

MOVING MAGNETS

Challenge



To Start

Drop the magnet down each tube

This exhibit investigates what happens when a magnet falls through tubes made of different materials.

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1. What force is causing the magnet to fall?

Gravity

2. What difference do you notice between the tubes?

The magnet falls at different speeds depending on what material the tube is made of.

3. **Experiment**

Complete the table below

Tube	Material	Magnetic? YES or NO (you can test this with the magnet)	Electrical conductor YES or NO (based on your knowledge)	Order of falling speed (1 fastest- 6 slowest)
1	Stainless steel	NO	YES	2
2	Copper with slits	NO	YES	4
3	Perspex	NO	NO	1
4	Copper	NO	YES	5
5	Aluminium	NO	YES	6
6	Copper coils	NO	YES	3

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4. What's happening?

- a As the magnet moves through a metal tube it produces an **electric field** around the tube *(these are called eddy currents)*.
- b This electric field produces a **magnetic field** around the tube.
- c This magnetic field acts in the **opposite** direction to the field of the moving magnet and repels it.
- d This **slows** the speed at which the magnet falls by opposing the force of gravity.
- e The opposing force is **greater** for better electrical conductors. In other words, good conductors slow the magnet more

Use this information and your results to rank the tubes in order of their ability to conduct electricity.

Rank	Material
1	Copper
2	Aluminium
3	Copper with slits
4	Stainless steel
5	Copper wire
6	Perspex

People often think the magnet falls more slowly because the tubes are magnetic.

Would this explanation agree with your observations?

Note that copper is a better electrical conductor, but here the aluminium *appears* better because the tube is thicker than for copper.

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- 5. In tube 6 the LED bulbs light as the magnet falls.

Complete the paragraph below to explain why.

When a **magnet** moves through a material that can **conduct** electricity, it generates an electric **field**.

This causes a **current** to flow in the copper wire. As the current flows through the LED the bulb **lights**.

