Let's discuss writing proofs using Coordinate Geometry.

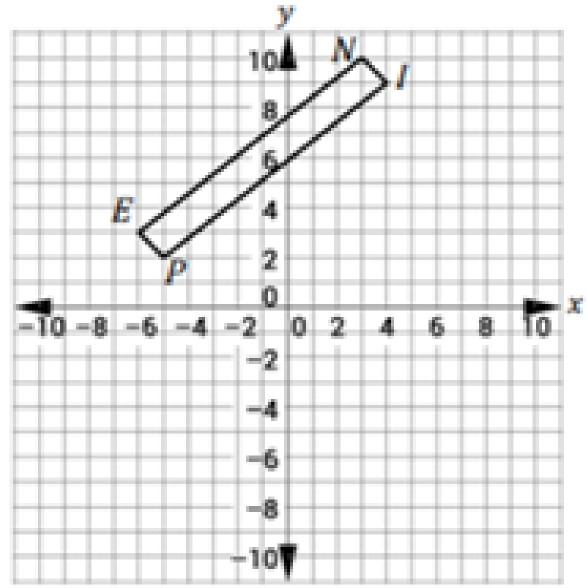
- Coordinate geometry involves placing geometric figures in a Coordinate Plane.

- Coordinate geometry proofs use several kinds of formulas.

Distance Formula	Slope Formula	Midpoint Formula
$d=\sqrt{(x_2-x_1)^2+(y_2-y_1)^2}$ Lengths	$m=\frac{y_2-y_1}{x_2-x_1}$ // or $\perp$	$M=\left(\frac{x_1+x_2}{2}, \frac{y_1+y_2}{2}\right)$ bisect

Consider the information and figure below.

Given:
$PINE$ is a quadrilateral with vertices at $P(-5,2), I(4,9)$, $N(3,10)$, and $E(-6,3)$.



Prove:
$PINE$ is a parallelogram.

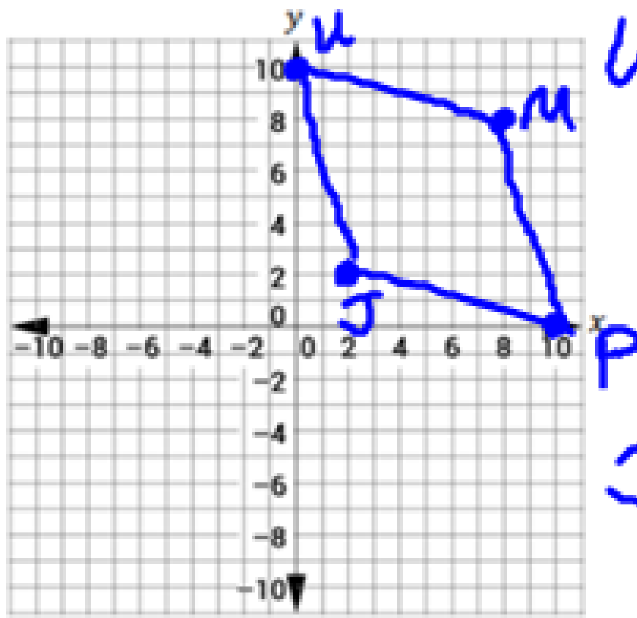
Write a paragraph proof based on the above information and diagram.

$\overline{EP}$ has slope of -1 & $\overline{NI}$ has a slope of -1 so $\overline{EP} \parallel \overline{NI}$. $\overline{EN}$ has a slope of $\frac{7}{9}$ & $\overline{PI}$ has a slope of $\frac{7}{9}$. So $\overline{EN} \parallel \overline{PI}$. Therefore PINE is a //gram by def of //gram

Consider the information below.

Given: $J(2,2), U(0,10), M(8,8), P(10,0)$.
Prove: $JUMP$ is a rhombus

$$JU=\sqrt{(2-0)^2+(2-10)^2}$$
$$=\sqrt{2^2+(-8)^2}$$
$$=\sqrt{4+64}=\sqrt{68}$$



$$UM=\sqrt{(0-8)^2+(10-8)^2}$$
$$=\sqrt{(-8)^2+(2)^2}$$
$$=\sqrt{64+4}=\sqrt{68}$$

$$MP=\sqrt{(8-10)^2+(8-0)^2}$$
$$=\sqrt{(-2)^2+8^2}$$
$$=\sqrt{4+64}=\sqrt{68}$$

$$JP=\sqrt{(2-10)^2+(2-0)^2}$$
$$=\sqrt{(-8)^2+2^2}$$
$$=\sqrt{64+4}=\sqrt{68}$$

Since $\overline{JU}\cong\overline{MP}\cong\overline{UM}\cong\overline{JP}$, then JUMP is a rhombus.

Quadrilateral $GRIT$ has coordinates $G(10, 8)$, $R(10, 20)$, $I(18, 20)$, and $T(18, 8)$.

Part A: Circle the correct answer that completes the statement below.

$GRIT$ is a rectangle | rhombus | isosceles trapezoid.

Part B: Which of the following statements is enough to justify your answer?

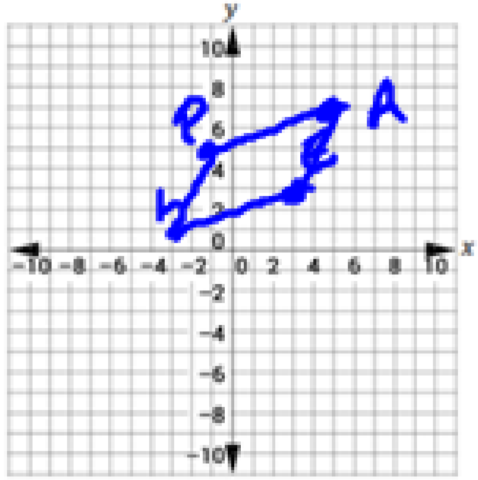
Ⓐ $GRIT$ has four right angles and two pairs of congruent sides.

Ⓑ $GRIT$ has opposite angles that are congruent but not right angles.

Ⓒ $GRIT$ has diagonals that intersect at $90°$.

Ⓓ $GRIT$ has one pair of parallel opposite sides and one pair of non-parallel but congruent sides.

2. Prove that quadrilateral $LEAP$ with vertices $L(-3,1), E(3,3)$, $A(5,7)$, and $P(-1,5)$ is a parallelogram.



Which of the following statements help to prove that $LEAP$ is a parallelogram? Select all that apply.

- [x] $LE = 2\sqrt{10}$, $EA = 2\sqrt{5}$, $AP = 2\sqrt{10}$, $LP = 2\sqrt{5}$, so $\overline{LE} \cong \overline{AP}$ and $\overline{EA} \cong \overline{LP}$. Opposite sides of a parallelogram are congruent.
- [ ] $LE = EA = AP = LP = 2\sqrt{10}$, so $\overline{LE} \cong \overline{EA} \cong \overline{AP} \cong \overline{LP}$. All sides are congruent, depicting a square, which is a type of parallelogram.
- [x] The slope of $\overline{LE}$ and $\overline{AP}$ is $\frac{1}{3}$. The slope of $\overline{EA}$ and $\overline{LP}$ is 2. Since $\overline{LE} \parallel \overline{AP}$ and $\overline{EA} \parallel \overline{LP}$, opposite sides of a parallelogram are parallel.
- [ ] The slope of $\overline{LE}$ and $\overline{AP}$ is $\frac{1}{3}$. Since $\overline{LE} \parallel \overline{AP}$, parallelograms have one pair of parallel sides.
- [ ] The slope of $\overline{LE}$ and $\overline{AP}$ is $\frac{1}{3}$, while the slope of $\overline{EA}$ and $\overline{LP}$ is -3. These slopes are opposite reciprocals of each other, so $LEAP$ is a rectangle, which is a type of parallelogram.