

2011 RC Jr. Math Mania  
Algebra & Probability Team Test – 7<sup>th</sup> Grade

1. Express in simplest radical form:  $\sqrt{4500}$
2. Find the slope of the line through the points (-2,4) and (-3,8).
3.  $3(4 + 2(8 - 12)^2) - 30 \div 3(5 - 7)^3$
4. In a survey of 382 math club members, 114 enjoyed arithmetic, 203 enjoyed algebra, and 258 enjoyed geometry. If 86 enjoyed both arithmetic and algebra, 92 enjoyed both arithmetic and geometry, 135 enjoyed both algebra and geometry, and 73 enjoyed all three, how many of the surveyed math club members enjoyed none of these subjects?
5. If 8 quince can be traded for R radishes, how many radishes could you get for Q quince?
6. What value(s) of  $x$  satisfy  $x^2 - 25 = 0$ ?
7. Solve for  $a$  in terms of  $b$ :  $4a - 5b = 17$ .
8. Henry and Irene play a game, taking turns rolling a single die. If Henry rolls a 4, 5, or 6 on his turn, he wins and the game is over. If Irene rolls a 1 or 2 on her turn, she wins and the game is over. If Irene gets the first turn, what is the probability that she wins the game?
9. Francis and Gary agree to meet at the monkey bars for a swinging contest sometime during their half-hour recess. If each of them shows up at the monkey bars at a random time during recess and each will only wait five minutes for the other before leaving, what is the probability that they meet at the monkey bars?
10. Evaluate:  $\frac{8!}{5!3!}$
11. Solve the system of equations 
$$\begin{aligned} 5u - v &= 11 \\ 2u + v &= 17 \end{aligned}$$
. Write the answer as an ordered pair in the form  $(u, v)$ .
12. A trusted friend rolls two six-sided dice behind a screen. You ask what she got, and she answers “two odd numbers”. What is the probability she got a sum of 8?
13. If Tim could paint the room in eight hours and Sally could paint it in seven hours, how many **minutes** would it take the two of them to paint the room if they worked together?
14. At the make-your-own-omelet bar, you choose one of three meats, one of four cheeses, and two different vegetables from seven choices. How many different omelets can you make?
15. What value(s) of  $w$  satisfy  $2(6w + 5) - 7(3 - 4w) = 309$ ?
16. If eight parrots can eat fifty crackers in three hours, how many hours would it take three parrots to eat 25 crackers?
17. Evaluate **as a decimal**:  $9.8 + 7.6 \times 5.4$
18. A set of five integer test scores from 0 to 100 inclusive has a mean of 64 and a range of 49. What is the smallest possible value of the median?
19. A dealership buys a jeep for \$8,000, and sets the selling price at 20% more than they spent. Since the jeep doesn't sell in a month or so, they discount it 20%. What is the new selling price?
20. In a standard deck of cards, what is the probability of drawing two diamonds in a row without putting any cards back into the deck?

## 2011 RC Junior Math Mania Geometry & Potpourri Team Test – 7th Grade

1. Two concentric circles have radii of 8 m and 12 m. What is the length of a chord drawn in the larger circle that is tangent to the smaller circle?
2. In the cryptarithm below, where each instance of a letter represents the same digit (0-9) and no two different letters represent the same digit (i.e. if an A represents a 1, then all A's represent 1's and no B's can represent 1), what is the largest possible value of the three-digit number ABC?
 
$$\begin{array}{r} AB \\ + BC \\ \hline CCA \end{array}$$
3. What is the least common multiple of 48 and 20?
4. What is the perimeter of a right triangle with legs measuring 6 m and 8 m?
5. Express the base 8 number  $572_8$  as a base 10 number.
6. A convex polygon has all of its diagonals drawn. If there are 44 diagonals, how many sides does the polygon have?
7. If Set K is the set of all positive multiples of 3 less than 100 and Set L is the set of all positive two-digit palindromes, how many elements are in the set  $K \cap L'$ ? (K and not L)
8. Two circles with radii of 2 m and 11 m have their centers 15 m from one another. What is the length, in meters, of one of their common external tangents?
9. What is the sum of the first twelve terms of an arithmetic sequence with a first term of 9 and a common difference of 13? (9, 22, 35...)
10. What is the missing term of the sequence 98, 89, 81, 73, 66, 60, 54, 49, 45, \_\_, 37, 34, ...?
11. A man is 72 inches tall and his shadow cast by a lamp 100 inches above the ground is 200 inches long. What is the distance, in inches of the man from the lamppost?
12. What is the name of a line drawn at a ninety-degree angle through the midpoint of a line segment?
13. What is the sum of the eleven smallest positive odd numbers?
14. Using the digits 9, 8, 3, and 2 exactly once each and the operations of addition, subtraction, multiplication, and division (and parentheses) as much as you like, create an expression that evaluates to 31.
15. A quadrilateral has three interior angles measuring  $102^\circ$ . What is the measure, in degrees, of its fourth angle?
16. What is the volume, in cubic meters, of a right circular cylinder with a base radius of 2 meters and a height of 3 meters?
17. Sequence A is defined with first term  $A_1 = 3$  and subsequent terms defined by  $A_n = 2A_{n-1} - 1$ . What is the value of  $A_5$ ?
18. List which statements below must be true if each statement is either true or false.  
A: C & D are not both true.  
B: A & C are both true.  
C: A & B are not both false.  
D: B & C are both false.
19. A 3x3x3 inch cube is cut into 27 1x1x1 cubes, when reassembled the cube is set on the table and all the visible surfaces are painted. How many of the 27 one inch cubes are painted on two of their sides?
20. What is the sum of the fourth and fifth terms of an arithmetic sequence with a first term of  $\frac{1}{24}$  and a second term of  $\frac{1}{12}$ ?