DIAGNOSTIC TEST

Please test yourself against time and compute your **Problem Solving Efficiency**.

Number of correct answers (maximum 60): _____ problems
Number wrong or not attempted: ( )

÷

Total time taken finish the test (maximum 60 minutes): _____ minute

Your **Problem Solving Efficiency** (/1; minimum 0): _____ problems/minute
(Total number of correct answers ÷ number of minutes taken)

Each question represents a section from each chapter of this book. If you spend more than 30 seconds on each question (Problem Solving Efficiency < 2), you have some room to improve. You have much more room to improve if you spend more than one minute oneach question (Problem Solving Efficiency < 1).

1 $\frac{11^5 - 11^4}{10}$

(A) 1/10 (B) 11/10 (C) $11^3/10$ (D) $11^4/10$ (E) 11^4

2 a + b = 5, b + c = 12, and c + a = 13. What is a + b + c?

(A) 13
(B) 15
(C) 17
(D) 19
(E) 20

3 ab = 3, bc = 6, ca = 2, and a > 0. What is abc?

(A) 3
(B) 4
(C) 6
(D) 8
(E) 12

4 If x and y are integers and $\frac{(x^2 - y^2)}{xy} = 2$, what is $\frac{x}{y} - \frac{y?}{x}$

(A) 1/2
(B) 2
(C) 6
(D) 8
(E) 12

5 What is k if $\frac{3.5 + 0.125}{2.5} = \frac{70 + 2.5}{k}$?

(A) 37.5
(B) 45
(C) 50
(D) 60
(E) 75

6 y denotes the sum of the odd integers from 1 to 49 inclusive, and x denotes the sum of the odd integers from 51 to 99 inclusive. What is the value of x - y?

(A) 500
(B) 600
(C) 750
(D) 1,000
(E) 1,250

7 If x is not an integer, which of the following can be an integer?

(A) x/2 (B) x^2 (C) $\sqrt{x-1}$ (D) x + 1 (E) 1/x

8 T is a 5-digit number with 5, 0, and 0 as its last three digits, in that order. T can therefore be divisible by each of the following EXCEPT

(A) 8 (B) 25 (C) 100 (D) 125 (E) 250

9 How many prime numbers are there between 15 and 30?

(A) 3 (B) 4 (C) 5 (D) 6 (E) 7

10 Ms. Green owns 2/3 of the shares in a company. If she sells 3/4 of her shares, what fraction of the shares does she own now?

(A) 1/12
(B) 5/12
(C) 1/6
(D) 1/5
(E) 1/4

11 The average of three different positive integers is 5. What is the greatest possible value of the product of the three integers?

(A) 56
(B) 84
(C) 100
(D) 120
(E) 150

12 In the correctly-worked addition problem below, which of the following could be the digit A?

$$\begin{array}{r} AB \\ +\ 6D \\ \hline 152 \end{array}$$

I. 7
II. 8
III. 9

(A) II only
(B) III only
(C) I and II only
(D) II and III only
(E) I, II, and III

13 $\frac{x}{y} + \frac{y}{x} = 8$. What is the value of $\frac{x + y}{\frac{1}{x} + \frac{1}{y}}$?

(A) 5
(B) 8
(C) 10
(D) 12
(E) 16

14 $x^2 + y^2 = 44$, and $xy = 4$. What is $(x - y)^2$?

(A) 15
(B) 24
(C) 25
(D) 30
(E) 36

15 If $\frac{3}{2x - 1} = y$, what is x in terms of y?

(A) $\frac{y - 3}{2y}$ (B) $\frac{2y}{y - 3}$ (C) $\frac{y}{2y - 3}$ (D) $\frac{y + 3}{2y - 3}$ (E) $\frac{y}{y - 3}$

16 If $5 < x < 8$ and $11 < y < 15$, then what is $1/(y - x)$ between?

(A) 1/10 and 1
(B) 1/3 and 1
(C) 1/5 and 1/3
(D) 1/10 and 1/5
(E) 1/10 and 1/3

17 $5^{20} \bullet 6 - 5^{21} =$

(A) 5^{20}
(B) 5^{27}
(C) 5^{140}
(D) 35^{20}
(E) 35^{140}

18 x and y are both negative. What can $\sqrt{x^2 + y^2}$ NOT be?

(A) 0
(B) Negative
(C) Positive
(D) Both A and B
(E) Both A and C

19 If line T is the graph of the equation $3x + 4y = 5$ and the point at which T crosses the x-axis has coordinates (h, 0), what is the value of h?

(A) 0
(B) 5/3
(C) 7/3
(D) 8/3
(E) 11/2

20 If $f(x) = x - 1$ and $g(x) = x^2 - 1$, which of the following pairs of x-values satisfy the equation $f[g(x)] = 0$?

(A) -2, 1
(B) -1, 0
(C) 0, 1
(D) 0, 2
(E) 1, 2

21 If $y = -x^2 + 1$ intersects line k at (t, 3) and (p, 0), what is the maximum possible slope for line k?

(A) -3
(B) 2
(C) 3
(D) 4
(E) 9

22 Which of the following values of x satisfy the equation $|-x - 2| < |x|$, when $-2 < x < 0$?

(A) -2
(B) -1
(C) 0
(D) 1
(E) 2

23 If P(x) = greatest prime factor less than or equal to x, what is P(49)?

(A) 7
(B) 23
(C) 45
(D) 47
(E) 49

24 S and T are positive integers. If S divided by 5 leaves a remainder of 3, and T divided by 5 leaves a remainder of 4, what is the remainder when S • T is divided by 5?

(A) 0
(B) 1
(C) 2
(D) 5
(E) 6

25

1, 3, 5, 7, 1, 3, 5, 7, ...

The sequence above with the first term, 1, repeats in the pattern 1, 3, 5, 7, indefinitely. What is the sum of the values from the 10th term through the 50th term?

(A) 120
(B) 160
(C) 180
(D) 200
(E) 212

26 How many multiples of 5 are there between 25 and 125, including 25 and 125?

(A) 19
(B) 20
(C) 21
(D) 22
(E) 100

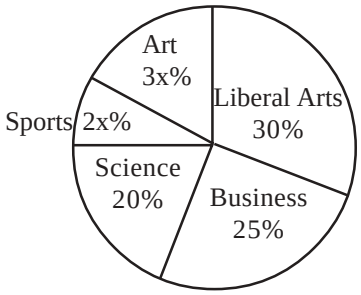
27 What is the probability that the difference between the numbers on the face of two dice thrown is greater than 1?

(A) 5/9
(B) 7/12
(C) 19/36
(D) 13/24
(E) 11/18

28 If x, y and z are the respective mean, median and mode of heights among 10 students and $y < x < z$, which of the following is true about their relationships?

(A) There are more students whose heights are greater than x
(B) The tallest student has a height of z
(C) x is the average of y and z
(D) The shortest student has a height of less than x
(E) The middle student has a height of x

29 According to the data of the pie chart below, 420 students majoring in art are represented by 3x% on the chart. How many students major in liberal arts?



(A) 280
(B) 560
(C) 720
(D) 840
(E) 960

30 If the value of x - 4y is greater than 2x by 300 percent of y, and x and y are not zero, what is x in terms of y?

(A) -7y
(B) -y
(C) y/3
(D) 3y/7
(E) 7y/3

31 In an 25-question test, scores are computed by subtracting 1/4 of the number of incorrect answers from the number of the correct answers. If a student answered every question and scored a 10, how many did he answer incorrectly?

(A) 8
(B) 10
(C) 11
(D) 12
(E) 13

32 If two lists of 4 consecutive even integers are separated by 2 even numbers, the sum of the 4 integers on one list is how much greater than the sum of the other?

(A) 24
(B) 36
(C) 48
(D) 60
(E) Cannot be determined

33 Which of the following cannot be the sum of a two-digit number and the number obtained by reversing the two digits?

(A) 88
(B) 121
(C) 132
(D) 145
(E) 187

34 John's age is twice Nancy's age. 5 years ago, John was x years old. In terms of x, how old will Nancy be in 3 years?

(A) x + 7
(B) (x + 11)/2
(C) (x + 2)/3
(D) (2x + 13)/4
(E) 2x + 5

35 If g tickets cost h dollars, what is the cost of x tickets in cents?

(A) 100h/xg
(B) h/100xg
(C) 100xh/g
(D) hg/100x
(E) xg/h

36 A class is composed of Caucasian, Latino, Asian and African American students in the ratio of 2 : 3 : 1 : 2. If the total number of students in the class is 40, how many students are Latino?

(A) 8
(B) 15
(C) 16
(D) 20
(E) 27

37 If the average (arithmetic mean) of 5 numbers is 4 and the sum of 3 numbers is -16, what is the average of the other two numbers?

(A) -12
(B) -8
(C) 12
(D) 18
(E) 24

38 If y is equal to 5/4 of x, x is what percent of y?

(A) 20%
(B) 33.3%
(C) 80%
(D) 280%
(E) 281%

39 The price of a certain product decreased by 60% every year for the past 4 consecutive years. If the average price of the product was originally $x, what is the average price of the product now in terms of x?

(A) 16x/625
(B) 16x/125
(C) 16x/81
(D) 36x/81
(E) 18x/9

40 A train traveled 500 miles at x mph and arrived one hour early. The train would have arrived exactly on time if it had traveled at what speed in miles per hour?

(A) x + 1
(B) 500x/(500 + x)
(C) 500/(x + 1)
(D) 500/(500 + x)
(E) x/(x + 500)

41 A bag of candy is made by mixing candy A of $5 per pound with candy B of $10 per pound. If the mixture is worth $7 per pound, how many pounds of candy A are needed to make 300 pounds of the mixture?

(A) 150
(B) 160
(C) 170
(D) 180
(E) 200

42 A 2-pound mixture composed of 1/4 oil and 3/4 water is added to 3 pounds of pure water. What percent of the resulting mixture is water?

(A) 5%
(B) 8%
(C) 10%
(D) 15%
(E) 25%

43 It takes 12 machines 6 days to finish a job. How many days will it take 8 machines, performing at the same rate, to complete 1/3 of the job at the same rate?

(A) 2
(B) 3
(C) 4
(D) 5
(E) 8

44 Ted can finish a job in 3 hours and Ann can finish the same job in 4 hours. If Ted works alone for 1 hour, and then Ann and Ted work together to finish the job, for how many more hours do they have to work together?

(A) 8/7
(B) 6/5
(C) 5/4
(D) 4/3
(E) 3/2

45 Of 70 students taking math, 40 were studying Algebra, 30 were studying Geometry and 10 were studying both. How many students were studying neither?

(A) 0
(B) 4
(C) 10
(D) 23
(E) 30

46 Diane spent 1/4 of her yearly allowance on clothing and spent 2/3 of the remainder on books. If she had $120 left, how much was her allowance?

(A) $240
(B) $360
(C) $400
(D) $480
(E) $600

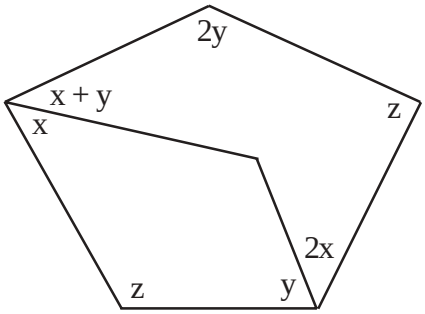
47 A telephone company charges X dollars for the first 3 minutes of a call and 50 cents for each additional minute, or fraction thereof. If a 20 minute phone call costs $12.00, what is X?

(A) $2.00
(B) $2.50
(C) $3.00
(D) $3.50
(E) $3.75

48 How much more expensive are four pounds of flour selling at $5.00 per 2 pounds than four pounds of flour selling at $7.50 per 2.5 pounds?

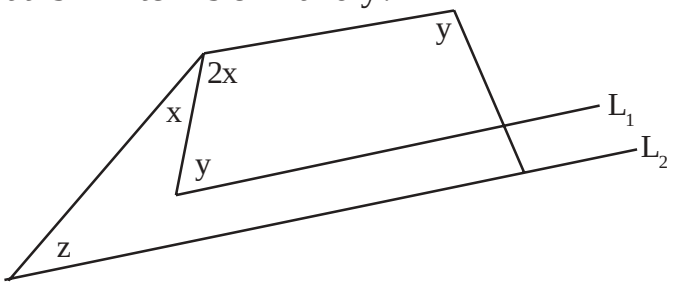
(A) $0.50
(B) $0.75
(C) $1.00
(D) $1.50
(E) $2.00

49 In the figure below, what is the value of z in terms of x and y?



(A) 90 - x- y
(B) 180 - x - 2y
(C) 270 - 2x - 2y
(D) 360 - x- 2y
(E) 540 - 2x - 2y

50 In the figure below, if L_1 // L_2, what is z in terms of x and y?

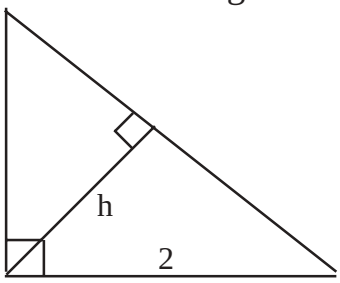


(A) 2x - y
(B) 360 - 2x - 2y
(C) 360 - x - y
(D) x - y
(E) y - x

51 If twice the width of a rectangle is equal to 5/6 times the length of the rectangle, what is the ratio of its perimeter to the length of its diagonal?

(A) 17/12
(B) 30/17
(C) 34/15
(D) 30/13
(E) 34/13

52 The area of the right triangle below is $2\sqrt{3}$. What is the length of the altitude h?



(A) $\sqrt{2}$
(B) $\sqrt{3}$
(C) 2
(D) $2\sqrt{2}$
(E) 3

53 In triangle ABC, $\angle A$ is 44° and $\angle B$ is 46°. If D is the point on side AB such that $CD \perp AB$, which of the following is the shortest?

(A) AC
(B) AD
(C) BC
(D) BD
(E) AD

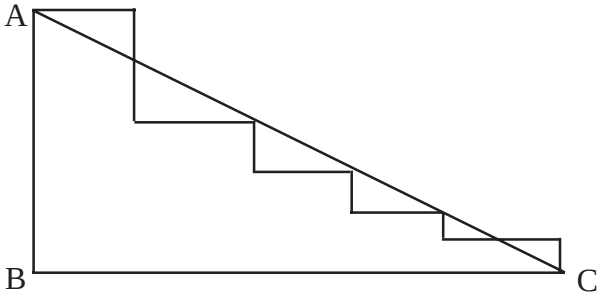
54 A train is traveling on a circular path with a 1/2 mile radius. If it travels 154 miles, how many laps around this path does it travel? (Use 22/7 for π).

(A) 14
(B) 35
(C) 49
(D) 56
(E) 63

55 If the area of an isosceles right triangle is 9/8 square inches, what is the perimeter of the triangle?

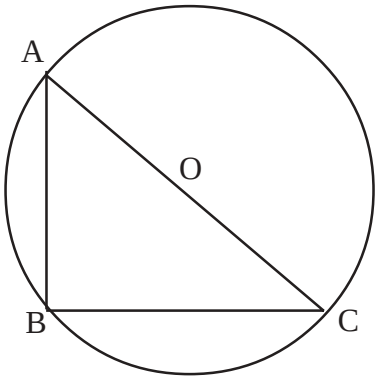
(A) $3 + \sqrt{3}/4$
(B) $3 + \sqrt{3}/2$
(D) $3 + 3\sqrt{2}/2$
(E) $7\sqrt{3}/2$
(C) $4 + 3\sqrt{3}/2$

56 In the figure below, the stair-shaped lines are parallel to either AB or BC. If the length AB is 6 and the length BC is 8, then which of the following represents the sum of line AC and the stair-shaped lines from A to C?



(A) 20
(B) $10 + 10\sqrt{2}$
(C) $10 + 5\sqrt{2}$
(D) 24
(E) $10 + 5\sqrt{3}$

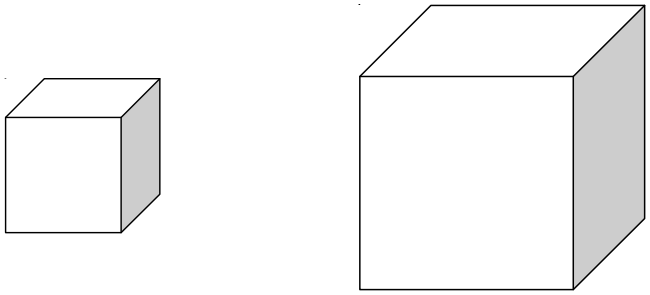
57 Segment AC is the diameter of circle O with the length 10, and AB = 5. Segment BD is the altitude drawn from B to AC. What is the length of BD?



(A) 5
(B) $5\sqrt{3}/2$
(C) $2\sqrt{10}$
(D) $3\sqrt{5}$
(E) $3\sqrt{10}$

58 If the ratio of the surface areas of the two similar cubes in the figure below is 9:25, and if the volume of the smaller cube is 54, what is the volume of the larger cube?

(A) 125
(B) 250
(C) 375
(D) 500
(E) 750



59 If three points A (2, -4), B (0, 4) and C (-3, x) are on the same line, what is the value of x?

(A) -16
(B) -8
(C) 8
(D) 15
(E) 16

60 Four lines can divide a triangular region into a minimum of how many nonoverlapping triangular region(s)?

(A) 0
(B) 1
(C) 2
(D) 3
(E) 4

Answers to Diagnostic Test

1. E	11. D	21. C	31. A	41. D	51. E
2. B	12. D	22. A	32. D	42. C	52. B
3. C	13. C	23. A	33. C	43. B	53. D
4. B	14. E	24. C	34. B	44. A	54. C
5. C	15. C	25. B	35. C	45. C	55. D
6. E	16. E	26. C	36. B	46. D	56. D
7. E	17. A	27. A	37. D	47. D	57. B
8. A	18. D	28. D	38. C	48. E	58. B
9. D	19. B	29. D	39. A	49. C	59. E
10. C	20. D	30. A	40. B	50. E	60. B