Recitation Class 5

(Examples)

Teaching Assistant

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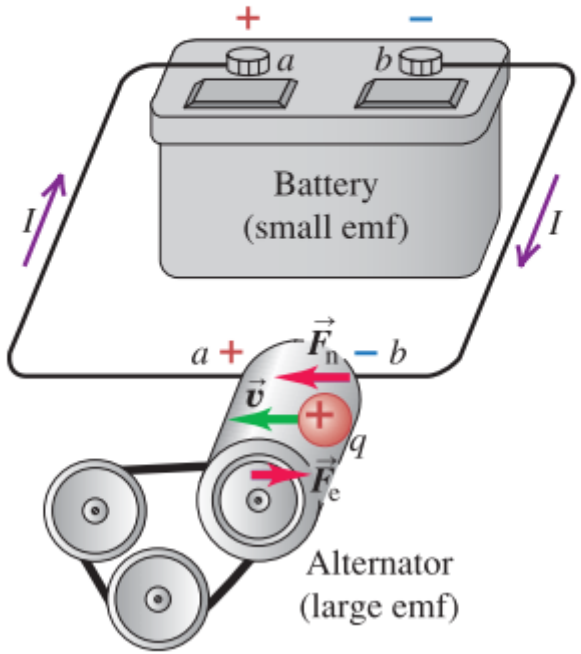
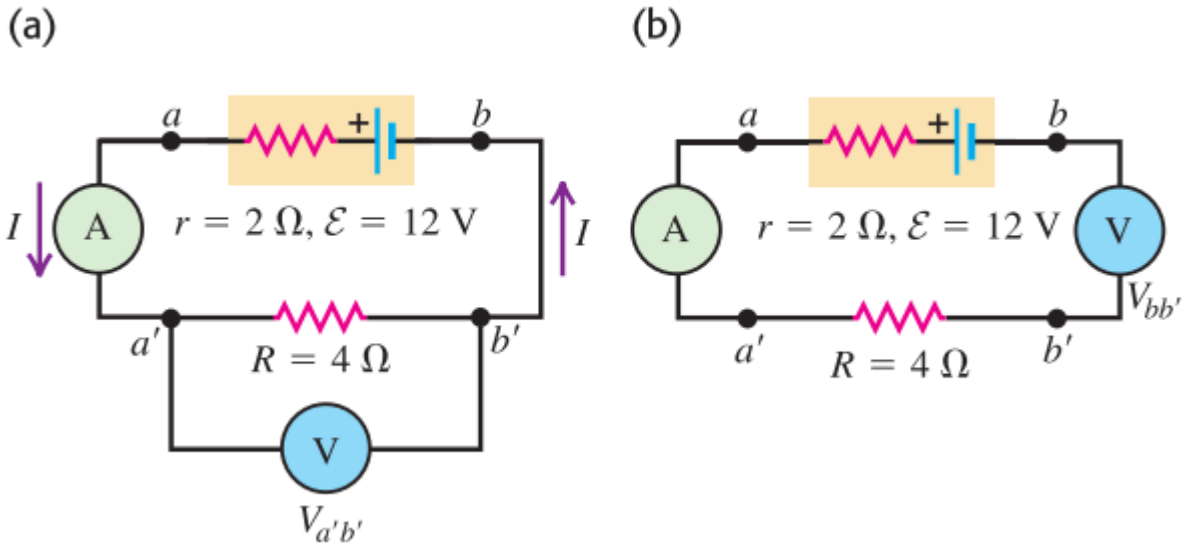
EMF

Power input to a source

25.23 When two sources are connected in a simple loop circuit, the source with the larger emf delivers energy to the other source.



Example 1



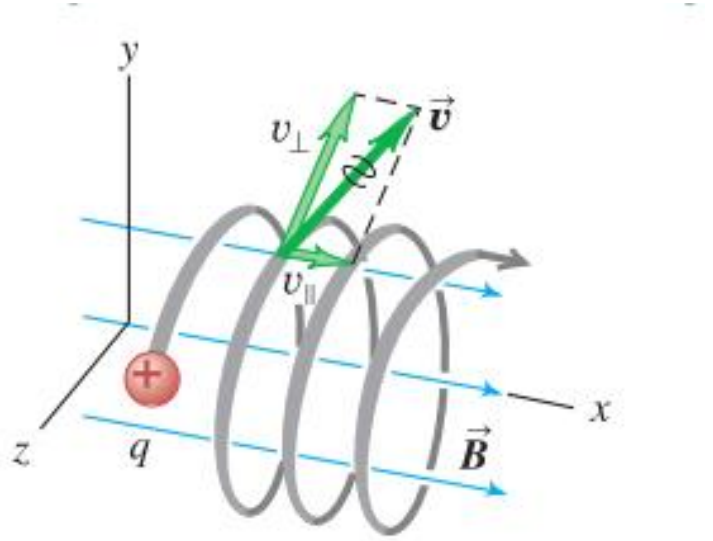
What are the readings of the ideal voltmeters?

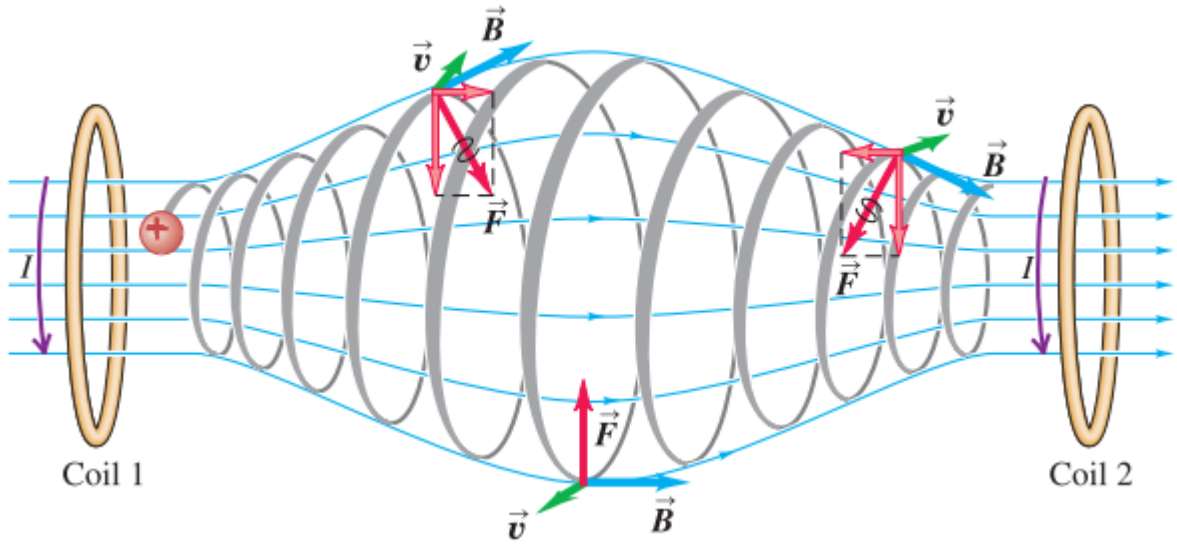
Example 2

25.86 ••• **CALC** A source with emf $\mathcal{E}$ and internal resistance r is connected to an external circuit. (a) Show that the power output of the source is maximum when the current in the circuit is one-half the short-circuit current of the source. (b) If the external circuit consists of a resistance R, show that the power output is maximum when $R = r$ and that the maximum power is $\mathcal{E}^2/4r$.

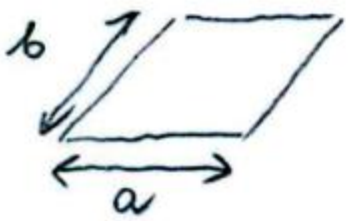
Magetism

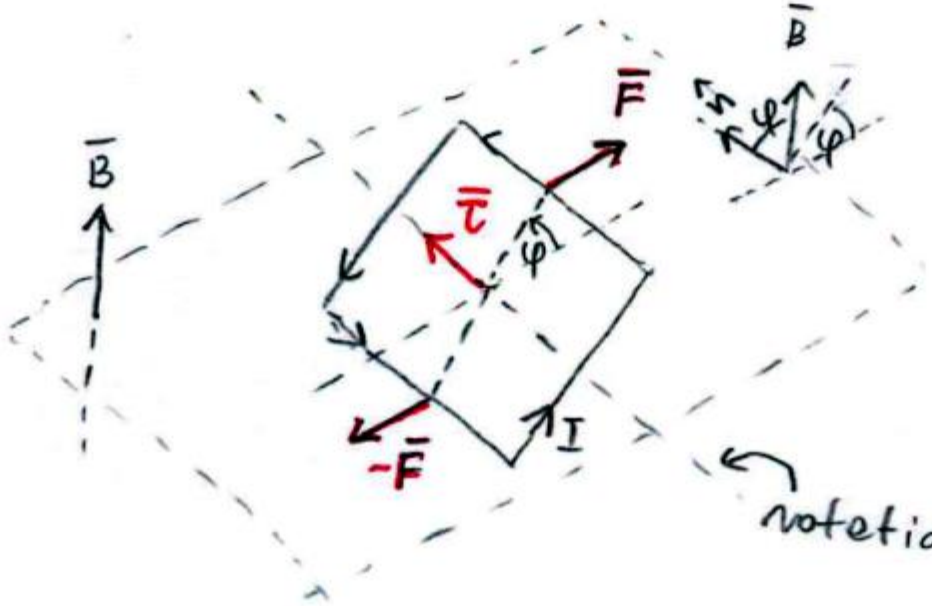
Motion


y
x
z
q
$\vec{v}$
$v_\perp$
$v_\parallel$
$\vec{B}$

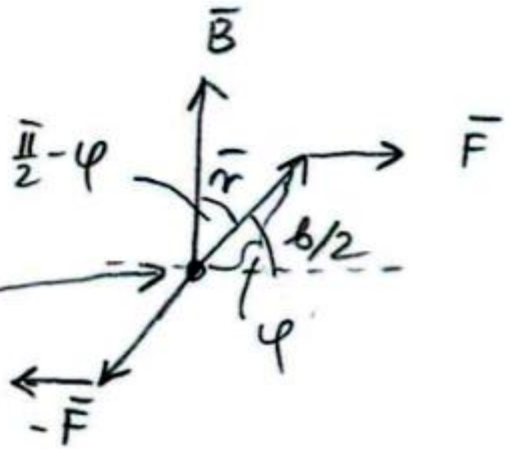

Coil 1
Coil 2
I
I
$\vec{B}$
$\vec{v}$
$\vec{F}$

Current loop

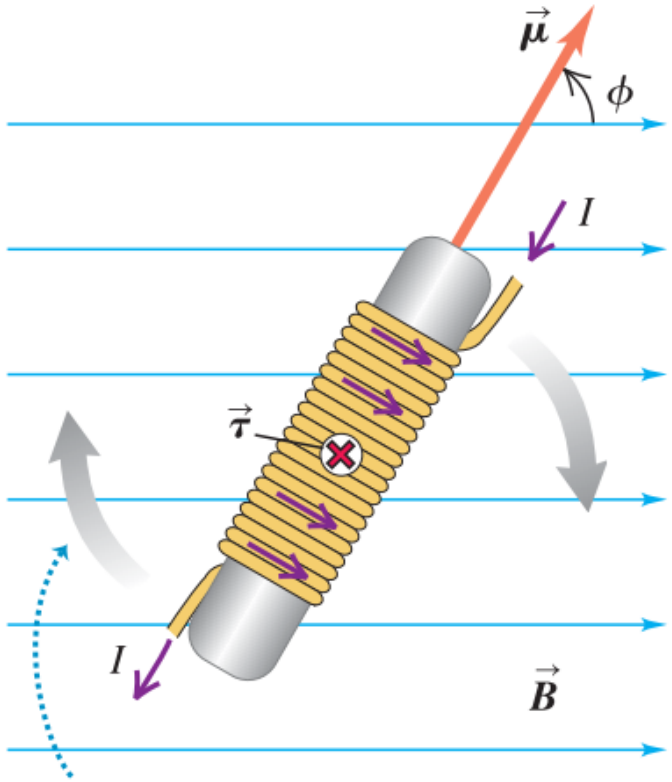




$\varphi = \measuredangle(\bar{B}, \hat{n})$

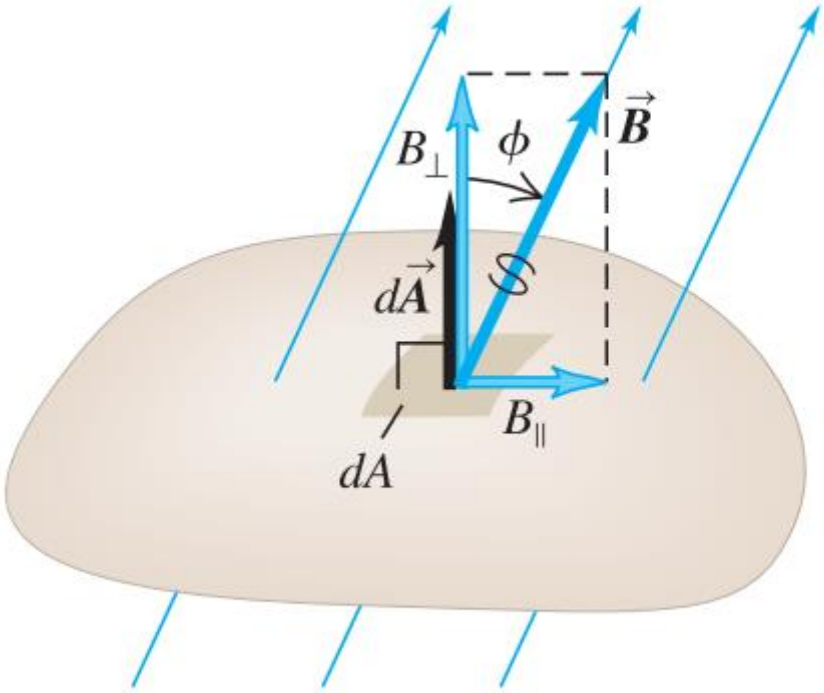


Solenoid

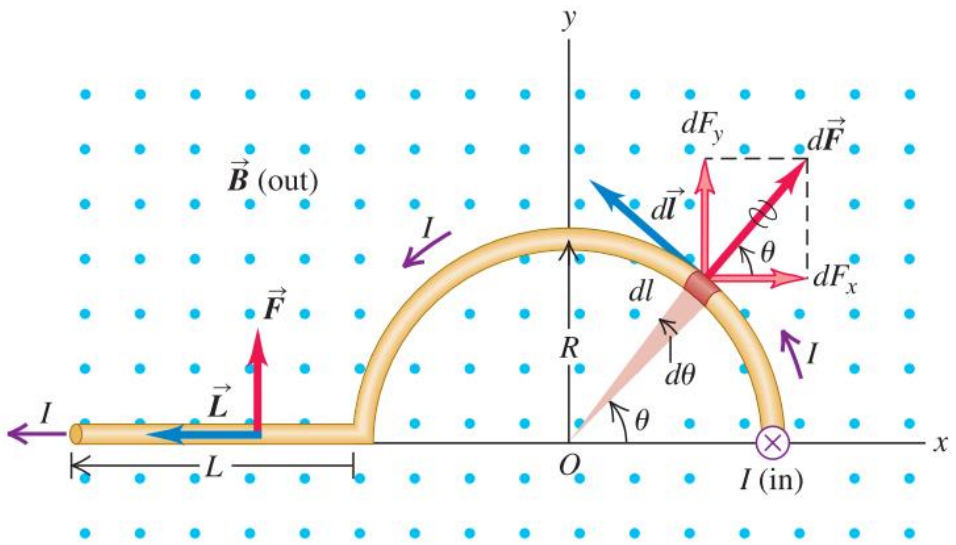


The torque tends to make the solenoid rotate clockwise in the plane of the page, aligning magnetic moment $\vec{\mu}$ with field $\vec{B}$.

Flux (Gauss's Law)



Example 1



In Fig. 27.30 the magnetic field $\vec{B}$ is uniform and perpendicular to the plane of the figure, pointing out of the page. The conductor, carrying current I to the left, has three segments: (1) a straight segment with length L perpendicular to the plane of the figure, (2) a semicircle with radius R, and (3) another straight segment with length L parallel to the x-axis. Find the total magnetic force on this conductor.