



# **Pre-Algebra 2011**

**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 28, 2012**

1. A ream of paper containing 300 sheets is 3cm thick. How many sheets of this type of paper would there be in a stack 55 cm high?
- A) 2500      B) 5500      C) 6670      D) 7500      E) 12500
2. A square and a triangle have equal perimeters. The lengths of the three sides of the triangle are 61 m, 81 m, and 98 m. The area of the square is:
- A)  $2400 \text{ m}^2$       B)  $3600 \text{ m}^2$       C)  $4800 \text{ m}^2$       D)  $6400 \text{ m}^2$       E)  $1440 \text{ m}^2$
3. If you walk for 30 minutes at a rate of 4 mph and then run for 45 minutes at a rate of 12 mph, how many miles have you gone at the end of 75 minutes?
- A) 3.5 miles      B) 8 miles      C) 9 miles      D) 10 miles      E) 11 miles
4. The difference between 5.5% sales tax and a 5% sales tax on an item priced at \$400 before tax is:
- A) \$0.01      B) \$1.00      C) \$2.00      D) \$20.00      E) \$100.00
5. How many whole numbers between 100 and 400 contain the digit 2?
- A) 100      B) 120      C) 138      D) 140      E) 148
6. The value of  $6 + \frac{1}{10} + \frac{6}{1000}$  is:
- A) 6.16      B) 6.016      C) 6.106      D) 6.0016      E) 6.1006

7. If  $a = \frac{0.1}{0.5}$ ,  $b = \frac{0.5}{1}$ , and  $c = \frac{1}{0.5}$ , then:
- A)  $a > b > c$       B)  $b > a > c$       C)  $c > a > b$       D)  $a > c > b$       E)  $c > b > a$
8. You are given one hour to complete a contest. The fraction of the time remaining for you to complete the contest after twenty-five minutes have elapsed is:
- A) 2.5      B)  $\frac{1}{4}$       C)  $\frac{7}{20}$       D)  $\frac{7}{12}$       E)  $\frac{5}{12}$
9. It requires eight hours to fill  $\frac{2}{5}$  of a swimming pool. At this rate, the number of hours required to fill the remainder of the pool is:
- A)  $\frac{2}{5}$       B)  $3\frac{3}{5}$       C)  $5\frac{2}{5}$       D) 6      E) 12
10. A piece of string, 40 cm long, is formed into a circle with ends of the string touching each other. The radius of the circle, in cm, is:
- A)  $20\pi$       B)  $\frac{10}{\pi}$       C)  $40\pi$       D)  $\frac{20}{\pi}$       E) none of these
11. The area of the country is 18,000,000 km<sup>2</sup>. Four hundred million people live there. Of the answers given, the best approximation of the number of people per square kilometer is:
- A) 0.000<sup>4</sup>      B) 0.04      C) 4      D) 0.02      E) 2
12. A garden, 20 yd x 20 yd, is enclosed by a sidewalk of width 1 yd. The area of the sidewalk, in square yards, is:
- A) 231      B) 31      C) 84      D) 64      E) none of these

13.  $\frac{1}{100}$  of 0.1% is:
- A) 0.1                      B) 0.001                      C) 0.0001                      D) 0.00001                      E) 0.000001
14. A man borrowed \$4500 and a year later paid back the loan plus interest with a check for \$5400. The annual rate of interest, in percent, paid for the loan was:
- A) 700                      B) 83.3                      C) 20                      D) 120                      E) 16.6
15. A merchant reduces the price of a \$15.00 item by 20%. The sale price is:
- A) \$13                      B) \$12                      C) \$10                      D) \$8.5                      E) \$8
16. In a class of 20 students, 30% wear glasses. Three of those wearing glasses are left-handed. Of those wearing glasses, the percent that are left-handed is:
- A) 10                      B) 25                      C) 50                      D) 60                      E) none of these
17. Mr. John sold two pipes at \$1.20 each. Based on the cost, the profit on one was 20% and the loss on the other was 20%. On the sale of the pipes he:
- A) broke even                      B) lost 4¢                      C) gained 4¢                      D) lost 10¢                      E) gained 10¢
18. The number of positive divisors of 60 is:
- A) 8                      B) 9                      C) 10                      D) 11                      E) 12

19.  $2^{10}-1$  is divisible by:
- A) 13                      B) 5                      C) 7                      D) 9                      E) 11
20. The three numbers 1, 2, and 3 can be used to form a three-digit number such as 231. The number of these three-digit numbers that are divisible by 6 is:
- A) 2                      B) 1                      C) 6                      D) 4                      E) 0
21. The smallest value of  $k$  so that  $40k$  is a perfect square is:
- A) 40                      B) 6                      C) 10                      D) 60                      E) 5
22. The numbers 3 and 6 have a sum of 9 and a product of 18. The sum is a factor of the product. Another pair of numbers with this property is:
- A) 5, 10                      B) 4, 8                      C) 2, 4                      D) 1, 2                      E) 6, 12
23. Every 12 minutes a bus leaves from Town A for Town B. Every 20 minutes a bus leaves from Town A for Town C. Buses leave at 1:00 p.m. for both places. Another time when buses will be leaving for both places is:
- A) 1:32 p.m.                      B) 2:00 p.m.                      C) 2:40 p.m.                      D) 3:10 p.m.                      E) 3:40 p.m.
24. If she works 8 hours a day, Nancy can paint a house in 18 days. If she works only 6 hours a day, the number of days it would take her to paint the same house, working at the same rate is:
- A) 96                      B) 16                      C) 24                      D) 48                      E) 72

25. Henry has \$14 more than my cousin Joe, who has \$12 more than my friend Ann. Together the three people have \$71. The amount Ann has, in dollars, is:
- A) \$14                      B) \$15                      C) \$16                      D) \$20                      E) none of these
26. The number of prime numbers less than ten thousand with digits that have a sum of 2 or 3 is:
- A) 4                              B) 3                              C) 6                              D) 5                              E) 2
27. There are 15 Blue Jays and 14 Orioles perched in 3 trees. Each tree has at least 4 Blue Jays and 2 Orioles. If no tree has more Orioles than Blue Jays, then the largest number of birds that can be in one tree is:
- A) 11                              B) 12                              C) 13                              D) 14                              E) 15
28. Two sides of a triangle have lengths 14 and 16. Of the following, the one that cannot be that of the third side is:
- A) 2                              B) 6                              C) 7                              D) 28                              E) 29
29. A sequence begins with the numbers 1, 2, 3, 5, 8, 13, .... A possible seventh number in this sequence is:
- A) 21                              B) 24                              C) 37                              D) 50                              E) none of these
30. A rectangular  $4 \times 3 \times 2$  block has its surface painted red, and then is cut into cubes with each edge 1 unit. The number of cubes having exactly one of its faces painted red is:
- A) 0                              B) 4                              C) 8                              D) 12                              E) 24

31. The areas of three of the faces of a rectangular box are  $40 \text{ cm}^2$ ,  $12 \text{ cm}^2$ , and  $30 \text{ cm}^2$ . The volume of the box, in  $\text{cm}^3$ , is:
- A) 60                      B) 52                      C) 3600                      D) 300                      E) 120
32. The greatest possible product of two positive integers which have a sum of 9 is:
- A) 8                      B) 14                      C) 18                      D) 20                      E) 22
33. If Janet travels 42 km in 45 minutes, her speed, in kilometers per hour, is:
- A) 60                      B) 56                      C) 64                      D) 70                      E) 63
34. The three digit number  $3A4$  is added to 429 and gives  $7B3$ . If  $5B3$  is divisible by 3, then the largest possible value of A is:
- A) 1                      B) 4                      C) 5                      D) 8                      E) 9
35. The number of positive integers that are less than 400 and that are not divisible by 2 or 3 is:
- A) 148                      B) 137                      C) 133                      D) 165                      E) 83
36. The lengths of the sides of a triangle are  $b + 1$ ,  $7 - b$ , and  $2b$ . The number of values of  $b$  for which the triangle is an isosceles is:

- A) 0                      B) 1                      C) 2                      D) 3                      E) none of these
37. Nine copies of a certain pamphlet cost less than \$10.00 while ten copies of the same pamphlet (at the same price) cost more than \$11.00. How much does one copy of this pamphlet cost?
- A) \$1.07                  B) \$1.08                  C) \$1.09                  D) \$1.10                  E) \$1.11
38. A school has 1200 students. Each student takes 4 classes a day. Each teacher teaches 4 classes. Each class has 30 students and 1 teacher. How many teachers are there at this school?
- A) 30                      B) 32                      C) 40                      D) 45                      E) 50
39. How many positive integers can be represented as a product of two distinct members of the set {1, 2, 3, 4, 5, 6}?
- A) 9                        B) 10                        C) 11                        D) 12                        E) 13
40. 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