Pre-Algebra

2018

Sponsored by the Indiana Council of Teachers of Mathematics

Indiana State Mathematics Contest

This test was prepared by Indiana State University, Department of Mathematics and Computer Sciences

Indiana State Mathematics Contest

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Next year's math contest date:

Indiana Council of Teachers of Mathematics
State Mathematics Competition
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1. If a=0.1/0.5, b=0.05/0.11, and c=1/0.5, then in order of magnitude,
   (A) a>b>c (B) b>a>c (C) c>a>b (D) a>c>b (E) c>b>a

2. Of the numbers 0.05129, 0.09,0.089, and 0.02889, the sum of the smallest and the largest is
   (A) 0.1189 (B) 0.08019 (C) 0.1428 (D) 0.1179 (E) 0.1429

3. The integer closest to $\sqrt{\frac{601}{9.9}+\frac{395}{100}}$ is
   (A) 3 (B) 8 (C) 9 (D) 25 (E) 64

4. When doing a series of additions on a calculator, a student noted that he added 85095 instead of 35.95. In order to correct this error with a single entry he should now
   (A) add 35.95 (B) subtract 85059.05 (C) subtract 85130.95
   (D) add 85130.95 (E) subtract 85095

5. The number halfway between 0.125 and $\frac{7}{12}$ is
   (A) $\frac{2}{15}$ (B) $\frac{1}{2}$ (C) $\frac{1}{3}$ (D) $\frac{11}{48}$ (E) $\frac{17}{48}$

6. Five students took a test. The average score was 68. If the scores of four students were 75, 53, 62, 84, the score of the fifth student was
   （A） 66 (B) 68 (C) 76 (D) $68\frac{1}{2}$ (E) 56

7. The average of $\frac{1}{20}$, $\frac{2}{30}$, and $\frac{3}{40}$ is:
   (A) $\frac{1}{15}$ (B) $\frac{23}{360}$ (C) $\frac{23}{120}$ (D) $\frac{23}{240}$ (E) None of these

8. The average of a set of integers is 60. The sum of the integers is 180. The number of integers in the set is:
   （A） 3 (B) 108 (C) 12 (D) 6 (E) None of these

9. A class of 200 students averaged 66% on an examination; another class of 300 students averaged 56%. The average percentage for all students was:
   （A） 63 (B) 62 (C) 61 (D) 60 (E) 50

10. Of the following sets of angles, the one which could be the angles of an isosceles triangle is

(A) $40^0, 60^0, 80^0$ (B) $82^0, 8^0, 91^0$ (C) $70^0, 70^0, 70^0$ (D) $50^0, 50^0, 70^0$ (E) $54^0, 72^0, 54^0$

11. The number of degrees in one interior angle of a regular polygon is x. In term of x, the number of sides of the polygon is

(A) $\frac{2x+360}{90}$ (B) $\frac{180}{2x}$ (C) $\frac{360}{180+x}$ (D) $\frac{360}{x}$ (E) $\frac{360}{180-x}$

12. The smallest number in the set $\{(-2.3)^2, 1.03, \sqrt{4}, (1.02)^2, (1.25)^2\}$

(A) $(-2.3)^2$ (B) 1.03 (C) $\sqrt{4}$ (D) $(1.02)^2$ (E) $(1.25)^2$

13. The lengths of the sides of a triangle are 7-b, b+1, and 4b-2. The number of values of b for which the triangle is isosceles is

(A) 0 (B) 1 (C) 2 (D) 3 (E) None of these

14. The regular price of a pencil is 10 cents and a special sale price for Mondays is 5 cents. If Karen bought 15 pencils on Saturday and 10 on Monday, then how much did she pay for pencils in the week?

(A) \$50 (B) \$1.5 (C) \$2 (D) \$3 (E) None of these

15. The integer 119 is exactly divisible by

(A) 2 (B) 3 (C) 5 (D) 11 (E) None of these

16. The number of integer divisors of 60, excluding 1 and 60, is

(A) 4 (B) 10 (C) 11 (D) 12 (E) 3

17. If xy = 6, $z^3 + 1 = 217$, then the value of xyz is

(A) 648 (B) 1296 (C) 48 (D) 36 (E) None of these

18. If a, b and c are real numbers such that $a^2 + b^2 + c^2 = 1$, then the minimum value of ab + bc + ca is

(A) -1 (B) $-\frac{1}{3}$ (C) 0 (D) $\frac{1}{2}$ (E) $-\frac{1}{2}$

19. If a, a+d, and 9d+a, (a>0, d>0), are the sides of a right-angled triangle, then the ratio a:d is

(A) 4:1 (B) 8:1 (C) 20: 21 (D) 20:1 (E) None of these

20. The side, front, and bottom faces of a rectangular solid have areas of 2x, $\frac{y}{2}$, and xy cm^2 respectively. The volume of the solid, in cubic centimeters, is

(A) xy (B) 2xy (C) x^2y^2 (D) 4xy (E) Cannot be determined from the information

21. If a and b are two integers with b>a, then the number of integers between a and b is

(A) b-a-1 (B) b-a+1 (C) b-a (D) b-a-2 (E) None of these

22. 90 + 91 + 92 +93 + 94 + 95 + 96 + 97 + 98 + 99 = ?

(A) 845 (B) 945 (C) 1005 (D) 1025 (E) 1045

23. If ax + 3y = 5 and 2x + cy = 3 represent the same straight line, then a + c equals

(A) 5 (B) $\frac{77}{15}$ (C) $\frac{19}{15}$ (D) $\frac{31}{5}$ (E) $\frac{77}{10}$

24. If the area of the square is 144, then the area of the inscribed circle is

(A) 36π (B) 6π (C) 9π (D) 12π (E) 81π

25. The area of a given circle is 9π cm^2. The diameter of this circle, in cm, is

(A) 9 (B) 3 (C) $\frac{3}{2}$ (D) $\frac{9}{2}$ (E) 6

26. A number which is a multiple of 15, but not a multiple of 18 is:

(A) 180 (B) 360 (C) 450 (D) 420 (E) 540

27. The difference between an 8.5% sales tax and an 8% sales tax on an item priced at $200 is:

(A) $0.10 (B) $1.00 (C) $5.00 (D) $10.00 (E) None of these

28. If (2, 5) is the midpoint of the line segment joining (5, y) and (x, 7), then x+y is equal to

(A) 6 (B) 5 (C) 7 (D) 12 (E) None of these

29. If a and b are the x- and y- intercepts of a line respectively which passes through the point (2, 1), then

(A) a(b-1)=2b (B) a =2b (C) b =2a (D) b(a-1) =2a (E) None of these

30. The lines x = 0, y = 0, and 2x + y = 4 form a triangle, the number of points with integer coordinates which are inside this triangle is

(A) 0 (B) 1 (C) 2 (D) 3 (E) more than 3

31. An unusual die has its six faces labeled 1, 2, 3, 5, 7, 9. If two such dice are rolled, and the numbers showing on the upper faces are added, then the number of possible different sums is

(A) 36 (B) 16 (C) 15 (D) 14 (E) 13

32. The number of possible positive integers that are less than 500 and that are not divisible by 2 or 3 is

(A) 168 (B) 167 (C) 166 (D) 165 (E) 83

33. If $\frac{2}{3}:\frac{5}{4}=\frac{9}{45}:x$, then x equals:

(A) $\frac{3}{8}$ (B) $\frac{1}{2}$ (C) $1\frac{1}{8}$ (D) $1\frac{1}{2}$ (E)None of these

34. The surface area of a sphere is equal to $4\pi r^2$ where r is the radius. How many times greater is the surface area of the new sphere if the radius is doubled?

(A) 8 (B) 4 (C) 2 (D) 3 (E) None of these

35. The three digit number 2A4 is added to 329 and gives 5B3. If 5B3 is divisible by 3, then the largest value of A is

(A) 1 (B) 4 (C) 7 (D) 8 (E) 9

36. What value of x will produce the next number in the following geometric sequence? 20, 10, 5, x-2.5

(A) 10 (B) 5 (C) 2.5 (D) 0 (E) None of these

37. What is the reciprocal of the reciprocal of $(\frac{1}{2}-\frac{1}{3})$?

(A) $\frac{1}{5}$ (B) $\frac{1}{6}$ (C) 3 (D) 2 (E) None of these

38. The product of all prime numbers between 1 and 2018 is divided by 143, what is the remainder?

(A) 0 (B) 1 (C) 2 (D) 3 (E) None of these

39. Of the following numbers, which one is divisible by the greatest number of multiple of different primes?

(A) 2310 (B) 396 (C) 1056 (D) 1375 (E) None of these

40. Two circles have diameters *PS* and *QR*. If *PS=2QR*, then the ratio of their areas is:
a. 9:1 b. 4:1 c. 3:1 d. 2:1 e. None of these