Classifying Quadrilaterals in the Coordinate Plane

To identify a quadrilateral as a parallelogram using sides and/or diagonals, show any of the following with organized work.

1) Both pairs of opposite sides are parallel (use the slope formula).
2) Both pairs of opposite sides are congruent (use the distance formula).
3) Diagonals bisect each other (use the midpoint formula).
4) One pair of opposite sides is both parallel and congruent (use slope and distance formulas).

To identify a quadrilateral as a parallelogram using interior angle measures, we must know or be able to show either of the following.

1) Both pairs of opposite angels are congruent.
2) For any interior angle, it is supplementary with each of its adjacent angles.

If we are told a quadrilateral is already a parallelogram, then we automatically know the following.

1) Both pairs of opposite sides are parallel.
2) Both pairs of opposite sides are congruent.
3) Diagonals bisect each other.
4) One pair of opposite sides is both parallel and congruent.
5) Both pairs of opposite angels are congruent.
6) For any interior angle, it is supplementary with each of its adjacent angles.

To identify a known parallelogram as a rectangle using sides and/or diagonals, show either of the following with organized work. Be sure you first know the quadrilateral is actually a parallelogram.

1) One interior angle is a right angle (use the slope formula and see if the product of slopes of the angle sides is –1).
2) Diagonals are congruent (use the distance formula).

If we are told a quadrilateral is already a rectangle, then we automatically know the following.

1) The rectangle has all of the characteristics of a parallelogram (see above).
2) The diagonals are congruent.
3) Adjacent sides are perpendicular (form right angles).

To identify a known parallelogram as a rhombus using sides and/or diagonals, show either of the following with organized work. Be sure you first know the quadrilateral is actually a parallelogram.

1) One pair of consecutive sides is congruent (use the distance formula).
2) The diagonals are perpendicular (use the slope formula and see if the product of slopes is –1).

To identify a known parallelogram as a rhombus using interior angle measures, we must know or be able to show that one diagonal bisects a pair of opposite angles. Be sure you first know the quadrilateral is actually a parallelogram.

If we are told a quadrilateral is already a rhombus, then we automatically know the following.

1) The rhombus has all of the characteristics of a parallelogram (see above).
2) The diagonals are perpendicular.
3) All sides are congruent.
4) Each diagonal bisects a pair of opposite angles.

To identify a known parallelogram as a square, you may show any of the following. Be sure you first know the quadrilateral is actually a parallelogram.

1) Show the parallelogram is a rectangle (see front of sheet) that has two adjacent, congruent sides (use the distance formula)
2) Show the parallelogram is a rectangle (see front of sheet) that has perpendicular diagonals (use the slope formula and see if the product of slopes is –1).
3) Show the parallelogram is a rhombus (see front of sheet) that has one vertex angle that is a right angle (use the slope formula and see if the product of slopes of the angle sides is –1).
4) Show the parallelogram is a rhombus (see front of sheet) that has congruent diagonals (use the distance formula).

If we are told a quadrilateral is already a square, then we automatically know the following.

1) The square has all of the characteristics of a rectangle (see front of sheet).
2) The square has all of the characteristics of a rhombus (see front of sheet).

If a quadrilateral is ***not*** a parallelogram, check to see if it is a trapezoid.

1) Only one pair of opposite sides is parallel (use slope formula).

If a quadrilateral is a trapezoid, check to see if it is an isosceles trapezoid by showing either of the following with organized work.

1) The non-parallel sides are congruent (use the distance formula).
2) Diagonals are congruent (use the distance formula).

If a quadrilateral is ***not*** a parallelogram, check to see if it is a kite by showing the following with organized work.

1) Two pairs of *adjacent* sides are congruent (use the distance formula).
2) Diagonals are perpendicular (use the slope formula and see if the product of slopes is –1).

If a quadrilateral is ***not*** a parallelogram, check to see if it is a trapezium by showing the following with organized work.

1) No pairs of sides are parallel (use the slope formula).
2) Diagonals are not perpendicular (use slope formula and see if the product of slopes *is not* –1).