Constructing a Perpendicular Line

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Theorem 11.3. Given a line l and a point A not lying on l, construct a line perpendicular to l through A.

Proof. Given line l and point A that is doesn't lie on l

1. Make circle A through line l and label the intersection points B and C
2. Make circle B through C
3. Make circle C through B and label intersection points X on the opposite side of line l then A and Y on the same side of A from line l
4. Make line k through A and X

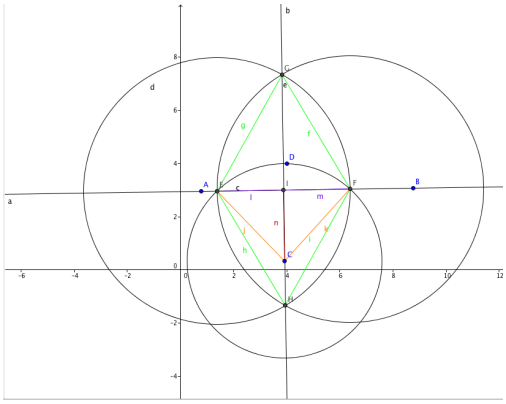

Figure 1: The image for constructing a perpendicular line.

To prove that this construction creates a perpendicular line, you start out with constructing the kite ABXC. This then is a kite as AB and AC have the same length as they both are radii of circle A and BX and CX have the same length as they both are radii of circle B. The important thing is to make sure that when choosing X it is on the opposite side of line l of point A. By using conjecture 2.5, we are able to say that the diagonals cross, creating a perpendicular line. It is important to note that if points X and A are on the same side, this would create a non-convex kite and which doesn't allow us to use conjecture 2.5.

Refereed by Brandon Stuhr □