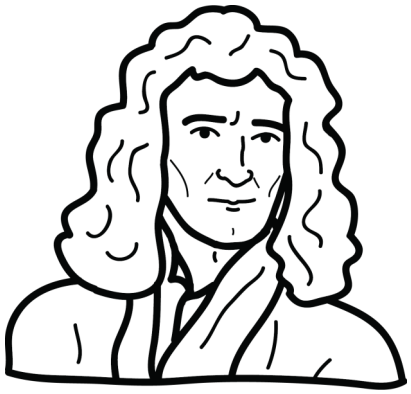
Forces and Motion



We're going to take a look at how and why things move the way they do. We'll look at how they change from being in one place to ending up in another place, which we call **motion**. We'll also look at some of the forces that affect their motion. But in order to understand motion, we have to get to know a man named Isaac Newton.

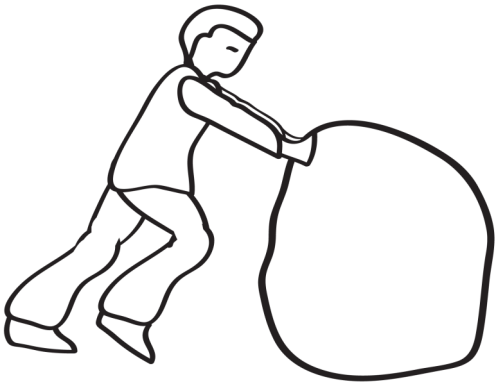
Isaac Newton was a brilliant scientist from England who lived from 1642 to 1727. Scientists were learning a lot about how things worked during this time, and Newton had a special gift for discovering and understanding new things about science. He taught us about how light and color work, made important discoveries about gravity, and invented calculus.

Isaac Newton developed three laws of motion that continue to be a part of our understanding of science today. His first law is called the **law of inertia**. It explains that if a body is moving, it tends to keep moving unless it's acted on by an outside force. It also explains that if a body is not moving, it won't start moving without a force acting on it. We'll look at the second part of that law first.

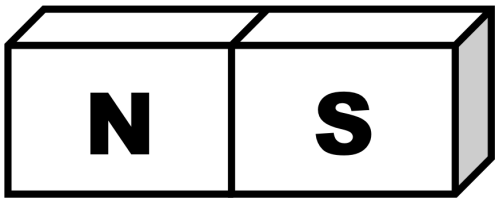
If an object isn't moving, it can't start moving on its own. It needs something to act on it. It needs a force. If an apple is sitting on your kitchen table, it will keep on sitting there until someone or something moves it. Your dog might come by and bump it with its nose. You might come past and pick it up. Someone might bump into the table and jostle it. But the apple won't suddenly move from the table to another place without being acted on by a force.

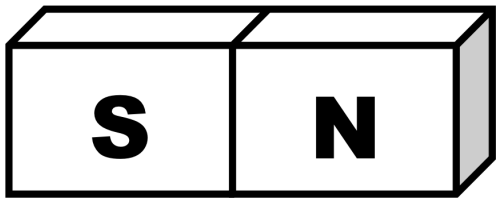
The same is true of a rock. If there is a rock sitting on the ground, it will stay there, in the same place, until something exerts a force on it and makes it move. The force could be you pushing the rock, or the force could be the moving of the ground from an earthquake. But if left completely alone, the rock won't move.

But maybe you're thinking that this doesn't really have anything to do with force. Maybe you're thinking it's because an apple and a rock aren't living things. They can't decide to move on their own because they aren't alive. What if I told you that you couldn't move without using force either?

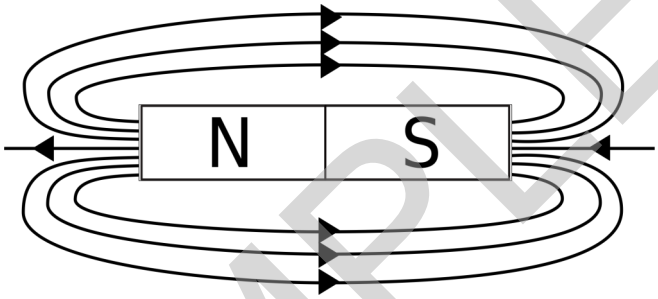


Every magnet has two poles, called the north pole and the south pole. If you cut a magnet in half, each piece would still have two poles. On a bar magnet, you can find a pole on each end. On a horseshoe magnet, the poles are at the ends of its "arms."



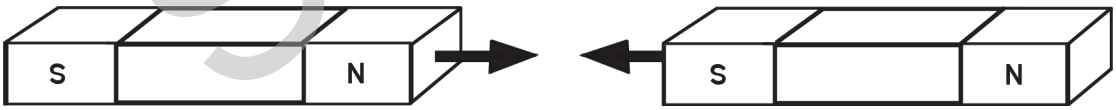


Every magnet is surrounded by a magnetic field. The stronger the magnet, the stronger its magnetic field. This field is strongest at the two poles.



When a magnetic field touches a magnetic object, it causes tiny magnetic particles inside the object to line up. Then it draws the object to itself.

But the north pole of a magnet can only attract a south pole, and a south pole can only attract a north pole.



If you try to line up the same poles, they repel, or push each other away.

Terminology

Using what you learned, define these words in the best way you can. Use the back of the page if you need more room.

Motion: _____

Law of inertia: _____

_____

_____

Friction: _____

Lubricating: _____

_____

Mass: _____

Acceleration: _____

_____

Gravity: _____

Magnetism: _____

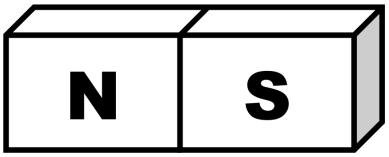
Bar magnet: _____

Horseshoe magnet: _____

Magnetite: _____

Electromagnetism: _____

_____

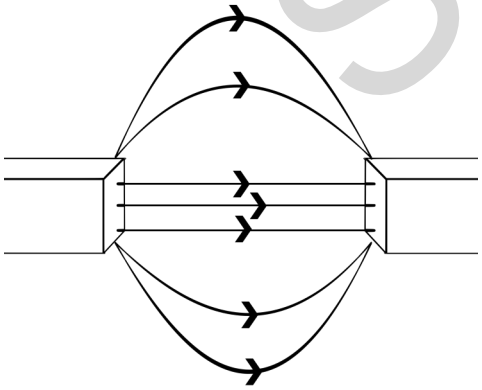


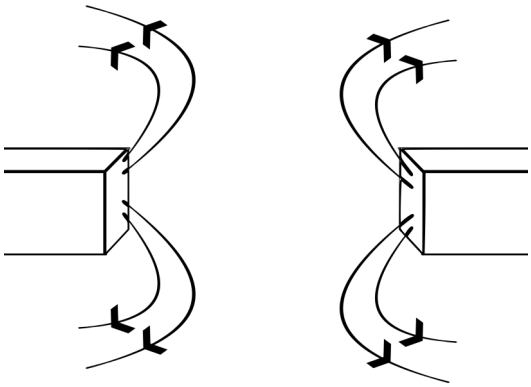
Review

In the first diagram, label which of the magnets will attract each other and which of the magnets will repel each other. In the second diagram, label the magnetic fields with either "attract" or "repel."

_____

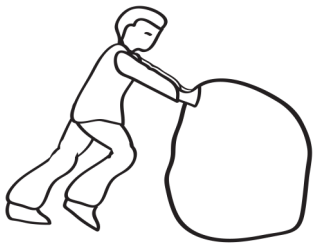
_____





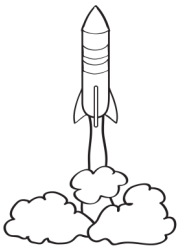
_____ _____

Which of Newton's laws explains inertia? Draw a circle around it.



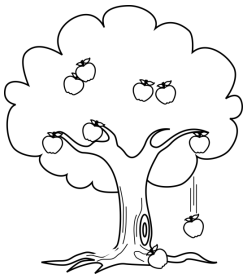
First

Second

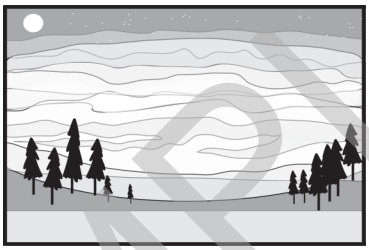


Third

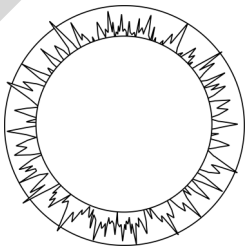
Which of the following is gravity not responsible for? Draw an X through it.



Things falling to the ground

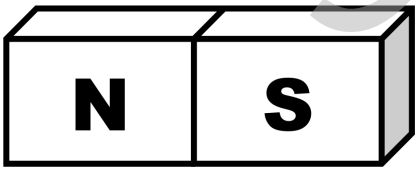


Auroras

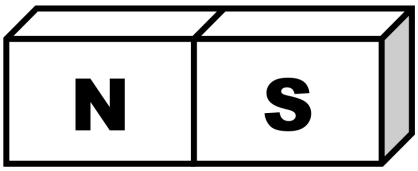


Holding the sun together

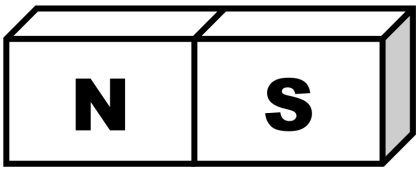
Where is a magnetic field the strongest? Draw a circle around it.



In the middle



Nowhere; it's equally strong at all points



At the poles

What combines to form electromagnetism?