

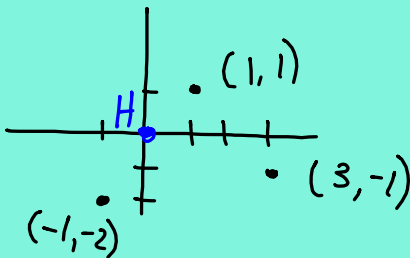
AREA OF A TRIANGLE

$$[A] = \begin{bmatrix} 1 & 2 \\ -3 & 4 \end{bmatrix} \quad \frac{1}{4 - -6}$$

$$\begin{aligned} \det([A]) &= ad - bc \\ &= 4 - -6 \\ &= 10 \end{aligned}$$

$$\text{Area of a } \triangle = \frac{1}{2} \left| \det \begin{vmatrix} x_1 & y_1 & 1 \\ x_2 & y_2 & 1 \\ x_3 & y_3 & 1 \end{vmatrix} \right|$$

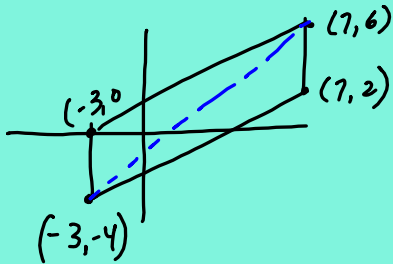
A farmer plants a triangular field with corn. The first vertex of the triangular field is 1 mi east and 1 mi north of his house. The second vertex is 3 mi east and 1 mi south of his house. The third vertex is 1 mi west and 2 mi south of his house. What is the area of the field?



$$\text{Area} = \frac{1}{2} \cdot |-10| = \frac{1}{2} \cdot 10 = \boxed{5 \text{ mi}^2}$$

$$\begin{vmatrix} 1 & 1 & 1 \\ 3 & -1 & 1 \\ -1 & -2 & 1 \end{vmatrix}$$

A parallelogram has vertices (in feet) at the coordinates $(-3, -4)$, $(7, 2)$, $(7, 6)$, & $(-3, 0)$. What is its area?



$$\text{Area of } \triangle = \frac{1}{2} |40| = 20$$

$$\begin{aligned} \text{Area of } \square &= 2 \cdot 20 \\ &= 40 \text{ ft}^2 \end{aligned} \quad \begin{vmatrix} -3 & 4 & 1 \\ 7 & 2 & 1 \\ 7 & 6 & 1 \end{vmatrix}$$

The volume of a triangular pyramid is given by the formula $(1/3)Bh$, where B represents the area of the triangular base and h is the height of the pyramid. Find the volume of a triangular pyramid whose height is 12 m and whose base has the coordinates $(-4, 1)$, $(-5, -6)$, & $(-8, -1)$.

$$V = \frac{1}{3} \cdot B \cdot h$$

$$\text{Area of } B = \frac{1}{2} |-26| = 13$$

$$V = \frac{1}{3} \cdot 13 \cdot 12$$

$$= \boxed{52 \text{ m}^3}$$

$$\begin{vmatrix} -4 & 1 & 1 \\ -5 & -6 & 1 \\ -8 & -1 & 1 \end{vmatrix}$$