

Table of Contents:

Forty-Five, Forty-Five, Love.....	6
<i>Applying the properties of special right triangles to measure the length of a tennis court net.</i>	
Probably Pi	9
<i>Using the concepts of probability and geometry to estimate the value of π.</i>	
Rolling Reuleaux	12
<i>Collecting data, making predictions, and solving systems of equations.</i>	
Statistical Sampling	18
<i>Estimating the number of items scattered in a field using three different methods of statistical sampling.</i>	
Similar Shadows.....	24
<i>Determining the height of objects using shadows, measurement and similar triangles.</i>	
Experimental and Theoretical Probability	26
<i>Learning about experimental and theoretical probability using colored tiles.</i>	
Perimeter and Area Tiles.....	30
<i>Using unit tiles to develop concepts of area and perimeter of rectangles.</i>	
Polygon Garden.....	33
<i>Students demonstrate geometry knowledge by designing a garden through a scale drawing.</i>	
One-Variable Carnival	36
<i>Collecting interesting one-variable data to create histograms, stem-and-leaf charts, circle graphs, etc.</i>	
Check Plus	45
<i>Complete handouts and suggestions for a classroom checking account unit.</i>	

Appendices

TI-83+ Program "PROB"	50
<i>Source code and manual for a graphing calculator program to replicate Probably PI activity.</i>	
Statistical Sampling Notes and Tests.....	53
<i>Sample presentation slides and assessments to accompany Statistical Sampling activity.</i>	
TI-83+ Program "PIZZA"	61
<i>Instructions and code for a program to find the area of arcs such as in Statistical Sampling activity.</i>	
Checking Account Sample Assessment	62
<i>Assessment verifies students' ability to correctly use check register, check, and deposit slip.</i>	

FORTY-FIVE, FORTY-FIVE, LOVE

Overview:

This activity allows students to use the properties of special right triangles to make measurements. The project roughly simulates a team of surveyors measuring distance.

Students will measure the width of a tennis court's net without stepping inside the boundaries of the court. The lab is written using the properties of a 45-45-90 triangles, but can be adapted to a 30-60-90 triangle or – with the use of trigonometric functions – any right triangle.

Concepts & Vocabulary:

Students should understand that special right triangles have a defined ratio between the lengths of their legs. Teams should be able to measure angles with a protractor and distances with a tape measure or other appropriate tool (trundle wheel, meter stick, etc.). Appropriate vocabulary for this activity includes triangle, hypotenuse, leg, isosceles, ratio and degree.

Materials:

Per team (2 – 4 students):

- Protractor
- Straw
- Measuring tape
- Scissors
- Tape

This activity is written to take place outdoors on a tennis court. Each team can work on half of a court (dividing the court by the net). The instructor can conduct this project in other settings with minimal adaptation. Perhaps asking students to calculate the width of a courtyard or the distance to an object on the far side of a fence.



Student Directions:

Your challenge in this activity is to measure the length of the net on a tennis court without stepping inside the boundaries of the court. To find this length, you will use your knowledge of special 45-45-90 triangles.

Materials:

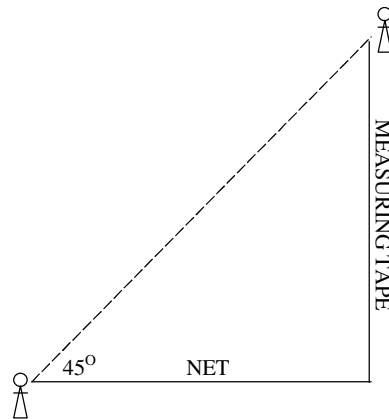
- Protractor
- Straw
- Measuring tape
- Scissors
- Tape

Procedure:

- Cut a straw into a five-inch length.
- Use a single piece of tape to secure the straw to the protractor. Tape the straw to the right side of the protractor's arm so that the center of the straw passes over the small hole at the center of the protractor.

The following procedures will be conducted outside. While working at the tennis courts, be sure not to step inside the green area of the court. Each time a team member steps inside the boundaries of the court, the team's score will be reduced five points.

- Stretch the measuring tape along the side of the tennis court. The tape should start at the net and extend perpendicular to the net toward the back of the court.
- On the opposite side of the court, place the protractor on the post supporting the net. The center hole of the protractor should be directly above the center of the post.
- Adjust the protractor so that the straight edge lines up with the net and the straw points toward the middle of the court at a 45-degree angle.
- Direct a team member to move along the measuring tape until they are visible looking through the straw.
- Read the measuring tape and record the distance between the team member and the net.



- Collect all of the team's materials and return them. Be sure to remove all tape from the protractor.

Results:

Use the collected data and properties of right triangles to calculate the length of the net. Each team member should turn in a sketch of the court as it appeared during your activity. Be sure to label relevant locations and all measurements calculated or measured by the team.

Grading Guidelines:

Preparation 20 pts.

Protractor/Straw Construction
Measuring Tape Placement

Procedure 30 pts.

Angle Measurement
Distance Measurement
Net Length Calculation

Cleanup 10 pts.

Results 40 pts.

Sketch
Label Locations
Label Measurements
Neatness

Total 100 pts.

Stepping Inside Tennis Court -5 pts.

