

Slope and Distance

Essential Questions

1. How are the distance formula and the Pythagorean Theorem related?
2. How can algebra be used to explore properties of geometric shapes in the plane?
3. What are real-world applications of slope and the distance formula?
4. Is there a relationship between the slopes of parallel lines?
5. Is there a relationship between the slopes of perpendicular lines?

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WORDS TO KNOW

congruent	having the same shape, size, lines, and angles; the symbol for congruent is \cong .
distance formula	a formula that states the distance between points (x_1, y_1) and (x_2, y_2) is equal to $\sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$
parallel lines	lines in a plane that do not share any points and never intersect; written as $\overleftrightarrow{AB} \parallel \overleftrightarrow{PQ}$
parallelogram	a special type of quadrilateral with two pairs of opposite sides that are parallel
perpendicular lines	two lines that intersect at a right angle (90°); written as \perp ; line segments and rays can also be perpendicular
quadrilateral	a polygon with four sides
rectangle	a special parallelogram with four right angles
rhombus	a special parallelogram with four sides congruent
slope	measure of the rate of change of one variable with respect to another variable; $m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{\Delta y}{\Delta x} = \frac{\text{rise}}{\text{run}}$
square	a parallelogram with four congruent sides and four right angles

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Recommended Resources

- Math Open Reference. “Distance from a point to a line.”

<http://walch.com/rr/CAU6L1ShortestDistance>

This site shows how to find the shortest distance from a point to a line, and provides an animation that allows you to manipulate both a point and a line on a coordinate plane to see how the perpendicular distance changes.

- Math Warehouse. “Parallel and Perpendicular Lines Applet.”

<http://walch.com/rr/CAU6L1LineRelationships>

Use this animation to determine the relationship between lines.

- Purplemath. “Straight-Line Equations: Parallel and Perpendicular Lines.”

<http://walch.com/rr/CAU6L1Straight-LineEquations>

This site summarizes how to write equations that are parallel and perpendicular to a given point.