
Connections

The Chapter Problem

For this *Chapter Problem*, students will design several different arches, creating and testing various conic models.

The arches they design must allow the described trucks to pass under the arches. Students should model their designs using equations and diagrams. They must also justify their designs, showing that the designs satisfy all the original criteria.

Students should choose what they think are their best designs and test their models before doing so. They might also research the design of bridges, arches, and factors that affect support.

Use the Chapter Problem on an ongoing basis as the chapter develops. For instance, as students learn more about circles, they should create semicircular models. When they complete section 7.4U about ellipses, they should create semielliptical models. Alternatively, students could solve the Chapter Problem after the entire unit has been taught. A blackline master listing all of the questions is provided at the end of the chapter. In addition, the guidelines to solutions for these questions are also provided.

Challenge 1

Satellite dishes are everywhere. This question allows students to explore the conical nature of a satellite dish by looking at the reflector in a simple flashlight. Students will need to take a flashlight apart and measure parts of the reflector to create appropriate graphical and algebraic models. They will make circular, elliptical, and parabolic shapes by shining the flashlight on the wall at different angles. Then they will decide whether these shapes are truly conical by tracing the images on graph paper and finding the corresponding equations of best fit. Students can also gather data about home-television satellite dishes or from distributors of satellite dishes.

Challenge 2

This problem would appeal to students interested in advertising or graphic design. Students need to find photos or illustrations in which they can identify conics. Then they should make conjectures about the type of conic and verify, through graphical and algebraic modelling, their conjectures. Encourage them to present their investigations as posters.

Web Challenge

You will find support for this Internet activity at the teachers' Web site: www.math.Nelson.com.

All three Challenges can be used as rich learning tasks or for formative / summative assessment purposes. Refer to the front matter of this *Teacher Resource* for more detailed instructions.