Lines and Squares: the Connection

Problem 1. We have discovered that the number of intersections in the *Lines* problem follows a progression.

For two lines on top, with an increasing number of points on the bottom:

points on bottom	1	2	3	4	5	6	7	8	9	10
	0	1	3	6	10	15				

For three lines on top, with an increasing number of points on the bottom:

points on bottom	1	2	3	4	5	6	7	8	9	10
	0	3	9	18	30					

For four lines on top, with an increasing number of points on the bottom:

points on bottom	1	2	3	4	5	6	7	8	9	10
	0	6	18	36						

For five lines on top, with an increasing number of points on the bottom:

points on bottom	1	2	3	4	5	6	7	8	9	10
	0	10	30							

Try to fill in the rest of the table by figuring out the pattern. What would you guess the number of intersections for 6 points on top and 6 points on the bottom? What does the pattern have to do with the problem?

Problem 2. We have discovered that the number of intersections in the *Lines* problem is always the same as the number of rectangles in the *Squares* problem? Hint: In the *Lines* problem, what determines (identifies) a particular intersection and, by the same token, in the *Squares* problem, what determines (identifies) a particular rectangle?