3.1 The Far Off Point

Imagine that you are given a page and on that page is a point and two non-intersecting lines. Imagine further that you have a ruler without markings and a writing surface to work on, but it is not much bigger than the page. You can see that the two lines might meet, but if they do, it is so far of the page that to try to find it is useless.

However, Desargues comes to the rescue.

Let P be the given point and let L_1 and L_2 be the given lines. Your problem is to use the Theorem of Desargues to find a construction that will produce that line through P, which, if extended, would pass through the far off point.

When your figure is complete, you can check your work by bringing the that imaginary point L_1 and L_2 should meet, onto the page (that is, onto your screen) and moving P around. If your work is correct, you will have three lines coming together, and you will not have a point where the three lines come together.

Submit your construction and its Construction protocol.

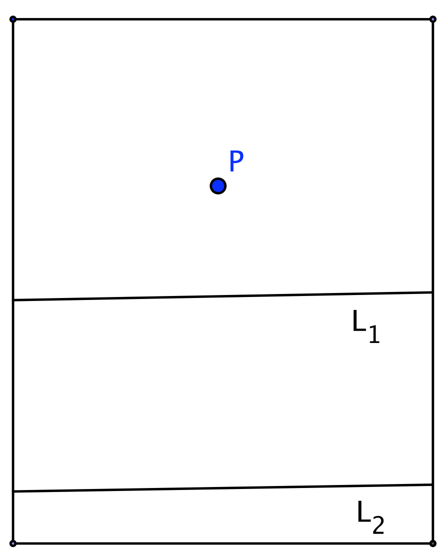

Figure 1: The far off point is $L_1 \cap L_2$.

3.2 Far Off Point. Pappus, Optional extra credit.

Again consider the point P and the two lines L_1 and L_2. Instead of using the Desargues configuration use the Pappus Configuration to solve the problem of the far off point.

Suggestion: Create a complete Pappus configuration (9 points and 9 lines) and move explore various positions of the objects until one of the 9 points is forced to move far off the page but all 8 of the other points stay on the page. This may suggest a solution to you.

3.3 Some cross ratios.

Using this definition for cross ratio,

$$(a, b; c, d) := \frac{(a-c)}{(c-b)} \Big/ \frac{(a-d)}{(d-b)}$$

calculate these cross ratios:

- $(x, 0; 1, \infty)$
- $(x, 0; \infty, 1)$
- $(x, 1; 0, \infty)$
- $(x, 1; \infty, 0)$
- $(x, \infty; 0, 1)$
- $(x, \infty; 1, 0)$

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