Geometry 4.8

Position and label triangles for use in coordinate proofs

Write coordinate proofs

Quiz 4.7-4.8 Mon.

proof

coordinate proof

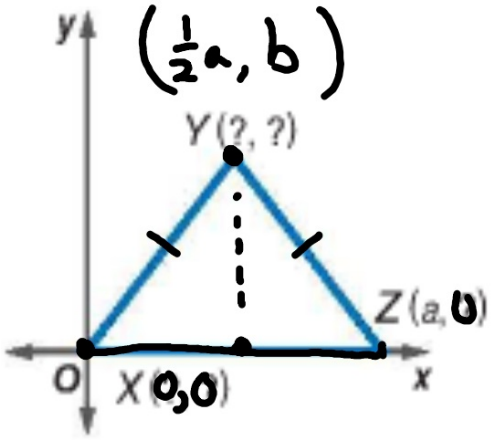
* position can make the problem easier or harder
    - make good choices: coordinate axes etc.
    - use as few variables as possible

calculate slope, distance, etc. using coordinates

show that corresponding parts are congruent, parallel, etc.

Example 2 Identify Missing Coordinates

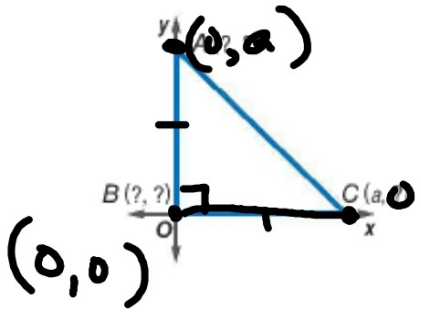
Name the missing coordinates of isosceles triangle XYZ.



Hint: Use the fewest variables possible.

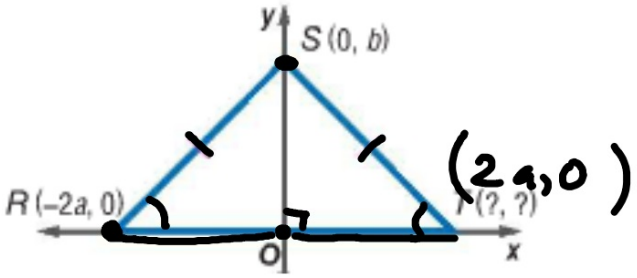
GuidedPractice

2. Name the missing coordinates of isosceles right triangle *ABC*.

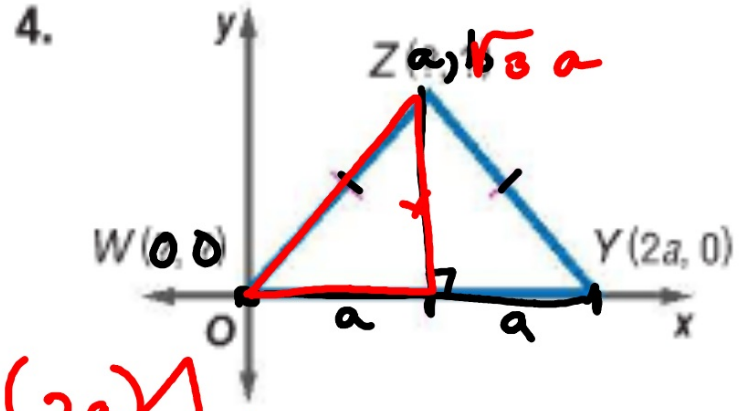


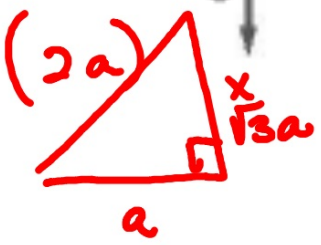
Name the missing coordinate(s) of each

3.



4.





$a^2 + x^2 = 2a \cdot 2a$

$a^2 + x^2 = 4a^2$

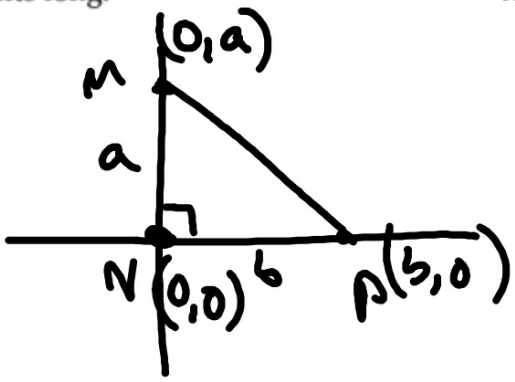
$-a^2 \qquad -a^2$

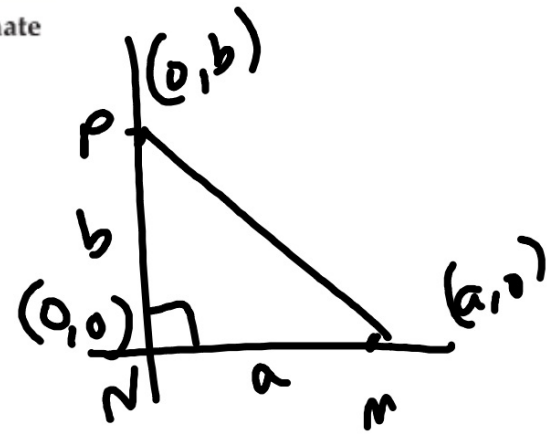
$\sqrt{x^2} = \sqrt{3a^2}$

$x = a\sqrt{3}$

Example 1 Position and Label a Triangle

Position and label right triangle *MNP* on the coordinate plane so that leg $\overline{MN}$ is *a* units long and leg $\overline{NP}$ is *b* units long.

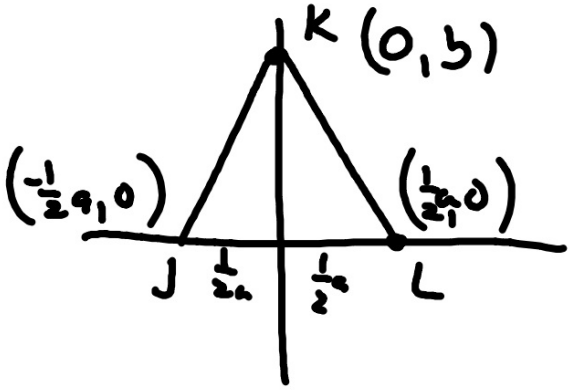


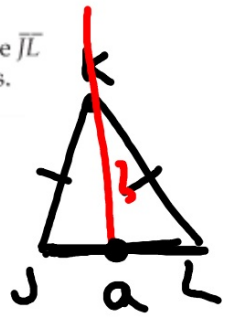


Suggestion:
Put one vertex at (0,0)
or
Center the triangle on an axis
(It depends on what you are doing next.)

GuidedPractice

1. Position and label isosceles triangle JKL on the coordinate plane so that its base $\overline{JL}$ is a units long, vertex K is on the y-axis, and the height of the triangle is b units.





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KeyConcept Placing Triangles on Coordinate Plane

Step 1 Use the origin as a vertex or center of the triangle. on axis

Step 2 Place at least one side of a triangle on an axis.

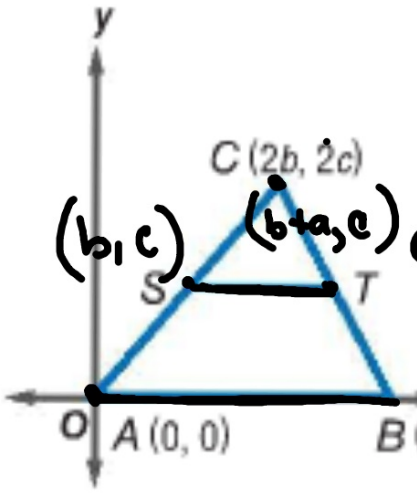
Step 3 Keep the triangle within the first quadrant if possible.

Step 4 Use coordinates that make computations as simple as possible.

(fewest)

Example 3 Write a Coordinate Proof

Write a coordinate proof to show that a line segment joining the midpoints of two sides of a triangle is parallel to the third side.



Show that slope of ST= slope of AB

Given S is mp, T is mp

Prove $\overline{ST} \parallel \overline{AB}$

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coords of $S \left(\frac{2b+0}{2}, \frac{2c+0}{2}\right) = (b, c)$

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

slope $\overline{ST} = \frac{c-c}{b+a-b} = \frac{0}{a} = 0$

slope $\overline{AB} = \frac{0-0}{2a-0} = \frac{0}{2a} = 0$

$\overline{ST} \parallel \overline{AB}$ same slope

Whiteboards

ARGUMENTS **Write a coordinate proof for each statement.**

19. The segments joining the base vertices to the midpoints of the legs of an isosceles triangle are congruent.