A Sprinkler System
Geometry:
McDougal Littell, *Geometry, Starting Point" Alternative Lesson Openers©2001*
Modified for TI-Nspire TouchPad by:
        Ray Fox, John Overton H.S. Nashville, TN

Teacher's Guide

Activity Overview: The objective is to deploy sprinklers in a design to cover a 24' X 48' lawn.
        Students need this lesson to:
                1) Appreciate the art of math
                2) Master the concepts of circles, semi-circles, and quarter circles
                3) Use the TI-Nspire TouchPad to create geometric designs

Textbook connection: *Geometry* by McDougal Littrell, © 2001
State Standards: TN: Course Level Expectations (CLE)
        3108.4.4: Develop geometric intuition and visualization through performing geometric constructions with… technology.

Webb's Depth of Knowledge: Level 4 (Extended Thinking)
        ✓ **Analyze** where and times of overlap
        ✓ **Create** additional designs

Watch Video at: *(May need to copy and paste into URL)*
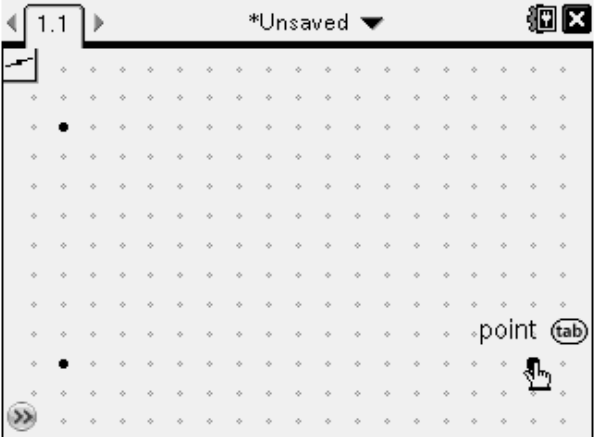
http://teachertube.com/members/viewVideo.php?video_id=180086&title=A_Sprinkler_System

Design a Sprinkler system for a 24' x 48' lawn using the TI-Nspire TouchPad

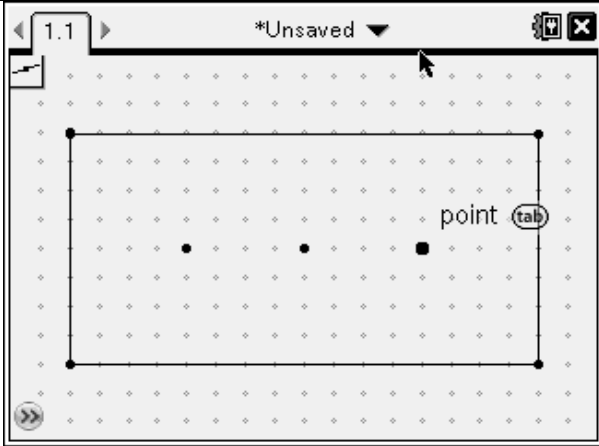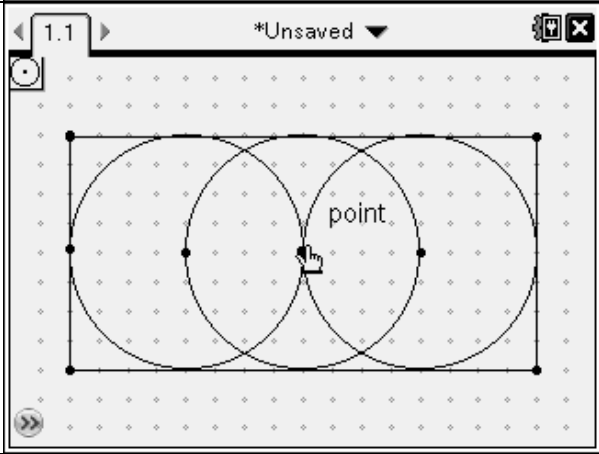|	
Open a New Document from the HOME Screen	(⌂ on) (1) It is your choice whether to Save
Add Graph as Geometry does NOT have grid option available	2: Add Graphs
Close the entry line Hide the Axis Show Gird Points	(ctrl)(G) (menu) [2: View] [4: Hide Axes] (menu) [2: View] [5: Show Grid]
Place points on three (3) corners for the rectangle (scale 1 grid = 3') (menu) [7: Points & Lines] [2: Point On] *(Points On ensures the point is on the grid)* Pr ess ⟐ twice to place point (Hint: use (ctrl)(+) to darken points)	
Use the points as a guide for the rectangle	(menu) [9: Shapes] [3: Rectangle] Move cursor by gently sliding finger on the TouchPad until cursor is on top of one point

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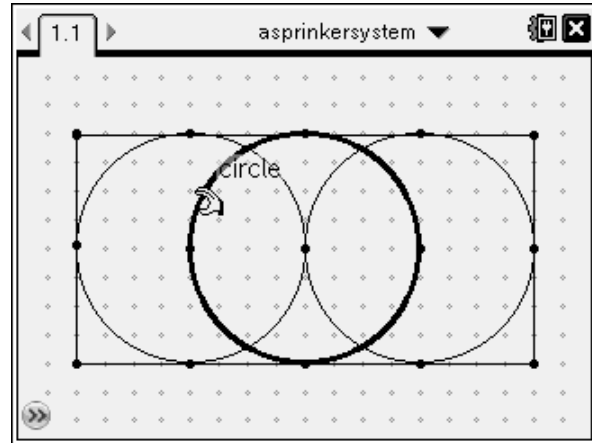|	
	(enter). Move cursor to second point & (enter), continue to third point & (enter) (esc) to stop using the Point & Lines tool
Use "Point On" to set the first three full circle sprinklers. Space them evenly across the middle of the lawn.	
Use the three points as a location for the sprinklers. Draw circles to demonstrate the water spray of the three "full circle" sprinklers. (menu) [9: Shapes][1: Circle] Use the TouchPad to one of the sprinkler location and (enter), move to the edge of the lawn & (enter). Repeat the process for the other two sprinklers until it looks like the screen at right.	
What is the area of the Lawn	*1152^2 feet*
Estimate the area watered.	*1040^2 feet*
What would be the area not watered?	*112^2 feet*
What is the area receiving double watering?	*353^2 feet*

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Locate sprinkler heads around the edges to ensure all areas receive a share of water.	
Since we cannot directly create semi circles, First place circles at the points on each side.	
Now to conserve water we will set the sprinklers to semi circle spray. (menu) [7: Points & Lines] [9: Arc Circle] *It takes three points to designate an Arc…begin, side, end. Put the side point somewhere other than at an intersection.*	

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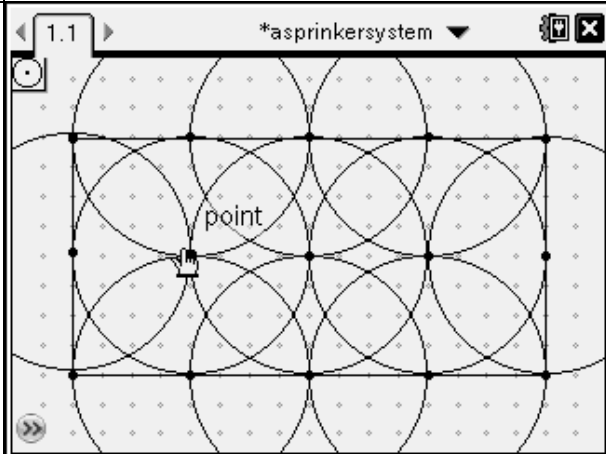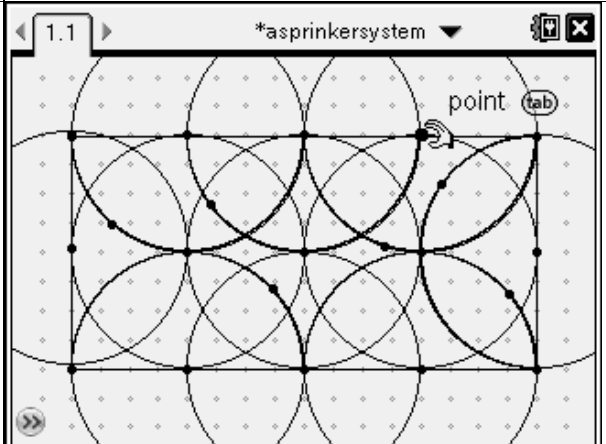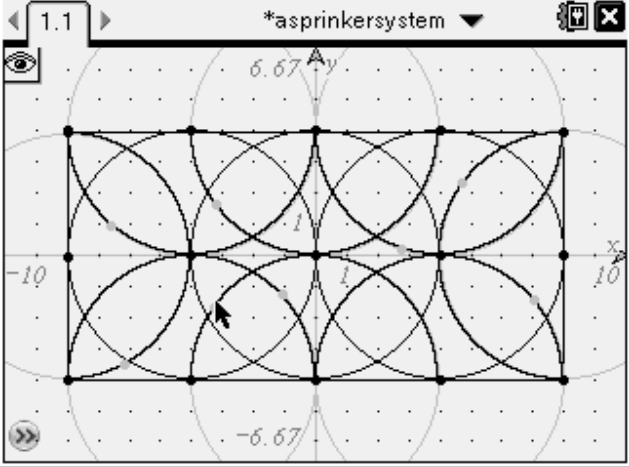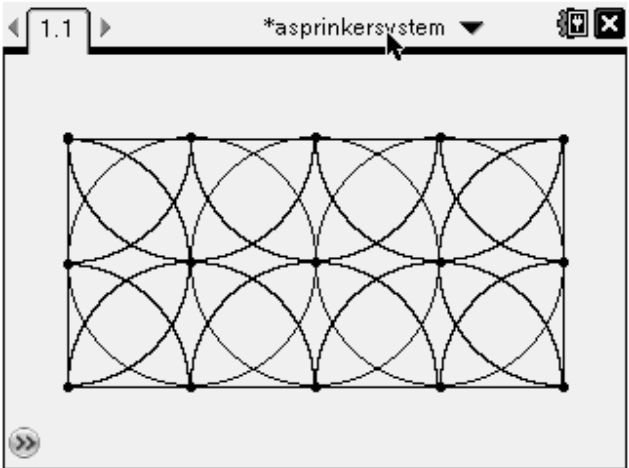**Modified for TI-Nspire TouchPad by:**
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Now hide the circles, but leave the arcs
 	
(menu) [1: Actions] [3: Hide/Show]
    Use the TouchPad to guide the cursor to the circles & (enter) to hide.
 	
    Move cursor to the points on the side of the arcs and hide them also.
 	
    Make sure the text agrees with what you are hiding. If you make a mistake, click on the object and it will reappear.
 	
(esc) (To exit the Hide Tool) and the hidden objects will disappear.	

We still need to add corner sprinklers. (menu) [9: Shapes] [1: Circle] Next indicate the Arc Circle for the ¼ Spray onto the lawn. Finally hide the circles (& points) so only the lawn portion is watered. (esc) (To exit the Hide Tool) and the hidden objects will disappear.	
Are there any areas that are not watered from at least two directions?	*No*
Either use the screen capture to print a copy of the finished sprinkler design, enlarge, and make copies for the students	Have students label each section of the lawn with how many directions from which it is being sprinkled. Students should color all the like numbered sections the same color. Posted the colored pictures around the room.
Challenge students to design sprinkler system(s) for various size and/or shape lawns.	Extension: Use the pictures for a template for stained glass windows.