LESSON MAKER PRO

Coordinate Shape Sleuth

Use slopes, distances, and midpoints to analyze figures on a coordinate plane.

HIGH SCHOOL · MA.912.GR.3.3

MA.912.GR.3.3 "Use coordinate geometry to solve mathematical and real-world geometric problems involving lines, circles, triangles and quadrilaterals."

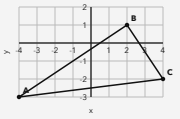
NAME _____ DATE _____

SLOPES AND DISTANCES

Find slope with $(y_2 - y_1)/(x_2 - x_1)$. Equal slopes show parallel lines, and negative reciprocal slopes show perpendicular lines. Use the distance formula to compare side lengths and classify a shape.

WORKED EXAMPLE

Use the triangle on the grid. Decide whether angle ABC is a right angle.



1. Find the slope of AB: (1 - (-3))/(2 - (-4)) = 4/6 = 2/3.
2. Find the slope of BC: (-2 - 1)/(4 - 2) = -3/2.
3. The slopes multiply to -1, so AB and BC are perpendicular.

Answer: Yes. Angle ABC is a right angle.

PRACTICE 6 problems

1 Find the slope of the line through (5, 7) and (10, 9).

ANSWER _____

2 Find the distance between (-6, 5) and (0, 5).

ANSWER _____

3 Are the line through (6, -1) and (9, 5) and the line through (-5, 8) and (1, 5) perpendicular? Show the two slopes.

ANSWER _____

4 Find the midpoint of the segment with endpoints (-7, 6) and (5, 10).

ANSWER _____

5 Triangle ABC has vertices A(6, 2), B(12, 2), and C(9, 6). Classify the triangle by its side lengths.

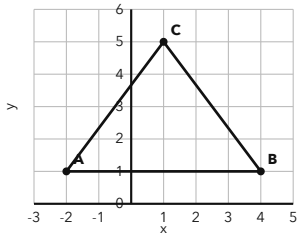
ANSWER _____

6 Quadrilateral PQRS has vertices P(5, 5), Q(9, 7), R(12, 3), and S(8, 1). Use slopes to classify it as specifically as possible.

ANSWER _____

APPLY IT Show your work

1 The grid shows the triangular boundary of an esports club's banner. One grid unit represents 1 foot. Find the banner's perimeter and area.



ANSWER _____

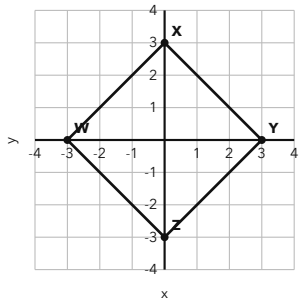
2 A student club marks a rectangular pop-up practice zone with corners at (3, 5), (9, 5), (9, 9), and (3, 9), measured in yards. Find the center of the zone and its area.

WORK SPACE

ANSWER _____

CHALLENGE One step up

The grid shows quadrilateral WXYZ. Classify it as specifically as possible. Explain using both slopes and side lengths.



WORK SPACE AND ANSWER

ANSWER KEY

Coordinate Shape Sleuth

HIGH SCHOOL · MA.912.GR.3.3

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Find the slope of the line through (5, 7) and (10, 9).	**2/5**
2	Find the distance between (-6, 5) and (0, 5).	**6**
3	Are the line through (6, -1) and (9, 5) and the line through (-5, 8) and (1, 5) perpendicular? Show the two slopes.	**Yes; the slopes are 2 and -1/2.**
4	Find the midpoint of the segment with endpoints (-7, 6) and (5, 10).	**(-1, 8)**
5	Triangle ABC has vertices A(6, 2), B(12, 2), and C(9, 6). Classify the triangle by its side lengths.	**Isosceles triangle; AC = BC = 5 and AB = 6.**
6	Quadrilateral PQRS has vertices P(5, 5), Q(9, 7), R(12, 3), and S(8, 1). Use slopes to classify it as specifically as possible.	**Parallelogram; PQ and RS have slope 1/2, and QR and SP have slope -4/3.**

PART 2 · APPLY IT

1. **Perimeter: 16 feet. Area: 12 square feet.** AB is 6 feet, AC and BC are each 5 feet, so the perimeter is 16 feet. Use base 6 feet and height 4 feet: area = 1/2(6)(4) = 12 square feet.
2. **Center: (6, 7). Area: 24 square yards.** Find the midpoint of either diagonal to get (6, 7). The side lengths are 6 yards and 4 yards, so the area is 24 square yards.

CHALLENGE

WXYZ is a square. Each side has length sqrt(18) = 3sqrt(2), and adjacent sides have slopes 1 and -1, so adjacent sides are perpendicular.

Accept equivalent distance forms, including sqrt(18) or 3sqrt(2). For classifications, require correct slope or distance evidence when the prompt asks for justification.