Wolfram Demonstrator - Polar and Rectangular Coordinates

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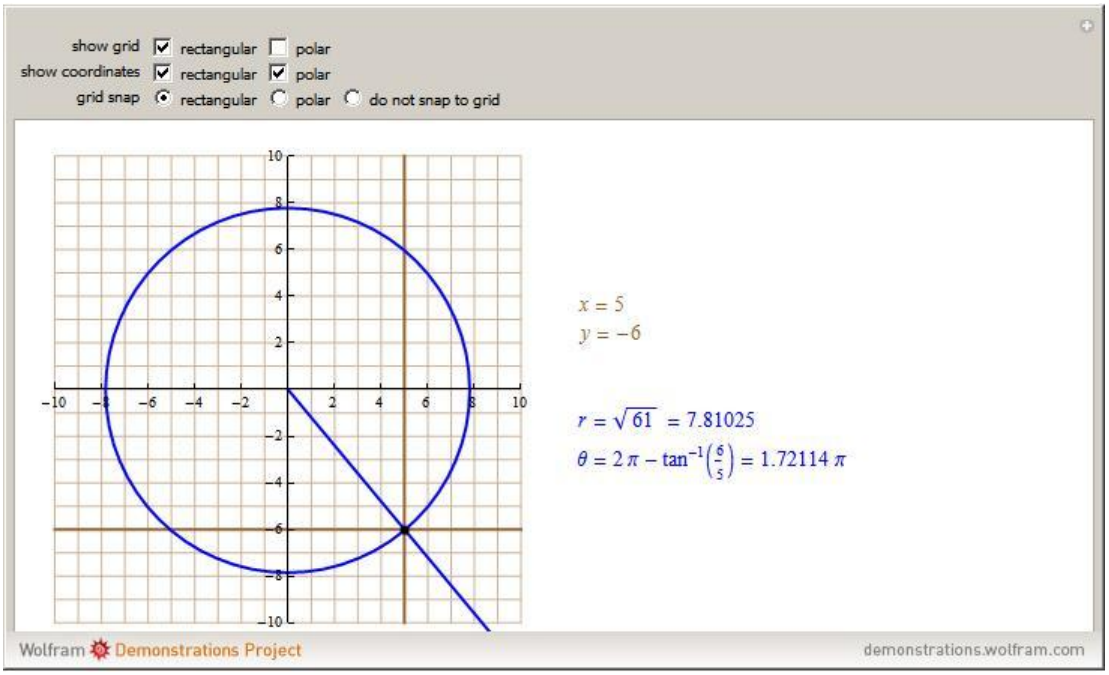

Students compare the rectangular and polar coordinates of a point. They are able to choose the grid lines they want to see (just rectangular, just polar, both or neither) and whether the point (a locator) snaps to a rectangular or polar grid. They can also see the rectangular and polar coordinates listed to the right of the diagram.

Grade Level: 10-12
PSSM Content Standard: n/a
CCSSM Content Standard: n/a
Math Content: Polar and Rectangular Coordinates

Evaluation

What is being learned? What mathematics is the focus of the activity/technology? Is relational or instrumental understanding emphasized?

Students are learning what a point graphed on a polar grid and a rectangular grid looks like. They can see the relationship between both grids and the coordinates (in polar form and rectangular form). The main focus is for students to be able to work with polar coordinates. An instrumental understanding is being emphasized.

How does learning take place? What are the underlying assumptions (explicit or implicit) about the nature of learning?

Students learn by moving a point around either a rectangular grid, polar grid, or something both at the same time. The point can "snap" to either a convenient polar coordinate or a convenient rectangular coordinate. There is explicit learning taking place. Students are not being given the conversion formulas (only the coordinates if they choose), but they are able to manipulate the points to make their own discoveries.

What role does technology play? What advantages or disadvantages does the technology hold for this role? What unique contribution does the technology make in facilitating learning?

Technology lets students see immediately the polar coordinates and rectangular coordinates. I do a very similar activity with a pen and paper or smiley face stickers and paper. We can only put so many point and lines on our paper before it starts to look sloppy and hard to follow. This technology is great because students can look at one point for as long as they need. If it was used with a smartboard the teacher could draw the triangles to help students see where the conversion formulas are derived from. The main disadvantage is that students can't put this website in their notes. I would have a paper copy for them to summarize their findings after playing with the demonstrator.

How does it fit within existing school curriculum? (e.g., is it intended to supplement or supplant existing curriculum? Is it intended to enhance the learning of something already central to the curriculum or some new set of understandings or competencies?)

This website is designed to supplement existing curriculum and enhance the learning of polar coordinates. It gives students a chance to visually see what is happening when they are plotting points. Many students struggle with polar coordinates just for the fact that they are so used to rectangular. This could be a great website to use multiple days. The first day just to practice with their polar coordinates and then another day to work on converting between polar and rectangular.

How does the technology fit or interact with the social context of learning? (e.g., Are computers used by individuals or groups? Does the technology/activity support collaboration or individual work? What sorts of interaction does the technology facilitate or hinder?)

I would suggest that students work on this individual. Individually would be ideal and then have students do a think-pair-share activity with their results. It would be very easy for one student to take over and a partner to get bored. I think this is an activity that students would also like to do at home when they are studying.

How are important differences among learners taken into account?

There aren't any modifications to be made to this assignment. It is just a supplement to learning about polar coordinates.

What do teachers and learners need to know? What demands are placed on teachers and other "users"? What knowledge is needed? What knowledge supports does the innovation provide (e.g., skills in using particular kinds of technology)?

This is one of the easiest pieces of technology that I've used. You have to have wolfram demonstrator downloaded, which does take some time, but after that it's all very self explanatory. There is also and auto run mode to see an example before students start. The biggest thing to notice is that you can change the settings to fit your needs (what type of graph to show and whether or not to "snap" to convenient points).