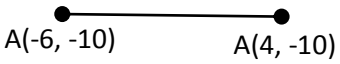
5.1 Classifying Triangles on the Coordinate Plane

Bell Work:

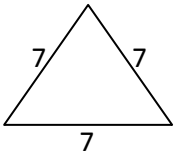
The coordinates of 2 points are given.
Where could a third point be placed to create a right triangle? **At (-6, some number other than -10) or (4, some number other than -10)**



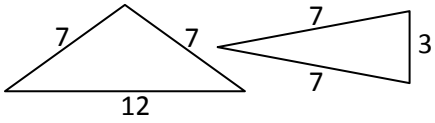
Triangles can be classified either by the lengths of their sides or the measures of their angles.

Sides:

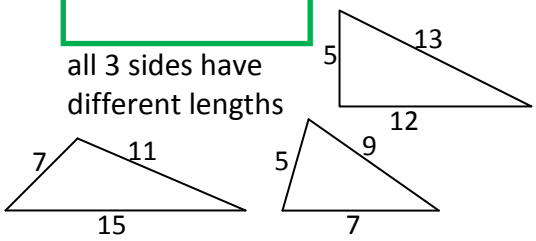
equilateral
the lengths of all 3 sides are the same



isosceles
the lengths of at least 2 sides are the same



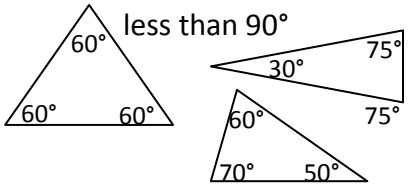
scalene
all 3 sides have different lengths



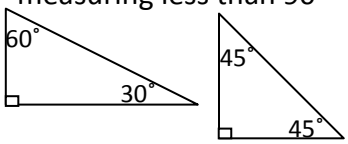
Note: an equilateral triangle is also an isosceles triangle

Angles:

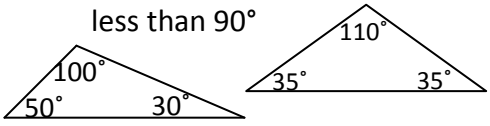
acute
all 3 angles have measures that are less than 90°



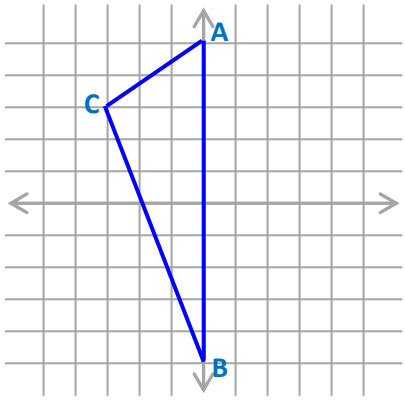
right
1 angle measures 90° and the other 2 are acute, measuring less than 90°



obtuse
1 angle measures more than 90° and the other 2 are acute, measuring less than 90°



1. a. Given triangle ABC with A(0, 5), B(0, -5), and C(-3, 3) classify the triangle as equilateral, isosceles, or scalene.
Plot the points on the graph and connect the points to form a triangle.



Length AB = **10**

Length BC = $\sqrt{(-3-0)^2+(3+5)^2} = \sqrt{9+64} = \sqrt{73} \approx 8.54$

Length AC = $\sqrt{(-3-0)^2+(3-5)^2} = \sqrt{9+4} = \sqrt{13} \approx 3.61$

Triangle ABC is a(n) **scalene** triangle.

b. Prove triangle ABC is a right triangle. **Triangle ABC "look like" a right triangle.**

Hint: Triangle ABC is a right triangle if it has a right angle. If two of its sides are perpendicular then they form a right angle. If the slopes of two sides of the triangle are opposite reciprocals then the sides are perpendicular.

Slope AB = $\frac{-5-5}{0-0} = \frac{-10}{0} = undefined$ Slope BC = $\frac{3+5}{-3-0} = \frac{8}{-3} = -\frac{8}{3}$

Slope AC = $\frac{3-5}{-3-0} = \frac{-2}{-3} = \frac{2}{3}$

There are no opposite reciprocals among the slopes so there are no perpendicular segments and thus no right angles.

<**ABC** is **not** a right angle therefore triangle ABC is **not** a right triangle.

c. Prove triangle ABC is a right triangle. (alternate method)

A triangle is a right triangle if the lengths of the 3 sides work in the Pythagorean Theorem, $a^2 + b^2 = c^2$ where a is the shortest side and c is the longest side. Use your side lengths from (a) to determine whether triangle ABC is a right triangle.

AC is the shortest side so it would be a in the formula. CB is the medium side so it would be b in the formula. AB is the longest side so it would be c in the formula.

$3.61^2 + 8.54^2$ equals? 10^2

13 + 73 equals 100

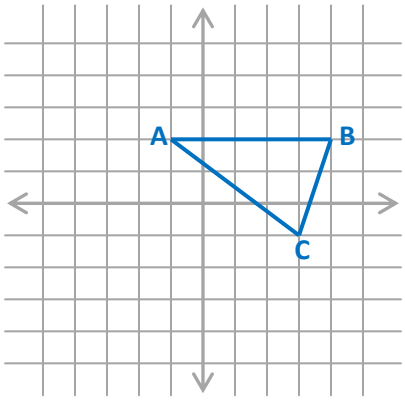
86 is not equal to 100

Triangle ABC is not a right triangle.

Practice:

2. Given triangle ABC with A(-1, 2), B(4, 2), and C(3, -1) classify the triangle as equilateral, isosceles, or scalene.

Is triangle ABC a right triangle? You may use which ever method you prefer. If it is not a right triangle do you think it is acute or obtuse?



AB = 5

BC = $\sqrt{(3-4)^2 + (-1-2)^2} = \sqrt{1+9} = \sqrt{10} \approx 3.16$

AC = $\sqrt{(3+1)^2 + (-1-2)^2} = \sqrt{16+9} = \sqrt{25} \approx 5$

Triangle ABC is isosceles.

BC is the shortest side so it would be a in the formula and b and c would both be 5.

$3.16^2 + 5^2$ is not equal to 5^2 so the triangle is not a right triangle.

slope AB = 0 (horizontal segment) **slope BC =** $\frac{-1-2}{3-4} = \frac{-3}{-1} = 3$

slope AC = $\frac{-1-2}{3+1} = \frac{-3}{4} = -\frac{3}{4}$

None of the slopes are opposite reciprocals so there are no perpendiculars thus no right angles.