**Geometry U 1-5: Investigation of Distance and Bisection Put all responses on another paper. \*The verbs “construct” and “reconstruct” mean to use a compass and a straightedge.**



1] Circles A and B have the same radius.

[a] With your compass and straightedge,

reconstruct the diagram of circles A and B.

MAKE SURE both circles have the same radius.

Label C and D where the circles intersect.

[b] Next, connect C and D.

[c] Is C equidistant from A and B? Explain how you know.

[D] Is D equidistant from A and B? Explain how you know.

[e] Choose three random points on $\overbar{CD}$ . Measure the distance each point is from C AND from D. Record each distance.

[f] Is each point closer to C or to D?

[g] Label E the point of intersection for $\overbar{CD}$ and $\overbar{AB}$. \*Measure / AEC and / BEC. Record your results.

[h] Explain how $\overbar{CD}$ is related to $\overbar{AB}$: $\overbar{CD}$ is the \_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_ of $\overbar{AB}$ because \_\_\_\_\_\_\_\_\_\_\_\_

 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

2] / FEG is shown. F and G are both on circle E.

 Circles F and G have the same radius. H is on

 circles F and G.

[a] With your compass and straightedge,

 reconstruct / FEG with circles E, F and G.

 MAKE SURE circles F and G are congruent.

[b] Is E equidistant from F and G? Explain.

[c] Is H equidistant from F and G? Explain.

[d] Connect E and H and extend past H to

 create $\vec{EH}$.

2] [e] Choose three random points on $\vec{EH}$ and measure how far each point is from F AND from G. Record your results.

[f] Is each point on $\vec{EH}$ closer to F or to G?

[g] Explain how $\vec{EH}$ is related to / FEG: $\vec{EH}$ is the \_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_ of / FEG because \_\_\_\_\_\_\_\_

 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

3] Examine the construction to the right. Use it to answer the questions below.

 IJ < IK and JL < KL.



[a] Does I appear to be equidistant from J and K? If not, I is closer to which point? Explain how you know.

[b] Does L appear to be equidistant from J and K?

If not, L is closer to which point? Explain how you know.

[c] If you connect I and L, will points on $\overbar{IL}$ be equidistant from J and K? Explain.

[d] If you draw $\vec{IL}$, will it be the angle bisector of

 / JIK? Explain your response.

4] Suppose $\overleftrightarrow{PQ }$ intersects $\overbar{RS}$. \*What conditions must be met, so that $\overleftrightarrow{PQ}$ is the perpendicular bisector of $\overbar{RS}$?

5] Suppose $\vec{YW}$ is a ray between $\vec{YX}$ and $\vec{YZ}$. All three rays have endpoint Y. \*What conditions must be met, so that $\vec{YW}$ is the angle bisector of / XYZ?

6] \*Challenge: /\ QRS has the following side lengths: QR = 2 ¾ “, RS = 4 “, QS = 5 “. Can you draw the triangle and find the point equidistant from Q, R and S?