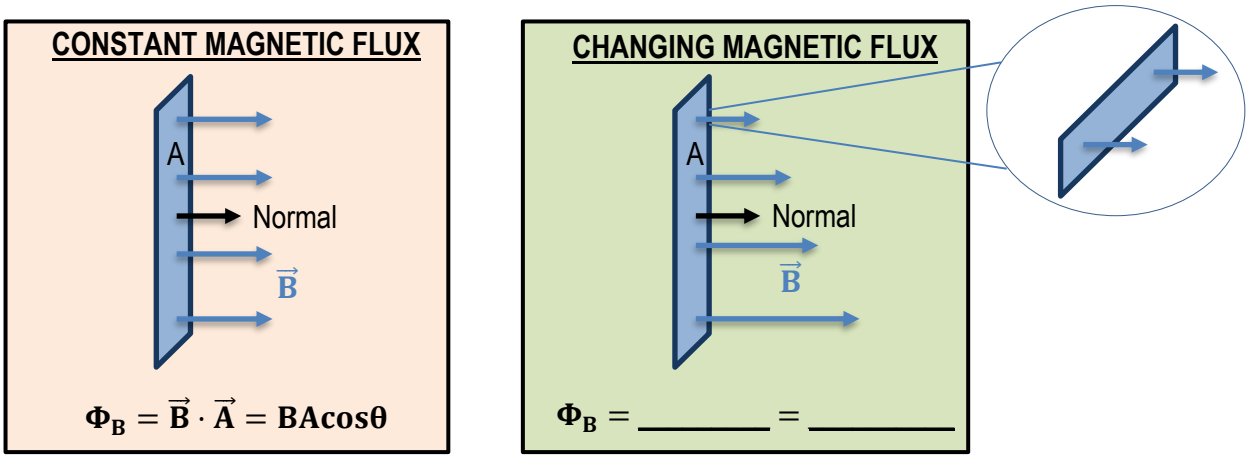
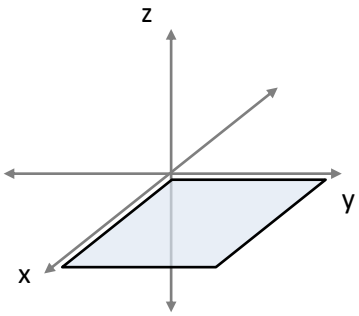
CONCEPT: MAGNETIC FLUX WITH CALCULUS



- If Magnetic Field vector *OR* Area vector changes along a surface, use _____ to calculate Magnetic Flux.
  - Magnetic Field may be a *function* of a position variable (like $\vec{B} = B_0 y\,\hat{x}$)

EXAMPLE: A magnetic field given by the equation $\vec{B} = 1.5x^2\,\hat{z}$ passes through a square loop on the x-y plane with side length 2m. The sides of the loop run along the x and y axes. What is the magnetic flux through this square loop?



EXAMPLE: MAGNETIC FLUX FROM STRAIGHT WIRE

What is the magnitude of the magnetic flux through the rectangular loop of length **L** and width **w** from the current-carrying wire shown in the following figure?