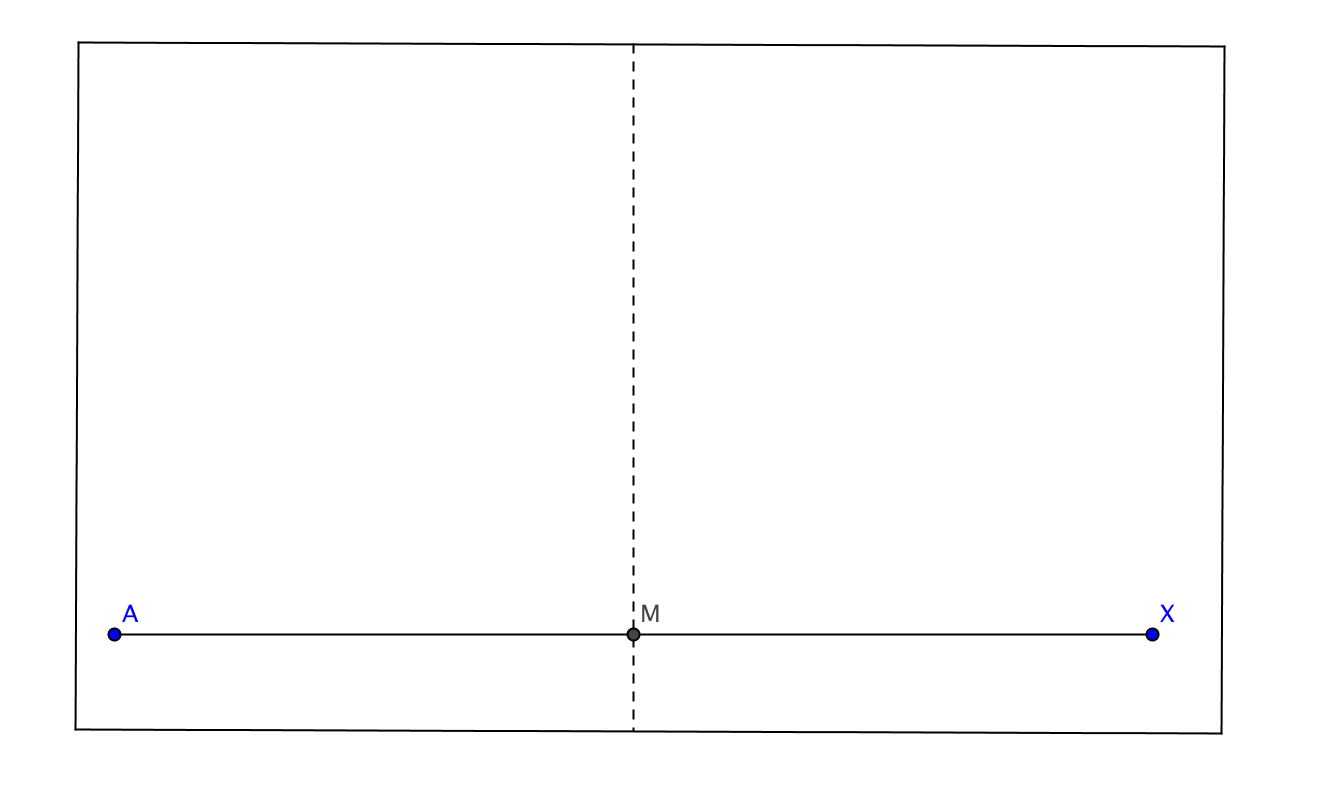
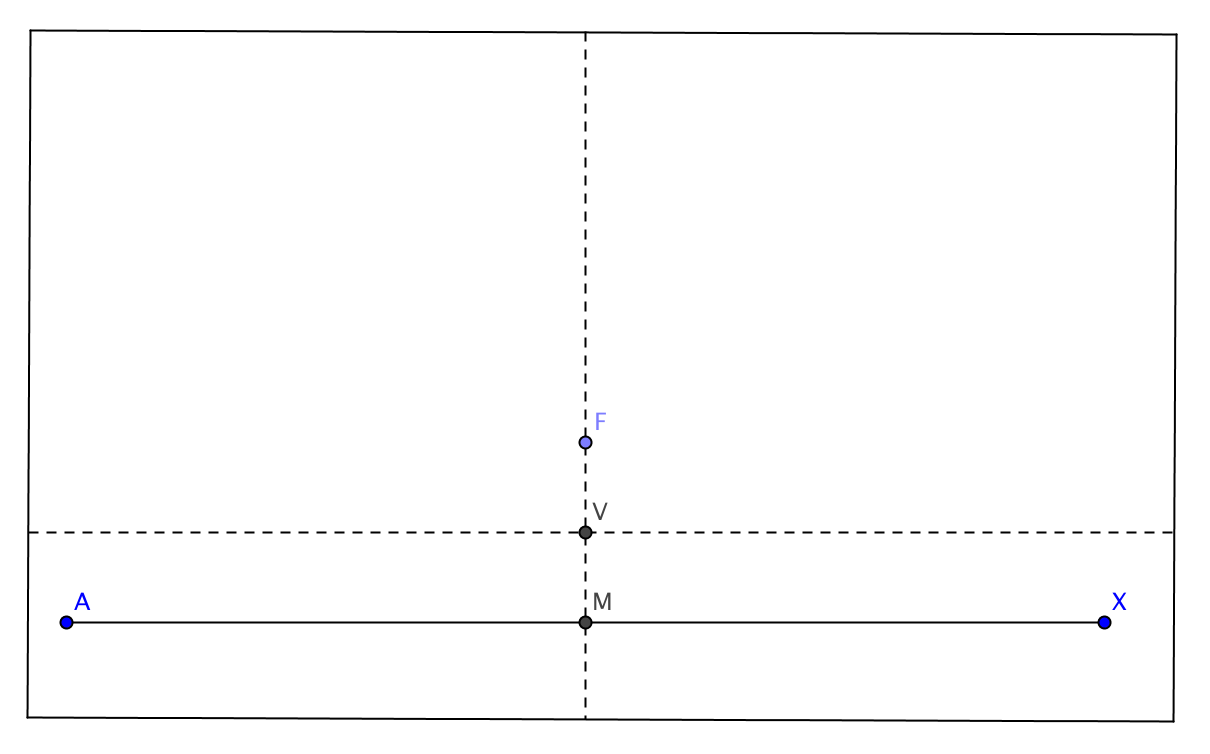
**Activity 5.7.1a Exploring the Parabola as a Locus of Points**

Materials Needed: A piece of parchment paper, Pencil, Ruler

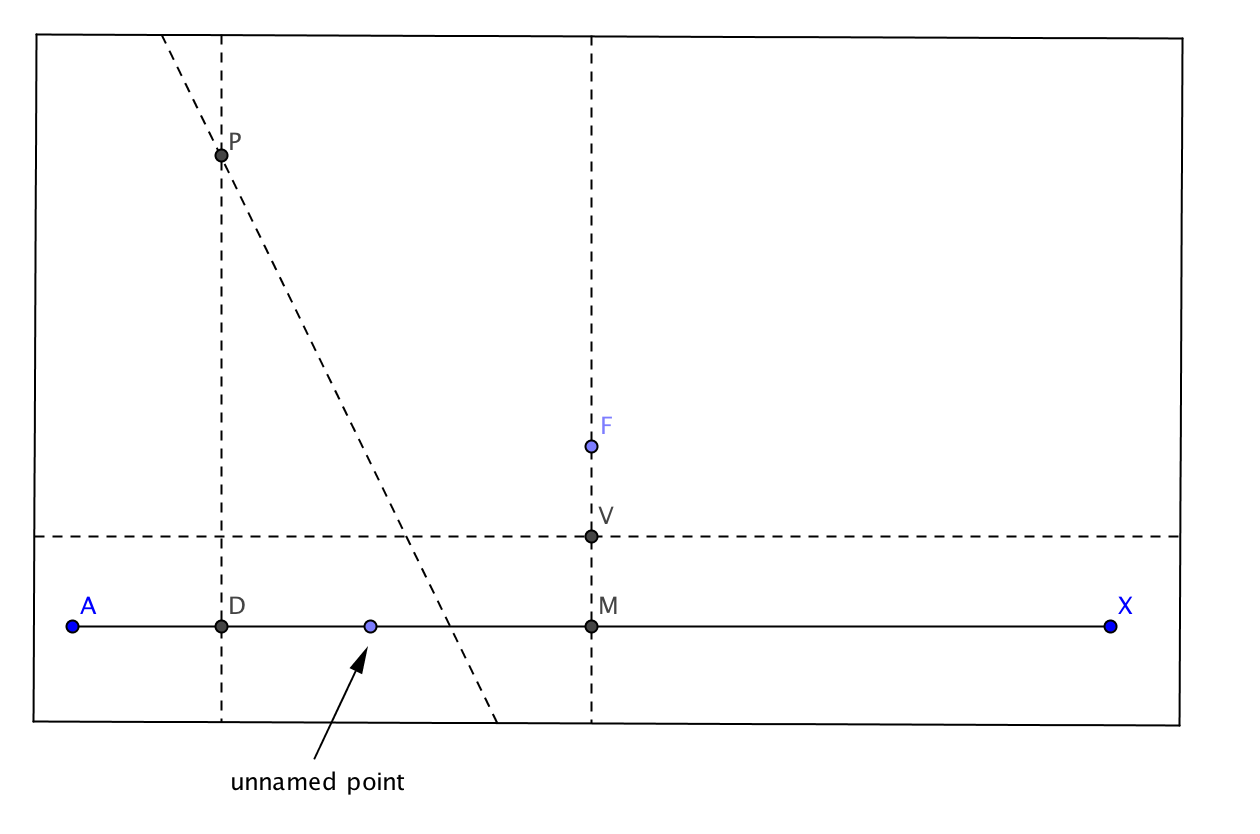
1. Use your ruler to draw a long segment that appears to be parallel to the bottom edge of your parchment paper. Place this segment at most 2 inches away from the bottom of the paper. (Don’t worry if this segment isn’t “perfectly parallel” to the bottom edge of the paper.)
2. Plot and label the left-most endpoint of your segment as *A*. Plot and label the right-most endpoint of your segment as *X*.
3. Fold point *A* on top of point *X*. (This will create a vertical crease that serves as the perpendicular bisector of .) Label the midpoint of as *M*. (See figure.)



1. Plot and label a point *F* somewhere along the vertical crease created in step (3) but less than 3 inches from *M*.
2. Fold point *M* onto point *F* and crease sharply creating a horizontal crease parallel to . Label the intersection of this horizontal crease and the vertical crease formed in step (3) as *V*. (See figure.)



1. This is the most important step here, so please read carefully!
2. Plot any point (leave it unnamed) on that lies either to the left or right side of *M*. Fold point *A* directly on top of this point. Crease sharply. This should create a vertical crease on your paper (on the left side of *M*).
3. Plot and label a point *D* at the intersection of and vertical crease you just formed.
4. Fold point *D* onto point *F*. Crease sharply. This will create a diagonal crease somewhere on your paper.
5. Plot and label a point *P* at the intersection of this diagonal crease and the vertical crease formed in step (a). (See figure.)



1. Take your ruler and measure the lengths *FP* and *PD* (on the left side of *M*.) What do you notice?
2. Why is your observation in step (7) above true? Can you think of a previously learned theorem that helps support your observation?
3. Repeat the **entire steps (6) and (7)** at least 15 more times. Pick the unnamed points on on both the left and right side of *M*. The more folds you make, the easier it will be to observe a pattern.
4. Draw a smooth curve through the set of points labeled *P* that you plotted by completing step (6) numerous times. If the shape of this curve is familiar, what do you call it?
5. Now even though was a segment, we could keep generating more points (all with the label *P*) if our paper were large enough. So, as we complete this formal definition below, consider the segment with endpoints *A* and *X* to be a *line* instead.

After class discussion:

1. Use your observation to help complete the following definition:

A is the locus of points in a plane that are from a fixed (called the ) and a given line (called the ).