



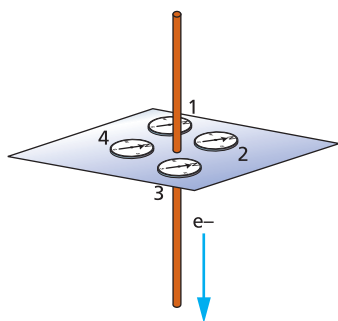
Physics

Practice Test

Before you try the Physics Practice Test, you may want to review Sections 1-6, where you will find 20 Checking Up questions, 9 What Do You Think Now? questions, 24 Physics Essential Questions, 44 Physics to Go questions, and 6 Inquiring Further questions.

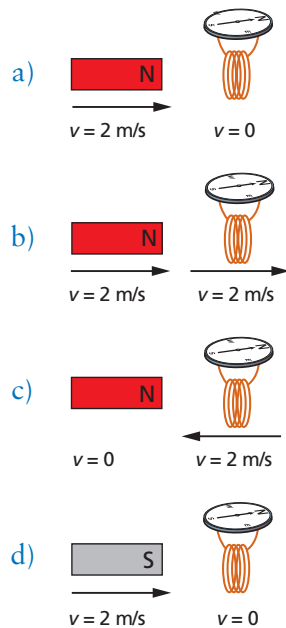
Content Review

- The presence of a magnetic field may be detected by using a
 - stationary charge.
 - light bulb.
 - small mass.
 - compass.
- A hand generator is connected to a coil of wire. A compass placed in the coil lines up with the axis of the coil when the generator handle is rotated. If the direction of the handle's rotation is reversed, what happens to the compass needle?
 - The needle rotates 90° .
 - The needle rotates 180° .
 - The needle spins continuously.
 - Nothing happens; the needle stays in place.
- A current-carrying wire has electrons flowing downward, as shown in the diagram. Which compass is correctly pointing in the direction of the magnetic field around the wire?

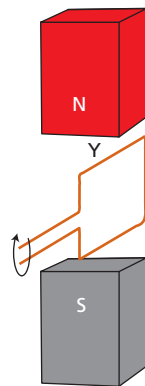


- 1
 - 2
 - 3
 - 4
- Which of the following has no effect on the strength of the magnetic field around a current-carrying coil of wire?
 - the number of turns of wire in the coil
 - the thickness of the wire
 - the current flowing through the coil
 - the material of the core placed in the coil
 - Which of the magnets below correctly shows the surrounding magnetic field lines?
 -
 -
 -
 -
 - The magnetic field of a solenoid is most like that of a
 - horseshoe magnet.
 - bar magnet.
 - donut magnet.
 - straight, current-carrying wire.
 - When soft iron is added as a core to a current-carrying solenoid, the magnetic field strength of the solenoid increases because
 - soft iron is already magnetized.
 - soft iron increases the current flowing around the coils of the solenoid.
 - soft iron adds the strength of Earth's magnetic field to the solenoid.
 - soft iron's magnetic domains align with the field due to the current.
 - Power plants send electricity at high voltages to local communities. To change this voltage to the 120 V used in residences, power companies use a device called a
 - turbine.
 - transmission tower.
 - motor.
 - transformer.

9. In which of the diagrams shown below will a current *not* be generated if the coil and magnet combinations are moved?

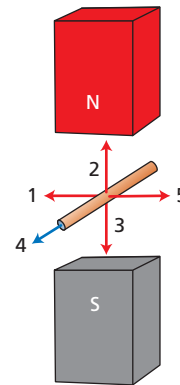


10. The diagram shows a loop of wire rotating in a magnetic field. Which statement below describes the current in section Y of the loop in the present position, and when the loop is rotated 180° ?



- The current is at its maximum and at 180° , the current will be at its maximum in the opposite direction.
- The current is zero and at 180° , the current will be at its maximum.
- The current is at its maximum and at 180° , the current will be at its maximum in the same direction.
- The current is at its maximum and at 180° , the current will be zero.

11. A wire is located in a section of a magnetic field as shown in the diagram. In which direction should the wire be moved to generate an induced voltage in the wire?



- 1
 - 2
 - 3
 - 4
12. In the diagram above, if an electron current is flowing through the wire in the direction labeled 4, in which direction is the force acting on the wire due to the current flow?
- 1
 - 2
 - 3
 - 5
13. Maxwell's equations demonstrate that
- all electromagnetic waves travel at the speed of light in a vacuum.
 - electromagnetic waves are composed of changing electric and magnetic fields.
 - sound is an electromagnetic wave.
- I only
 - I and II only
 - I and III only
 - I, II, and III
14. How long does it take a radio wave to travel from Philadelphia to Chicago, a distance of approximately 900 km? (The speed of light is 300,000 km/s).
- 0.003 s
 - 0.3 s
 - 300 s
 - 3×10^8 s



Practice Test *(continued)*

15. The steam-powered device used by many power plants to spin the generators and to make electricity is called a
- turbine.
 - transmission tower.
 - motor.
 - transformer.

Critical Thinking

16. Explain how an electrical current flows in the rotating loop of wire in an AC generator, and in the circuit to which the generator is connected as the loop rotates 360° . Use a voltage vs. time graph to help explain.
17. Explain how a galvanometer works. Include a diagram of a galvanometer.
18. A large electromagnet is often used in a junkyard to lift material.
- What specific types of material can an electromagnet lift?
 - How does the electromagnet release the material once it has been moved?
 - Explain why adding a soft iron core improves the electromagnetic power of a solenoid.
19. The distance to the nearest star is approximately 40,000,000,000,000 km and the speed of light is approximately 300,000 km/s. Use these two facts to explain why it would be extremely difficult to communicate with any “intelligent beings” on a planet circling that star.
20. Draw a transmission system for electricity powered by a wind generator and transmitted through an electric substation to your house.
- Assume the wind turbine generates electricity at 690 V. Include any steps up and down for the voltage that may be necessary as the electricity moves from the generator to your house.
 - List all the energy changes that the system undergoes as wind energy is converted for use to heat water with an electric stove in your home.

Active Physics

Plus

21. A wire measuring 3.0 m in length is at rest in a magnetic field of 0.02 T. If the wire experiences a force of 12 N, what current must be flowing in the wire?
22. An electron (charge = 1.6×10^{-19} C) is moving at 4.0×10^5 m/s in a magnetic field of 0.0080 T. What is the size of the force acting on the electron?

