

## SECTION 1

Time—25 Minutes

16 Questions

**Directions:** In this section solve each problem, using any available space on the page for scratchwork. Then indicate the best of the answer choices given.

**Numbers:** All numbers used are real numbers.

**Figures:** Figures that accompany problems in this section are intended to provide information useful in solving the problems. They are drawn as accurately as possible EXCEPT when it is stated in a specific problem that its figure is not drawn to scale. All figures lie in a plane unless otherwise indicated.

1. A study based on a random sample revealed that, on average, 2 out of 5 adults have high blood pressure. If these results hold true for the 580,000 adults in *City A*, approximately how many adults in *City A* have high blood pressure?  
(A) 116,000  
(B) 145,000  
(C) 232,000  
(D) 250,000  
(E) 290,000
2. The sum  $\frac{7}{8} + \frac{1}{9}$  is between  
(A)  $\frac{1}{2}$  and  $\frac{3}{4}$   
(B)  $\frac{3}{4}$  and 1  
(C) 1 and  $1\frac{1}{4}$   
(D)  $1\frac{1}{4}$  and  $1\frac{1}{2}$   
(E)  $1\frac{1}{2}$  and 2
3. A certain state legislature consists of 124 members, each of whom is either a Democrat or a Republican. If there are 18 more Republicans than Democrats, how many Republicans are in the legislature?  
(A) 44  
(B) 53  
(C) 71  
(D) 80  
(E) 106
4. A certain psychologist charges \$30 more for the first hour of therapy than for each additional hour. If the total charge to a patient who receives 6 hours of therapy is \$300, what is the total charge to a patient who receives only 3 hours of therapy?  
(A) \$120  
(B) \$135  
(C) \$150  
(D) \$165  
(E) \$192
5. If  $x + y = 1$  and  $x - y = -1$ , what is the value of  $xy$ ?  
(A) -2  
(B) -1  
(C) 0  
(D) 1  
(E) 2
6. NOT SCORED
7. If  $(x^2 + 6x + 9) + 6(x + 3) + 9 = 0$ , then  $x =$   
(A) -6  
(B) -3  
(C) 0  
(D) 3  
(E) 6

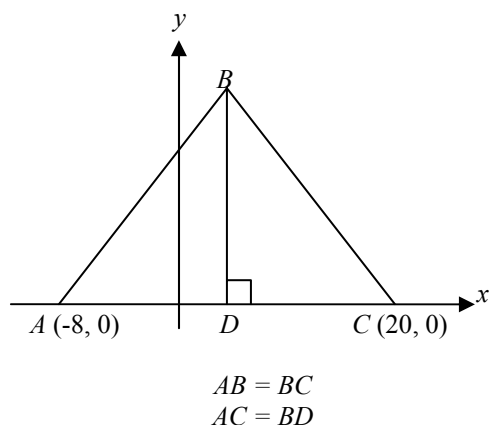
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8. In 1982 and 1983, Company  $B$ 's operating expenses were \$12.0 million and \$14.0 million, respectively, and its revenues were \$15.6 million and \$18.8 million, respectively. What was the percent increase in Company  $B$ 's Profit (revenues minus operating expenses) from 1982 to 1983?

- (A) 3%  
 (B)  $16\frac{2}{3}\%$   
 (C) 25%  
 (D)  $33\frac{1}{3}\%$   
 (E) 60%

9. If  $a$  and  $b$  are integers and  $b \neq 0$ , which of the following CANNOT equal 0?

- (A)  $ab$   
 (B)  $a - b$   
 (C)  $a + b$   
 (D)  $ab - b^2$   
 (E)  $a^2 + b^2$



10. What are the coordinates of point  $B$  in the  $xy$ -plane above?

- (A) (6, 12)  
 (B) (6, 28)  
 (C) (8, 20)  
 (D) (12, 20)  
 (E) (14, 28)

11. Last year 31 percent of Ace Book Company's sales revenue came from the sale of novels. Of the remaining revenue,  $\frac{1}{3}$  was from the sale of biographies. The company's revenue from the sale of novels was approximately how many times its revenue from the sale of biographies?

- (A) 1.3  
 (B) 1.5  
 (C) 2.1  
 (D) 2.5  
 (E) 3.1

12. Three musical notes have frequencies  $x$ ,  $y$ , and  $z$ , respectively. If  $x$ ,  $y$ , and  $z$  are positive,  $\frac{x}{y} = \frac{y}{z}$ , and  $2x = z$ , what is  $y$  in terms of  $x$ ?

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

#### LEAGUE RESULTS

Team	Number of Games Won
$A$	4
$B$	7
$C$	9
$D$	2
$E$	2
$X$	

13. According to the incomplete table above, if each of the 6 teams in the league played each of the other teams exactly twice and there were no ties, how many games did team  $X$  win? (Only 2 teams play in a game.)

- (A) 4  
 (B) 5  
 (C) 6  
 (D) 8  
 (E) 10

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14. When the integer  $k$  is divided by 12, the remainder is 3. Which of the following, when divided by 12, will have a remainder of 6?

I.  $2k$   
II.  $6k$   
III.  $4k + 6$

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

15. A rectangular tabletop consists of a piece of laminated wood bordered by a thin metal strip along its four edges. The surface area of the tabletop is  $x$  square feet, and the total length of the strip before it was attached was  $x$  feet. If the tabletop is 3 feet wide, what is its approximate length, in feet?

- (A) 12  
(B) 10  
(C) 9  
(D) 8  
(E) 6

16. For all real numbers  $v$ , the operation  $v^*$  is defined by the equation  $v^* = v - \frac{v}{3}$ . If  $(v^*)^* = 8$ ,

then  $v =$

- (A) 15  
(B) 18  
(C) 21  
(D) 24  
(E) 27

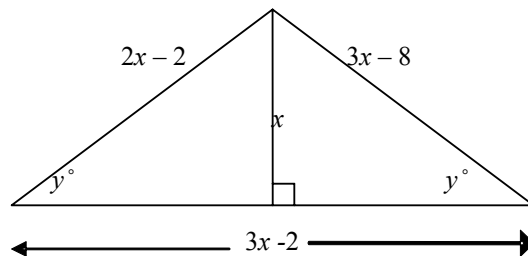
## STOP

IF YOU FINISH BEFORE TIME IS CALLED, YOU MAY CHECK YOUR WORK ON THIS SECTION ONLY.

DO NOT TURN TO ANY OTHER SECTION IN THE TEST.



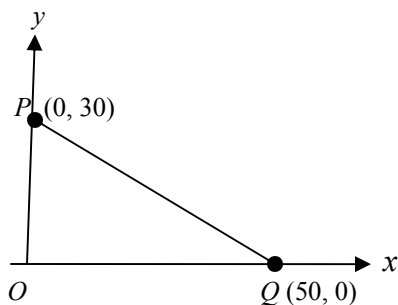
6. In the first hour of a two-hour trip, a car traveled  $d$  kilometers, and in the second hour of the trip, the car traveled one-half that distance. What is the average rate at which the car traveled during the trip, in kilometers per hour?
- (A)  $d$   
 (B)  $\frac{1}{3}d$   
 (C)  $\frac{1}{2}d$   
 (D)  $\frac{3}{4}d$   
 (E)  $\frac{3}{2}d$
7. Jaime earned enough money by selling seashells at 25 cents each to buy several used paperback books at 55 cents each. If he spent all of the money he earned selling seashells to buy the books, what is the least number of seashells he could have sold?
- (A) 5  
 (B) 11  
 (C) 17  
 (D) 25  
 (E) 30
8. In a certain sequence, the first term is 1, and each successive term is 1 more than the reciprocal of the term that immediately proceeds it. What is the fifth term of the sequence?
- (A)  $\frac{3}{5}$   
 (B)  $\frac{5}{8}$   
 (C)  $\frac{8}{5}$   
 (D)  $\frac{5}{3}$   
 (E)  $\frac{9}{2}$
9. A wildlife preserve is being planned for 3,000 rhinoceroses. The preserve is to contain a total of 10,000 acres of watering area, plus 100 acres of grazing area for each rhinoceros. If the number of rhinoceroses is expected to increase by 10 percent, how many thousand acres should the preserve have in order to provide for the increased population?
- (A) 340  
 (B) 330  
 (C) 320  
 (D) 310  
 (E) 300
10. For the positive numbers,  $n$ ,  $n + 1$ ,  $n + 2$ ,  $n + 4$ , and  $n + 8$ , the mean is how much greater the median?
- (A) 0  
 (B) 1  
 (C)  $n + 1$   
 (D)  $n + 2$   
 (E)  $n + 3$



11. The figure above shows the dimensions of an isosceles triangle in terms of  $x$ . What is the area of the triangle?
- (A) 24  
 (B) 30  
 (C) 48  
 (D) 60  
 (E) 96

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12. In a certain animal population, for each of the first 3 months of life, the probability that an animal will die during that month is  $\frac{1}{10}$ . For a group of 200 newborn members of the population, approximately how many would be expected to survive the first 3 months of life?
- (A) 140  
(B) 146  
(C) 152  
(D) 162  
(E) 170



13. In the figure above, how many of the points on line segment  $PQ$  have coordinates that are both integers?
- (A) 5  
(B) 8  
(C) 10  
(D) 11  
(E) 20
14. What is the least number of digits (including repetitions) needed to express  $10^{100}$  in decimal notation?
- (A) 4  
(B) 100  
(C) 101  
(D) 1,000  
(E) 1,001

15. A group of 12 people plan to rent a van and agree to share equally the total cost of the rental, which is  $E$  dollars. If  $n$  of the people decide not to participate at the last minute, by how many dollars will each remaining person's share of the total cost increase?
- (A)  $\frac{E}{12-n}$   
(B)  $\frac{12-n}{E}$   
(C)  $\frac{E}{12(12-n)}$   
(D)  $\frac{nE}{12(12-n)}$   
(E)  $\frac{(12-n)E}{12n}$

16. The concentration of a certain chemical in a full water tank depends on the depth of the water. At a depth that is  $x$  feet below the top of the tank, the concentration is  $3 + \frac{4}{\sqrt{5-x}}$  parts per million, where  $0 < x < 4$ . To the nearest 0.1 foot, at what depth is the concentration equal to 6 parts per million?
- (A) 2.4 ft  
(B) 2.5 ft  
(C) 2.8 ft  
(D) 3.0 ft  
(E) 3.2 ft

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## ANSWER KEY – Test Code 52

Section 1	Section 2	Section 4	Section 5	Section 6	Section 7
1. C	1. B	1. D	1. E	1. B	1. D
2. B	2. A	2. D	2. B	2. E	2. D
3. C	3. A	3. C	3. E	3. A	3. B
4. D	4. E	4. E	4. D	4. D	4. A
5. C	5. C	5. A	5. A	5. A	5. A
6. Not Scored	6. B	6. C	6. D	6. D	6. E
7. A	7. D	7. E	7. A	7. B	7. B
8. D	8. B	8. A	8. A	8. C	8. A
9. E	9. D	9. A	9. D	9. A	9. D
10. B	10. D	10. B	10. A	10. B	10. C
11. A	11. C	11. B	11. E	11. C	11. E
12. B	12. A	12. C	12. B	12. B	12. E
13. C	13. B	13. A	13. C	13. D	13. D
14. E	14. C	14. E	14. D	14. C	14. E
15. E	15. A	15. B	15. B	15. D	15. E
16. B	16. D	16. E	16. A	16. E	16. C
	17. E	17. E			17. A
	18. B	18. D			18. A
		19. B			19. E
		20. A			20. A
					21. A
					22. E