Name_____

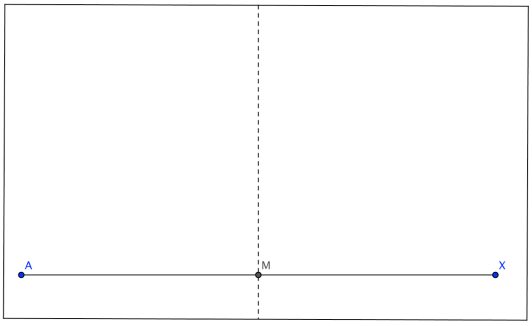
# Locus Construction (I)

**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.)

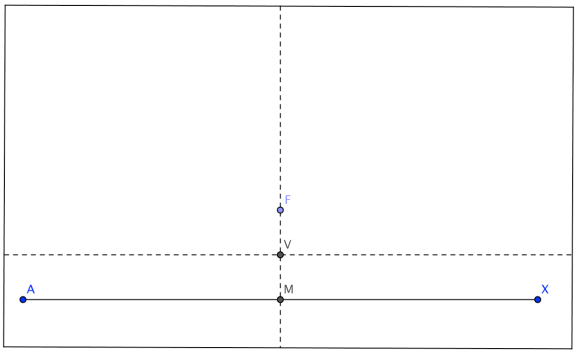
2. Plot and label the left-most endpoint of your segment as $A$. Plot and label the right-most endpoint of your segment as $X$.

3. Fold point $A$ on top of point $X$. (This will create a vertical crease that serves as the perpendicular bisector of $\overline{AX}$.) Label the midpoint of $\overline{AX}$ as $M$. (See figure.)




4. Plot and label a point $F$ somewhere along the vertical crease created in step (3) but less than 3 inches from $M$.

5. Fold point $M$ onto point $F$ and crease sharply creating a horizontal crease parallel to $\overline{AX}$. Label the intersection of this horizontal crease and the vertical crease formed in step (3) as $V$. (See figure.)



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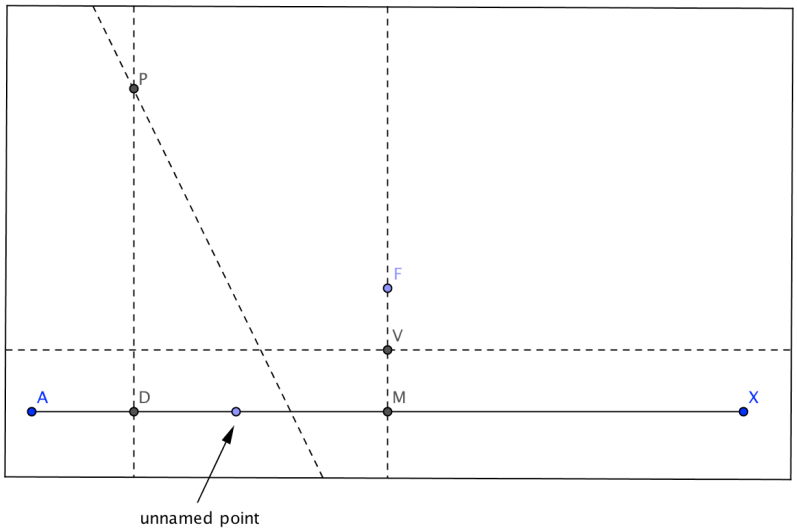
6. This is the most important step here, so please read carefully!

   a) Plot any point (leave it unnamed) on $\overline{AX}$ 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 $M$).

   b) Plot and label a point $D$ at the intersection of $\overline{AX}$ and vertical crease you just formed.

   c) Fold point $D$ onto point $F$. Crease sharply. This will create a diagonal crease somewhere on your paper.

   d) Plot and label a point $P$ at the intersection of this diagonal crease and the vertical crease formed in step (a). (See figure.)




7. Take your ruler and measure the lengths $FP$ and $PD$ (on the left side of $M$.) What do you notice?

8. Why is your observation in step (7) above true? What previously learned theorem justifies your observation?

9. Repeat the **entire steps (6) and (7)** at least 15-25 more times. Pick the unnamed points on $\overline{AX}$ on **both the left and right side of *M***. The more folds you make, the better the end product!

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10. 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 looks familiar, how would you describe it?
11.

12. Now even though $\overline{AX}$ 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:

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

**A _____ is a locus (set of points) in a plane that are**

**_____from a fixed _____,**

**(called the _____ ) and a given line (called the_____).**