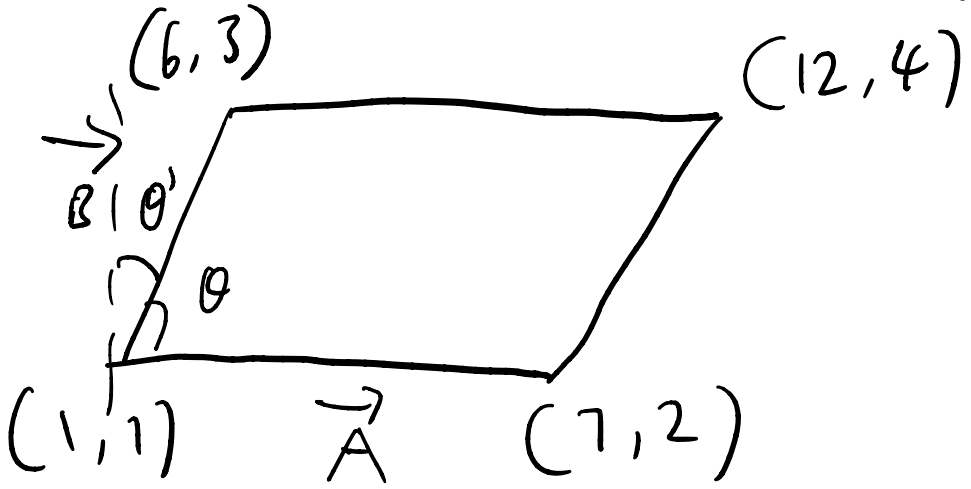
22/11/24

# Area of a Parallelogram




$\vec{A} = 6i + j$

$\vec{B} = 5i + 2j$

$\vec{A'} = \langle -a_2, a_1 \rangle$

$= \langle -1, 6 \rangle$

$$\text{Area} = |\vec{A}|\,|\vec{B}| \sin\theta$$

$$= |\vec{A}|\,|\vec{B}| \cos\left(\frac{\pi}{2} - \theta\right)$$

$$= |\vec{A'}|\,|\vec{B}| \cos\theta'$$

$$= \vec{A'} \cdot \vec{B}$$

$$= (-a_2 b_1 + a_1 b_2)$$

$$= \begin{vmatrix} 6 & 1 \\ 5 & 2 \end{vmatrix} = 12 - 5$$

$$= 7$$

1. a) $\begin{vmatrix} 1 & 2 \\ 3 & 4 \end{vmatrix}$

$= ad - bc$

$= 4 - 6$

$= -2$

b) $\begin{vmatrix} 1 & -2 \\ -3 & 4 \end{vmatrix}$

$= 4 - 6$

$= -2$

c) $\begin{vmatrix} 3 & 4 \\ 1 & 2 \end{vmatrix}$

$= 6 - 4$

$= 2$

2.

Area $= \triangle ABC + \triangle ACD$

$= \frac{1}{2}\vec{AB} \cdot \vec{AC} + \vec{AC} \cdot \vec{AD}$

$\vec{AB} = 1i + 2j$

$\vec{AC} = 4i + 3j$

$\vec{AD} = 3i - j$

$= \frac{1}{2}\begin{vmatrix} 1 & 2 \\ 4 & 3 \end{vmatrix} + \frac{1}{2}\begin{vmatrix} 4 & 3 \\ 3 & -1 \end{vmatrix}$

$= \frac{1}{2}((3-8) + (-4-9))$

$= \frac{1}{2}|-18|$

$= 9$