

Texas Instruments Activity #9

Title: Area Between the Curves – The Game

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Estimated Time: 40-50 Minutes

NCTM Standards:

Communication Standard – Organize and consolidate their mathematical thinking through communication.

Connections Standard – Recognize and apply mathematics in contexts outside of mathematics.

Algebra Standard – Understand patterns, relations, and functions. Approximate and interpret rates of change from graphical and numerical data.

Topics in Calculus:

Integrals, Applications of Integrals

Overview:

This activity is set-up as a game in which paired students each pick a function, then predict the area between the two curves, without knowing the other person's function. Then, the students find the area between the functions and determine the winner.

Teacher Directions:

Break the students into pairs, using your preferred method. Then explain the rules of the game. (The rules are listed on the student sheet. This will help to eliminate any misunderstandings about the rules.) There is a list of functions that are included with the game. However, feel free to add or delete functions as needed.

Supplies: TI-89 Graphing Calculator

AREA BETWEEN THE CURVES

The objective of this activity is to determine whether the area of between the two curves you selected is the greater than or less than a certain area. In pairs, follow the steps below. Each time you complete the entire set of directions, you will have completed a round. The first person will be $f(x)$ and the second person will be $g(x)$.

STEP ONE: Have each person select a type of function below and create a function out of it. Make values for the parameters, a, b, c, \dots . Do not show the other person your function. Write the function on the score sheet, in your space. You cannot use the same function more than once.

STEP TWO: Without seeing the other person's function, decide on a number for which the area between the functions is either above or below. Write this number in the spaces provided, on the second page. (Remember that areas must be positive.)

STEP THREE: Decide which side of the number each of you will have. (The areas less than the number from STEP TWO or the areas greater than the number from STEP TWO.) If you are unable to decide, flip a coin or alternate between rounds.) Write this number in the space titled "Magic Number" provided on the score sheet.

STEP FOUR: Now, reveal your functions to each other, write the other person's function in the corresponding spaces on the score sheet.

STEP FIVE: Find the area between the curves using your TI-89 graphing calculator. First graph the two functions to find the intersection points, then, Make sure that both of you complete the calculation so that you can compare the answers. To solve for the area using the TI-89, press $\boxed{2nd}\boxed{[f]expression1}\boxed{-}expression2\boxed{[]}lower\ bound\boxed{[]}upper\ bound\boxed{[]}\boxed{(X)}\boxed{[]}\boxed{ENTER}$.

STEP SIX: Now, determine the winner of the round. The winner of the round receives one point for winning the round. If the answer is the same as the number from STEP TWO, then both of people will receive one point.

$ax^2 + bx + c$	$ax^3 + bx^2 + cx + d$
$a \cdot e^{(bx+c)} + d$	$a \cdot \ln(bx + c) + d$
	$ax + b$
$a \cdot \sin(bx + c) + d$	$a \cdot \cos(bx + c) + d$

The Area Between the Curves
Score Sheet

Round 1		Magic Number	Area
$F(x)=$	$G(x)$		
Round 2		Magic Number	Area
$F(x)=$	$G(x)$		
Round 3		Magic Number	Area
$F(x)=$	$G(x)$		
Round 4		Magic Number	Area
$F(x)=$	$G(x)$		
Round 5		Magic Number	Area
$F(x)=$	$G(x)$		
Round 6		Magic Number	Area
$F(x)=$	$G(x)$		
Round 7		Magic Number	Area
$F(x)=$	$G(x)$		
Round 8		Magic Number	Area
$F(x)=$	$G(x)$		
Round 9		Magic Number	Area
$F(x)=$	$G(x)$		
Round 10		Magic Number	Area
$F(x)=$	$G(x)$		
Round 11		Magic Number	Area
$F(x)=$	$G(x)$		
Round 12		Magic Number	Area
$F(x)=$	$G(x)$		
Round 13		Magic Number	Area
$F(x)=$	$G(x)$		
Round 14		Magic Number	Area
$F(x)=$	$G(x)$		
Round 15		Magic Number	Area
$F(x)=$	$G(x)$		
Round 16		Magic Number	Area
$F(x)=$	$G(x)$		
Round 17		Magic Number	Area
$F(x)=$	$G(x)$		
Round 18		Magic Number	Area
$F(x)=$	$G(x)$		

Score

Name	Score Tally	Total
$F(x)$		
$g(x)$		