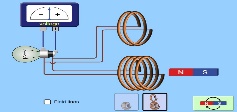
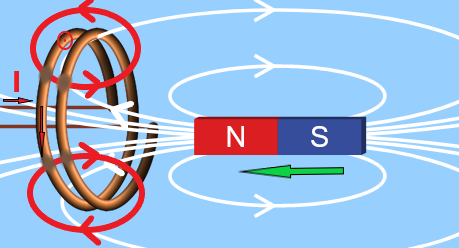
**Electromagnetic Induction (Faraday’s Law)**

Open [Faraday’s Law](https://phet.colorado.edu/sims/html/faradays-law/latest/faradays-law_en.html) simulation.

[](https://phet.colorado.edu/sims/html/faradays-law/latest/faradays-law_en.html)

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You move the North Pole of the magnet into the coil, increasing the magnetic field (White lines). The electrons generate their own magnetic field (Red lines) in the opposite direction to try to cancel out the change you are imposing on them. If we curl the fingers of out right hand around the coil in the direction of the magnetic field desired by the electrons our thumb point in the direction of the current.

Click on the loop icon so that you have both the N = 2 loops and the N = 4 loops.

Start with the North pole of the magnet closest to the coil.

Move the magnet slowly into the N = 4 loops and note the brightness of the bulb as well as the deflection of the galvanometer indicator. Try to do the same with the same speed through the N = 2 loops. Was there a difference? If so, for which number of loops did the light bulb became brighter?

Yes, there was difference. Light became brighter for 4 loops.

Which way did the needle deflect (to the right or to the left)?

The needle deflected to left.

Move the magnet slowly into the N = 4 loops to remind yourself of the brightness of the bulb and the deflection of the indicator. Then move the magnet much faster and note the brightness of the bulb and the deflection of the indicator. Was there more brightness with one compared to the other? Was there more deflection with one compared to the other? Which motion caused more movement by the needle as well as generating more light from the light bulb?

Yes there was difference. The slowly moving magnet was less bright and showed less deflection than faster moving of magnet.

If you move the magnet into the coil and just leave it there in a stationary position, what happens to the brightness of the bulb. What happens to the indicator? Explain why this happens.

The bulb turns off and indicator returns to middle. This happens because there is no relative motion between coil and magnet so no emf was induced and no current flow.

Which way does the indicator needle deflect when you move the north pole of the magnet into the loops? (To the left or to the right?)

The indicator needle deflect to left.

Is this what you would expect from using the right-hand-rule?

Yes, this is what we expect from right hand rule.

Which way does the indicator needle deflect when you pull the north pole of the magnet out of the loops? (To the left or to the right?)

It deflects to right.

Is this what you would expect from using the right-hand-rule?

Yes this is what we expect from using right-hand rule.

Turn the magnet around so that the south pole enters the loops first. Which way did the indicator deflect? In which situation did the indicator deflect in the same direction with the north pole?

The indicator deflects to right. When magnet was coming out of loop it deflected in same direction with north pole.

Pull the south pole out of the loops. Which way did the indicator deflect? In which situation did the indicator deflect in the same direction with the north pole?

The indicator deflects to left. When magnet entered into of loop it deflected in same direction with North Pole.

Move the South Pole of the magnetic in and out of the coils.

How is the magnitude of the current and brightness of the light bulb affected by the number of loops (2 or 4) the magnetic moves in and out of? Is this the same as moving the North Pole in and out of the coil?

The magnitude of current and brightness increases with increase in number of loops. Yes, it is same with North Pole also.

How does the speed of the magnet in and out of the coil affect the amount of deflection of the needle as well as the brightness of the light bulb? Is this the same as moving the North Pole in and out of the coil?

The amount of deflection of needle and brightness increases with increase in speed of magnet in and out. Yes, it is same with North Pole also.