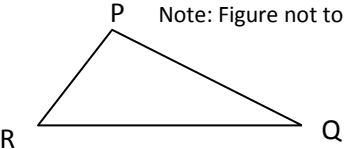
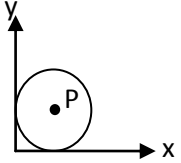
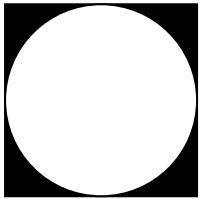
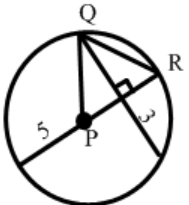
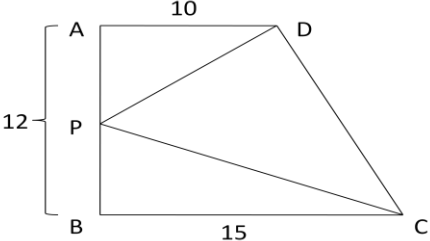
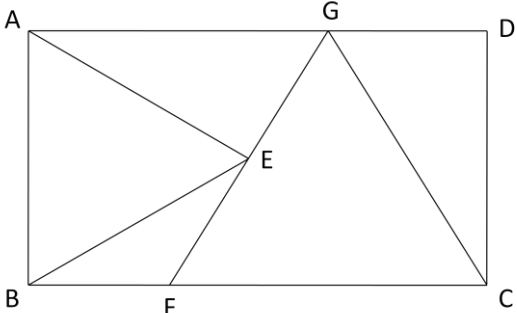




Knights of Pi Math Tournament – May 16, 2009
 Algebra & Geometry 7th/8th

1	Find the value of x : $x = \left(\frac{108}{7}\right) \div \left(\frac{27}{21}\right) - 2\left(\sqrt{\frac{2009}{41}} - 5^3\right)$
2	What is the area, in square cm, of a trapezoid with a height of 6 cm and base lengths in centimeters representing the two smallest prime numbers, respectively?
3	A ladybug lives on a coordinate plane where the positive y -axis is pointing north. It lands at the point $(2, 6)$ and crawls on a straight line toward the point $(8, 15)$. How many units has the ladybug traveled to the east of where it landed at the time when its y -coordinate is 10?
4	<p>In isosceles triangle PQR, the measure of angle R is 92 degrees. What is the positive difference, in degrees, between the measures of angles P and Q?</p> <p style="text-align: center;">Note: Figure not to scale</p> 
5	Austin's parents give him \$50.00 so that he can buy some chips for a party. Doritos cost \$5.25 per bag and Fritos cost \$3.85 per bag. If Austin must buy 3 bags of Fritos for every 1 bag of Doritos he buys, what is the maximum number of bags of Fritos he can buy?
6	<p>The circle in the diagram with center P is tangent to both the x- and y-axes. Given that the area of the circle is 196π, what are the coordinates of point P?</p> <p><i>(Express your answer as a coordinate pair.)</i></p> 
7	A non-degenerate triangle has side lengths of 16, 22, and x . If x must be a multiple of 3, how many possible values are there for x ?
8	 <p>Find the area, in square inches, of the shaded region given that the circumference of the circle is 10π inches and the circle is internally tangent to all four sides of the square.</p> <p><i>(Express your answer as a decimal rounded to the nearest tenth.)</i></p>
9	If $ x - 7 = -4x$, then find the sum of all solutions for x .
10	 <p>Given that the circle shown has center P, find the length of \overline{QR}.</p>

11	1000 unit cubes are assembled to form a larger cube with side length 10. The outside of this large cube is painted. The cube is then disassembled into unit cubes. What is the total number of unpainted faces on cubes that have at least one face painted?
12	Solve for p : $\begin{cases} 3q - 5r = 15 \\ q + r = 10 - 2p \\ 7r - 2q - 4p = 7 \end{cases}$
13	A lamb is tethered to an outside corner of a square barn with sides measuring 22 meters. The rope holding the lamb extends 24 meters. Assuming no other obstructions, what is the total area in which the lamb can graze? (Express your answer in square meters in terms of π .)
14	A cylindrical water barrel is 3 feet tall, 18 inches in diameter, and $\frac{3}{4}$ filled with water. What is the maximum number of spherical iron cannonballs that can be added to the tank without causing it to overflow if each cannonball is 6 inches in diameter?
15	Mr. Nonis is on a spaceship with an engine that runs on space goo. The fuel tank initially contains 60 galactic globules of space goo. It takes Mr. Nonis 8 jiffies to pump a galactic globule of space goo into the fuel tank. The engine burns 3 galactic globules of space goo every 16 jiffies. If Mr. Nonis adds space goo to the fuel tank as fast as he can, how long, in jiffies, can the spaceship's engine run continuously?
16	What is the coefficient of the x^2y^3 term in the expansion of $(x + 3y)^5$?
17	You draw six distinct lines on a square sheet of paper. Each line must touch two edges of the paper. If you then cut the paper along each line, what is the positive difference between the smallest and the greatest number of pieces of paper that can result?
18	<p>If triangle DPC's area is less than or equal to $\frac{8}{15}$ the area of the trapezoid ABCD, how many integer values could \overline{BP} have?</p> 
19	<p>If the figure ABCD is a rectangle and the two triangles ABE and CFG are equilateral triangles, not necessarily congruent, what is the ratio of AB to BC?</p> 
20	A parabola in the Cartesian coordinate plane is defined by the function $f(x) = x^2 - 5x + 2$. Given that $\int f(x) dx = \frac{1}{3}x^3 - \frac{5}{2}x^2 + kx + C$, $\prod_{x=k}^2 \sin x = a$, and that $b = \sqrt[3]{a}$, what are the coordinates of the origin?