

Formal Constructions

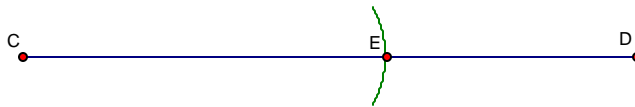
A. Line Segment:

I. Given \overline{AB} , construct \overline{CE} congruent to \overline{AB} .



Steps:

1. Using your ruler, draw \overline{CD} longer than \overline{AB} .
2. Using center A, open the compass so that it passes through B.
3. Using the same radius as in Step 2, draw an arc with center C that intersect \overline{CD} .
4. Label the intersection as E.



II. Construct a line segment congruent to the following line segments:



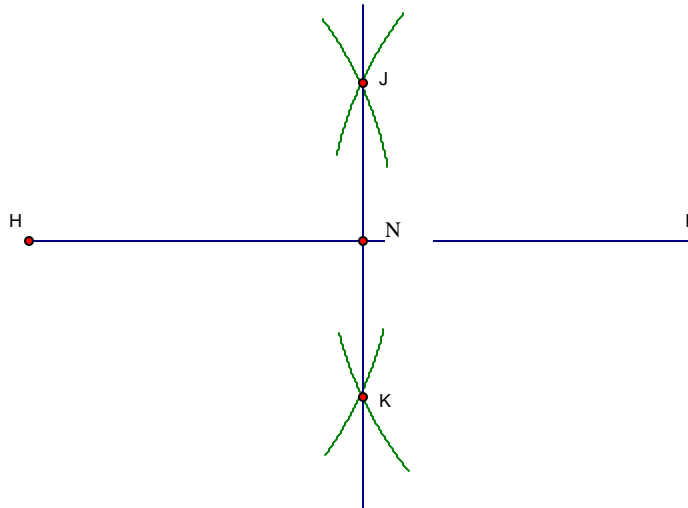
B. Bisector of a Line Segment (Also, the *perpendicular* bisector)

I. Construct the bisector of \overline{HI} .



Steps:

- Using any radius greater than $\frac{1}{2} \overline{HI}$, draw two arcs with center H, one on each side of \overline{HI} .
- Using the same radius as in Step 1, draw two arcs with center I that intersect the arcs you drew in Step 1. Label the points J and K.
- Draw \overline{JK} , \overline{JK} is the bisector of \overline{HI} . It is also the perpendicular bisector of \overline{HI} .



II. Questions:

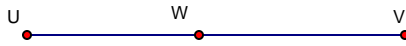
- Measure the length of \overline{NI} and \overline{NH} . Are the lengths the same? _____
- Why does this construction work? (Hint: Look at the equilateral triangles.) ___

III. Construct the bisector of each line segment below:



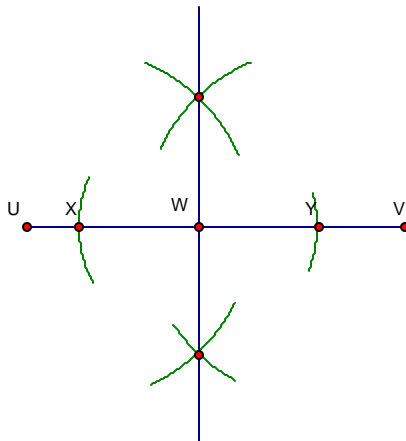
C. Perpendicular Lines

I. Construct a perpendicular line to \overline{UV} through point W.



Steps:

1. Using any radius, draw two arcs with center W that intersect \overline{UV} at point X and Y.
2. Follow Steps 1 –3 from Part B to construct the perpendicular bisector of the subsegment \overline{XY} .



II. Questions:

1. Measure all the angles. Are they all 90° ? _____
2. Why does this construction work? (Hint: What do you know about diagonals of quadrilaterals?) _____

III. Construct a perpendicular line to \overline{AB} through point C.

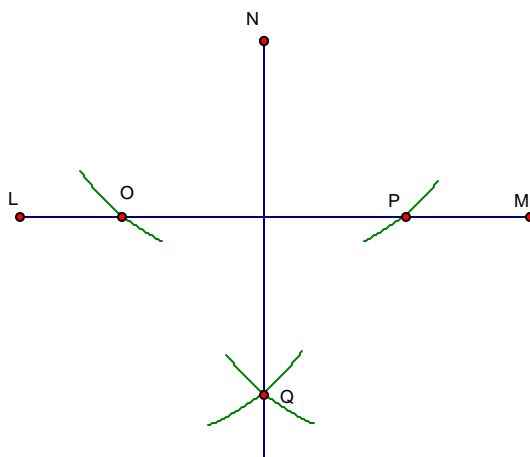


IV. Construct a perpendicular line to \overline{LM} through point N.



Steps:

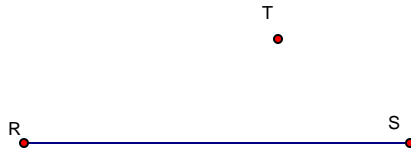
1. Using any radius larger than the distance from N to \overline{LM} , draw two arcs with center N that intersect \overline{LM} at points O and P.
2. Using the same radius as in Step 1, draw two arcs below \overline{LM} with center O and P. Label the intersection point Q.
3. Draw \overline{NQ} , \overline{NQ} is perpendicular to \overline{LM} .



V. Questions:

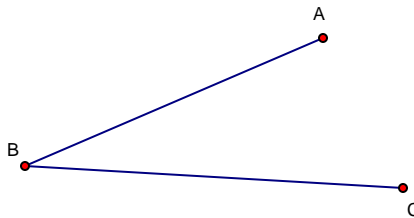
1. Measure all the angles. Are they all 90° ? _____
2. Why does this construction work? _____

VI. Construct a perpendicular line to \overline{RS} through point T.



D. Angles

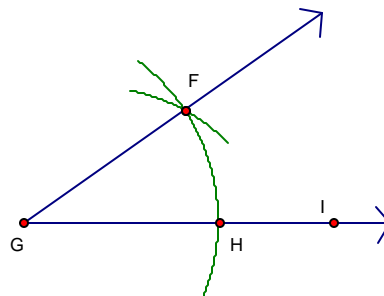
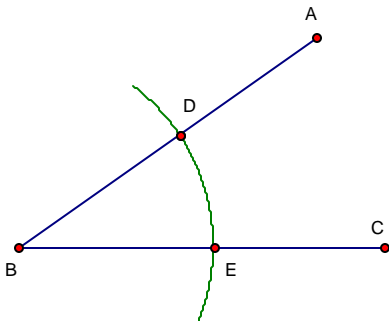
I. Construct $\angle FGH$ congruent to $\angle ABC$.



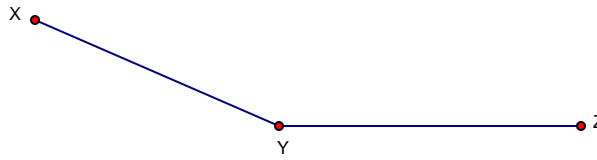
Steps:

1. Draw \overline{GI} .
2. Using any radius and center B, draw an arc that intersects \overline{BA} at D and \overline{BC} at E.
3. Using the same radius, draw an arc with center G. Label the intersection H.
4. Open the compass to distance \overline{DE} . Draw an arc with this radius with center H that intersects the arc from Step 1. Label the intersection F.

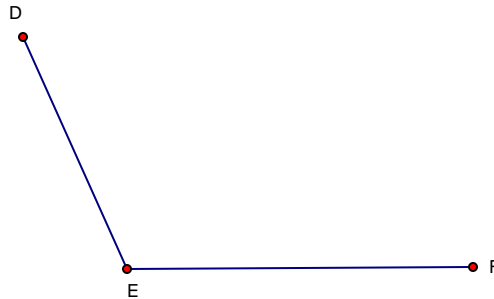
5. Use your ruler to draw \overline{GF} . $\angle FGH \cong \angle ABC$.



II. Construct an angle congruent to $\angle XYZ$.

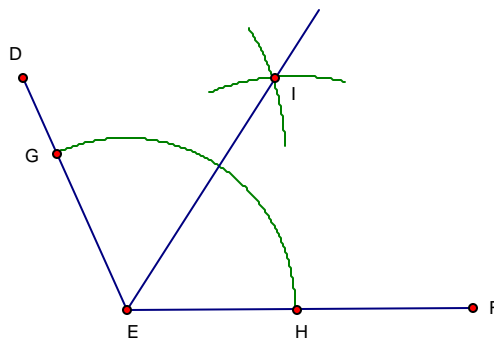


III. Construct the angle bisector of $\angle DEF$.



Steps:

1. Using center E with any radius, draw an arc that intersects \overline{ED} and \overline{EF} . Label the points of intersections as G and H.
2. Draw an arc with center G with any radius. Draw an arc with center H and the same radius. Label the intersection of the arcs as I.
3. Draw \overrightarrow{EI} . \overrightarrow{EI} bisects $\angle DEF$.



IV. Questions:

1. Measure $\angle IEH$ and $\angle IEG$. Are they equal? _____
2. Why does this construction work? (Hint: Why did we use the same radius in Step 2?) _____

V. Construct the angle bisector of $\angle JKL$.

