

33.23. Visualize: Please refer to Figure P33.23. To calculate the flux we need to consider the orientation of the normal of the surface relative to the magnetic field direction. We will consider the flux through the surface in the two parts corresponding to the two different directions of the surface normals.

Solve: The flux is

$$\begin{aligned}\Phi &= \Phi_{\text{top}} + \Phi_{\text{left}} = \vec{A}_{\text{top}} \cdot \vec{B} + \vec{A}_{\text{left}} \cdot \vec{B} = A_{\text{top}} B \cos 45^\circ + A_{\text{left}} B \cos 45^\circ \\ &= 2 \times (0.050 \text{ m} \times 0.10 \text{ m})(0.050 \text{ T}) \cos 45^\circ = 3.54 \times 10^{-4} \text{ Wb}\end{aligned}$$