



**Exercise 1**

- a. Given triangle  $ABC$  with vertices  $A(a_1, a_2)$ ,  $B(b_1, b_2)$ , and  $C(c_1, c_2)$ , find the coordinates of the point of concurrency of the medians.
- b. Let  $A(-23, 12)$ ,  $B(13, 36)$ , and  $C(23, -1)$  be vertices of a triangle. Where will the medians of this triangle intersect? (Use “Tyler’s formula” from part (a) to complete this problem.)

**Exercise 2**

Prove that the diagonals of a parallelogram bisect each other.

## Problem Set

- Point  $M$  is the midpoint of  $\overline{AC}$ . Find the coordinates of  $M$ :
  - $A(2, 3), C(6, 10)$
  - $A(-7, 5), C(4, -9)$
- $M(-2, 10)$  is the midpoint of  $\overline{AB}$ . If  $A$  has coordinates  $(4, -5)$ , what are the coordinates of  $B$ ?
- Line  $A$  is the perpendicular bisector of  $\overline{BC}$  with  $B(-2, -1)$  and  $C(4, 1)$ .
  - What is the midpoint of  $\overline{BC}$ ?
  - What is the slope of  $\overline{BC}$ ?
  - What is the slope of line  $A$ ? (Remember, it is perpendicular to  $\overline{BC}$ .)
  - Write the equation of line  $A$ , the perpendicular bisector of  $\overline{BC}$ .
- Find the coordinates of the intersection of the medians of  $\triangle ABC$  given  $A(-5, 3), B(6, -4)$ , and  $C(10, 10)$ .
- Use coordinates to prove that the diagonals of a parallelogram meet at the intersection of the segments that connect the midpoints of its opposite sides.
- Given a quadrilateral with vertices  $E(0, 5), F(6, 5), G(4, 0)$ , and  $H(-2, 0)$ :
  - Prove quadrilateral  $EFGH$  is a parallelogram.
  - Prove  $(2, 2.5)$  is a point on both diagonals of the quadrilateral.
- Prove quadrilateral  $WXYZ$  with vertices  $W(1, 3), X(4, 8), Y(10, 11)$ , and  $Z(4, 1)$  is a trapezoid.
- Given quadrilateral  $JKLM$  with vertices  $J(-4, 2), K(1, 5), L(4, 0)$ , and  $M(-1, -3)$ :
  - Is it a trapezoid? Explain.
  - Is it a parallelogram? Explain.
  - Is it a rectangle? Explain.
  - Is it a rhombus? Explain.
  - Is it a square? Explain.
  - Name a point on the diagonal of  $JKLM$ . Explain how you know.