MPM 2D
CLASSIFYING FIGURES on a COORDINATE GRID

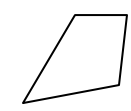
CLASSIFYING QUADRILATERALS

Polygon

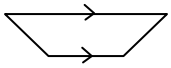
Does not have 4 sides

Quadrilateral
- Has 4 sides

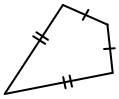
Not a parallelogram
- Both opposite sides NOT parallel



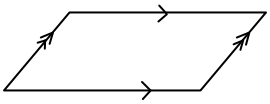
Trapezoid
- Only one pair of opposite sides are parallel



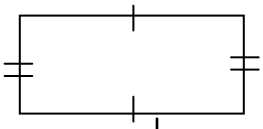
Kite
- 2 pairs of adjacent sides are equal



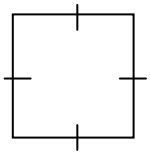
Parallelogram
- Opposite sides are parallel
- Opposite sides are equal



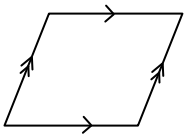
Rectangle
- Parallelogram with adjacent sides ⊥



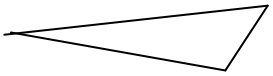
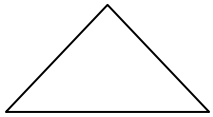
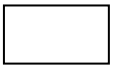
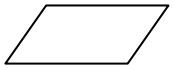
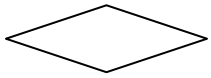
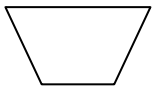
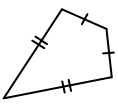
Square
- Rectangle with all sides equal



Rhombus
- Parallelogram with all sides equal

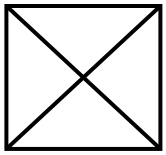
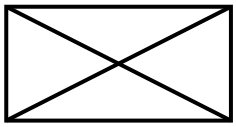
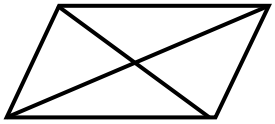
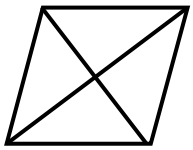
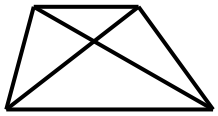
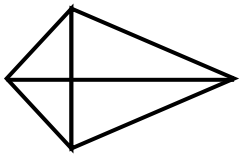


Classifying Triangles and Quadrilaterals

Type of Geometric Figure	Diagram	Lengths	Slopes
TRIANGLES:		$d = \sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2}$	$m = \frac{y_2 - y_1}{x_2 - x_1}$
Scalene		all sides are different in length	**if** right-angled: two of the slopes are negative reciprocals
Isosceles		two sides are equal in length	**if** right-angled: two of the slopes are negative reciprocals
Equilateral		all sides are equal in length	not possible (all angles equal 60 degrees)
Right		N/A	two of the slopes are negative reciprocals
QUADRILATERALS:		$d = \sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2}$	$m = \frac{y_2 - y_1}{x_2 - x_1}$
Square		lengths of <u>all</u> sides are equal	rhombus with one 90 degree angle
Rectangle		lengths of <u>opposite</u> sides are equal	parallelogram with one 90 degree angle
Parallelogram		lengths of <u>opposite</u> sides are equal	2 sets of parallel lines
Rhombus		lengths of <u>all</u> sides are equal	equilateral parallelogram
Trapezoid			one set of parallel lines
Kite		pairs of <u>adjacent</u> sides are equal	

CLASSIFYING FIGURES ON A COORDINATE GRID

NOTE: DIAGONALS in a quadrilateral are interior line segments that connect opposite corners.

QUADRILATERAL	***SIDE SEGMENTS***	***DIAGONALS***	***PROOF REQUIRED FOR DIGONALS***
1. SQUARE 	4 equal side lengths 2 pairs of equal slopes Perpendicular sides	Equal length → Perpendicular → Bisect each other →	Length of segments Slopes Same midpoint
2. RECTANGLE 	2 pairs of equal side lengths 2 pairs of equal slopes Perpendicular sides		
3. PARALLELOGRAM 	2 pairs of equal side lengths 2 pairs of equal slopes		
4. RHOMBUS 	4 equal side lengths 2 pairs of equal slopes		
5. TRAPEZOID 	1 pair of equal slopes		
6. KITE 	Equal adjacent side lengths		

EXAMPLES:

① Verify that the quadrilateral with P (-9, 1), Q (1, 5), R (3, 0) and S (-7, -4) is a rectangle.

HINT: **What properties does a rectangle have?**

What formulas will be used to prove the properties?

② Verify that the quadrilateral with J(-2, 1), K(1, 3), L(4, 1) and M(1, -1) is a rhombus.

③ Verify that the quadrilateral with W(-4,-5), X(-3, -7), Y(-4, -10) and Z(-5, -7) is a kite.

④ Classify the quadrilateral with A(-8, 7), B(-2, 9), C(-9, 4) and D(-3, 6).

⑤ Classify the quadrilateral with E(5, 11), F(10, 12), G(11, 7) and H(6, 6).

⑥ Given ΔABC where A(-10, 6), B(-7, 7) and C(-5, 1), determine the type of triangle.

⑦ A) Name all quadrilaterals in which their diagonals bisect each other.

B) Which of the shapes listed in part A have diagonals that are equal in length.

C) What additional property of the diagonals is needed to identify one of the shapes?

⑧ A) Name the quadrilaterals in which their side lengths are all equal.

B) What additional property can be used to identify one of the shapes? What formula would be used to prove the property?