Problem 12-2) Let $\boldsymbol{A} = |\boldsymbol{A}|\cos\theta_A\,\hat{\boldsymbol{x}} + |\boldsymbol{A}|\sin\theta_A\,\hat{\boldsymbol{y}}$ and $\boldsymbol{B} = |\boldsymbol{B}|\cos\theta_B\,\hat{\boldsymbol{x}} + |\boldsymbol{B}|\sin\theta_B\,\hat{\boldsymbol{y}}$. We will have

$$\boldsymbol{A}\times\boldsymbol{B} = \left(A_xB_y - A_yB_x\right)\hat{\boldsymbol{z}} = |\boldsymbol{A}|\,|\boldsymbol{B}|(\cos\theta_A\sin\theta_B - \sin\theta_A\cos\theta_B)\hat{\boldsymbol{z}}$$

$$= |\boldsymbol{A}|\,|\boldsymbol{B}|\sin(\theta_B - \theta_A)\,\hat{\boldsymbol{z}}.$$

Note that $|\boldsymbol{A}|\,|\boldsymbol{B}|\sin(\theta_B - \theta_A)$ is the area of the parallelogram, and $\hat{\boldsymbol{z}}$ is perpendicular to the xy-plane, which is the plane defined by $\boldsymbol{A}$ and $\boldsymbol{B}$.