Self-Test 3

Describe briefly the locus of points that satisfy the conditions.

1. In the plane of two intersecting lines j and k, and equidistant from the lines
2. In space and t units from point P
3. In space and equidistant from points W and X that are 10 cm apart
4. In the plane of $\angle DEF$, equidistant from the sides of the angle, and 4 cm from $\overrightarrow{EF}$
5. In the plane of two parallel lines s and t, equidistant from s and t, and 4 cm from a particular point A in the plane (three possibilities)
6. Construct a large isosceles $\triangle RST$. Then construct the locus of points that are equidistant from the vertices of $\triangle RST$.
7. Draw a long segment, $\overline{BC}$, and an acute angle, $\angle 1$. Construct a right triangle with an acute angle congruent to $\angle 1$ and hypotenuse congruent to $\overline{BC}$.

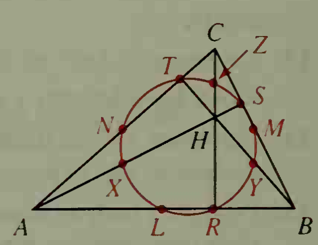
Extra — The Nine-Point Circle

Given any $\triangle ABC$, let H be the intersection of the three altitudes. There is a circle that passes through these nine special points:

midpoints L, M, N of the three sides

points R, S, T, where the three altitudes of the triangle meet the sides

midpoints X, Y, Z of $\overline{HA}$, $\overline{HB}$, $\overline{HC}$



Key steps of proof:

1. $XYMN$ is a rectangle.
2. The circle circumscribed about $XYMN$ has diameters $\overline{MX}$ and $\overline{NY}$.
3. Because $\angle XSM$ and $\angle YTN$ are right angles, the circle contains points S and T as well as X, Y, M, and N.
4. $XLMZ$ is a rectangle.
5. The circle circumscribed about $XLMZ$ has diameters $\overline{MX}$ and $\overline{LZ}$.
6. Because $\angle XSM$ and $\angle ZRL$ are right angles, the circle contains points S and R as well as X, L, M, and Z.