# Worksheet on Equidistant Water Reservoir

Dr. Sarah's MAT 3610: Introduction to Geometry

goals:

- IGS Exploration
  I can use Interactive Geometry Software (IGS) to discover relationships and demonstrate they seem to apply in a wide variety of examples.
- Proof Considerations
  I can write rigorous proofs in geometry, identify underlying assumptions, and understand limitations and applications.
- Geometric Perspectives
  I can compare and contrast multiple geometric perspectives.

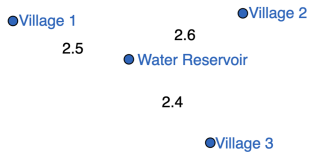
**Welcoming Environment:** Keep it a safe place to express meaningful ideas and opinions. Actively listen to others and encourage everyone to participate. Part of the welcoming environment is to keep an open mind as you engage in our class activities, explore consensus and employ collective thinking across barriers. Maintain a professional tone, show respect and courtesy, and make your contributions matter.

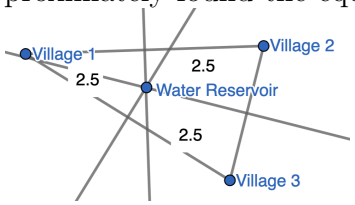
1. **Building Community**: What are the preferred first names of those sitting near you? If you weren't able to be there write N/A or give reference to anyone you had help from.

2. You work for the World Health Organization (WHO) and have been asked to locate a new water reservoir that two villages will use. Optimally you want to locate the reservoir so that it is equidistant from the villages. Where should the reservoir be placed (theoretically)?

3. What are some real-life situations where the equidistant location would not be desirable?

4. You have now been asked to locate a new reservoir that three villages will use. Use an IGS:
   - Create three villages as points that are not collinear.
   - Next create a fourth point that you might expect could work for an equidistant reservoir and measure the distances from the reservoir to each of the villages.
   - Then drag the reservoir until you have approximately found the equidistant location.




   - Now construct the triangle formed by the villages and the perpendicular bisectors of the sides, showing the circumcenter is approximately at your equidistant location for the reservoir.
   - Review the proof that points on a perpendicular bisector are equidistant from the two vertices/endpoints of the line segment it bisects from the congruence and similarity 1 interactive video. Name a congruence theorem that we used for it and sketch a related picture that shows which parts are initially congruent before we apply the theorem.

5. Find an example where it doesn't make sense to locate the reservoir at the perpendicular bisector and sketch your example (hint: consider one where the bisector is outside the villages).

6. You are helping the World Health Organization (WHO) to locate another reservoir, but this time four villages in 3-space, to accommodate for mountains and valleys, will use the reservoir. Does the corresponding congruence theorem you mentioned in #4 work for four villages?

7. Consider equidistance by looking at different examples of four villages in 3-space and discussing with your group. Summarize your ideas and be sure to bring in polyhedra to your discussions.

8. How about if there are more than four villages?

9. Where does the university drinking water come from?

10. **Help each other and PDF responses to ASULearn**: If you are finished with the worksheet before I bring us back together, first ensure that your entire group is finished too, and if not, help each other. If your entire group is finished, then split up and pull up chairs so that you can discuss your responses with other groups. Collate your handwritten responses, preferably on this handout, into one full size multipage PDF for submission in the ASULearn assignment. I recommend you turn it in sometime today, but you have until the next class.