2011 RC Jr. Math Mania
Individual Test – 7th Grade

1. What is the perimeter, in feet, of a regular octagon with sides measuring 18 inches?

2. In how many unique ways can the letters in the word "STARS" be arranged?

3. What is the average of the data set {1, 3, 5, 1, 7, 5, 2, 7, 5, 6, 3, 5, 2}?

4. What is the area, in square centimeters, of a circle inscribed in a square with sides measuring 8 cm? (Use $\pi \approx 3.14$).

5. How many diagonals can be drawn in a regular decagon?

6. Find the sum of the next three numbers in the Fibonacci sequence: 1, 1, 2, 3, 5, 8, 13, 21, _,__,__.

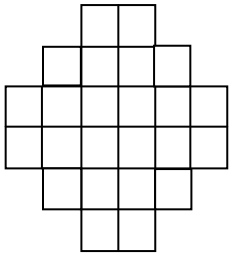
7. What is the length of the hypotenuse of a right triangle with legs measuring 12 m and 16 m?

8. Simplify by combining like terms: $4d + 8 - d + 3d + 7 - d \ + 6d - 1$

9. Billy's height increases by 6 inches each year. Bob's height increases by half of that amount each year. If Billy and Bob's heights were the same 3 years ago, how much taller, in inches, than Bob will Billy be exactly two years from today?

10. My piggy bank contains only nickels, dimes, and quarters, and contains 20 coins worth a total of \$3.30. If the total value of the quarters is five times the total value of all the other coins, how many dimes are in the piggy bank?

11. How many squares of any size are in the figure?



12. A sheep is tied to a corner of a square barn and allowed to graze outside the barn. If the barn measures 20 m on each side and the sheep is tied with a 14 m rope, what is the total area, in square meters, of the region where the sheep can graze ? (Use $\pi \approx \frac{22}{7}$.)

13. In the subtraction problem to the right, each instance of a given letter represents a particular digit, and different letters represent different digits (e.g. if one A is a 9, all of the A's are 9's and B cannot be 9). What is the smallest possible value of the four-digit number ABCD?

$$\begin{array}{r} ABC \\ -DB \\ \hline DD \end{array}$$

14. What is the sum of the number of days in April, the number of prime factors of 210, the number in the hundreths' place of 67789.239, and the number of sides of an nonagon?

15. A farmer has goats and chickens and two sons. Between the boys, goats, and chickens there are 42 heads and 100 legs. How many goats does she have?

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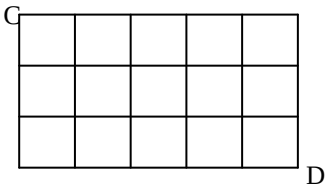
16. Evaluate: $-3-(-4)(-5)-(-6)$

17. What value(s) of c satisfy $3c+17=8c-38$?

18. What is the volume, in cubic meters, of a right circular cylinder with a base radius of 9 m and a height of 2 m (Leave your answer in terms of π.)

19. Find x if $2^x = 32$.

20. In the grid of unit squares to the right, you must travel from C to D by moving only right or down along the gridlines. In how many ways can this be done?



21. What is the largest number of regions into which three lines can divide a plane?

22. How many integers between 10 and 40 are prime?

23. Express the solution to the system of equations $4f-g=5$ and $2f+g=7$ as an ordered pair in the form (f,g).

24. What is the midpoint of the line segment with endpoints (3, 8) and (5, 2)?

25. What value(s) of n satisfy $\frac{n+14}{3}=\frac{2n+6}{5}$?

26. Evaluate: $8\times(7-5)^4+2\times3^2\div6$

27. If $v(w)=7w+6$, evaluate $v(3)$.

28. Simplify the following: $2\sqrt{50}-7\sqrt{18}+\sqrt{800}$.

29. A group of gamers orders pizza and splits the cost evenly. If there had been two more gamers, each gamer would have paid sixty cents less. If there had been two fewer gamers, each gamer would have paid one dollar more than they did. What was the total cost of the pizza order, in dollars rounded to the nearest hundredth (cent)?

30. When two fair, six-sided dice are rolled, what is the probability that the positive difference between the numbers shown is two?