Physics 3204

Unit 2: Electromagnetism

Worksheet5: Motor Principle

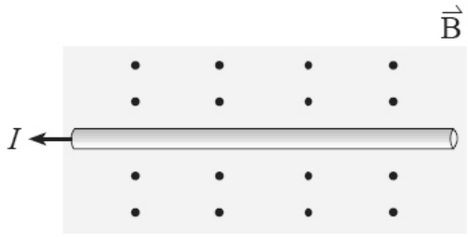
1. In which direction does the current-carrying conductor below experience a magnetic force?

(A) down
(B) left
(C) right
(D) up

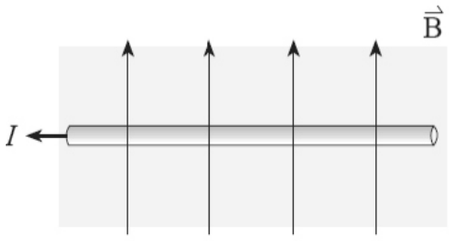
2. In which diagram does the current-carrying conductor experience a magnetic force out of the page?

(A)

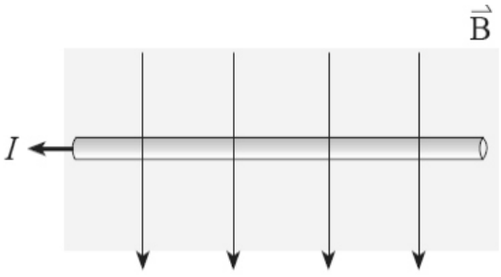
(B)



(C)

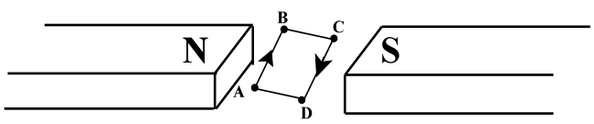


(D)

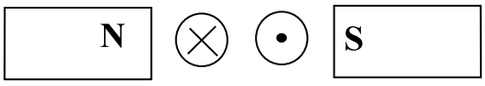


3. Which describes the rotation of the armature in the magnetic field below?

Top View



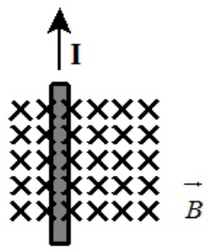
Side View



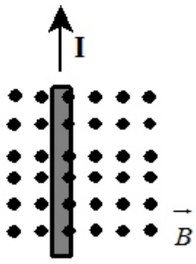
(A) AB deflects upwards
(B) BC deflects downwards
(C) CD deflects upwards
(D) DA deflects downwards

4. In which diagram would an external magnetic field, $\vec{B}$, cause the current-carrying wire to be deflected towards the left?

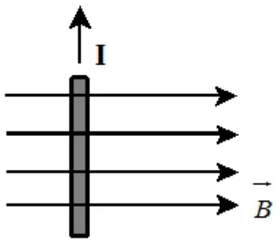
(A)



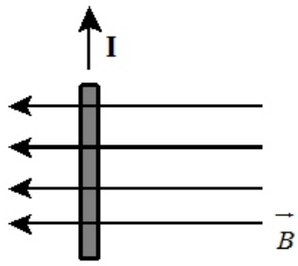
(B)



(C)

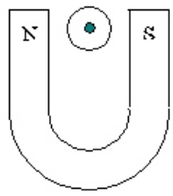


(D)



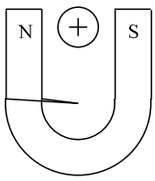
5. Electrons flow out of the page through a copper conductor located between the poles of a horseshoe magnet. How will the conductor move?

(A) down
(B) right
(C) left
(D) up

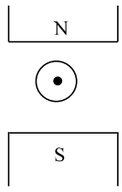


6. What is the direction of the force on the conductor in each diagram below.

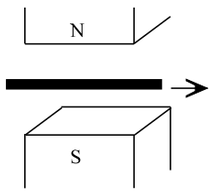
(A)



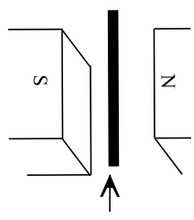
(B)



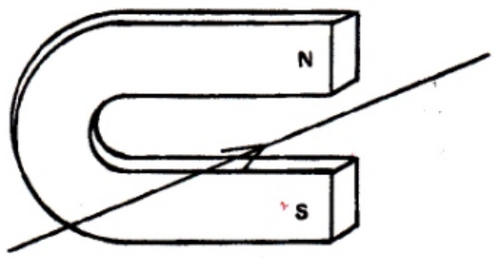
(C)



(D)

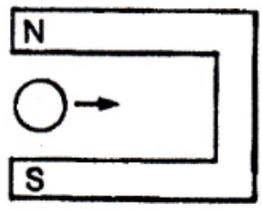


7. A straight wire is placed in a magnetic field as shown below. The arrow on the wire indicates the direction of the electron flow. Use the diagram to show the direction of the resulting force on the wire.



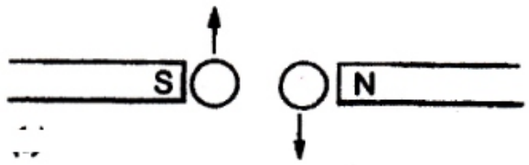
8. In the diagrams below, the arrows represent the direction of the mechanical force on a straight conductor. Determine the direction of electron flow in each conductor.

(A)



(B)

(C)



9. The diagrams provided show a metal rod, of mass m, suspended in a constant magnetic field by two identical wires. In diagram 1, there is no current in the wires, but in diagram 2, a current flows as shown. Compare the tension in the wires for diagram 2 to that for diagram 1. Explain your answer JUNE 2009

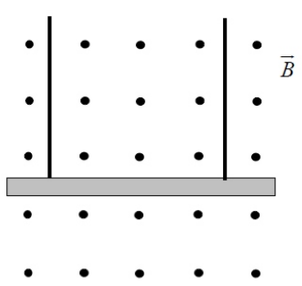


Diagram 1

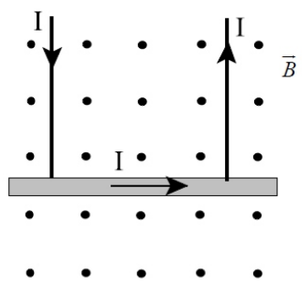


Diagram 2

10. Two thin metal rods, A and B, are supported in a vertical wooden rack as shown in the diagram. The two rods are connected by a wire on one end and to a battery at the other end. It is observed that as the connection to the battery is made, one of the rods jumps upward. Identify which rod jumps upward and explain why.
AUGUST 2008