GEOMETRY PROBLEMS

NEW HAMPSHIRE STATE TEAM
NATIONAL MATHCOUNTS PREPARATION

1. Geometry Warm–up

(1) Compute the area of a 65–72–97 triangle

(2) Use Pick's theorem to find the area of the "triangular doughnut" formed by subtracting the triangle with vertices $(0,-1),(-1,1),(1,1)$ from the triangle with vertices $(-3,-3),(0,4),(3,-3)$.

(3) Use the shoelace theorem to compute the area of the polygon whose vertices are at $(-1,-2),(-2,5),(1,3),(2,7),(3,-1)$ (connected clockwise).

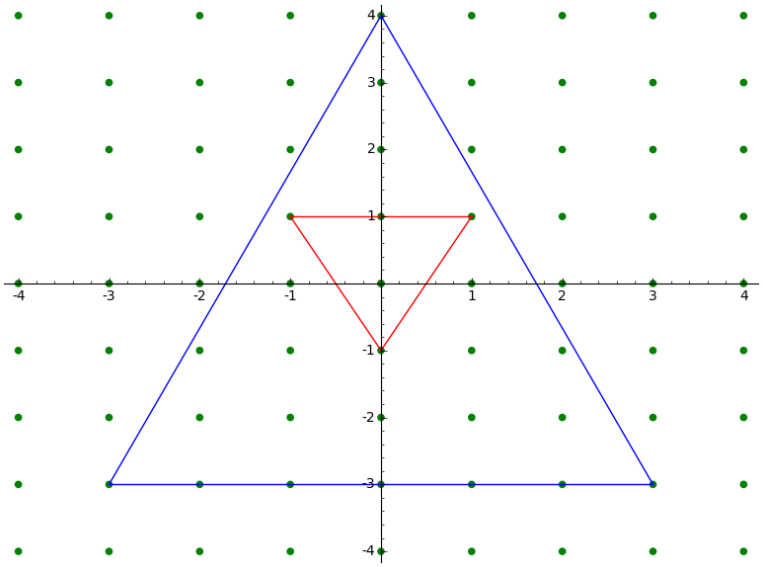
(4) Determine if the triangle with vertices $(1,2),(3,5),(-8,8)$ is a right triangle.

(5) In quadrilateral $ABCD$ $\angle B$ is a right angle and diagonal $\overline{AC}$ is perpendicular to $\overline{CD}$. Also, $AB = 18$, $BC = 21$, and $CD = 14$. Find the perimeter of $ABCD$.

(6) In convex hexagon $ABCDEF$ all six sides are congruent, $\angle A$ and $\angle D$ are right angles and the remaining angles are congruent. The area of the hexagon is $2116(\sqrt{2}+1)$. Find the length of AB.

(7) The lengths of the sides of a triangle are $\log_{10}(15)$, $\log_{10}(8)$, and $\log_{10}(p)$, where p is prime. How many possible triangles are there?

Date: March 14, 2017.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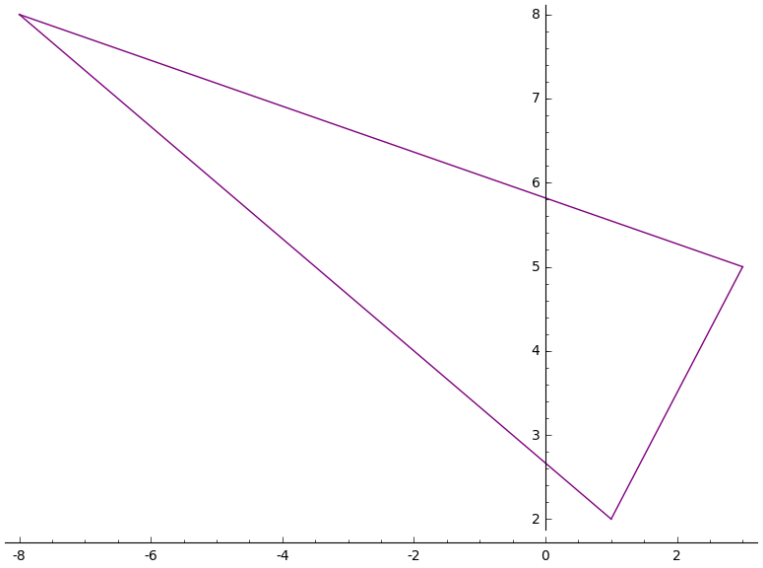
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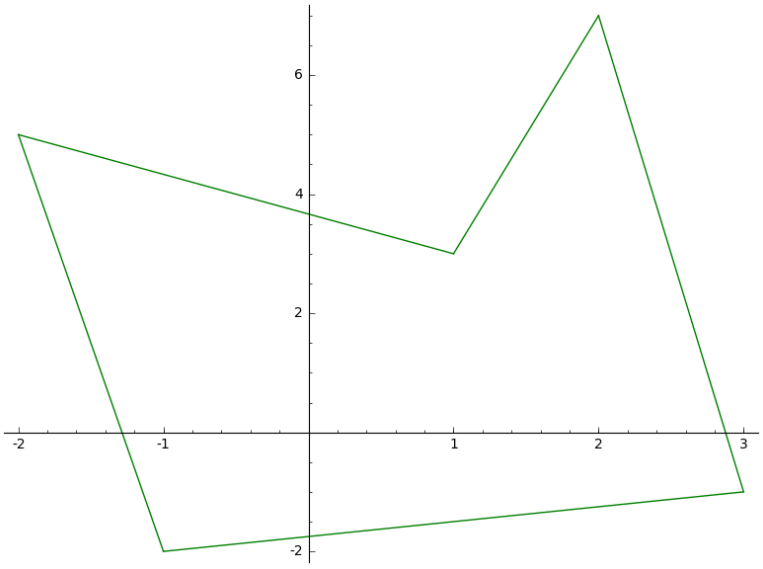
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