



Pre-Algebra Course

2006

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 21, 2007

1. If $\frac{b}{a} = 2$ and $\frac{c}{b} = 5$, what is the ratio of $4a + b$ to $b + c$?
- a. $\frac{1}{3}$ b. $\frac{2}{3}$ c. $\frac{1}{2}$
- d. $\frac{2}{5}$ e. $\frac{3}{5}$
2. A ream of paper containing 200 sheets is 2 cm thick. Approximately how many sheets of this type of paper would there be in a stack 4.5 cm high?
- a. 450 b. 400 c. 200
- d. 650 e. None of these
3. Two cars head towards each other from opposite ends of a highway 2000 miles long. The speed of the first car is 78 miles/hour. The speed of the second car is 82 miles/hour. The cars will meet in:
- a. 11.25 hours b. 12 hours c. 12.5 hours
- d. 13 hours e. 14 hours
4. Consider the sequence -1, 2, -3, 4, -5, 6, ..., -299, 300. What is the average of this sequence of 300 numbers?
- a. -1 b. -0.5 c. 0
- d. 0.5 e. 1
5. A class of 30 students averaged 65% on an examination; another class of 20 students averaged 55%. The average percentage for all students was:
- a. 63 b. 62 c. 61
- d. 62.5 e. 57
6. Four students took a test. The average mark was 66. If the marks of 3 students were 75, 54, and 64, the mark of the fourth student was:
- a. 72 b. 71 c. 66
- d. 68 e. 70

7. The product $\left(1-\frac{1}{2}\right)\left(1-\frac{1}{3}\right)\left(1-\frac{1}{4}\right)\left(1-\frac{1}{5}\right)\dots\left(1-\frac{1}{99}\right)\left(1-\frac{1}{100}\right)$ is equal to:
- a. $\frac{1}{99}$ b. $\frac{1}{80}$ c. $\frac{1}{90}$
d. $\frac{1}{100}$ e. None of these
8. If $a*b$ means $\frac{a+b}{a \times b}$, find the value of $5*(4*3)$.
- a. $\frac{67}{35}$ b. $\frac{35}{12}$ c. $\frac{67}{12}$
d. $\frac{79}{20}$ e. None of these
9. If x is an even number, which of the following is always odd?
- a. $\frac{x}{2}+6$ b. $\frac{x}{2}+8$ c. $\frac{x}{2}+9$
d. $\frac{x}{2}+1$ e. None of these
10. A square and a triangle have equal perimeters. The lengths of the three sides of the triangle are 7 cm, 8 cm, and 9 cm. The area of the square is, in cm^2 :
- a. 24 b. 36 c. 68
d. 64 e. 144
11. Of the following sets of angles, which could be the angles of an isosceles triangle?
- a. $30^\circ, 60^\circ, 90^\circ$ b. $92^\circ, 6^\circ, 92^\circ$ c. $70^\circ, 70^\circ, 70^\circ$
d. $50^\circ, 50^\circ, 60^\circ$ e. $52^\circ, 76^\circ, 52^\circ$
12. The length of a rectangle is increased by 30% and its width is decreased by 10%. This increases the area by:
- a. 20% b. 15% c. 22%
d. 17% e. None of these

13. The side, front, and bottom faces of a rectangular solid have areas of $3x$, $3y$, and xy cm^2 respectively. The volume of the solid, in cm^3 , is:
- a. $3xy$ b. $9xy$ c. x^2y^2
d. xy^2 e. None of these
14. 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. 1.5:1
15. Points A, B, C, and D are placed in that order on a line so that $AB = 4BC = 2CD$. Then BD as a fraction of AD is:
- a. $\frac{3}{7}$ b. $\frac{3}{4}$ c. $\frac{6}{7}$
d. $\frac{2}{7}$ e. None of these
16. Starting at 870 and counting backwards by 7's, a student counts 870, 863, 856, etc. A number that will be counted is:
- a. 116 b. 115 c. 114
d. 113 e. 112
17. Consider the following sequence: 2, 6, 10, 14, 18, 22, Which term of this sequence is 2006?
- a. the 501st b. the 502nd c. the 500th
d. the 400th e. None of these
18. If you walk for 30 minutes at a rate of 4 miles per hour and then run for 15 minutes at a rate of 10 miles per hour, how many miles have you gone at the end of 45 minutes?
- a. 5 miles b. 6 miles c. 5.5 miles
d. 4.5 miles e. None of these

19. The positive integers are written consecutively in groups of four so that the first row contains 1, 2, 3, 4; the second row 5, 6, 7, 8; etc. The row which has a sum of 170 is the:
- a. 9th row b. 10th row c. 11th row
d. 12th row e. None of these
20. If A and B are nonzero digits, the number of digits (not necessarily different) in the sum of $9876 + A32 + B1$ is:
- a. 4 b. 5 c. 6
d. 9 e. None of these
21. There are 24 four-digit numbers that can be formed from the digits 1, 2, 3, and 4 using each digit once and only once. What is the sum of these 24 numbers?
- a. 66,660 b. 66,600 c. 66,000
d. 65,260 e. None of these
22. The three digit number $2A4$ is added to 329 giving $5B3$. If $5B3$ is divisible by 3, then the largest possible value of A is:
- a. 4 b. 5 c. 6
d. 7 e. 8
23. A bag contains 40 jellybeans, of which 10 are red, 10 are black, 10 are green, and 10 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. 31 b. 22 c. 4
d. 5 e. None of these
24. Six old single-digit house numbers were found in a garage. There were one 2, one 3, two 5's and two 6's. The number of different two-digit house numbers that can be created using any two of them is:
- a. 14 b. 15 c. 16
d. 8 e. None of these
25. If the distance between consecutive fence posts is 4 meters, the number of posts needed to build a fence around a triangular region with sides 20 meters, 24 meters, and 32 meters is:
- a. 18 b. 19 c. 20
d. 21 e. None of these

32. A number is a summation of three parts in the ratio 1:2:7 where the largest part is 49. This number is:
- a. 60 b. 70 c. 80
d. 90 e. None of these
33. In a class of 40 students, 15% are absent today. How many students are in class today?
- a. 30 b. 31 c. 32
d. 33 e. 34
34. How many positive integers not greater than 600 are multiples of 2 but not 3?
- a. 300 b. 250 c. 200
d. 150 e. None of these
35. Predict the next number in the sequence 1, 2, 4, 7, 11, 16, 22, 29, 37, 46, ...
- a. 55 b. 56 c. 57
d. 58 e. 59
36. How many whole numbers between 200 and 700 begin and/or end with 3?
- a. 150 b. 160 c. 140
d. 170 e. None of these
37. In a certain year, April has exactly four Tuesdays, and exactly 4 Saturdays. On what day could April 1 possibly fall that year?
- a. Monday b. Tuesday c. Wednesday
d. Friday e. Saturday
38. The number of right-angled triangles that can be formed by using any three of the six points (0,0), (0,2), (0,4), (2,0), (4,0), (2,2) as vertices is:
- a. 9 b. 10 c. 11
d. 12 e. None of these

39. Assume every 7 digit whole number is a possible phone number except those which begin with a 0 or 1. What fraction of telephone numbers begin with 8 and end with 3?

a. $\frac{1}{63}$

b. $\frac{1}{80}$

c. $\frac{1}{81}$

d. $\frac{1}{90}$

e. $\frac{1}{100}$

40. The units digit of $29^{2006} + 97^{2006}$ is:

a. 2

b. 4

c. 6

d. 8

e. 0