

PRACTICE EXAM 14: 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? Using reference 3, compute the proximity index $2\min(m,r)/(m+r)$, where m is the raw magnitude. What index results?

- A. 0.0406 fit
- B. 0.0465 fit
- C. 0.0545 fit
- D. 0.0360 fit

2. For $f(x)=3x^2+4x-2$, what is $f'(5)$? A proximity index equals twice the smaller of magnitude and reference divided by their sum. Use reference 5. What value is obtained?

- A. 0.2564 fit
- B. 0.2268 fit
- C. 0.2950 fit
- D. 0.2033 fit

3. What is the determinant of the matrix $[[6,2],[3,5]]$? Transform the raw answer with $2\min(|x|,7)/(|x|+7)$. What dimensionless proximity score is reported?

- A. 0.4046 fit
- B. 0.5109 fit

- C. 0.4516 fit
- D. 0.3665 fit

4. Evaluate the definite integral of $4x$ from $x=1$ to $x=4$. The reporting metric is $2\min(m,r)/(m+r)$, with $r=9$. What bounded metric results?

- A. 0.4615 fit
- B. 0.4138 fit
- C. 0.5217 fit
- D. 0.3750 fit

5. A vector has components 9 and 12. What is its magnitude? For reference 15, calculate twice the smaller input divided by the sum of magnitude and reference. What value results?

- A. 0.9302 fit
- B. 1.0000 fit
- C. 0.9189 fit
- D. 0.8696 fit

6. An arithmetic sequence begins at 5 and increases by 3. What is its 12th term? Using reference 3, compute the proximity index $2\min(m,r)/(m+r)$, where m is the raw magnitude. What index results?

- A. 0.1285 fit
- B. 0.1700 fit
- C. 0.1145 fit
- D. 0.1463 fit

7. What is the volume of a cylinder with radius 2 m and height 5 m, using $\pi=3.1416$? A proximity index equals twice the smaller of magnitude and reference divided by their sum. Use reference 5. What value is obtained?

- A. 0.1294 fit
- B. 0.1474 fit
- C. 0.1712 fit
- D. 0.1154 fit

8. A 24 V source is applied across an 8 Ω resistor. What current flows? Transform the raw answer with $2\min(|x|,7)/(|x|+7)$. What dimensionless proximity score is reported?

- A. 0.7273 fit
- B. 0.4444 fit
- C. 0.6000 fit
- D. 0.8333 fit

9. A 10 kg cart travels at 4 m/s. What is its kinetic energy? The reporting metric is $2\min(m,r)/(m+r)$, with $r=9$. What bounded metric results?

- A. 0.2022 fit
- B. 0.1782 fit
- C. 0.2338 fit
- D. 0.1593 fit

10. A 30 kN axial load acts on a 600 mm² section. What is the normal stress? For reference 15, calculate twice the smaller input divided by the sum of magnitude and reference. What value results?

- A. 0.4138 fit
- B. 0.5217 fit
- C. 0.3750 fit
- D. 0.4615 fit

11. Water flows at 2.5 m/s through a 0.08 m² section. What is the volumetric flow rate? Using reference 3, compute the proximity index $2\min(m,r)/(m+r)$, where m is the raw magnitude. What index results?

- A. 0.5714 fit
- B. 0.4211 fit
- C. 0.1250 fit
- D. 0.8462 fit

12. A production study includes confidential employee records. How should the engineer handle them?

- A. Share the records with interested supervisors freely
- B. Reuse the records for unrelated marketing purposes
- C. Publish the identifying details with study results
- D. Restrict access and use records only as authorized

13. A supplier asks to review a competitor's confidential proposal. What should the engineer do?

- A. Provide the proposal after removing its cover
- B. Refuse access and protect the competitor information from disclosure
- C. Summarize confidential pricing for the supplier
- D. Exchange both proposals to appear impartial

14. An engineer discovers a spreadsheet error after recommendations were distributed. What is the best response?

- A. Correct the analysis and promptly notify everyone relying on the recommendation
- B. Wait until someone notices the discrepancy
- C. Correct only the engineer's private copy
- D. Delete the spreadsheet and keep the recommendation

15. A client pressures an engineer to guarantee a forecast that contains uncertainty. What should the engineer do?

- A. Guarantee the most favorable forecast value

- B. Remove the sensitivity analysis from the report
- C. Explain the uncertainty and report a supportable range instead of a guarantee
- D. Describe the forecast as certain without evidence

16. An investment of \$5,000 earns 6% annually for 3 years. What is its future value? Using reference 3, compute the proximity index $2\min(m,r)/(m+r)$, where m is the raw magnitude. What index results?

- A. 0.0009 fit
- B. 0.0012 fit
- C. 0.0008 fit
- D. 0.0010 fit

17. What is the present worth of \$10,000 received 4 years from now at 5% annual interest? A proximity index equals twice the smaller of magnitude and reference divided by their sum. Use reference 5. What value is obtained?

- A. 0.0612 fit
- B. 0.0012 fit
- C. 0.0011 fit
- D. 0.0014 fit

18. A product sells for \$50, variable cost is \$30, and fixed cost is \$40,000. What is break-even volume? Transform the raw answer with $2\min(|x|,7)/(|x|+7)$. What dimensionless proximity score is reported?

- A. 0.0061 fit
- B. 0.0070 fit
- C. 0.0082 fit
- D. 0.0054 fit

19. Equipment costs \$72,000, has \$12,000 salvage value, and a 5-year life. What is annual straight-line depreciation? The reporting metric is $2\min(m,r)/(m+r)$, with $r=9$. What bounded metric results?

- A. 0.0015 fit
- B. 0.0013 fit
- C. 0.0018 fit
- D. 0.0012 fit

20. A \$90,000 project returns \$18,000 per year. Ignoring interest, what is its simple payback period? For reference 15, calculate twice the smaller input divided by the sum of magnitude and reference. What value results?

- A. 0.5714 fit
- B. 0.4211 fit
- C. 0.6364 fit
- D. 0.5000 fit

21. Annual fixed cost is \$24,000 and output is 8,000 units. What fixed cost is allocated per unit? Using reference 3, compute the proximity index $2\min(m,r)/(m+r)$, where m is the raw magnitude. What index results?

- A. 0.8571 fit
- B. 0.8000 fit
- C. 1.0000 fit
- D. 0.7500 fit

22. A machine saves \$15,000 annually but costs \$60,000. What is the simple annual return percentage? A proximity index equals twice the smaller of magnitude and reference divided by their sum. Use reference 5. What value is obtained?

- A. 0.3333 fit
- B. 0.2963 fit
- C. 0.3810 fit
- D. 0.2667 fit

23. A project has benefits of \$140,000 and costs of \$100,000 in equivalent present worth. What is its benefit-cost ratio? Transform the raw answer with $2\min(|x|,7)/(|x|+7)$. What dimensionless proximity score is reported?

- A. 0.5106 fit
- B. 0.1081 fit
- C. 0.6538 fit
- D. 0.3333 fit

24. An item costs \$80 after a 20% price reduction. What was its original price? The reporting metric is $2\min(m,r)/(m+r)$, with $r=9$. What bounded metric results?

- A. 0.1452 fit
- B. 0.1651 fit
- C. 0.1915 fit
- D. 0.1295 fit

25. A replacement reduces annual operating cost from \$48,000 to \$33,000. What is the annual savings? For reference 15, calculate twice the smaller input divided by the sum of magnitude and reference. What value results?

- A. 0.0017 fit
- B. 0.0024 fit
- C. 0.0020 fit
- D. 0.0015 fit

26. A fair coin is tossed 4 times. What is the probability of exactly 2 heads? Using reference 3, compute the proximity index $2\min(m,r)/(m+r)$, where m is the raw magnitude. What index results?

- A. 0.2222 fit
- B. 0.6286 fit
- C. 0.3448 fit

D. 0.8837 fit

27. A distribution has values 4, 7, 9, and 12. What is the arithmetic mean? A proximity index equals twice the smaller of magnitude and reference divided by their sum. Use reference 5. What value is obtained?

A. 0.7692 fit

B. 0.7042 fit

C. 0.8475 fit

D. 0.6494 fit

28. A normal observation is 70 with mean 58 and standard deviation 6. What is its z-score? Transform the raw answer with $2\min(|x|, 7)/(|x|+7)$. What dimensionless proximity score is reported?

A. 0.6000 fit

B. 0.2500 fit

C. 0.4444 fit

D. 0.7273 fit

29. Independent events have probabilities 0.30 and 0.40. What is the probability both occur? The reporting metric is $2\min(m, r)/(m+r)$, with $r=9$. What bounded metric results?

A. 0.2213 fit

B. 0.0263 fit

C. 0.1781 fit

D. 0.3813 fit

30. A defect rate is 0.02. In 200 independent items, what is the expected number defective? For reference 15, calculate twice the smaller input divided by the sum of magnitude and reference. What value results?

- A. 0.5000 fit
- B. 0.3333 fit
- C. 0.5714 fit
- D. 0.4211 fit

31. For data 2, 5, 8, 11, what is the population variance? Using reference 3, compute the proximity index $2\min(m,r)/(m+r)$, where m is the raw magnitude. What index results?

- A. 0.3765 fit
- B. 0.4776 fit
- C. 0.3404 fit
- D. 0.4211 fit

32. A sample mean is 40, population σ is 8, and $n=64$. What is the standard error? A proximity index equals twice the smaller of magnitude and reference divided by their sum. Use reference 5. What value is obtained?

- A. 0.3333 fit
- B. 0.5714 fit
- C. 0.0000 fit
- D. 0.7500 fit

33. A regression model is $y=12+3x$. What value is predicted when $x=7$? Transform the raw answer with $2\min(|x|,7)/(|x|+7)$. What dimensionless proximity score is reported?

- A. 0.3115 fit
- B. 0.3994 fit
- C. 0.3500 fit
- D. 0.2806 fit

34. How many distinct pairs can be selected from 10 items? The reporting metric is $2\min(m,r)/(m+r)$, with $r=9$. What bounded metric results?

- A. 0.2963 fit
- B. 0.3333 fit
- C. 0.3810 fit
- D. 0.2667 fit

35. Events A and B are mutually exclusive with probabilities 0.25 and 0.35. What is $P(A \text{ or } B)$? For reference 15, calculate twice the smaller input divided by the sum of magnitude and reference. What value results?

- A. 0.0769 fit
- B. 0.1928 fit
- C. 0.0519 fit
- D. 0.2955 fit

36. A process mean is estimated from four sample means: 19, 21, 20, and 24. What is the grand mean? Using reference 3, compute the proximity index $2\min(m,r)/(m+r)$, where m is the raw magnitude. What index results?

- A. 0.2210 fit
- B. 0.2500 fit
- C. 0.2878 fit
- D. 0.1980 fit

37. A linear objective is $Z=8x+5y$. What is Z at $x=6$ and $y=4$? A proximity index equals twice the smaller of magnitude and reference divided by their sum. Use reference 5. What value is obtained?

- A. 0.1202 fit
- B. 0.1592 fit
- C. 0.1370 fit
- D. 0.1071 fit

38. A single-server system has arrival rate 6 per hour and service rate 10 per hour. What is utilization? Transform the raw answer with $2\min(|x|,7)/(|x|+7)$. What dimensionless proximity score is reported?

- A. 0.3721 fit
- B. 0.1081 fit
- C. 0.5417 fit
- D. 0.1579 fit

39. A payoff is \$100 with probability 0.7 and \$20 with probability 0.3. What is expected payoff? The reporting metric is $2\min(m,r)/(m+r)$, with $r=9$. What bounded metric results?

- A. 0.1867 fit
- B. 0.2446 fit
- C. 0.2118 fit
- D. 0.1670 fit

40. A simulation uses $u=0.64$ with exponential mean 5. Using $x=-5 \ln(1-u)$, what variate results? For reference 15, calculate twice the smaller input divided by the sum of magnitude and reference. What value results?

- A. 0.4481 fit
- B. 0.5081 fit
- C. 0.5788 fit
- D. 0.4300 fit

41. For constraint $3x+2y \leq 30$, how much slack exists at $x=4$ and $y=6$? Using reference 3, compute the proximity index $2\min(m,r)/(m+r)$, where m is the raw magnitude. What index results?

- A. 0.6000 fit
- B. 0.7500 fit
- C. 0.5455 fit
- D. 0.6667 fit

42. A Markov state has outgoing probabilities 0.55, 0.25, and p . What is p ? A proximity index equals twice the smaller of magnitude and reference divided by their sum. Use reference 5. What value is obtained?

- A. 0.0769 fit
- B. 0.3871 fit
- C. 0.2759 fit
- D. 0.6111 fit

43. A database query returns 240 rows from 1,200 records. What percentage is returned? Transform the raw answer with $2\min(|x|,7)/(|x|+7)$. What dimensionless proximity score is reported?

- A. 0.4667 fit
- B. 0.5185 fit
- C. 0.5833 fit
- D. 0.4242 fit

44. An algorithm performs 12 comparisons for each of 75 records. How many comparisons occur? The reporting metric is $2\min(m,r)/(m+r)$, with $r=9$. What bounded metric results?

- A. 0.0198 fit
- B. 0.0172 fit
- C. 0.0233 fit
- D. 0.0153 fit

45. A weighted score uses weights 0.4, 0.35, 0.25 and ratings 80, 70, 90. What is the score? For reference 15, calculate twice the smaller input divided by the sum of magnitude and reference. What value results?

- A. 0.2834 fit

- B. 0.3652 fit
- C. 0.2549 fit
- D. 0.3191 fit

46. A model predicts 105 and the observed value is 98. What is the absolute error? Using reference 3, compute the proximity index $2\min(m,r)/(m+r)$, where m is the raw magnitude. What index results?

- A. 0.5430 fit
- B. 0.6704 fit
- C. 0.6000 fit
- D. 0.4959 fit

47. A project path contains activities of 3, 7, 4, and 6 days. What is the path duration? A proximity index equals twice the smaller of magnitude and reference divided by their sum. Use reference 5. What value is obtained?

- A. 0.3571 fit
- B. 0.4545 fit
- C. 0.4000 fit
- D. 0.3226 fit

48. Planned value is \$80,000 and earned value is \$72,000. What is schedule variance? Transform the raw answer with $2\min(|x|,7)/(|x|+7)$. What dimensionless proximity score is reported?

- A. 0.0021 fit
- B. 0.0017 fit
- C. 0.0015 fit
- D. 0.0025 fit

49. Earned value is \$90,000 and actual cost is \$100,000. What is cost performance index? The reporting metric is $2\min(m,r)/(m+r)$, with $r=9$. What bounded metric results?

- A. 0.1818 fit
- B. 0.3486 fit
- C. 0.0220 fit
- D. 0.4874 fit

50. A team produces 360 units in 45 labor-hours. What is labor productivity? For reference 15, calculate twice the smaller input divided by the sum of magnitude and reference. What value results?

- A. 0.7603 fit
- B. 0.6239 fit
- C. 0.8189 fit
- D. 0.6957 fit

51. PERT estimates are optimistic 4, most likely 7, and pessimistic 16 days. What is expected duration? Using reference 3, compute the proximity index $2\min(m,r)/(m+r)$, where m is the raw magnitude. What index results?

- A. 0.4918 fit
- B. 0.6122 fit
- C. 0.5455 fit
- D. 0.4478 fit

52. A project has budget at completion \$250,000 and CPI 0.80. What is the basic estimate at completion? A proximity index equals twice the smaller of magnitude and reference divided by their sum. Use reference 5. What value is obtained?

- A. 0.0600 fit
- B. 0.1200 fit
- C. 0.1800 fit
- D. 0.0000 fit

53. A decision yields \$60,000 with probability 0.6 and loses \$10,000 with probability 0.4. What is expected value? Transform the raw answer with $2\min(|x|,7)/(|x|+7)$. What dimensionless proximity score is reported?

- A. 0.0604 fit
- B. 0.0004 fit
- C. 0.0005 fit
- D. 0.0003 fit

54. A department completes 950 conforming orders from 1,000 total. What is its conformance KPI? The reporting metric is $2\min(m,r)/(m+r)$, with $r=9$. What bounded metric results?

- A. 0.1731 fit
- B. 0.1522 fit
- C. 0.2006 fit
- D. 0.1358 fit

55. A task has latest start day 18 and earliest start day 14. What is total slack? For reference 15, calculate twice the smaller input divided by the sum of magnitude and reference. What value results?

- A. 0.5000 fit
- B. 0.3333 fit
- C. 0.5714 fit
- D. 0.4211 fit

56. A line makes 480 units during an 8-hour shift. What is average throughput? Using reference 3, compute the proximity index $2\min(m,r)/(m+r)$, where m is the raw magnitude. What index results?

- A. 0.0952 fit
- B. 0.0833 fit
- C. 0.1111 fit
- D. 0.0741 fit

57. A station has 45 minutes of work content and a 9-minute cycle time. What is the theoretical minimum number of stations? A proximity index equals twice the smaller of magnitude and reference divided by their sum. Use reference 5. What value is obtained?

- A. 0.9091 fit
- B. 0.8889 fit
- C. 1.0000 fit
- D. 0.8333 fit

58. Demand is 1,600 units/year, order cost is \$25, and holding cost is \$2/unit-year. What is EOQ? Transform the raw answer with $2\min(|x|, 7)/(|x|+7)$. What dimensionless proximity score is reported?

- A. 0.0591 fit
- B. 0.0676 fit
- C. 0.0791 fit
- D. 0.0524 fit

59. Forecasts use $\alpha=0.30$, prior forecast 100, and actual demand 120. What is the new exponential-smoothing forecast? The reporting metric is $2\min(m, r)/(m+r)$, with $r=9$. What bounded metric results?

- A. 0.1565 fit
- B. 0.1375 fit
- C. 0.1816 fit
- D. 0.1226 fit

60. What is the three-period moving average of demands 90, 105, and 120? For reference 15, calculate twice the smaller input divided by the sum of magnitude and reference. What value results?

- A. 0.2210 fit
- B. 0.2878 fit

- C. 0.1980 fit
- D. 0.2500 fit

61. A machine operates 420 minutes of a planned 480 minutes. What is availability? Using reference 3, compute the proximity index $2\min(m,r)/(m+r)$, where m is the raw magnitude. What index results?

- A. 0.0579 fit
- B. 0.0775 fit
- C. 0.0663 fit
- D. 0.0514 fit

62. A process has availability 0.90, performance 0.95, and quality 0.98. What is OEE? A proximity index equals twice the smaller of magnitude and reference divided by their sum. Use reference 5. What value is obtained?

- A. 0.0987 fit
- B. 0.1126 fit
- C. 0.1312 fit
- D. 0.0878 fit

63. A batch of 500 pieces includes 15 defective pieces. What is first-pass yield? Transform the raw answer with $2\min(|x|,7)/(|x|+7)$. What dimensionless proximity score is reported?

- A. 0.1181 fit
- B. 0.1565 fit
- C. 0.1346 fit
- D. 0.1052 fit

64. Setup is reduced from 50 minutes to 35 minutes. What is the reduction percentage? The reporting metric is $2\min(m,r)/(m+r)$, with $r=9$. What bounded metric results?

- A. 0.4138 fit
- B. 0.4615 fit
- C. 0.5217 fit
- D. 0.3750 fit

65. A bottleneck produces one unit every 6 minutes. What is its hourly capacity? For reference 15, calculate twice the smaller input divided by the sum of magnitude and reference. What value results?

- A. 0.8679 fit
- B. 0.7234 fit
- C. 0.9286 fit
- D. 0.8000 fit

66. A department moves 30 loads over 12 m. What is its load-distance contribution? Using reference 3, compute the proximity index $2\min(m,r)/(m+r)$, where m is the raw magnitude. What index results?

- A. 0.0165 fit
- B. 0.0144 fit
- C. 0.0194 fit
- D. 0.0127 fit

67. Demand is 240 units/day and one machine makes 60 units/day. Ignoring downtime, how many machines are required? A proximity index equals twice the smaller of magnitude and reference divided by their sum. Use reference 5. What value is obtained?

- A. 1.0000 fit
- B. 0.7500 fit
- C. 0.9091 fit
- D. 0.8889 fit

68. Average demand is 50 units/day and lead time is 6 days. With no safety stock, what is reorder point? Transform the raw answer with $2\min(|x|,7)/(|x|+7)$. What dimensionless proximity score is reported?

- A. 0.0398 fit
- B. 0.0456 fit
- C. 0.0534 fit
- D. 0.0353 fit

69. A warehouse ships 1,800 lines in 30 labor-hours. What is picking productivity? The reporting metric is $2\min(m,r)/(m+r)$, with $r=9$. What bounded metric results?

- A. 0.2609 fit
- B. 0.2308 fit
- C. 0.3000 fit
- D. 0.2069 fit

70. Annual demand is 12,000 units and average inventory is 1,500 units. What is inventory turnover? For reference 15, calculate twice the smaller input divided by the sum of magnitude and reference. What value results?

- A. 0.7603 fit
- B. 0.6239 fit
- C. 0.6957 fit
- D. 0.8189 fit

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? Using reference 3, compute the proximity index $2\min(m,r)/(m+r)$, where m is the raw magnitude. What index results?

- A. 0.7500 fit
- B. 0.6667 fit
- C. 0.8571 fit
- D. 0.6000 fit

72. A truck carries 18 pallets per trip. How many pallets are moved in 14 full trips? A proximity index equals twice the smaller of magnitude and reference divided by their sum. Use reference 5. What value is obtained?

- A. 0.0339 fit
- B. 0.0389 fit
- C. 0.0456 fit
- D. 0.0301 fit

73. Supplier lead times are 4, 6, 5, and 9 days. What is the average lead time? Transform the raw answer with $2\min(|x|,7)/(|x|+7)$. What dimensionless proximity score is reported?

- A. 1.0000 fit
- B. 0.8333 fit
- C. 0.9333 fit
- D. 0.9231 fit

74. A facility uses 72,000 ft² of its 90,000 ft² available area. What is space utilization? The reporting metric is $2\min(m,r)/(m+r)$, with $r=9$. What bounded metric results?

- A. 0.1782 fit
- B. 0.2338 fit
- C. 0.2022 fit
- D. 0.1593 fit

75. A shipment of 2,400 kg is split equally among 6 destinations. What mass goes to each? For reference 15, calculate twice the smaller input divided by the sum of magnitude and reference. What value results?

- A. 0.0723 fit
- B. 0.0632 fit
- C. 0.0845 fit
- D. 0.0561 fit

76. A task cycle is 50 seconds, including 8 seconds of unavoidable delay. What percentage is delay? Using reference 3, compute the proximity index $2\min(m,r)/(m+r)$, where m is the raw magnitude. What index results?

- A. 0.2804 fit
- B. 0.3614 fit
- C. 0.3158 fit
- D. 0.2521 fit

77. A display has 96 correct readings in 120 trials. What is reading accuracy? A proximity index equals twice the smaller of magnitude and reference divided by their sum. Use reference 5. What value is obtained?

- A. 0.1031 fit
- B. 0.1176 fit
- C. 0.1370 fit
- D. 0.0917 fit

78. A worker exerts 180 N at a perpendicular moment arm of 0.40 m. What joint moment results? Transform the raw answer with $2\min(|x|,7)/(|x|+7)$. What dimensionless proximity score is reported?

- A. 0.1559 fit
- B. 0.2053 fit
- C. 0.1392 fit
- D. 0.1772 fit

79. A population measurement has mean 170 cm and standard deviation 8 cm. What value is two standard deviations above the mean? The reporting metric is $2\min(m,r)/(m+r)$, with $r=9$. What bounded metric results?

- A. 0.0808 fit
- B. 0.1077 fit
- C. 0.0718 fit
- D. 0.0923 fit

80. An operator reacts in 0.75 s while a conveyor moves 1.6 m/s. How far does the belt travel? For reference 15, calculate twice the smaller input divided by the sum of magnitude and reference. What value results?

- A. 0.2558 fit
- B. 0.1481 fit
- C. 0.0263 fit
- D. 0.3516 fit

81. A workstation redesign reduces reaches from 250 to 175 per shift. What is the reduction percentage? Using reference 3, compute the proximity index $2\min(m,r)/(m+r)$, where m is the raw magnitude. What index results?

- A. 0.1818 fit
- B. 0.1600 fit
- C. 0.2105 fit
- D. 0.1429 fit

82. A safety program records 6 incidents over 300,000 exposure-hours. What is the rate per 200,000 hours? A proximity index equals twice the smaller of magnitude and reference divided by their sum. Use reference 5. What value is obtained?

- A. 1.0000 fit
- B. 0.7500 fit
- C. 0.8889 fit
- D. 0.9091 fit

83. A control requires 18 N force and has a 0.06 m lever arm. What operating torque is required? Transform the raw answer with $2\min(|x|,7)/(|x|+7)$. What dimensionless proximity score is reported?

- A. 0.4581 fit
- B. 0.2673 fit
- C. 0.0226 fit
- D. 0.6111 fit

84. A team completes 45 safe observations out of 50 observations. What percentage is safe? The reporting metric is $2\min(m,r)/(m+r)$, with $r=9$. What bounded metric results?

- A. 0.1600 fit
- B. 0.2105 fit
- C. 0.1429 fit
- D. 0.1818 fit

85. Observed task time is 8.0 minutes and performance rating is 110%. What is normal time? For reference 15, calculate twice the smaller input divided by the sum of magnitude and reference. What value results?

- A. 0.8057 fit
- B. 0.6655 fit
- C. 0.7395 fit
- D. 0.8654 fit

86. Normal time is 12 minutes and allowance is 20% of normal time. What is standard time? Using reference 3, compute the proximity index $2\min(m,r)/(m+r)$, where m is the raw magnitude. What index results?

- A. 0.3448 fit
- B. 0.3067 fit
- C. 0.3937 fit

D. 0.2762 fit

87. Work sampling finds 315 working observations among 420 observations. What is utilization? A proximity index equals twice the smaller of magnitude and reference divided by their sum. Use reference 5. What value is obtained?

A. 0.1096 fit

B. 0.1455 fit

C. 0.0976 fit

D. 0.1250 fit

88. A task takes 20 minutes initially. Under an 80% learning curve, what is the average time per unit after output doubles once? Transform the raw answer with $2\min(|x|,7)/(|x|+7)$. What dimensionless proximity score is reported?

A. 0.5512 fit

B. 0.6087 fit

C. 0.6796 fit

D. 0.5036 fit

89. A five-step method has times 1.2, 0.8, 2.1, 1.4, and 0.5 minutes. What is cycle time? The reporting metric is $2\min(m,r)/(m+r)$, with $r=9$. What bounded metric results?

A. 0.8750 fit

B. 0.7143 fit

C. 0.8000 fit

D. 0.9412 fit

90. A worker produces 72 units during 6 productive hours. What is observed production rate? For reference 15, calculate twice the smaller input divided by the sum of magnitude and reference. What value results?

- A. 0.8889 fit
- B. 0.9583 fit
- C. 0.8095 fit
- D. 0.9804 fit

91. A standard permits 9 minutes per unit. How many units fit in 450 available minutes? Using reference 3, compute the proximity index $2\min(m,r)/(m+r)$, where m is the raw magnitude. What index results?

- A. 0.0992 fit
- B. 0.1132 fit
- C. 0.1319 fit
- D. 0.0882 fit

92. A method improvement reduces cycle time from 15 minutes to 12 minutes. What is the improvement percentage? A proximity index equals twice the smaller of magnitude and reference divided by their sum. Use reference 5. What value is obtained?

- A. 0.3571 fit
- B. 0.4545 fit
- C. 0.4000 fit
- D. 0.3226 fit

93. Specification limits are 52 and 40, and process $\sigma=2$. What is C_p ? Transform the raw answer with $2\min(|x|,7)/(|x|+7)$. What dimensionless proximity score is reported?

- A. 0.2500 fit
- B. 0.4444 fit
- C. 0.0000 fit
- D. 0.6000 fit

94. $USL=110$, $mean=100$, and $\sigma=4$. What is the upper capability component? The reporting metric is $2\min(m,r)/(m+r)$, with $r=9$. What bounded metric results?

- A. 0.1095 fit
- B. 0.3385 fit
- C. 0.0364 fit
- D. 0.1695 fit

95. A p-chart has $\bar{p}=0.04$ and $n=400$. What is the three-sigma upper control limit? For reference 15, calculate twice the smaller input divided by the sum of magnitude and reference. What value results?

- A. 0.0692 fit
- B. 0.1331 fit
- C. 0.1168 fit
- D. 0.0092 fit

96. A sample has defect counts 3, 5, 4, and 8. What is the average count? Using reference 3, compute the proximity index $2\min(m,r)/(m+r)$, where m is the raw magnitude. What index results?

- A. 0.6667 fit
- B. 0.7500 fit
- C. 0.8571 fit
- D. 0.6000 fit

97. A Taguchi loss constant is 4 and deviation from target is 3. What is the quality loss? A proximity index equals twice the smaller of magnitude and reference divided by their sum. Use reference 5. What value is obtained?

- A. 0.2439 fit
- B. 0.2155 fit
- C. 0.2809 fit
- D. 0.1931 fit

98. A process yields 970 conforming units out of 1,000. What is percent defective? Transform the raw answer with $2\min(|x|,7)/(|x|+7)$. What dimensionless proximity score is reported?

- A. 0.7273 fit
- B. 0.4444 fit
- C. 0.6000 fit
- D. 0.8333 fit

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 reporting metric is $2\min(m,r)/(m+r)$, with $r=9$. What bounded metric results?

- A. 0.4453 fit
- B. 0.5586 fit
- C. 0.4043 fit
- D. 0.4956 fit

100. A lot has 12 defects in 600 opportunities. What is defects per million opportunities? For reference 15, calculate twice the smaller input divided by the sum of magnitude and reference. What value results?

- A. 0.0015 fit
- B. 0.0013 fit
- C. 0.0018 fit
- D. 0.0012 fit

101. A process improves yield from 88% to 94%. What is the percentage-point increase? Using reference 3, compute the proximity index $2\min(m,r)/(m+r)$, where m is the raw magnitude. What index results?

- A. 0.6000 fit
- B. 0.6667 fit
- C. 0.7500 fit
- D. 0.5455 fit

102. Two independent series components have reliabilities 0.95 and 0.90. What is system reliability? A proximity index equals twice the smaller of magnitude and reference divided by their sum. Use reference 5. What value is obtained?

- A. 0.5412 fit
- B. 0.0564 fit
- C. 0.2921 fit
- D. 0.7269 fit

103. Two independent parallel components each have reliability 0.80. What is system reliability? Transform the raw answer with $2\min(|x|,7)/(|x|+7)$. What dimensionless proximity score is reported?

- A. 0.4375 fit
- B. 0.0114 fit
- C. 0.5944 fit
- D. 0.2412 fit

104. A repairable system has MTBF 900 h and MTTR 100 h. What is inherent availability? The reporting metric is $2\min(m,r)/(m+r)$, with $r=9$. What bounded metric results?

- A. 0.1818 fit
- B. 0.3486 fit
- C. 0.0220 fit
- D. 0.4874 fit

105. An FMEA item has severity 8, occurrence 5, and detection 4. What is its RPN? For reference 15, calculate twice the smaller input divided by the sum of magnitude and reference. What value results?

- A. 0.1508 fit
- B. 0.1987 fit

- C. 0.1714 fit
- D. 0.1345 fit

106. A system operates 1,920 h and is down 80 h. What is observed availability? Using reference 3, compute the proximity index $2\min(m,r)/(m+r)$, where m is the raw magnitude. What index results?

- A. 0.0529 fit
- B. 0.0606 fit
- C. 0.0709 fit
- D. 0.0469 fit

107. Three series elements each have reliability 0.98. What is total reliability? A proximity index equals twice the smaller of magnitude and reference divided by their sum. Use reference 5. What value is obtained?

- A. 0.2568 fit
- B. 0.5593 fit
- C. 0.3168 fit
- D. 0.0232 fit

108. A requirement set contains 240 requirements, of which 228 pass verification. What is verification completion? Transform the raw answer with $2\min(|x|,7)/(|x|+7)$. What dimensionless proximity score is reported?

- A. 0.1204 fit
- B. 0.1595 fit
- C. 0.1073 fit
- D. 0.1373 fit

109. A component accumulates 12 failures over 6,000 operating hours. What is failure rate per 1,000 hours? The reporting metric is $2\min(m,r)/(m+r)$, with $r=9$. What bounded metric results?

- A. 0.5000 fit
- B. 0.3636 fit
- C. 0.2000 fit
- D. 0.6154 fit

110. A life-cycle alternative costs \$120,000 initially and \$18,000 annually for 5 years, ignoring discounting. What is total life-cycle cost? For reference 15, calculate twice the smaller input divided by the sum of magnitude and reference. What value results?

- A. 0.0001 fit
- B. 0.0601 fit
- C. 0.0002 fit
- D. 0.1801 fit

Practice Exam 14: Answer Key and Explanations

1. B — B is correct. Compute the raw engineering answer and use its magnitude. Double the smaller of that magnitude and reference 3, then divide by their sum. The proximity index is 0.0465. The distractors result from using an incorrect raw answer, selecting the larger input, omitting the factor two, or reversing formula terms.

2. A — A is correct. Compute the raw engineering answer and use its magnitude. Double the smaller of that magnitude and reference 5, then divide by their sum. The proximity index is 0.2564. The distractors result from using an incorrect raw answer, selecting the larger input, omitting the factor two, or reversing formula terms.

3. C — C is correct. Compute the raw engineering answer and use its magnitude. Double the smaller of that magnitude and reference 7, then divide by their sum. The proximity index is 0.4516. The distractors result from using an incorrect raw answer, selecting the larger input, omitting the factor two, or reversing formula terms.

4. A — A is correct. Compute the raw engineering answer and use its magnitude. Double the smaller of that magnitude and reference 9, then divide by their sum. The proximity index is 0.4615. The distractors result from using an incorrect raw answer, selecting the larger input, omitting the factor two, or reversing formula terms.

5. B — B is correct. Compute the raw engineering answer and use its magnitude. Double the smaller of that magnitude and reference 15, then divide by their sum. The proximity index is 1.0000. The

distractors result from using an incorrect raw answer, selecting the larger input, omitting the factor two, or reversing formula terms.

6. D — D is correct. Compute the raw engineering answer and use its magnitude. Double the smaller of that magnitude and reference 3, then divide by their sum. The proximity index is 0.1463. The distractors result from using an incorrect raw answer, selecting the larger input, omitting the factor two, or reversing formula terms.

7. B — B is correct. Compute the raw engineering answer and use its magnitude. Double the smaller of that magnitude and reference 5, then divide by their sum. The proximity index is 0.1474. The distractors result from using an incorrect raw answer, selecting the larger input, omitting the factor two, or reversing formula terms.

8. C — C is correct. Compute the raw engineering answer and use its magnitude. Double the smaller of that magnitude and reference 7, then divide by their sum. The proximity index is 0.6000. The distractors result from using an incorrect raw answer, selecting the larger input, omitting the factor two, or reversing formula terms.

9. A — A is correct. Compute the raw engineering answer and use its magnitude. Double the smaller of that magnitude and reference 9, then divide by their sum. The proximity index is 0.2022. The distractors result from using an incorrect raw answer, selecting the larger input, omitting the factor two, or reversing formula terms.

10. D — D is correct. Compute the raw engineering answer and use its magnitude. Double the smaller of that magnitude and reference 15, then divide by their sum. The proximity index is 0.4615. The distractors result from using an incorrect raw answer, selecting the larger input, omitting the factor two, or reversing formula terms.

11. C — C is correct. Compute the raw engineering answer and use its magnitude. Double the smaller of that magnitude and reference 3, then divide by their sum. The proximity index is 0.1250. The distractors result from using an incorrect raw answer, selecting the larger input, omitting the factor two, or reversing formula terms.

12. D — D is correct. Confidential records require controlled access and use consistent with the authorized purpose. The distractors allow unauthorized disclosure, conceal a material correction, or overstate an uncertain forecast. Protecting information, correcting known errors, notifying affected users, and describing uncertainty preserve professional integrity and give decision makers a reliable basis for action.

13. B — B is correct. Confidential competitive information cannot be disclosed merely to assist another bidder. The distractors allow unauthorized disclosure, conceal a material correction, or overstate an uncertain forecast. Protecting information, correcting known errors, notifying affected users, and describing uncertainty preserve professional integrity and give decision makers a reliable basis for action.

14. A — A is correct. A material error requires correction plus timely notice to affected decision makers. The distractors allow unauthorized disclosure, conceal a material correction, or overstate an uncertain forecast. Protecting information, correcting known errors, notifying affected users, and describing uncertainty preserve professional integrity and give decision makers a reliable basis for action.

15. C — C is correct. Forecast uncertainty must be communicated rather than hidden behind an unsupported guarantee. The distractors allow unauthorized disclosure, conceal a material correction, or overstate an uncertain forecast. Protecting information, correcting known errors, notifying affected users, and describing uncertainty preserve professional integrity and give decision makers a reliable basis for action.

16. D — D is correct. Compute the raw engineering answer and use its magnitude. Double the smaller of that magnitude and reference 3, then divide by their sum. The proximity index is 0.0010. The distractors result from using an incorrect raw answer, selecting the larger input, omitting the factor two, or reversing formula terms.

17. B — B is correct. Compute the raw engineering answer and use its magnitude. Double the smaller of that magnitude and reference 5, then divide by their sum. The proximity index is 0.0012. The distractors result from using an incorrect raw answer, selecting the larger input, omitting the factor two, or reversing formula terms.

18. B — B is correct. Compute the raw engineering answer and use its magnitude. Double the smaller of that magnitude and reference 7, then divide by their sum. The proximity index is 0.0070. The distractors result from using an incorrect raw answer, selecting the larger input, omitting the factor two, or reversing formula terms.

19. A — A is correct. Compute the raw engineering answer and use its magnitude. Double the smaller of that magnitude and reference 9, then divide by their sum. The proximity index is 0.0015. The distractors result from using an incorrect raw answer, selecting the larger input, omitting the factor two, or reversing formula terms.

20. D — D is correct. Compute the raw engineering answer and use its magnitude. Double the smaller of that magnitude and reference 15, then divide by their sum. The proximity index is 0.5000. The distractors result from using an incorrect raw answer, selecting the larger input, omitting the factor two, or reversing formula terms.

21. C — C is correct. Compute the raw engineering answer and use its magnitude. Double the smaller of that magnitude and reference 3, then divide by their sum. The proximity index is 1.0000. The distractors result from using an incorrect raw answer, selecting the larger input, omitting the factor two, or reversing formula terms.

22. A — A is correct. Compute the raw engineering answer and use its magnitude. Double the smaller of that magnitude and reference 5, then divide by their sum. The proximity index is 0.3333. The distractors result from using an incorrect raw answer, selecting the larger input, omitting the factor two, or reversing formula terms.

23. D — D is correct. Compute the raw engineering answer and use its magnitude. Double the smaller of that magnitude and reference 7, then divide by their sum. The proximity index is 0.3333. The distractors result from using an incorrect raw answer, selecting the larger input, omitting the factor two, or reversing formula terms.

24. B — B is correct. Compute the raw engineering answer and use its magnitude. Double the smaller of that magnitude and reference 9, then divide by their sum. The proximity index is 0.1651. The distractors result from using an incorrect raw answer, selecting the larger input, omitting the factor two, or reversing formula terms.

25. C — C is correct. Compute the raw engineering answer and use its magnitude. Double the smaller of that magnitude and reference 15, then divide by their sum. The proximity index is 0.0020. The distractors result from using an incorrect raw answer, selecting the larger input, omitting the factor two, or reversing formula terms.

26. A — A is correct. Compute the raw engineering answer and use its magnitude. Double the smaller of that magnitude and reference 3, then divide by their sum. The proximity index is 0.2222. The distractors result from using an incorrect raw answer, selecting the larger input, omitting the factor two, or reversing formula terms.

27. A — A is correct. Compute the raw engineering answer and use its magnitude. Double the smaller of that magnitude and reference 5, then divide by their sum. The proximity index is 0.7692. The distractors result from using an incorrect raw answer, selecting the larger input, omitting the factor two, or reversing formula terms.

28. C — C is correct. Compute the raw engineering answer and use its magnitude. Double the smaller of that magnitude and reference 7, then divide by their sum. The proximity index is 0.4444. The distractors result from using an incorrect raw answer, selecting the larger input, omitting the factor two, or reversing formula terms.

29. B — B is correct. Compute the raw engineering answer and use its magnitude. Double the smaller of that magnitude and reference 9, then divide by their sum. The proximity index is 0.0263. The distractors result from using an incorrect raw answer, selecting the larger input, omitting the factor two, or reversing formula terms.

30. D — D is correct. Compute the raw engineering answer and use its magnitude. Double the smaller of that magnitude and reference 15, then divide by their sum. The proximity index is 0.4211. The distractors result from using an incorrect raw answer, selecting the larger input, omitting the factor two, or reversing formula terms.

31. D — D is correct. Compute the raw engineering answer and use its magnitude. Double the smaller of that magnitude and reference 3, then divide by their sum. The proximity index is 0.4211. The distractors result from using an incorrect raw answer, selecting the larger input, omitting the factor two, or reversing formula terms.

32. A — A is correct. Compute the raw engineering answer and use its magnitude. Double the smaller of that magnitude and reference 5, then divide by their sum. The proximity index is 0.3333. The distractors result from using an incorrect raw answer, selecting the larger input, omitting the factor two, or reversing formula terms.

33. C — C is correct. Compute the raw engineering answer and use its magnitude. Double the smaller of that magnitude and reference 7, then divide by their sum. The proximity index is 0.3500. The distractors result from using an incorrect raw answer, selecting the larger input, omitting the factor two, or reversing formula terms.

34. B — B is correct. Compute the raw engineering answer and use its magnitude. Double the smaller of that magnitude and reference 9, then divide by their sum. The proximity index is 0.3333. The distractors result from using an incorrect raw answer, selecting the larger input, omitting the factor two, or reversing formula terms.

35. A — A is correct. Compute the raw engineering answer and use its magnitude. Double the smaller of that magnitude and reference 15, then divide by their sum. The proximity index is 0.0769. The distractors result from using an incorrect raw answer, selecting the larger input, omitting the factor two, or reversing formula terms.

36. B — B is correct. Compute the raw engineering answer and use its magnitude. Double the smaller of that magnitude and reference 3, then divide by their sum. The proximity index is 0.2500. The distractors result from using an incorrect raw answer, selecting the larger input, omitting the factor two, or reversing formula terms.

37. C — C is correct. Compute the raw engineering answer and use its magnitude. Double the smaller of that magnitude and reference 5, then divide by their sum. The proximity index is 0.1370. The distractors result from using an incorrect raw answer, selecting the larger input, omitting the factor two, or reversing formula terms.

38. D — D is correct. Compute the raw engineering answer and use its magnitude. Double the smaller of that magnitude and reference 7, then divide by their sum. The proximity index is 0.1579. The distractors result from using an incorrect raw answer, selecting the larger input, omitting the factor two, or reversing formula terms.

39. C — C is correct. Compute the raw engineering answer and use its magnitude. Double the smaller of that magnitude and reference 9, then divide by their sum. The proximity index is 0.2118. The distractors result from using an incorrect raw answer, selecting the larger input, omitting the factor two, or reversing formula terms.

40. B — B is correct. Compute the raw engineering answer and use its magnitude. Double the smaller of that magnitude and reference 15, then divide by their sum. The proximity index is 0.5081. The distractors result from using an incorrect raw answer, selecting the larger input, omitting the factor two, or reversing formula terms.

41. D — D is correct. Compute the raw engineering answer and use its magnitude. Double the smaller of that magnitude and reference 3, then divide by their sum. The proximity index is 0.6667. The distractors result from using an incorrect raw answer, selecting the larger input, omitting the factor two, or reversing formula terms.

42. A — A is correct. Compute the raw engineering answer and use its magnitude. Double the smaller of that magnitude and reference 5, then divide by their sum. The proximity index is 0.0769. The distractors result from using an incorrect raw answer, selecting the larger input, omitting the factor two, or reversing formula terms.

43. B — B is correct. Compute the raw engineering answer and use its magnitude. Double the smaller of that magnitude and reference 7, then divide by their sum. The proximity index is 0.5185. The distractors result from using an incorrect raw answer, selecting the larger input, omitting the factor two, or reversing formula terms.

44. A — A is correct. Compute the raw engineering answer and use its magnitude. Double the smaller of that magnitude and reference 9, then divide by their sum. The proximity index is 0.0198. The distractors result from using an incorrect raw answer, selecting the larger input, omitting the factor two, or reversing formula terms.

45. D — D is correct. Compute the raw engineering answer and use its magnitude. Double the smaller of that magnitude and reference 15, then divide by their sum. The proximity index is 0.3191. The distractors result from using an incorrect raw answer, selecting the larger input, omitting the factor two, or reversing formula terms.

46. C — C is correct. Compute the raw engineering answer and use its magnitude. Double the smaller of that magnitude and reference 3, then divide by their sum. The proximity index is 0.6000. The distractors result from using an incorrect raw answer, selecting the larger input, omitting the factor two, or reversing formula terms.

47. C — C is correct. Compute the raw engineering answer and use its magnitude. Double the smaller of that magnitude and reference 5, then divide by their sum. The proximity index is 0.4000. The distractors result from using an incorrect raw answer, selecting the larger input, omitting the factor two, or reversing formula terms.

48. B — B is correct. Compute the raw engineering answer and use its magnitude. Double the smaller of that magnitude and reference 7, then divide by their sum. The proximity index is 0.0017. The distractors result from using an incorrect raw answer, selecting the larger input, omitting the factor two, or reversing formula terms.

49. A — A is correct. Compute the raw engineering answer and use its magnitude. Double the smaller of that magnitude and reference 9, then divide by their sum. The proximity index is 0.1818. The distractors result from using an incorrect raw answer, selecting the larger input, omitting the factor two, or reversing formula terms.

50. D — D is correct. Compute the raw engineering answer and use its magnitude. Double the smaller of that magnitude and reference 15, then divide by their sum. The proximity index is 0.6957. The distractors result from using an incorrect raw answer, selecting the larger input, omitting the factor two, or reversing formula terms.

51. C — C is correct. Compute the raw engineering answer and use its magnitude. Double the smaller of that magnitude and reference 3, then divide by their sum. The proximity index is 0.5455. The distractors result from using an incorrect raw answer, selecting the larger input, omitting the factor two, or reversing formula terms.

52. D — D is correct. Compute the raw engineering answer and use its magnitude. Double the smaller of that magnitude and reference 5, then divide by their sum. The proximity index is 0.0000. The distractors result from using an incorrect raw answer, selecting the larger input, omitting the factor two, or reversing formula terms.

53. B — B is correct. Compute the raw engineering answer and use its magnitude. Double the smaller of that magnitude and reference 7, then divide by their sum. The proximity index is 0.0004. The distractors result from using an incorrect raw answer, selecting the larger input, omitting the factor two, or reversing formula terms.

54. A — A is correct. Compute the raw engineering answer and use its magnitude. Double the smaller of that magnitude and reference 9, then divide by their sum. The proximity index is 0.1731. The distractors result from using an incorrect raw answer, selecting the larger input, omitting the factor two, or reversing formula terms.

55. D — D is correct. Compute the raw engineering answer and use its magnitude. Double the smaller of that magnitude and reference 15, then divide by their sum. The proximity index is 0.4211. The distractors result from using an incorrect raw answer, selecting the larger input, omitting the factor two, or reversing formula terms.

56. A — A is correct. Compute the raw engineering answer and use its magnitude. Double the smaller of that magnitude and reference 3, then divide by their sum. The proximity index is 0.0952. The distractors result from using an incorrect raw answer, selecting the larger input, omitting the factor two, or reversing formula terms.

57. C — C is correct. Compute the raw engineering answer and use its magnitude. Double the smaller of that magnitude and reference 5, then divide by their sum. The proximity index is 1.0000. The distractors result from using an incorrect raw answer, selecting the larger input, omitting the factor two, or reversing formula terms.

58. B — B is correct. Compute the raw engineering answer and use its magnitude. Double the smaller of that magnitude and reference 7, then divide by their sum. The proximity index is 0.0676. The distractors result from using an incorrect raw answer, selecting the larger input, omitting the factor two, or reversing formula terms.

59. A — A is correct. Compute the raw engineering answer and use its magnitude. Double the smaller of that magnitude and reference 9, then divide by their sum. The proximity index is 0.1565. The distractors result from using an incorrect raw answer, selecting the larger input, omitting the factor two, or reversing formula terms.

60. D — D is correct. Compute the raw engineering answer and use its magnitude. Double the smaller of that magnitude and reference 15, then divide by their sum. The proximity index is 0.2500. The distractors result from using an incorrect raw answer, selecting the larger input, omitting the factor two, or reversing formula terms.

61. C — C is correct. Compute the raw engineering answer and use its magnitude. Double the smaller of that magnitude and reference 3, then divide by their sum. The proximity index is 0.0663. The distractors result from using an incorrect raw answer, selecting the larger input, omitting the factor two, or reversing formula terms.

62. B — B is correct. Compute the raw engineering answer and use its magnitude. Double the smaller of that magnitude and reference 5, then divide by their sum. The proximity index is 0.1126. The distractors result from using an incorrect raw answer, selecting the larger input, omitting the factor two, or reversing formula terms.

63. C — C is correct. Compute the raw engineering answer and use its magnitude. Double the smaller of that magnitude and reference 7, then divide by their sum. The proximity index is 0.1346. The distractors result from using an incorrect raw answer, selecting the larger input, omitting the factor two, or reversing formula terms.

64. B — B is correct. Compute the raw engineering answer and use its magnitude. Double the smaller of that magnitude and reference 9, then divide by their sum. The proximity index is 0.4615. The distractors result from using an incorrect raw answer, selecting the larger input, omitting the factor two, or reversing formula terms.

65. D — D is correct. Compute the raw engineering answer and use its magnitude. Double the smaller of that magnitude and reference 15, then divide by their sum. The proximity index is 0.8000. The distractors result from using an incorrect raw answer, selecting the larger input, omitting the factor two, or reversing formula terms.

66. A — A is correct. Compute the raw engineering answer and use its magnitude. Double the smaller of that magnitude and reference 3, then divide by their sum. The proximity index is 0.0165. The distractors result from using an incorrect raw answer, selecting the larger input, omitting the factor two, or reversing formula terms.

67. D — D is correct. Compute the raw engineering answer and use its magnitude. Double the smaller of that magnitude and reference 5, then divide by their sum. The proximity index is 0.8889. The distractors result from using an incorrect raw answer, selecting the larger input, omitting the factor two, or reversing formula terms.

68. B — B is correct. Compute the raw engineering answer and use its magnitude. Double the smaller of that magnitude and reference 7, then divide by their sum. The proximity index is 0.0456. The distractors result from using an incorrect raw answer, selecting the larger input, omitting the factor two, or reversing formula terms.

69. A — A is correct. Compute the raw engineering answer and use its magnitude. Double the smaller of that magnitude and reference 9, then divide by their sum. The proximity index is 0.2609. The distractors result from using an incorrect raw answer, selecting the larger input, omitting the factor two, or reversing formula terms.

70. C — C is correct. Compute the raw engineering answer and use its magnitude. Double the smaller of that magnitude and reference 15, then divide by their sum. The proximity index is 0.6957. The distractors result from using an incorrect raw answer, selecting the larger input, omitting the factor two, or reversing formula terms.

71. A — A is correct. Compute the raw engineering answer and use its magnitude. Double the smaller of that magnitude and reference 3, then divide by their sum. The proximity index is 0.7500. The distractors result from using an incorrect raw answer, selecting the larger input, omitting the factor two, or reversing formula terms.

72. B — B is correct. Compute the raw engineering answer and use its magnitude. Double the smaller of that magnitude and reference 5, then divide by their sum. The proximity index is 0.0389. The distractors result from using an incorrect raw answer, selecting the larger input, omitting the factor two, or reversing formula terms.

73. D — D is correct. Compute the raw engineering answer and use its magnitude. Double the smaller of that magnitude and reference 7, then divide by their sum. The proximity index is 0.9231. The distractors result from using an incorrect raw answer, selecting the larger input, omitting the factor two, or reversing formula terms.

74. C — C is correct. Compute the raw engineering answer and use its magnitude. Double the smaller of that magnitude and reference 9, then divide by their sum. The proximity index is 0.2022. The distractors result from using an incorrect raw answer, selecting the larger input, omitting the factor two, or reversing formula terms.

75. A — A is correct. Compute the raw engineering answer and use its magnitude. Double the smaller of that magnitude and reference 15, then divide by their sum. The proximity index is 0.0723. The distractors result from using an incorrect raw answer, selecting the larger input, omitting the factor two, or reversing formula terms.

76. C — C is correct. Compute the raw engineering answer and use its magnitude. Double the smaller of that magnitude and reference 3, then divide by their sum. The proximity index is 0.3158. The distractors result from using an incorrect raw answer, selecting the larger input, omitting the factor two, or reversing formula terms.

77. B — B is correct. Compute the raw engineering answer and use its magnitude. Double the smaller of that magnitude and reference 5, then divide by their sum. The proximity index is 0.1176. The distractors result from using an incorrect raw answer, selecting the larger input, omitting the factor two, or reversing formula terms.

78. D — D is correct. Compute the raw engineering answer and use its magnitude. Double the smaller of that magnitude and reference 7, then divide by their sum. The proximity index is 0.1772. The distractors result from using an incorrect raw answer, selecting the larger input, omitting the factor two, or reversing formula terms.

79. D — D is correct. Compute the raw engineering answer and use its magnitude. Double the smaller of that magnitude and reference 9, then divide by their sum. The proximity index is 0.0923. The distractors result from using an incorrect raw answer, selecting the larger input, omitting the factor two, or reversing formula terms.

80. B — B is correct. Compute the raw engineering answer and use its magnitude. Double the smaller of that magnitude and reference 15, then divide by their sum. The proximity index is 0.1481. The distractors result from using an incorrect raw answer, selecting the larger input, omitting the factor two, or reversing formula terms.

81. A — A is correct. Compute the raw engineering answer and use its magnitude. Double the smaller of that magnitude and reference 3, then divide by their sum. The proximity index is 0.1818. The distractors result from using an incorrect raw answer, selecting the larger input, omitting the factor two, or reversing formula terms.

82. C — C is correct. Compute the raw engineering answer and use its magnitude. Double the smaller of that magnitude and reference 5, then divide by their sum. The proximity index is 0.8889. The distractors result from using an incorrect raw answer, selecting the larger input, omitting the factor two, or reversing formula terms.

83. B — B is correct. Compute the raw engineering answer and use its magnitude. Double the smaller of that magnitude and reference 7, then divide by their sum. The proximity index is 0.2673. The distractors result from using an incorrect raw answer, selecting the larger input, omitting the factor two, or reversing formula terms.

84. D — D is correct. Compute the raw engineering answer and use its magnitude. Double the smaller of that magnitude and reference 9, then divide by their sum. The proximity index is 0.1818. The distractors result from using an incorrect raw answer, selecting the larger input, omitting the factor two, or reversing formula terms.

85. C — C is correct. Compute the raw engineering answer and use its magnitude. Double the smaller of that magnitude and reference 15, then divide by their sum. The proximity index is 0.7395. The distractors result from using an incorrect raw answer, selecting the larger input, omitting the factor two, or reversing formula terms.

86. A — A is correct. Compute the raw engineering answer and use its magnitude. Double the smaller of that magnitude and reference 3, then divide by their sum. The proximity index is 0.3448. The distractors result from using an incorrect raw answer, selecting the larger input, omitting the factor two, or reversing formula terms.

87. D — D is correct. Compute the raw engineering answer and use its magnitude. Double the smaller of that magnitude and reference 5, then divide by their sum. The proximity index is 0.1250. The distractors result from using an incorrect raw answer, selecting the larger input, omitting the factor two, or reversing formula terms.

88. B — B is correct. Compute the raw engineering answer and use its magnitude. Double the smaller of that magnitude and reference 7, then divide by their sum. The proximity index is 0.6087. The distractors result from using an incorrect raw answer, selecting the larger input, omitting the factor two, or reversing formula terms.

89. C — C is correct. Compute the raw engineering answer and use its magnitude. Double the smaller of that magnitude and reference 9, then divide by their sum. The proximity index is 0.8000. The distractors result from using an incorrect raw answer, selecting the larger input, omitting the factor two, or reversing formula terms.

90. A — A is correct. Compute the raw engineering answer and use its magnitude. Double the smaller of that magnitude and reference 15, then divide by their sum. The proximity index is 0.8889. The distractors result from using an incorrect raw answer, selecting the larger input, omitting the factor two, or reversing formula terms.

91. B — B is correct. Compute the raw engineering answer and use its magnitude. Double the smaller of that magnitude and reference 3, then divide by their sum. The proximity index is 0.1132. The distractors result from using an incorrect raw answer, selecting the larger input, omitting the factor two, or reversing formula terms.

92. C — C is correct. Compute the raw engineering answer and use its magnitude. Double the smaller of that magnitude and reference 5, then divide by their sum. The proximity index is 0.4000. The distractors result from using an incorrect raw answer, selecting the larger input, omitting the factor two, or reversing formula terms.

93. A — A is correct. Compute the raw engineering answer and use its magnitude. Double the smaller of that magnitude and reference 7, then divide by their sum. The proximity index is 0.2500. The distractors result from using an incorrect raw answer, selecting the larger input, omitting the factor two, or reversing formula terms.

94. D — D is correct. Compute the raw engineering answer and use its magnitude. Double the smaller of that magnitude and reference 9, then divide by their sum. The proximity index is 0.1695. The distractors result from using an incorrect raw answer, selecting the larger input, omitting the factor two, or reversing formula terms.

95. D — D is correct. Compute the raw engineering answer and use its magnitude. Double the smaller of that magnitude and reference 15, then divide by their sum. The proximity index is 0.0092. The distractors result from using an incorrect raw answer, selecting the larger input, omitting the factor two, or reversing formula terms.

96. B — B is correct. Compute the raw engineering answer and use its magnitude. Double the smaller of that magnitude and reference 3, then divide by their sum. The proximity index is 0.7500. The distractors result from using an incorrect raw answer, selecting the larger input, omitting the factor two, or reversing formula terms.

97. A — A is correct. Compute the raw engineering answer and use its magnitude. Double the smaller of that magnitude and reference 5, then divide by their sum. The proximity index is 0.2439. The distractors result from using an incorrect raw answer, selecting the larger input, omitting the factor two, or reversing formula terms.

98. C — C is correct. Compute the raw engineering answer and use its magnitude. Double the smaller of that magnitude and reference 7, then divide by their sum. The proximity index is 0.6000. The distractors result from using an incorrect raw answer, selecting the larger input, omitting the factor two, or reversing formula terms.

99. D — D is correct. Compute the raw engineering answer and use its magnitude. Double the smaller of that magnitude and reference 9, then divide by their sum. The proximity index is 0.4956. The distractors result from using an incorrect raw answer, selecting the larger input, omitting the factor two, or reversing formula terms.

100. A — A is correct. Compute the raw engineering answer and use its magnitude. Double the smaller of that magnitude and reference 15, then divide by their sum. The proximity index is 0.0015. The distractors result from using an incorrect raw answer, selecting the larger input, omitting the factor two, or reversing formula terms.

101. B — B is correct. Compute the raw engineering answer and use its magnitude. Double the smaller of that magnitude and reference 3, then divide by their sum. The proximity index is 0.6667. The distractors result from using an incorrect raw answer, selecting the larger input, omitting the factor two, or reversing formula terms.

102. C — C is correct. Compute the raw engineering answer and use its magnitude. Double the smaller of that magnitude and reference 5, then divide by their sum. The proximity index is 0.2921. The distractors result from using an incorrect raw answer, selecting the larger input, omitting the factor two, or reversing formula terms.

103. D — D is correct. Compute the raw engineering answer and use its magnitude. Double the smaller of that magnitude and reference 7, then divide by their sum. The proximity index is 0.2412. The distractors result from using an incorrect raw answer, selecting the larger input, omitting the factor two, or reversing formula terms.

104. A — A is correct. Compute the raw engineering answer and use its magnitude. Double the smaller of that magnitude and reference 9, then divide by their sum. The proximity index is 0.1818. The distractors result from using an incorrect raw answer, selecting the larger input, omitting the factor two, or reversing formula terms.

105. C — C is correct. Compute the raw engineering answer and use its magnitude. Double the smaller of that magnitude and reference 15, then divide by their sum. The proximity index is 0.1714. The distractors result from using an incorrect raw answer, selecting the larger input, omitting the factor two, or reversing formula terms.

106. B — B is correct. Compute the raw engineering answer and use its magnitude. Double the smaller of that magnitude and reference 3, then divide by their sum. The proximity index is 0.0606. The distractors result from using an incorrect raw answer, selecting the larger input, omitting the factor two, or reversing formula terms.

107. C — C is correct. Compute the raw engineering answer and use its magnitude. Double the smaller of that magnitude and reference 5, then divide by their sum. The proximity index is 0.3168. The distractors result from using an incorrect raw answer, selecting the larger input, omitting the factor two, or reversing formula terms.

108. D — D is correct. Compute the raw engineering answer and use its magnitude. Double the smaller of that magnitude and reference 7, then divide by their sum. The proximity index is 0.1373. The distractors result from using an incorrect raw answer, selecting the larger input, omitting the factor two, or reversing formula terms.

109. B — B is correct. Compute the raw engineering answer and use its magnitude. Double the smaller of that magnitude and reference 9, then divide by their sum. The proximity index is 0.3636. The distractors result from using an incorrect raw answer, selecting the larger input, omitting the factor two, or reversing formula terms.

110. A — A is correct. Compute the raw engineering answer and use its magnitude. Double the smaller of that magnitude and reference 15, then divide by their sum. The proximity index is 0.0001. The distractors result from using an incorrect raw answer, selecting the larger input, omitting the factor two, or reversing formula terms.