Name: Date: Period: 4

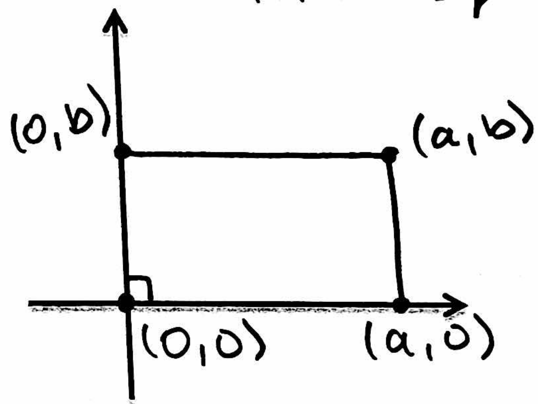
Coordinate Proofs

Lesson Objective IWBAT write coordinate proofs

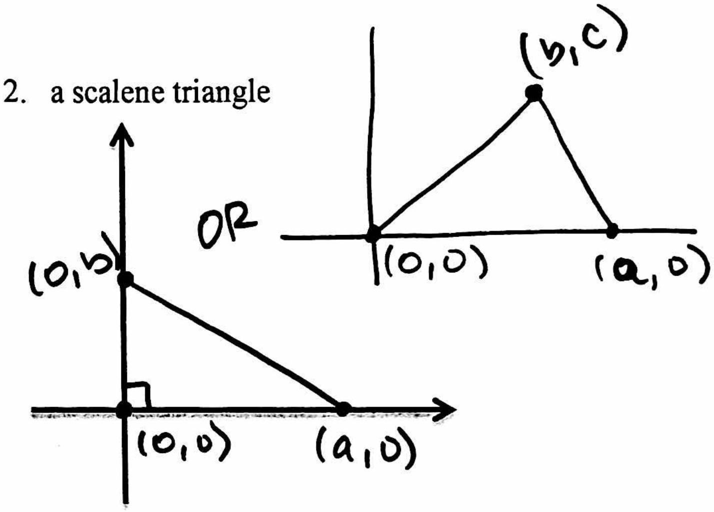
Coordinate Proof: A coordinate proof involves placing a geometric figure in a coordinate plane.
→ When you use variables to represent the coordinates of a figure in a coordinate proof, the results are true for ALL figures of that type.

Placing Figures in the Coordinate Plane

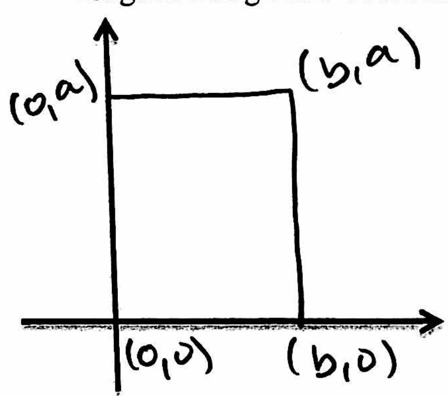
1. a rectangle (not a square)



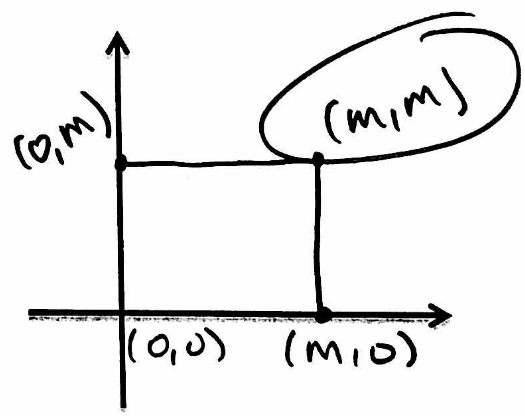
2. a scalene triangle



3. Show another way to place the rectangle from #1 that is convenient for finding side lengths. Assign new coordinates.

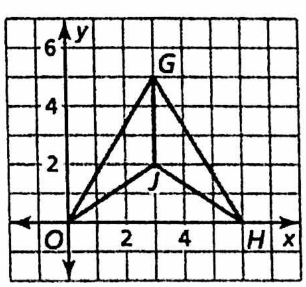


4. A square has vertices at (0, 0), (m, 0), and (0, m). What are the coordinates of the fourth vertex?



Writing a Proof Using Coordinate Geometry

5. Write a proof.
Given: $\overrightarrow{GJ}$ bisects $\angle OGH$
Prove: $\Delta GJO \cong \Delta GJH$

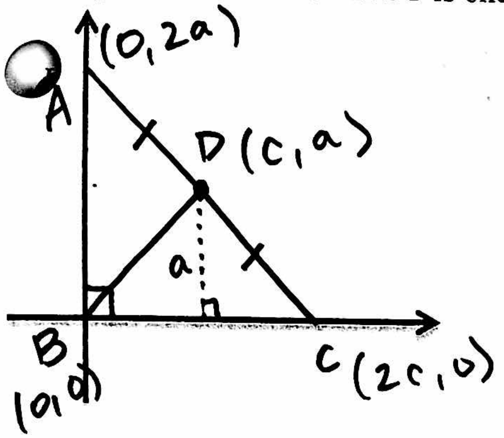


Writing a Coordinate Proof

Formulas: Slope m = $\frac{y_2-y_1}{x_2-x_1}$ **Distance =** $\sqrt{(x_2-x_1)^2+(y_2-y_1)^2}$ **Midpoint =** $\left(\frac{x_1+x_2}{2}, \frac{y_1+y_2}{2}\right)$

Step 1: Place the figure in the coordinate plane
Step 2 Write the proof

8. Write a proof.
Given: $\angle B$ is a right angle in ΔABC, D is the midpoint of $\overline{AC}$
Prove: The area of ΔDBC is one-half the area of ΔABC



$$\text{area} = \frac{1}{2}bh$$

~~area~~ $\text{area } \Delta DBC = \frac{1}{2} \text{ area } \Delta ABC$

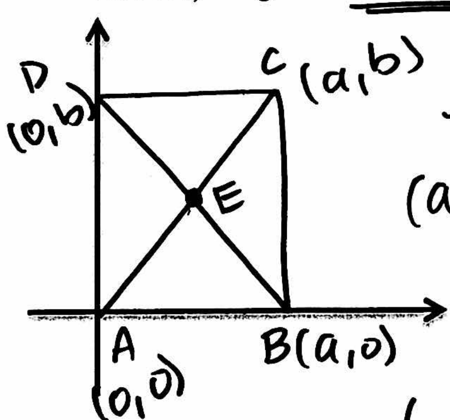
$$\frac{1}{2}(2c)(a) = \frac{1}{2}\left(\cancel{\frac{1}{2}}(\cancel{2}c)(2a)\right)$$

$$ca = \frac{1}{2}(2ca)$$

$$ca = ca$$

8. Given: Rectangle ABCD with A (0,0); B (a,0); C (a,b); D (0,b)
Prove: a) Diagonals bisect each other b) Diagonals are congruent

back side →



they have the
(a) same mdpt!

$$\text{mdpt } \overline{AC} = \text{mdpt } \overline{DB}$$

$$\left(\frac{0+a}{2}, \frac{0+b}{2}\right) = \left(\frac{0+a}{2}, \frac{b+0}{2}\right)$$

$$\left(\frac{a}{2}, \frac{b}{2}\right) = \left(\frac{a}{2}, \frac{b}{2}\right)$$

(b) $AC = BD$

$$\sqrt{(0-a)^2+(0-b)^2} = \sqrt{(0-a)^2+(b-0)^2}$$

$$\sqrt{(-a)^2+(-b)^2} = \sqrt{(-a)^2+b^2}$$

$$\sqrt{a^2+b^2} = \sqrt{a^2+b^2}$$