Exploring the Parabola

ExploreParabola.tns

Name _____

Class _____

Introduction

- *A volunteer from the class becomes the most popular person in the school—everyone wants to be close to this person. How can you arrange yourselves to all be equally close to the person?*
- *Two volunteers are now equally popular but very jealous—everyone wants to be close to them, but never closer to one than the other! How could the friends of these two people arrange themselves?*
- *Consider one very popular person, and the most popular group, lined along the wall at the school dance, hand in hand. How will others arrange themselves so as to be equally close to both the individual and any single person from the group?*

Problem 1 – Exploring the parabola

On page 1.2, drag the two points on the graph. What do you notice?

Now take the locus of the line as you move the point on the segment. Go to **MENU > Construction > Locus**, click on the solid line, and then click on the point on the dotted segment.

- What shape does the locus create?

Move to page 1.3. Take the locus of point *P* as point *D* traces the *x*-axis. Drag points *F* and *D*.

- What effect do the points *F* and *D* have on the locus?

- Where does point *P* lie in relation to points *F* and *D*? Use the **Length** tool to measure the distance.

On page 1.5, drag point *F* to (0, 4) or click twice on the coordinates to change them. Move (✣) and change (⁒) the graph of $y = x^2$ to match the bold curve.

- What is the equation of the parabola with the focus at (0, 4) and directrix on the *x*-axis?

Move points *F* and *D* to answer the following questions.

- What is the equation of the parabola with the focus at (2, 3) and directrix $y = 0$?

- What is the focal point for the parabola with the equation, $y = 0.125(x - 3)^2 + 2$?

- What is the significance of the coefficient of *x* in each of these equations?

- Can you find the general form for the equation of a parabola with its focus located at (*a*, *b*) and directrix on the *x*-axis?

The diagram on page 1.12 shows a ray of light (bold lines) as it passes through the focus, hits, and then reflects off of a parabola.

- Move points *F* and *D*. What do you observe about the ray of light?