

Designing a Shape

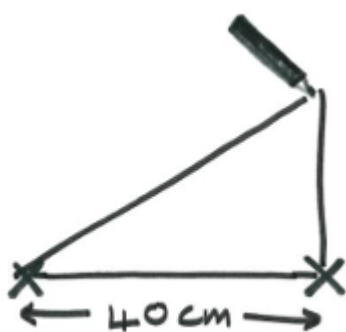
Annotation

Phil is able to describe the locus defined by a set length of string and a set of points. He applies a scale factor to model the problem, producing a similar shape to the solution to the problem. He recognises the ellipse as the locus of points with a constant sum of distances to two foci.

Problem: Designing a Shape

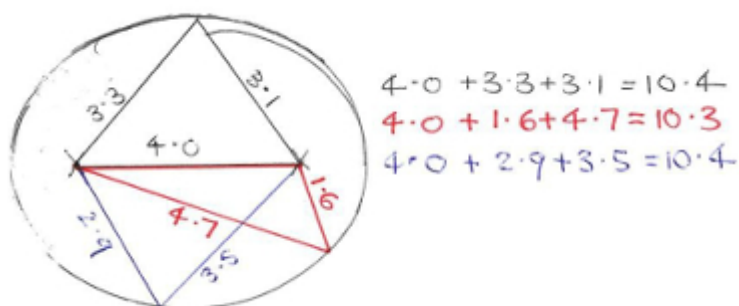
The teacher poses the following task:

Jaime wishes to make a coffee table. To make the top of the coffee table, she first puts two nails, 40cm apart, into a sheet of plywood. Then she makes a loop out of 100 cm of string. With a pencil, she makes a shape as she draws around the nails with the string stretched tight all the way around. Model this situation to find and to describe the generation of the shape of Jaime's coffee table .

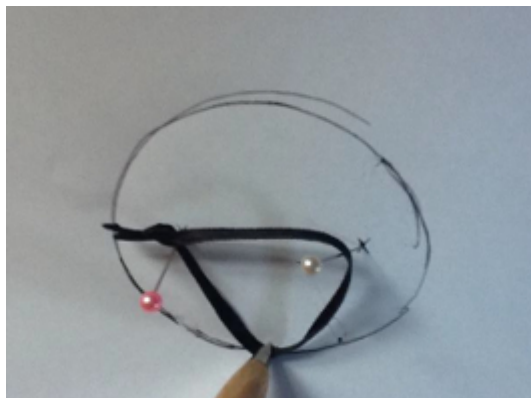


Student Response

Phil: Jaime's coffee table will be an oval shape. We can also call this an ellipse.



Teacher: This looks great. Talk me through what you've done here, Phil.



Phil: I thought the path would be like a circle, but not quite because of the two nails rather than one at the centre. So I decided to make a scale model and made my own version with pins and a ribbon and did it all to one tenth of Jamie's dimensions.

Teacher: I am very interested in the triangles that you've drawn and measured on your model.

Thank you. I noticed that the ribbon made a triangle when I stretched it tight. I also thought about the loop of ribbon being just 10cm in total, so the perimeter of all the triangles that I made when I traced the path would always be 10 cm. Well, actually I didn't

Phil: tie it to exactly 10 cm, it was more like 10.3 or 10.4 as you can see from my measurements. Then I checked this idea with three different ones. My model was a bit wobbly so I measured out to bits of the ellipse where it was tidy...but if I'd drawn things really tidily, it would have worked for **any** triangle that I could fit.

Teacher: Can you please tell me exactly what you mean by 'fitting'?

I mean each triangle has two corners, vertices, at the pin points and a perimeter of 10 cm.

Phil: But my model was good enough to tell me that Jaime's coffee table will be an ellipse, just bigger than mine.