Indiana State Mathematics Contest 2016

Pre-Algebra

Do not open this test booklet until you have been advised to do so by the test proctor.

This test was prepared by faculty at **Indiana State University**

Next year's math contest date: Saturday, April 22, 2017

Indiana Council of Teachers of Mathematics
State Mathematics Competition
Pre-Algebra 2016

Indiana State University, Department of Mathematics and Computer Sciences

1. One and twenty-nine hundredths is:
   a. 0.129 b. 1.029 c. 1.29 d. 129.00 e. None of these

2. The second largest number in the set {0.3, 0.9, 0.18, 0.27, 0.081} is:
   a. 0.3 b. 0.9 c. 0.18 d.0.27 e. 0.081

3. If $a = \frac{10}{50}$, $b = \frac{5}{10}$, and $c = \frac{1000}{500}$, then:

   a. $a > b > c$ b. $b > a > c$ c. $c > a > b$ d. $a > c > b$ e. $c > b > a$

4. Of the following sets of angles, which could be the angles of an isosceles triangle?
   a. 50°, 50°, 90°
   b. 91°, 8°, 91°
   c. 70°, 70°, 70°
   d. 50°, 50°, 60°
   e. 54°, 72°, 54°

5. In ΔPQR, angle P contains k degrees and the bisectors of angles Q and R meet at T. The number of degrees in angle QTR is:
   a. $180 - \frac{k}{2}$ b. $90 + \frac{k}{2}$ c. $90 - \frac{k}{2}$ d. $60 + k$ e. None of these

6. The number of feet in $\frac{16}{3}$ miles is:

   b. 27,666 b. 27,560 c. $27,733\frac{1}{3}$ d. 27,984 e. 28,160

7. In triangle ABC, angle A is smaller than angle B. The altitude to the base AB divides the vertex angle C into parts C_1 and C_2 with C_2 adjacent to BC. Then:

   a. $C_1 + C_2 = A + B$ b. $C_1 - C_2 = B - A$ c. $C_1 - C_2 = A - B$
   d. $C_1 - C_2 = A + B$ e. $C_1 + C_2 = B - A$

8. The average of $\frac{10}{20}$, $\frac{12}{18}$, and $\frac{9}{12}$ is:

a. $\frac{2}{3}$ b. $\frac{23}{36}$ c. $\frac{23}{12}$ d. $\frac{23}{24}$ e. None of these

9. The average of the numbers 490, 310, 770, 50, and 930 is:
   a. 500 b. 520 c. 510 d. 530 e. None of these

10. The number halfway between $\frac{2}{16}$ and $\frac{28}{48}$ is:
    a. $\frac{2}{5}$ b. $\frac{1}{2}$ c. $\frac{1}{3}$ d. $\frac{11}{48}$ e. $\frac{17}{48}$

11. The average of a set of integers is 6000. The sum of the integers is 18000. The number of integers in the set is:
    a. 3
    b. 108
    c. 12
    d. 6
    e. None of these

12. A school of 2000 students averaged 66% on an examination; another school of 3000 students averaged 56%. The average percentage for all students from both schools was:
    a. 63 b. 62 c. 61 d. 60 e. 50

13. If X and Y are nonzero digits, the number of digits (not necessarily different) in the sum of $X1 + Y32 + 9876$ is:

    a. 4
    b. 5
    c. 6
    d. 9
    e. None of these

14. If the average of -3, 5 and x is 3, then x is:
    a. -8
    b. -1/2
    c. 5
    d. 7
    e. None of these

15. Five students took a mathematics test. The average score was 78. If the scores of four boys were 95, 62, 94, and 63, the score of the fifth boy was:
    a. 76
    b. 78
    c. 86
    d. 66
    e. None of these

16. How many positive factors of 36 are also multiples of 4?

a. 2 b. 3 c. 4 d. 5 e.6

17. $89+90 + 91 + 92 +93 + 94 + 95 + 96 + 97 + 98 + 99 = ?$

a. 934
b. 1034
c. 1094
d. 1114
e. 1134

18. A ream of paper containing 5000 sheets is 0.50 m thick. Approximately how many sheets of this type of paper would there be in a stack 0.75 m high?
a. 2560
b. 5500
c. 6670
d. 7500
e. None of these

19. If $a = -2$, the largest number in the set $\left\{-3a, 4a, \frac{24}{a}, a^2, 1\right\}$ is:

a. $-3a$ b. $4a$ c. $\frac{24}{a}$ d. a^2 e. 1

20. A square and a triangle have equal perimeters. The lengths of the three sides of the triangle are 0.62 m, 0.83 m, and 0.95 m. The area of the square, in cm^2, is:
a. 2400
b. 3600
c. 6800
d. 6400
e. 14400

21. If you walk for 45 minutes at a rate of 4 mph and then run for 30 minutes at a rate of 10 mph, how many miles have you gone at the end of one hour and 15 minutes?
a. 3.5 miles
b. 8 miles
c. 9 miles
d. 480 miles
e. None of these

22. The difference between a 7.5% sales tax and a 7% sales tax on an item priced at $200 before tax is:
    a. $0.10
    b. $1.00
    c. $5.00
    d. $10.00
    e. None of these

23. The ratio of boys to girls in a school is 2:3. If there are 300 students in the school, how many more girls than boys are in the school?
    a. 10
    b. 30
    c. 50
    d. 60
    e. None of these

24. If the length and width of a rectangle are each increased by 10%, then the perimeter of the rectangle is increased by:
    a. 1%
    b. 10%
    c. 20%
    d. 21%
    e. 40%

25. In a certain year, January had exactly four Tuesdays, and exactly four Saturdays. On what day did January 1 fall that year?
    a. Monday
    b. Tuesday
    c. Wednesday
    d. Friday
    e. Saturday

26. Mr. Green receives a 10% raise every year. His salary after four such raises has gone up by what percent?
    a. 40%
    b. 44%
    c. 45%
    d. More than 45%
    e. None of these

27. A contest began at noon one day and ended 1000 minutes later. At what time did the contest end?
    a. 10:00 p.m.
    b. Midnight
    c. 2:30 a.m.
    d. 4:40 a.m.
    e. None of these

28. In the product $B2 \times 7B = 6396$, B is a digit. The value B =
    a. 8
    b. 7
    c. 6
    d. 5
    e. None of these

29. If $A * B = \frac{A+B}{2}$, then $(3*5)*8$ is:
    a. 6
    b. 8
    c. 12
    d. 16
    e. None of these

30. If a, a, and $a+9d$, (where $d > 0$) are the angles of a right-angled triangle, then the ratio a:d is:
    a. 4:1
    b. 8:1
    c. 20:21
    d. 9:1
    e. None of these

31. The smallest product one could obtain by multiplying two numbers in the set $\{-70, -50, -10, 10, 30\}$ is:
    a. -3500
    b. -2100
    c. -1500
    d. -100
    e. None of these

32. The difference between the lowest common multiple and greatest common divisor of the numbers 5, 10, and 35 is:
    a. 1745
    b. 35
    c. 65
    d. 5
    e. None of these

33. The number of positive integer divisors of 60 is:
    a. 9 b. 10 c. 12 d. 11 e. None of these

34. The positive integers are written consecutively in groups of five so that the first row contains 1, 2, 3, 4, 5; the second row 6, 7, 8, 9, 10; etc. The row which has a sum nearest to the value of 150 is the:
    a. 5^{th} row
    b. 6^{th} row
    c. 7^{th} row
    d. 8^{th} row
    e. 9^{th} row

35. The three digit number 2A4 is added to 329 and gives 5B3. If 5B3 is divisible by 3, then the largest possible value of A is:
    a. 4
    b. 5
    c. 6
    d. 7
    e. 8

36. While cleaning out a garage, John found four old single-digit house numbers, one 3, one 4, and two 5s. The number of different two-digit house numbers he can create using any two of them is:

    a. 12 b. 5 c. 6 d. 7 e. None of these

37. A bag contains 80 jellybeans, 20 of which are red, 20 are black, 20 are green, and 20 are yellow. The least number that a blindfolded person must eat to be certain of having eaten at least one of each color is:

    a. 61 b.23 c.6 d. 5 e. None of these

38. Rearranging the digits of the number 975 produces different numbers. The sum of all such numbers, including 975, is:

    a. 4662
    b. 4065
    c. 3705
    d. 3687
    e. None of these

39. A number which is a multiple of 15, but not a multiple of 18 is:
    a. 180
    b. 320
    c. 360
    d. 420
    e. 540

40. The side, front, and bottom face of a rectangular cube have areas of $6x$, 6y, and xy cm^2, respectively. The volume of the cube, in cm^3, is:

a. xy b. $6xy$ c. x^2y^2 d. $12xy$ e. None of these