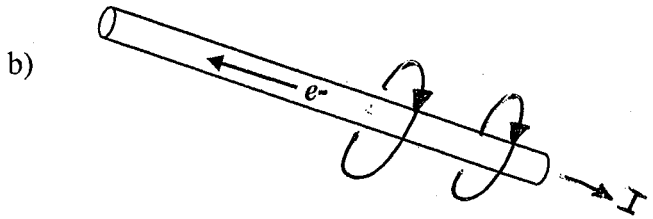
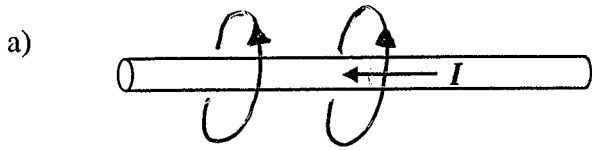


NETISM EXERCISES: 1

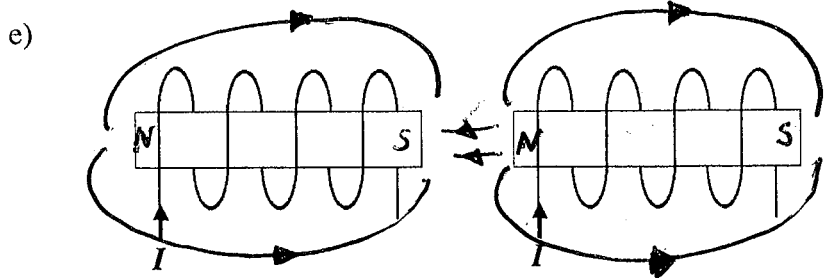
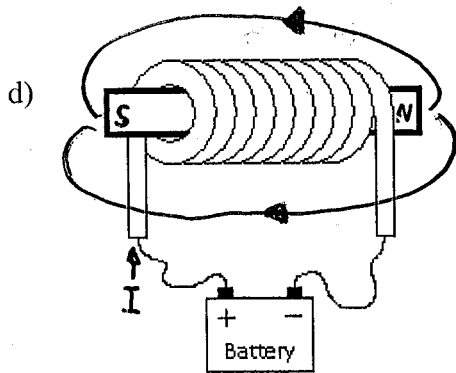
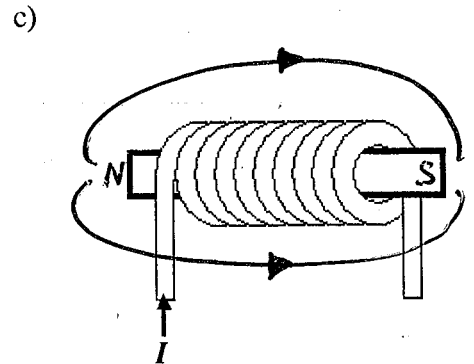
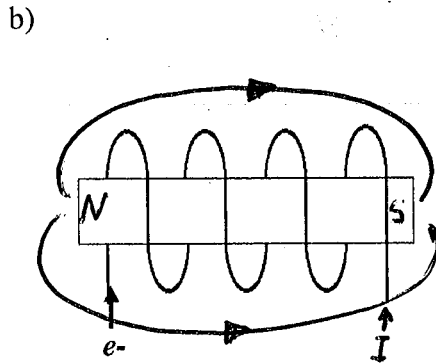
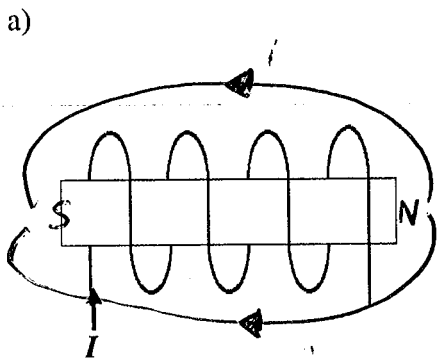
name: SOLUTIONS

Mapping Magnetic Fields around Current Carrying Wires/Solenoids:

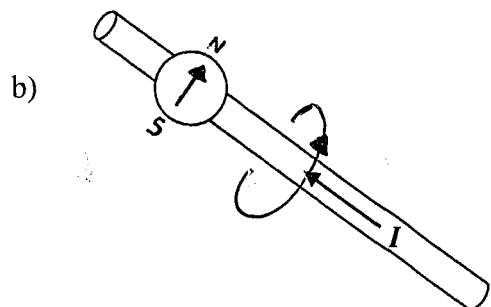
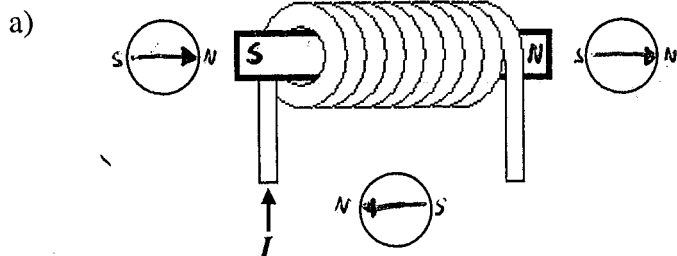
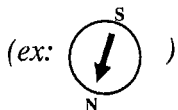
1: Using the Right Hand Rule, draw the magnetic field around the following wires:



2: Draw the magnetic field around the following Solenoids. Indicate which side of the solenoid acts like the North Pole of a magnet.



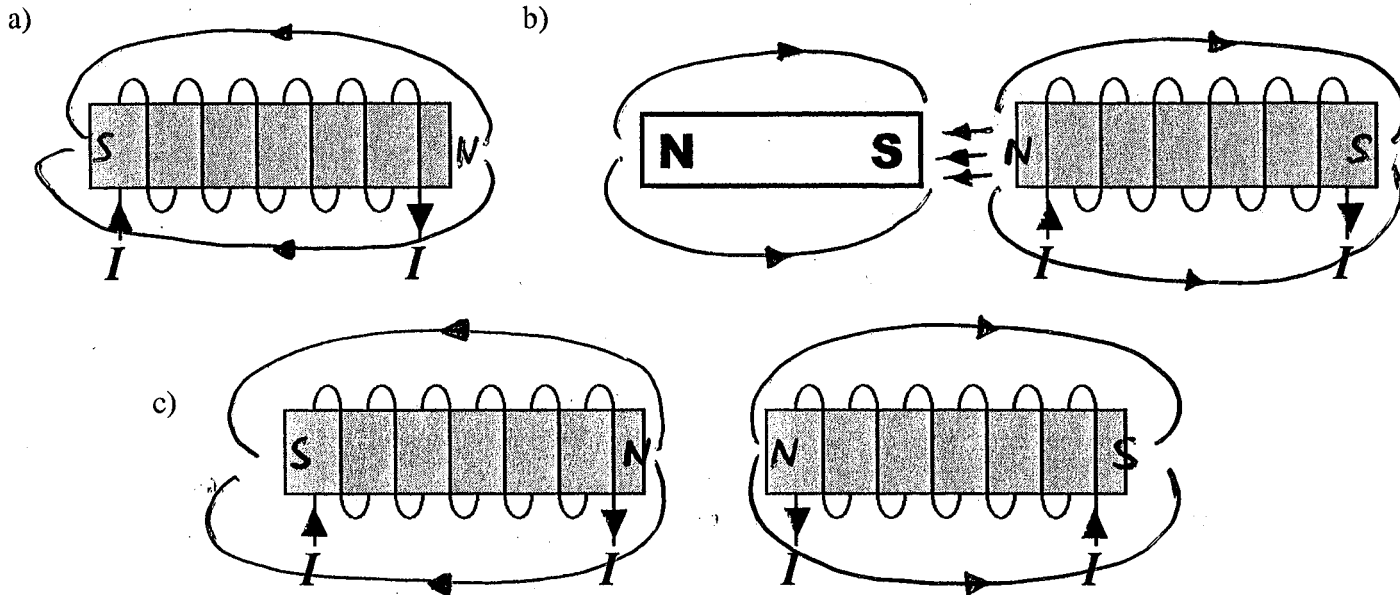
3: At the various positions indicated, show what direction the North-side of a compass would point in?



MAGNETISM EXERCISES: 2

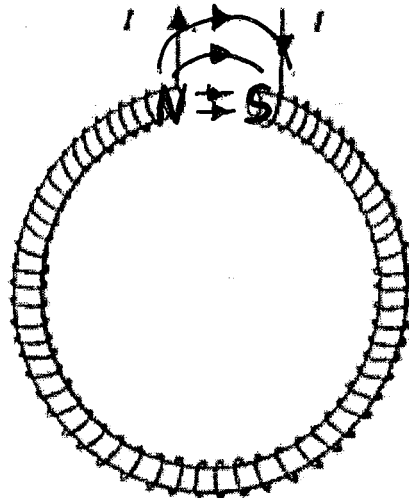
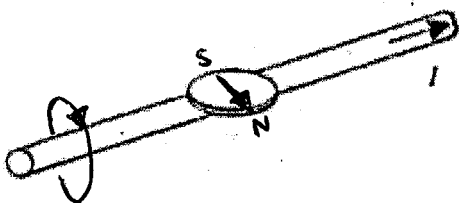
name: Solutions

1. Draw the magnetic field lines produced in each of the following situations. Indicate which side of the solenoid acts like the North Pole and South Pole.

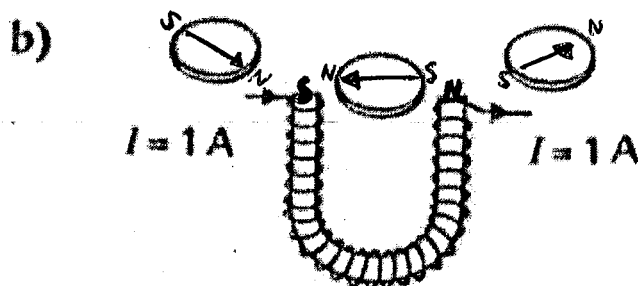
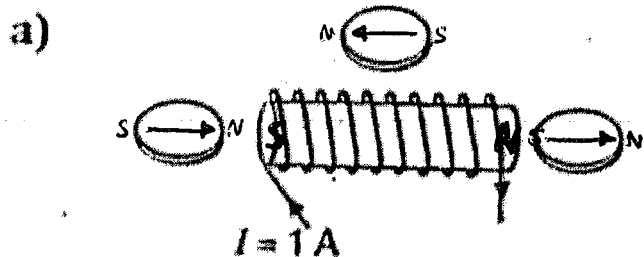


3. What is the shape of the magnetic field produced by the following solenoid?

2. Indicate the position of the compass needle shown below when the current indicated by the arrow travels through the circuit.



4. Indicate the direction that a compass needle would point when placed on the given positions. ex:



MAGNETISM PRACTICE: A

1. In the laboratory, you are given three different substances:

1. a magnetic substance
2. a ferromagnetic substance
3. a non-magnetic substance

You bring these substances close to one another and note your observations.

Which of the following observations is correct?

- a) Substances 1 and 2 repel each other. c) Substances 1 and 3 attract each other.
- b) Substances 1 and 2 attract each other. d) Substances 2 and 3 attract each other.

2. You have two ten-cent coins, one from 1965 and the other from 1994. To determine whether these coins are magnetic, ferromagnetic or non-magnetic, you conduct tests and note your observations.

Step	Test	Observation
1	Bring a magnet near the 1965 coin.	No reaction
2	Bring a magnet near the 1994 coin.	Attraction
3	Bring each coin near an iron nail.	No reaction

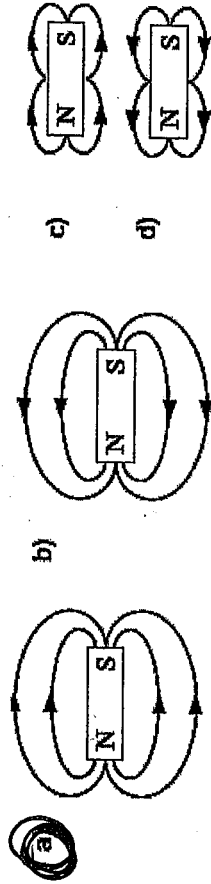
Given these observations, what can you say about these coins?

- a) The 1965 coin is non-magnetic and the 1994 coin is magnetic.
- b) The 1965 coin is non-magnetic and the 1994 coin is ferromagnetic.
- c) The 1965 coin is magnetic and the 1994 coin is ferromagnetic.
- d) The 1965 coin is ferromagnetic and the 1994 coin is magnetic.

MAGNETISM PRACTICE: B

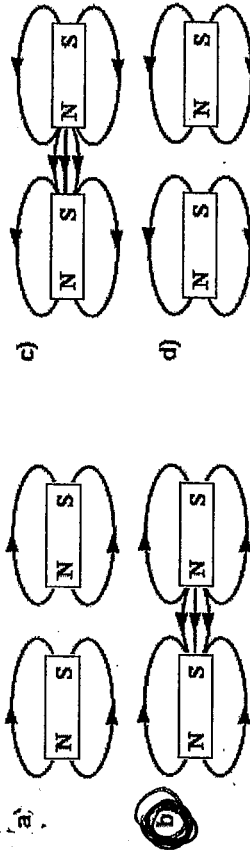
1. A straight magnet always produces an external magnetic field.

In which of the following diagrams is this magnetic field correctly represented?



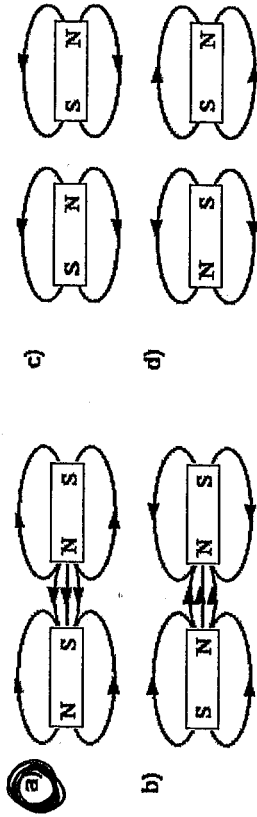
2. Two magnets are placed end to end.

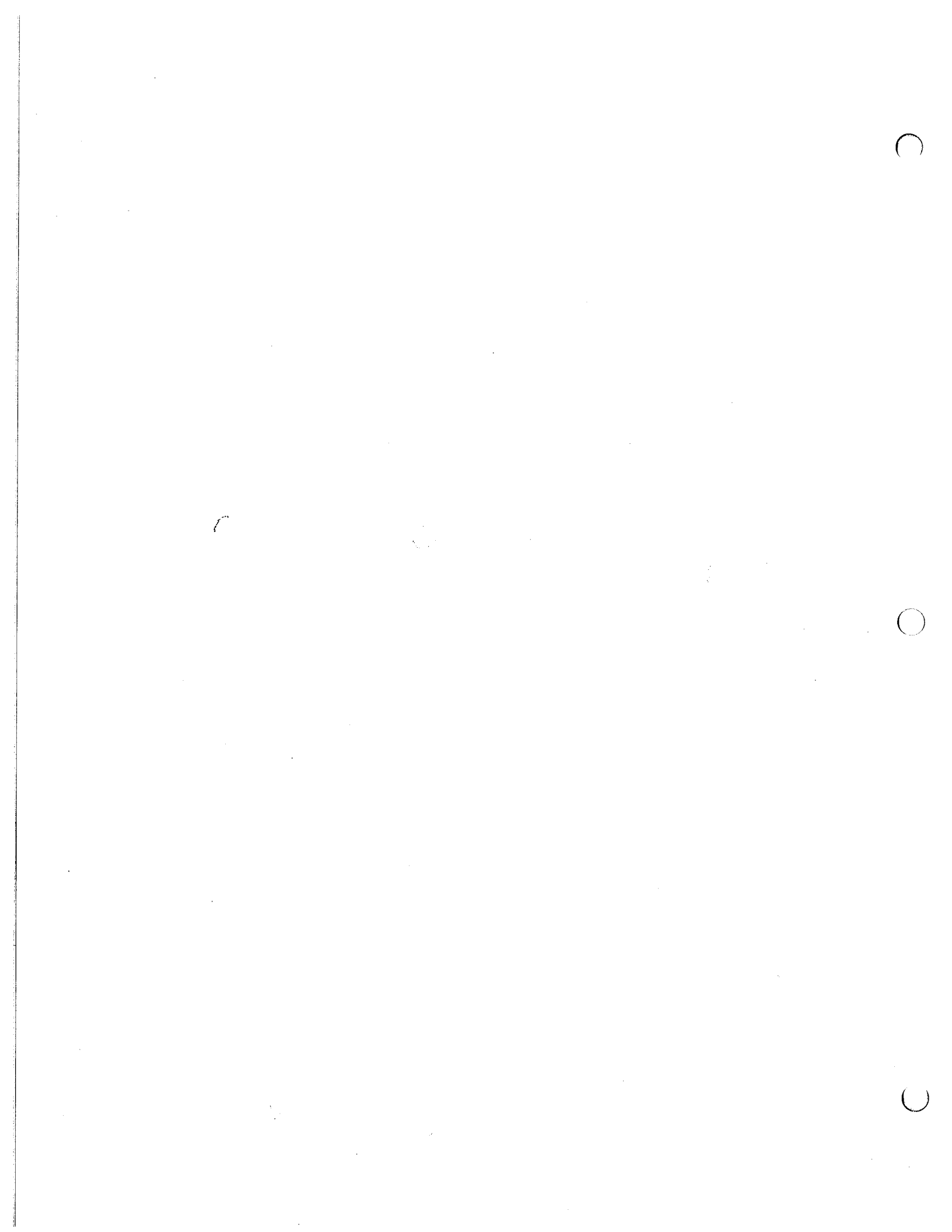
Which diagram correctly illustrates the magnetic fields around these magnets?



3. Two magnets are placed side by side.

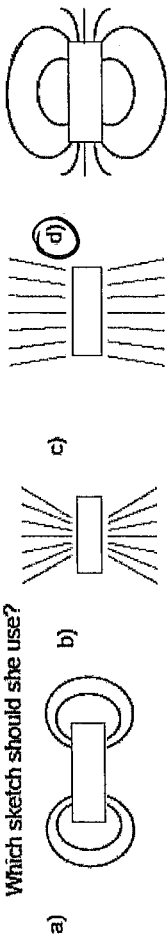
Which of the following diagrams correctly represents the magnetic fields produced by these magnets?



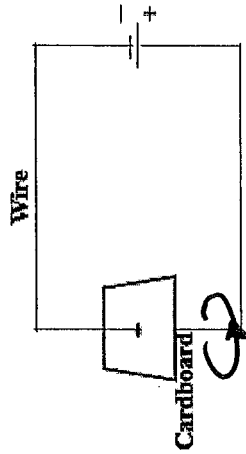


MAGNETISM PRACTICE: C

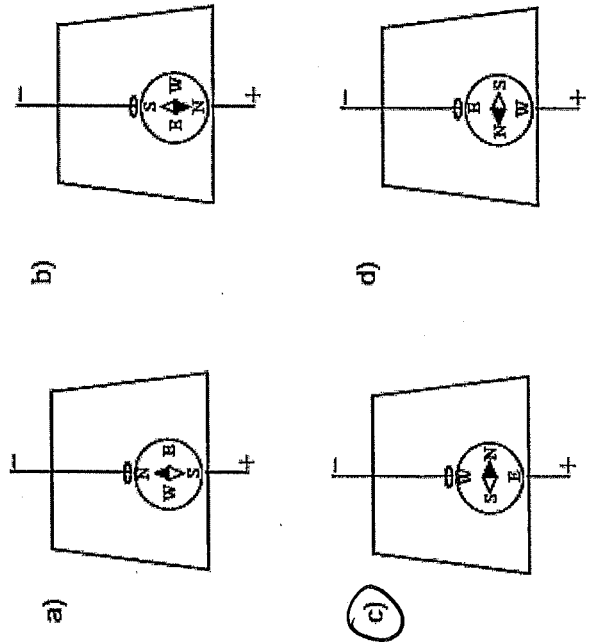
1. Nathalie wants to draw a sketch representing the magnetic field she observed around a current-bearing solenoid she used in the laboratory. Which sketch should she use?



2. A copper wire, with a current flowing through it, passes through a piece of cardboard as shown in the diagram to the right.

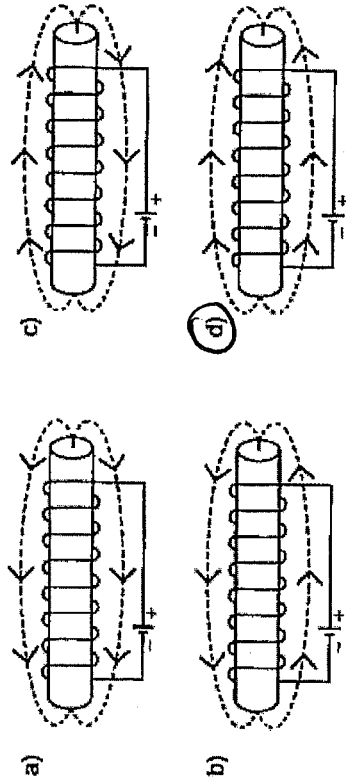


A magnetic compass is placed on the piece of cardboard near the wire. Which of the following diagrams shows the direction in which the compass needle will point?



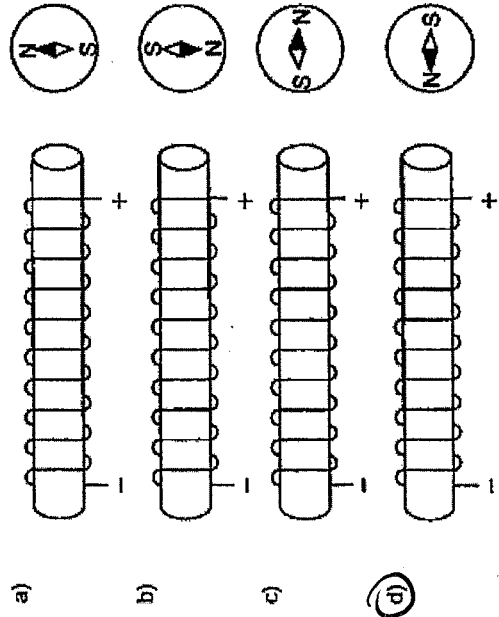
3. An electric current flows through a solenoid.

Which diagram correctly illustrates the magnetic field produced by this solenoid?



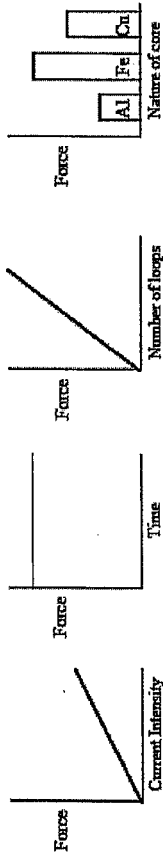
4. A compass is placed at one end of a solenoid.

In which illustration is the compass needle pointing in the right direction?



MAGNETISM PRACTICE: D

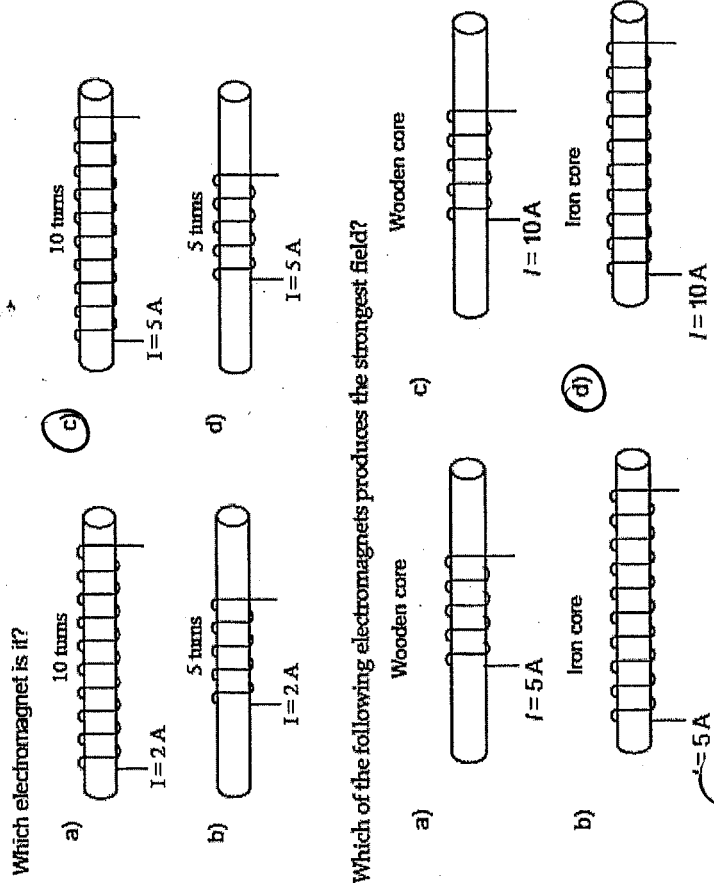
1. Julie performed several experiments in the laboratory investigating the magnetic field produced by a solenoid. She plotted the following four graphs:



According to the graphs, which variables affect the strength of the magnetic field?

- a) the current intensity, the time, the number of loops, and the nature of the core
 b) the time, and the number of loops only
 c) the current intensity, and the number of loops only
 d) the current intensity, the number of loops, and the nature of the core only

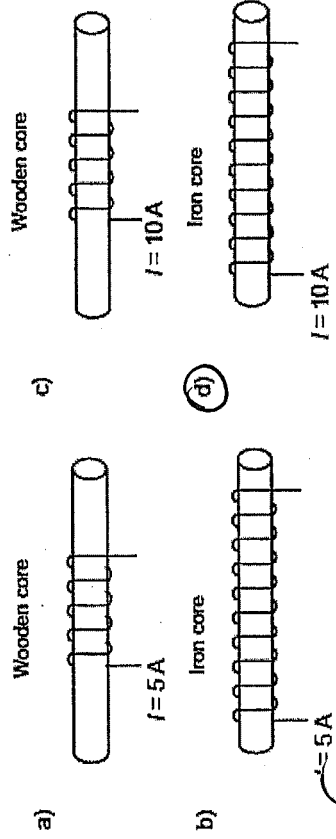
2. The diagrams below, illustrate electromagnets all consisting of the same core. One of these electromagnets produces a magnetic field that is more intense than that of all the others.



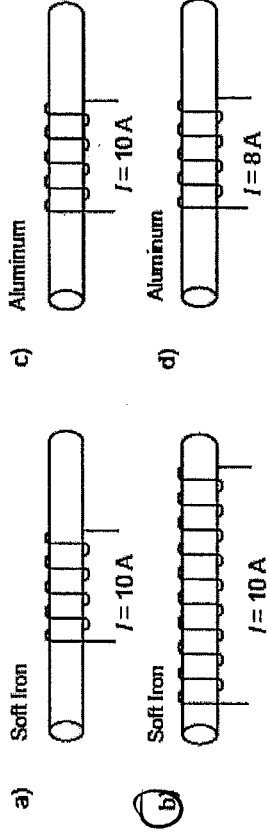
Which electromagnet is it?

- a) Wooden core, $I = 5\text{ A}$
- b) Iron core, $I = 5\text{ A}$
- c) Wooden core, $I = 10\text{ A}$
- d) Iron core, $I = 10\text{ A}$

3. Which of the following electromagnets produces the strongest field?



4. The electromagnets illustrated below produce magnetic fields of different intensities. Which electromagnet produces the strongest field?



5. If you are making an electromagnet, which combination will produce the strongest magnetic field:

- A solenoid with 100 turns
- A solenoid with 200 turns
- A current of 5 amperes
- A current of 10 amperes

- a) 1 and 3
 b) 1 and 4
 c) 2 and 3
 d) 2 and 4

6. In a steel mill, a mechanical crane with a powerful electromagnet suspended from the end of a cable is used to load and unload pieces of iron of all shapes and sizes.

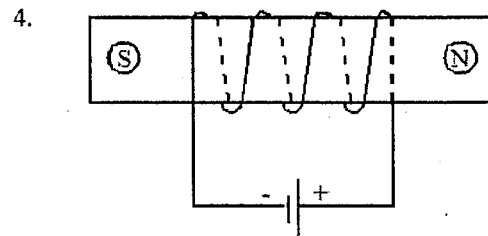
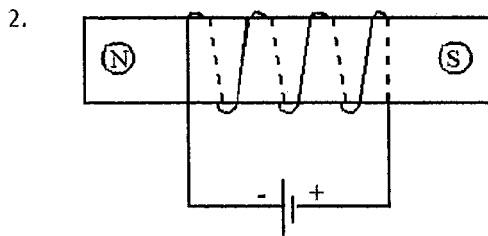
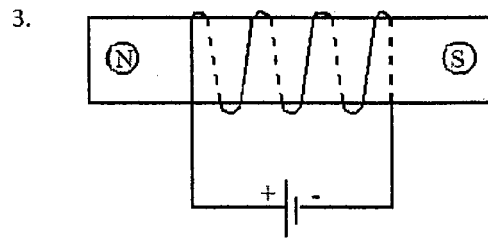
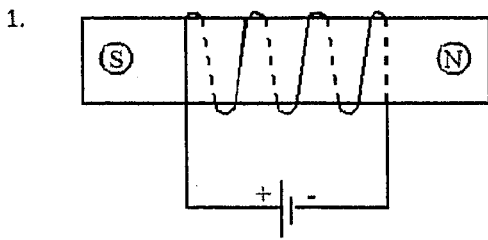
Why is an electromagnet used rather than a natural magnet?

→ Can be turned on and off with electricity

Magnetism Review:

name: SOLUTIONS.

The four diagrams below represent electromagnets connected to the terminals of a battery.



In which diagrams are the magnetic poles of the electromagnet correctly indicated?

A) 1 and 3

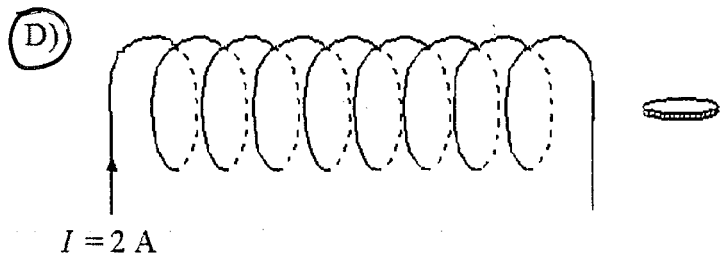
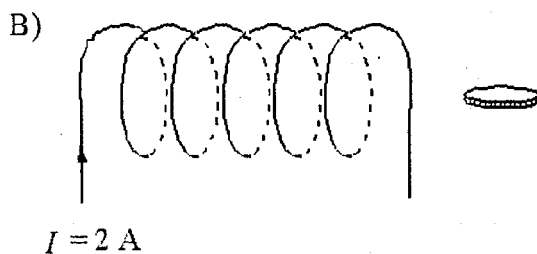
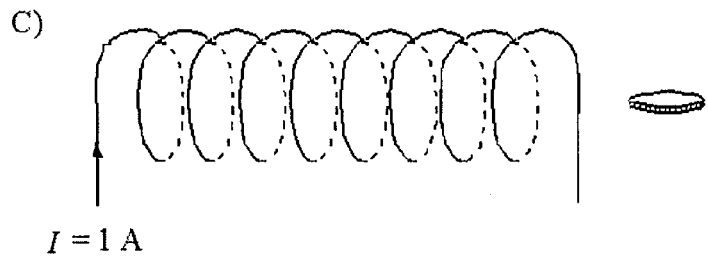
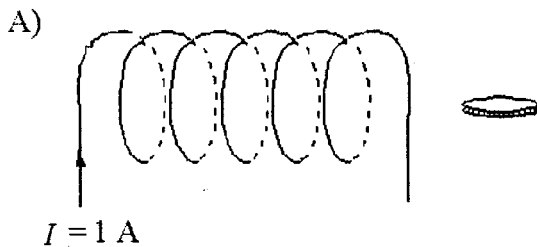
B) 1 and 4

C) 2 and 4

D) 3 and 4

2 Each of the following diagrams shows a \$0.25 coin placed in front of a solenoid.

Which of these solenoids attracts the coin the most?



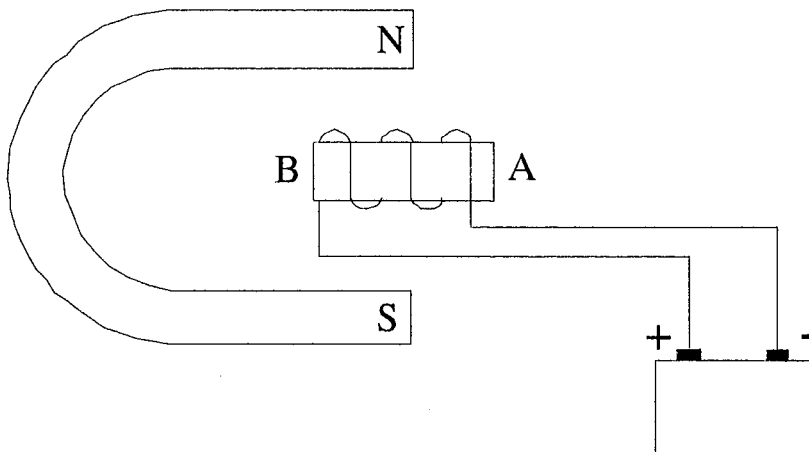
- 3 A student is asked to construct several electromagnets and to measure the strength of each using paper clips. Taking into account the current, the number of turns of wire around the core and the strength of the electromagnet, predict which of the electromagnets below would pick up the most paperclips and which one would pick up the fewest.

<u>Electromagnet</u>	<u>Current</u>	<u>n° of turns of wire</u>	<u>n° of paper-clips</u>
n° 1	1A	10	4
n° 2	4A	10	???
n° 3	1A	30	???
n° 4	4A	30	???

Electromagnet: 4 will pick up the most paperclips

Electromagnet: 1 will pick up the fewest paperclips

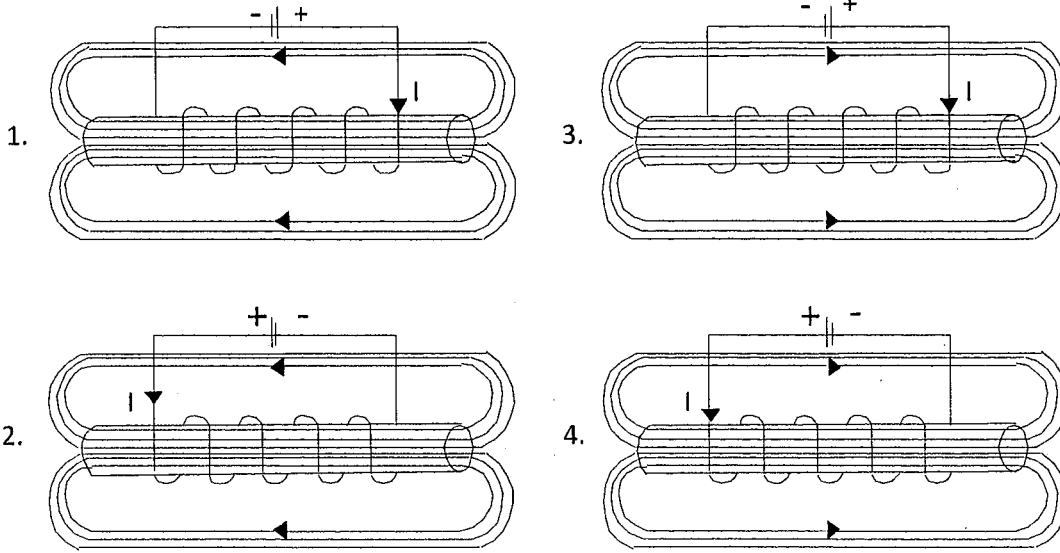
- 4 A solenoid connected to a battery is placed between the North Pole and the south pole of a U-shaped magnet.



What effect does the magnet have on the solenoid?

- A) The north pole attracts the whole solenoid while the south pole repels it.
- B) The south pole attracts the whole solenoid while the north pole repels it.
- C) The north pole attracts part A of the solenoid and the south pole attracts part B.
- D) The south pole attracts part A of the solenoid and the north pole attracts part B.

5 Two of the following diagrams correctly represent the magnetic field created by a solenoid.

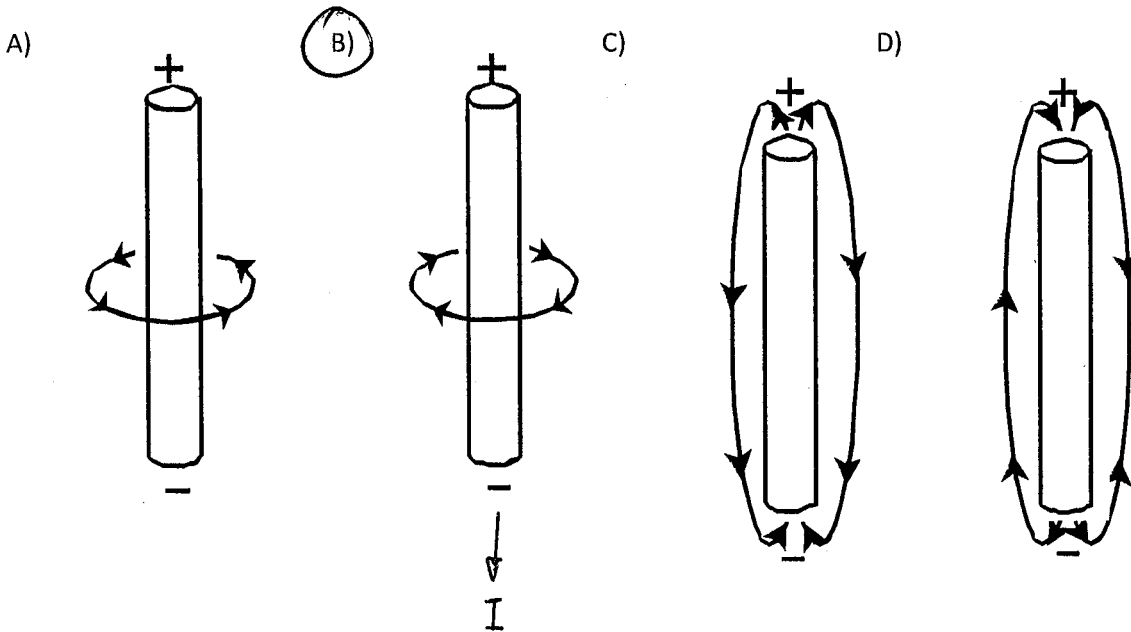


Which two diagrams are they?

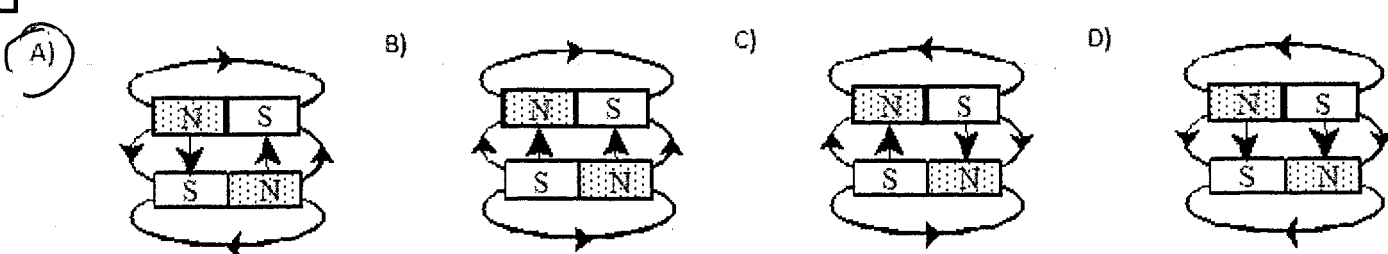
- (A) 1 and 2 B) 1 and 4 C) 2 and 3 D) 3 and 4

6 An electric current flows through a straight wire and produces a magnetic field.

Which of the following diagrams correctly represents this magnetic field?

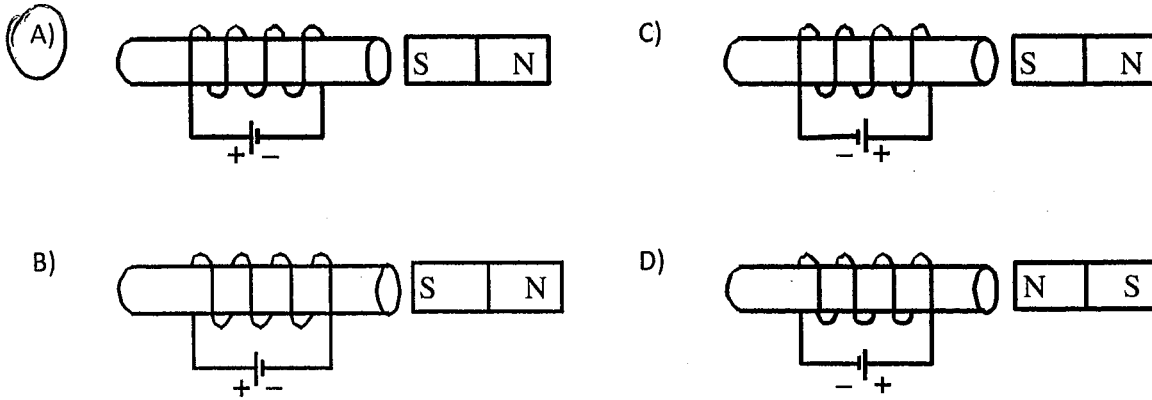


7 Which of the following diagrams best represents the magnetic fields produced by two magnets?



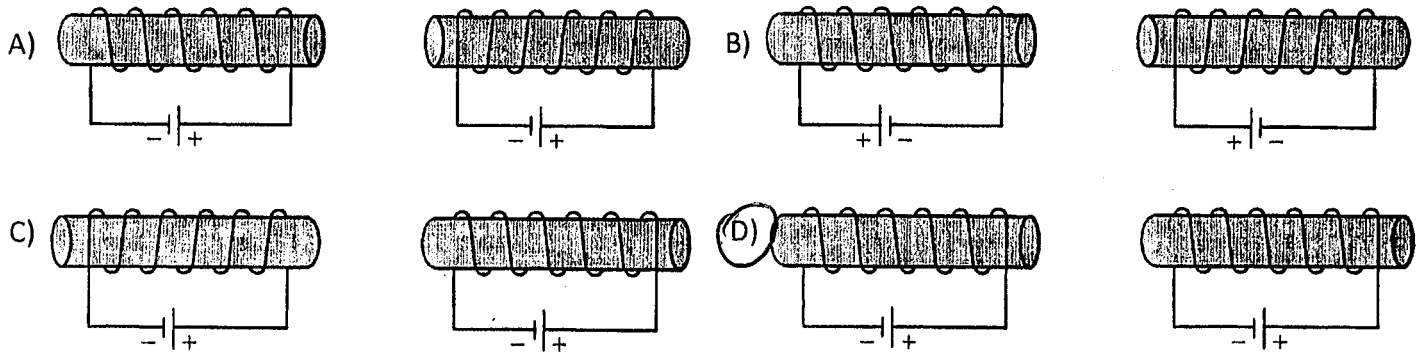
8 A bar magnet is brought close to a current-bearing solenoid.

In which one of the following situations will there be repulsion?

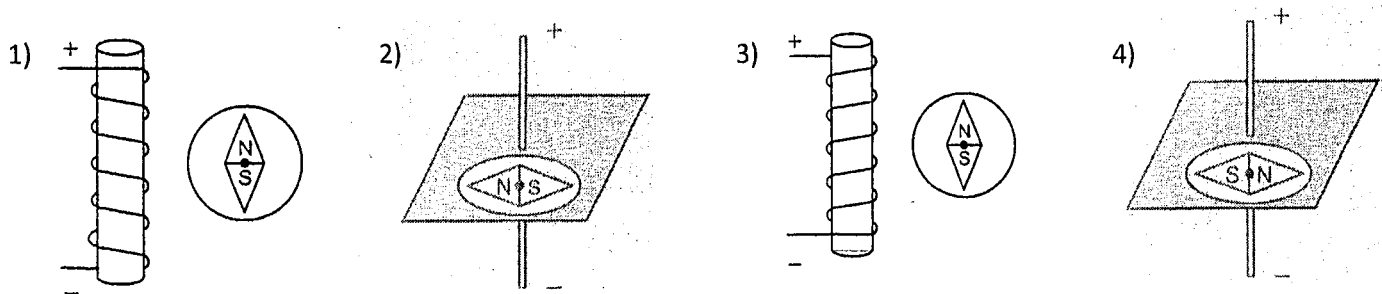


9 Two electromagnets are placed end to end.

In which one of the following diagrams do the electromagnets attract each other?



10 The diagrams below illustrate a compass placed in magnetic field.



Which diagrams show the compass needle pointing in the correct direction?

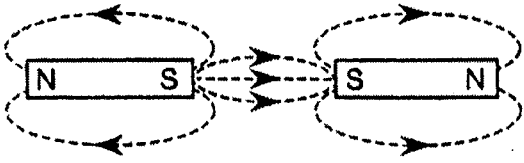
A) 1 and 2

B) 1 and 4

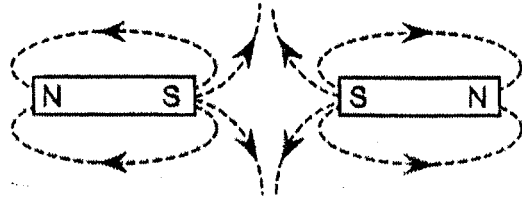
C) 2 and 3

D) 3 and 4

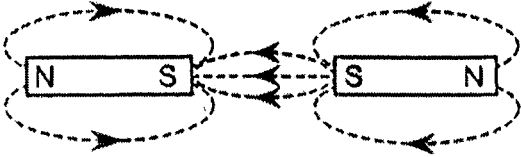
11 Which of the following diagrams correctly represents the magnetic field produced by two magnets?



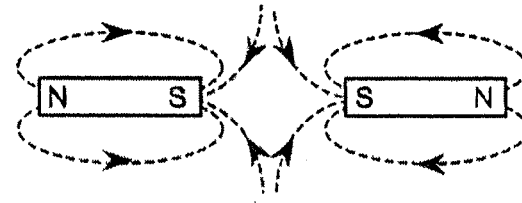
c)



B)

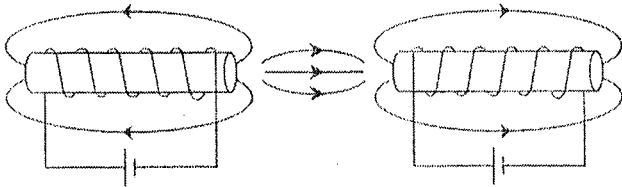


D)

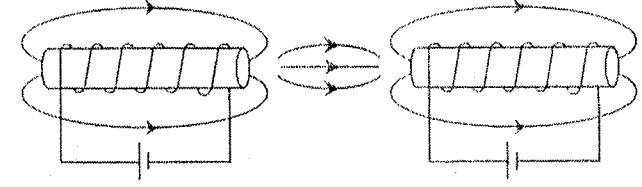


12 Which of the following diagrams correctly represents the magnetic lines of force between two solenoids?

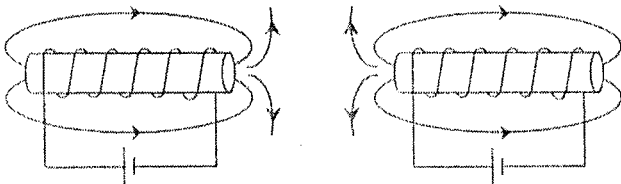
A)



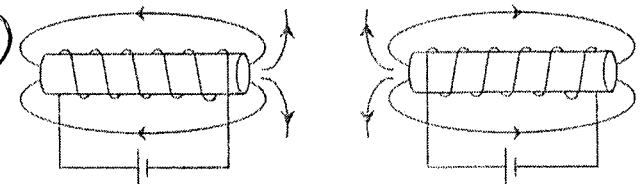
c)



B)

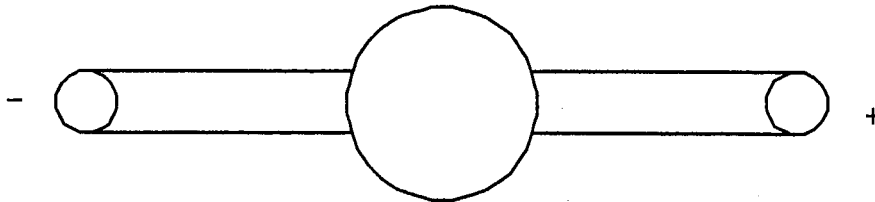


D)



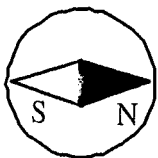
13 The following diagram shows a compass placed over a conducting wire. Electricity is flowing through this wire.

Compass



Which of the following compasses shows the needle pointing in the correct direction for this situation?

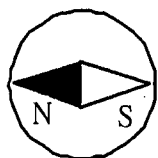
A)



B)



c)

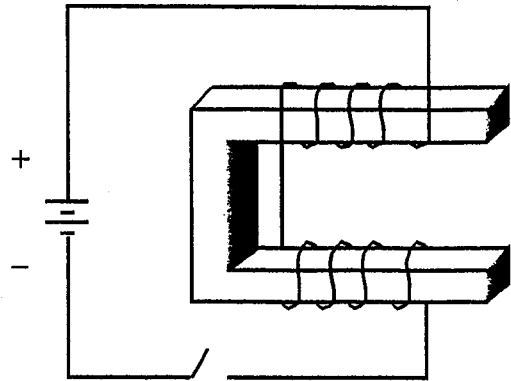


D)

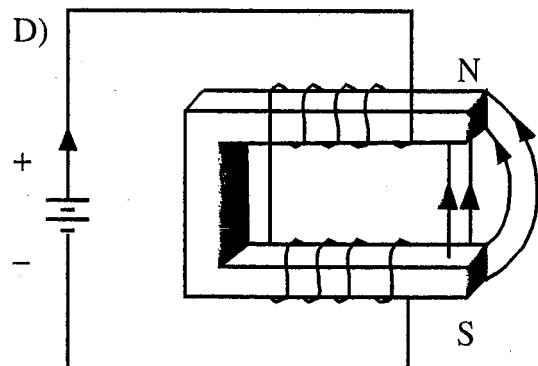
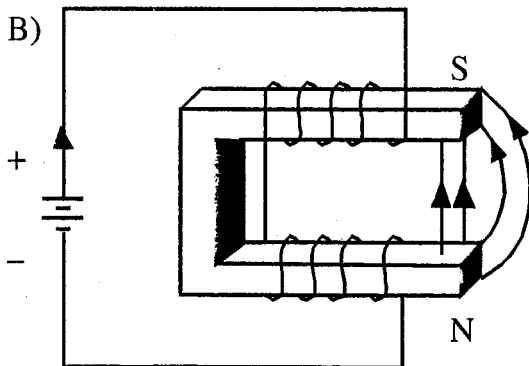
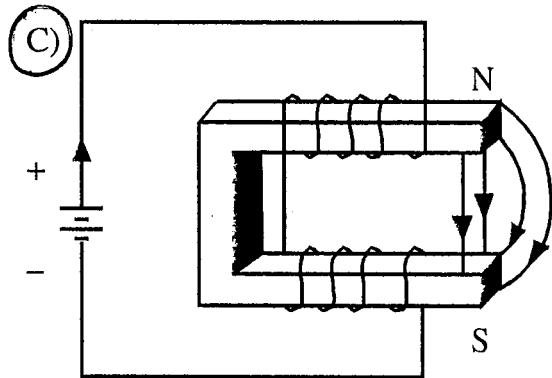
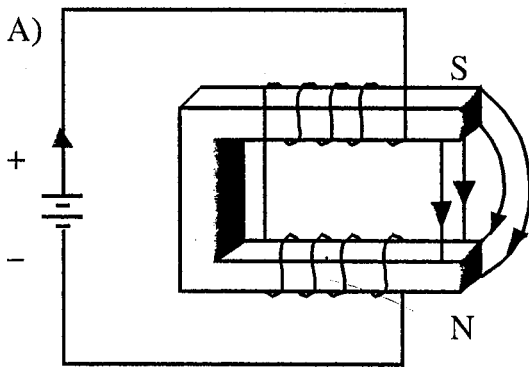


14

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?



Answer key:

1)D 2)D 3)4&1 4)D 5)A 6)B 7)A 8)A 9)D 10)C 11)D 12)D 13)D 14)C