

Enriched Magnetism

Ferromagnets and non-magnets

Def: Ferromagnets: Act as temporary magnets, they have domains, but their domains are only aligned when they come in contact with a magnet. Fe and Co are examples.

Def: Non-magnets: Can never have any magnetic properties because they do not have domains.

Reactions:

magnet to magnet= $A \approx R$

magnet to FM= A

magnet to NM= NR

FM to FM= $||$

FM to NM= $||$

NM to NM= $||$

$N \ N \ N$
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Magnetic, Ferromagnetic and Non-magnetic substances

1. Object A and B attract A is mag
 Object A and C attract B is FM
 Object B and C have no reaction C is FM
 Object A and D have no reaction D is NM

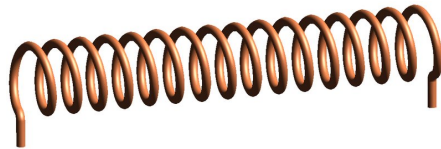
2. Object A and B attract A is Mag
 Object A and C have no reaction B is FM
 Object B and C have no reaction C is NM
 Object A and D attract D is FM
 Object B and D have no reaction

3. Object A and B repel A is Mag
 Object A and C attract B is mag
 Object B and C attract C is FM
 Object A and D attract D is FM
 Object C and D have no reaction E is NM
 Object A and E have no reaction

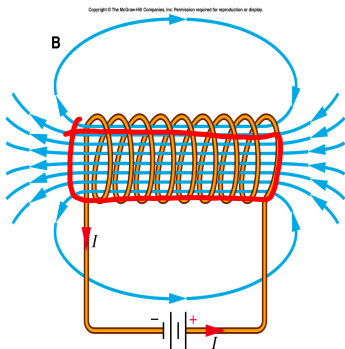
4. Object A and B have no reaction A is NM
 Object A and C have no reaction B is FM
 Object B and C have no reaction C is FM
 Object B and D attract D is mag
 Object C and D attract
 Object A and D have no reaction

Solenoids

def: Wire wrapped around like a loop.



Shape of the magnetic field like that of a bar magnet.



- Long line = +
- Short = -

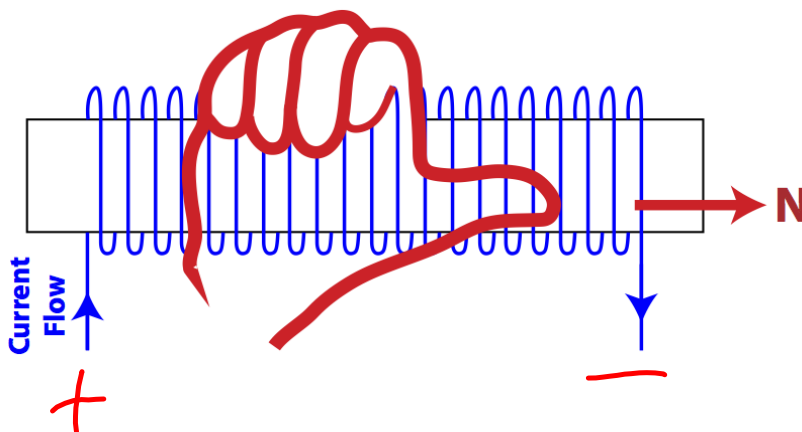
Current travels away from "+" & down to "-"

Magnetic Field due to a Current in a Solenoid.mp4

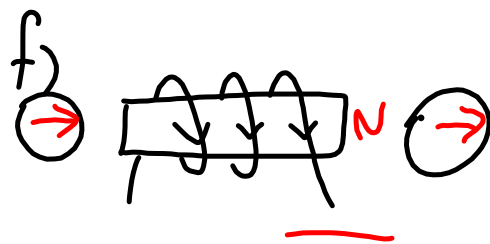
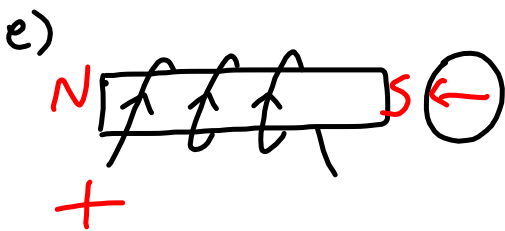
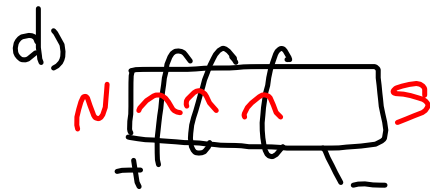
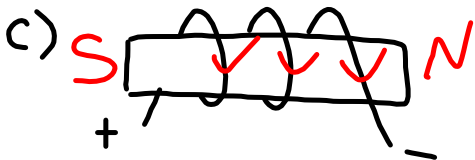
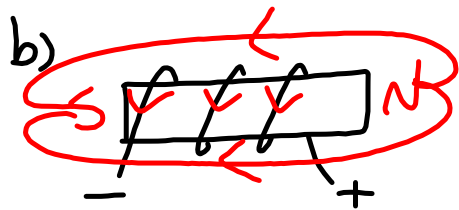
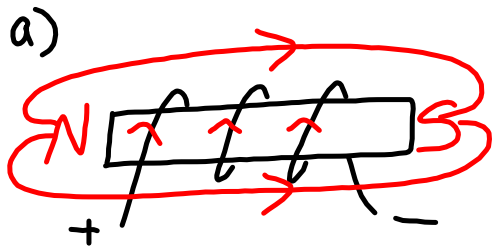
Right hand rule:

Thumb: points towards North

Fingers: curl in the current direction (+ to -)

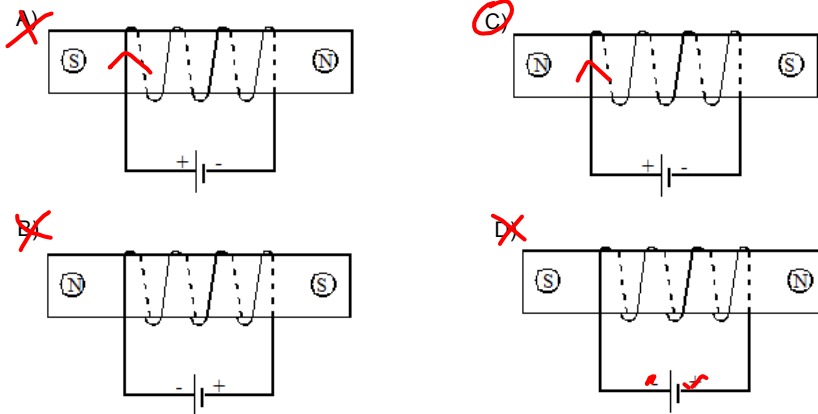


Solenoid Practice

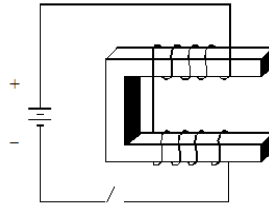


Past Exam questions

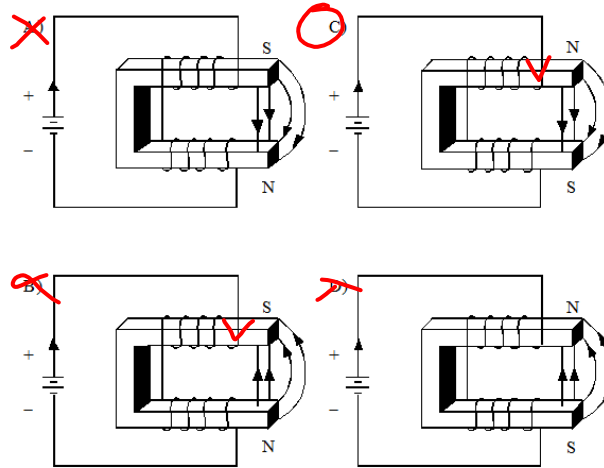
1. The four diagrams below represent electromagnets connected to the terminals of a battery. In which of the diagrams are the magnetic poles correctly indicated?



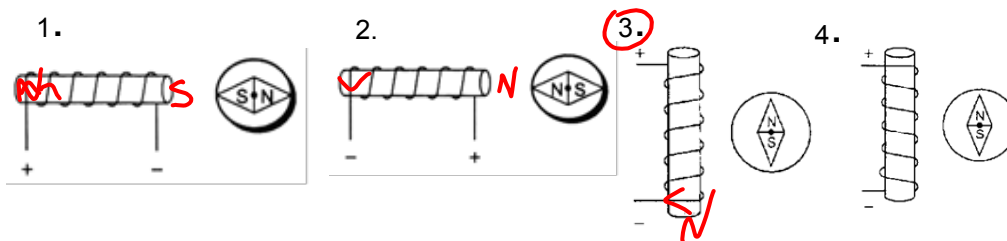
2. The magnet in the diagram is constructed from an iron core and a coil of wire connected to a battery. When the switch is turned off, an electric current circulates through the wire.



Which of the following diagrams correctly shows the magnetic field of this electromagnet?



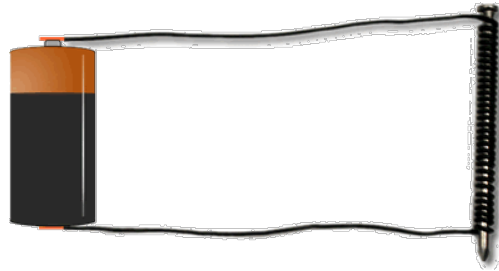
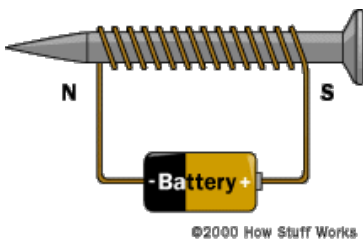
3. Which pictures below have the correct compass direction?



- ~~A) 1 and 2~~ ~~B) 1 and 3~~ ~~C) 2 and 4~~ **D) only 3**

Electromagnets

Def: Solenoids with a ferromagnetic core which allows the core to become magnetic.



Magnetism_ Induction.avi



Factors which affect the strength of the electromagnet

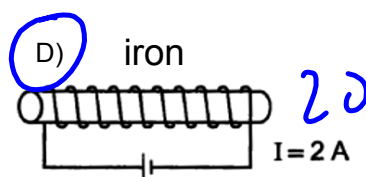
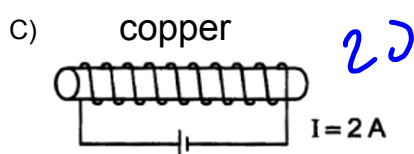
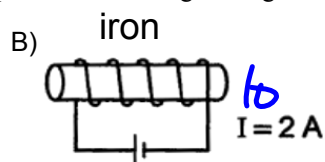
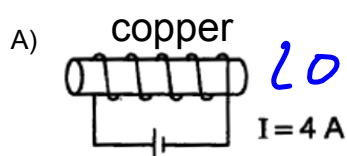
Factor	Increase strength
number of turns	<i>more turns</i>
current intensity	<i>more current</i>
type of core	<i>best iron Fe</i>
temperature	<i>colder</i>

Determining the force of an electromagnet

$$F = I \times N$$

Past Electromagnet question

1. Which one of the following electromagnets will produce the strongest magnetic field?



Attachments



Magnetic Field due to a Current in a Solenoid.mp4