Geometry_ConstructCenter_Trogdon.doc

This activity contains instructions for creating a table of coordinates for 3 non-collinear points to be used to determine the center and measure the radius for the circle that contains the points. The user will plot the points in a scatterplot, construct the circle's center, identify its coordinates, and measure the radius using the Nspire tools and utilities.

Problem 3 of the Geometry_ConstructCenter_Trogdon.tns activity

Insert a page after the introductory page of Problem 3.
(Use /c > 2: File > 7: Insert Page, then chose 3: Add Lists and Spreadsheets)

Step 1: Move to the entry block in the heading of List A and type in *xcoord* as the variable for the *x*-coordinates of your points, then move to the entry block for List B and type *ycoord* as the variable name for the *y*-coordinates of your points. (Use b > 1: Actions > 2: Resize to widen the Columns A and B so that the variable names show.) Use the right arrow of the Nav Pad to make each column wider so the variable names can be seen in the column heading. You will have to do each column separately.

Step 2: Enter the coordinates of 3 non-collinear points in the columns. The points (-3,1), (4,2), and (1,-7) will determine a circle with a center with integer coordinates and an integer radius. You can also use 3 points of your choice.

Insert another page for your scatterplot and constructions.
(Use /c > 2: File > 7: Insert Page, then chose 2: Add Graphs and Geometry)

Step 3: Prepare this page to display the scattergram and the circle determined by the points. You won't need the Entry Line, so go ahead and hide it. (Use b > 2: View > 6: Hide Entry Line, then ·.) You will need to set the Window Settings so that when you draw the circle it looks like a cirle. A horizontal to vertical ratio of 3:2 works well, e.g. [-15, 15] by [-10,10]. (To set the Window, use b > 4: Window > 1: Window Settings. You can use e to cycle through the fields as you change them.)

Step 4: Time to plot your points. (Use b > 3: Graph Type > 3: Scatterplot > ·.) You will be at the bottom of the screen with the *x*-variable block highlighted. You can press · or the a, then choose *xcoord* from the list and press ·. Next e to the *y*-variable block and repeat the variable selection process to choose *ycoord* as the variable. The general ordered pair (*xcoord*, *ycoord*) will appear on the screen, so grab and drag it into an open space on the screen.

Step 5: Now it is time to do the construction to find the center of the circle. Create 3 segments connecting your points to form a triangle. (Use b > 6: Points and Lines > 5: Segment > ·. Move the pencil cursor to one of the points and press ·, then move to a second point and press ·. Repeat the process to connect the 2nd point to the 3rd point, then the 3rd point back to the first.) Construct the perpendicular bisector to each of the segments. (Use b > 9: Construct > 3: Perpendicular Bisector > ·. Move the pencil cursor to highlight each segment and press · to make the perpendicular bisector appear.) The three perpendicular bisectors should have a common point of intersection.

Step 6: Find the point of intersection of any two of the perpendicular bisectors to fix the center of the circle. (Use b > 6: Points and Lines > 3: Intersection Points > ·. Move the finger cursor to highlight one of the 3 bisectors and press ·, then highlight another one and press · to get the point of intersection.) The coordinates of the center of the circle you just found must be identified. (Use b > 1: Tools > 6: Coordinates and Equations > ·. Move the cursor to highlight the center point and press ·.) A faint ordered pair will appear and the curser is set to drag it to a location on the screen that is out of the way. Press · to place the ordered pair at a convenient location. You now have the coordinates (*h*, *k*) of the center.

Step 7: The radius of the circle determined by your points is the distance from the center to any of your 3 points. You need to measure the radius. (Use b > 1: Tools > 7:Measurement > 1: Length > ·. Move the cursor to highlight the center and one of the points and the radius will appear faintly. The cursor is engaged to move you radius measurement to an uncluttered place on the screen and press ·.

Step 8: It would be unthinkable to conclude an activity about finding the center and radius of a circle without actually drawing the circle on your TI-Nspire! Time to make the circle. (Use b > 8: Shapes > 1: Circle ·, then drag the pencil pointer to the center of the circle and press · and then drag the pencil pointer to highlight one of the points and press ·.) Congratulations! You have constructed the circle determined by any 3 non-collinear points, located its center, and measured its radius. In problem 4 you'll get to write the equation for your circle.

Step 9: Other changes to your Graphs and Geometry screen display. Possibly you would like to remove the general (xcoord, ycoord) from view. (Use b > 1: Tools > 2: Hide/Show ·, then move the eyeball cursor over the ordered pair and press · to hide it.) You may want to label the radius and the coordinates of the center with text identifying what they are. (Use b > 1: Tools > 5: Text ·, then position the text cursor near where you want the label to appear, press · and key in your labels.) You can adjust the location after completing the label with grab and drag.