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H. Geometry per. 5
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5 / 12 / 15

Inclinometer Project: Light Pole Contest

Summary

In our project, we compared the heights of two stadium light poles, one from Barlow (during a track practice) and the other from Bunnell (during a track meet), with indirect measurement. We built an inclinometer/clinometer with the help of the videos, and brought a measuring tape and an iPhone 6 to videotape. We measured the distance of ourselves from the poles, the angle at which the top of the poles were from our eye level, and the height of our eye level from the ground. From there, we used the basics of right triangle trigonometry to find the heights of the light poles.

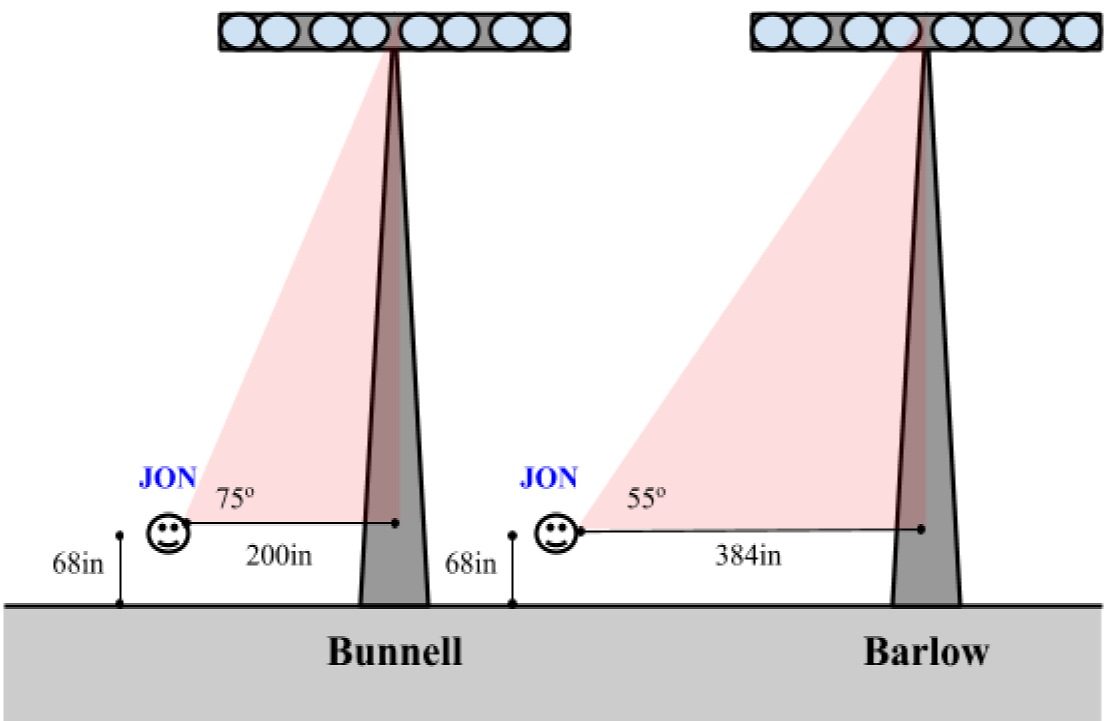

Image not drawn to scale.

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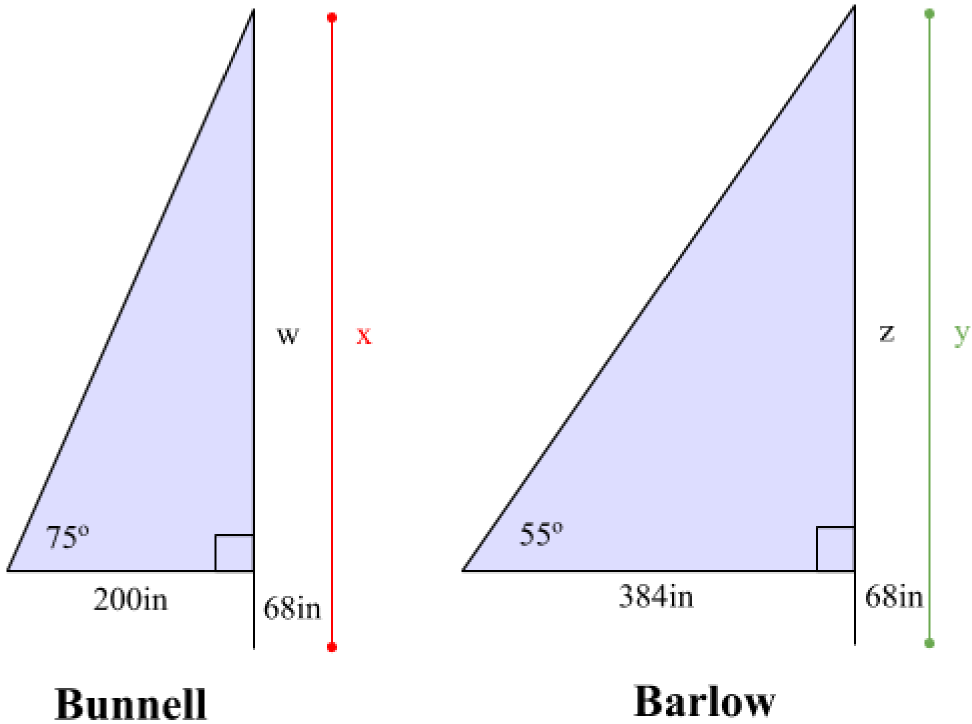

Find and compare x and y.

Image not drawn to scale.

Measurements and Conclusion

Calculations:

Bunnell

- $tan\ 75 = \frac{opp}{adj} = \frac{w}{200}$
- $3.732 = \frac{w}{200}$
- $200 * 3.732 \ = (\frac{w}{200}) * 200$
- $746.4 = w$
- $x = w + 68 = 764.4 + 68 = 814.4 in\ /\ 12 = 67.87 ft$

Barlow

- $tan\ 55 = \frac{opp}{adj} = \frac{z}{384}$
- $1.428 = \frac{z}{384}$
- $384 * 1.428 \ = (\frac{z}{384}) * 384$
- $548.4 = z$
- $x = z + 68 = 548.4 + 68 = 616.4 in\ /\ 12 = 51.37 ft$

Conclusion:

From our measurements, we concluded that the light pole from Bunnell is taller than the one from Barlow by 16.5 feet, being 67.87 feet tall while the Barlow one was 51.37 feet tall. We can conclude that Barlow needs taller lights.

Reflection

From this project, we learned with a real-life example how to use the basics of right-angle trigonometry to indirectly measure lengths. Although our example (comparing the heights of two light poles at high-school stadiums) was not the most practical, it was a simple example that made clear the basics of an application of trigonometry. Unfortunately, it was a very narrow application of trigonometry, only using tangent with right triangles.

What we might do next is to expand our experimentation with a broader range of trigonometric tools: to try to measure with non-right-angle trigonometry (with the Law of Sines and Cosines), as well as some of the other math problems that we saw involving indirect measurement (e.g. the moon crater problem) to further our understanding of the usefulness of trigonometry, but we did not have much time with other schoolwork.