

Hidden Magnetic Work

Trace how electric current and magnetic forces make technologies work.

PS.9.f "many technologies use electricity and magnetism."

NAME _____

DATE _____

1 READ AND MARK

Read it twice

YOUR JOB Underline each technology named in the passage. Circle the words that explain how electricity and magnetism help that technology do its job.

Electricity Meets Magnetism

- ① At a recycling center, a crane swings a large metal disk over a pile of scrap. An electric current flows through coils of wire inside the disk. The current creates a magnetic field, turning the disk into an electromagnet. It attracts iron and steel, then releases them when the operator switches off the current. This controlled magnetism helps sort metals quickly. Aluminum cans do not stick because aluminum is not strongly attracted to the electromagnet in this setup.
- ② Electric motors use a different arrangement of electricity and magnetism. In an electric fan, current passes through wire coils, making them magnetic. The magnetic coils push and pull against other magnets inside the motor. Those forces turn the fan blades. Reversing the current at the right time keeps the turning motion going. A battery-powered toy car and an electric drill also contain motors that change electrical energy into motion rather than relying on fuel burned in an engine for travel.
- ③ A phone speaker makes sound with electricity and magnetism. An electrical audio signal travels through a coil near a permanent magnet. The changing current changes the coil's magnetic field, so the coil moves back and forth. Attached to the coil, a thin cone pushes air and produces sound waves. Wireless charging uses coils too. Alternating current in a charging pad creates a changing magnetic field that induces current in a phone's receiving coil, transferring electrical energy without a cord.

2 ANSWER WITH EVIDENCE _____ Use the passage

1 What changes the recycling crane's metal disk into an electromagnet, and what happens when the current is switched off?

2 How do magnetic forces make an electric fan's blades turn?

3 Compare the phone speaker and the wireless charger. What is the main result of electricity and magnetism in each technology?

4 Which technology in the passage uses alternating current, and why does it need a changing magnetic field?

3 YOUR TURN _____ Your own words

Design a classroom device that uses electricity and magnetism. In exactly three sentences, name the device and explain how an electric current creates or changes a magnetic effect that makes the device work.

PART 1 • READ AND MARK

Underline each technology named in the passage. Circle the words that explain how electricity and magnetism help that technology do its job. Accept any marking that follows this job and points at the right text.

PART 2 • ANSWERS

#	QUESTION	ANSWER
1	What changes the recycling crane's metal disk into an electromagnet, and what happens when the current is switched off?	Current flowing through coils of wire makes the disk an electromagnet. When the current is switched off, it releases the iron and steel.
2	How do magnetic forces make an electric fan's blades turn?	Current makes wire coils magnetic. The magnetic coils push and pull against other magnets in the motor, turning the blades.
3	Compare the phone speaker and the wireless charger. What is the main result of electricity and magnetism in each technology?	In the speaker, the coil moves a cone to produce sound waves. In wireless charging, a changing magnetic field induces current in the phone's coil and transfers electrical energy.
4	Which technology in the passage uses alternating current, and why does it need a changing magnetic field?	The wireless charging pad uses alternating current. Its changing magnetic field induces current in the phone's receiving coil.

PART 3 • YOUR TURN (SAMPLE ANSWER)

A powered cabinet latch could secure a class set of tablets. When current flows through a coil, the coil becomes an electromagnet and pulls a steel latch into place. When the circuit is opened, the magnetic field disappears, so the latch can be released by hand.

Accept equivalent descriptions that accurately connect electric current, magnetic fields, and the technology's result. For the open response, accept any plausible device with a correct explanation of how electricity and magnetism work together.