Pre-Algebra

2019

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
Pre-Algebra 2019

Indiana State University, Department of Mathematics and Computer Sciences

1. $\frac{4\times5}{9\times11}\times\frac{2\times9\times11}{4\times5\times2}=$

   (A) 1 (B) 0 (C) 49 (D) $\frac{1}{49}$ (E) 50

2. $\frac{10^{17}}{5\times10^{14}}=$

   (A) .002 (B) .2 (C) 20 (D) 200 (E) 2000

3. Compute 89201.7+90201.7 + 91201.7 + 92201.7 +93201.7 + 94201.7 + 95201.7 + 96201.7 + 97201.7 +98201.7 + 99201.7 =

   (A) 936218.7 (B) 1036218.7 (C) 1096218.7 (D) 11162187 (E) 1136218.7

4. A ream of paper containing 500 sheets is 0.05 m thick. Approximately how many sheets of this type of paper would there be in a stack 75 cm high?

   (A) 2500 (B) 5500 (C) 6670 (D) 7500 (E) None of these

5. If $a=-2.5$, the largest number in the set $\{-3a, 4a, \frac{24}{a}, a^2, 1\}$ is

   (A) $-3a$ (B) $4a$ (C) $\frac{24}{a}$ (D) a^2 (E) 1

6. The product of the 9 factors $(1-\frac{1}{10})(1-\frac{1}{9})(1-\frac{1}{8})(1-\frac{1}{7})(1-\frac{1}{6})(1-\frac{1}{5})(1-\frac{1}{4})(1-\frac{1}{3})(1-\frac{1}{2})=$

   (A) $\frac{1}{10}$ (B) $\frac{1}{9}$ (C) $\frac{1}{2}$ (D) $\frac{10}{11}$ (E) $\frac{11}{2}$

7. The number halfway between $\frac{7}{12}$ and $\frac{1}{8}$ on the number line is

   (A) $\frac{29}{48}$ (B) $\frac{17}{48}$ (C) $\frac{11}{48}$ (D) $\frac{1}{3}$ (E) $\frac{1}{2}$

8. A square and a triangle have equal perimeters. The lengths of the three sides of the triangle are 0.062 m, 0.083 m and 0.095 m. The area of the square is

   (A) $24\ \text{cm}^2$ (B) $36\ \text{cm}^2$ (C) $48\ \text{cm}^2$ (D) $64\ \text{cm}^2$ (E) $144\ \text{cm}^2$

9. If you walk for half an hour at a rate of 4 mph and then run for 45 minutes at a rate of 10 mph, how many miles have you gone?

   (A) 7.5 miles (B) 8.5 miles (C) 9.5 miles (D) 480 miles (E) None of these

10. The difference between an 7.5% sales tax and an 7% sales tax on an item priced at $200 is:

    (A) $0.10 (B) $0.5 (C) $1.00 (D) $10.00 (E) $50

11. There are twenty-four 4-digit numbers that can be formed, each using all the digits 1, 2, 3, 4. The 6^{th} smallest such number is:

    (A) 1234 (B) 1423 (C) 1432 (D) 1324 (E) None of these

12. The ratio of boys to girls in a school is 2:3. If there are 500 students in the school, how many more girls than boys are in the school?

    (A) 100 (B) 200 (C) 300 (D) 400 (E) None of these

13. If your average score on your first six mathematics tests was 84 and your average score on your first seven mathematics tests was 85, then your score on the seventh test was

    (A) 86 (B) 88 (C) 90 (D) 91 (E) 92

14. A sequence is 1, 2, 5, 10, 17, …. A possible eighth number in this sequence is:

    (A) 24 (B) 26 (C) 37 (D) 50 (E) None of these

15. The smallest value of *k* so that 75*k* is a perfect square is:

    (A) 3 (B) 6 (C) 9 (D) 10 (E) 5

16. 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

17. Henry has $240 more than Joe, and Joe has $150 more than Ann. Together the three people have $990. The amount Ann has, in dollars, is:

(A) $150 (B) $200 (C) $390 (D) $450 (E) None of these

18. The product of all prime numbers between 1 and 2019 is divided by 187, what is the remainder?

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

19. If $\frac{1}{5} : x = \frac{2}{3} : \frac{5}{4}$, 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

20. What value of x will produce the next number in the following geometric sequence? 200, 100, 50, x-25

(A) 100 (B) 50 (C) 25 (D) 0 (E) None of these

21. How many positive integers less than 100 are neither multiples of 2 or 3?

(A) 30 (B) 31 (C) 32 (D) 33 (E) None of these

22. The surface area S of a sphere is equal to $4\pi r^2$ where r is the radius. What will be the change in total surface area of sphere if it's radius r is reduced to half of its size?

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

23. If $\frac{x}{4} + \frac{y}{5} = \frac{9}{10}$, where x and y are positive integers, then 5x+3y is

(A) 15 (B) 16 (C) 17 (D) 18 (E) None of these

24. The volume V of a sphere is equal to $\frac{4}{3}\pi r^3$ where r is the radius. How many times greater is the volume of the new sphere if the radius is tripled?

(A) 8 (B) 27 (C) 24 (D) 3 (E) None of these

25. If the length and width of a rectangle are each increased by 10%, then the area of the rectangle is increased by:

(A) 1% (B) 10% (C) 20% (D) 21% (E) None of these

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. Rearranging the digits of the number 795 produces different numbers. The sum of all such numbers, including 795, is:

(A) 4662 (B) 4065 (C) 3705 (D) 3687 (E) None of these

28. A bag contains 60 jellybeans, 15 of which are red, 15 are black, 15 are green, and 15 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) 46 (B) 18 (C) 4 (D) 5 (E) None of these

29. If $b = 4d$, $c = 2d$, and $b + c + d = 42$, then what does b equal?
(A) 12 (B) 21 (C) 24 (D) 42 (E) None of these

30. If $5x - 3 = 5$, then what does $10x - 10$ equal?

(A) 10 (B) 14 (C) 6 (D) 2 (E) None of these

31. Two angles are supplementary with one angle 50 degrees greater than the other. What is the smaller angle, in degrees?
(A) 90 (B) 40 (C) 45 (D) 65 (E) None of these

32. If the 24th day of June was on a Thursday, then what day was the first day of June, in the same year, on?
(A) Monday (B) Tuesday (C) Wednesday (D) Thursday (E) None of these

33. A family has 6 children whose ages total 36. In three years, what will the ages of the children total?
(A) 39 (B) 54 (C) 48 (D) 42 (E) None of these

34. In a certain year, January had exactly four Tuesdays and four Saturdays. On what day did January 31 fall that year?
(A) Monday (B) Sunday (C) Friday (D) Saturday (E) None of these

35. A middle school has 600 students. Each student takes 5 classes a day. Each teacher teaches 4 classes. Each class has 15 students and 1 teacher. How many teachers are there at this school?
(A) 30 (B) 40 (C) 50 (D) 20 (E) None of these

36. The smallest sum one could get by adding three different numbers from the set {2019, 2018, 2017, 2016, 7, 8, 9, 25,-1,12,-3} is
(A) -3 (B) -1 (C) 3 (D) -4 (E) None of these

37. A contest began at 9am one day and ended 1000 minutes later. At what time did the contest end?
(A) 1:40am (B) 2:40am (C) 3:40am (D) 4:40am (E) None of these

38. How many whole numbers are between $\sqrt{7}$ and $\sqrt{99}$?
(A) 6 (B) 7 (C) 8 (D) 9 (E) None of these

39. Two circles have radii *PS* and *QR*. If *PS=3QR*, then the ratio of their areas is:
(A) 9:1 (B) 4:1 (C) 3:1 (D) 2:1 (E) None of these

40. If I add 6 of the first 7 whole integers, the sum cannot be:
(A) 19 (B) 20 (C) 21 (D) 22 (E) None of these