2007 Rocket City Junior Math Mania
Algebra Test – 8th Grade

1. Evaluate: $(9-6\div 2)^2+8\div 4$

2. Evaluate:
$$\begin{array}{r} 47 \\ 86 \\ \underline{+29} \end{array}$$

3. What is the equation, in slope-intercept form $(y=mx+b)$, of the line through the points $(1,5)$ and $(-1,9)$?

4. What is the value of v in the solution to the system of equations $\begin{array}{l} v+w+x=-2 \\ 2v-w-x=5 \\ v+2w+3x=-6 \end{array}$?

5. Express $\sqrt{1080}$ in simplest radical form.

6. If you can buy 6 liters of root beer for D dollars, how many liters of root beer can you buy for 60 cents? Express your answer as a fraction in terms of D.

7. t is a positive two-digit integer. u is the positive two-digit integer formed when the digits of t are reversed. If u is two more than twice t, what is the largest possible value of t?

8. What value(s) of y satisfy $5y+12=2y^2$?

9. Ten years ago, Jean-Mikel was twice Anna-Marie's age. Now, Anna-Marie's age is ten less than two-thirds of Jean-Mikel's age. How old is Jean-Mikel?

10. Mei has ten liters of a 40% acid solution and ten liters of an 80% solution. What is the largest number of **milliliters** of 55% acid solution she can create by mixing some of her two solutions?

2007 Rocket City Junior Math Mania
Geometry Test – 8th Grade

1. What is the area, in square centimeters, of a circle circumscribed about an equilateral triangle with sides measuring 6 cm?

2. A rectangle has an area of 308 cm^2 and a perimeter of 72 cm. What is the length, in centimeters, of a longer side of the rectangle?

3. What is the surface area, in square centimeters, of a regular tetrahedron with edges measuring 7 cm?

4. What is the sum, in degrees, of the measures of the interior angles in a convex hexagon?

5. What is the volume, in cubic centimeters, of a right circular cone with a base radius of 8 cm and a height of 12 cm?

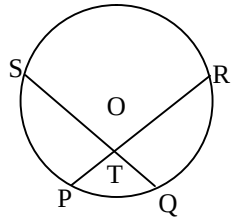
6. A right triangle has legs measuring 3 and 4 cm. What is the length, in centimeters, of the altitude to the hypotenuse?

7. What is the perimeter, in centimeters, of a square inscribed inside a circle with a radius measuring 8 cm?

8. A cow is tied to an external corner of a rectangular barn measuring 20 by 25 m. If the cow's leash is 30 m long, how many square meters can the cow graze?

9. A triangle with sides measuring 3, 4, and 5 cm is similar to a triangle with sides measuring 12, 15, and x cm. What is the value of x?

10. In circle O, chords $\overline{PR}$ and $\overline{QS}$ intersect at T. If $m\angle STR = 72°$ and $mRPQ = 307°$, what is $mSQP$ in degrees?



2007 Rocket City Junior Math Mania
Potpourri Test – 8th Grade

1. A collection of 23 coins (each of which is either a quarter or a dime) is worth $4.55. How many quarters are in the collection?

2. What is the perimeter, in centimeters, of a rectangle with an area of 128 cm^2 and a side measuring 8 cm?

3. When three standard six-sided dice are rolled, what is the probability that the numbers shown on their top faces sum to six?

4. How many positive integers are factors of 36? (Both 1 and 36 count as factors of 36.)

5. In the cryptarithm shown, each instance of a letter represents the same digit (0-9) and different letters represent different digits (i.e. if one A is a 1, all A's are 1's and B cannot be

   1). What is the maximum possible value of the four-digit number ABCD?
   $$\begin{array}{r} AB \\ +BC \\ \hline DA \end{array}$$

6. What is the sum of the terms of an infinite geometric sequence with a first term of 12 and a common ratio of $\frac{1}{3}$?

7. How many positive four-digit integers are divisible by 3 but not 4?

8. In a five-element data set of integers between 0 and 100 inclusive, the mean is 72, the only mode is 63, and the range is 24. What is the largest possible value of the median?

9. What is the sum of the 12 smallest positive odd numbers?

10. If exactly one of the statements below is true, which is it (A, B, or C)?

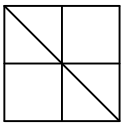
    A: Statement C is true
    B: Statement C is false
    C: Statement A is true

2007 Rocket City Junior Math Mania
Probability Test – 8th Grade

1. What is the probability that a card drawn from a standard 52-card deck is a spade or a nine (or both)?

2. A bag contains three yellow marbles, two blue marbles, and one green marble. If one marble is removed from the bag and hidden, what is the probability that the next marble drawn is blue?

3. How many ways can an ant crawl from the upper left corner of the figure to the lower right corner if it must always travel either down, right, or both along the lines?



4. How many distinct arrangements are there of the letters in the word "PEPPER"?

5. A bag contains three red marbles, four white marbles, and five blue marbles. When two marbles are drawn simultaneously, what is the probability that they are different colors?

6. When three cards are drawn from a standard 52-card deck, what is the probability that they have adjacent ranks (A-2-3, 2-3-4, … , J-Q-K, or Q-K-A)?

7. When six coins are flipped, what is the probability that there are more heads than tails?

8. The probability of wind today is $\frac{3}{5}$, while the probability of rain is $\frac{2}{3}$. Furthermore, if it rains, the probability of wind rises to $\frac{3}{4}$. What is the probability of neither rain nor wind?

9. When two standard six-sided dice are rolled, what is the probability that one of the numbers shown is equal to or is a multiple of the other number shown?

10. Bryce's CD collection has one Dire Straits CD, two ACDC CD's, three Beatles CDs and four Pink Floyd CDs. How many ways can he arrange his CDs next to each other on a shelf if all of each artist's CDs must be next to one another and no ACDC CD can be next to any Beatles CD?