! **Time - 120 minutes**

Rules: For each problem from 1 to 60 you receive1 point and there is only one correct answer.

Organizing committee wishes a successful work!

Name……………………………………………School ……………….. City……………

1. Which of the following is the simplified form of x-[2x-(3-x)]?

(A) x   (B) 3   (C) 3-2x   (D) 2x-3   (E) 4x+3

2. If a-b > 0, which of the following must equal |a-b|?

I. a-b   II. -(a-b)   III. |b-a|

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

3. $\sqrt{\dfrac{2}{3}}\sqrt{\dfrac{15}{4}} =$

(A) $\sqrt{\dfrac{30}{6}}$ (B) $\sqrt{\dfrac{10}{2}}$ (C) $\sqrt{30}$ (D) $\sqrt{5}$ (E) $\sqrt{\dfrac{10}{3}}$

4. If x-y=0, then each of the following is equal to xy EXCEPT

(A) yx (B) $-y^2$ (C) (-x)(-y)   (D) x^2 (E) y^2 (E) y^2

5. If x<-x, then

(A) x>0   (B) x<0   (C) x=0   (D) 1/x>0   (E) $x^2<0$

6. The first and last terms of a perfect square trinomial are $36x^2$ and $4y^2z^2$. Which of the following could be the middle term?

(A) 24xyz   (B) 2xyz   (C) $12x^2y^2z^2$ (D) 12xyz   (E) $24x^2y^2z^2$

7. If $x=-\dfrac{1}{4}$, then $4\big[(x+4)(4x-1)\big]=$

A) -120   B) 0   C)30   D) -15   E) -30

8. If x-2y-z=2, x-y+2z=9 and 2x+y+z=3, then z=

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

9. Which of the following is reciprocal of $\dfrac{a}{b}+\dfrac{b}{a}$?

(A) $\dfrac{ab}{a+b}$ (B) $\dfrac{b}{a}+\dfrac{a}{b}$ (C) $\dfrac{1}{a^2+b^2}$ (D) $ab^{-1}+ba^{-1}$ (E) $\dfrac{ab}{a^2+b^2}$

10. Which of the following can never be zero, if x is a real number?

(A) x^2-1 (B) $|x|$ (C) x/4   (D) x^3+1 (E) $2x^2+2$

11. If the diagonal of a square is 20, the length of side is

(A) 21.21   (B) 1.41   (C) 7.07   (D) 14.14   (E) 28.28

12. If $f(x)=3x^2+kx-2$, then k=   (A) 1   (B) 2   (C) 3   (D) 4   (E) 5

13. Which of the following is the completely factored form of $5x^4$-20 in the real number system?

(A) $5(x^4-4)$ (B)$5(x^2-2)(x^2+2)$ (C) $(x^2-2)(5x+10)$ (D) $5(x-\sqrt{2})(x+\sqrt{2})(x^2+2)$ (E) $(x-\sqrt{2})(x+\sqrt{2})(5x+10)$

14. If the sides of a right triangle have lengths of x-7, x, and x+1, then x=

(A) {1, 7}   (B) {7, -1}   (C) {7, 4}   (D) {7, 12}   (E) {4, 12}

15. Which of the following must be true for all real numbers x, y and z?

I. x(y+z)=xy+xz   II. x(y+z)=x(z+y)   III.x(y+z)=(y+z)x

(A) I and II only   (B) I and III only   (C) II and III only   (D) I, II and III   (E) None

16. If $\dfrac{3}{a-1}=1+\dfrac{2}{a+1}$ then a=

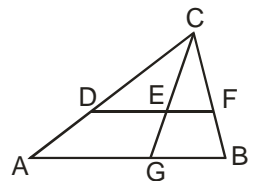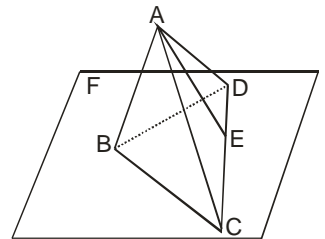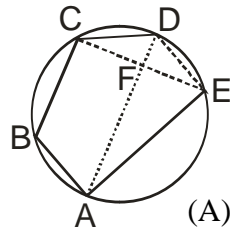(A) {1, -1}   (B) {-1/5, 1, -1}   (C) {-1/5}   (D) {-5}   (E) {-1/5, 0}

17. What is greatest integer x for which -6x-1>12?

(A) -2 (B) -3 (C) 3 (D) 2 (E) -1
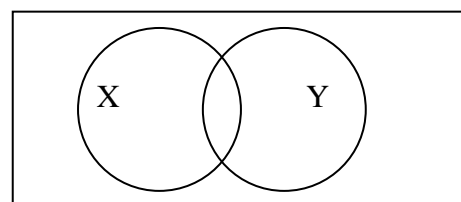
18. The sum of two numbers is 21, and the difference of their squares is 63. The numbers are

(A) {10, 11}   (B) {8, 13}   (C) {9, 12}   (D) {14, 7}   (E) {6, 15}

19. If (a+1)(2-a)<0, then
(A) -2<a<1   (B) a<-2 or a>1   (C) a<-2 or a<1   (D) -1<a<2   (E) a>2 or a<-1

20. If a student's first two test grades are 100 and 91, what grade must she make on her third test for the average of the three to be 90?
(A) 79 (B) 78 (C) 77 (D) 76 (E) 75

21. The volume of Cube A is thee times the volume of Cube B. If the sum of the areas of a of the faces of Cube B is 18, then the volume of Cube A is
(A) $\sqrt{3}$ (B) 3   (C) $3\sqrt{3}$ (D) 9   (E) $9\sqrt{3}$

22. If f(x)=x^2+3x-4, then f(x+1)=
(A) x^2+3x-3   (B) x(x+5)   (C) x^2+5x-3   (D) x^2+5x-1   E) 3x+1

23. The ratio of the length of a rectangle to its width is 5 to 4. If the perimeter of the rectangle is 36, the length is
(A) 10 (B) 3   (C) 4   (D) 5   (E) 6

24. If P=(4, 1), O=(0, 0) and Q=(0, -2), then sin∠POQ=
(A) 0.75   (B) -0.8   (C) -0.75   (D) 0.8 (E) 0.97

25. Each of the following is a term in is a term in the product of $x^2 - x + 2$ and $x^2 + x + 1$ EXEPT
A) x^4 B) x^3 C) $2x^2$ D) x   E) 2

26. Which of the following is equal to tanθ+cotθ?
(A) $\dfrac{1}{\cot\theta + \tan\theta}$ (B) $\dfrac{\sin\theta + \cos\theta}{(\sin\theta)(\cos\theta)}$ (C) $\tan^2\theta$+1   (D) (sinθ)(cosθ)   (E) $\sec^2\theta$

27. In Figure BC‖AD, CE⊥AD, CF=FE, AF=8, FD=2, BC=6. The area of pentagon ABCD is
24   (B) 30   (C) 36   (D) 52   (E) 60

28. Which of the following is a equation with roots -3/4 and 1/2?
(A) $8x^2$+5x-3=0   (B) $8x^2$-5x-3=0   (C) $8x^2$+5x+3=0   (D) $8x^2$-2x-3=0   (E) $8x^2$+2x-3=0

29. What is the increase in volume V of a rectangular box if its width is doubled, its length is tripled, and its height quadrupled?
(A) 24V   (B) 8V   (C) 9V   (D) 16V   (E) 12V

30. If f(x)=4^{-x}, then f(a/2)=
(A) 2   (B) 1   (C) $2^{1/a}$ (D) $1/2^a$ (E) 2^a

31. ∆BCD in Figure is equilateral with BC=4. AE is perpendicular to plane F. AE=4. The volume of the pyramid is
(A) 48   (B) 5.33   (C) 27.71   (D) 16   (E) 9.24

32. If 6a-2, 3a and a+2 are in arithmetic progression, then a=
(A) 0   (B) 1   (C) 2   (D) 3   (E) 4

33. Each of the following sets of lines will determine a plane EXCEPT
(A) a pair of parallel lines   (B) a pair of perpendicular lines   (C) two lines perpendicular to the same plane   (D) any two nonintersecting lines   (E) any two intersecting lines

34. What is the range of function defined by y= |x|/x?
(A) y>0   (B) {1, -1}   (C) y<0   (D) All real numbers except zero   (E) No real numbers

35. If the sum of the measures of the angle of a polygon is 1440, how many sides does the polygon have?
(A) 14   (B) 8   (C) 12   (D) 10   (E) 16

36. Which of the following has the greatest y-intercept?
(A) x+2y=3   (B) 2x+3y=4   (C) 3x+4y=5   (D) 4x+5y=6   (E) 5x+6y=7

37. In figure, DF‖AB, BC⊥AB, BC=5, BG=4, BA=12, DA=3, CE=
(A) 5.44   (B) 0.54   (C) 1.09   (D) 0.42   (E) 4.93

38. The axis of symmetry of y=$-3x^2$+12x-9 is
(A) x=3   (B) x=-3   (C) x=6   (D) x=-2   (E) x=2

39. If z=7-24i, then |z|=
(A) 5   (B) 17   (C) 31   (D) 168   (E) 25

40. The expression $\dfrac{a^{-1} - b^{-1}}{a^{-2} - b^{-2}}$=   (A) $\dfrac{b-a}{ab}$ (B) $\dfrac{b+a}{ab}$ (C) $\dfrac{ab}{b+a}$ (D) $\dfrac{a^2-b^2}{a-b}$ (E) a-b

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41. The radian measure of an angle of 16° is
(A) 0.889   (B) 50.27   (C) 0.2793   (D) 35.34   (E) 11.25

42. For what real value of x and y is the following true? $x-y+2i=6+(x+y)i$
(A) (4,-2)   (B) (1,2)   (C) (2,4)   (D) (3,1)   (E) (3,2)

43. If $x>0$ and $\log_{3x}27=1$, then $x=$
(A) 9   (B) -1/3   (C) -3   (D) 1/3   (E) 3

44. Which of the following is a point in the intersection of $x^2+y^2<4$ and $x-3y<-3$?
(A) (0,1)   (B) (1,-1)   (C) (1,0)   (D) (-1,1)   (E) (0,0)

45. If n is the number of any term, then the nth term of the geometric sequence $2\sqrt{2}$, 8, $16\sqrt{2}$, .. is
(A) $n\sqrt{2}$ (B) $(n\sqrt{2})^2$ (C) $(2\sqrt{2})^n$ (D) $(2\sqrt{2})^{n+1}$ (E) $(2\sqrt{2})^{n-1}$

46. In how many different ways can the letters of the word "WINDOW" be arranged?
(A) 720   (B) 360   (C) 180   (D) 90   (E) 45

47. Which of the following is a point of intersection of the graphs of $y=\frac{1}{2}\sin2x$ and $y=\frac{1}{2}$?

(A) $(45°,\frac{1}{2})$ (B) $(60°,\frac{1}{2})$ (C) $(90°,\frac{1}{2})$ (D) $(180°,\frac{1}{2})$ (E) $(360°,\frac{1}{2})$

48. The graph of $xy=0$ is
(A) a point   (B) a line   (C) a pair of intersecting lines (D) a pair of parallel lines   (E) a hyperbola

49. If 40 percent of a 20-gallon solution is alcohol, how many QUARTS of water must be added to make a new solution that is 25 percent alcohol?
(A) 60   (B) 48   (C) 36   (D) 24   (E) 12

50. If $y^2-9x^2=25$, then the maximum negative value of y is
(A) -25 (B) -1   (C) -5   (D) -5/3   (E) The maximum negative value cannot be determined

51. If a is positive and b negative, which of the following is negative?
(A) $|ab|$ (B) $a|b|$ (C) $|a|b$ (D) $a+|b|$ (E) $|a|-b$

52. If the sum of $x-6y+2z$ and $3x-4y+2z$ is subtracted from $3y-4z+x$, the result is
(A) 13y-8z-3x (B) 7y+5x   (C) 4x-10y+4z (D) x-6y+2z   (E) 3x+8z-13y

53. If the equation of a circle is $x^2+y^2=3$, which of the following is an x-intercept?
(A) 0   (B) $-\sqrt{3}$ (C) 3   (D) -3   (E) Cannot be determined

54. If $\frac{8a+1}{2}=\frac{8a+6}{4}+5$ then $a=$
(A) 0   (B) 1   (C) 2   (D) 3   (E) 4

55. Together Mr. Haddick and Mr. Beebe have $20.25. Mr. Haddick has only dimes, and Mr. Beebe only quarters. If Mr. Haddick has twice as many coins as Mr Beebe, how many does Mr. Beebe have?
(A) 45   (B) 40   (C) 35   (D) 30   (E) 25

56. If $a=3b-5$ and $b=4a-2$, then $a=$
(A) 1   (B) 2   (C) 3   (D) -1   (E) 0

57. $\frac{\sqrt{x-y}}{\sqrt{x+y}}=$ (A) $\frac{x-y}{x+y}$ (B) $\frac{\sqrt{x^2-y^2}}{x+y}$ (C) $\sqrt{x-y}$ (D) x-y   (E) x+y

58. In figure X and Y are the sets of all points contained in the circular regions. Which of the following must be true?
I $(X\cup Y)$ is subset of Y   II $X\cap Y=\varnothing$ III If a point is not in $X\cup Y$, then it is not in X
(A) I only   (B) I and II only   (C) II only   (D) III only   (E) II and III only

59. If two angles of a quadrilateral are equal in measure, then the other two must be
(A) equal in measure   (B) obtuse   (C) acute   (D) supplementary   (E) no conclusion possible

60. Which of the following is true?
(A) $(13^2)^4=13^6$ (B) $3^2+3^3=3^5$ (C) $4^{-4}\times4^3=1/4$ (D) $(36)^{1/2}=18$ (E) $7\sqrt{11}=11\sqrt{7}$

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БЛАНКА за ОТГОВОРИ:

ИМЕ...КЛАС.......УЧИЛИЩЕ...

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

ВЕРНИ ОТГОВОРИ:

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