

## 4.1 Test-Taking Strategies

**1. Pace yourself.**

Consult the on-screen timer periodically. Work as carefully as possible, but do not spend valuable time checking answers or pondering problems that you find difficult.

**2. Use the erasable notepad provided.**

Working a problem out may help you avoid errors in solving the problem. If diagrams or figures are not presented, it may help if you draw your own.

**3. Read each question carefully to determine what is being asked.**

For word problems, take one step at a time, reading each sentence carefully and translating the information into equations or other useful mathematical representations.

**4. Scan the answer choices before attempting to answer a question.**

Scanning the answers can prevent you from putting answers in a form that is not given (e.g., finding the answer in decimal form, such as 0.25, when the choices are given in fractional form, such as  $\frac{1}{4}$ ). Also, if the question requires approximations, a shortcut could serve well (e.g., you may be able to approximate 48 percent of a number by using half).

**5. Don't waste time trying to solve a problem that is too difficult for you.**

Make your best guess and move on to the next question.

## 4.2 The Directions

These directions are very similar to those you will see for problem solving questions when you take the GMAT exam. If you read them carefully and understand them clearly before sitting for the GMAT exam, you will not need to spend too much time reviewing them once the test begins.

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.

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## 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. 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
14. If  $\frac{x}{4}$  is 2 more than  $\frac{x}{8}$ , then  $x =$
- (A) 4  
 (B) 8  
 (C) 16  
 (D) 32  
 (E) 64
15. 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)  $24 + x$

16. 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%

17. 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

18. For what value of  $x$  between  $-4$  and  $4$ , inclusive, is the value of  $x^2 - 10x + 16$  the greatest?

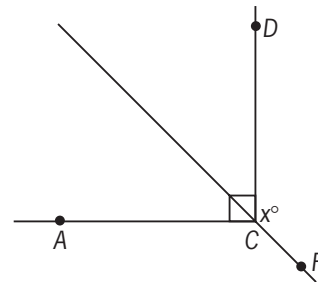
- (A)  $-4$
- (B)  $-2$
- (C)  $0$
- (D)  $2$
- (E)  $4$

19. 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)  $\frac{7}{4}$

20. 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



21. In the figure above, if  $F$  is a point on the line that bisects angle  $ACD$  and the measure of angle  $DCF$  is  $x^\circ$ , which of the following is true of  $x$ ?

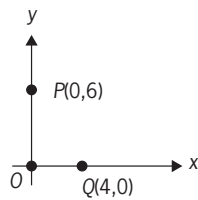
- (A)  $90 \leq x < 100$
- (B)  $100 \leq x < 110$
- (C)  $110 \leq x < 120$
- (D)  $120 \leq x < 130$
- (E)  $130 \leq x < 140$

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

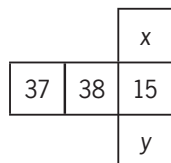
- I.  $3$  and  $\frac{1}{3}$
- II.  $\frac{1}{17}$  and  $-\frac{1}{17}$
- III.  $\sqrt{3}$  and  $\frac{\sqrt{3}}{3}$

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

23. 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



24. 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)
25. 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
26. 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%
27. 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%
28. 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



29. In the figure above, the sum of the three numbers in the horizontal row equals the product of the three numbers in the vertical column. What is the value of  $xy$ ?

- (A) 6
- (B) 15
- (C) 35
- (D) 75
- (E) 90

30.  $(1 + \sqrt{5})(1 - \sqrt{5}) =$

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

31. 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)  $(10^4)^6$

32. If the perimeter of a rectangular garden plot is 34 feet and its area is 60 square feet, what is the length of each of the longer sides?

- (A) 5 ft
- (B) 6 ft
- (C) 10 ft
- (D) 12 ft
- (E) 15 ft

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

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

34. 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

35. If positive integers  $x$  and  $y$  are not both odd, which of the following must be even?

- (A)  $xy$
- (B)  $x + y$
- (C)  $x - y$
- (D)  $x + y - 1$
- (E)  $2(x + y) - 1$

36. 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)  $15^\circ$
- (B)  $36^\circ$
- (C)  $54^\circ$
- (D)  $90^\circ$
- (E)  $150^\circ$

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

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

38. 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)  $3(x-y)$

39. The organizers of a fair projected a 25 percent increase in attendance this year over that of last year, but attendance this year actually decreased by 20 percent. What percent of the projected attendance was the actual attendance?

- (A) 45%  
 (B) 56%  
 (C) 64%  
 (D) 75%  
 (E) 80%

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

$$2x + 2y = -4$$

$$4x + y = 1$$

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. What is the maximum number of  $1\frac{1}{4}$  foot pieces of wire that can be cut from a wire that is 24 feet long?

- (A) 11  
 (B) 18  
 (C) 19  
 (D) 20  
 (E) 30

43. If the numbers  $\frac{17}{24}$ ,  $\frac{1}{2}$ ,  $\frac{3}{8}$ ,  $\frac{3}{4}$ , and  $\frac{9}{16}$  were ordered from greatest to least, the middle number of the resulting sequence would be

- (A)  $\frac{17}{24}$   
 (B)  $\frac{1}{2}$   
 (C)  $\frac{3}{8}$   
 (D)  $\frac{3}{4}$   
 (E)  $\frac{9}{16}$

44. 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?

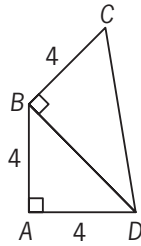
- (A) \$7.00  
 (B) \$14.00  
 (C) \$18.00  
 (D) \$22.00  
 (E) \$31.50



45. Last year if 97 percent of the revenues of a company came from domestic sources and the remaining revenues, totaling \$450,000, came from foreign sources, what was the total of the company's revenues?
- (A) \$1,350,000  
 (B) \$1,500,000  
 (C) \$4,500,000  
 (D) \$15,000,000  
 (E) \$150,000,000
46.  $\frac{2+2\sqrt{6}}{2} =$
- (A)  $\sqrt{6}$   
 (B)  $2\sqrt{6}$   
 (C)  $1+\sqrt{6}$   
 (D)  $1+2\sqrt{6}$   
 (E)  $2+\sqrt{6}$
47. 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
48. Craig sells major appliances. For each appliance he sells, Craig receives a commission of \$50 plus 10 percent of the selling price. During one particular week Craig sold 6 appliances for selling prices totaling \$3,620. What was the total of Craig's commissions for that week?
- (A) \$412  
 (B) \$526  
 (C) \$585  
 (D) \$605  
 (E) \$662
49. 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
50.  $\frac{31}{125} =$
- (A) 0.248  
 (B) 0.252  
 (C) 0.284  
 (D) 0.312  
 (E) 0.320
51. Members of a social club met to address 280 newsletters. If they addressed  $\frac{1}{4}$  of the newsletters during the first hour and  $\frac{2}{5}$  of the remaining newsletters during the second hour, how many newsletters did they address during the second hour?
- (A) 28  
 (B) 42  
 (C) 63  
 (D) 84  
 (E) 112
52. 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

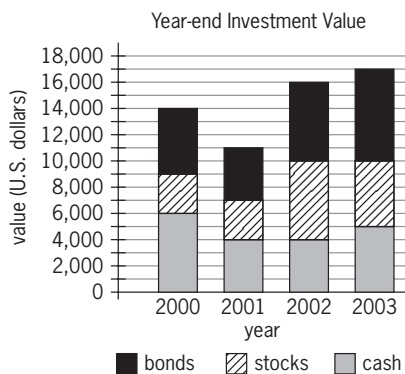
53. If  $a$  and  $b$  are positive integers and  $(2^a)^b = 2^3$ , what is the value of  $2^a 2^b$ ?
- (A) 6  
(B) 8  
(C) 16  
(D) 32  
(E) 64
54.  $\frac{1}{3 - \frac{1}{3 - \frac{1}{3 - 1}}} =$
- (A)  $\frac{7}{23}$   
(B)  $\frac{5}{13}$   
(C)  $\frac{2}{3}$   
(D)  $\frac{23}{7}$   
(E)  $\frac{13}{5}$
55. 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
56. 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
57. The sum of three integers is 40. The largest integer is 3 times the middle integer, and the smallest integer is 23 less than the largest integer. What is the product of the three integers?
- (A) 1,104  
(B) 972  
(C) 672  
(D) 294  
(E) 192
58. 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)  $0.0153$
59. 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

60. 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
61. 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
62. 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
63. 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%
64. 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)  $1\frac{1}{4}$
65. When positive integer  $n$  is divided by 5, the remainder is 1. When  $n$  is divided by 7, the remainder is 3. What is the smallest positive integer  $k$  such that  $k + n$  is a multiple of 35?
- (A) 3  
(B) 4  
(C) 12  
(D) 32  
(E) 35
66. 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



67. 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)  $16\sqrt{2}$
68. 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
69. 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
70. 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
71.  $\frac{(39,897)(0.0096)}{198.76}$  is approximately
- (A) 0.02  
 (B) 0.2  
 (C) 2  
 (D) 20  
 (E) 200
72. 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)  $2n^2$
73. 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

74. 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
75. 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



76. 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

77. 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
78. 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
79. 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
80. 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

81. 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)  $\frac{1}{4}$

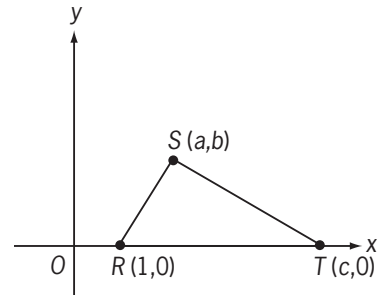
82. Three business partners, Q, R, and S, agree to divide their total profit for a certain year in the ratios 2:5:8, respectively. If Q's share was \$4,000, what was the total profit of the business partners for the year?

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

83. 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



84. 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)  $\frac{c(a-1)}{2}$

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

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

86. What is the largest integer  $n$  such that  $\frac{1}{2^n} > 0.01$ ?

- (A) 5  
 (B) 6  
 (C) 7  
 (D) 10  
 (E) 51

87. 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

88. 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)  $t - \frac{3}{2}$
89. 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
90. 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)  $x^3 = w^3$
91. 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)  $y = \frac{1}{2}x + 5$
92. 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
93.  $\left(\frac{1}{5}\right)^2 - \left(\frac{1}{5}\right)\left(\frac{1}{4}\right) =$
- (A)  $-\frac{1}{20}$   
 (B)  $-\frac{1}{100}$   
 (C)  $\frac{1}{100}$   
 (D)  $\frac{1}{20}$   
 (E)  $\frac{1}{5}$
94. 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

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

95. 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

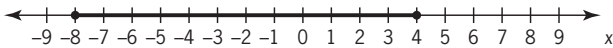
$$\begin{array}{l} 3r \leq 4s + 5 \\ |s| \leq 5 \end{array}$$

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

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

97. 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



98. 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)  $|x + 2| \leq 6$

99. 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)  $\frac{2}{5}$

100. 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

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

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

102. René earns \$8.50 per hour on days other than Sundays and twice that rate on Sundays. Last week she worked a total of 40 hours, including 8 hours on Sunday. What were her earnings for the week?

- (A) \$272  
(B) \$340  
(C) \$398  
(D) \$408  
(E) \$476



103. In a shipment of 120 machine parts, 5 percent were defective. In a shipment of 80 machine parts, 10 percent were defective. For the two shipments combined, what percent of the machine parts were defective?
- (A) 6.5%  
 (B) 7.0%  
 (C) 7.5%  
 (D) 8.0%  
 (E) 8.5%
104. Of the following, the closest approximation to  $\sqrt{\frac{5.98(601.5)}{15.79}}$  is
- (A) 5  
 (B) 15  
 (C) 20  
 (D) 25  
 (E) 225
105. Which of the following CANNOT be the greatest common divisor of two positive integers  $x$  and  $y$ ?
- (A) 1  
 (B)  $x$   
 (C)  $y$   
 (D)  $x - y$   
 (E)  $x + y$
106. Last year Carlos saved 10 percent of his annual earnings. This year he earned 5 percent more than last year and he saved 12 percent of his annual earnings. The amount saved this year was what percent of the amount saved last year?
- (A) 122%  
 (B) 124%  
 (C) 126%  
 (D) 128%  
 (E) 130%
107. A corporation that had \$115.19 billion in profits for the year paid out \$230.10 million in employee benefits. Approximately what percent of the profits were the employee benefits? (Note: 1 billion =  $10^9$ )
- (A) 50%  
 (B) 20%  
 (C) 5%  
 (D) 2%  
 (E) 0.2%
108. 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
109. 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
110. On the number line, if  $r < s$ , if  $p$  is halfway between  $r$  and  $s$ , and if  $t$  is halfway between  $p$  and  $r$ , then  $\frac{s-t}{t-r} =$
- (A)  $\frac{1}{4}$   
 (B)  $\frac{1}{3}$   
 (C)  $\frac{4}{3}$   
 (D) 3  
 (E) 4

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. A certain clock marks every hour by striking a number of times equal to the hour, and the time required for a stroke is exactly equal to the time interval between strokes. At 6:00 the time lapse between the beginning of the first stroke and the end of the last stroke is 22 seconds. At 12:00, how many seconds elapse between the beginning of the first stroke and the end of the last stroke?
- (A) 72  
 (B) 50  
 (C) 48  
 (D) 46  
 (E) 44
114. 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)  $\frac{100}{x} + \frac{100}{y}$
115. 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
116. 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)  $(3,5)$
117. 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
118. Salesperson A's compensation for any week is \$360 plus 6 percent of the portion of A's total sales above \$1,000 for that week. Salesperson B's compensation for any week is 8 percent of B's total sales for that week. For what amount of total weekly sales would both salespeople earn the same compensation?
- (A) \$21,000  
 (B) \$18,000  
 (C) \$15,000  
 (D) \$4,500  
 (E) \$4,000

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

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

120. 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)  $\frac{x + ny}{n + 1}$

121. If  $xy > 0$  and  $yz < 0$  which of the following must be negative?

- (A)  $xyz$
- (B)  $xyz^2$
- (C)  $xy^2z$
- (D)  $xy^2z^2$
- (E)  $x^2y^2z^2$

122. 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)  $3n$

123. 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)  $-2.89$

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

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

125. 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

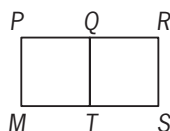
126. David used part of \$100,000 to purchase a house. Of the remaining portion, he invested  $\frac{1}{3}$  of it at 4 percent simple annual interest and  $\frac{2}{3}$  of it at 6 percent simple annual interest. If after a year the income from the two investments totaled \$320, what was the purchase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

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

127. 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)  $\frac{3x}{80}$
128. If  $x$  is an integer and  $y = 3x + 2$ , which of the following CANNOT be a divisor of  $y$ ?
- (A) 4  
(B) 5  
(C) 6  
(D) 7  
(E) 8
129. As a salesperson, Phyllis can choose one of two methods of annual payment: either an annual salary of \$35,000 with no commission or an annual salary of \$10,000 plus a 20 percent commission on her total annual sales. What must her total annual sales be to give her the same annual pay with either method?
- (A) \$100,000  
(B) \$120,000  
(C) \$125,000  
(D) \$130,000  
(E) \$132,000
130. 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)  $\frac{4}{5}$
131. Working alone, Printers X, Y, and Z can do a certain printing job, consisting of a large number of pages, in 12, 15, and 18 hours, respectively. What is the ratio of the time it takes Printer X to do the job, working alone at its rate, to the time it takes Printers Y and Z to do the job, working together at their individual rates?
- (A)  $\frac{4}{11}$   
(B)  $\frac{1}{2}$   
(C)  $\frac{15}{22}$   
(D)  $\frac{22}{15}$   
(E)  $\frac{11}{4}$
132. 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

133. 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.

134. 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

135. 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)  $1\frac{1}{2}$

136. 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)  $10^{10}$

137. 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?

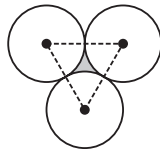
- (A) 11%
- (B) 25%
- (C) 44%
- (D) 56%
- (E) 125%

138. A driver completed the first 20 miles of a 40-mile trip at an average speed of 50 miles per hour. At what average speed must the driver complete the remaining 20 miles to achieve an average speed of 60 miles per hour for the entire 40-mile trip? (Assume that the driver did not make any stops during the 40-mile trip.)

- (A) 65 mph
- (B) 68 mph
- (C) 70 mph
- (D) 75 mph
- (E) 80 mph

139. 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)  $\frac{S}{2} + 2$



140. 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

141. 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

142. 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?

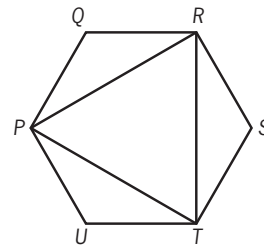
- (A) 72  
 (B) 74  
 (C) 75  
 (D) 78  
 (E) 80

143. 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

144. 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



145. In the figure shown,  $PQRSTU$  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)  $4x\sqrt{3}$

146. 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?

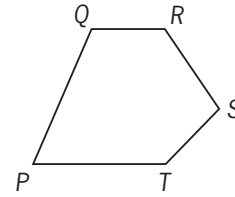
- (A)  $33\frac{1}{3}\%$
- (B) 40%
- (C) 50%
- (D) 60%
- (E)  $66\frac{2}{3}\%$

147. 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

148. 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.

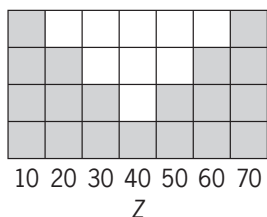
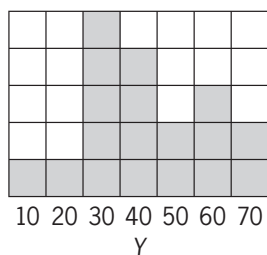
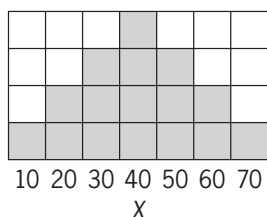
149. In pentagon  $PQRST$ ,  $PQ = 3$ ,  $QR = 2$ ,  $RS = 4$ , and  $ST = 5$ . Which of the lengths 5, 10, and 15 could be the value of  $PT$ ?

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

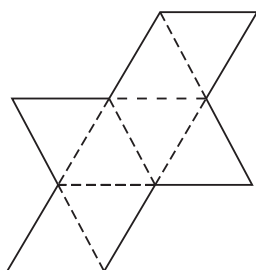
3,  $k$ , 2, 8,  $m$ , 3

150. 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



151. 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  $Z$



152. 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

$$2x + y = 12$$

$$|y| \leq 12$$

153. 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
154. 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
155. 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
156. 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%



157. 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
158. 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
159. 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
160. 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)  $\frac{5}{6}$
161. 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  
(D) 20  
(E) 80
162. 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
163. 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
164. 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