Each correct answer is worth 25 points.

1. A line segment connects the origin to the point (1000, 2012). Counting the endpoints, how many lattice points are on the segment? A lattice point is a point with integer coordinates.

2. A kite is flying on a string that is straight and taut. In a light breeze, the string makes a 60° angle with the horizontal. In a strong breeze, the string makes an angle of 45° with the horizontal. If the kite is 40 feet higher in a light breeze than it is in a strong breeze, how long is the string?

3. I have 14 black socks, 8 brown socks and 4 pink socks in a drawer. On a dark morning, I pick two socks at random out of the drawer. What is the probability that the socks match?

4. Solve for x: $\frac{5}{6} \cdot \frac{2}{3} \cdot \frac{1}{2} \cdot x = \frac{x^{5/6} - x^{2/3}}{x^{1/2}}$.

5. Find the value of $m$ so that the equation $\frac{x(x-1)-(m-1)}{(x-1)(m-1)} = \frac{x}{m}$ would have a unique solution.

6. Find the center of the circle that passes through the points (1, 2), (3, -12) and (7, 10).

7. There are $2^6 = 64$ ways to color white or black the six squares in a 2 x 3 array of squares. How many different colorings are possible? Two colorings are the same if one can be moved by rotations or reflections onto the other. For example, the four colorings shown are the same.

8. A square measuring 12 inches on each side is inscribed in an isosceles triangle with two vertices on the base and one vertex on each of the other two sides. A square measuring 6 inches on a side is then constructed with two vertices on the first square and one vertex on each of two sides of the triangle as shown. A third square is constructed in a similar manner. If this process is continued indefinitely, what is the area inside the triangle and outside of the squares?