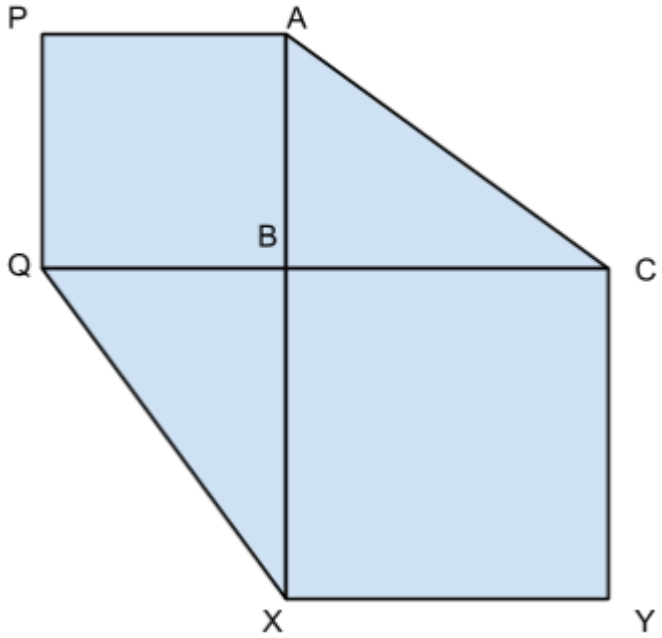
Knights of Pi Math Tournament – December 20th, 2014

Geometry 7th/8th

1	Take square ABCD with midpoints E, F, G, and H of sides AB, BC, CD, and DA respectively. Draw all pairwise segments between the midpoints and the vertices and find the ratio of the area of the octagon to the area of the square.
2	PQBA and BCXY are squares. If AB = 3, BC = 4, and AC = 5, what is the length of QX? 
3	Let circles w1 and w2 intersect at A and B, with AB = 3. Draw the common tangent between w1 and w2 that is closer to B, and let it intersect w1 at C and w2 at D. Given that CD = 6, what is the measure of angle NMB?
4	If the circumference of a circle is 148pi, what is the area of the circle?
5	Let H be the orthocenter and O be the circumcenter of a triangle ABC. Given that <HAB =30, what is the measure of angle OAC?
6	A cube has a side length of 7 meters. You double the side length in all three dimensions. How much greater is the volume now?
7	How many planes of symmetry does an octahedron have?
8	Three vertices of a square are (4,7), (2,3) and (5,4). Find the center of this square.
9	A triangle has side lengths of 4, 9, and 12. Find the length of the shortest altitude

10	ABC is an equilateral triangle. Line L from point A meets BC at P and the circumcircle of ABC at Q. If BQ = 4/7 and CQ = ⅔, what is PQ?

