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Chapter 1 : What Kind of Objects Are Attracted to Magnets? | Sciencing

When another magnet is brought near it, the two magnets will either be attracted or repelled, and the object will move. For example, if a magnet is attached with a string to the middle of a horizontal pencil, the apparatus will behave like a pendulum when another magnet is moved around it.

You might also wonder about what happens between A and C and between B and D, in the positions shown. A and C repel. B and D attract. If you imagine each magnet as a tube of current going around the axis, the ones that attract are the ones where the nearby parts of the current go the same way in each tube. How do magnets stick together only sometimes? Hello Isabel- Bar magnets only sometimes stick together and sometimes repel because each has a north pole and a south pole. Opposite poles attract, and like poles repel. The picture above shows an example. In permanent magnets what sort of energy do they use to push or pull other magnets if any at all? I was also wondering does a permanent magnet ever lose its magnetism? A good permanent magnet stays that way for a very long time at room temperature. You also ask, if I understand right, what sort of energy is involved in the magnetic forces between magnets. There is energy stored in the magnetic field itself. The density of that energy is proportional to the square of the field strength. When magnets move near each other, that field energy generally changes. I know a magnet can attract steel paper clips through paper, cardboard, plastics, cloth, etc. But can a magnet attract steel paper clips through a sheet of sheet? I have beeen confused as some sources say it will not. I know you can make a iron nail a temporary magnet by attracting it to a magnet at one end and have paper clips attracted to the nail. Picture the magnetic field in the usual way, as a set of field lines coming out of one pole of the magnet and returning to the other. Some of the field lines get stuck in them. Now what happens if you put a big sheet of steel in between the magnet and the paper clips? The field lines mostly get drawn into the sheet, spread out in the sheet, and return without going past the sheet to the paperclip. This effect depends a lot on the shape of the sheet. A small piece of steel can pull field lines into it leaving more field just behind it than were there before. Each clip tends to steer field lines on to the next one. So the steel redirects the field, with a sheet redistributing it away from the clip just on the other side. It would tend to grab clips right near the edge of the sheet, where some of the field lines exit. We made electromagnets in class with wire, a large nail and a 6 volt battery. The nails were not magnetic, but after we disconnected the batteries from the nails, the nails would pick up staples. How did the battery or the electricity magnetize the nail? At room temperature the little magnets of the electrons in the iron tend to line up with other, making those magnetic domains. However, the magnetism of the different domains points all different directions, so overall it cancels out. When you put the nail in the electromagnet made with the coiled wire powered by the battery, it lines up a lot of those domains to point the same way. That means the nail is a bit magnetized. This is temporarily posted without the usual check, until Lee gets back from Paris. The answer I usually get is something like: I am aware of that. Your first question is easy. Sure, you can make a donut-shaped magnet with the N poles on the outer part and the S poles near the donut hole. Your second question is extremely hard to answer. I think for now perhaps the best non-answer is this. At that point, all you can do is describe the properties, not say what things are made of. Electromagnetic fields are pretty close to that point. We could give maybe a step or so deeper description, but it would be in terms of quantum fields. Those are even more abstract mathematical entities than magnetic fields. Well, i know that moving or spinning charged particles can cause a magnetic field. But how does it do that? And what causes those forces in the first place? For example, gravity is caused by mass curving or warping space time or something of the sort, what causes magnetic and electrostatic forces? I know very basic quantum mechanics. Look at a moving charge near a neutral, current-carrying wire. But if you now look in the rest frame of the charge, the wire is no longer neutral, thanks to the different Lorentz contractions of the differently-moving plus and minus charges. So there must have been a velocity-dependent force back in the frame where the wire was neutral. We call that velocity-dependent force magnetism. Ok, that handles the part about why magnetism, given electricity. The part about why electricity in the first place is unfortunately over my head. Purcell derives the magnetism from electricity from assuming a symmetry, special relativity, a rule about how the world obeys the same laws of physics even as you represent its contents in different ways. What a neat site. These kids are so smart! Also, to Atticus and the other brilliant kids who ask the right questions, give them more questions that they can access and imagine! One that I have often pondered please answer: What do you see when looking through an infinitely powerful microscope? What is a particle made of the smallest one? Then the question is of course what is energy? Is there an answer to this question? Or is it unanswerable? We were just discussing doing more to encourage our readers to do experiments. Your suggestion about raising follow-up questions for them is along the same lines. We think of the magnetic field as a real thing, all spread out in space, acting where it is. But how did that field get all spread-out? Not by sudden action-at-a-distance. It had to work its way over from the source, by an electromagnetic wave traveling at the speed of light. Right now, the deepest things we know are all differential equations, but some people suspect that may change. Adding bar magnets together Q: If you place two equally strong magnets together so they attract do the act as a single magnet with one magnetic field? Will the resulting magnet be twice as strong as one of the original magnets? Hi Mark, If you have two thin bar magnets and put them together in parallel the resulting strength is about double. If you keep adding more and more of them eventually the resulting sum is not the sum of the number of magnets due to the over all geometry of the combination. It involves some integrals. Does positive attract positive? People say Positive energy attracts Positive. But how is this possible if they repel each other? Or is that a bunch of bull? My mom bought 2 expensive bar magnets to stand on while exercising. Is she nuts or is this true? This old physics has nothing to do with various new-age ideas. Magnets are still another matter. No magnetic charges "monopoles" have ever been found. Your mom may not be nuts because many medical conditions are known to be helped by something called the placebo effect. People who believe that something e. Magnets are truly harmless. I have a lot of trouble motivating myself to exercise enough. Storing energy in magnets Q: Is there a way to create energy from magnets? For example, when putting the same end of a magnet together, the magnets push away from each other. Where does this energy come from? Would it be possible to create giant magnets or contained magnetic fields in order to create energy and power mechanisms? Understanding that all energy is simply transferred but not newly created, where is this energy coming from?

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Chapter 2 : Q & A: Is gold magnetic? | Department of Physics | University of Illinois at Urbana-Champaign

Magnets can attract dollar bills, liquids, particles from your breakfast cereal, even strawberries if the magnet is strong enough. The reason for this is the objects contain particles of ferrous material, often iron, that is attracted to the magnet.

Fun to play with as a kid or even an adult, the mystery of magnets is an interesting study subject. Magnets attract certain things, repel others and are a necessary component to many of the items we use in daily life. The question of what objects are attracted to magnets leads to surprising results. Metals Iron, nickel and cobalt are strongly attracted to magnets. Scientists call these metallic elements "ferromagnetic" because of this strong attraction. The mechanism for making a metal attractive to magnets has to with the arrangement of electrons that orbit the atoms: Other metals, such as tungsten and lead, also attract magnets, though it is too weak to measure without specialized scientific equipment. Magnetic Minerals Certain minerals have attractions to magnetism, some weak, some very strong. Platinum-bearing minerals often have a magnetic attraction usually due to ferrous impurities. Hematite and franklinite display weak magnetic attractions. Lodestone, another name for magnetite, is a highly magnetic mineral, which itself is generally magnetic, hence the name magnetite. A material of interest due to its surprising attraction to magnets is some types of black sand, which is actually crushed magnetite. In highly volcanic areas this sand can be attracted to magnets through liquid, a process that is highly useful in some gold-mining methods, as it pulls impure magnetic sand away from the gold. Sciencing Video Vault Alloys: Metal Mixtures Magnets will also attract some alloys, or mixed combinations of ferromagnetic metals with other elements, such as carbon and aluminum. The alloy alnico, for example, is a fairly strong and durable magnetic alloy consisting of aluminum, nickel and cobalt. Another alloy, which combines the rare-earth element neodymium with iron and boron, produces the strongest permanent magnets ever made. Without these powerful magnets, products such as quadcopter drones might otherwise be impossible to make. Other alloys, such as certain types of stainless steel, have very weak attraction to magnets, despite containing iron. Odd Everyday Things Magnets can attract dollar bills, liquids, particles from your breakfast cereal, even strawberries if the magnet is strong enough. The reason for this is the objects contain particles of ferrous material, often iron, that is attracted to the magnet. Ink in a dollar bill for instance, has iron particles. Breakfast cereal is often fortified with iron, that can leave small particles which will stick to a magnet. Iron naturally occurs in many things such as some liquids or even vegetation, but it takes a very strong magnet to attract the tiny particles in some things and see it in action. Aurora Borealis Those who are lucky enough to view this light show in the northern night sky may not realize that the action is the result of magnetism. The Earth itself is surrounded by a magnetic field and is in essence a giant magnet due in part to its molten iron core. The magnetic field around Earth attracts particles, such as those from the solar wind, which interact with the magnetic field and cause the display we call the Northern Lights.

Chapter 3 : Scrap Heap Magnet by erin wright on Prezi

Even though the magnet isn't attracted to the can, that doesn't meant that they cannot interact with each other. If you move the magnet over the can you can actually cause the can to rock back and forth and eventually role.

Magnetic moments in neighboring atoms are held parallel by quantum mechanical forces. These atoms with these magnetic characteristics are grouped into regions called domains. Each domain has its own North pole and South pole. A Domain is the smallest known permanent magnet. About domains would occupy an area the size of the head of a common pin. A domain is composed of approximately one quadrillion 1,,,,, or atoms. In unmagnetized ferromagnetic materials, the domains are randomly oriented and neutralize each other or cancel each other out. However, the magnetic fields are still present within the domains! These diagrams show domains as small cubes or squares - kind of a micro view. As you can see, this sample has multiple North and South poles where the magnetic field lines exit and enter the material. The application of an external magnetic field causes the magnetism in the domains to become aligned so that their magnetic moments are added to each other and lined up with the applied field. This shows the magnetic field around a group of domains, where all but one is oriented in the same direction. And this shows the magnetic field around a group of domains that are all lined up together. With soft magnetic materials such as iron, small external fields will cause a great amount of alignment. However, because of the small restraining force only a little of the alignment will be retained when the external field is removed. With hard magnetic materials such as Alnico a greater external field must be applied to cause alignment of the domains, but most of the alignment will be retained when the field is removed, thus creating a stronger permanent magnet, which will have one North and one South pole. If we were to look at this from more of a macro level, a level at which we have actually seen under microscopes, we would see larger domains - not as cubes or squares, but more like irregular polygons. If you were to examine a piece of iron that is not magnetized, you will find that the domains within the iron will not be pointing in the same direction, but will be pointing in a bunch of random directions. This randomness is what causes the magnetic field of each domain to be cancelled out by the magnetic field of another domain. The result is that there is no single north pole or south pole. Instead, there are a bunch of north and south poles all over the place that cancel each other out. It takes some energy to cause a domain to re-orient itself. As the external magnetic field becomes stronger, more and more of the domains will line up with it. Another way to look at it is that the domains that are aligned with the external magnetic field will grow in size, and the others will shrink. There will be a condition where all of the domains within the iron are aligned with the external magnetic field. This condition is called saturation, because there are no more domains that can be lined up, no matter how much stronger the magnetic field is made. These diagrams show domains as irregular polygons - more of a macro view. Note that the domains still have their own magnetic field, but that the field lines stay almost exclusively within the material. Very little leaks out of the material. This would be an example of unmagnetized iron. Resulting magnetic field with the domains as indicated above with small mag field. This has two north poles lower right and upper right and one very spread-out south pole on the left. Resulting magnetic field with the domains as indicated above with larger mag field. Starting to look more like a magnet with a defined north and south pole. Resulting magnetic field with the domains as indicated above with large mag field, saturation of domains. This is what a permanent or temporary magnet would typically look like. What happens when the external magnetic field is reduced back to zero? In a soft magnetic material such as iron or silicon steel , most of the domains will return to their random orientations, so that you will be left with a very weak magnet since only a few of the domains will be lined up in the same direction. In other words, you are back where you started from. In a hard magnetic material alloys of iron such as Alnico, some steels, neodymium-iron-boron, etc , most of the domains will remain aligned, so that you will be left with a strong magnet. Since the ending point is not the same as the starting point for magnetic materials, they have what is called hysteresis. A freely suspended bar magnet will always tend to align itself with the North and South magnetic poles of the earth. An example of this is the magnetic compass. This shows the magnetic lines of force for a long, narrow bar magnet. North is on the right end. This shows the magnetic lines of force for a flat, wide magnet. North is on top. Note the concentration of lines where they exit or enter the magnet, at the ends. This is what defines a pole. Since magnetic fields are like rubber-bands, and since they like to crowd into ferromagnetic material whenever they can, they bunch up inside the magnet material. Again, since the field lines are like closed loops, there is always some place where they enter the magnet South pole , and some place where they exit the magnet North pole. These places are the poles. The magnetic field lines tend to be closest together there. This is why, if you break a magnet in half, you will still have a North pole and a South pole, since the lines enter one magnet, then exit it, then enter the next magnet, then exit it, before it goes back to the first magnet again. If the magnetic field line exits the magnet, somewhere it will have to enter it again - the loops are closed like rubber-bands. The minimum number of poles a magnet can have is two - one each of North and South. However, it is possible for a magnet to have more than two poles, right? Look at the pictures above again, where we have a lot of random square domains. See all the poles all around the periphery of the group of domains? I count about 10! Below is a magnet with 8 poles. This magnet has 8 poles - 4 North and 4 South, or 4 pole-pairs. A compass in the vicinity of a magnet will always point along a tangent to one of the magnetic field lines. This occurs because unlike poles of a magnet are always attracted to each other by the invisible lines of force whereas like poles repel each other. The earth acts like a large permanent magnet. In fact, the earth is the largest magnet in the world. Its magnetism is the result of electron convection currents in the liquid core, and they have flipped around a few times in the past, just like what the sun does every 11 years. Permanent magnets can be designed and engineered in hundreds of shapes and sizes to perform various tasks. For example, the horse-shoe shape is very commonly used in magnetic separators because its lines of force are mostly at the open end of the horse-shoe, and this helps in the separation of ferrous materials. A piece of iron placed within the effective range of the magnetic field will, in turn become magnetized. It will have its own North and South poles and will be attracted to the permanent magnet. Summary What all this is saying, is that the atoms of ferromagnetic materials tend to have their own magnetic field created by the electrons that orbit it. Small groups of about atoms tend to orient themselves in the same direction. These groups are called domains. Each domain has its own north pole and south pole. When the external magnetic field is then removed, soft magnetic materials will become randomly oriented domains again. However, hard magnetic materials will keep most of their domains aligned, making it a strong permanent magnet. Magnetic field lines are closed loops. They enter a magnet at its South pole, and exit a magnet at its North pole. The poles may cover a large area, where the concentration of lines is not uniform. Scientific Disciplines Did you notice all of the scientific disciplines that are involved with magnets?

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Chapter 4 : How do magnets work?

The simplest answer is that the paramagnetic materials contain unpaired electrons that create an attractive force in a magnetic field. Most materials are diamagnetic with spin-paired electrons, and repel slightly.

How do you explain a magnet lifting a paperclip? These parallel currents attract each other. The magnetic field is doing some positive work on these objects and exactly same amount of negative work on the moving charges producing the current. So, net amount of work done by magnetic field is zero. The electric field responsible for generating the currents is doing exactly same amount of positive work to keep the current flowing. So, finally, it is that electric field which is doing the work. However, it is highly misleading to say that the magnetic field cannot do work at all because: Moreover, once things i. Lorentz transformations then "mix" electric and magnetic fields in a fundamental way. The magnetic field does not speed the charge up, so it does not work on the charge directly, but the sideways thrust imparted through the charge can do work on the surrounding lattice. Current elements not aligned to the magnetic field have torques on them through the same mechanism and these torques can do work. These mechanisms underly electric motors. Another way to summarise statements 1. To tap the energy in this field, you must let the magnetic field dwindle with time, and electric field arising from the time varying magnetic field can work on charges to retrieve the work stored in the magnetic field. We can put most of the mechanisms discussed in statements 1. So it applies equally whether we are working through the currents on the field or the field is working on us. The above is very general: If we raise the current density, there is a back EMF transient electric field around the surface current which we must work against and the work done per unit length of the solenoid is: So now, the energy store is purely magnetic field: The above analysis works in reverse:

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Chapter 5 : What is attracted to magnets?

An ingot of pure silver isn't attracted to a magnet. But when the magnet is passed over the silver it causes the ingot to move. Video of Silver Interacting with a Neodynium Magnet.

Moving electrical charges are responsible for the magnetic field in permanent magnets as well. As quantum physicists currently explain it, the movement of electrons is a little more complicated than that. The electrons have a charge and a mass, as well as a movement that physicists describe as spin in an upward or downward direction. You can learn more about electrons in How Atoms Work. If one of the electrons in a pair spins upward, the other spins downward. This is part of a quantum-mechanical principle known as the Pauli Exclusion Principle. Since paired electrons spin in opposite directions, their magnetic fields cancel one another out. Atoms of ferromagnetic elements, on the other hand, have several unpaired electrons that have the same spin. Iron, for example, has four unpaired electrons with the same spin. Because they have no opposing fields to cancel their effects, these electrons have an orbital magnetic moment. The magnetic moment is a vector -- it has a magnitude and a direction. An iron atom and its four unpaired electrons In metals like iron, the orbital magnetic moment encourages nearby atoms to align along the same north-south field lines. Iron and other ferromagnetic materials are crystalline. As they cool from a molten state, groups of atoms with parallel orbital spin line up within the crystal structure. This forms the magnetic domains discussed in the previous section. You may have noticed that the materials that make good magnets are the same as the materials magnets attract. This is because magnets attract materials that have unpaired electrons that spin in the same direction. In other words, the quality that turns a metal into a magnet also attracts the metal to magnets. Many other elements are diamagnetic -- their unpaired atoms create a field that weakly repels a magnet. This explanation and its underlying quantum physics are fairly complicated, and without them the idea of magnetic attraction can be mystifying. Measuring Magnets You can measure magnetic fields using instruments like gauss meters, and you can describe and explain them using numerous equations. Here are some of the basics: Magnetic lines of force, or flux, are measured in Webers Wb. In electromagnetic systems, the flux relates to the current. One Tesla is equal to 10, gauss. You can also measure the field strength in Webers per square meter. In equations, the symbol B represents field strength. The symbol H represents it in equations.

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Chapter 6 : Q & A: How do magnets work? | Department of Physics | University of Illinois at Urbana-Champ

6 â€¢ EXPERIENCE SCIENCE What Materials Do Magnets Attract? (continued) calendrierdelascience.coms students' observations. Ask: What metals did the magnet attract? (iron and steel) Remind students that only certain metals.

We wanted to show that a magnetic field could cause certain liquids to behave as solids. Along with the petri dishes and iron filings we needed, the Steve Spangler Science catalog had a neodymium magnet it described as "super strong. It also adhered itself so firmly to the underside of a metal table that we had to use a pair of locking pliers to retrieve it. When we decided it would be safer to keep the magnet in a pocket between takes, people wound up momentarily stuck to the table, a ladder and the studio door. Around the office, the magnet became an object of curiosity and the subject of impromptu experiments. Its uncanny strength and its tendency to suddenly and noisily jump from unwary grips to the nearest metal surface got us thinking. We all knew the basics of magnets and magnetism -- magnets attract specific metals, and they have north and south poles. Opposite poles attract each other while like poles repel. Magnetic and electrical fields are related, and magnetism, along with gravity and strong and weak atomic forces, is one of the four fundamental forces in the universe. But none of those facts led to an answer to our most basic question. What exactly makes a magnet stick to certain metals? Why do they attract or repel each other, depending on their positioning? And what makes neodymium magnets so much stronger than the ceramic magnets we played with as children? Iron filings right align along the magnetic field lines of a cylindrical neodymium magnet. To understand the answers to these questions, it helps to have a basic definition of a magnet. Magnets are objects that produce magnetic fields and attract metals like iron, nickel and cobalt. Permanent or hard magnets create their own magnetic field all the time. Temporary or soft magnets produce magnetic fields while in the presence of a magnetic field and for a short while after exiting the field. Electromagnets produce magnetic fields only when electricity travels through their wire coils. Iron filings right align along the magnetic field lines of a cubical neodymium magnet. Until recently, all magnets were made from metal elements or alloys. These materials produced magnets of different strengths. Ceramic magnets, like the ones used in refrigerator magnets and elementary-school science experiments, contain iron oxide in a ceramic composite. Alnico magnets are made from aluminum, nickel and cobalt. Neodymium magnets contain iron, boron and the rare-earth element neodymium. Samarium cobalt magnets combine cobalt with the rare-earth element samarium. In the past few years, scientists have also discovered magnetic polymers, or plastic magnets. Some of these are flexible and moldable. However, some work only at extremely low temperatures, and others pick up only very lightweight materials, like iron filings. It takes a little effort for these materials to become magnets.

Chapter 7 : Electrons and Why Magnets Stick | HowStuffWorks

We've all seen huge magnets do really incredible, showy things in TV and film. They helped to get Walter and Jesse out of a pinch in Breaking Bad, they made Bender Bending Rodriguez sing "She.

Experiments with magnets and our surroundings What is attracted to magnets? Take a wand magnet and go around the house to see what will stick to it or feel like it is attracted to it. Keep a list of the items you tried, and if the attraction was strong, weak, or none. Then try to figure out why. Metals Try especially different types of metals, for example: After that, it was changed to 2. It is mostly a zinc alloy with a copper coating. The dime, quarter and half dollar is Anthony dollar is To learn more about some of these metals, check out the pendulum experiment. Below is a photo showing some of these metals, and a photo showing copper balls. The cylinder of titanium was from a jet engine exhaust system. Minerals Besides seeing what effect a strong magnet has on different metals, try and find out the effect it has on different minerals. A great source of minerals is found in the shops of most public, natural and science museums and in science shops or nature stores at malls. They usually have a stand with several different types of colorful minerals displayed; often the pieces are highly polished. An interesting science fair project would be to have several types of minerals on display along with a wand magnet. You can see which minerals are strongly attracted to the magnet can be picked up by the magnet , which are slightly attracted to the magnet, and which are not attracted at all. Try to predict what category each would fall into. Here are some minerals I know are strongly or slightly attracted to magnets: Some jewelry is made of hematite. Magnetite This may very likely be a weak magnet by itself! Remember, this was what started the whole study of magnetism to begin with in ancient Greece. This is seen in the fifth photo above. To make the project more colorful and interesting, I also have some silicon, tektite, tourmaline, quartz, marble, tiger-eye, peacock ore, bismuth and others minerals. Possible selection of minerals from Edmund Also check this site for more as a source for minerals and other interesting links: I was at Wonderworks in Orlando, Florida when I spotted them. Now, hematite cannot be permanently magnetized. So, how do they do that? They are actually ferrite magnets that have been polished to look like hematite and then magnetized. I had heard about spheres of these that would stick together making a bracelet, too. Ferrofluids The area of ferrofluids is quite new , and very interesting. The surfactant is needed to keep the particles of magnetite from agglomerating clumping together due to magnetic and van der Waals interactions. Thermal motion helps, but is not sufficient by itself. A group of these prepared particles is like a solution that acts like a medium density liquid which is affected by magnetic fields. When a magnet is brought near it, the liquid splits up and starts to group itself into spikes or hairs along the magnetic field lines as shown in the photos. It is used to seal rotating shafts, and in speakers to help dampen the vibrations of the speaker coil, and help cool the coil. Great stuff to play with! Here are some photos of what you can do with a vial of ferrofluid I purchased the kit FF from Educational Innovations as well as the separate preform display cell FF sitting in front. When storing the preform display cell, it is best to sit it onto its cap. This keeps the interior walls cleanest. Another source for Ferrofluid is from CZFerro. Their kits are quite reasonable, and come with a pair of magnets with which you can manipulate the fluid. Other Objects Try other materials, too, like wood, plastic, carbon, cotton, wool, glass, concrete, leaves, CDs, and so on, which you can find around the house. Some things which will be attracted to or stick to a very strong magnet, like a rare-earth magnet, is the tape from a VCR or audio tape, a dollar bill, and the surface of a floppy disk. The reason these items will stick to a magnet is because of the very small particles of iron used in the ink of the dollar bill, and the iron oxide ferric oxide used as the recording medium for the VCR and audio tapes and for the floppy disk. Please only use a tape or disk which you want to destroy! As you can see in the photo above, the tape from a VCR is attracted to the rare-earth magnet. The magnet will erase the information contained on that section of the VCR tape. I used a pencil to hold open the flip-top cover. How about a dollar bill? On the other two photos, you can see how the bill is attracted to the rare-earth magnet. Take a crisp bill. Lay it on a table as shown with the longer portion on the table, the shorter portion sticking up. Bring the magnet close to the edge of the bill. Watch the bill spring toward the magnet. The reason for the attraction is that the ink on the bill has some iron particles in it. To see what effect a magnet has on floppy disks: Take a floppy disk and try these things with it. Be sure to record exactly what you do and your observations - the two most important parts of an experiment! Be sure to try some typical refrigerator magnets usually very weak since they can barely hold one piece of paper to the fridge door as well as some stronger rare-earth magnets neodymium-iron-boron magnets which can easily hold a stack of 20 sheets to the fridge. Also, vary how the magnet approaches the floppy disk and leaves the disk. For example - directly toward it, perpendicular to the plane of the disk, or across the face of the disk, in parallel to the plane of the disk. Perhaps a quick approach and a slow approach could also be compared. Try the top side and the bottom side of the disk. Even try moving the magnet around in a circle on the face of the disk. Maybe even have a floppy held to the fridge by a magnet for a week to see if time has any affect. If you can make an AC electromagnet, that would also be a great addition for comparison. What kind of data will you put on the disk in order to see if the data has been corrupted? Perhaps some bitmap images would work well, with a simple pattern of black and white squares. They are usually large files so they would cover a large part of the disk. Also, looking at the image would be a very quick and easy way to determine if any bits were changed. Another method would be to have a large data file on the disk, and do a file compare to the original which is kept on the hard drive. Want to try something a bit unusual? You know that several cereals claim to be "iron fortified". How do they do that? By adding some finely powdered iron like small iron filings in with the cereal as it is being mixed. To see this, simply do the following: Get some cereal that has a large percentage of the RDA Recommended Dietary Allowance for iron, and pour half a serving into a bowl. Add water no need to waste the milk to the cereal. Mix up the stuff so that it is a watery slurry, not very thick. Take a strong rare-earth magnet and place it into an inside-out zip-lock bag. The purpose for the bag is to keep the surface of the magnet free from iron particles which are very difficult to get off. Move the bagged magnet around in the slurry of the cereal. After a minute, take the magnet and its plastic bag out of the slurry, and examine it to see small, dark specks attached to the plastic at the magnet. This is metallic iron. Unfortunately, our bodies can not absorb metallic iron very well, so this really does not help with our intake of iron. The iron is needed to help form hemoglobin, which is the pigment in red blood cells responsible for transporting oxygen. You can now turn the bag outside in and carefully remove the magnet from the zip-lock bag. This will keep the iron filings inside the bag and off the magnet. Conclusions What did you find out? Do you now have a fairly extensive list of things magnets can and cannot attract? Check out this information as well: For more information on various minerals, a great source is: Problem with 2 or 3 unknown rods Suppose you are given 2 metal rods: However, both of them are painted so they appear to be the same. Their weight is the same. You have no other objects with you. How will you be able to determine which rod is the magnet and which rod is iron?

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Chapter 8 : Looking for a magnet that can attract gold

Testing out what things are attracted to magnets can be fun and surprising. If you are lucky your teacher may even set up a science experiment with magnets. When starting a science experiment it is important to write down what you think is going to happen.

The magnets needed for this experiment can be bought online from science supply stores. Abstract Have you ever seen a magician float an object in the air? If so, you might think that levitation making things float is just a magic trick, but the truth is you can use an invisible physical force to levitate a magnet! Try this science project to find out how. Share your story with Science Buddies! Yes, I Did This Project! Please log in or create a free account to let us know how things went. Luc Berger at Carnegie Mellon University for his help and insights. Cite This Page General citation information is provided here. Be sure to check the formatting, including capitalization, for the method you are using and update your citation, as needed. It must have seemed like a magic stone to themâ€"able to make tiny pieces of iron rise up and slide around by some invisible force. The earliest records of magnets are from the Chinese and the Greeks who both wrote of lodestones, which are naturally occurring stones that attract iron. Today we know that lodestones contain magnetite, a naturally occurring magnetic material. Through experimentation and observation, both the Chinese and the Greeks eventually began to use these magnetic lodestones to make compasses to use for navigation at sea. And scientists are still discovering more and more about magnetic principles today! One of the most basic and important features of magnets is that when allowed to rotate freely on a piece of string, they always align themselves so that one end faces the North Pole and the other end faces the South Pole, these two ends are referred to as the north and south poles of the magnet. By aligning the poles of two magnets in different combinations, the magnets will either be attracted, pulled closer to one another or repelled pushed farther apart from one another. Magnets are used in a wide variety of household objects, including headphones, televisions, computer disks, and refrigerator magnets. Recently, engineers have used magnets to create maglev short for magnetic levitation trains. These maglev trains use the attractive and repellant nature of magnets to levitate or "float" above the tracks, rather than use wheels. The first commercial high-speed maglev train, located in Shanghai, China, began transporting people in December of It averages miles per hour! This maglev train in Shanghai, China uses magnets to levitate above the tracks and travels an average of miles per hour!

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Abstract Have you ever seen a magician float an object in the air? If so, you might think that levitation (making things float) is just a magic trick, but the truth is you can use an invisible physical force to levitate a magnet!

The like poles are attracted to unlike poles, but like poles repel each other. For example, the north pole of one magnet is attracted to the south pole of another. Magnets have a force or magnetic field that attracts metal objects such as iron and steel. This makes magnets useful in car ignitions and toys. Certain metal objects will move if they are placed near a magnet, but others will not. To make objects move with a magnet attach a piece of metal, or another magnet, to it. A refrigerator magnet may be able to lift a paper clip, but may not be able to lift a nail or small steel bar. Tape a small piece of metal to the object that is to be moved. The object will be attracted to a magnet brought near it. For example, a magnet will move paper that is attached to the metal. Sciencing Video Vault Attach a magnet to an object. When another magnet is brought near it, the two magnets will either be attracted or repelled, and the object will move. For example, if a magnet is attached with a string to the middle of a horizontal pencil, the apparatus will behave like a pendulum when another magnet is moved around it. Magnetize a piece of metal such as a paper clip, by rubbing it against a permanent magnet. The paper clip can pick up other paper clips and small metal objects. It will also behave like a small magnet. When it is attached to another object and brought near another magnet of similar strength, the object will move. Tip To move heavier objects, use a small earth magnet. Use glue to attach the metal permanently to the object. Things Needed Small piece of iron or steel Paper clip.