What is the probability that this triangle is acute?

P is a random point in a square ABCD. What is the probability that triangle APB is acute? *(Question taken from NCTM Calendar problems 100 favorites)*

The Squeak project let the student explore the subject in 3 different ways:

1) Check random points to get a visual idea of the variables above.

2) Check many random points (random samples) and leave marks that differentiate "acute" spots from "non-acute" spots. Compute ratio between number of acute spots and total number of spots and get probability of event in the sample. Observe pattern of distribution of color spots in the square and continue with Geometry.

3) Systematically scan the square, pixel by pixel, check each one whether it creates an acute triangle with AB. When the answer is yes, leave green and count in YES group, when no, mark in red and count in NO group. The ratio between the number of element in the YES group and the total number of checked points is approximation to the desired probability. The patterns that the colored spots create give us insight to the geometry.

Included is a squeak book with directions, hints about the programming and few additional questions to explore.

No Squeak required for demonstration purposes.

Math Key Words: probability, geometry, random, random number, Sample, acute triangle, approximation, geometric proof, Pi

Squeak Key Words: "basic" menu, random number, numeric variables, test for numeric value, "turn toward dot" tile, use of properties of 2 objects in one script tile, pen use

Grade Level: High-School

NCTM standard for grades 9-12:

Geometry: Analyze characteristics and properties of tow-and three-dimensional geometric shapes and develop mathematical arguments about geometrical relationships.
Use visualization, spatial reasoning, and geometric modeling to solve problems.

Measurements: Apply appropriate techniques, tools, and formulas to determine measurements.

Data Analysis and Probability: Formulate questions that can be addressed with data and collect, organize, and display relevant data to answer them.
Develop and evaluate inferences and predictions that are based on data.
Understand and apply basic concepts of probability.

Squeak Project: Acute Triangle Question
Related Projects: NewLociConnectors (Squeak)