

## Construction 5

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

Given: Point  $C$  on line  $k$

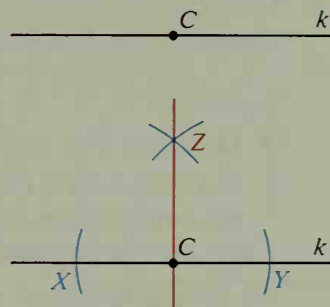
Construct: The perpendicular to  $k$  at  $C$

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  $\overleftrightarrow{PZ} \perp k$ .

