



Name: _____ () Class: _____ Date: _____

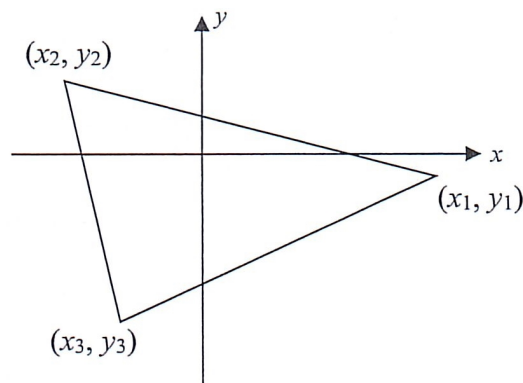
MA303.1.3 – Area of a Triangle

At the end of this unit, you should be able to

- find the area of a triangle using the shoe-lace method
- use the shoe-lace method to find area of convex polygon

We now explore an interesting method of finding the area of the triangle, given the coordinates of the three vertices. It is also known as the **shoe-lace method**.

Given the coordinates of the vertices of a triangle such that they are in an anti clock-wise order



The area of the triangle is $\frac{1}{2} \begin{vmatrix} x_1 & x_2 & x_3 & x_1 \\ y_1 & y_2 & y_3 & y_1 \end{vmatrix}$

where $\begin{vmatrix} x_1 & x_2 & x_3 & x_1 \\ y_1 & y_2 & y_3 & y_1 \end{vmatrix} = x_1y_2 + x_2y_3 + x_3y_1 - x_1y_3 - x_3y_2 - x_2y_1$

E1. Find the area of a triangle with vertices (2, 4), (−1, −2) and (−2, 3) .

P1. Find the area of a triangle with vertices $(-2, -1)$, $(-1, -4)$ and $(3, 0)$.

E2. Prove the shoe-lace formula.

E3. The shoe-lace method also works for any n -sided polygon with vertices (x_1, y_1) , (x_2, y_2) , (x_3, y_3) , ... and (x_n, y_n) arranged in an anti-clockwise manner such that the edges do not intersect one another (simple polygon). What adjustments must you make when the coordinates are arranged in a clockwise manner instead?

P2. Find the area of the polygon with vertices $(-5, -4)$, $(0, 3)$, $(1, -2)$ and $(4, 0)$.