Name: _____ Date: _____

UNIT 7 **LESSON 9**

AIM: HOW DO PROVE PARALLELOGRAMS AND RECTANGLES USING COORDINATE GEOMETRY?

Do Now: Fill in the formulas for distance, slope and midpoint on the table below.

	DISTANCE	SLOPE	MIDPOINT
FORMULA			
KEY WORDS			

FORMULA APPLICATIONS:

1. The coordinates of the vertices of parallelogram *CDEH* are $C(-5,5)$, $D(2,5)$, $E(-1,-1)$, and $H(-8,-1)$. What are the coordinates of *P*, the point of intersection of diagonals $\overline{CE}$ and $\overline{DH}$?

1) $(-2,3)$

2) $(-2,2)$

3) $(-3,2)$

4) $(-3,-2)$

2. Rectangle *KLMN* has vertices $K(0,4)$, $L(4,2)$, $M(1,-4)$, and $N(-3,-2)$. Determine and state the coordinates of the point of intersection of the diagonals.

3. The coordinates of the vertices of parallelogram *ABCD* are $A(-3,2)$, $B(-2,-1)$, $C(4,1)$, and $D(3,4)$. The slopes of which line segments could be calculated to show that *ABCD* is a rectangle?

1) $\overline{AB}$ and $\overline{DC}$

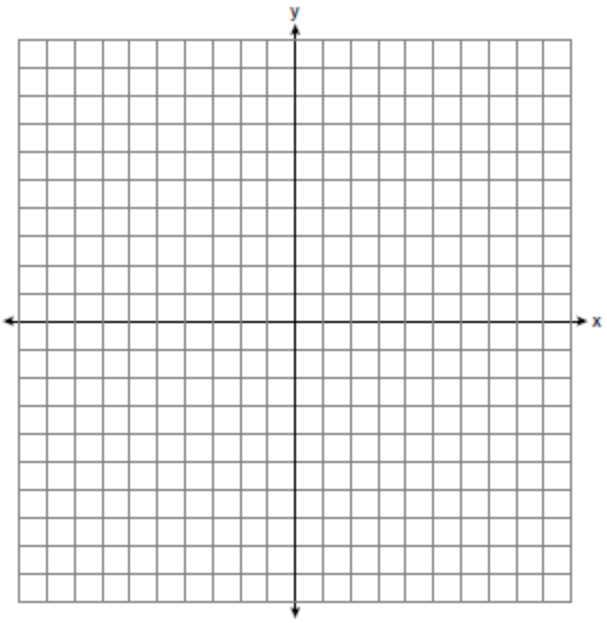
2) $\overline{AB}$ and $\overline{BC}$

3) $\overline{AD}$ and $\overline{BC}$

4) $\overline{AC}$ and $\overline{BD}$

4. In the coordinate plane, the vertices of triangle *PAT* are $P(-1,-6)$, $A(-4,5)$, and $T(5,-2)$.

a) State the coordinates of *R* so that quadrilateral *PART* is a parallelogram.

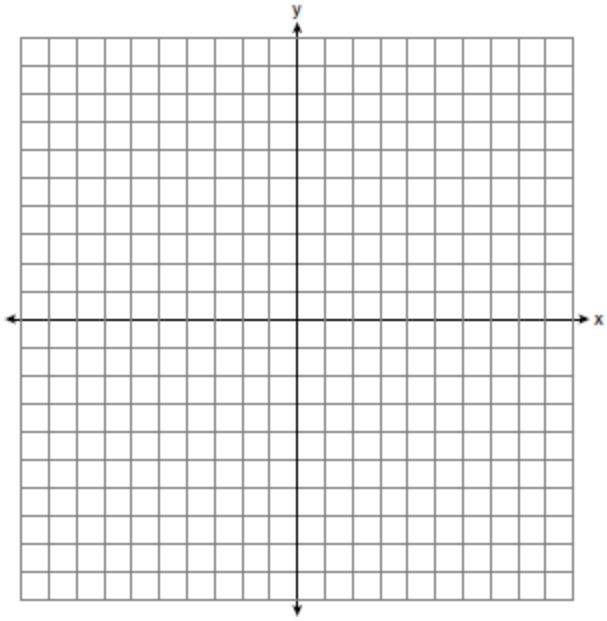


b) Prove that quadrilateral *PART* is a parallelogram.

NOTES:

- To find a missing point in a parallelogram or rectangle, use the graph to repeat the _____ on opposite sides.
- To prove a quadrilateral is a parallelogram, we use the _____ formula ___ times to show that _____ but _____.

5. In the coordinate plane, the vertices of $\triangle RST$ are $R(6,-1)$, $S(1,-4)$, and $T(-5,6)$.



a) Prove that $\triangle RST$ is a right triangle.

b) State the coordinates of point *P* such that quadrilateral *RSTP* is a rectangle.

c) Prove that your quadrilateral *RSTP* is a rectangle.

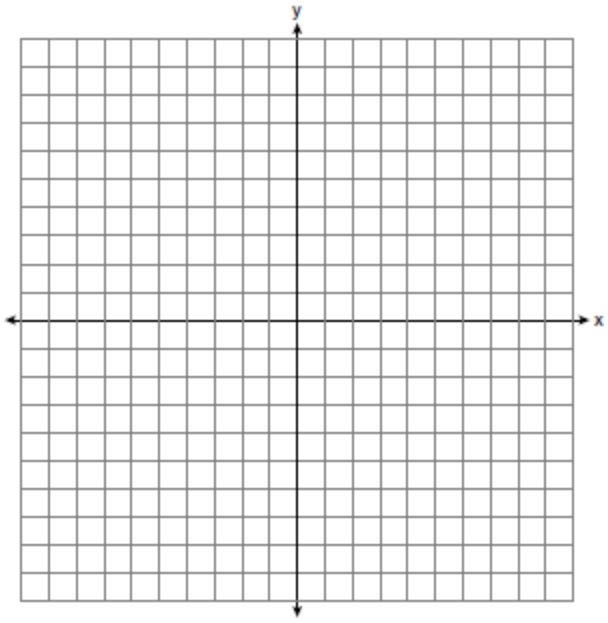
NOTES:

- To prove a triangle is a right triangle, we use the _____ formula ____ times and use those numbers to prove the Pythagorean theorem (_____). Where 'c' is the _____ number.
- To prove a quadrilateral is a rectangle, we use the _____ formula ___ times to show that _____ and _____.

NOW YOU TRY ONE!

5. Ashanti is surveying for a new parking lot shaped like a parallelogram. She knows that three of the vertices of parallelogram *ABCD* are $A(0,0)$, $B(5,2)$, and $C(6,5)$.

a) Find the coordinates of point *D* and sketch parallelogram *ABCD* on the accompanying set of axes.



b) Justify mathematically that the figure you have drawn is a parallelogram.

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UNIT 7 **LESSON 9 HOMEWORK**

1. Parallelogram *ABCD* has coordinates $A(1,5)$, $B(6,3)$, $C(3,-1)$, and $D(-2,1)$. What are the coordinates of *E*, the intersection of diagonals $\overline{AC}$ and $\overline{BD}$?

1) $(2,2)$

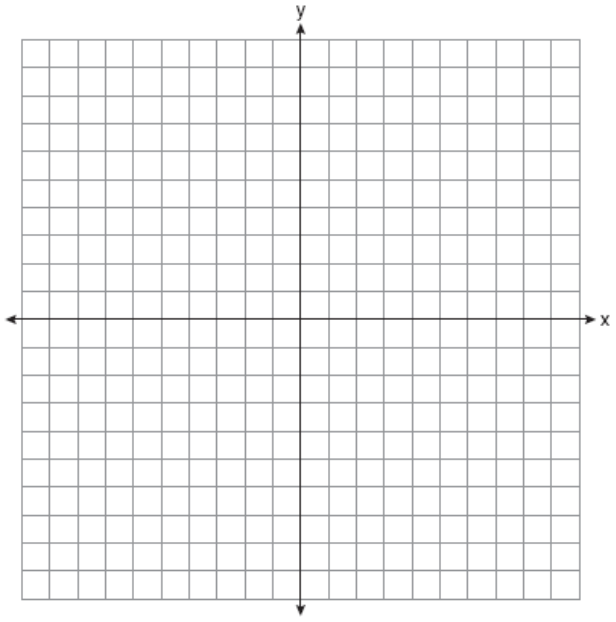
2) $(4.5,1)$

3) $(3.5,2)$

4) $(-1,3)$

2. The vertices of parallelogram *MATH* have coordinates $M(-4,2)$, $A(-1,-3)$, $T(9,3)$.

a) Find the coordinates of point *H* and sketch parallelogram *ABCD* on the accompanying set of axes.



b) Prove that quadrilateral *MATH* is a rectangle.