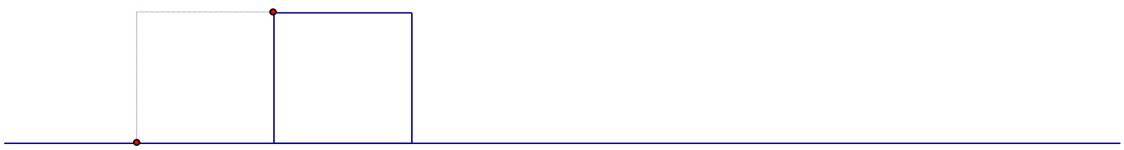
Rolling Polygons

Draw a line segment across your paper.

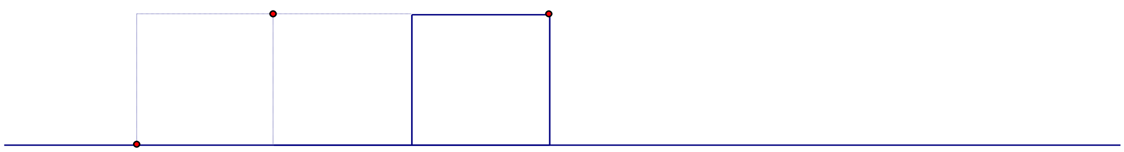
Set the square pattern block on the line near the left end.

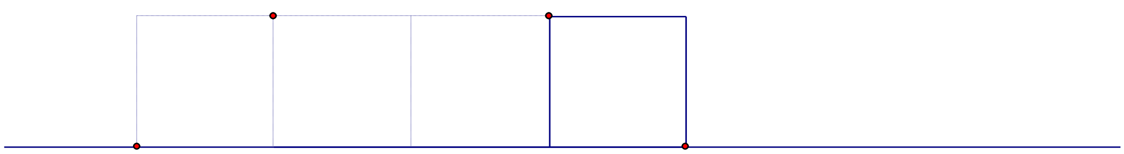
Mark the lower left corner of the square and place a corresponding point on the line.

Rotate the square to the right around the lower right vertex until the square comes to rest on the line (90 degrees in this case). Mark the location of the upper left vertex. (This is the "landing" point of the originally marked corner.)

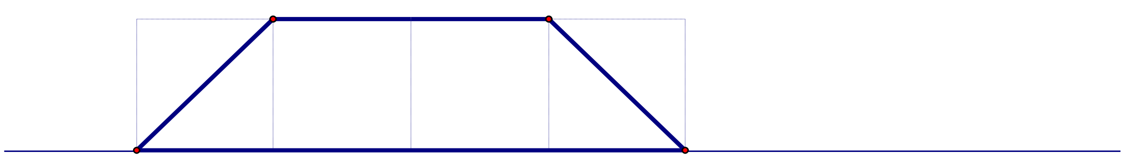


Continue rotating the square and marking the landing spot of the marked corner until the square comes to rest with marked corner on the line.





Connect (in order) the points showing the "landing" spots for the marked corner. Connect the final point with the first point.

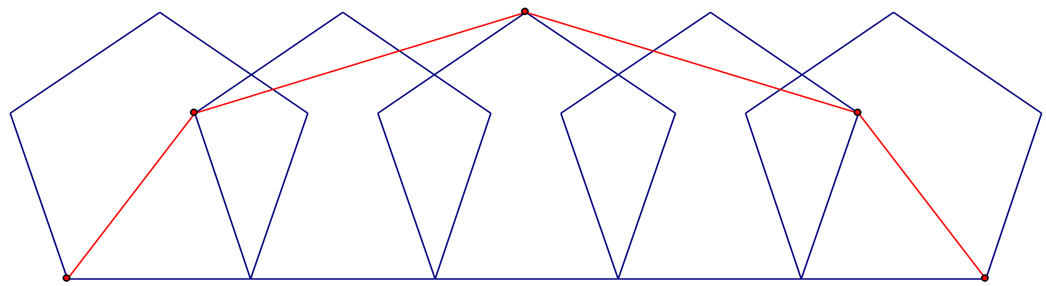


How does the area of this shape (a trapezoid in this case) compare to the area of the original square?

What will happen if this activity is repeated with other regular polygons?

Do the polygons need to be regular? Will you get the same results if you use the non-regular pattern blocks?

Even though the pattern blocks don't include a regular pentagon, try repeating the activity with a pentagon. Can you find the area of the new shape compared to the original without using area formulas?

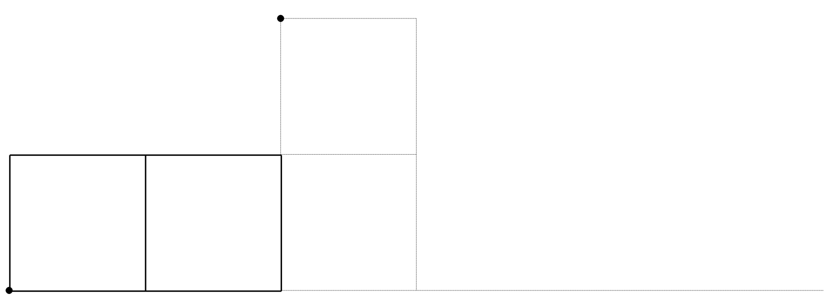


Can you generalize to n-gons?

Can you generalize to a "polygon" with an infinite number of sides? What do you know about this shape?

Rolling Rectangles: An Extension

Start with a 1 X 2 rectangle. Repeat the process of rolling the polygon and marking the corner. How does the area of the figure created by connecting the corner dot compare to the area of the original rectangle? Try a 1 X 3 rectangle? How about a 1 X 4 rectangle? Can you generalize for any 1 x n rectangle?



What happens with m X n rectangles?