

Lab 5: Relationships between Angles, Lines and Triangle Sides

(A) LAB Context

BIG PICTURE of this UNIT:	<ul style="list-style-type: none">• How do I determine the measure of angles in geometric shapes, without direct measurement?• How do I solve for sides or angles in right triangles?• How do I model real world scenarios using right triangles?
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(B) Lesson Objectives:

- Given a linear function in the form of $y = mx$, use geogebra to explore the relationship between slopes of lines and the angle of the lines.
- Given a right triangle, use geogebra to explore the relationship between the ratios of triangle sides and the angles in the given triangle.

PART 1 - Skills REVIEW/EXPLORATION

Exploration #1 - RELATIONSHIPS - The relationship between the slope of a line and the angle it makes with the positive x axis.

1. Draw the line $y = mx$ in geogebra and add a slider for m .
2. Add the point $(0,0)$ into your construction, this will now be Point A
3. Add a point to the line, this will now be Point B
4. Construct a line perpendicular to the x -axis that goes through your point.
5. Construct the intersection point between the perpendicular line and the x -axis, this will be Point C
6. Construct triangle ABC.
7. IF you are TOTALLY lost, open the Geogebra Interactive I've created here at <https://ggbm.at/warMhdcg>
8. Using the slider, change the slope to $m = 1$ (so the equation of our line is now $y = x$) and have Geogebra measure angle CAB, you should see the angle measure as 45° .
9. Use the slope measurement tool to show the slope of our line.
10. Now reposition Point B, what happens to the slope and what happens to the angle of the line? Does the location of Point B matter?

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To start collecting data, use this Google sheet and we can enter our first "data point" of slope ratio of 1 and an angle of 45° on this google sheet:

https://docs.google.com/a/cacegypt.org/spreadsheets/d/1eK_LI8dYiilT43V9LknTP9lv6a6lmW-KTxn74QMEw8s/edit?usp=sharing

11. Continue to play (change m to any value where $m \geq 0$) and thereby add more data (slope ratio and the line's angle) and see what happens to our graph of this relationship between slope ratio and angle of the line.
12. CONGRATULATIONS! We have just INVENTED a function, one that allows us to input a slope and get an angle of a line as an output.

BIG PICTURE: We have used GEOMETRY to investigate a relationship (which we did by creating a DATA SET) and we can now analyze with a FUNCTION