

17 Electromagnetism

1. A simple instrument to detect small electric currents is the 1A _____. When it is in parallel with a 1B _____ resistor, it becomes a(n) 1C _____ and measures 1D _____.
In series with a 1E _____ resistor it becomes a(n) 1F _____ and measures 1G _____.
2. In a DC motor, the _____ conducts current into the loop by rubbing against the brushes.
3. Several loops, collectively called the _____, rotate in a motor.
4. In a galvanometer, the _____ in the coil can be measured, since it controls the size of the force on it.
5. The process of generating electricity by moving a conductor in a magnetic field is electromagnetic _____.
6. In order to determine the direction of **induced** conventional current in a wire, your _____ should point in the direction the wire is moving.
7. The brushes and slip-rings of an AC generator permit the _____ to turn freely while allowing current to pass into the external circuit.
8. Generators and _____ are basically identical in construction.

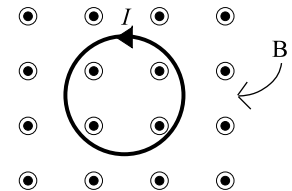
In the space to the left, write the letter of the answer to each question.

- _____ 9. The reason a **generator** works is that...
 - A) a battery directly exerts a force on an armature, generating circular motion.
 - B) a magnet magnetizes an armature and attracts it.
 - C) a commutator creates a magnetic field that generates the motion of a magnet.
 - D) an outside force pushes an armature, generating a current.
- _____ 10. The reason a **motor** works is that...
 - A) a current flowing through an armature creates a magnetic field and a force.
 - B) a commutator creates a magnetic field that generates the motion of a magnet.
 - C) an outside force pushes an armature, generating a current.
- _____ 11. Electromagnetic induction is a process in which...
 - A) an electroscope is charged by contact with charged insulators.
 - B) a current is induced by relative motion between a magnetic field and a conductor.
 - C) a magnet is demagnetized by disturbing its magnetic domains.
 - D) a wire is moved by the flow of current through a magnetic field.

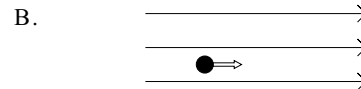
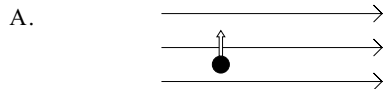
- _____ 12. The commutator in a motor is...
- A) a loop of wire that rotates in a magnetic field.
 - B) a permanent magnet or an electromagnet.
 - C) a combination of rings and brushes that alternate the current.
 - D) the power source that moves the loop of wire.

- _____ 13. The armature in a motor is...
- A) a loop of wire that rotates in a magnetic field.
 - B) a permanent magnet or an electromagnet.
 - C) a combination of rings and brushes that alternate the current.
 - D) the power source that moves the loop of wire.

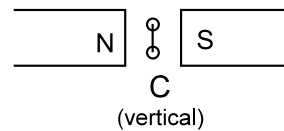
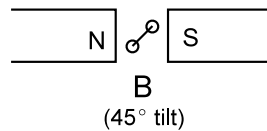
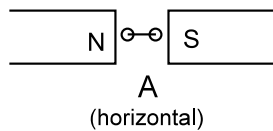
- _____ 14. There is a counter-clockwise conventional current I in a circular loop of wire. The loop is situated in an external magnetic field B directed out of the page as shown at right. The effect of the forces that act on this current is to make the loop...
- A) expand in size.
 - B) contract in size.
 - C) rotate about an axis perpendicular to the page.
 - D) accelerate into the page.



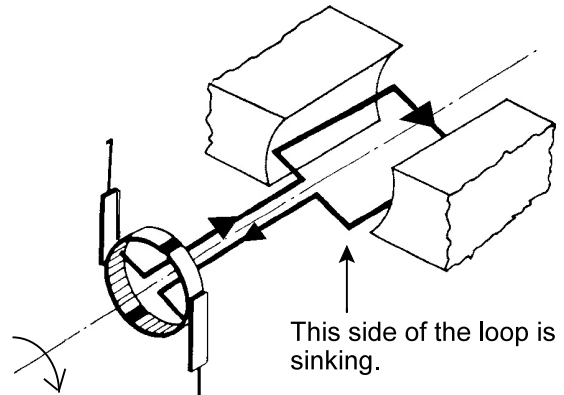
- _____ 15. In which diagram below would electricity **NOT** be produced? The diagrams show magnetic fields as arrows and a wire in cross-section as a circle with an arrow indicating its movement.



- _____ 16. Which cross-section of a generator shows the position of the loop when the induced current is a maximum?



At right is a diagram of a **generator**. The arrows on the loop indicate the direction of the induced conventional current. The curved arrow along the rotation axis and the diagram text indicate which way the loop spins.



17. Look at the direction of the conventional current flow and decide which brush of the generator is positive. Clearly label it with a "+" sign.
18. Use the generator rule to determine the direction of the magnetic field and draw the lines of flux between the two permanent field magnets (the blocks on either side of the armature).
19. Label with an "N" the field magnet which is acting as the north pole.
20. List three ways to maximize this generator's output:

- A) _____
- B) _____
- C) _____