5.8 Coordinate Proofs

Lesson Objective

PLACE FIGURES IN THE COORDINATE PLANE AND WRITE COORDINATE PROOFS.
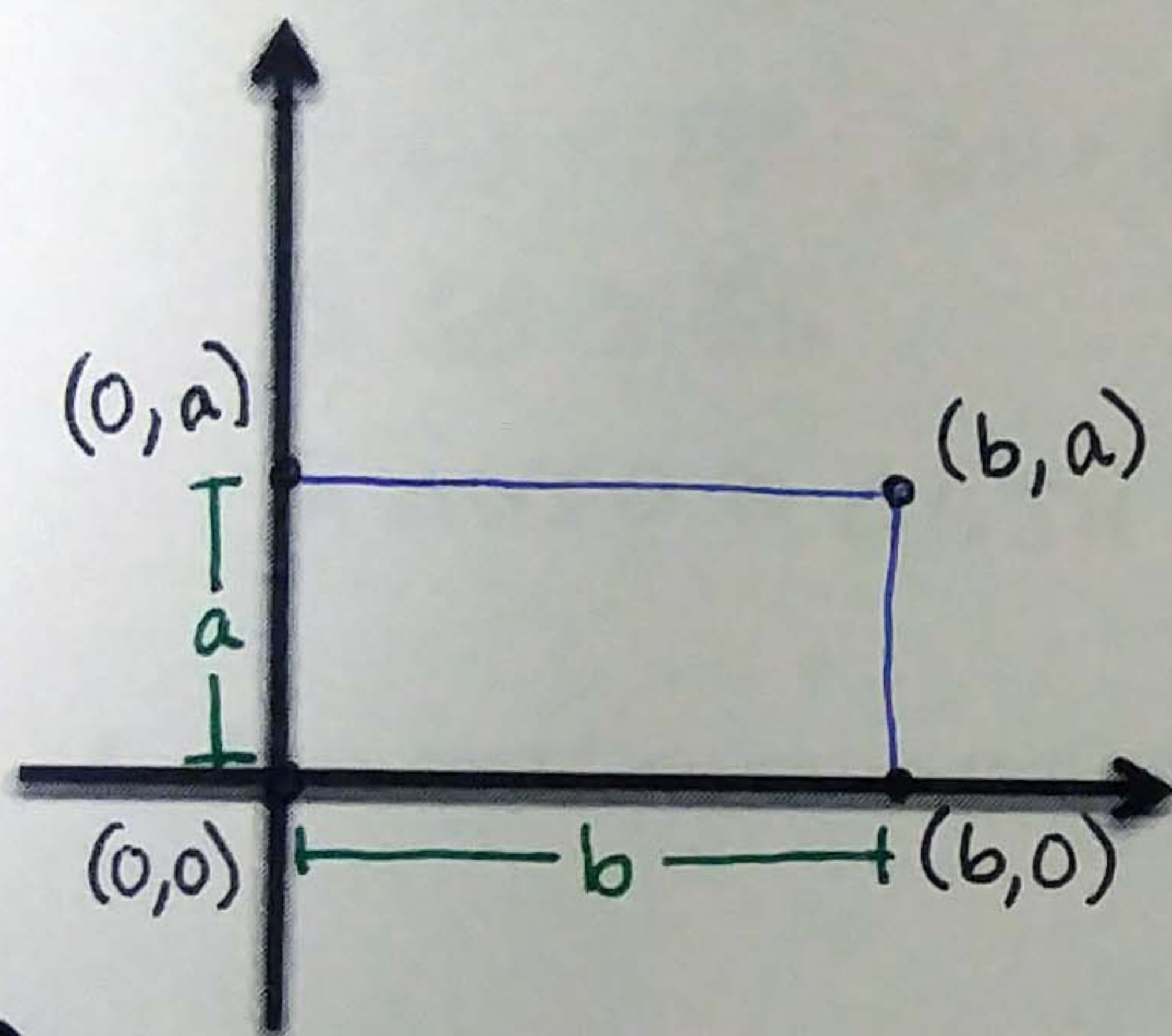
<u>Coordinate Proof:</u> A coordinate proof involves placing a geometric figure in a coordinate plane.
→ When you use variables to represent the coordinates of a figure in a coordinate proof, the results are true for ALL figures of that type.
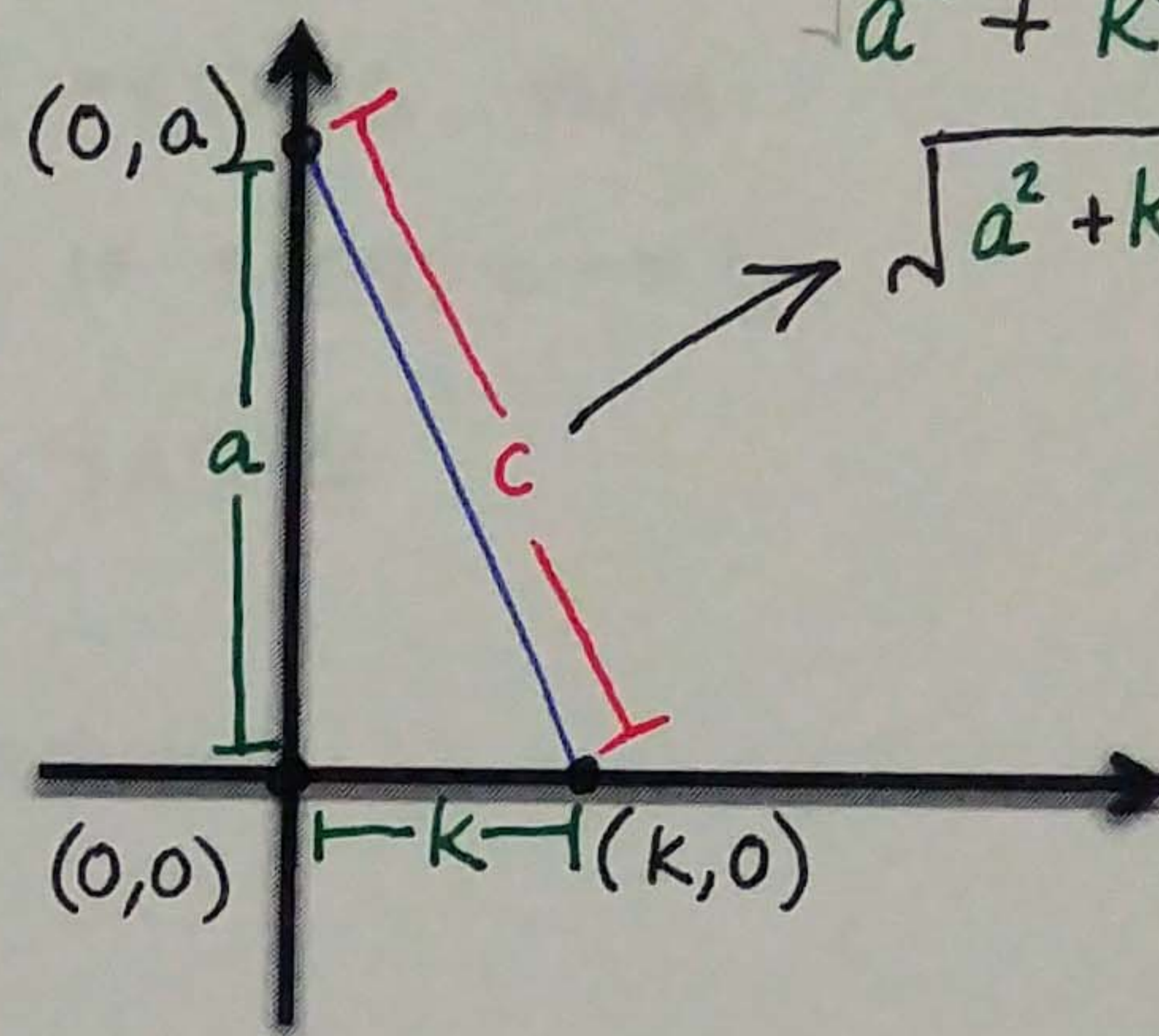
<u>Placing Figures in the Coordinate Plane</u>

Examples:

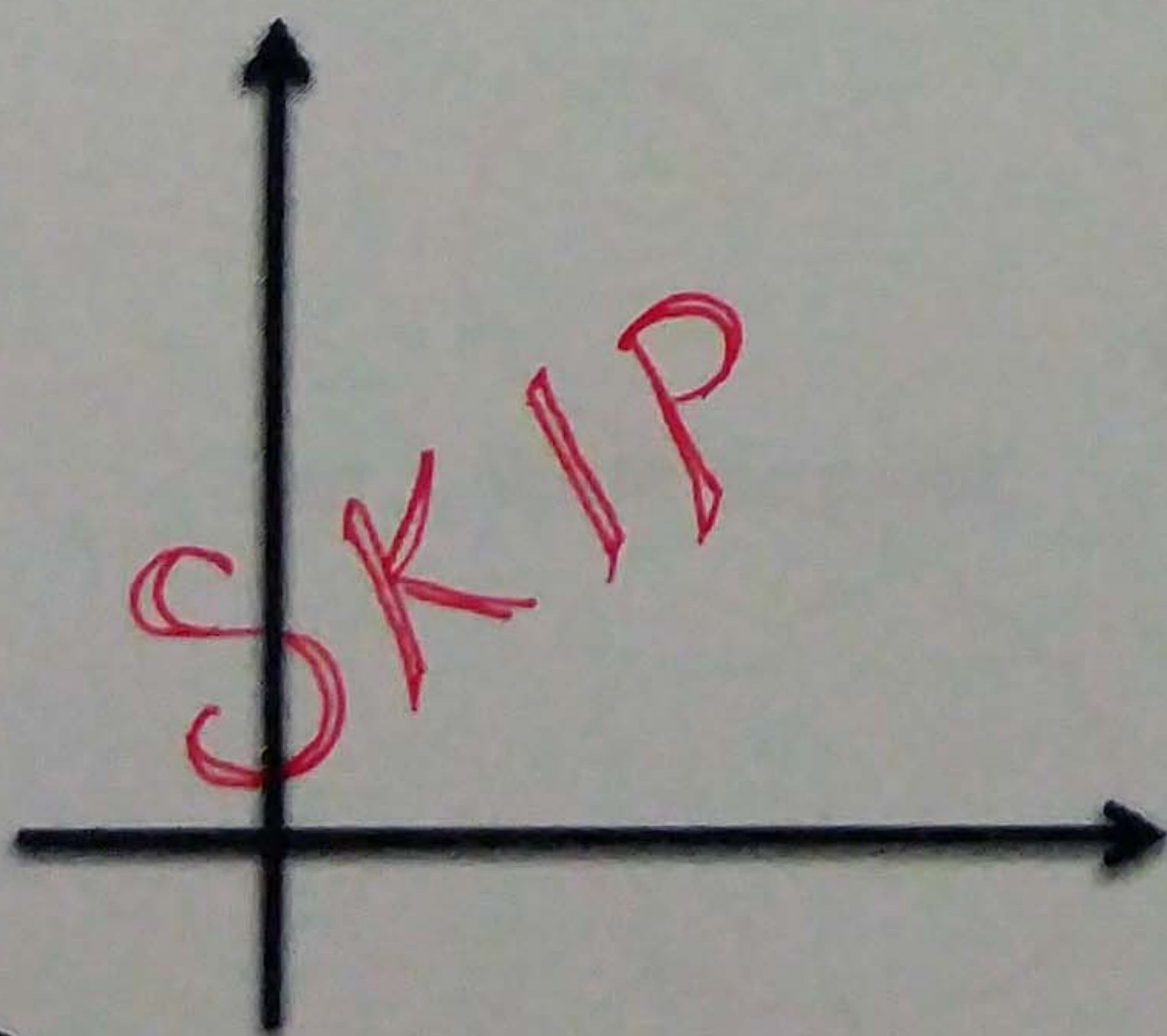1. a rectangle

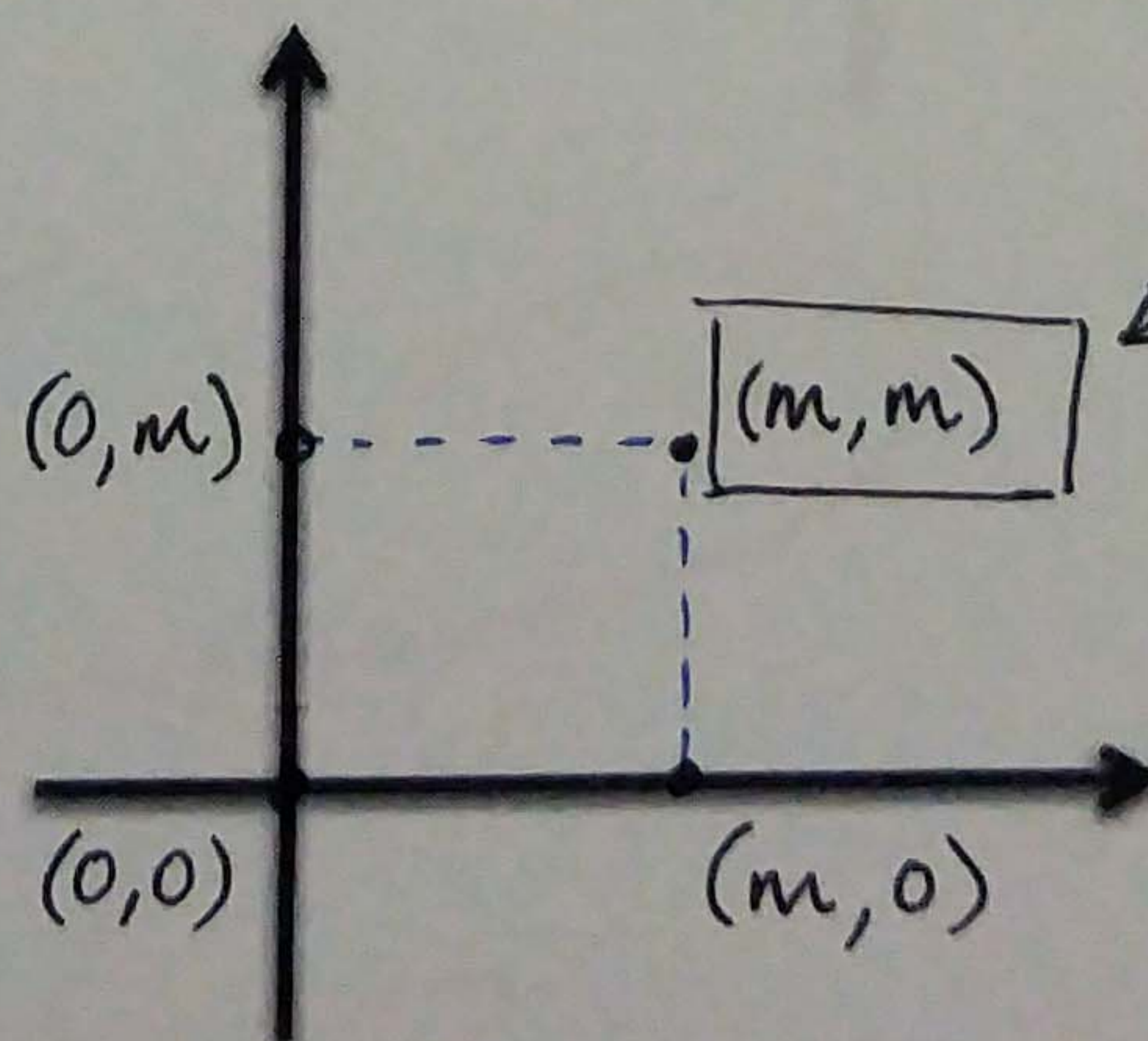2. a scalene triangle

PYTHAGOREAN THEOREM:

$$a^2 + k^2 = \sqrt{c^2}$$

$$\sqrt{a^2 + k^2} = c$$

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

SKIP

4. A square has vertices at (0, 0), (m, 0), and (0, m). What are the coordinates of the fourth vertex?
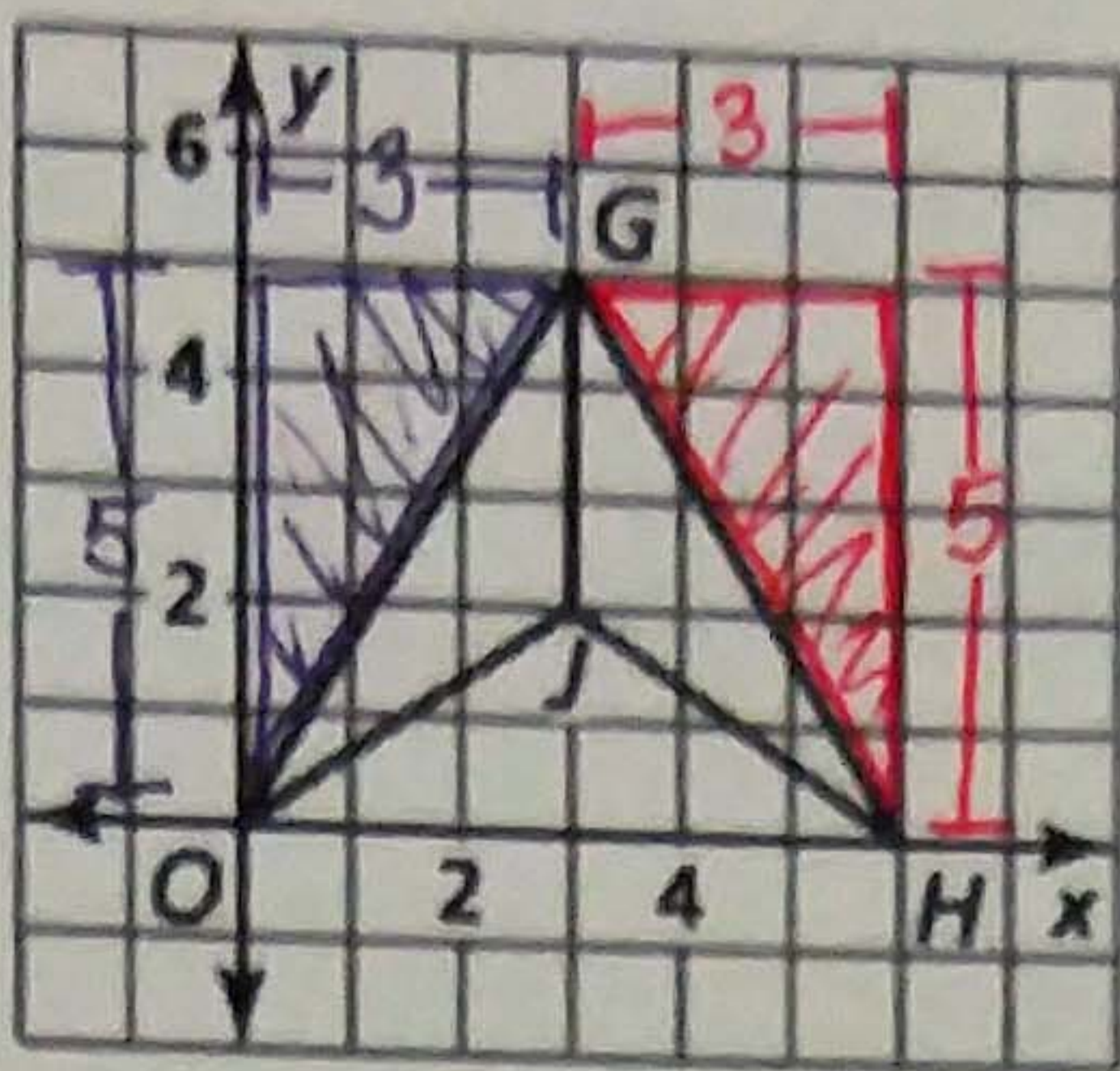
5. Write a two-column proof.
   Given: $\overrightarrow{GJ}$ bisects $\angle OGH$
   Prove: $\triangle GJO \cong \triangle GJH$

PYTHAGOREAN THEOREM:

$$3^2 + 5^2 = GH^2$$
$$\sqrt{9+25} = GH$$
$$\sqrt{34} = GH$$

$$3^2 + 5^2 = GO^2$$
$$\sqrt{9+25} = GO$$
$$\sqrt{34} = GO$$

Statements	Reasons
1. $\overline{GJ}$ BISECTS $\angle OGH$	1. GIVEN
2. $\angle OGJ \cong \angle HGJ$	2. DEF. $\angle$ BISECTOR
3. $\overline{GJ} \cong \overline{GJ}$	3. REFL. PROP. $\cong$
4. $GO = \sqrt{34}$, $GH = \sqrt{34}$	4. PYTHAG. THM.
5. $\overline{GO} \cong \overline{GH}$	5. IF SEGS. $= \rightarrow \cong$
6. $\triangle GJO \cong \triangle GJH$	6. SAS $\cong$

6. How could we prove that $\angle O \cong \angle H$ from the figure above?

CPCTC

Writing a Coordinate Proof
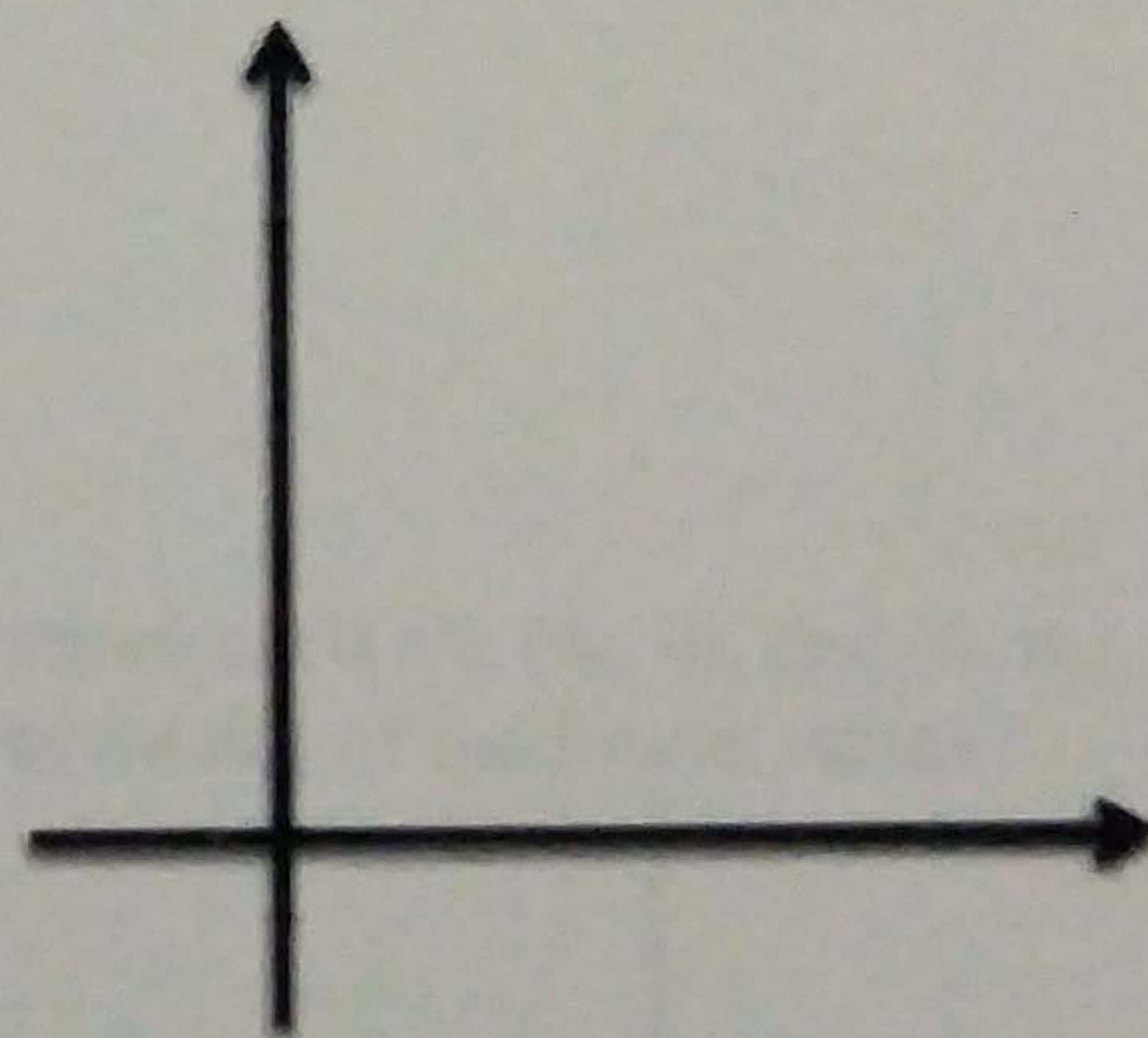
7. Write a proof.
   Given: $\angle B$ is a right angle in $\triangle ABC$, D is the midpoint of $\overline{AC}$
   Prove: The area of $\triangle DBC$ is one-half the area of $\triangle ABC$

Step 1: Place the figure in the coordinate plane. Assign coordinates to each of the vertices.

Step 2: Write a rough-draft/plan for the proof.

Step 3: Write the proof.

SKIP