

4.3 Sample Questions

Solve the problem and indicate the best of the answer choices given.

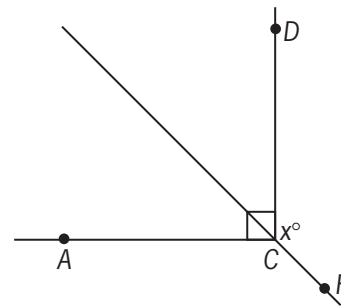
Numbers: All numbers used are real numbers.

Figures: A figure accompanying a problem solving question is intended to provide information useful in solving the problem. Figures are drawn as accurately as possible. Exceptions will be clearly noted. Lines shown as straight are straight, and lines that appear jagged are also straight. The positions of points, angles, regions, etc., exist in the order shown, and angle measures are greater than zero. All figures lie in a plane unless otherwise indicated.

- If $x + y = 2$ and $x^2 + y^2 = 2$, what is the value of xy ?
 - 2
 - 1
 - 0
 - 1
 - 2
- Points A , B , C , and D , in that order, lie on a line. If $AB = 3$ cm, $AC = 4$ cm, and $BD = 6$ cm, what is CD , in centimeters?
 - 1
 - 2
 - 3
 - 4
 - 5
- What is the value of $x^2yz - xyz^2$, if $x = -2$, $y = 1$, and $z = 3$?
 - 20
 - 24
 - 30
 - 32
 - 48
- If $x > y$ and $y > z$, which of the following represents the greatest number?
 - $x - z$
 - $x - y$
 - $y - x$
 - $z - y$
 - $z - x$
- To order certain plants from a catalog, it costs \$3.00 per plant, plus a 5 percent sales tax, plus \$6.95 for shipping and handling regardless of the number of plants ordered. If Company C ordered these plants from the catalog at the total cost of \$69.95, how many plants did Company C order?
 - 22
 - 21
 - 20
 - 19
 - 18
- Company C produces toy trucks at a cost of \$5.00 each for the first 100 trucks and \$3.50 for each additional truck. If 500 toy trucks were produced by Company C and sold for \$10.00 each, what was Company C's gross profit?
 - \$2,250
 - \$2,500
 - \$3,100
 - \$3,250
 - \$3,500
- A group of store managers must assemble 280 displays for an upcoming sale. If they assemble 25 percent of the displays during the first hour and 40 percent of the remaining displays during the second hour, how many of the displays will not have been assembled by the end of the second hour?
 - 70
 - 98
 - 126
 - 168
 - 182

8. Of the following, which is least?
- (A) $\frac{0.03}{0.00071}$
- (B) $\frac{0.03}{0.0071}$
- (C) $\frac{0.03}{0.071}$
- (D) $\frac{0.03}{0.71}$
- (E) $\frac{0.03}{7.1}$
9. The maximum recommended pulse rate R , when exercising, for a person who is x years of age is given by the equation $R = 176 - 0.8x$. What is the age, in years, of a person whose maximum recommended pulse rate when exercising is 140?
- (A) 40
- (B) 45
- (C) 50
- (D) 55
- (E) 60
10. If the average (arithmetic mean) of 5 numbers j , $j + 5$, $2j - 1$, $4j - 2$, and $5j - 1$ is 8, what is the value of j ?
- (A) $\frac{1}{3}$
- (B) $\frac{7}{13}$
- (C) 1
- (D) 3
- (E) 8
11. Guadalupe owns 2 rectangular tracts of land. One is 300 m by 500 m and the other is 250 m by 630 m. The combined area of these 2 tracts is how many square meters?
- (A) 3,360
- (B) 307,500
- (C) 621,500
- (D) 704,000
- (E) 2,816,000
12. There are five sales agents in a certain real estate office. One month Andy sold twice as many properties as Ellen, Bob sold 3 more than Ellen, Cary sold twice as many as Bob, and Dora sold as many as Bob and Ellen together. Who sold the most properties that month?
- (A) Andy
- (B) Bob
- (C) Cary
- (D) Dora
- (E) Ellen
13. In a field day at a school, each child who competed in n events and scored a total of p points was given an overall score of $\frac{p}{n} + n$. Andrew competed in 1 event and scored 9 points. Jason competed in 3 events and scored 5, 6, and 7 points, respectively. What was the ratio of Andrew's overall score to Jason's overall score?
- (A) $\frac{10}{23}$
- (B) $\frac{7}{10}$
- (C) $\frac{4}{5}$
- (D) $\frac{10}{9}$
- (E) $\frac{12}{7}$
14. Which of the following represent positive numbers?
- I. $-3 - (-5)$
- II. $(-3)(-5)$
- III. $-5 - (-3)$
- (A) I only
- (B) II only
- (C) III only
- (D) I and II
- (E) II and III

15. If $\frac{x}{4}$ is 2 more than $\frac{x}{8}$, then $x =$
- (A) 4
(B) 8
(C) 16
(D) 32
(E) 64
16. If Mario was 32 years old 8 years ago, how old was he x years ago?
- (A) $x - 40$
(B) $x - 24$
(C) $40 - x$
(D) $24 - x$
(E) $24 + x$
17. A grocer has 400 pounds of coffee in stock, 20 percent of which is decaffeinated. If the grocer buys another 100 pounds of coffee of which 60 percent is decaffeinated, what percent, by weight, of the grocer's stock of coffee is decaffeinated?
- (A) 28%
(B) 30%
(C) 32%
(D) 34%
(E) 40%
18. The toll T , in dollars, for a truck using a certain bridge is given by the formula $T = 1.50 + 0.50(x - 2)$, where x is the number of axles on the truck. What is the toll for an 18-wheel truck that has 2 wheels on its front axle and 4 wheels on each of its other axles?
- (A) \$2.50
(B) \$3.00
(C) \$3.50
(D) \$4.00
(E) \$5.00
19. For what value of x between -4 and 4 , inclusive, is the value of $x^2 - 10x + 16$ the greatest?
- (A) -4
(B) -2
(C) 0
(D) 2
(E) 4
20. If $x = -\frac{5}{8}$ and $y = -\frac{1}{2}$, what is the value of the expression $-2x - y^2$?
- (A) $-\frac{3}{2}$
(B) -1
(C) 1
(D) $\frac{3}{2}$
(E) $\frac{7}{4}$
21. The number $2 - 0.5$ is how many times the number $1 - 0.5$?
- (A) 2
(B) 2.5
(C) 3
(D) 3.5
(E) 4
22. If $x - y = R$ and $xy = S$, then $(x - 2)(y + 2) =$
- (A) $R + S - 4$
(B) $R + 2S - 4$
(C) $2R - S - 4$
(D) $2R + S - 4$
(E) $2R + S$



23. In the figure above, if F is a point on the line that bisects angle ACD and the measure of angle DCF is x° , which of the following is true of x ?
- (A) $90 \leq x < 100$
(B) $100 \leq x < 110$
(C) $110 \leq x < 120$
(D) $120 \leq x < 130$
(E) $130 \leq x < 140$

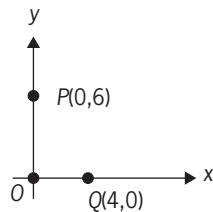
24. In which of the following pairs are the two numbers reciprocals of each other?

- I. 3 and $\frac{1}{3}$
- II. $\frac{1}{17}$ and $-\frac{1}{17}$
- III. $\sqrt{3}$ and $\frac{\sqrt{3}}{3}$

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

25. A rope 20.6 meters long is cut into two pieces. If the length of one piece of rope is 2.8 meters shorter than the length of the other, what is the length, in meters, of the longer piece of rope?

- (A) 7.5
- (B) 8.9
- (C) 9.9
- (D) 10.3
- (E) 11.7



26. In the rectangular coordinate system shown above, points O , P , and Q represent the sites of three proposed housing developments. If a fire station can be built at any point in the coordinate system, at which point would it be equidistant from all three developments?

- (A) (3,1)
- (B) (1,3)
- (C) (3,2)
- (D) (2,2)
- (E) (2,3)

27. What is the perimeter, in meters, of a rectangular garden 6 meters wide that has the same area as a rectangular playground 16 meters long and 12 meters wide?

- (A) 48
- (B) 56
- (C) 60
- (D) 76
- (E) 192

28. Of the total amount that Jill spent on a shopping trip, excluding taxes, she spent 50 percent on clothing, 20 percent on food, and 30 percent on other items. If Jill paid a 4 percent tax on the clothing, no tax on the food, and an 8 percent tax on all other items, then the total tax that she paid was what percent of the total amount that she spent, excluding taxes?

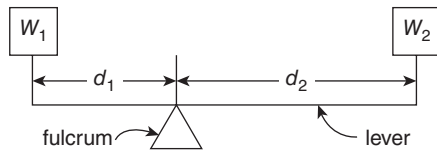
- (A) 2.8%
- (B) 3.6%
- (C) 4.4%
- (D) 5.2%
- (E) 6.0%

29. How many integers x satisfy both $2 < x \leq 4$ and $0 \leq x \leq 3$?

- (A) 5
- (B) 4
- (C) 3
- (D) 2
- (E) 1

30. At the opening of a trading day at a certain stock exchange, the price per share of stock K was \$8. If the price per share of stock K was \$9 at the closing of the day, what was the percent increase in the price per share of stock K for that day?

- (A) 1.4%
- (B) 5.9%
- (C) 11.1%
- (D) 12.5%
- (E) 23.6%



31. As shown in the diagram above, a lever resting on a fulcrum has weights of w_1 pounds and w_2 pounds, located d_1 feet and d_2 feet from the fulcrum. The lever is balanced and $w_1 d_1 = w_2 d_2$. Suppose w_1 is 50 pounds and w_2 is 30 pounds. If d_1 is 4 feet less than d_2 , what is d_2 , in feet?

(A) 1.5
(B) 2.5
(C) 6
(D) 10
(E) 20

32. The number of rooms at Hotel G is 10 less than twice the number of rooms at Hotel H. If the total number of rooms at Hotel G and Hotel H is 425, what is the number of rooms at Hotel G?

(A) 140
(B) 180
(C) 200
(D) 240
(E) 280

33. $(1 + \sqrt{5})(1 - \sqrt{5}) =$

(A) -4
(B) 2
(C) 6
(D) $-4 - 2\sqrt{5}$
(E) $6 - 2\sqrt{5}$

34. A certain population of bacteria doubles every 10 minutes. If the number of bacteria in the population initially was 10^4 , what was the number in the population 1 hour later?

(A) $2(10^4)$
(B) $6(10^4)$
(C) $(2^6)(10^4)$
(D) $(10^6)(10^4)$
(E) $(10^4)^6$

35. $\frac{3}{100} + \frac{5}{1,000} + \frac{7}{100,000} =$

(A) 0.357
(B) 0.3507
(C) 0.35007
(D) 0.0357
(E) 0.03507

36. If r and s are positive integers such that $(2^r)(4^s) = 16$, then $2r + s =$

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

37. The annual budget of a certain college is to be shown on a circle graph. If the size of each sector of the graph is to be proportional to the amount of the budget it represents, how many degrees of the circle should be used to represent an item that is 15 percent of the budget?

(A) 15°
(B) 36°
(C) 54°
(D) 90°
(E) 150°

38. $\sqrt{16+16} =$

(A) $4\sqrt{2}$
(B) $8\sqrt{2}$
(C) $16\sqrt{2}$
(D) 8
(E) 16

39. Three people each contributed x dollars toward the purchase of a car. They then bought the car for y dollars, an amount less than the total number of dollars contributed. If the excess amount is to be refunded to the three people in equal amounts, each person should receive a refund of how many dollars?

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

40. What is the ratio of $\frac{3}{4}$ to the product $4\left(\frac{3}{4}\right)$?

- (A) $\frac{1}{4}$
 (B) $\frac{1}{3}$
 (C) $\frac{4}{9}$
 (D) $\frac{9}{4}$
 (E) 4

$$\begin{aligned} 2x + 2y &= -4 \\ 4x + y &= 1 \end{aligned}$$

41. In the system of equations above, what is the value of x ?

- (A) -3
 (B) -1
 (C) $\frac{2}{5}$
 (D) 1
 (E) $1\frac{3}{4}$

42. Last week Jack worked 70 hours and earned \$1,260. If he earned his regular hourly wage for the first 40 hours worked, $1\frac{1}{2}$ times his regular hourly wage for the next 20 hours worked, and 2 times his regular hourly wage for the remaining 10 hours worked, what was his regular hourly wage?

- (A) \$7.00
 (B) \$14.00
 (C) \$18.00
 (D) \$22.00
 (E) \$31.50

43. $\frac{2+2\sqrt{6}}{2} =$

- (A) $\sqrt{6}$
 (B) $2\sqrt{6}$
 (C) $1+\sqrt{6}$
 (D) $1+2\sqrt{6}$
 (E) $2+\sqrt{6}$

44. A certain fishing boat is chartered by 6 people who are to contribute equally to the total charter cost of \$480. If each person contributes equally to a \$150 down payment, how much of the charter cost will each person still owe?

- (A) \$80
 (B) \$66
 (C) \$55
 (D) \$50
 (E) \$45

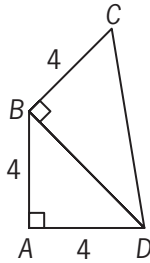
45. Which of the following must be equal to zero for all real numbers x ?

- I. $-\frac{1}{x}$
 II. $x + (-x)$
 III. x^0

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

46. $\frac{31}{125} =$
- (A) 0.248
(B) 0.252
(C) 0.284
(D) 0.312
(E) 0.320
47. If Mel saved more than \$10 by purchasing a sweater at a 15 percent discount, what is the smallest amount the original price of the sweater could be, to the nearest dollar?
- (A) 45
(B) 67
(C) 75
(D) 83
(E) 150
48. If a and b are positive integers and $(2^a)^b = 2^3$, what is the value of $2^a 2^b$?
- (A) 6
(B) 8
(C) 16
(D) 32
(E) 64
49. $\frac{1}{3 - \frac{1}{3 - \frac{1}{3 - 1}}} =$
- (A) $\frac{7}{23}$
(B) $\frac{5}{13}$
(C) $\frac{2}{3}$
(D) $\frac{23}{7}$
(E) $\frac{13}{5}$
50. After 4,000 gallons of water were added to a large water tank that was already filled to $\frac{3}{4}$ of its capacity, the tank was then at $\frac{4}{5}$ of its capacity. How many gallons of water does the tank hold when filled to capacity?
- (A) 5,000
(B) 6,200
(C) 20,000
(D) 40,000
(E) 80,000
51. Five machines at a certain factory operate at the same constant rate. If four of these machines, operating simultaneously, take 30 hours to fill a certain production order, how many fewer hours does it take all five machines, operating simultaneously, to fill the same production order?
- (A) 3
(B) 5
(C) 6
(D) 16
(E) 24
52. How many integers between 1 and 16, inclusive, have exactly 3 different positive integer factors? (Note: 6 is NOT such an integer because 6 has 4 different positive integer factors: 1, 2, 3, and 6.)
- (A) 1
(B) 2
(C) 3
(D) 4
(E) 6
53. If $d = 2.0453$ and d^* is the decimal obtained by rounding d to the nearest hundredth, what is the value of $d^* - d$?
- (A) -0.0053
(B) -0.0003
(C) 0.0007
(D) 0.0047
(E) 0.0153

54. Stephanie has $2\frac{1}{4}$ cups of milk on hand and makes 2 batches of cookies, using $\frac{2}{3}$ cup of milk for each batch of cookies. Which of the following describes the amount of milk remaining after she makes the cookies?
- (A) Less than $\frac{1}{2}$ cup
 (B) Between $\frac{1}{2}$ cup and $\frac{3}{4}$ cup
 (C) Between $\frac{3}{4}$ cup and 1 cup
 (D) Between 1 cup and $1\frac{1}{2}$ cups
 (E) More than $1\frac{1}{2}$ cups
55. A school club plans to package and sell dried fruit to raise money. The club purchased 12 containers of dried fruit, each containing $16\frac{3}{4}$ pounds. What is the maximum number of individual bags of dried fruit, each containing $\frac{1}{4}$ pounds, that can be sold from the dried fruit the club purchased?
- (A) 50
 (B) 64
 (C) 67
 (D) 768
 (E) 804
56. The sequence a_1, a_2, a_3, a_4, a_5 is such that $a_n = a_{n-1} + 5$ for $2 \leq n \leq 5$. If $a_5 = 31$, what is the value of a_1 ?
- (A) 1
 (B) 6
 (C) 11
 (D) 16
 (E) 21
57. A certain bridge is 4,024 feet long. Approximately how many minutes does it take to cross this bridge at a constant speed of 20 miles per hour? (1 mile = 5,280 feet)
- (A) 1
 (B) 2
 (C) 4
 (D) 6
 (E) 7
58. If $S = \{0, 4, 5, 2, 11, 8\}$, how much greater than the median of the numbers in S is the mean of the numbers in S ?
- (A) 0.5
 (B) 1.0
 (C) 1.5
 (D) 2.0
 (E) 2.5
59. The annual interest rate earned by an investment increased by 10 percent from last year to this year. If the annual interest rate earned by the investment this year was 11 percent, what was the annual interest rate last year?
- (A) 1%
 (B) 1.1%
 (C) 9.1%
 (D) 10%
 (E) 10.8%
60. A total of 5 liters of gasoline is to be poured into two empty containers with capacities of 2 liters and 6 liters, respectively, such that both containers will be filled to the same percent of their respective capacities. What amount of gasoline, in liters, must be poured into the 6-liter container?
- (A) $4\frac{1}{2}$
 (B) 4
 (C) $3\frac{3}{4}$
 (D) 3
 (E) $1\frac{1}{4}$
61. List S consists of 10 consecutive odd integers, and list T consists of 5 consecutive even integers. If the least integer in S is 7 more than the least integer in T , how much greater is the average (arithmetic mean) of the integers in S than the average of the integers in T ?
- (A) 2
 (B) 7
 (C) 8
 (D) 12
 (E) 22



62. In the figure above, what is the area of triangular region BCD ?

(A) $4\sqrt{2}$
 (B) 8
 (C) $8\sqrt{2}$
 (D) 16
 (E) $16\sqrt{2}$

63. What is the larger of the 2 solutions of the equation $x^2 - 4x = 96$?

(A) 8
 (B) 12
 (C) 16
 (D) 32
 (E) 100

64. Of the goose eggs laid at a certain pond, $\frac{2}{3}$ hatched, and $\frac{3}{4}$ of the geese that hatched from those eggs survived the first month. Of the geese that survived the first month, $\frac{3}{5}$ did not survive the first year. If 120 geese survived the first year and if no more than one goose hatched from each egg, how many goose eggs were laid at the pond?

(A) 280
 (B) 400
 (C) 540
 (D) 600
 (E) 840

65. Judy bought a quantity of pens in packages of 5 for \$0.80 per package. She sold all of the pens in packages of 3 for \$0.60 per package. If Judy's profit from the pens was \$8.00, how many pens did she buy and sell?

(A) 40
 (B) 80
 (C) 100
 (D) 200
 (E) 400

66. If $x^2 - 2x - 15 = 0$ and $x > 0$ which of the following must be equal to 0?

I. $x^2 - 6x + 9$
 II. $x^2 - 7x + 10$
 III. $x^2 - 10x + 25$

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

67. $\frac{(39,897)(0.0096)}{198.76}$ is approximately

(A) 0.02
 (B) 0.2
 (C) 2
 (D) 20
 (E) 200

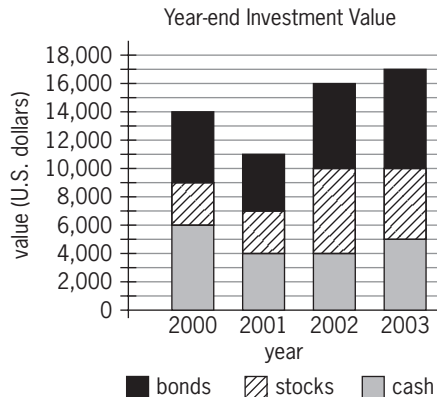
68. If a square region has area n , what is the length of the diagonal of the square in terms of n ?

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

69. The “prime sum” of an integer n greater than 1 is the sum of all the prime factors of n , including repetitions. For example, the prime sum of 12 is 7, since $12 = 2 \times 2 \times 3$ and $2 + 2 + 3 = 7$. For which of the following integers is the prime sum greater than 35?
- (A) 440
(B) 512
(C) 620
(D) 700
(E) 750
70. Each machine at a toy factory assembles a certain kind of toy at a constant rate of one toy every 3 minutes. If 40 percent of the machines at the factory are to be replaced by new machines that assemble this kind of toy at a constant rate of one toy every 2 minutes, what will be the percent increase in the number of toys assembled in one hour by all the machines at the factory, working at their constant rates?
- (A) 20%
(B) 25%
(C) 30%
(D) 40%
(E) 50%
71. When a subscription to a new magazine was purchased for m months, the publisher offered a discount of 75 percent off the regular monthly price of the magazine. If the total value of the discount was equivalent to buying the magazine at its regular monthly price for 27 months, what was the value of m ?
- (A) 18
(B) 24
(C) 30
(D) 36
(E) 48
72. At a garage sale, all of the prices of the items sold were different. If the price of a radio sold at the garage sale was both the 15th highest price and the 20th lowest price among the prices of the items sold, how many items were sold at the garage sale?
- (A) 33
(B) 34
(C) 35
(D) 36
(E) 37
73. Half of a large pizza is cut into 4 equal-sized pieces, and the other half is cut into 6 equal-sized pieces. If a person were to eat 1 of the larger pieces and 2 of the smaller pieces, what fraction of the pizza would remain uneaten?
- (A) $\frac{5}{12}$
(B) $\frac{13}{24}$
(C) $\frac{7}{12}$
(D) $\frac{2}{3}$
(E) $\frac{17}{24}$
74. If $a = 1 + \frac{1}{4} + \frac{1}{16} + \frac{1}{64}$ and $b = 1 + \frac{1}{4}a$, then what is the value of $a - b$?
- (A) $-\frac{85}{256}$
(B) $-\frac{1}{256}$
(C) $-\frac{1}{4}$
(D) $\frac{125}{256}$
(E) $\frac{169}{256}$
75. In a certain learning experiment, each participant had three trials and was assigned, for each trial, a score of either -2 , -1 , 0 , 1 , or 2 . The participant’s final score consisted of the sum of the first trial score, 2 times the second trial score, and 3 times the third trial score. If Anne received scores of 1 and -1 for her first two trials, not necessarily in that order, which of the following could NOT be her final score?
- (A) -4
(B) -2
(C) 1
(D) 5
(E) 6

76. For all positive integers m and v , the expression $m \ominus v$ represents the remainder when m is divided by v . What is the value of $((98 \ominus 33) \ominus 17) - (98 \ominus (33 \ominus 17))$?

(A) -10
(B) -2
(C) 8
(D) 13
(E) 17



77. The chart above shows year-end values for Darnella's investments. For just the stocks, what was the increase in value from year-end 2000 to year-end 2003?

(A) \$1,000
(B) \$2,000
(C) \$3,000
(D) \$4,000
(E) \$5,000

78. If the sum of the reciprocals of two consecutive odd integers is $\frac{12}{35}$, then the greater of the two integers is

(A) 3
(B) 5
(C) 7
(D) 9
(E) 11

79. What is the sum of the odd integers from 35 to 85, inclusive?

(A) 1,560
(B) 1,500
(C) 1,240
(D) 1,120
(E) 1,100

80. In a certain sequence, each term after the first term is one-half the previous term. If the tenth term of the sequence is between 0.0001 and 0.001, then the twelfth term of the sequence is between

(A) 0.0025 and 0.025
(B) 0.00025 and 0.0025
(C) 0.000025 and 0.00025
(D) 0.0000025 and 0.000025
(E) 0.00000025 and 0.0000025

81. A certain drive-in movie theater has a total of 17 rows of parking spaces. There are 20 parking spaces in the first row and 21 parking spaces in the second row. In each subsequent row there are 2 more parking spaces than in the previous row. What is the total number of parking spaces in the movie theater?

(A) 412
(B) 544
(C) 596
(D) 632
(E) 692

82. Ada and Paul received their scores on three tests. On the first test, Ada's score was 10 points higher than Paul's score. On the second test, Ada's score was 4 points higher than Paul's score. If Paul's average (arithmetic mean) score on the three tests was 3 points higher than Ada's average score on the three tests, then Paul's score on the third test was how many points higher than Ada's score?

(A) 9
(B) 14
(C) 17
(D) 23
(E) 25

83. The price of a certain stock increased by 0.25 of 1 percent on a certain day. By what fraction did the price of the stock increase that day?

(A) $\frac{1}{2,500}$
 (B) $\frac{1}{400}$
 (C) $\frac{1}{40}$
 (D) $\frac{1}{25}$
 (E) $\frac{1}{4}$

84. Three business partners, Q, R, and S, agree to divide their total profit for a certain year in the ratios 2:5:8, respectively. If Q's share was \$4,000, what was the total profit of the business partners for the year?

(A) \$26,000
 (B) \$30,000
 (C) \$52,000
 (D) \$60,000
 (E) \$300,000

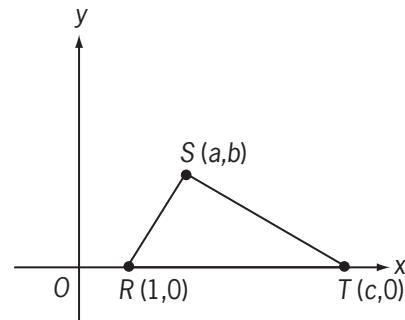
85. For each trip, a taxicab company charges \$4.25 for the first mile and \$2.65 for each additional mile or fraction thereof. If the total charge for a certain trip was \$62.55, how many miles at most was the trip?

(A) 21
 (B) 22
 (C) 23
 (D) 24
 (E) 25

86. When 24 is divided by the positive integer n , the remainder is 4. Which of the following statements about n must be true?

I. n is even.
 II. n is a multiple of 5.
 III. n is a factor of 20.

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



87. In the rectangular coordinate system above, the area of $\triangle RST$ is

(A) $\frac{bc}{2}$
 (B) $\frac{b(c-1)}{2}$
 (C) $\frac{c(b-1)}{2}$
 (D) $\frac{a(c-1)}{2}$
 (E) $\frac{c(a-1)}{2}$

88. What is the thousandths digit in the decimal equivalent of $\frac{53}{5,000}$?

(A) 0
 (B) 1
 (C) 3
 (D) 5
 (E) 6

89. The product of 3,305 and the 1-digit integer x is a 5-digit integer. The units (ones) digit of the product is 5 and the hundreds digit is y . If A is the set of all possible values of x and B is the set of all possible values of y , then which of the following gives the members of A and B ?
- | <u>A</u> | <u>B</u> |
|---------------------|--------------------------------|
| (A) {1, 3, 5, 7, 9} | {0, 1, 2, 3, 4, 5, 6, 7, 8, 9} |
| (B) {1, 3, 5, 7, 9} | {1, 3, 5, 7, 9} |
| (C) {3, 5, 7, 9} | {1, 5, 7, 9} |
| (D) {5, 7, 9} | {1, 5, 7} |
| (E) {5, 7, 9} | {1, 5, 9} |
90. What is the largest integer n such that $\frac{1}{2^n} > 0.01$?
- (A) 5
(B) 6
(C) 7
(D) 10
(E) 51
91. If x and y are integers such that $2 < x \leq 8$ and $2 < y \leq 9$, what is the maximum value of $\frac{1}{x} - \frac{x}{y}$?
- (A) $-3\frac{1}{8}$
(B) 0
(C) $\frac{1}{4}$
(D) $\frac{5}{18}$
(E) 2
92. Items that are purchased together at a certain discount store are priced at \$3 for the first item purchased and \$1 for each additional item purchased. What is the maximum number of items that could be purchased together for a total price that is less than \$30?
- (A) 25
(B) 26
(C) 27
(D) 28
(E) 29
93. The average (arithmetic mean) length per film for a group of 21 films is t minutes. If a film that runs for 66 minutes is removed from the group and replaced by one that runs for 52 minutes, what is the average length per film, in minutes, for the new group of films, in terms of t ?
- (A) $t + \frac{2}{3}$
(B) $t - \frac{2}{3}$
(C) $21t + 14$
(D) $t + \frac{3}{2}$
(E) $t - \frac{3}{2}$
94. A garden center sells a certain grass seed in 5-pound bags at \$13.85 per bag, 10-pound bags at \$20.43 per bag, and 25-pound bags at \$32.25 per bag. If a customer is to buy at least 65 pounds of the grass seed, but no more than 80 pounds, what is the least possible cost of the grass seed that the customer will buy?
- (A) \$94.03
(B) \$96.75
(C) \$98.78
(D) \$102.07
(E) \$105.36
95. If $x = -|w|$, which of the following must be true?
- (A) $x = -w$
(B) $x = w$
(C) $x^2 = w$
(D) $x^2 = w^2$
(E) $x^3 = w^3$
96. Which of the following lines in the xy -plane does not contain any point with integers as both coordinates?
- (A) $y = x$
(B) $y = x + \frac{1}{2}$
(C) $y = x + 5$
(D) $y = \frac{1}{2}x$
(E) $y = \frac{1}{2}x + 5$

97. One inlet pipe fills an empty tank in 5 hours. A second inlet pipe fills the same tank in 3 hours. If both pipes are used together, how long will it take to fill $\frac{2}{3}$ of the tank?

(A) $\frac{8}{15}$ hr
 (B) $\frac{3}{4}$ hr
 (C) $\frac{5}{4}$ hr
 (D) $\frac{15}{8}$ hr
 (E) $\frac{8}{3}$ hr

98. For a light that has an intensity of 60 candles at its source, the intensity in candles, S , of the light at a point d feet from the source is given by the formula $S = \frac{60k}{d^2}$, where k is a constant. If the intensity of the light is 30 candles at a distance of 2 feet from the source, what is the intensity of the light at a distance of 20 feet from the source?

(A) $\frac{3}{10}$ candle
 (B) $\frac{1}{2}$ candle
 (C) 1 candle
 (D) 2 candles
 (E) 3 candles

99. A certain financial institution reported that its assets totaled \$2,377,366.30 on a certain day. Of this amount, \$31,724.54 was held in cash. Approximately what percent of the reported assets was held in cash on that day?

(A) 0.00013%
 (B) 0.0013%
 (C) 0.013%
 (D) 0.13%
 (E) 1.3%

$$\begin{array}{r} AB \\ + BA \\ \hline AAC \end{array}$$

100. In the correctly worked addition problem shown, where the sum of the two-digit positive integers AB and BA is the three-digit integer AAC , and A , B , and C are different digits, what is the units digit of the integer AAC ?

(A) 9
 (B) 6
 (C) 3
 (D) 2
 (E) 0

$$\begin{array}{l} 3r \leq 4s + 5 \\ |s| \leq 5 \end{array}$$

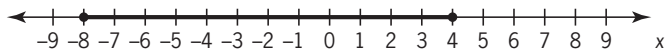
101. Given the inequalities above, which of the following CANNOT be the value of r ?

(A) -20
 (B) -5
 (C) 0
 (D) 5
 (E) 20

102. If m is an even integer, v is an odd integer, and $m > v > 0$, which of the following represents the number of even integers less than m and greater than v ?

(A) $\frac{m-v}{2} - 1$
 (B) $\frac{m-v-1}{2}$
 (C) $\frac{m-v}{2}$
 (D) $m - v - 1$
 (E) $m - v$

103. A positive integer is divisible by 9 if and only if the sum of its digits is divisible by 9. If n is a positive integer, for which of the following values of k is $25 \times 10^n + k \times 10^{2n}$ divisible by 9?
- (A) 9
(B) 16
(C) 23
(D) 35
(E) 47
104. The perimeter of rectangle A is 200 meters. The length of rectangle B is 10 meters less than the length of rectangle A and the width of rectangle B is 10 meters more than the width of rectangle A . If rectangle B is a square, what is the width, in meters, of rectangle A ?
- (A) 10
(B) 20
(C) 40
(D) 50
(E) 60



105. On the number line, the shaded interval is the graph of which of the following inequalities?
- (A) $|x| \leq 4$
(B) $|x| \leq 8$
(C) $|x - 2| \leq 4$
(D) $|x - 2| \leq 6$
(E) $|x + 2| \leq 6$

106. Of all the students in a certain dormitory, $\frac{1}{2}$ are first-year students and the rest are second-year students. If $\frac{4}{5}$ of the first-year students have not declared a major and if the fraction of second-year students who have declared a major is 3 times the fraction of first-year students who have declared a major, what fraction of all the students in the dormitory are second-year students who have not declared a major?

- (A) $\frac{1}{15}$
(B) $\frac{1}{5}$
(C) $\frac{4}{15}$
(D) $\frac{1}{3}$
(E) $\frac{2}{5}$

107. If the average (arithmetic mean) of x , y , and z is $7x$ and $x \neq 0$, what is the ratio of x to the sum of y and z ?

- (A) 1:21
(B) 1:20
(C) 1:6
(D) 6:1
(E) 20:1

108.
$$\frac{(-1.5)(1.2) - (4.5)(0.4)}{30} =$$

- (A) -1.2
(B) -0.12
(C) 0
(D) 0.12
(E) 1.2

109. In the coordinate plane, line k passes through the origin and has slope 2. If points $(3,y)$ and $(x,4)$ are on line k , then $x + y =$

- (A) 3.5
(B) 7
(C) 8
(D) 10
(E) 14

110. If a , b , and c are constants, $a > b > c$, and $x^3 - x = (x - a)(x - b)(x - c)$ for all numbers x , what is the value of b ?
- (A) -3
(B) -1
(C) 0
(D) 1
(E) 3
111. Company K's earnings were \$12 million last year. If this year's earnings are projected to be 150 percent greater than last year's earnings, what are Company K's projected earnings this year?
- (A) \$13.5 million
(B) \$15 million
(C) \$18 million
(D) \$27 million
(E) \$30 million
112. $17^3 + 17^4 =$
- (A) 17^7
(B) $17^3(18)$
(C) $17^6(18)$
(D) $2(17^3) + 17$
(E) $2(17^3) - 17$
113. Jonah drove the first half of a 100-mile trip in x hours and the second half in y hours. Which of the following is equal to Jonah's average speed, in miles per hour, for the entire trip?
- (A) $\frac{50}{x+y}$
(B) $\frac{100}{x+y}$
(C) $\frac{25}{x} + \frac{25}{y}$
(D) $\frac{50}{x} + \frac{50}{y}$
(E) $\frac{100}{x} + \frac{100}{y}$
114. What is the greatest number of identical bouquets that can be made out of 21 white and 91 red tulips if no flowers are to be left out? (Two bouquets are identical whenever the number of red tulips in the two bouquets is equal and the number of white tulips in the two bouquets is equal.)
- (A) 3
(B) 4
(C) 5
(D) 6
(E) 7
115. In the xy -plane, the points (c,d) , $(c,-d)$, and $(-c,-d)$ are three vertices of a certain square. If $c < 0$ and $d > 0$, which of the following points is in the same quadrant as the fourth vertex of the square?
- (A) $(-5,-3)$
(B) $(-5,3)$
(C) $(5,-3)$
(D) $(3,-5)$
(E) $(3,5)$
116. For all numbers s and t , the operation $*$ is defined by $s * t = (s - 1)(t + 1)$. If $(-2) * x = -12$, then $x =$
- (A) 2
(B) 3
(C) 5
(D) 6
(E) 11
117. If the amount of federal estate tax due on an estate valued at \$1.35 million is \$437,000 plus 43 percent of the value of the estate in excess of \$1.25 million, then the federal tax due is approximately what percent of the value of the estate?
- A. 30%
B. 35%
C. 40%
D. 45%
E. 50%

118. If $\frac{3}{10^4} = x\%$, then $x =$

- (A) 0.3
- (B) 0.03
- (C) 0.003
- (D) 0.0003
- (E) 0.00003

119. If a basketball team scores an average (arithmetic mean) of x points per game for n games and then scores y points in its next game, what is the team's average score for the $n + 1$ games?

- (A) $\frac{nx + y}{n + 1}$
- (B) $x + \frac{y}{n + 1}$
- (C) $x + \frac{y}{n}$
- (D) $\frac{n(x + y)}{n + 1}$
- (E) $\frac{x + ny}{n + 1}$

120. At a certain pizzeria, $\frac{1}{8}$ of the pizzas sold in one week were mushroom and $\frac{1}{3}$ of the remaining pizzas sold were pepperoni. If n of the pizzas sold were pepperoni, how many were mushroom?

- (A) $\frac{3}{8}n$
- (B) $\frac{3}{7}n$
- (C) $\frac{7}{16}n$
- (D) $\frac{7}{8}n$
- (E) $3n$

121. What is the value of $2x^2 - 2.4x - 1.7$ for $x = 0.7$?

- (A) -0.72
- (B) -1.42
- (C) -1.98
- (D) -2.40
- (E) -2.89

122. What is the remainder when 3^{24} is divided by 5?

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

123. If the volume of a ball is 32,490 cubic millimeters, what is the volume of the ball in cubic centimeters? (1 millimeter = 0.1 centimeter)

- (A) 0.3249
- (B) 3.249
- (C) 32.49
- (D) 324.9
- (E) 3,249

124. David used part of \$100,000 to purchase a house. Of the remaining portion, he invested $\frac{1}{3}$ of it at 4 percent simple annual interest and $\frac{2}{3}$ of it at 6 percent simple annual interest. If after a year the income from the two investments totaled \$320, what was the purchase price of the house?

- (A) \$96,000
- (B) \$94,000
- (C) \$88,000
- (D) \$75,000
- (E) \$40,000

125. The cost to rent a small bus for a trip is x dollars, which is to be shared equally among the people taking the trip. If 10 people take the trip rather than 16, how many more dollars, in terms of x , will it cost per person?

- (A) $\frac{x}{6}$
- (B) $\frac{x}{10}$
- (C) $\frac{x}{16}$
- (D) $\frac{3x}{40}$
- (E) $\frac{3x}{80}$

126. Last year Department Store X had a sales total for December that was 4 times the average (arithmetic mean) of the monthly sales totals for January through November. The sales total for December was what fraction of the sales total for the year?

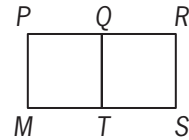
(A) $\frac{1}{4}$
 (B) $\frac{4}{15}$
 (C) $\frac{1}{3}$
 (D) $\frac{4}{11}$
 (E) $\frac{4}{5}$

127. In the sequence $x_0, x_1, x_2, \dots, x_n$, each term from x_1 to x_k is 3 greater than the previous term, and each term from x_{k+1} to x_n is 3 less than the previous term, where n and k are positive integers and $k < n$. If $x_0 = x_n = 0$ and if $x_k = 15$, what is the value of n ?

(A) 5
 (B) 6
 (C) 9
 (D) 10
 (E) 15

128. If $x \neq 2$, then $\frac{3x^2(x-2) - x + 2}{x-2} =$

(A) $3x^2 - x + 2$
 (B) $3x^2 + 1$
 (C) $3x^2$
 (D) $3x^2 - 1$
 (E) $3x^2 - 2$



Note: Not drawn to scale.

129. In the figure shown above, line segment QR has length 12, and rectangle $MPQT$ is a square. If the area of rectangular region $MPRS$ is 540, what is the area of rectangular region $TQRS$?

(A) 144
 (B) 216
 (C) 324
 (D) 360
 (E) 396

130. Machines A and B always operate independently and at their respective constant rates. When working alone, Machine A can fill a production lot in 5 hours, and Machine B can fill the same lot in x hours. When the two machines operate simultaneously to fill the production lot, it takes them 2 hours to complete the job. What is the value of x ?

(A) $3\frac{1}{3}$
 (B) 3
 (C) $2\frac{1}{2}$
 (D) $2\frac{1}{3}$
 (E) $1\frac{1}{2}$

131. A certain manufacturer sells its product to stores in 113 different regions worldwide, with an average (arithmetic mean) of 181 stores per region. If last year these stores sold an average of 51,752 units of the manufacturer's product per store, which of the following is closest to the total number of units of the manufacturer's product sold worldwide last year?

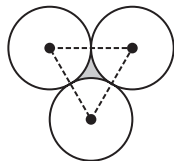
(A) 10^6
 (B) 10^7
 (C) 10^8
 (D) 10^9
 (E) 10^{10}

132. Andrew started saving at the beginning of the year and had saved \$240 by the end of the year. He continued to save and by the end of 2 years had saved a total of \$540. Which of the following is closest to the percent increase in the amount Andrew saved during the second year compared to the amount he saved during the first year?

(A) 11%
 (B) 25%
 (C) 44%
 (D) 56%
 (E) 125%

133. Two numbers differ by 2 and sum to S . Which of the following is the greater of the numbers in terms of S ?

(A) $\frac{S}{2} - 1$
 (B) $\frac{S}{2}$
 (C) $\frac{S}{2} + \frac{1}{2}$
 (D) $\frac{S}{2} + 1$
 (E) $\frac{S}{2} + 2$



134. The figure shown above consists of three identical circles that are tangent to each other. If the area of the shaded region is $64\sqrt{3} - 32\pi$, what is the radius of each circle?

(A) 4
 (B) 8
 (C) 16
 (D) 24
 (E) 32

135. In a numerical table with 10 rows and 10 columns, each entry is either a 9 or a 10. If the number of 9s in the n th row is $n - 1$ for each n from 1 to 10, what is the average (arithmetic mean) of all the numbers in the table?

(A) 9.45
 (B) 9.50
 (C) 9.55
 (D) 9.65
 (E) 9.70

136. A positive integer n is a perfect number provided that the sum of all the positive factors of n , including 1 and n , is equal to $2n$. What is the sum of the reciprocals of all the positive factors of the perfect number 28?

(A) $\frac{1}{4}$
 (B) $\frac{56}{27}$
 (C) 2
 (D) 3
 (E) 4

137. The infinite sequence $a_1, a_2, \dots, a_n, \dots$ is such that $a_1 = 2$, $a_2 = -3$, $a_3 = 5$, $a_4 = -1$, and $a_n = a_{n-4}$ for $n > 4$. What is the sum of the first 97 terms of the sequence?

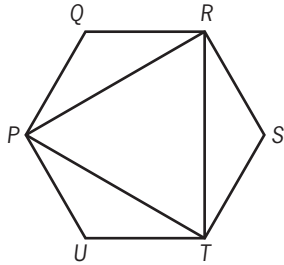
(A) 72
 (B) 74
 (C) 75
 (D) 78
 (E) 80

138. The sequence $a_1, a_2, \dots, a_n, \dots$ is such that $a_n = 2a_{n-1} - x$ for all positive integers $n \geq 2$ and for a certain number x . If $a_5 = 99$ and $a_3 = 27$, what is the value of x ?

(A) 3
 (B) 9
 (C) 18
 (D) 36
 (E) 45

139. A window is in the shape of a regular hexagon with each side of length 80 centimeters. If a diagonal through the center of the hexagon is w centimeters long, then $w =$

(A) 80
(B) 120
(C) 150
(D) 160
(E) 240



140. In the figure shown, $PQRTSU$ is a regular polygon with sides of length x . What is the perimeter of triangle PRT in terms of x ?

(A) $\frac{x\sqrt{3}}{2}$
(B) $x\sqrt{3}$
(C) $\frac{3x\sqrt{3}}{2}$
(D) $3x\sqrt{3}$
(E) $4x\sqrt{3}$

141. In a certain medical survey, 45 percent of the people surveyed had the type A antigen in their blood and 3 percent had both the type A antigen and the type B antigen. Which of the following is closest to the percent of those with the type A antigen who also had the type B antigen?

(A) 1.35%
(B) 6.67%
(C) 13.50%
(D) 15.00%
(E) 42.00%

142. On a certain transatlantic crossing, 20 percent of a ship's passengers held round-trip tickets and also took their cars aboard the ship. If 60 percent of the passengers with round-trip tickets did not take their cars aboard the ship, what percent of the ship's passengers held round-trip tickets?

(A) $33\frac{1}{3}\%$
(B) 40%
(C) 50%
(D) 60%
(E) $66\frac{2}{3}\%$

143. If x and k are integers and $(12^x)(4^{2x+1}) = (2^k)(3^2)$, what is the value of k ?

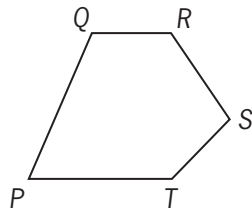
(A) 5
(B) 7
(C) 10
(D) 12
(E) 14

144. If S is the sum of the reciprocals of the 10 consecutive integers from 21 to 30, then S is between which of the following two fractions?

(A) $\frac{1}{3}$ and $\frac{1}{2}$
(B) $\frac{1}{4}$ and $\frac{1}{3}$
(C) $\frac{1}{5}$ and $\frac{1}{4}$
(D) $\frac{1}{6}$ and $\frac{1}{5}$
(E) $\frac{1}{7}$ and $\frac{1}{6}$

145. For every even positive integer m , $f(m)$ represents the product of all even integers from 2 to m , inclusive. For example, $f(12) = 2 \times 4 \times 6 \times 8 \times 10 \times 12$. What is the greatest prime factor of $f(24)$?

- (A) 23
(B) 19
(C) 17
(D) 13
(E) 11



Note: Not drawn to scale.

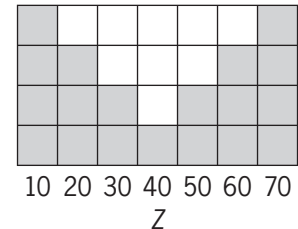
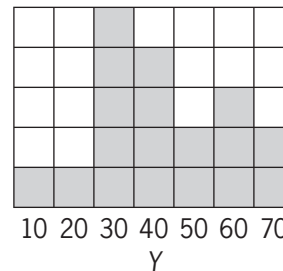
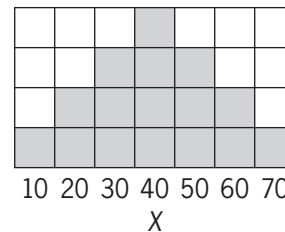
146. In pentagon $PQRST$, $PQ = 3$, $QR = 2$, $RS = 4$, and $ST = 5$. Which of the lengths 5, 10, and 15 could be the value of PT ?

- (A) 5 only
(B) 15 only
(C) 5 and 10 only
(D) 10 and 15 only
(E) 5, 10, and 15

3, k , 2, 8, m , 3

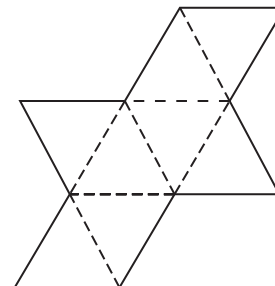
147. The arithmetic mean of the list of numbers above is 4. If k and m are integers and $k \neq m$, what is the median of the list?

- (A) 2
(B) 2.5
(C) 3
(D) 3.5
(E) 4



148. If the variables X , Y , and Z take on only the values 10, 20, 30, 40, 50, 60, or 70 with frequencies indicated by the shaded regions above, for which of the frequency distributions is the mean equal to the median?

- (A) X only
(B) Y only
(C) Z only
(D) X and Y
(E) X and Z



149. When the figure above is cut along the solid lines, folded along the dashed lines, and taped along the solid lines, the result is a model of a geometric solid. This geometric solid consists of 2 pyramids, each with a square base that they share. What is the sum of the number of edges and the number of faces of this geometric solid?

- (A) 10
(B) 18
(C) 20
(D) 24
(E) 25

$$2x + y = 12$$

$$|y| \leq 12$$

150. For how many ordered pairs (x, y) that are solutions of the system above are x and y both integers?

(A) 7
(B) 10
(C) 12
(D) 13
(E) 14

151. The points R , T , and U lie on a circle that has radius 4. If the length of arc RTU is $\frac{4\pi}{3}$, what is the length of line segment RU ?

(A) $\frac{4}{3}$
(B) $\frac{8}{3}$
(C) 3
(D) 4
(E) 6

152. A certain university will select 1 of 7 candidates eligible to fill a position in the mathematics department and 2 of 10 candidates eligible to fill 2 identical positions in the computer science department. If none of the candidates is eligible for a position in both departments, how many different sets of 3 candidates are there to fill the 3 positions?

(A) 42
(B) 70
(C) 140
(D) 165
(E) 315

153. A survey of employers found that during 1993 employment costs rose 3.5 percent, where employment costs consist of salary costs and fringe-benefit costs. If salary costs rose 3 percent and fringe-benefit costs rose 5.5 percent during 1993, then fringe-benefit costs represented what percent of employment costs at the beginning of 1993?

(A) 16.5%
(B) 20%
(C) 35%
(D) 55%
(E) 65%

154. The subsets of the set $\{w, x, y\}$ are $\{w\}$, $\{x\}$, $\{y\}$, $\{w, x\}$, $\{w, y\}$, $\{x, y\}$, $\{w, x, y\}$, and $\{\}$ (the empty subset). How many subsets of the set $\{w, x, y, z\}$ contain w ?

(A) Four
(B) Five
(C) Seven
(D) Eight
(E) Sixteen

155. There are 5 cars to be displayed in 5 parking spaces, with all the cars facing the same direction. Of the 5 cars, 3 are red, 1 is blue, and 1 is yellow. If the cars are identical except for color, how many different display arrangements of the 5 cars are possible?

(A) 20
(B) 25
(C) 40
(D) 60
(E) 125

156. The number $\sqrt{63 - 36\sqrt{3}}$ can be expressed as $x + y\sqrt{3}$ for some integers x and y . What is the value of xy ?

(A) -18
(B) -6
(C) 6
(D) 18
(E) 27

157. There are 10 books on a shelf, of which 4 are paperbacks and 6 are hardbacks. How many possible selections of 5 books from the shelf contain at least one paperback and at least one hardback?

(A) 75
(B) 120
(C) 210
(D) 246
(E) 252

158. If x is to be chosen at random from the set $\{1, 2, 3, 4\}$ and y is to be chosen at random from the set $\{5, 6, 7\}$, what is the probability that xy will be even?
- (A) $\frac{1}{6}$
 (B) $\frac{1}{3}$
 (C) $\frac{1}{2}$
 (D) $\frac{2}{3}$
 (E) $\frac{5}{6}$
159. The function f is defined for each positive three-digit integer n by $f(n) = 2^x 3^y 5^z$, where x , y , and z are the hundreds, tens, and units digits of n , respectively. If m and v are three-digit positive integers such that $f(m) = 9f(v)$, then $m - v =$
- (A) 8
 (B) 9
 (C) 18
 (C) 20
 (E) 80
160. If $10^{50} - 74$ is written as an integer in base 10 notation, what is the sum of the digits in that integer?
- (A) 424
 (B) 433
 (C) 440
 (D) 449
 (E) 467
161. A certain company that sells only cars and trucks reported that revenues from car sales in 1997 were down 11 percent from 1996 and revenues from truck sales in 1997 were up 7 percent from 1996. If total revenues from car sales and truck sales in 1997 were up 1 percent from 1996, what is the ratio of revenue from car sales in 1996 to revenue from truck sales in 1996?
- (A) 1:2
 (B) 4:5
 (C) 1:1
 (D) 3:2
 (E) 5:3
162. Becky rented a power tool from a rental shop. The rent for the tool was \$12 for the first hour and \$3 for each additional hour. If Becky paid a total of \$27, excluding sales tax, to rent the tool, for how many hours did she rent it?
- (A) 5
 (B) 6
 (C) 9
 (D) 10
 (E) 12
163. If $4 < \frac{7-x}{3}$, which of the following must be true?
- I. $5 < x$
 II. $|x + 3| > 2$
 III. $-(x + 5)$ is positive.
- (A) II only
 (B) III only
 (C) I and II only
 (D) II and III only
 (E) I, II, and III
164. A certain right triangle has sides of length x , y , and z , where $x < y < z$. If the area of this triangular region is 1, which of the following indicates all of the possible values of y ?
- (A) $y > \sqrt{2}$
 (B) $\frac{\sqrt{3}}{2} < y < \sqrt{2}$
 (C) $\frac{\sqrt{2}}{3} < y < \frac{\sqrt{3}}{2}$
 (D) $\frac{\sqrt{3}}{4} < y < \frac{\sqrt{2}}{3}$
 (E) $y < \frac{\sqrt{3}}{4}$

165. On a certain day, a bakery produced a batch of rolls at a total production cost of \$300. On that day, $\frac{4}{5}$ of the rolls in the batch were sold, each at a price that was 50 percent greater than the average (arithmetic mean) production cost per roll. The remaining rolls in the batch were sold the next day, each at a price that was 20 percent less than the price of the day before. What was the bakery's profit on this batch of rolls?

(A) \$150
(B) \$144
(C) \$132
(D) \$108
(E) \$90

166. A set of numbers has the property that for any number t in the set, $t + 2$ is in the set. If -1 is in the set, which of the following must also be in the set?

I. -3
II. 1
III. 5

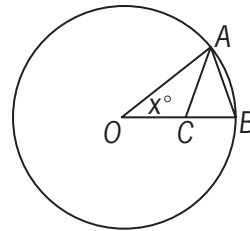
(A) I only
(B) II only
(C) I and II only
(D) II and III only
(E) I, II, and III

167. A couple decides to have 4 children. If they succeed in having 4 children and each child is equally likely to be a boy or a girl, what is the probability that they will have exactly 2 girls and 2 boys?

(A) $\frac{3}{8}$
(B) $\frac{1}{4}$
(C) $\frac{3}{16}$
(D) $\frac{1}{8}$
(E) $\frac{1}{16}$

168. The closing price of Stock X changed on each trading day last month. The percent change in the closing price of Stock X from the first trading day last month to each of the other trading days last month was less than 50 percent. If the closing price on the second trading day last month was \$10.00, which of the following CANNOT be the closing price on the last trading day last month?

(A) \$3.00
(B) \$9.00
(C) \$19.00
(D) \$24.00
(E) \$29.00



169. In the figure above, point O is the center of the circle and $OC = AC = AB$. What is the value of x ?

(A) 40
(B) 36
(C) 34
(D) 32
(E) 30

170. An airline passenger is planning a trip that involves three connecting flights that leave from Airports A, B, and C, respectively. The first flight leaves Airport A every hour, beginning at 8:00 a.m., and arrives at Airport B $2\frac{1}{2}$ hours later. The second flight leaves Airport B every 20 minutes, beginning at 8:00 a.m., and arrives at Airport C $1\frac{1}{6}$ hours later. The third flight leaves Airport C every hour, beginning at 8:45 a.m. What is the least total amount of time the passenger must spend between flights if all flights keep to their schedules?

(A) 25 min
(B) 1 hr 5 min
(C) 1 hr 15 min
(D) 2 hr 20 min
(E) 3 hr 40 min

171. If n is a positive integer and n^2 is divisible by 72, then the largest positive integer that must divide n is

(A) 6
(B) 12
(C) 24
(D) 36
(E) 48

172. A certain grocery purchased x pounds of produce for p dollars per pound. If y pounds of the produce had to be discarded due to spoilage and the grocery sold the rest for s dollars per pound, which of the following represents the gross profit on the sale of the produce?

(A) $(x - y)s - xp$
(B) $(x - y)p - ys$
(C) $(s - p)y - xp$
(D) $xp - ys$
(E) $(x - y)(s - p)$

173. If x , y , and z are positive integers such that x is a factor of y , and x is a multiple of z , which of the following is NOT necessarily an integer?

(A) $\frac{x+z}{z}$
(B) $\frac{y+z}{x}$
(C) $\frac{x+y}{z}$
(D) $\frac{xy}{z}$
(E) $\frac{yz}{x}$

174. Running at their respective constant rates, Machine X takes 2 days longer to produce w widgets than Machine Y. At these rates, if the two machines together produce $\frac{5}{4}w$ widgets in 3 days, how many days would it take Machine X alone to produce $2w$ widgets?

(A) 4
(B) 6
(C) 8
(D) 10
(E) 12

175. A square wooden plaque has a square brass inlay in the center, leaving a wooden strip of uniform width around the brass square. If the ratio of the brass area to the wooden area is 25 to 39, which of the following could be the width, in inches, of the wooden strip?

I. 1
II. 3
III. 4

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

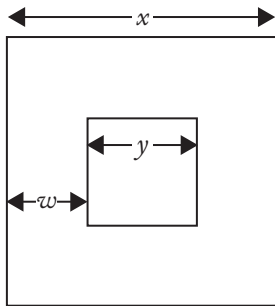
176.
$$\frac{2\frac{3}{5} - 1\frac{2}{3}}{\frac{2}{3} - \frac{3}{5}} =$$

(A) 16
(B) 14
(C) 3
(D) 1
(E) -1

175. A square wooden plaque has a square brass inlay in the center, leaving a wooden strip of uniform width around the brass square. If the ratio of the brass area to the wooden area is 25 to 39, which of the following could be the width, in inches, of the wooden strip?

- I. 1
 - II. 3
 - III. 4
- (A) I only
 (B) II only
 (C) I and II only
 (D) I and III only
 (E) I, II, and III

Geometry Area



Note: Not drawn to scale.

Let x represent the side length of the entire plaque, let y represent the side length of the brass inlay, and w represent the uniform width of the wooden strip around the brass inlay, as shown in the figure above. Since the ratio of the area of the brass inlay to the area of the wooden strip is 25 to 39, the ratio of the area of the brass inlay to the area of the entire plaque is $\frac{y^2}{x^2} = \frac{25}{25+39} = \frac{25}{64}$.

Then, $\frac{y}{x} = \sqrt{\frac{25}{64}} = \frac{5}{8}$ and $y = \frac{5}{8}x$. Also, $x = y + 2w$ and $w = \frac{x-y}{2}$. Substituting $\frac{5}{8}x$ for y into this

expression for w gives $w = \frac{x - \frac{5}{8}x}{2} = \frac{\frac{3}{8}x}{2} = \frac{3}{16}x$. Thus,

- I. If the plaque were $\frac{16}{3}$ inches on a side, then the width of the wooden strip would be 1 inch, and so 1 inch is a possible width for the wooden strip.
- II. If the plaque were 16 inches on a side, then the width of the wooden strip would be 3 inches, and so 3 inches is a possible width for the wooden strip.
- III. If the plaque were $\frac{64}{3}$ inches on a side, then the width of the wooden strip would be 4 inches, and so 4 inches is a possible width for the wooden strip.

The correct answer is E.

176. $\frac{2\frac{3}{5} - 1\frac{2}{3}}{\frac{2}{3} - \frac{3}{5}} =$

- (A) 16
 (B) 14
 (C) 3
 (D) 1
 (E) -1

Arithmetic Operations on rational numbers

Work the problem:

$$\frac{2\frac{3}{5} - 1\frac{2}{3}}{\frac{2}{3} - \frac{3}{5}} = \frac{\frac{13}{5} - \frac{5}{3}}{\frac{2}{3} - \frac{3}{5}} = \frac{\frac{39-25}{15}}{\frac{10-9}{15}} = \frac{14}{1} = 14$$

The correct answer is B.

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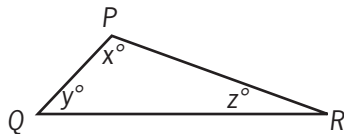
5.3 Sample Questions

Each **data sufficiency** problem consists of a question and two statements, labeled (1) and (2), which contain certain data. Using these data and your knowledge of mathematics and everyday facts (such as the number of days in July or the meaning of the word *counterclockwise*), decide whether the data given are sufficient for answering the question and then indicate one of the following answer choices:

- A Statement (1) ALONE is sufficient, but statement (2) alone is not sufficient.
- B Statement (2) ALONE is sufficient, but statement (1) alone is not sufficient.
- C BOTH statements TOGETHER are sufficient, but NEITHER statement ALONE is sufficient.
- D EACH statement ALONE is sufficient.
- E Statements (1) and (2) TOGETHER are not sufficient.

Note: In data sufficiency problems that ask for the value of a quantity, the data given in the statements are sufficient only when it is possible to determine exactly one numerical value for the quantity.

Example:



In $\triangle PQR$, what is the value of x ?

- (1) $PQ = PR$
- (2) $y = 40$

Explanation: According to statement (1) $PQ = PR$; therefore, $\triangle PQR$ is isosceles and $y = z$. Since $x + y + z = 180$, it follows that $x + 2y = 180$. Since statement (1) does not give a value for y , you cannot answer the question using statement (1) alone. According to statement (2), $y = 40$; therefore, $x + z = 140$. Since statement (2) does not give a value for z , you cannot answer the question using statement (2) alone. Using both statements together, since $x + 2y = 180$ and the value of y is given, you can find the value of x . Therefore, BOTH statements (1) and (2) TOGETHER are sufficient to answer the questions, but NEITHER statement ALONE is sufficient.

Numbers: All numbers used are real numbers.

Figures:

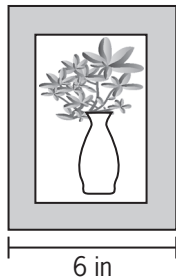
- Figures conform to the information given in the question, but will not necessarily conform to the additional information given in statements (1) and (2).
- Lines shown as straight are straight, and lines that appear jagged are also straight.
- The positions of points, angles, regions, etc., exist in the order shown, and angle measures are greater than zero.
- All figures lie in a plane unless otherwise indicated.

177. What is the tenths digit of the number d when it is written as a decimal?

- (1) $d = \frac{54}{25}$
- (2) $1,000d = 2,160$

178. Rita's monthly salary is $\frac{2}{3}$ Juanita's monthly salary. What is their combined monthly salary?

- (1) Rita's monthly salary is \$4,000.
- (2) Either Rita's monthly salary or Juanita's monthly salary is \$6,000.



179. A framed picture is shown above. The frame, shown shaded, is 6 inches wide and forms a border of uniform width around the picture. What are the dimensions of the viewable portion of the picture?

- (1) The area of the shaded region is 24 square inches.
- (2) The frame is 8 inches tall.

180. What is the value of the integer x ?

- (1) x rounded to the nearest hundred is 7,200.
- (2) The hundreds digit of x is 2.

181. Is $2x > 2y$?

- (1) $x > y$
- (2) $3x > 3y$

182. If p and q are positive, is $\frac{p}{q}$ less than 1?

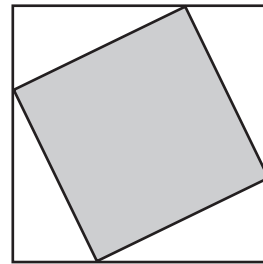
- (1) p is less than 4.
- (2) q is less than 4.

183. In a certain factory, hours worked by each employee in excess of 40 hours per week are overtime hours and are paid for at $1\frac{1}{2}$ times the employee's regular hourly pay rate. If an employee worked a total of 42 hours last week, how much was the employee's gross pay for the hours worked last week?

- (1) The employee's gross pay for overtime hours worked last week was \$30.
- (2) The employee's gross pay for all hours worked last week was \$30 more than for the previous week.

184. If $x > 0$, what is the value of x^5 ?

- (1) $\sqrt{x} = 32$
- (2) $x^2 = 2^{20}$



185. In the quilting pattern shown above, a small square has its vertices on the sides of a larger square. What is the side length, in centimeters, of the larger square?

- (1) The side length of the smaller square is 10 cm.
- (2) Each vertex of the small square cuts 1 side of the larger square into 2 segments with lengths in the ratio of 1:2.

186. Did Insurance Company K have more than \$300 million in total net profits last year?

- (1) Last year Company K paid out \$0.95 in claims for every dollar of premiums collected.
- (2) Last year Company K earned a total of \$150 million in profits from the investment of accumulated surplus premiums from previous years.

187. How many hours would it take Pump A and Pump B working together, each at its own constant rate, to empty a tank that was initially full?

- (1) Working alone at its constant rate, Pump A would empty the full tank in 4 hours 20 minutes.
- (2) Working alone, Pump B would empty the full tank at its constant rate of 72 liters per minute.

188. What is the value of the integer N ?

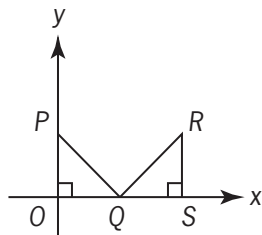
- (1) $101 < N < 103$
- (2) $202 < 2N < 206$

189. Is zw positive?

- (1) $z + w^3 = 20$
- (2) z is positive.

190. On the scale drawing of a certain house plan, if 1 centimeter represents x meters, what is the value of x ?

- (1) A rectangular room that has a floor area of 12 square meters is represented by a region of area 48 square centimeters.
- (2) The 15-meter length of the house is represented by a segment 30 centimeters long.



191. In the rectangular coordinate system above, if $\triangle OPQ$ and $\triangle QRS$ have equal area, what are the coordinates of point R ?

- (1) The coordinates of point P are $(0, 12)$.
- (2) $OP = OQ$ and $QS = RS$.

192. If y is greater than 110 percent of x , is y greater than 75?

- (1) $x > 75$
- (2) $y - x = 10$

193. How much did credit-card fraud cost United States banks in year X to the nearest \$10 million?

- (1) In year X , counterfeit cards and telephone and mail-order fraud accounted for 39 percent of the total amount that card fraud cost the banks.
- (2) In year X , stolen cards accounted for \$158.4 million, or 16 percent, of the total amount that credit-card fraud cost the banks.

194. What is the average (arithmetic mean) of x and y ?

- (1) The average of x and $2y$ is 10.
- (2) The average of $2x$ and $7y$ is 32.

195. What is the value of $\frac{r}{2} + \frac{s}{2}$?

- (1) $\frac{r+s}{2} = 5$
- (2) $r + s = 10$

196. Is the positive integer n odd?

- (1) $n^2 + (n+1)^2 + (n+2)^2$ is even.
- (2) $n^2 - (n+1)^2 - (n+2)^2$ is even.

197. For all x , the expression x^* is defined to be $ax + a$, where a is a constant. What is the value of 2^* ?

- (1) $3^* = 2$
- (2) $5^* = 3$

198. Is $k + m < 0$?

- (1) $k < 0$
- (2) $km > 0$

199. A retailer purchased a television set for x percent less than its list price, and then sold it for y percent less than its list price. What was the list price of the television set?

- (1) $x = 15$
- (2) $x - y = 5$

200. If x and y are positive, is $xy > x + y$?

- (1) $x < y$
- (2) $2 < x$

201. What is the ratio of c to d ?

- (1) The ratio of $3c$ to $3d$ is 3 to 4.
- (2) The ratio of $c + 3$ to $d + 3$ is 4 to 5.

202. A certain dealership has a number of cars to be sold by its salespeople. How many cars are to be sold?

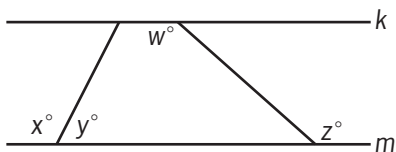
- (1) If each of the salespeople sells 4 of the cars, 23 cars will remain unsold.
- (2) If each of the salespeople sells 6 of the cars, 5 cars will remain unsold.

203. A candle company determines that, for a certain specialty candle, the supply function is $p = m_1x + b_1$ and the demand function is $p = m_2x + b_2$, where p is the price of each candle, x is the number of candles supplied or demanded, and m_1 , m_2 , b_1 , and b_2 are constants. At what value of x do the graphs of the supply function and demand function intersect?

- (1) $m_1 = -m_2 = 0.005$
- (2) $b_2 - b_1 = 6$

204. Some computers at a certain company are Brand X and the rest are Brand Y. If the ratio of the number of Brand Y computers to the number of Brand X computers at the company is 5 to 6, how many of the computers are Brand Y?

- (1) There are 80 more Brand X computers than Brand Y computers at the company.
- (2) There is a total of 880 computers at the company.



205. In the figure shown, lines k and m are parallel to each other. Is $x = z$?

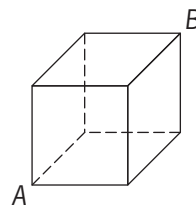
- (1) $x = w$
- (2) $y = 180 - w$

206. When the wind speed is 9 miles per hour, the wind-chill factor w is given by

$$w = -17.366 + 1.19t,$$

where t is the temperature in degrees Fahrenheit. If at noon yesterday the wind speed was 9 miles per hour, was the wind-chill factor greater than 0?

- (1) The temperature at noon yesterday was greater than 10 degrees Fahrenheit.
- (2) The temperature at noon yesterday was less than 20 degrees Fahrenheit.

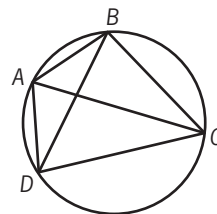


207. What is the volume of the cube above?

- (1) The surface area of the cube is 600 square inches.
- (2) The length of diagonal AB is $10\sqrt{3}$ inches.

208. Of the 230 single-family homes built in City X last year, how many were occupied at the end of the year?

- (1) Of all single-family homes in City X, 90 percent were occupied at the end of last year.
- (2) A total of 7,200 single-family homes in City X were occupied at the end of last year.



209. In the figure shown, quadrilateral $ABCD$ is inscribed in a circle of radius 5. What is the perimeter of quadrilateral $ABCD$?

- (1) The length of AB is 6 and the length of CD is 8.
- (2) AC is a diameter of the circle.

210. If x is a positive integer, what is the value of x ?

- (1) $x^2 = \sqrt{x}$
- (2) $\frac{n}{x} = n$ and $n \neq 0$.

211. Is the median of the five numbers a , b , c , d , and e equal to d ?

- (1) $a < c < e$
- (2) $b < d < c$

212. During a certain bicycle ride, was Sherry's average speed faster than 24 kilometers per hour?
(1 kilometer = 1,000 meters)

- (1) Sherry's average speed during the bicycle ride was faster than 7 meters per second.
- (2) Sherry's average speed during the bicycle ride was slower than 8 meters per second.

213. If x and y are integers, what is the value of x ?

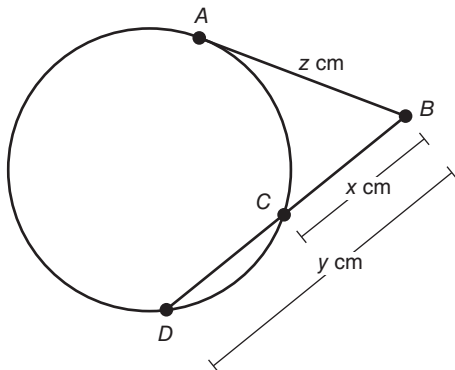
- (1) $xy = 1$
- (2) $x \neq -1$

214. If p , s , and t are positive, is $|ps - pt| > p(s - t)$?

- (1) $p < s$
- (2) $s < t$

215. Is $x > y$?

- (1) $x + y > x - y$
- (2) $3x > 2y$



216. In the figure above, \overline{AB} , which has length z cm, is tangent to the circle at point A, and \overline{BD} , which has length y cm, intersects the circle at point C. If $BC = x$ cm and $z = \sqrt{xy}$, what is the value of x ?

- (1) $CD = x$ cm
- (2) $z = 5\sqrt{2}$

217. The total cost of an office dinner was shared equally by k of the n employees who attended the dinner. What was the total cost of the dinner?

- (1) Each of the k employees who shared the cost of the dinner paid \$19.
- (2) If the total cost of the dinner had been shared equally by $k + 1$ of the n employees who attended the dinner, each of the $k + 1$ employees would have paid \$18.

218. What is the value of x ?

- (1) $x + 1 = 2 - 3x$
- (2) $\frac{1}{2x} = 2$

219. Is the integer n a prime number?

- (1) $24 \leq n \leq 28$
- (2) n is not divisible by 2 or 3.

220. What is the sum of the first four terms of sequence S ?

- (1) After the first two terms of S , the value of each term of S is equal to the average (arithmetic mean) of the last two preceding terms.
- (2) The average (arithmetic mean) of the first three terms of S is 10.

221. If x and y are positive integers, what is the remainder when $10^x + y$ is divided by 3?

- (1) $x = 5$
- (2) $y = 2$

222. What was the amount of money donated to a certain charity?

- (1) Of the amount donated, 40 percent came from corporate donations.
- (2) Of the amount donated, \$1.5 million came from noncorporate donations.

223. In a certain order, the pretax price of each regular pencil was \$0.03, the pretax price of each deluxe pencil was \$0.05, and there were 50% more deluxe pencils than regular pencils. All taxes on the order are a fixed percent of the pretax prices. The sum of the total pretax price of the order and the tax on the order was \$44.10. What was the amount, in dollars, of the tax on the order?

- (1) The tax on the order was 5% of the total pretax price of the order.
- (2) The order contained exactly 400 regular pencils.

224. If m is an integer greater than 1, is m an even integer?

- (1) 32 is a factor of m .
- (2) m is a factor of 32.

225. If the set S consists of five consecutive positive integers, what is the sum of these five integers?

- (1) The integer 11 is in S , but 10 is not in S .
- (2) The sum of the even integers in S is 26.

226. If $x > 0$, what is the value of x ?

- (1) $x^3 - x = 0$
- (2) $\sqrt[3]{x} - x = 0$

227. Which of the positive numbers x or y is greater?

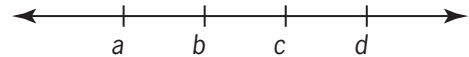
- (1) $y = 2x$
- (2) $2x + 5y = 12$

228. A total of 20 amounts are entered on a spreadsheet that has 5 rows and 4 columns; each of the 20 positions in the spreadsheet contains one amount. The average (arithmetic mean) of the amounts in row i is R_i ($1 \leq i \leq 5$). The average of the amounts in column j is C_j ($1 \leq j \leq 4$). What is the average of all 20 amounts on the spreadsheet?

- (1) $R_1 + R_2 + R_3 + R_4 + R_5 = 550$
- (2) $C_1 + C_2 + C_3 + C_4 = 440$

229. Was the range of the amounts of money that Company Y budgeted for its projects last year equal to the range of the amounts of money that it budgeted for its projects this year?

- (1) Both last year and this year, Company Y budgeted money for 12 projects and the least amount of money that it budgeted for a project was \$400.
- (2) Both last year and this year, the average (arithmetic mean) amount of money that Company Y budgeted per project was \$2,000.



230. If a , b , c , and d are numbers on the number line shown and if the tick marks are equally spaced, what is the value of $a + c$?

- (1) $a + b = -8$
- (2) $a + d = 0$

231. Is $xm < ym$?

- (1) $x > y$
- (2) $m < 0$

232. If $y = x^2 - 6x + 9$, what is the value of x ?

- (1) $y = 0$
- (2) $x + y = 3$

233. If $rs \neq 0$, is $\frac{1}{r} + \frac{1}{s} = 4$?

- (1) $r + s = 4rs$
- (2) $r = s$

234. If x , y , and z are three integers, are they consecutive integers?

- (1) $z - x = 2$
- (2) $x < y < z$

235. A collection of 36 cards consists of 4 sets of 9 cards each. The 9 cards in each set are numbered 1 through 9. If one card has been removed from the collection, what is the number on that card?
- (1) The units digit of the sum of the numbers on the remaining 35 cards is 6.
 - (2) The sum of the numbers on the remaining 35 cards is 176.
236. In the xy -plane, point (r, s) lies on a circle with center at the origin. What is the value of $r^2 + s^2$?
- (1) The circle has radius 2.
 - (2) The point $(\sqrt{2}, -\sqrt{2})$ lies on the circle.
237. If r , s , and t are nonzero integers, is $r^5s^3t^4$ negative?
- (1) rt is negative.
 - (2) s is negative.
238. Each Type A machine fills 400 cans per minute, each Type B machine fills 600 cans per minute, and each Type C machine installs 2,400 lids per minute. A lid is installed on each can that is filled and on no can that is not filled. For a particular minute, what is the total number of machines working?
- (1) A total of 4,800 cans are filled that minute.
 - (2) For that minute, there are 2 Type B machines working for every Type C machine working.
239. If a and b are constants, what is the value of a ?
- (1) $a < b$
 - (2) $(t - a)(t - b) = t^2 + t - 12$, for all values of t .
240. If x is a positive integer, is \sqrt{x} an integer?
- (1) $\sqrt{4x}$ is an integer.
 - (2) $\sqrt{3x}$ is not an integer.
241. If p , q , x , y , and z are different positive integers, which of the five integers is the median?
- (1) $p + x < q$
 - (2) $y < z$
242. If $w + z = 28$, what is the value of wz ?
- (1) w and z are positive integers.
 - (2) w and z are consecutive odd integers.
243. If $abc \neq 0$, is $\frac{\frac{a}{b}}{c} = \frac{a}{\frac{b}{c}}$?
- (1) $a = 1$
 - (2) $c = 1$
244. The arithmetic mean of a collection of 5 positive integers, not necessarily distinct, is 9. One additional positive integer is included in the collection and the arithmetic mean of the 6 integers is computed. Is the arithmetic mean of the 6 integers at least 10?
- (1) The additional integer is at least 14.
 - (2) The additional integer is a multiple of 5.
245. A certain list consists of 400 different numbers. Is the average (arithmetic mean) of the numbers in the list greater than the median of the numbers in the list?
- (1) Of the numbers in the list, 280 are less than the average.
 - (2) Of the numbers in the list, 30 percent are greater than or equal to the average.
246. In a two-month survey of shoppers, each shopper bought one of two brands of detergent, X or Y, in the first month and again bought one of these brands in the second month. In the survey, 90 percent of the shoppers who bought Brand X in the first month bought Brand X again in the second month, while 60 percent of the shoppers who bought Brand Y in the first month bought Brand Y again in the second month. What percent of the shoppers bought Brand Y in the second month?
- (1) In the first month, 50 percent of the shoppers bought Brand X.
 - (2) The total number of shoppers surveyed was 5,000.
247. If m and n are positive integers, is $m + n$ divisible by 4?
- (1) m and n are each divisible by 2.
 - (2) Neither m nor n is divisible by 4.

248. What is the area of rectangular region R ?

- (1) Each diagonal of R has length 5.
- (2) The perimeter of R is 14.

249. How many integers n are there such that $r < n < s$?

- (1) $s - r = 5$
- (2) r and s are not integers.

250. If the total price of n equally priced shares of a certain stock was \$12,000, what was the price per share of the stock?

- (1) If the price per share of the stock had been \$1 more, the total price of the n shares would have been \$300 more.
- (2) If the price per share of the stock had been \$2 less, the total price of the n shares would have been 5 percent less.

251. If n is positive, is $\sqrt{n} > 100$?

- (1) $\sqrt{n-1} > 99$
- (2) $\sqrt{n+1} > 101$

252. Is $xy > 5$?

- (1) $1 \leq x \leq 3$ and $2 \leq y \leq 4$.
- (2) $x + y = 5$

253. In Year X , 8.7 percent of the men in the labor force were unemployed in June compared with 8.4 percent in May. If the number of men in the labor force was the same for both months, how many men were unemployed in June of that year?

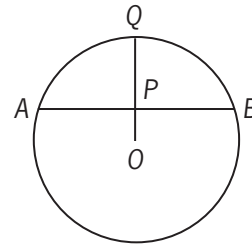
- (1) In May of Year X , the number of unemployed men in the labor force was 3.36 million.
- (2) In Year X , 120,000 more men in the labor force were unemployed in June than in May.

254. If $x \neq 0$, what is the value of $\left(\frac{x^p}{x^q}\right)^4$?

- (1) $p = q$
- (2) $x = 3$

255. On Monday morning a certain machine ran continuously at a uniform rate to fill a production order. At what time did it completely fill the order that morning?

- (1) The machine began filling the order at 9:30 a.m.
- (2) The machine had filled $\frac{1}{2}$ of the order by 10:30 a.m. and $\frac{5}{6}$ of the order by 11:10 a.m.



256. What is the radius of the circle above with center O ?

- (1) The ratio of OP to PQ is 1 to 2.
- (2) P is the midpoint of chord AB .

257. If a and b are positive integers, what is the value of the product ab ?

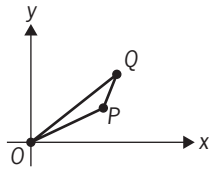
- (1) The least common multiple of a and b is 48.
- (2) The greatest common factor of a and b is 4.

258. What is the number of 360-degree rotations that a bicycle wheel made while rolling 100 meters in a straight line without slipping?

- (1) The diameter of the bicycle wheel, including the tire, was 0.5 meter.
- (2) The wheel made twenty 360-degree rotations per minute.

259. In the equation $x^2 + bx + 12 = 0$, x is a variable and b is a constant. What is the value of b ?

- (1) $x - 3$ is a factor of $x^2 + bx + 12$.
- (2) 4 is a root of the equation $x^2 + bx + 12 = 0$.



260. In the figure above, line segment OP has slope $\frac{1}{2}$ and line segment PQ has slope 2. What is the slope of line segment OQ ?

- (1) Line segment OP has length $2\sqrt{5}$.
- (2) The coordinates of point Q are $(5, 4)$.

261. In $\triangle XYZ$, what is the length of YZ ?

- (1) The length of XY is 3.
- (2) The length of XZ is 5.

262. If the average (arithmetic mean) of n consecutive odd integers is 10, what is the least of the integers?

- (1) The range of the n integers is 14.
- (2) The greatest of the n integers is 17.

263. If x , y , and z are positive numbers, is $x > y > z$?

- (1) $xz > yz$
- (2) $yx > yz$

264. K is a set of numbers such that

- (i) if x is in K , then $-x$ is in K , and
- (ii) if each of x and y is in K , then xy is in K .

Is 12 in K ?

- (1) 2 is in K .
- (2) 3 is in K .

265. If $x^2 + y^2 = 29$, what is the value of $(x - y)^2$?

- (1) $xy = 10$
- (2) $x = 5$

266. After winning 50 percent of the first 20 games it played, Team A won all of the remaining games it played. What was the total number of games that Team A won?

- (1) Team A played 25 games altogether.
- (2) Team A won 60 percent of all the games it played.

267. Is x between 0 and 1?

- (1) x^2 is less than x .
- (2) x^3 is positive.

268. If m and n are nonzero integers, is m^n an integer?

- (1) n^m is positive.
- (2) n^m is an integer.

269. What is the value of xy ?

- (1) $x + y = 10$
- (2) $x - y = 6$

270. If n is the least of three different integers greater than 1, what is the value of n ?

- (1) The product of the three integers is 90.
- (2) One of the integers is twice one of the other two integers.

271. Is x^2 greater than x ?

- (1) x^2 is greater than 1.
- (2) x is greater than -1 .

272. Michael arranged all his books in a bookcase with 10 books on each shelf and no books left over. After Michael acquired 10 additional books, he arranged all his books in a new bookcase with 12 books on each shelf and no books left over. How many books did Michael have before he acquired the 10 additional books?

- (1) Before Michael acquired the 10 additional books, he had fewer than 96 books.
- (2) Before Michael acquired the 10 additional books, he had more than 24 books.

273. If $xy > 0$, does $(x - 1)(y - 1) = 1$?

- (1) $x + y = xy$
- (2) $x = y$

274. Last year in a group of 30 businesses, 21 reported a net profit and 15 had investments in foreign markets. How many of the businesses did not report a net profit nor invest in foreign markets last year?

- (1) Last year 12 of the 30 businesses reported a net profit and had investments in foreign markets.
- (2) Last year 24 of the 30 businesses reported a net profit or invested in foreign markets, or both.

275. Is the perimeter of square S greater than the perimeter of equilateral triangle T ?

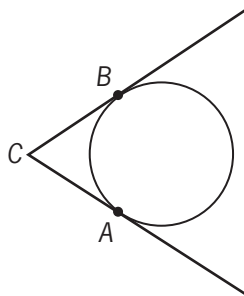
- (1) The ratio of the length of a side of S to the length of a side of T is 4:5.
- (2) The sum of the lengths of a side of S and a side of T is 18.

276. If $x + y + z > 0$, is $z > 1$?

- (1) $z > x + y + 1$
- (2) $x + y + 1 < 0$

277. For all z , $\lceil z \rceil$ denotes the least integer greater than or equal to z . Is $\lceil x \rceil = 0$?

- (1) $-1 < x < -0.1$
- (2) $\lceil x + 0.5 \rceil = 1$



278. The circular base of an above-ground swimming pool lies in a level yard and just touches two straight sides of a fence at points A and B , as shown in the figure above. Point C is on the ground where the two sides of the fence meet. How far from the center of the pool's base is point A ?

- (1) The base has area 250 square feet.
- (2) The center of the base is 20 feet from point C .

279. If $xy = -6$, what is the value of $xy(x + y)$?

- (1) $x - y = 5$
- (2) $xy^2 = 18$

280. $[y]$ denotes the greatest integer less than or equal to y . Is $d < 1$?

- (1) $d = y - [y]$
- (2) $[d] = 0$

281. If N is a positive odd integer, is N prime?

- (1) $N = 2^k + 1$ for some positive integer k .
- (2) $N + 2$ and $N + 4$ are both prime.

282. If m is a positive integer, then m^3 has how many digits?

- (1) m has 3 digits.
- (2) m^2 has 5 digits.

283. What is the value of $x^2 - y^2$?

- (1) $(x - y)^2 = 9$
- (2) $x + y = 6$

284. For each landscaping job that takes more than 4 hours, a certain contractor charges a total of r dollars for the first 4 hours plus $0.2r$ dollars for each additional hour or fraction of an hour, where $r > 100$. Did a particular landscaping job take more than 10 hours?

- (1) The contractor charged a total of \$288 for the job.
- (2) The contractor charged a total of $2.4r$ dollars for the job.

285. If $x^2 = 2^x$, what is the value of x ?

- (1) $2x = \left(\frac{x}{2}\right)^3$
- (2) $x = 2^{x-2}$

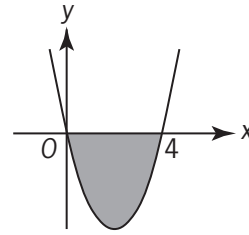
286. The sequence $s_1, s_2, s_3, \dots, s_n, \dots$ is such that $s_n = \frac{1}{n} - \frac{1}{n+1}$ for all integers $n \geq 1$. If k is a positive integer, is the sum of the first k terms of the sequence greater than $\frac{9}{10}$?

- (1) $k > 10$
- (2) $k < 19$

287. In the sequence S of numbers, each term after the first two terms is the sum of the two immediately preceding terms. What is the 5th term of S ?
- (1) The 6th term of S minus the 4th term equals 5.
 - (2) The 6th term of S plus the 7th term equals 21.
288. If 75 percent of the guests at a certain banquet ordered dessert, what percent of the guests ordered coffee?
- (1) 60 percent of the guests who ordered dessert also ordered coffee.
 - (2) 90 percent of the guests who ordered coffee also ordered dessert.
289. A tank containing water started to leak. Did the tank contain more than 30 gallons of water when it started to leak? (Note: 1 gallon = 128 ounces)
- (1) The water leaked from the tank at a constant rate of 6.4 ounces per minute.
 - (2) The tank became empty less than 12 hours after it started to leak.
290. In the xy -plane, lines k and ℓ intersect at the point $(1,1)$. Is the y -intercept of k greater than the y -intercept of ℓ ?
- (1) The slope of k is less than the slope of ℓ .
 - (2) The slope of ℓ is positive.
291. A triangle has side lengths of a , b , and c centimeters. Does each angle in the triangle measure less than 90 degrees?
- (1) The 3 semicircles whose diameters are the sides of the triangle have areas that are equal to 3 cm^2 , 4 cm^2 , and 6 cm^2 , respectively.
 - (2) $c < a + b < c + 2$
292. Each of the 45 books on a shelf is written either in English or in Spanish, and each of the books is either a hardcover book or a paperback. If a book is to be selected at random from the books on the shelf, is the probability less than $\frac{1}{2}$ that the book selected will be a paperback written in Spanish?
- (1) Of the books on the shelf, 30 are paperbacks.
 - (2) Of the books on the shelf, 15 are written in Spanish.
293. A small school has three foreign language classes, one in French, one in Spanish, and one in German. How many of the 34 students enrolled in the Spanish class are also enrolled in the French class?
- (1) There are 27 students enrolled in the French class, and 49 students enrolled in either the French class, the Spanish class, or both of these classes.
 - (2) One-half of the students enrolled in the Spanish class are enrolled in more than one foreign language class.
294. If S is a set of four numbers w , x , y , and z , is the range of the numbers in S greater than 2?
- (1) $w - z > 2$
 - (2) z is the least number in S .
295. Last year $\frac{3}{5}$ of the members of a certain club were males. This year the members of the club include all the members from last year plus some new members. Is the fraction of the members of the club who are males greater this year than last year?
- (1) More than half of the new members are male.
 - (2) The number of members of the club this year is $\frac{6}{5}$ the number of members last year.
296. If a , b , and c are consecutive integers and $0 < a < b < c$, is the product abc a multiple of 8?
- (1) The product ac is even.
 - (2) The product bc is a multiple of 4.
297. M and N are integers such that $6 < M < N$. What is the value of N ?
- (1) The greatest common divisor of M and N is 6.
 - (2) The least common multiple of M and N is 36.

298. Stations X and Y are connected by two separate, straight, parallel rail lines that are 250 miles long. Train P and train Q simultaneously left Station X and Station Y, respectively, and each train traveled to the other's point of departure. The two trains passed each other after traveling for 2 hours. When the two trains passed, which train was nearer to its destination?

- (1) At the time when the two trains passed, train P had averaged a speed of 70 miles per hour.
- (2) Train Q averaged a speed of 55 miles per hour for the entire trip.



299. In the xy -plane shown, the shaded region consists of all points that lie above the graph of $y = x^2 - 4x$ and below the x -axis. Does the point (a,b) (not shown) lie in the shaded region if $b < 0$?

- (1) $0 < a < 4$
- (2) $a^2 - 4a < b$

300. If a and b are positive integers, is $\sqrt[3]{ab}$ an integer?

- (1) \sqrt{a} is an integer.
- (2) $b = \sqrt{a}$