2008 Rocket City Junior Math Mania
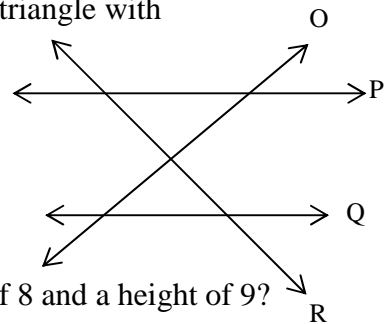## Algebra Test – 7th Grade

1. Evaluate: $(-2)^3 - (-3)^0 (-4)^2$

2. If F pounds of flour can be purchased with N nickels, how many pounds of flour can be purchased for one dollar?

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

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

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

6. 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?

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

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

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

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

2008 Middlementary Math Bonanza
Geometry Test – 7th Grade

1. An octahedron is a Platonic solid with eight faces that are equilateral triangles. How many vertices does an octahedron have?
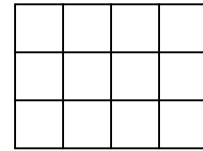
2. What is the length, in centimeters, of the hypotenuse of a right triangle with legs measuring 12 cm and 84 cm?

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

4. What is the volume of a square pyramid with a base diagonal of 8 and a height of 9?
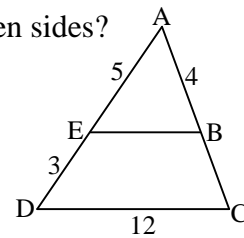
5. How many squares of any size can be found in the unit grid shown?

6. Two right rectangular prisms are similar to one another. The smaller has edges measuring 2, 3, and 4 cm, while the larger has a longest edge measuring 12 cm. What is the surface area, in square centimeters, of the larger prism?

7. What is the measure of an interior angle of a regular polygon with ten sides?
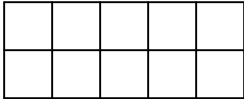
8. In the triangle shown, $\overline{EB} \parallel \overline{CD}$ and all lengths are in centimeters.

   What is the length, in centimeters, of $\overline{EB}$?

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

10. Jim is building a 3-D scale model of a building, in which ten inches represents 4 feet. How many cubic inches of building material will he need to represent a building with a base that measures 10 feet by 20 feet and is 12 stories high (where one story is 10 feet)? Assume that his building model will be a solid rectangular prism.

2008 Rocket City Junior Math Mania
Probability Test – 7th Grade

1. In the grid of unit squares shown, how many paths of length seven are there from the upper left corner to the lower right corner traveling along grid lines?

2. The probability of rain tomorrow is $\frac{3}{4}$, while the probability of wind tomorrow is $\frac{1}{3}$. If these are independent events, what is the probability that it is neither rainy nor windy tomorrow?

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

4. 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?

5. 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)?

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

7. 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?

8. 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?

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

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