison by dividing that raw value by the same-unit reference of 10. The resulting index is 0.8800. The distractors represent multiplying by the reference, reversing an earlier ratio, or carrying forward an incorrect raw result.

86. C — C is correct. First calculate the engineering quantity requested in the original scenario. Then form the dimensionless comparison by dividing that raw value by the same-unit reference of 2. The resulting index is 7.20. The distractors represent multiplying by the reference, reversing an earlier ratio, or carrying forward an incorrect raw result.

87. B — B is correct. First calculate the engineering quantity requested in the original scenario. Then form the dimensionless comparison by dividing that raw value by the same-unit reference of 4. The resulting index is 18.75. The distractors represent multiplying by the reference, reversing an earlier ratio, or carrying forward an incorrect raw result.

88. D — D is correct. First calculate the engineering quantity requested in the original scenario. Then form the dimensionless comparison by dividing that raw value by the same-unit reference of 5. The resulting index is 3.20. The distractors represent multiplying by the reference, reversing an earlier ratio, or carrying forward an incorrect raw result.

89. A — A is correct. First calculate the engineering quantity requested in the original scenario. Then form the dimensionless comparison by dividing that raw value by the same-unit reference of 8. The resulting index is 0.7500. The distractors represent multiplying by the reference, reversing an earlier ratio, or carrying forward an incorrect raw result.

90. C — C is correct. First calculate the engineering quantity requested in the original scenario. Then form the dimensionless comparison by dividing that raw value by the same-unit reference of 10. The resulting index is 1.20. The distractors represent multiplying by the reference, reversing an earlier ratio, or carrying forward an incorrect raw result.

91. B — B is correct. First calculate the engineering quantity requested in the original scenario. Then form the dimensionless comparison by dividing that raw value by the same-unit reference of 2. The resulting index is 25.00. The distractors represent multiplying by the reference, reversing an earlier ratio, or carrying forward an incorrect raw result.

92. C — C is correct. First calculate the engineering quantity requested in the original scenario. Then form the dimensionless comparison by dividing that raw value by the same-unit reference of 4. The resulting index is 5.00. The distractors represent multiplying by the reference, reversing an earlier ratio, or carrying forward an incorrect raw result.

93. D — D is correct. First calculate the engineering quantity requested in the original scenario. Then form the dimensionless comparison by dividing that raw value by the same-unit reference of 5. The resulting index is 0.2000. The distractors represent multiplying by the reference, reversing an earlier ratio, or carrying forward an incorrect raw result.

94. A — A is correct. First calculate the engineering quantity requested in the original scenario. Then form the dimensionless comparison by dividing that raw value by the same-unit reference of 8. The resulting index is 0.1042. The distractors represent multiplying by the reference, reversing an earlier ratio, or carrying forward an incorrect raw result.

95. A — A is correct. First calculate the engineering quantity requested in the original scenario. Then form the dimensionless comparison by dividing that raw value by the same-unit reference of 10. The resulting index is 0.0069. The distractors represent multiplying by the reference, reversing an earlier ratio, or carrying forward an incorrect raw result.

96. C — C is correct. First calculate the engineering quantity requested in the original scenario. Then form the dimensionless comparison by dividing that raw value by the same-unit reference of 2. The resulting index is 2.50. The distractors represent multiplying by the reference, reversing an earlier ratio, or carrying forward an incorrect raw result.

97. D — D is correct. First calculate the engineering quantity requested in the original scenario. Then form the dimensionless comparison by dividing that raw value by the same-unit reference of 4. The resulting index is 9.00. The distractors represent multiplying by the reference, reversing an earlier ratio, or carrying forward an incorrect raw result.

98. B — B is correct. First calculate the engineering quantity requested in the original scenario. Then form the dimensionless comparison by dividing that raw value by the same-unit reference of 5. The resulting index is 0.6000. The distractors represent multiplying by the reference, reversing an earlier ratio, or carrying forward an incorrect raw result.

99. A — A is correct. First calculate the engineering quantity requested in the original scenario. Then form the dimensionless comparison by dividing that raw value by the same-unit reference of 8. The resulting index is 3.42. The distractors represent multiplying by the reference, reversing an earlier ratio, or carrying forward an incorrect raw result.

100. B — B is correct. First calculate the engineering quantity requested in the original scenario. Then form the dimensionless comparison by dividing that raw value by the same-unit reference of 10. The resulting index is 2000.00. The distractors represent multiplying by the reference, reversing an earlier ratio, or carrying forward an incorrect raw result.

101. C — C is correct. First calculate the engineering quantity requested in the original scenario. Then form the dimensionless comparison by dividing that raw value by the same-unit reference of 2. The resulting index is 3.00. The distractors represent multiplying by the reference, reversing an earlier ratio, or carrying forward an incorrect raw result.

102. D — D is correct. First calculate the engineering quantity requested in the original scenario. Then form the dimensionless comparison by dividing that raw value by the same-unit reference of 4. The resulting index is 0.2137. The distractors represent multiplying by the reference, reversing an earlier ratio, or carrying forward an incorrect raw result.

103. D — D is correct. First calculate the engineering quantity requested in the original scenario. Then form the dimensionless comparison by dividing that raw value by the same-unit reference of 5. The resulting index is 0.1920. The distractors represent multiplying by the reference, reversing an earlier ratio, or carrying forward an incorrect raw result.

104. B — B is correct. First calculate the engineering quantity requested in the original scenario. Then form the dimensionless comparison by dividing that raw value by the same-unit reference of 8. The resulting index is 0.1125. The distractors represent multiplying by the reference, reversing an earlier ratio, or carrying forward an incorrect raw result.

105. A — A is correct. First calculate the engineering quantity requested in the original scenario. Then form the dimensionless comparison by dividing that raw value by the same-unit reference of 10. The resulting index is 16.00. The distractors represent multiplying by the reference, reversing an earlier ratio, or carrying forward an incorrect raw result.

106. C — C is correct. First calculate the engineering quantity requested in the original scenario. Then form the dimensionless comparison by dividing that raw value by the same-unit reference of 2. The resulting index is 48.00. The distractors represent multiplying by the reference, reversing an earlier ratio, or carrying forward an incorrect raw result.

107. B — B is correct. First calculate the engineering quantity requested in the original scenario. Then form the dimensionless comparison by dividing that raw value by the same-unit reference of 4. The resulting index is 0.2353. The distractors represent multiplying by the reference, reversing an earlier ratio, or carrying forward an incorrect raw result.

108. D — D is correct. First calculate the engineering quantity requested in the original scenario. Then form the dimensionless comparison by dividing that raw value by the same-unit reference of 5. The resulting index is 19.00. The distractors represent multiplying by the reference, reversing an earlier ratio, or carrying forward an incorrect raw result.

109. C — C is correct. First calculate the engineering quantity requested in the original scenario. Then form the dimensionless comparison by dividing that raw value by the same-unit reference of 8. The resulting index is 0.2500. The distractors represent multiplying by the reference, reversing an earlier ratio, or carrying forward an incorrect raw result.

110. A — A is correct. First calculate the engineering quantity requested in the original scenario. Then form the dimensionless comparison by dividing that raw value by the same-unit reference of 10. The resulting index is 21000.00. The distractors represent multiplying by the reference, reversing an earlier ratio, or carrying forward an incorrect raw result.