Pre-Algebra

2009

Sponsored by the Indiana Council of Teachers of Mathematics

Indiana State Mathematics Contest

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

ICTM Website

http://www.indianamath.org/

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

Next year's math contest date: April 24, 2010

1. If $b = 2a$ and $c = 5b$, what is the ratio of $8a + 2b$ to $2b + 2c$?

a. $\frac{1}{3}$ b. $\frac{2}{3}$ c. $\frac{1}{2}$ d. $\frac{2}{5}$ e. $\frac{3}{5}$

2. The third largest number in the set {0.3, 0.9, 0.18, 0.27, 0.81} is:

a. 0.3
b. 0.9
c. 0.18
d. 0.27
e. 0.81

3. Of the following sets of angles, which could be the angles of an isosceles triangle?

a. 60°, 45°, 45°
b. 90°, 10°, 90°
c. 70°, 70°, 70°
d. 50°, 50°, 70°
e. 55°, 70°, 55°

4. The average of the numbers 490, 310, 770, 500, and 930 is:

a. 500
b. 520
c. 510
d. 530
e. None of these

5. The number halfway between 0.125 and $\frac{7}{12}$ is:

a. $\frac{2}{5}$ b. $\frac{1}{2}$ c. $\frac{1}{3}$ d. $\frac{11}{48}$ e. $\frac{17}{48}$

6. 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

7. How many positive factors of 36 are not multiples of 4?

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

8. Compute 95 + 91 + 92 +93 + 94 + 95 + 96 + 97 + 98 + 99 = ?

a. 850
b. 950
c. 1010
d. 1030
e. 1050

9. 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

10. A square and an equilateral triangle have equal perimeters. The length of one side of the triangle is 8cm. The area of the square is, in cm^2:

a. 24
b. 36
c. 68
d. 64
e. 144

11. If you walk for 30 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?

a. 4 miles
b. 5 miles
c. 6 miles
d. 7 miles
e. None of these

12. The ratio of boys to girls in a class is 3:2. If there are 30 students in the class, how many more boys than girls are in the class?

a. 1
b. 2
c. 3
d. 6
e. None of these

13. 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. 40%

14. Mr. Green receives a 10% raise every year. His salary after three such raises has gone up by what percent?

a. 10%
b. 20%
c. 30%
d. More than 30%
e. None of these

15. If $A * B = \frac{A+B}{2}$, then $(80 * 80) * 60$ is:

a. 60
b. 70
c. 80
d. 90
e. None of these

16. The smallest product one could obtain by multiplying two numbers in the set $\{-7, -5, -3 - 1, 1, 3, 5, 7\}$ is:

a. -1 b. -3 c. -5 d. -49 e. None of these

17. The product of the lowest common multiple and greatest common divisor of the numbers 10 and 35 is:

a. 5 b. 70 c. 105 d. 350 e. None of these

18. The number of positive integer divisors of 120 is:

a. 12
b. 14
c. 16
d. 18
e. None of these

19. A bag contains 40 colored balls, 10 of which are red, 10 are black, 10 are green, and 10 are yellow. The least number of balls that a blindfolded person must pick to be certain of having at least one of each color is:

a. 11 b. 21 c. 31 d. 40 e. None of these

20. A number which is a multiple of 12, but not a multiple of 18 is:

a. 180 b. 320 c. 360 d. 420 e. 540

21. If $4x+6=5$, then $\frac{x}{2} \div (4x^2+2x) =$

a. 2 b. $\frac{3}{2}$ c. $\frac{2}{3}$ d. $\frac{1}{2}$ e. $\frac{8}{5}$

22. If a, a, and $a+3d$, (where $d>0$) are the angles of a right-angled triangle, then the ratio a:d is:

a. 1:1 b. 2:1 c. 3:1 d. 4:1 e. None of these

23. The side, front, and bottom face of a rectangular box have areas of 10, 10, and 25 cm^2, respectively. The volume of the box, in cm^3, is:

a. 25 b. 50 c. 625 d. 100 e. None of these

24. A football tournament has 12 teams. If each team continues to play in the game until beaten once, the number of games needed to determine the champion is:

a. 6 b. 10 c. 11 d. 12 e. None of these

25. The points A(-3, 4), B(4,3), C(3,-4), D(3, 4), and E(-4,-3) are plotted on a rectangular plane. The line segment that is vertical is:

a. AD
b. BE
c. BC
d. CD
e. None of these

26. The point (4, 3) is reflected in the *y*-axis. The image is then reflected in the *x*-axis. The coordinates of the point in its final position are:

a. (3,-4) b. (-3, 4) c. (-4,3) d. (-4,-3) e. None of these

27. If (1, 2) is the midpoint of the line segment joining (-5, *y*) and (*x*,-5), then $x+y$ is:

a. 16 b. 12 c. 10 d. 8 e. None of these

28. The area of a circle is $9/\pi$ cm^2. The circumference of this circle is, in cm:

a. 6 b. 12 c. 18 d. 3 e. None of these

29. If the area of a square is 36, then the area of its inscribed circle is:

a. 36π b. 6π c. 9π d. 12π e. None of these

30. If the diameter of the circle is decreased by 50%, the area is decreased by:

a. 25% b. 50% c. 75% d. 100% e. None of these

31. Consider the sequence 1, 2, 3, 4, 5, 6, …, 299, 300. What is twice of the average of this sequence of 300 numbers?

a. 300 b. 301 c. 600 d. 602 e. None of these

32. The product $\left(1+\frac{1}{2}\right)\left(1+\frac{1}{3}\right)\left(1+\frac{1}{4}\right)\left(1+\frac{1}{5}\right)...\left(1+\frac{1}{99}\right)\left(1+\frac{1}{100}\right)$ is equal to:

a. 50
b. 50.5
c. 51
d. 51.5
e. None of these

33. If x is an odd number, which of the following is always even?

a. $x+6$ b. $3x+7$ c. $2x+9$ d. $4x+1$ e. None of these

34. Consider the following sequence: 1, 5, 9, 13, 17, 21, …. Which term of this sequence is 2009?

a. the 501st
b. the 502nd
c. the 503rd
d. the 504th
e. None of these

35. Of 100 students, 42 took mathematics, 38 took chemistry, and 20 took both mathematics and chemistry. How many took either mathematics or chemistry?

a. 40 b. 42 c. 38 d. 60 e. 100

36. The ratio of three numbers is 5:3:2. The sum of these three numbers is 30. What is the difference between the largest number and the smallest number?

a. 9 b. 8 c. 7 d. 6 e. None of these

37. A number is a summation of three parts in the ratio 2:3:5 where the largest part is 50. This number is:

a. 60 b. 80 c. 100 d. 120 e. None of these

38. How many positive integers not greater than 600 are multiples of 3 but not 5?

a. 40 b. 160 c. 200 d. 150 e. None of these

39. Predict the next number in the sequence 1, 1, 2, 3, 5, 8, 13, 21, …

a. 30 b. 31 c. 32 d. 33 e. 34

40. The units digit of $29^{2009} + 97^{2009}$ is:

a. 2 b. 4 c. 6 d. 8 e. 0