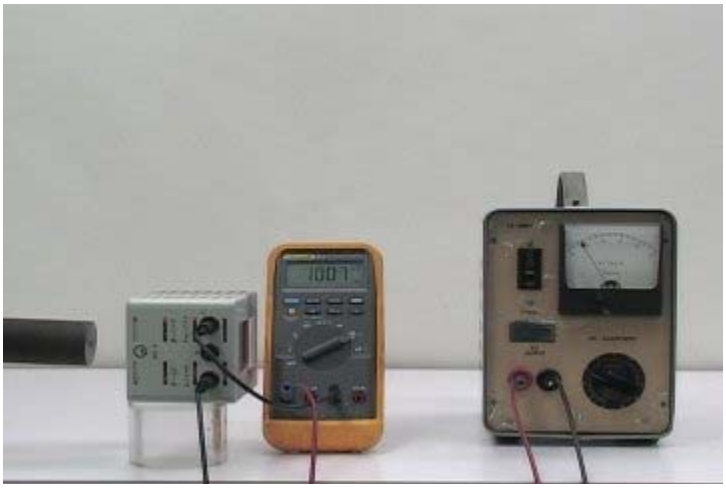
Answer #281

The answer is (d): the current will go down and then return to its original value, as seen in an mpeg video by clicking your mouse on the photograph below.



When the iron core is thrust into the coil, it becomes magnetized, forming a bar magnet. As that bar magnet moves into the coil, it induces a component of current in the opposite direction to the original current, so as to oppose the motion, according to Lenz's law. This current reduces the total current in the coil, as read on the digital ammeter.

An alternative way to look at this process involves conservation of energy. When the magnet is thrust into the coil, additional energy is stored in the magnetic field. The current becomes less, temporarily conserving the amount of energy in the magnetic field. Because the current is ultimately determined by the resistance of the coil, it rapidly increases, increasing the amount of energy stored in the magnetic field.

Question #282 is a follow-up to this question.

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For questions and comments regarding the *Question of the Week* contact
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given on the Lecture-Demonstration Home Page.