2008 Rocket City Junior Math Mania
Algebra Test – 8th Grade

1. Evaluate: $\begin{array}{r} 259 \\ \times 83 \\ \hline \end{array}$

2. What value(s) of *a* satisfy $2(3-a)+3(2a+5)=65$?

3. What are the coordinates, in the form (x, y), of the x-intercept of the line with equation $y=-8x+15$?

4. If a boat travels 4 miles downstream at a rate of 8 miles per hour then returns upstream to the starting point at a rate of 2 miles per hour, what was the boat's average speed for the trip?

5. Simplify by rationalizing the denominator: $\dfrac{12}{4+\sqrt{14}}$

6. What value(s) of *b* satisfy $b^2+6b-16=0$?

7. What ordered triple (c,d,e) satisfies the system of equations $\begin{array}{l} 2c+d+e=1 \\ 3d-e=1 \\ c+d=1 \end{array}$?

8. What are the coordinates, in the form (x, y), of the point of intersection of the lines $y=3x+7$ and $y=-2x-8$?

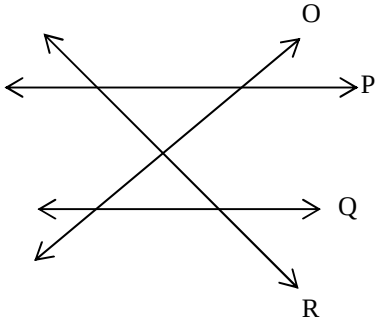
9. When Fred and Ginny try to find the roots of a quadratic of the form $x^2+Bx+C=0$ that their teacher wrote on the board, Fred miscopies the value of *B*, while Ginny miscopies the value of *C*. If Fred finds the roots to be 8 and 9, while Ginny finds them to be 1 and –28, what are the actual roots of the original equation?

10. Simplify $(x-3)(x-1)(x+4)$ by expanding and combining like terms.

2008 Middlementary Math Bonanza
Geometry Test – 8th Grade

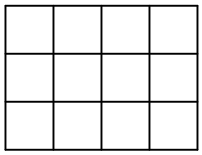
1. An octahedron is a Platonic solid with eight faces that are equilateral triangles. How many vertices does an octahedron have?

2. In the figure shown, $\overleftrightarrow{P} \parallel \overleftrightarrow{Q}$, $\overleftrightarrow{O} \perp \overleftrightarrow{R}$, and the smaller angle between $\overleftrightarrow{O}$ and $\overleftrightarrow{P}$ measures $19°$. What is the measure, in degrees, of the smaller angle between $\overleftrightarrow{Q}$ and $\overleftrightarrow{R}$?



3. What is the length, in centimeters, of the hypotenuse of a right triangle with legs measuring 12 cm and 84 cm?

4. How many squares of any size can be found in the unit grid shown?



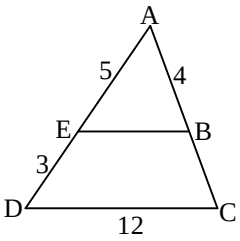
5. What is the area, in square centimeters, of an equilateral triangle with sides measuring 6 cm?

6. Tim the sprinter runs at a rate of 350 centimeters per second. How many **hours** will it take him to run one kilometer?

7. If triangle ABC contains the points: A(-5, -3), B(-4,2), and C (-9, 1), and is translated four units to the right and 3 units down into triangle A'B'C', what is the sum of the abscissas of the vertices of triangle A'B'C?

8. In the triangle shown, $\overline{EB} \parallel \overline{CD}$ and all lengths are in centimeters. What is the length, in centimeters, of $\overline{EB}$?

9. Find the volume of a square pyramid with a base diagonal of 8 and a slant height of $4\sqrt{5}$.



10. Two concentric circles are drawn such that a chord of the larger circle that is tangent to the smaller circle measures 40 cm. What is the area, in square centimeters, of the region between the two circles?

2008 Rocket City Junior Math Mania
Potpourri Test – 8th Grade

1. What is the sum of A, B, and C?

   A is the difference between 148 and 92.
   B is the product of 9 and 18.
   C is the quotient of 345 and 3.

2. What is the next term of the sequence 4, 11, 7, 9, 10, 7, 13, __?

3. What is the range of the data set $\{12,19,19,34,49,49,49,62,62,87\}$?

4. How many two-digit multiples of 2 do not contain the digit 2?

5. What is the sum of the first ten terms of an arithmetic sequence with a first term of 32 and a common difference of 27?

6. Write an expression that equals 20 using the one-digit numbers 3, 5, 7, and 9 exactly once each and the operations of addition, subtraction, multiplication, and division (and parentheses) as much or as little as you like.

7. What is the smallest prime number greater than 200?

8. If C is the set of all positive even numbers less than 200 and D is the set of all positive multiples of 7 between 100 and 150 inclusive, how many elements are in the set $C \cup D$?

9. Convert the base six number 325_6 to base ten.

10. What is the fourth term of a recursively defined sequence with first term $a_1 = 5$, $a_2 = 3$, and subsequent terms defined by $a_n = (a_{n-1})^2 - 22$?

2008 Rocket City Junior Math Mania
Probability Test – 8th Grade

1. How many ways can five people sit around a round table?

2. Sam and Max play a game in which the first person to get heads when they flip a fair two-sided coin wins. The first player gets to flip the coin once, then the second player gets to flip the coin twice, then the first player gets to flip the coin three times, then the second player gets to flip the coin four times. What is the probability that no one has won the game after the process described?

3. When a single card is drawn from a standard fifty-two card deck, what is the probability that it is either a heart or a Jack (or both)?

4. When three fair, six-sided dice are rolled, what is the probability that the product of the numbers shown is six?

5. Your friend (who you trust completely) rolls two standard, six-sided dice behind a screen and tells you that she did not roll any numbers higher than four. What is the probability that she rolled doubles?

6. In a survey of the 138 members of the computer club, 89 knew Python, 75 knew Java, and 68 knew C#. If 37 knew all three languages, 53 knew both Python & C#, 40 knew both Java & C#, and 61 knew both Java & Python, how many club members did not know any of these languages?

7. How many ways are there to arrange the letters in the word "TATTLETALE"?

8. When four fair coins are flipped, what is the probability that there are more heads than tails?

9. The probability of rain tomorrow is $\frac{3}{5}$. It is well known that when it rains, the probability of wind is $\frac{1}{3}$, otherwise the probability of wind is $\frac{1}{2}$. What is the probability it is windy tomorrow?

10. Vivian and Katie are trying to meet at the park. If each of them arrives sometime between 1 PM and 2 PM and each will wait up to 20 minutes for the other person to show up, what is the probability that they end up meeting?