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37. (II) A circular coil 18.0 cm in diameter and containing twelve loops lies flat on the ground. The Earth's magnetic field at this location has magnitude 5.50×10^{-5} T and points into the Earth at an angle of 66.0° below a line pointing due north. If a 7.10-A clockwise current passes through the coil, determine (*a*) the torque on the coil, and (*b*) which edge of the coil rises up, north, east, south, or west.

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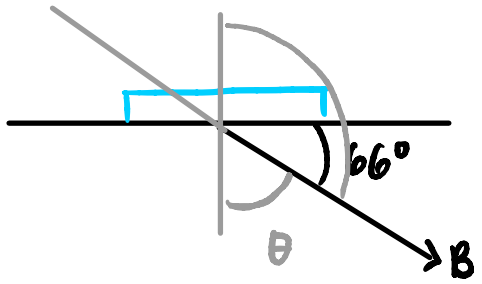
$\tau = \vec{\mu} \times \vec{B} = IAb \times \vec{B}$



$A = \pi r^2 = \pi \left(\frac{d}{2}\right)^2$

$(\theta + 66°) = 90°$

$\theta = 24°$

a)

$$\tau = NI\,A \cdot B \sin\theta = 12(7.10A)\left[\left(\frac{0.180m}{2}\right)^2 \pi\right](5.5 \times 10^{-5} T)\sin(24°)$$

$$= 4.85 \times 10^{-5}\ m.N$$

b.