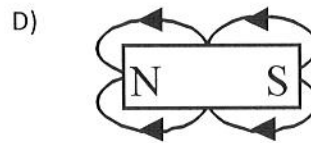
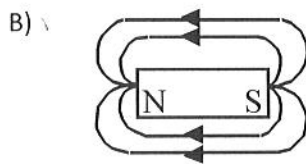
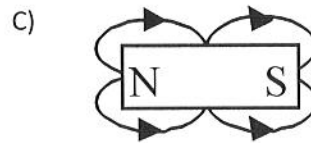
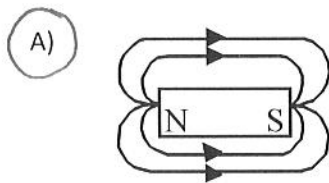


Magnetism, Power and Energy Review

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

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



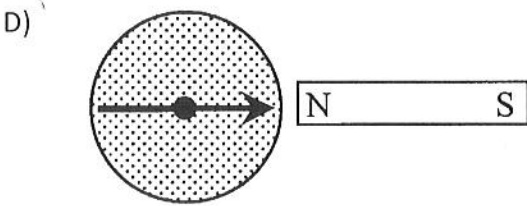
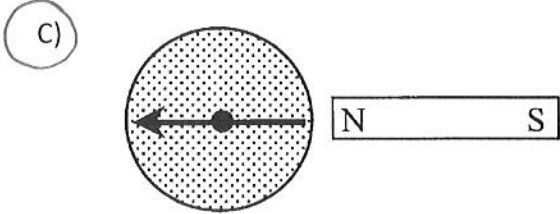
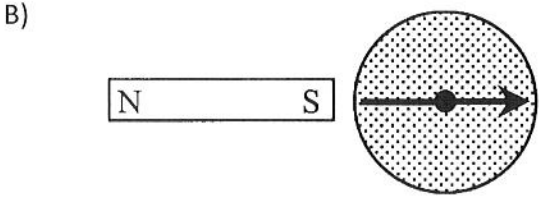
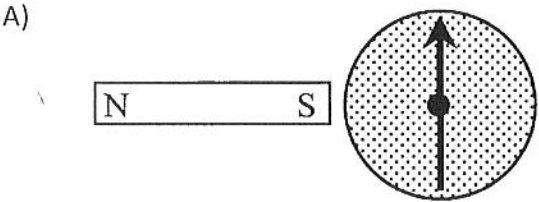
2. In the laboratory, you are given three different substances :

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.
- B) Substances 1 and 2 attract each other.
- C) Substances 1 and 3 attract each other.
- D) Substances 2 and 3 attract each other.

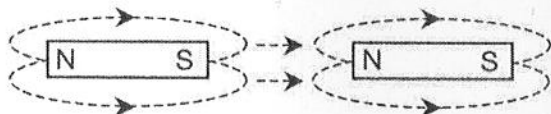
3. A magnetic compass is placed at one of the ends of a bar magnet. Which of the following diagrams correctly shows the direction in which the compass needle will point?



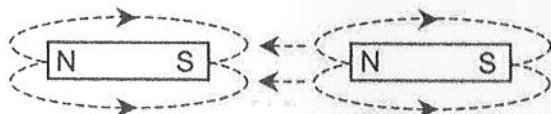
4. Two identical magnets are placed next to each other.

Which of the following diagrams best represents the magnetic field between the two magnets?

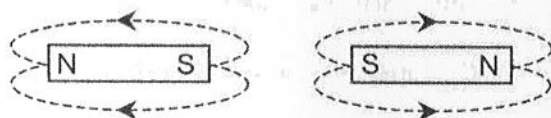
A)



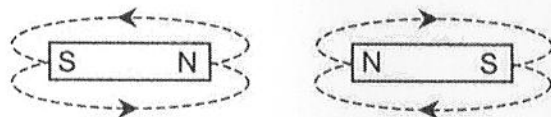
B)



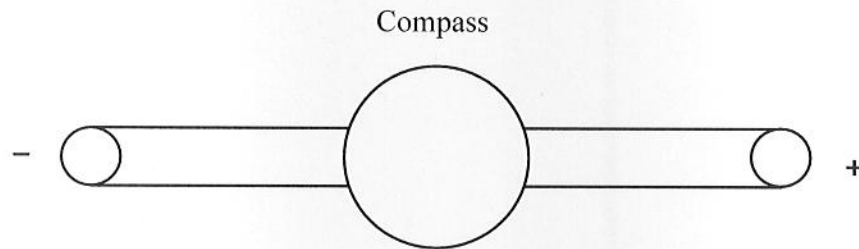
C)



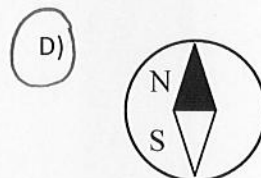
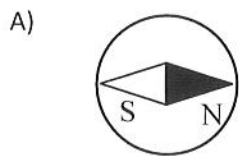
D)



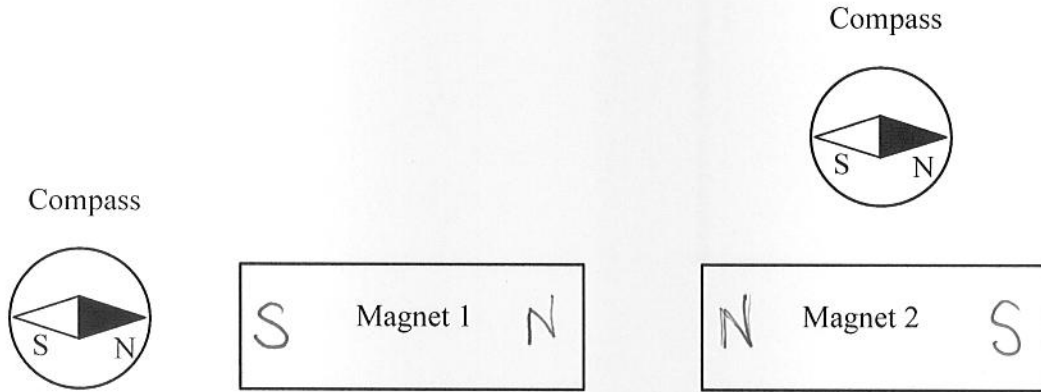
5. The following diagram shows a compass placed over a conducting wire. Electricity is flowing through this wire.



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

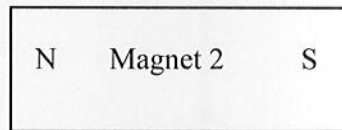
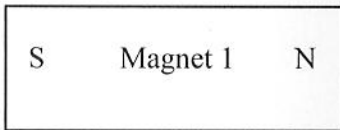


6. The following diagram shows two bar magnets and two compasses placed in a certain way.

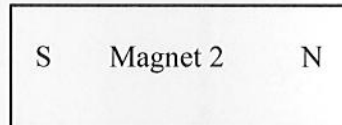
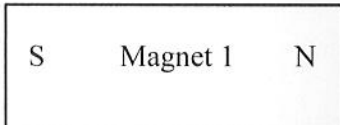


The poles are not indicated on magnets 1 and 2 in the diagram, but the compass needles show the direction of the magnetic fields of these magnets. Which of the following diagrams correctly indicates the poles of these magnets?

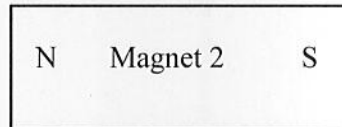
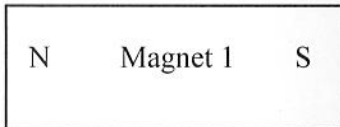
A)



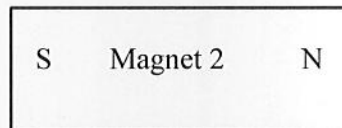
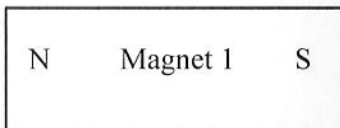
B)



C)

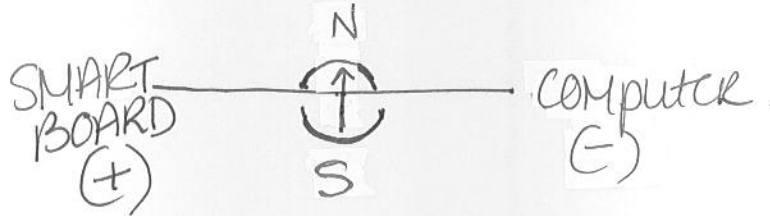


D)



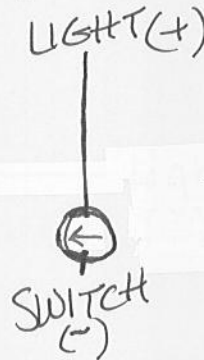
7. Current in a wire moves from the computer to the smart board. A compass is placed behind the wire on the wall, which way will it point?

Draw the situation:



11. Current in a wire moves from light switch up to the lights in the ceiling. A compass is placed near the light switch, which way will it point?

Draw the situation:



12. The motor in the fume hood in the laboratory is supposed to be changed. The contractor suggests two types of motors. The main characteristics of each are presented below.

Motor 1 : 110 V 2.0 A \$210 (purchase price)

Motor 2 : 110 V 1.4 A \$230 (purchase price)

The motor in the fume hood must operate 24 hours a day, 365 days a year. The cost of electricity is \$0.05 per kW•h.

Taking into account its purchase price, which of the two motors is more economical after one year's use? Show all your work.

Motor #1

$$P = V \times I$$

$$110V \times 2.0A$$

$$= 220W$$

$$= 0.22KW$$

$$E = P \times t$$

$$P = 0.22KW$$

$$t = 24h \times 365 = 8760h$$

$$E = 0.22KW \cdot 8760h$$

$$= 1927.2KWh$$

Cost

$$\$0.05/KWh \times 1927.2KWh$$

$$= \$96.36 + \$210$$

$$= \$306.36.$$

Motor #2

$$\begin{aligned}P &= 110\text{V} \times 1.4\text{A} \\ &= 154\text{W} \\ &= 0.154\text{kW}\end{aligned}$$

$$\begin{aligned}E &= 0.154\text{kW} \times 8760\text{h} \\ &= 1349.04\text{kWh}\end{aligned}$$

$$\begin{aligned}1349.04\text{kWh} \times \$0.05/\text{kWh} \\ &= \$67.45 \\ &+ \$230 = \$297.45\end{aligned}$$

Motor #2 is more economical.

13. The rating plate of an electric oven indicates that it has a power of 3500 W. This oven was used for 45 minutes. How much energy did this oven consume in this situation?

$$E = P \times t$$

$$E = 3500 \text{ W} \times 2700 \text{ s} \\ = 9450000 \text{ J}$$

$$P = 3500 \text{ W}$$

$$t = 45 \text{ min} \times 60 \\ = 2700 \text{ s}$$

or

$$t = 45 \text{ min} \div 60 = 0.75 \text{ h}$$

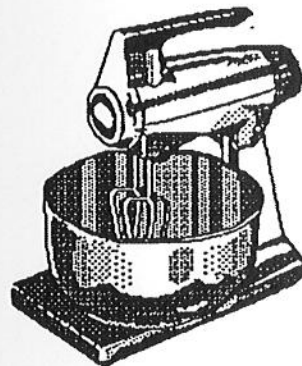
$$E = 3500 \text{ W} \times 0.75 \text{ h} \\ = 2625 \text{ W}\cdot\text{h}$$

14. Ms. Sanniti uses an electric mixer to whip some cream in a mixing bowl for her Boyfriend's birthday cake. The power of the motor is 10 W.

After using the mixer for 5 min, she calculates that the cream has absorbed 1200 J of thermal and mechanical energy.

Total energy consumed

$$E = P \times t \quad t = 5 \text{ min} \times 60 \\ = 10 \text{ W} \times 300 \text{ s} \quad = 300 \text{ s} \\ = 3000 \text{ J}$$



What amount of electrical energy used by the motor was not absorbed by the cream?

$$\text{Total energy consumed} - \text{energy absorbed} \\ 3000 \text{ J} - 1200 \text{ J} = 1800 \text{ J} \\ \text{was not absorbed.}$$