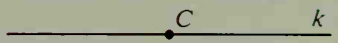
Construction 5

Given a point on a line, construct the perpendicular to the line at the given point.

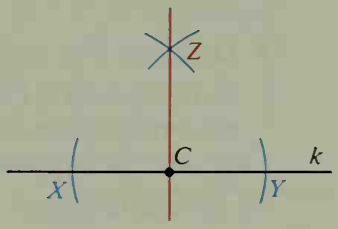
Given: Point C on line k

Construct: The perpendicular to k at C



Procedure:

1. Using C as center and any radius, draw arcs intersecting k at X and Y.
2. Using X as center and a radius greater than CX, draw an arc. Using Y as center and the same radius, draw an arc intersecting the arc with center X at a point Z.
3. Draw $\overleftrightarrow{CZ}$.



$\overleftrightarrow{CZ}$ is perpendicular to k at C.

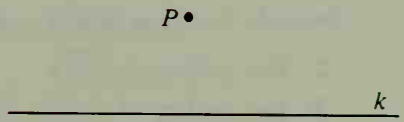
Justification: You constructed points X and Y so that C is equidistant from X and Y. Then you constructed point Z so that Z is equidistant from X and Y. Thus $\overleftrightarrow{CZ}$ is the perpendicular bisector of $\overline{XY}$, and $\overleftrightarrow{CZ} \perp k$ at C.

Construction 6

Given a point outside a line, construct the perpendicular to the line from the given point.

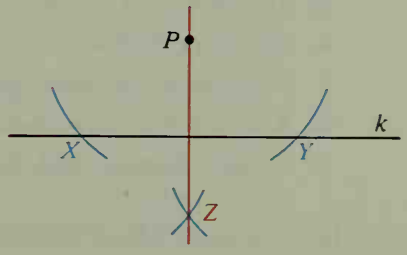
Given: Point P outside line k

Construct: The perpendicular to k from P



Procedure:

1. Using P as center, draw two arcs of equal radii that intersect k at points X and Y.
2. Using X and Y as centers and a suitable radius, draw arcs that intersect at a point Z.
3. Draw $\overleftrightarrow{PZ}$.



$\overleftrightarrow{PZ}$ is perpendicular to k.

Justification: Both P and Z are equidistant from X and Y. Thus $\overleftrightarrow{PZ}$ is the perpendicular bisector of $\overline{XY}$, and $\overleftrightarrow{PZ} \perp k$.