The verticles of triangle ABC are: A(-2, -2), B(-5,-4), C(4,1). Round your answer to the nearest tenth.

1. Find the perimeter of the triangle
2. Find the area of the triangle
3. Johnathon says the triangle is a right triangle. Do you agree or disagree. Why or why not?

Solution:

1. Perimeter of the triangle

$$AB = \sqrt{(-5+2)^2 + (-4+2)^2} = \sqrt{13}$$
$$BC = \sqrt{(-5-4)^2 + (-4-1)^2} = \sqrt{106}$$
$$AC = \sqrt{(4+2)^2 + (1+2)^2} = \sqrt{45}$$
$$P = AB + BC + AC \approx 20.6$$

2. Area of the triangle

   Solution using Heron's formula

$$p = \frac{P}{2}$$
$$S = \sqrt{p(p-AB)(p-AC)(p-BC)} \approx 1.5$$

   Solution using cross product

$$AB = (-3, -2)$$
$$AC = (6, 3)$$
$$S = \frac{1}{2}|AB \times AC| = \frac{3}{2} = 1.5$$

3. Disagree. Right triangle must satisfy Pythagorean theorem.

$$AC^2 + AB^2 = 13 + 45 = 58$$
$$BC^2 = 106$$
$$AC^2 + AB^2 \neq BC^2$$

Answer:

1. 20.6
2. 1.5
3. Disagree. Right triangle must satisfy Pythagorean theorem.