Conic Sections CS1.5: Finding the Area of a triangle.

Find the area of the triangle with vertices: (-2, -4), (0, 6), and (3,3).

Method 1: Heron's Formula.

If you know the lengths of the sides of a triangle (let's call them , b, & c) , then

$$Area = \sqrt{s(s-a)(s-b)(s-c)} \qquad \text{(Heron's Formula)}$$

where s is the "semiperimeter" defined by $s = \frac{1}{2}(a+b+c)$
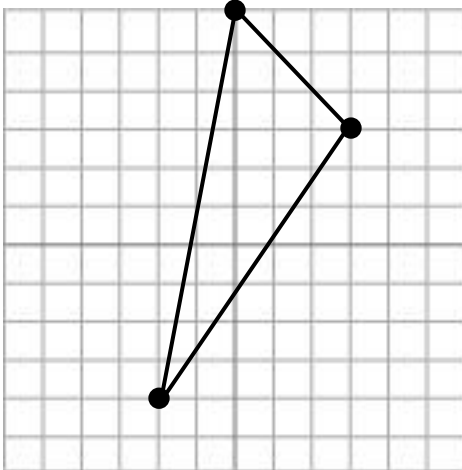
Let's solve it:

a =

b =

c =

s =

Area =

Method 2: Use Geometry

Step 1: Draw a rectangle around the triangle

Step 2: Calculate the area of the three "new" right triangles using

$$Area = \frac{1}{2}b \cdot h$$

Step 3: Calculate the area of the rectangle

Step 4: Subtract the area of the "new" triangles

Area Triangle 1 =

Area Triangle 2 =

Area Triangle 3 =

Area Rectangle =

Area our triangle =

Method 3: Using Determinants (shoelace formula)

For a triangle with vertices: $(x_1, y_1), (x_2, y_2), (x_3, y_3)$,

Area = $Area = \pm\frac{1}{2}\begin{vmatrix} x_1 & y_1 & 1 \\ x_2 & y_2 & 1 \\ x_3 & y_3 & 1 \end{vmatrix}$ (The plus or minus at the front just means to make your answer positive)

Area =

Method 4: Random Crazy use of Matrices

$$(4 \cdot Area)^2 = \begin{bmatrix} a^2 & b^2 & c^2 \end{bmatrix} \begin{bmatrix} -1 & 1 & 1 \\ 1 & -1 & 1 \\ 1 & 1 & -1 \end{bmatrix} \begin{bmatrix} a^2 \\ b^2 \\ c^2 \end{bmatrix}$$

Let's try it. Use the a, b and c from the Heron's formula problem

Find the area of a triangle with vertices: $(1, 2), (3, 7), \ \& \ (5, -3)$ by ALL FOUR METHODS!