Coordinate Geometry Proofs: Everything you ever wanted to know!

Important Formulas:

Distance	Slope	Midpoint
$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$	$m = \frac{y_2 - y_1}{x_2 - x_1}$	$(x, y) = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y}{2}\right)$
Use this formula to show: • sides are equal or unequal in length	Use this formula to show: • sides are parallel (equal slopes) • sides are perpendicular (slopes are negative reciprocals)	Use this formula to show: • segment bisectors (cut a segment in half)

Steps:

1. Draw and label the graph.
2. State the formulas you will be using.
3. Show ALL work (if you are using your graphing calculator be sure to show your screen displays as part of your work).
4. Have a concluding sentence stating what you have proven and why it is true.

Methods to use for Coordinate Geometry Proofs:

Shape Properties	**To prove that a quadrilateral is a…prove that any one of the following statements is true:**
Parallelogram • Opposite sides are parallel • A diagonal divides a parallelogram into two congruent triangles • Opposite sides are congruent • Opposite angles are congruent • Consecutive angles are supplementary • The diagonals bisect each other	• Both pairs of opposite sides are parallel • Both pairs of opposite sides are congruent • One pair of opposite sides are both congruent and parallel • Both pairs of opposite angles are congruent • The diagonals bisect each other
Rectangle • Has all the properties of a parallelogram • Contains 4 right angles and is therefore equiangular • The diagonals are congruent	• The quadrilateral is a parallelogram with one right angle • The quadrilateral is equiangular • The quadrilateral is a parallelogram whose diagonals are congruent
Rhombus • Has all the properties of a parallelogram • Is equilateral • The diagonals of a rhombus are perpendicular to each other • The diagonals of a rhombus bisect each other	• The quadrilateral is a parallelogram with two congruent sides • The quadrilateral is equilateral • The quadrilateral is a parallelogram whose diagonals are perpendicular to each other • The quadrilateral is a parallelogram, and a diagonal bisects the angles whose vertices it joins
Square • Has all the properties of a rectangle • Has all the properties of a rhombus	• The quadrilateral is a rectangle in which two consecutive sides are congruent • The quadrilateral is a rhombus which has a right angle as one of its angles

Trapezoid

We prove that a quadrilateral is an isosceles trapezoid by showing that it has the special properties of an isosceles trapezoid: Only two sides are parallel; the nonparallel sides are congruent.