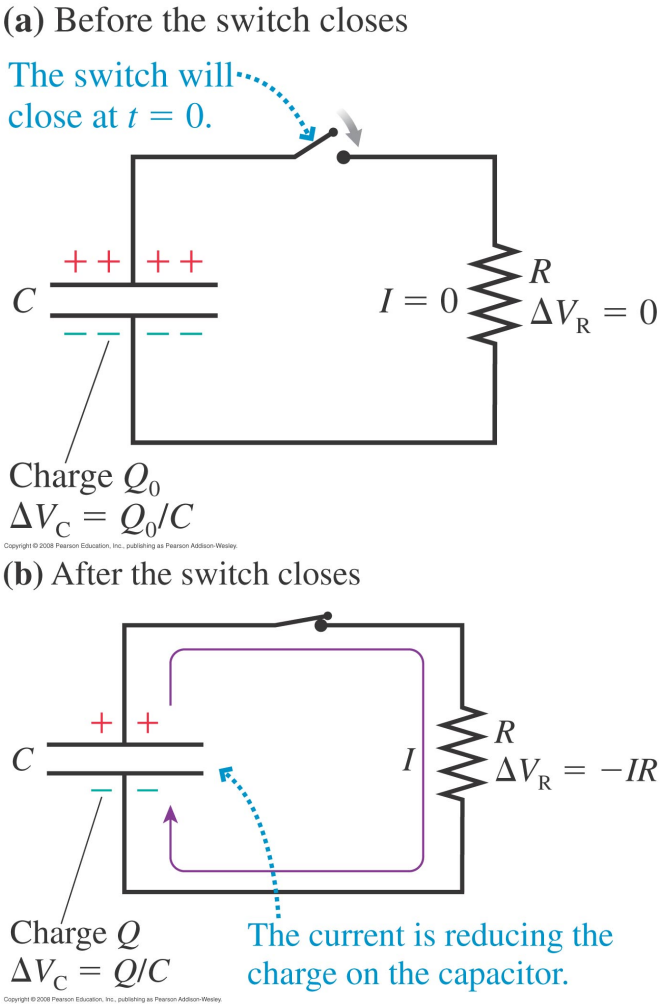
RC Circuits (32.9)



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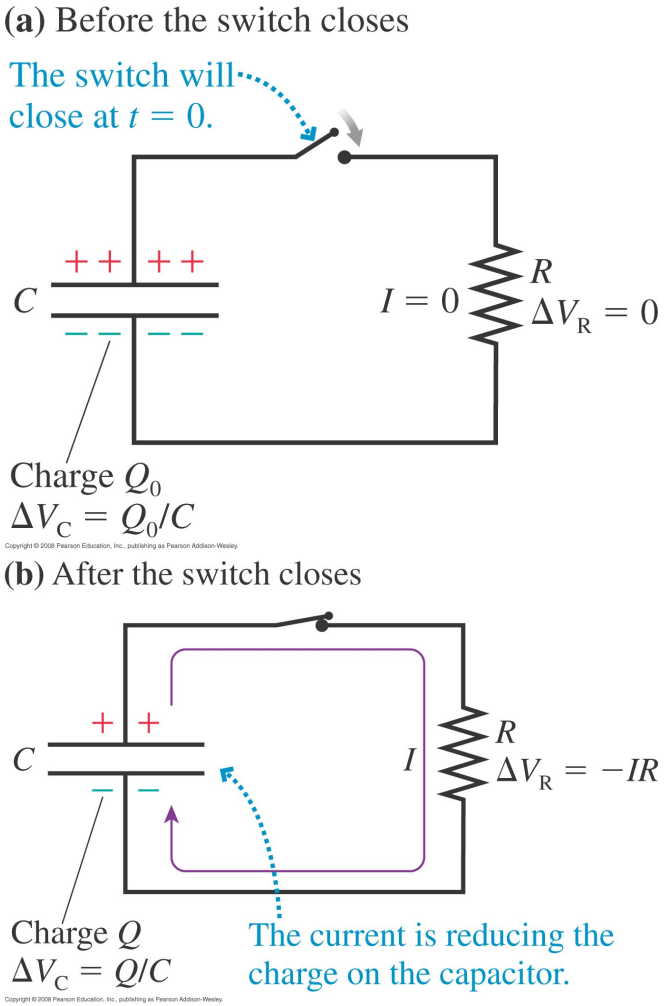

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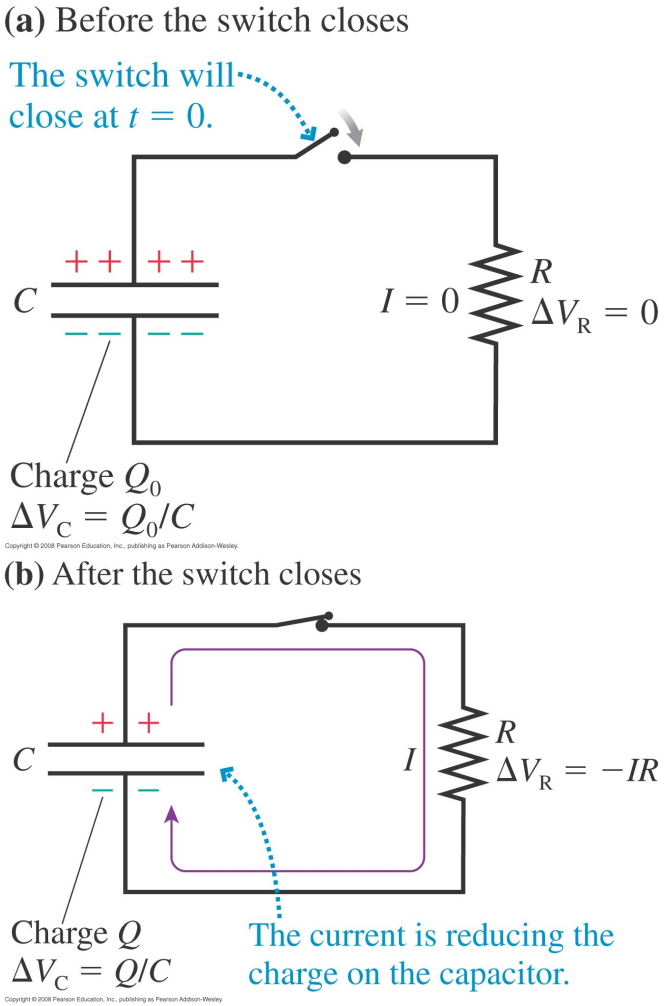

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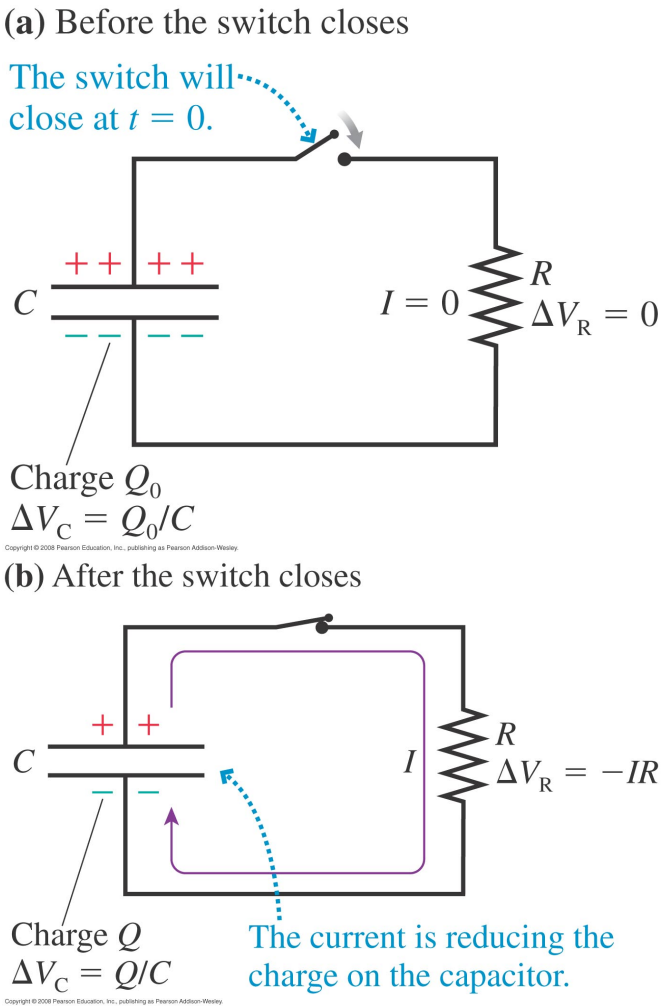

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- We can solve this by integrating it.

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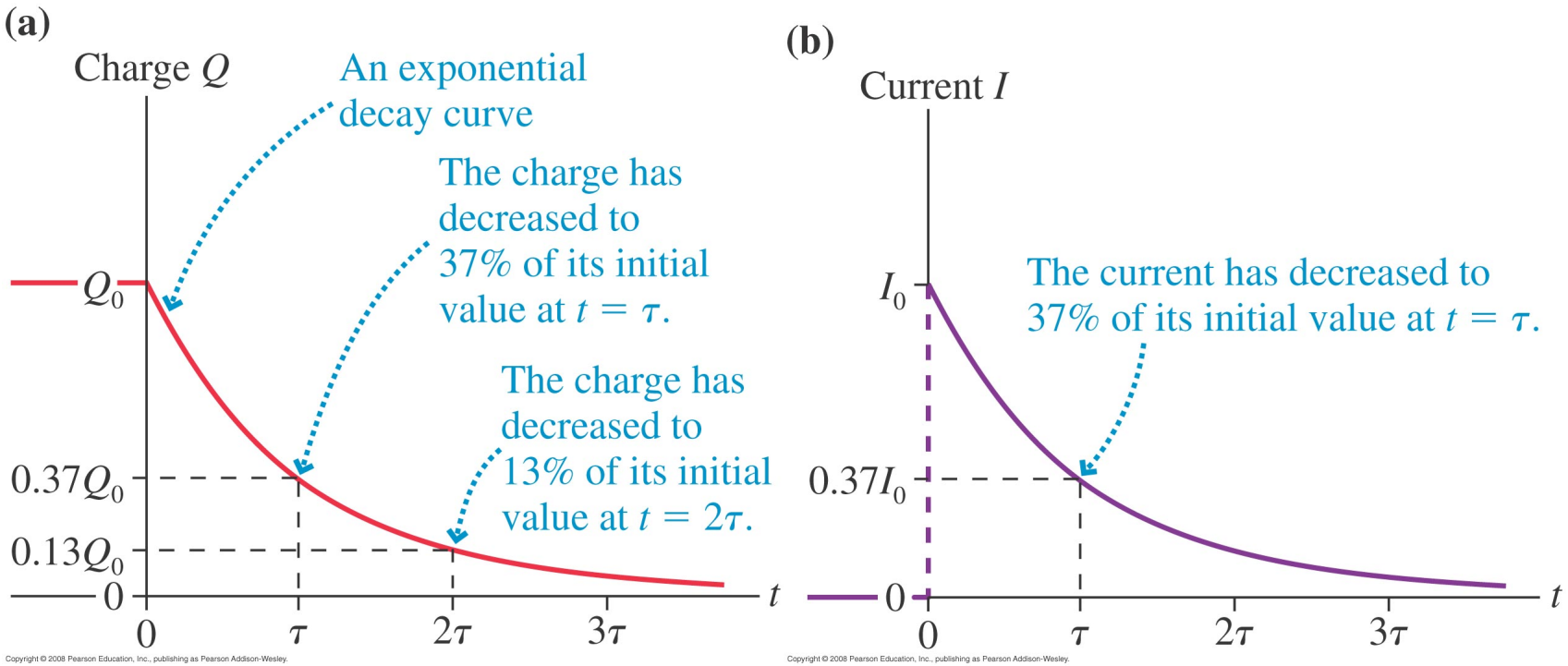
RC Circuits


(a)
Charge Q
An exponential decay curve
The charge has decreased to 37% of its initial value at $t = \tau$.
The charge has decreased to 13% of its initial value at $t = 2\tau$.
Q_0
$0.37Q_0$
$0.13Q_0$
0
0
τ
2τ
3τ
t
Copyright © 2008 Pearson Education, Inc., publishing as Pearson Addison-Wesley.
(b)
Current I
I_0
$0.37I_0$
0
The current has decreased to 37% of its initial value at $t = \tau$.
0
τ
2τ
3τ
t
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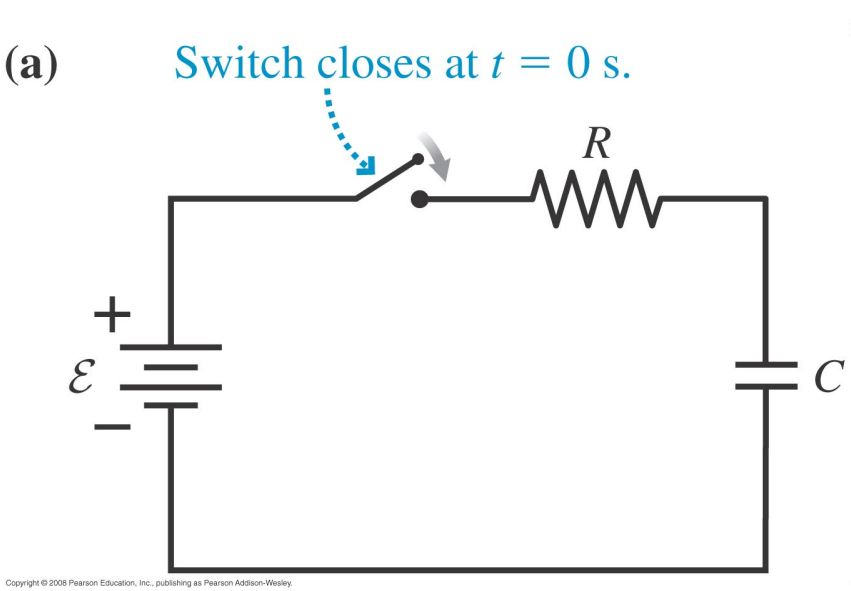
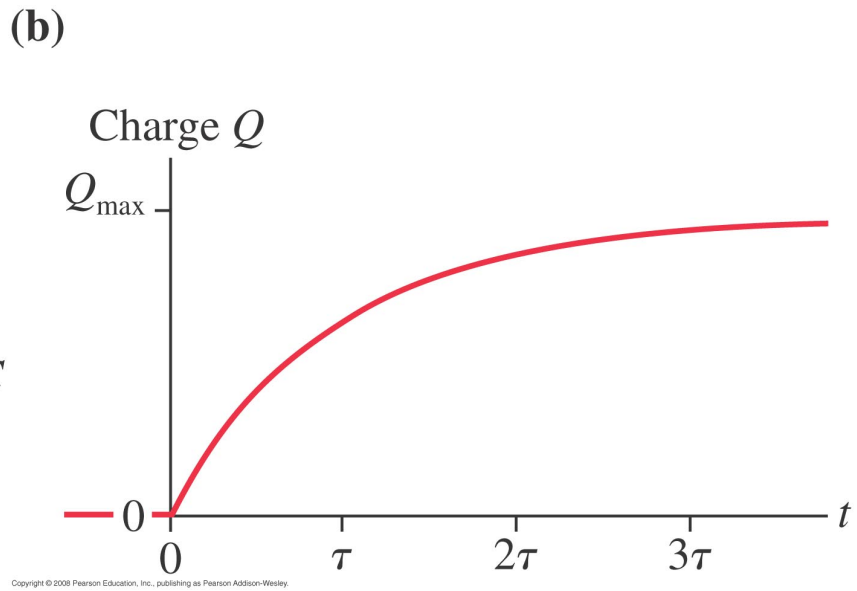
Charging a Capacitor





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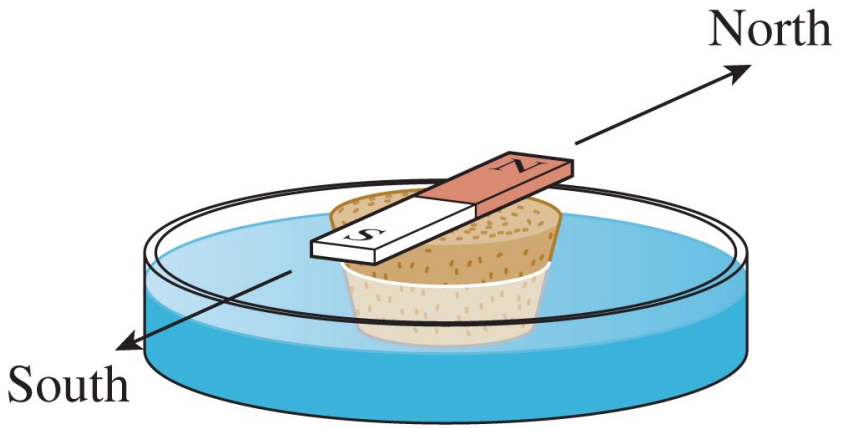
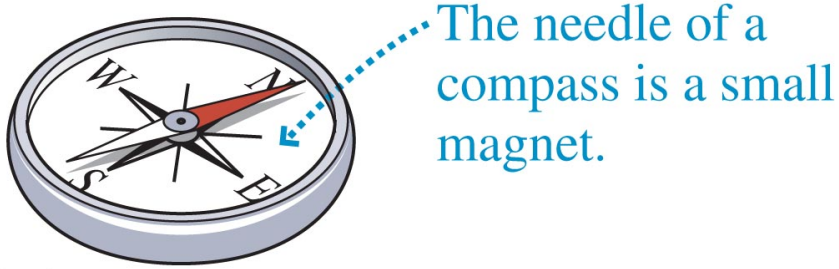
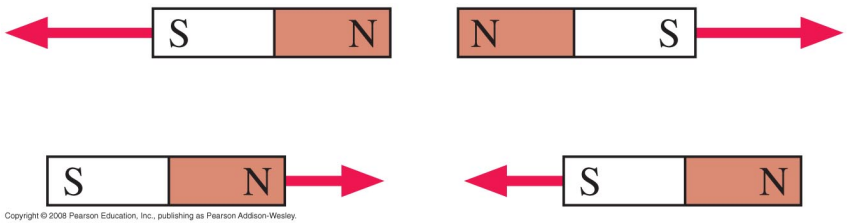
- Magnetism was also understood in a macroscopic sense before the microscopic basis was known.
- We will try to get a feeling for both the macroscopic and microscopic pictures of magnetism and for the relationship between electricity and magnetism.

Things You Already Know About Magnetism (33.1)







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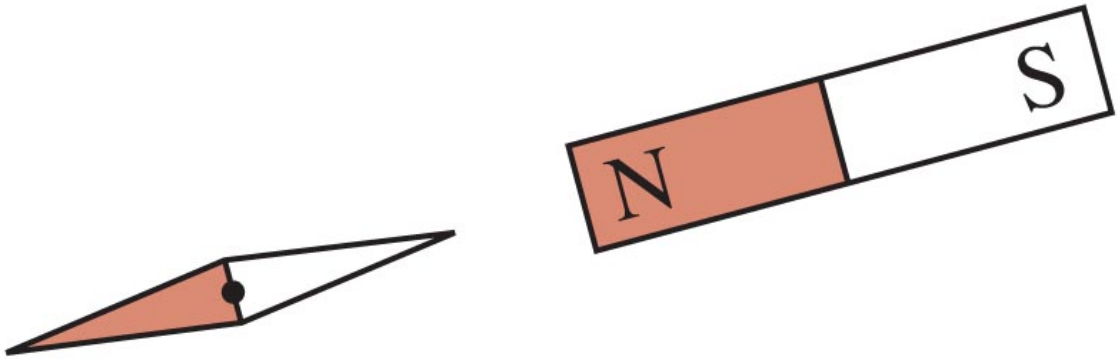

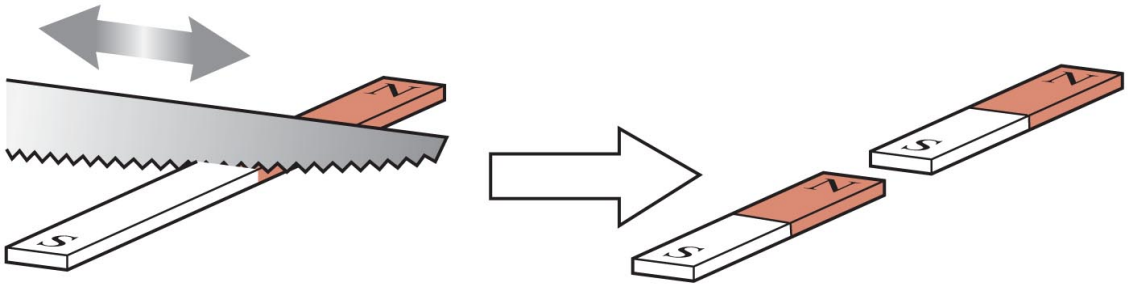

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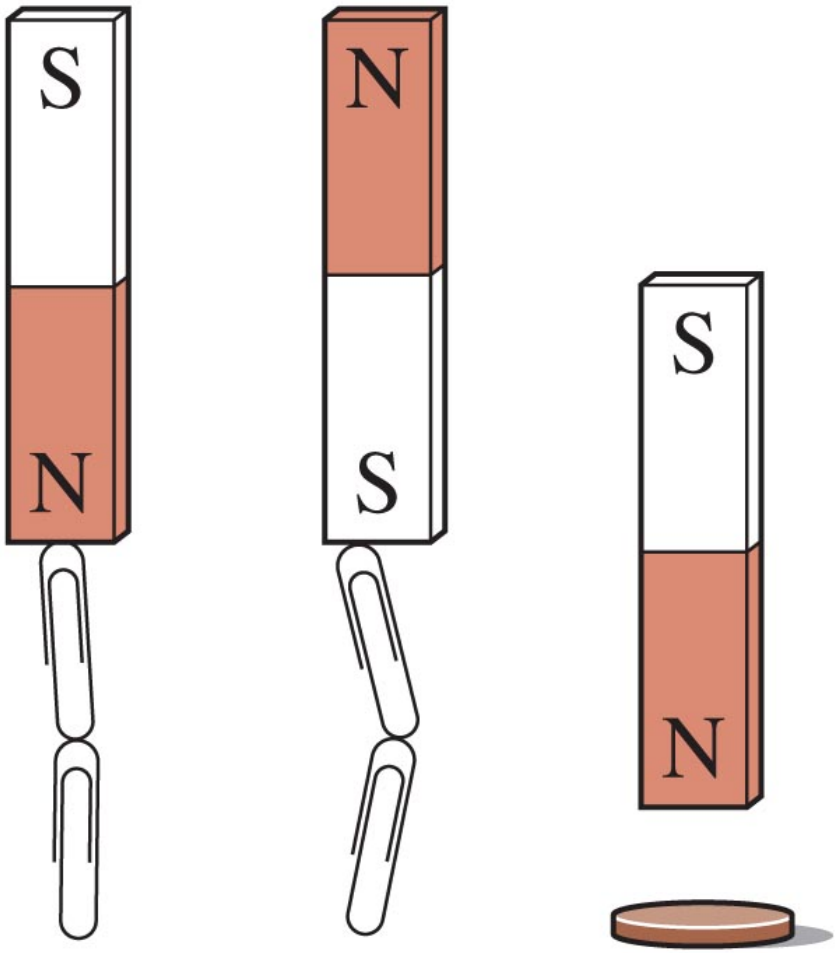

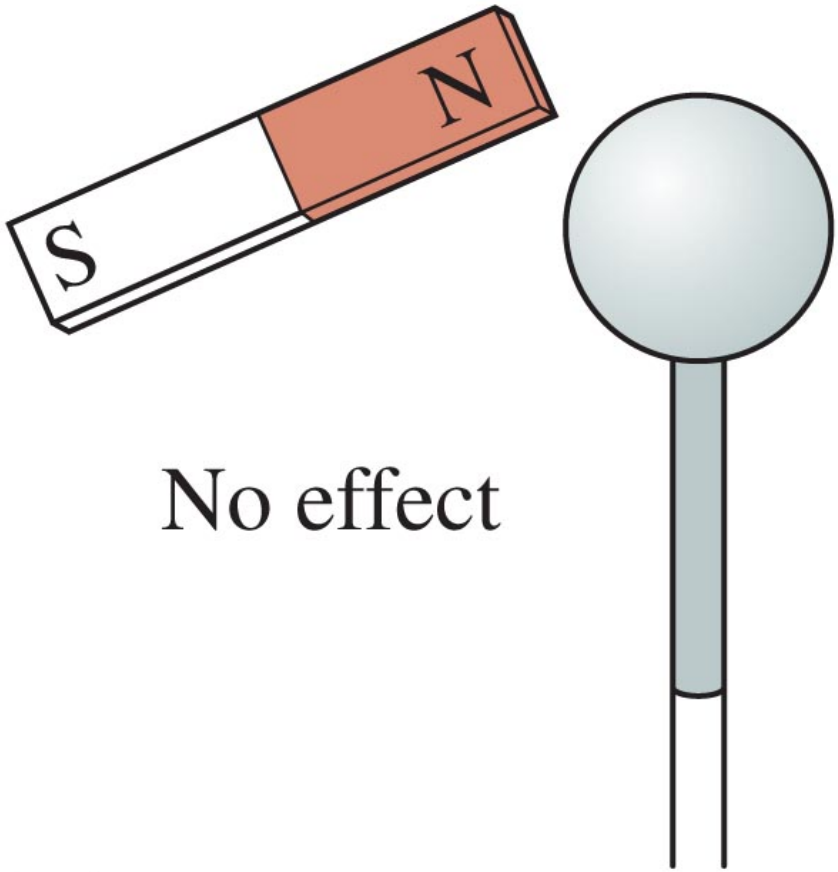

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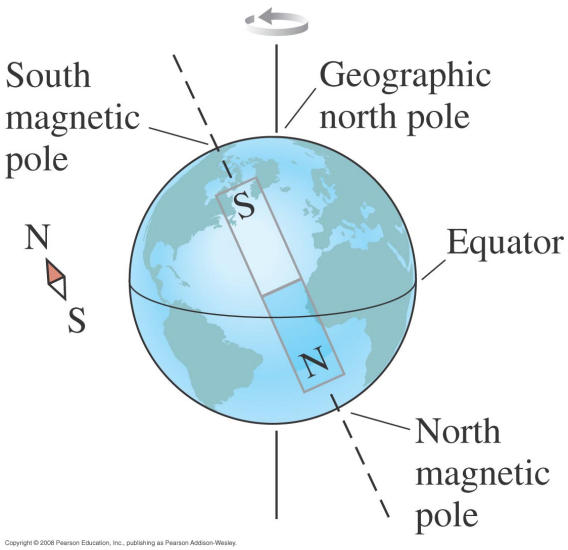

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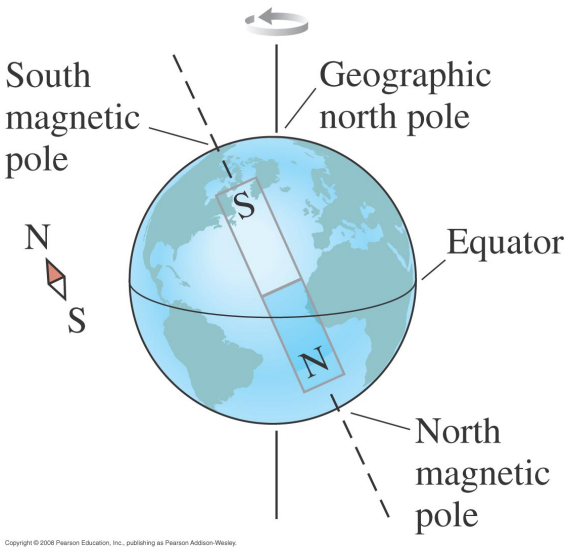

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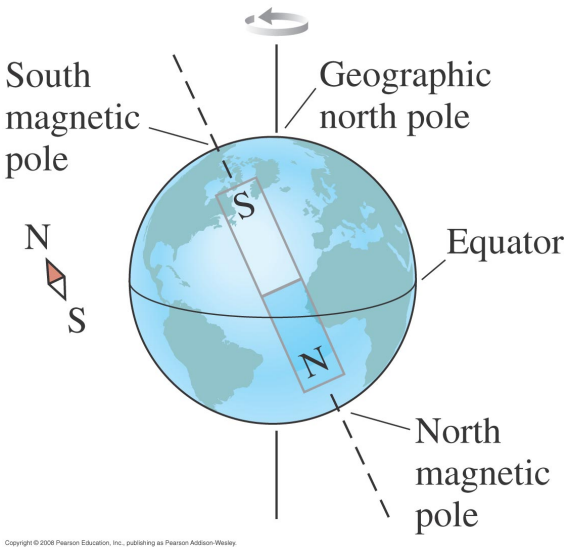

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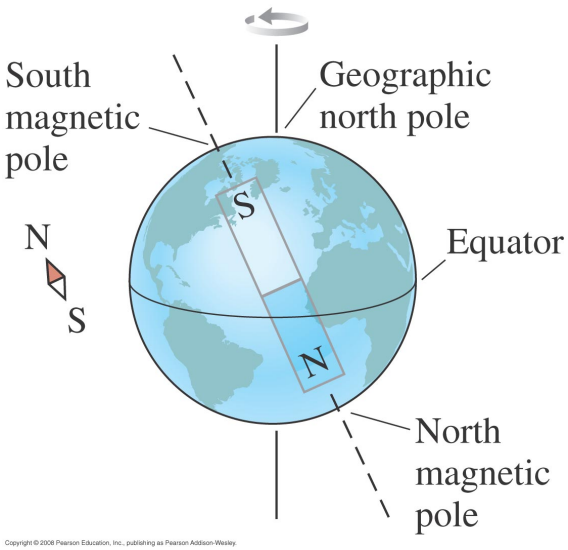

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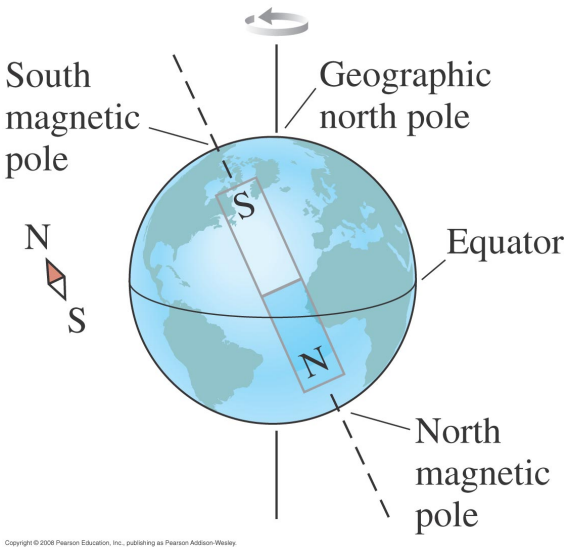

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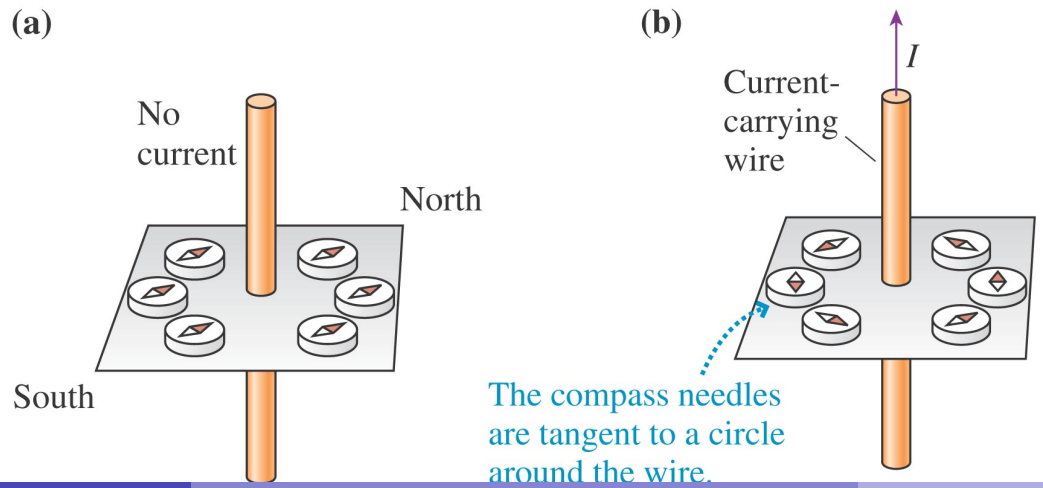
- This must mean that the geographic north pole of the earth is actually near a magnetic south pole! The north-seeking side of a compass needle would be repelled by a magnetic north pole...

The Discovery of the Magnetic Field (33.2)

- The connection between electricity and magnetism was discovered in 1816 by Oersted during a classroom lecture demonstration!



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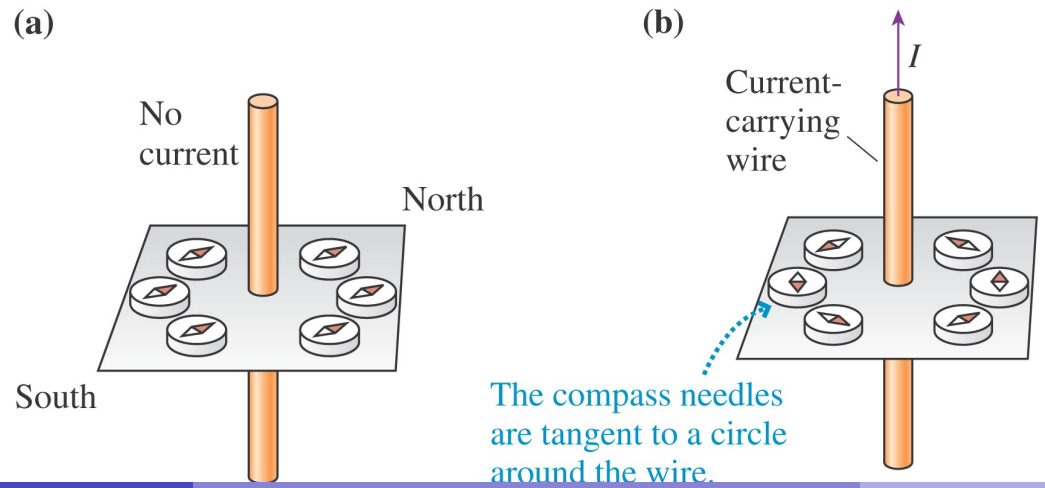

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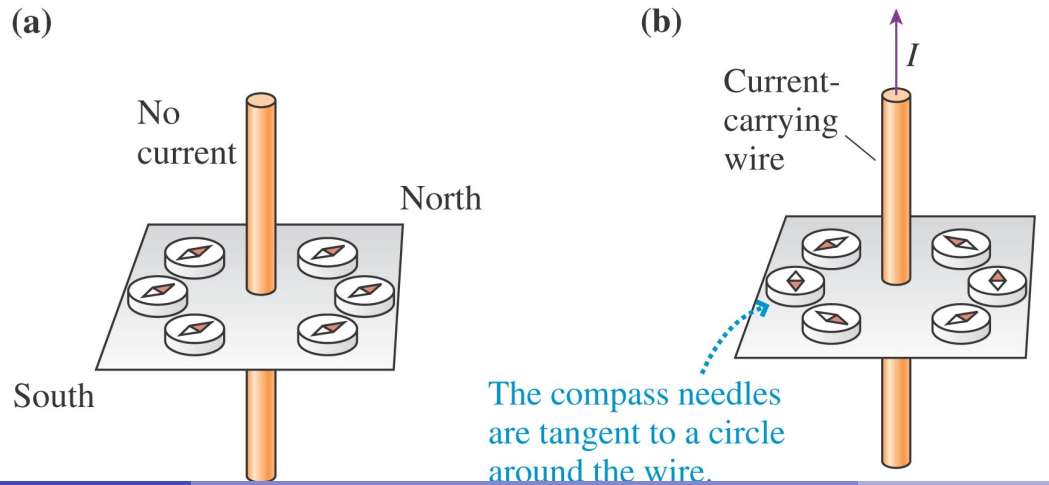

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- Current generates a magnetic field!