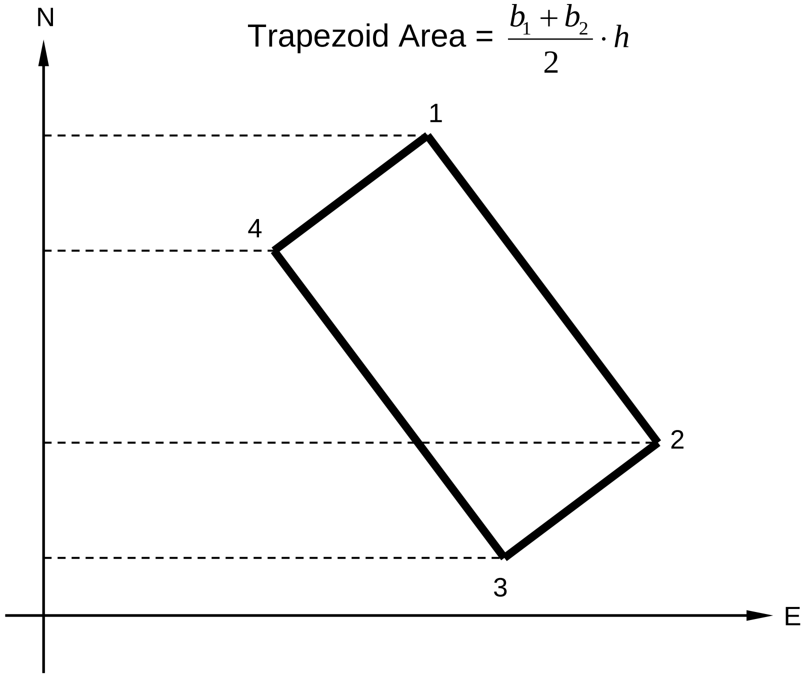
Trapezoid Area = $\dfrac{b_1 + b_2}{2} \cdot h$



Example Coordinates:

$$1 = \begin{pmatrix} 25 \\ 20 \end{pmatrix} = \begin{pmatrix} N_1 \\ E_1 \end{pmatrix}$$

$$2 = \begin{pmatrix} 9 \\ 32 \end{pmatrix} = \begin{pmatrix} N_2 \\ E_2 \end{pmatrix}$$

$$3 = \begin{pmatrix} 3 \\ 24 \end{pmatrix} = \begin{pmatrix} N_3 \\ E_3 \end{pmatrix}$$

$$4 = \begin{pmatrix} 19 \\ 12 \end{pmatrix} = \begin{pmatrix} N_4 \\ E_4 \end{pmatrix}$$

Trapezoid 1 $= (N_1 - N_2) \cdot \dfrac{E_1 + E_2}{2} = (25 - 9) \cdot \dfrac{20 + 32}{2} = 416$

Trapezoid 2 $= (N_2 - N_3) \cdot \dfrac{E_2 + E_3}{2} = (9 - 3) \cdot \dfrac{32 + 24}{2} = 168$

Trapezoid 3 $= (N_4 - N_3) \cdot \dfrac{E_3 + E_4}{2} = (19 - 3) \cdot \dfrac{24 + 12}{2} = 288$

Trapezoid 4 $= (N_1 - N_4) \cdot \dfrac{E_4 + E_1}{2} = (25 - 19) \cdot \dfrac{12 + 20}{2} = 96$

<u>The Polygon Area</u> **=** $[416] + [168] - [288] - [96]$ = 200 ***or algebraically…***

$$\left[(N_1 - N_2) \cdot \frac{E_1 + E_2}{2}\right] + \left[(N_2 - N_3) \cdot \frac{E_2 + E_3}{2}\right] - \left[(N_4 - N_3) \cdot \frac{E_3 + E_4}{2}\right] - \left[(N_1 - N_4) \cdot \frac{E_4 + E_1}{2}\right] =$$

$$\frac{1}{2} \cdot \left[(N_1 - N_2) \cdot (E_1 + E_2) + (N_2 - N_3) \cdot (E_2 + E_3) + (N_3 - N_4) \cdot (E_3 + E_4) + (N_4 - N_1) \cdot (E_4 + E_1)\right] =$$

$$\frac{1}{2} \cdot \begin{Bmatrix} +N_1 \cdot E_1 & +N_1 \cdot E_2 & -N_2 \cdot E_1 & -N_2 \cdot E_2 \\ +N_2 \cdot E_2 & +N_2 \cdot E_3 & -N_3 \cdot E_2 & -N_3 \cdot E_3 \\ +N_3 \cdot E_3 & +N_3 \cdot E_4 & -N_4 \cdot E_3 & -N_4 \cdot E_4 \\ +N_4 \cdot E_4 & +N_4 \cdot E_1 & -N_1 \cdot E_4 & -N_1 \cdot E_1 \end{Bmatrix} = \frac{1}{2} \cdot \begin{Bmatrix} +N_1 \cdot E_2 & -N_2 \cdot E_1 \\ +N_2 \cdot E_3 & -N_3 \cdot E_2 \\ +N_3 \cdot E_4 & -N_4 \cdot E_3 \\ +N_4 \cdot E_1 & -N_1 \cdot E_4 \end{Bmatrix} =$$

$$\frac{1}{2} \cdot \left[(25 \cdot 32) - (9 \cdot 20) + (9 \cdot 24) - (3 \cdot 32) + (3 \cdot 12) - (19 \cdot 24) + (19 \cdot 20) - (25 \cdot 12)\right] =$$

$$\frac{620 + 120 - 420 + 80}{2} = 200$$