11-2 Homework: Using slope to prove theorems
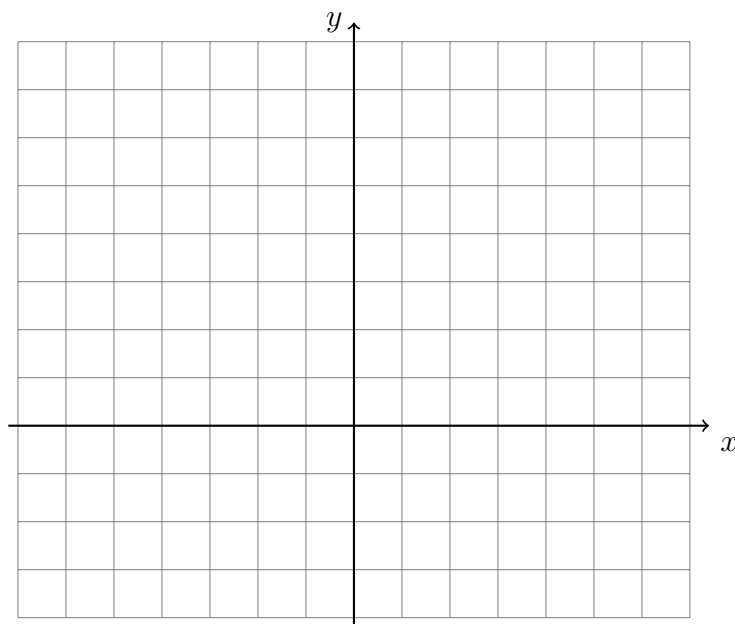
1. Graph and label the two equations. Mark their intersection as an ordered pair.

 $y = -2x + 3$ $2x - 4y = 8$

   Are the lines parallel, perpendicular, or neither? Justify your answer.

2. A translation of $x \to x + 2, y \to y - 4$ maps $\overline{AB} \to \overline{CD}$, with $A(-2, 0)$ and $B(0, 5)$. Find the slopes and y-intercepts of $\overleftrightarrow{AB}$ and $\overleftrightarrow{CD}$, and hence write down the equations of the two lines.

3. On the graph, draw $\triangle ABC$ with vertices $A(-2, 1)$, $B(9, -1)$, $C(1, 5)$. Prove that $\triangle ABC$ is a right triangle by showing $\overline{AC} \perp \overline{BC}$. Complete the concluding statements given.
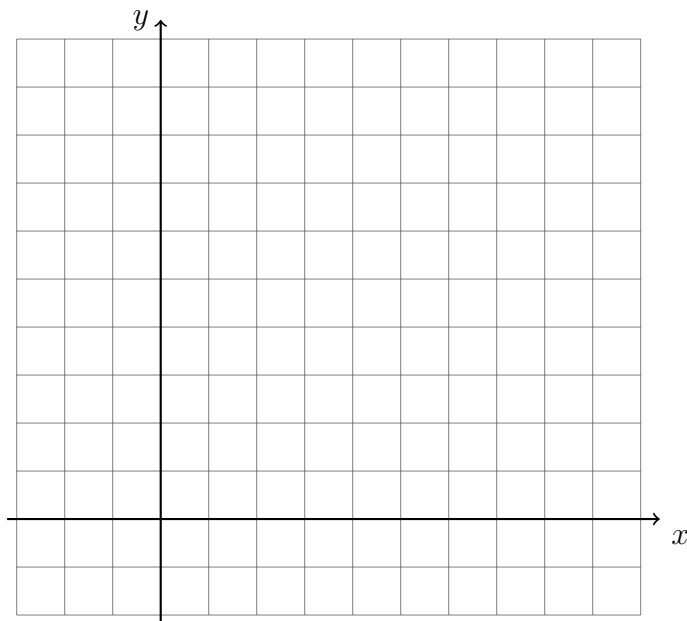
Segment $\overline{AC}$ and segment _____ are perpendicular so $\angle C$ is a _____ angle.

Angle _____ is a right angle so $\triangle ABC$ is a right triangle.

Fill in the blanks.

4. The opposite sides of a parallelogram are both _____ and _____.

5. Opposite internal angles of a parallelogram are _____ .

6. Adjacent internal angles of a parallelogram are _____.

7. The diagonals of a parallelogram _____ each other.

8. Draw quadrilateral $ABCD$ with vertices $A(0,2)$, $B(6,-1)$, $C(5,3)$, and $D(-1,6)$ on the grid below. Prove that $ABCD$ is a parallelogram by using slopes to show $\overline{AB}||\overline{CD}$ and $\overline{AD}||\overline{BC}$.

Be sure to state that $m_{\overline{AB}} = m_{\overline{CD}}$ and $m_{\overline{AD}} = m_{\overline{BC}}$. Finish with a concluding statement.
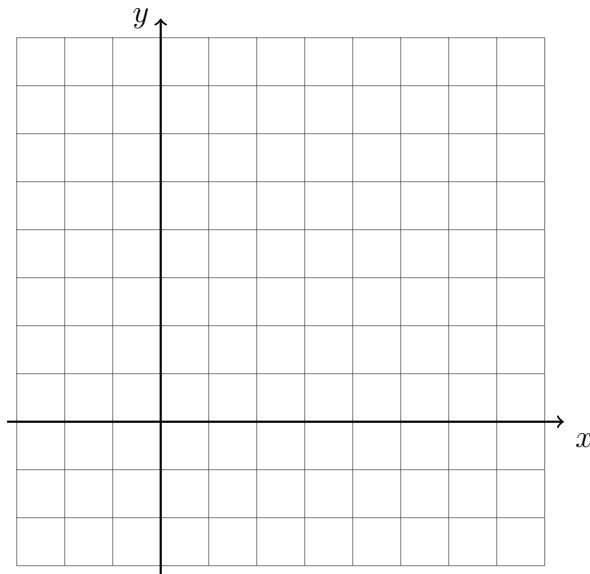
9. Three of the vertices of the parallelogram $ABCD$ are given: $A(-1,1)$, $B(4,-1)$, $C(6,6)$. Determine and state the coordinates of the fourth vertex, D, and mark and label it on the grid below. Draw the sides of the parallelogram.
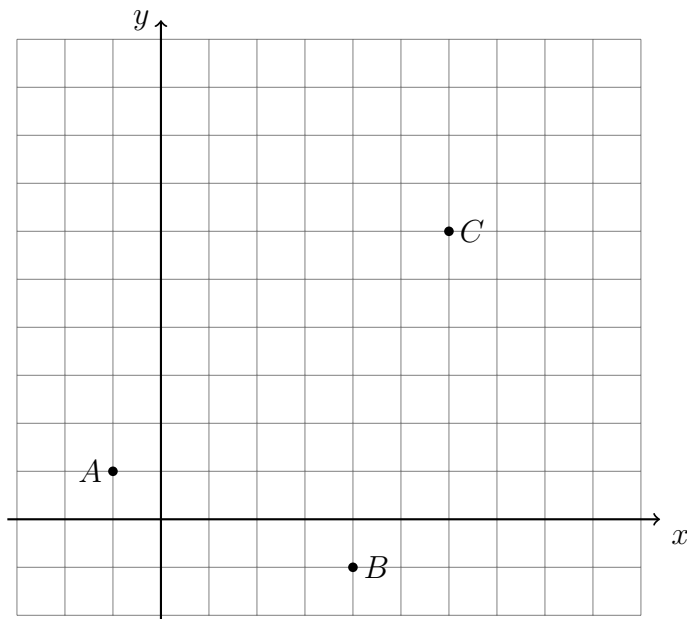
10. The parallelogram $BECA$ with vertices $B(-2,-1)$, $E(6,1)$, $C(4,7)$, and $A(-4,5)$ is shown. Use the midpoint formula to show that the diagonals $\overline{BC}$ and $\overline{EA}$ bisect each other. State that $M_{\overline{BC}} = M_{\overline{EA}}$ and the concluding statement. Draw the diagonals and label the midpoint.