

StormTheCastle.com
Summer Fun Projects
Book

**Lots of fun projects you can build
with complete instructions.**

**This book is all about
Harnessing the fun and power of
Wind, Water, Nature, Gravity and Science.**

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StormTheCastle.com Summer Projects and Fun

When it comes to projects and having fun there is the type of fun that you do indoors like play board games, video games, make arts and crafts, dioramas and all kinds of stuff like that. But, in summer time when school is out there is a whole new set of fun and interesting projects that you can do. This is the Stormthecastle.com's Summer Projects booklet.

Here you can find all kinds of fun outdoor stuff to do and make. And it isn't all your usual stuff. There are lots of interesting things to do in a few different areas so there are surely a few different things that will interest you.

So, thanks for subscribing to my newsletter and have fun this summer! And if you have any ideas for great summer projects I would love to hear about them. Maybe I will try it for my website or next year's summer fun booklet.

If you want to check out these projects and lots more projects including stuff you can make inside like dioramas, terrariums, paper mache, weapons, armor, dragonslayers and more you can visit my website: StormTheCastle.com

How this book is arranged: I realize that you probably are not interested in all the different types of projects so I created a table of contents for you to quickly scan through and see what you like. Then the next few pages are summaries with pictures of the various project. After that I launch into the full fledged projects with tutorials, pictures and more.

Quick list of the projects:

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Getting Creative – Some Closing Thoughts

I have a whole series of Dragonslayer videos where I make all sorts of bazookas and devices to bring down a dragon. Now, I am not going to show you how to make these but I do want to use this opportunity to encourage you to let your creativity go absolutely wild. There are simply millions of fun and interesting things you can do and make in an outdoor setting. So get outside and have some fun!!!

Kite Projects

Kite making is a very old tradition and even though you can buy a nice kite for a few dollars in just about any store there is a certain reward in making your own. I do have a very popular tutorial on how to make a traditional kite but.. I also have a couple of very unique tutorials that you might want to try. The first unique kite project is a box kite. This is a very unusual shaped kite that is actually a very good flyer. (It looks like a box –hence the name). And secondly I have something called a “Kite Messenger” This thing is really unique in that it rides up the string of your flying kite and then it rides all the way back down. Kind of neat.



How to Make a Traditonal Kite

This is an easy kite to make. Just two sticks, some plastic and tape and you are ready to fly it - Make a Regular Kite



How to Make a Box Kite

A Boxkite is a unique kind of kite that is easy and fun to make and really flies - Even though it doesnt look like it can fly.



How to make a Kite Messenger

This is a neat little project that looks like a sailing ship. It rides up the kite string all the way to the kite, releases, then comes back down so you can send it up again.

Water Projects –

If you live near a pond, river, lake or even if you have a big swimming pool I

have one nice little project that you might enjoy and it is really easy to make. It is called the bottle boat.



How to make a Bottle Boat

Pretty much all recycled materials and easy to make. I even take it a step further and add some electronics so you can steer it. But you can just make the simple version shown in about one hour.

Science Fun and Learning Projects

For some people this might sound like much fun but with these projects this is definitely not true! These are a lot of fun and there is some really beautiful learning that accompanies these projects. This is, without a doubt, my favorite section of this booklet.

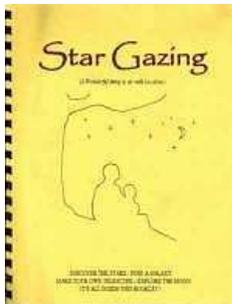
Night Sky Projects:

Astronomy is my absolute favorite subjects and in summer time the evenings are warm and comfortable. This is a great time to learn about the Stars, planets, constellations and more.



Make your own small telescope

You just need two simple lenses and a couple of cardboard tubes. I show you how to improvise and make this neat little telescope



The Book of StarGazing

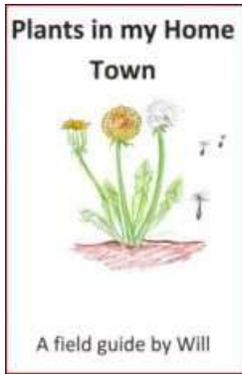
I have a whole series of things you can do to learn about the night sky including viewing the moon, meteor showers, and identifying the stars and constellations.



How to Take Star Photos with just a camera

No telescope is needed to take some really nice star and star trail photos. I show you how to do it.

Nature Projects



Take a Nature Hike and Write a guide!

You can choose an area of nature like Plants or Insects or Rocks and Minerals and go out and collect samples then write yourself a little guide. I have some great ideas and tips right here.

Some thoughts on other Nature Projects

I have ordered a butterfly hatching set and I will be doing a tutorial and some videos about that. This is something that you might want to think about and just about every toy store has these kits. These hands on kits that are all about learning nature usually come in a few different types including hatching butterflies, keeping an ant farm or using a microscope. So, take a trip to your local toy store and check out the science section.

To me this kind of toy is much better than most types because a child learns to care for something and to watch and monitor it over a period of time. There is a certain patience and persistence that is learned.

Okay let's get pyrotechnic and Remote Controlled!!



Model Rockets

This is a real fun outdoor activity and it doesn't cost a whole lot to get started . You can usually get a complete setup for around 40 dollars and this includes launching pad, rocket and engines for propulsion. The nice thing about this activity is that you spend some time making the rocket then you get to launch it. I highly encourage you to give this a try!

Radio Controlled Airplanes



This can be more expensive as a hobby and you can literally spend hundreds of dollars if you want to get started with a nice gas powered airplane which I have done. But you can also find some neat little airplanes that are electric, ready to fly and a lot of fun for less than a hundred dollars.

Catapults and Siege Engines



I have lots of catapult projects on my website and most of them are small table top types. But I do have a few that are just too big for the house. These are around three feet in measurement at the base and you have to fire them outside!



Make a Simple Go Kart

On my website this is one of the top ten most popular projects. With a trip to the hardware store to buy a bit of wood, four wheels and some bolts you can have a fun downhill racer.

How to Make a Traditional Kite -

This is a pretty traditional kite. We have all seen this kind. It is easy to make and you can probably do it in half an hour. It only takes a few materials and you can improvise and use a variety of things depending on what you have. I have used a plastic trash bag but you could use newspaper. I also have a video tutorial on how to make this kite.

OK, Let's Make This Kite



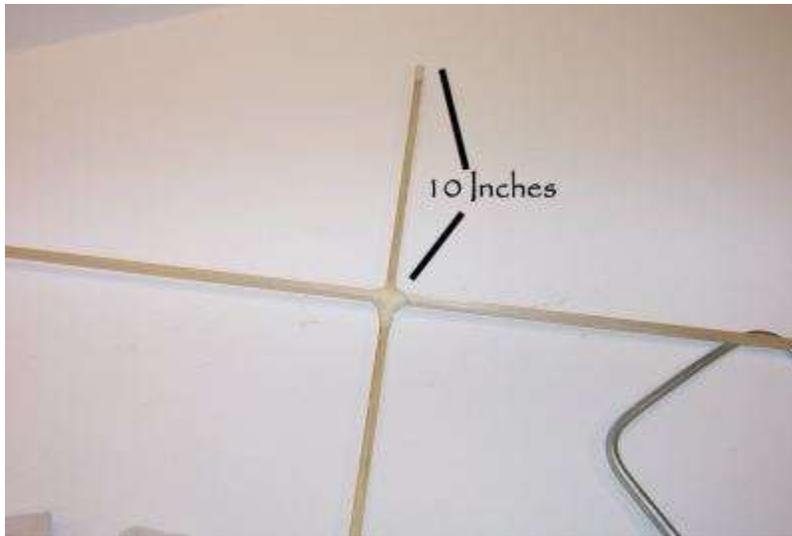
This picture shows the materials needed to make this kite.

- A Plastic bag or newspapers
- Two sticks 1/4" square is perfect, 1/4" round is good too One stick is 36 inches long and the second is 33 inches long
- Masking tape
- Scissors
- String for flying and for building the kite
- A little saw or small knife for notching the wood
- some strips of cloth about 2" wide and a one foot long

That's everything, you don't need a lot of stuff to make this kite. Here are the instructions on how to do it.

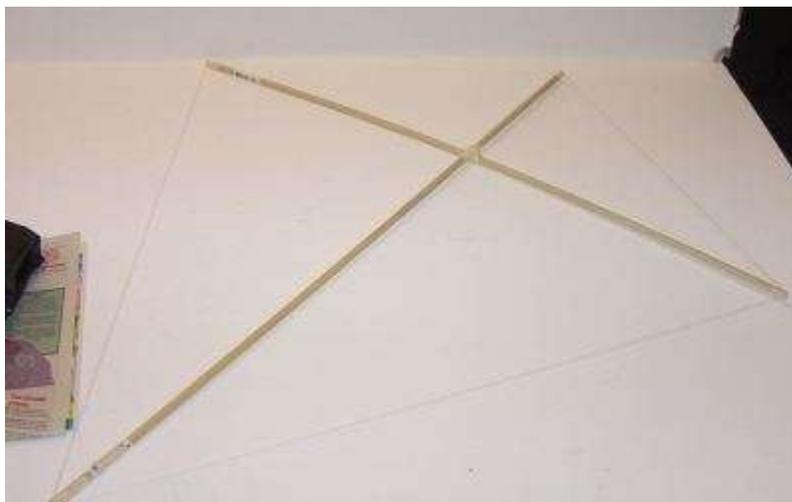


Take both your pieces of wood and wrap a layer of masking tape around each end like shown in this picture then use your saw or pocket knife to make a notch in the ends. This notch is for your string.



Lay the 36 inch piece vertical so it is up and down and measure ten inches from the top. At this ten inch point put your 33 inch piece of wood. Use string to tie them together tight and then wrap over the string with some tape so it is nice and strong.

Watch the orientation of the notches on the ends of the wood. You will see what I mean in the next step. So read the next step before you do this one.



Now wrap a single layer of string all the way around the kite. It should go right into the notches. Start and end at the bottom of the kite. After you have wrapped it and tied it add pieces of tape over the notches so the string doesn't pop out with the force of the wind.

Pull the string reasonably tight before tying it. The cross bar should be a little bowed.



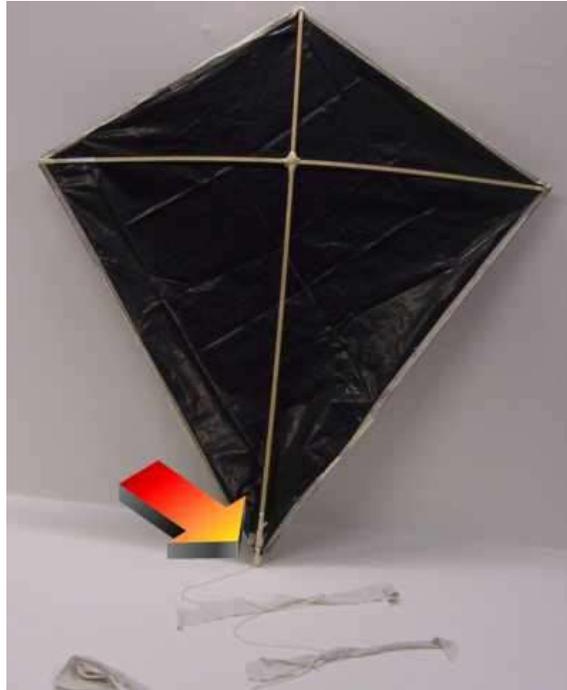
This closeup picture shows the string resting in the notch. You can see that if the notch were vertical you couldn't get the string in it. So when assembling the two pieces of wood into the cross shape you should make sure the notches are all running the same way so the string falls into them correctly.

This picture is almost complete. I just need to put a couple of small pieces over the notch and string so the string doesn't pop out in the wind.



Now lay your frame right on the plastic and cut the plastic to about the same shape and size as the frame.

Using long pieces of masking tape fold the plastic over the string and tape it down. Make the plastic reasonably tight.



Cut yourself a piece of string about six feet in length and tie one end of it to the bottom of your kite. At intervals about a foot apart tie strips of cloth to the string.

When you go flying your kite bring yourself some extra string and some extra strips of cloth so you can add more cloth as needed to keep the kite flying nice and straight.



Now tie your kite string right here at the point where the two pieces of wood meet and you are ready to go! Have fun with your home made kite.

Further Resources: You can [see the youtube video of how to make this kite here.](#)

How to Make a Box Kite



Here is one of the box kites I have made and it is the subject of this tutorial on making one. You would think by looking at it that there is no way this thing would fly but in reality it flies really well.

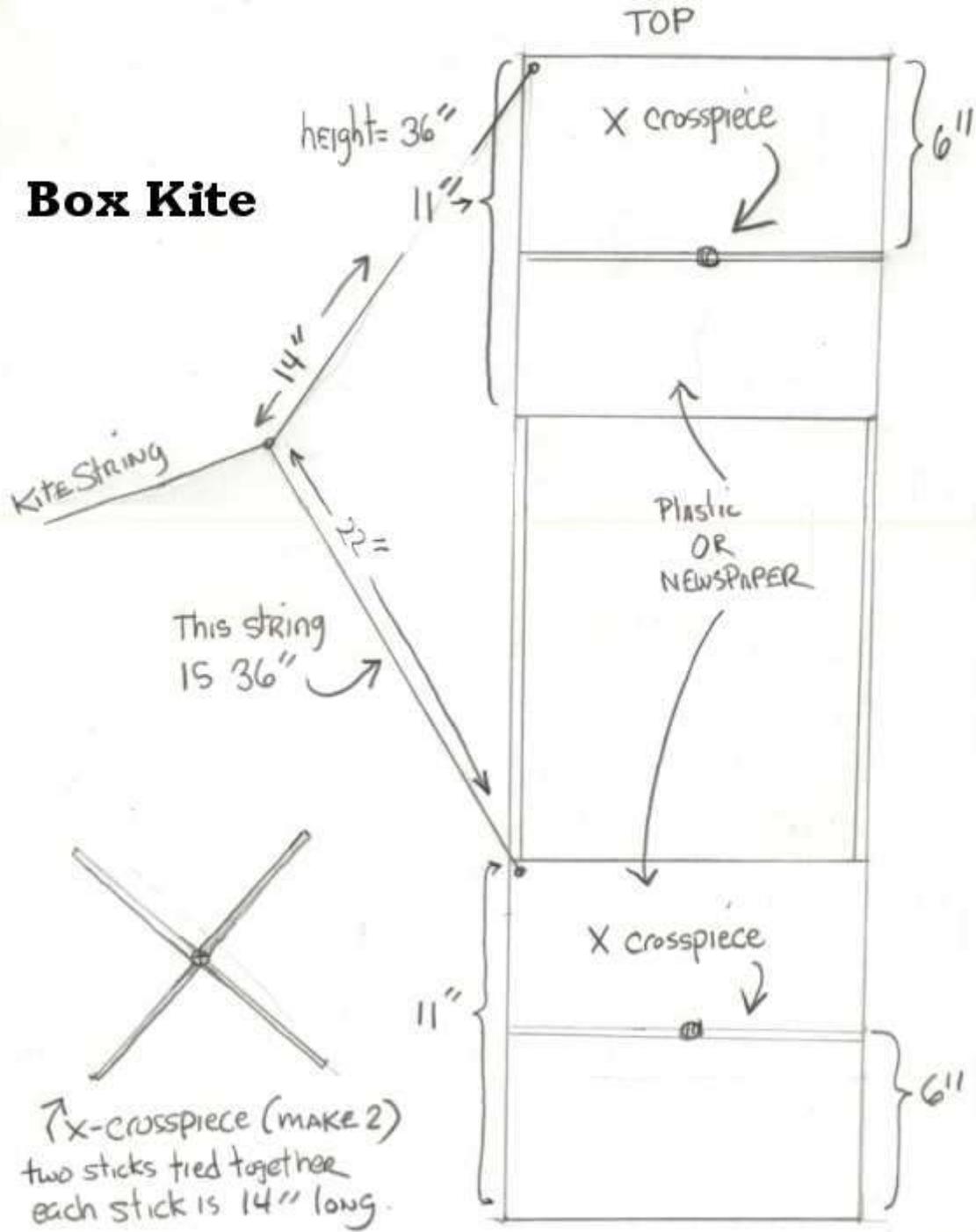
This is a text tutorial with lots of pictures and a written out plan for making the kite but [there is also a video that shows all the steps in how to make it](#). At the end of the video I also show it flying.

Some thoughts on being creative with materials

This kind of a project is very flexible and you have a whole host of materials that you can use to make it. I used 1/4 inch wooden dowels that I bought at a hardware store. Each dowel cost me 59 cents. You can do this or you can use some kind of other material. Looking around the house you might be able to scrounge up something suitable. I have a cat toy that is a long plastic stick which would be perfect for this. You also might want to dig up some old flags. The wooden or plastic pole might be perfect. About the plastic I used. It is painters drop cloth and it is 2 mil thick but this doesnt matter much. You can use a large plastic trash bag or you can use newspaper.

Here are the plans for the Box Kite we are making

Box Kite

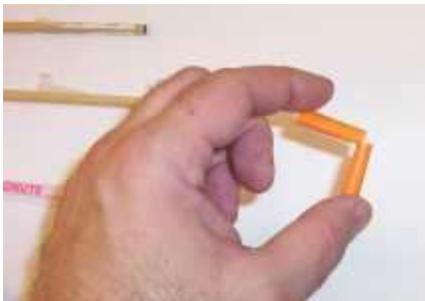


The materials You need to make this kite:

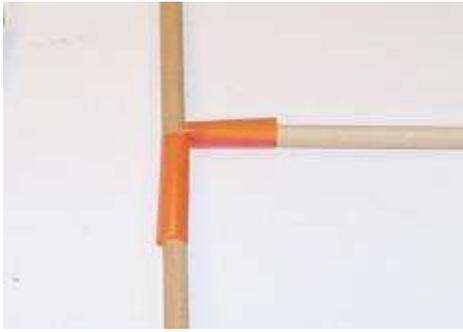


- 4 pieces of wood that are each 36 inches long
- 4 pieces of wood that are 14 inches long
- Some string for tying things up (not kite string)
- Some straws, optional and I will show you how I use them
- Kite string
- Plastic, plastic bag or newspaper
- Masking Tape
- Easy tools like scissors, saw for cutting the wood, marker or pencil

Before we begin making this kite here are some tips for construction. Remember that you can be creative. Work with the materials you have. The design is very forgiving and you have a lot of ways you can go about building this project.



If you are using round dowels for your kite you might want to find some straws that will slide over them. This makes the assembly much easier. Simply cut a notch in the straw as shown here in the picture.



Now the straw can be used as a way to easily assemble dowels together.



You can also put a notch in the ends of pieces to help them connect better.



The best technique for assembly is to put the two pieces together where you want them connected then apply a piece of masking tape to hold them in place. Then you wrap the joint with your string. Finally you cover the string with masking tape. This makes a really strong yet lightweight joint.



Lets begin assembling the kite. Attach one of your X pieces as shown in the picture. It is 6 inches from the bottom.

Do the same thing at the other end of the kite. 6 inches away from the end.

I tied a string all the way around it at the X's for additional strenght but this is optional.



This picture shows the completed frame. Note that I have taped two of the uprights right up against a wall. This made it a lot easier to work with. If you are working alone you might want to use this technique. It is really handy.

Now you have the frame of the kite completed all we have to do is add the plastic (or newspaper) and then add the strings and you are ready to fly it.

Cut yourself two pieces of plastic or newspaper that are 11 inches wide and 48 inches long.



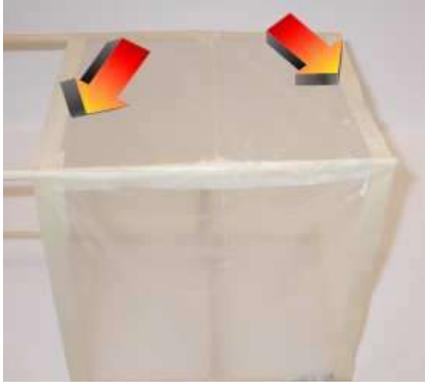
Using masking tape attach one end of the plastic to one of the bars as shown.



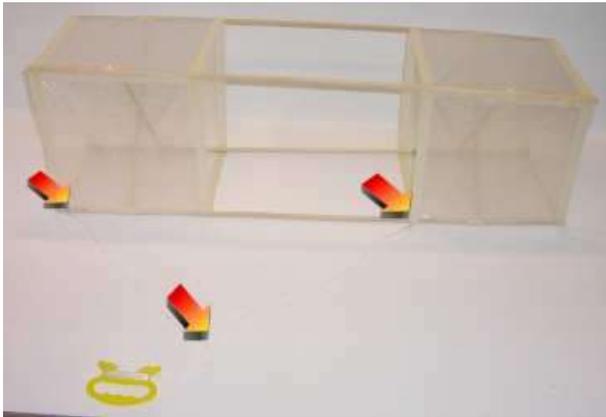
Now wrap the plastic around the kite, trim it to size and tape it down to the bar. It should only make one revolution and end right at the bar where you first started.



This image shows the plastic wrapping completed. It looks nice. Good Job! Now we need to strengthen this plastic a bit and you absolutely have to do the next step if you used news paper. it will prevent the kite from tearing.



Wrap tape along the ends of the plastic or newspaper. This will prevent them from tearing. Just a single layer of tape all the way around the kite will be fine. Do this on both edges.



Attach a piece of string to the kite at the points shown. After it is attached, tied and taped it should be about 36 inches long.

The third arrow shows where your kite string attaches to the string you just put on the kite. It should be about 14 inches from the side on the left.



Attaching the string to the kite can be a little tricky but it will be strong enough if you cut a small hole in the masking tape and then wrap the string right around the wooden stick.

Your kite is done! Congratulations! Now go out and have some fun with it. :)

Make A Kite Messenger

This is a unique little project that you don't see very often but if you fly kites or are considering flying a kite you might want to give this a try. It is a kite messenger and what it does is ride up the string all the way to the flying kite, it disengages then comes all the way back down so you can send it up again. It uses an ingenious little mechanism to achieve this by deflating the sail so the wind stops pushing it and it comes back down.

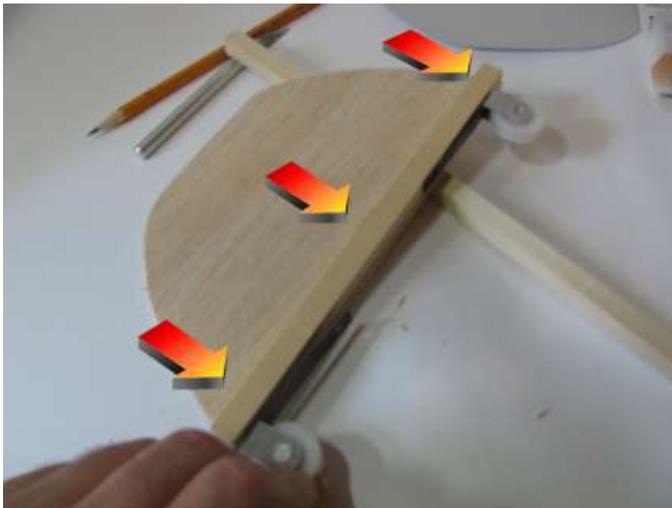


This project uses a variety of easy to find materials but the one important thing you are going to need is a pair of pulleys. It is important to have these so you can get a real easy and smooth riding up the string to the kite. I picked up a pair of screen door pulleys at the local hardware store.

Some Other Materials you will need. Remember to try to keep the boat (messenger) as light as possible so it will sail smoothly.

- A piece of balsa wood or cardboard approximately 8 inches by 4 inches
- 1 piece of wood that is about 1/2 inch by 1/2 inch and 8 inches long (you secure the pulleys to this)
- A plastic shopping bag
- 3 wooden barbecue skewers
- some glue
- a coat hanger or other type of stiff wire (copper house wire also works well)
- 1 screw
- some string
- a couple of paper clips
- some spare change like quarters and some tape
- 1 plastic straw
- Masking Tape

Let's start building this



Out of your square piece of flat wood, balsa wood or cardboard cut out a rough boat shape as shown.

Glue or screw the two pulleys onto the wooden stick then glue that down to the top edge of the boat shape with the pulleys oriented above the ship shape as shown.



Now assemble the sail as shown. The sail is a ten inch square.

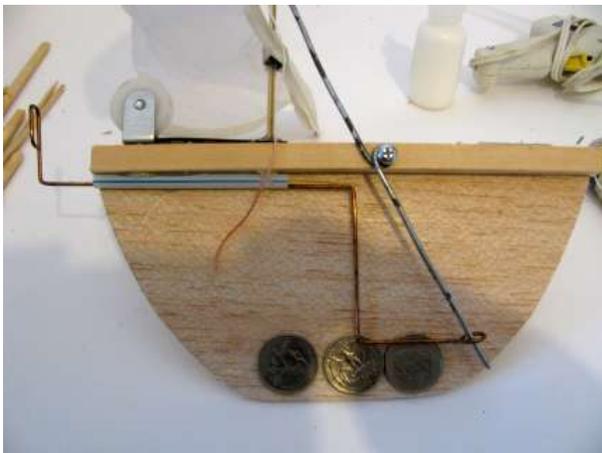
To make the actual plastic sail you can lay out a plastic bag and use tape to tape out a ten inch square then cut it right along the tape. This will give it some durability.

Along the top and the bottom securely tape a barbecue skewer horizontally.

Securely tie the bottom skewer of the sail to the upright. Glue it in place. You don't want it to rotate at all. Do not secure the top of the sail to the upright.



At the top of the vertical mast tape a paper clip that has been formed with a loop at the end of it. Be sure the loop extends past the top of the vertical mast.



Let's take a look at the mechanism that triggers the sail deflating so the messenger can ride back down the kite string.

There are two lengths of stiff wire you have to make for this to work. Lets first look at the copper colored wire.

You bend this several times so it looks as shown. Note that you have to push it through a three inch piece of straw before you complete the bends otherwise you can't get it through the straw. At each end of this wire is a hoop. The hoop on the

left guides it along the kite string. The second hoop is pierced by the second wire. Once you have this wire and straw completed you can glue the straw directly to the boat as shown. Be sure the wire moves freely through it.

Now the second wire



This second wire is about eight inches long. Bend it so it has a loop right in the middle that your screw can fit through. This will act as a pivot. When you do secure this to the boat you will only insert the screw far enough to hold tight but it needs to allow the wire to pivot freely. The head of the screw acts as a plate to just hold the wire on.

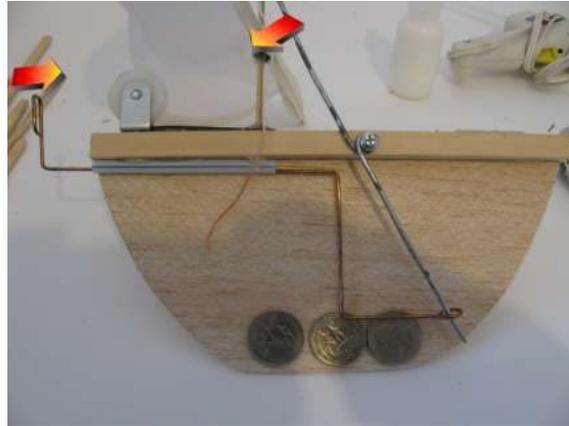


The top of the wire should be bent into a slight curve as shown.

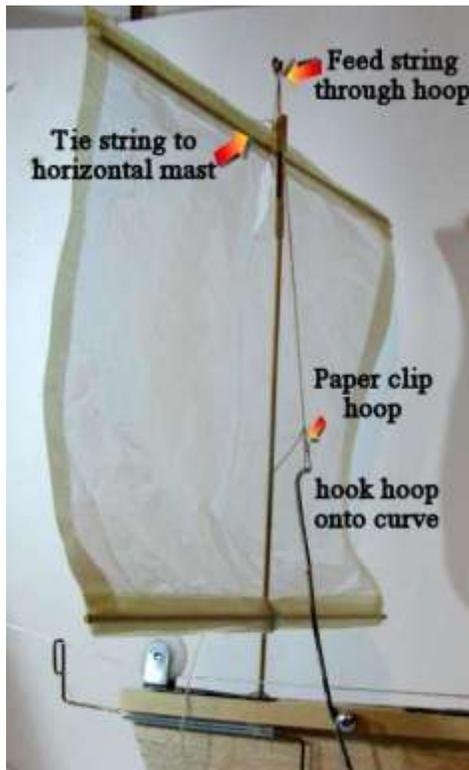


The bottom of the pivot wire is straight and it will simply go through the hoop in the copper wire. When you screw down the pivot wire just insert it like shown then screw it down to the 1/4 inch wood.

So let's take a look at how it works. The picture below is an explanation of this release mechanism. When the messenger rides up the string it bumps into the kite. This pushes the copper rod in (shown by the arrow on the left). This in turn transmits the motion to the pivot rod which causes it to move to the left. This will release it from a string to the sail and the sail will fall.



So let's finish this off and I will show you the final step which is to connect the sail by a string to the top of the silver pivot wire.



Now to complete the messenger you tie a string to the center of the top horizontal mast.

Then you feed that string up through the hoop at the top of the vertical mast.

Then you run it down to your pivot wire. Shape a paper clip into a loop and tie the string to it.

All you have to do is gently put the paper clip over the hoop and the messenger is ready to be activated.

One more thing!

You can see that I have a series of coins mounted to the bottom of the messenger. This is because without weight it will tip over and the mast will ride on the bottom! So put your messenger on a string and add weights so it sits upright. Just tape or glue them on.

Make A Bottle Boat



This is a neat little project that uses mostly recycled and used materials. It isn't hard to make and you should be able to build it in an hour or maybe two. I have also taken this project a bit further than normal and added some remote controls to it. You can do something like this if you have an old RC car or airplane you no longer use.

You have a lot of flexibility when it comes to using materials to make your boat. It is pretty much a little recycled boat. And you can use two liter plastic bottles which work the best but you can use any size plastic bottle that you want. Below is a picture of the same boat that I added a remote controlled rudder to so it could be steerable.



So let's get started. This picture shows the materials needed to make the basic bottle boat.



- 2 - two liter bottles with the caps on and tightened.
- A plastic shopping bag
- 3 dowels or wooden barbecue skewers. 1 -14 inches long and 2 eight inches long
- a thin piece of wood that is 8 inches square
- String or wire
- Glue or a glue gun

The basic assembly is pretty easy.

- First glue the two bottles together side by side.
- And lay them flat when gluing them so they are nice and even.
- Then glue your board down to the bottles.
- Drill a hole along the centerline of the board and about 1/3 of the way from the front end. The front end is where the bottoms of the bottles are. The pour spouts are the back of the boat.
- Build your sail (more about that in a second)
- Insert the sail assembly into the hole and down all the way between the two bottles. Glue it firmly in place both at the wooden surface and at the crevice between the two bottles. You need these two glue points to keep the sail nice and strong.
- The following picture shows this basic assembly.
- NOTE: You should build the whole sail assembly before securing it to the boat. So read through this whole page before starting.



Now let's build the sail.



This picture shows the layout of the three rods for the sail assembly. Tie and glue the two horizontal ones as shown. The first is four inches from the bottom and the second is twelve inches from the bottom.



When building the sail it is very important that you make it very strong so securely tie the pieces together and then put a liberal amount of glue on them. You don't want these to slip sideways - or the boat will not work. Instead of propelling the boat forward the sails will simply turn!

In the picture here you can see I tied it with wire and then applied hot glue to secure it. I also drilled 1//8 inch holes and ran the wire through that. No way my sail is slipping!



To add the sail (I recommend you actually do this before you glue the whole thing to the boat). You can just slip the whole bag right over the sail structure and poke a little hole so the mast sticks through it. Then secure it tightly with string and tape at all four corners and along both masts. If you want a better looking sail you can also lay your bag flat down on a table then use masking tape to make an eight inch square and cut it out.



This picture shows the sail in place so you can get an idea of what the finished sail should look like.

Now let's talk about the guide wires

If your boat mast and sail are built very strongly you probably don't need these guide wires but I recommend you do them any way.

I simply drilled holes in the four corners of the boat and in the ends of all the masts. then I ran the wires. You can alternately use string.



Now paint it up and you are done! And you can add some fun little details like gluing figures to the surface of the boat or making yourself a little flag for the top.

I have modified this boat to have a remote controlled rudder so I can steer it. You can see how I did this by visiting the tutorial on my website. [The Radio control portion of this tutorial is here](#)

How to Make a small Refractor Telescope out of cardboard

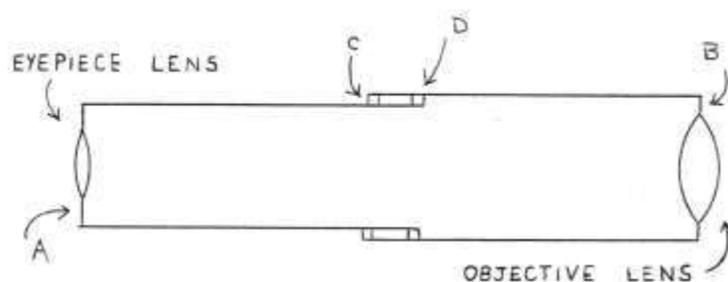


This article will show you the complete process for making a small refractor telescope. I also have a video that goes along with this tutorial. The picture above shows the telescope that I make and that you can make too.

Making a telescope is an extraordinarily rewarding experience because it crosses several different realms of experience. The first reward for you is the fun of making something. And the second reward is the sheer pleasure of using what you made to explore the universe. And you also get the added benefits of saving some money and learning about telescopes and building things.

The Simplest telescope you can make

There are a lot of different types you can make and the absolute simplest one you can make is composed of just two lenses. One large lens called an objective and a second smaller lens called an eyepiece. You hold one lens near your eye and another lens at arms length. You adjust the difference between the two by moving your arm in toward you. A point will be reached where everything comes into focus. It is as simple as that. You have a telescope. Now you can make it much better by creating a tube around it. Get two cardboard tubes with one that can slide in and out of the other. You mount one lens on the end of one tube and the other lens on the end of the other tube. Insert one tube into the other and then slide them in and out to find the focus.



You can get very inexpensive lenses from a variety of surplus and online stores and they generally will only cost a couple of dollars each. I recommend you get for your primary lens a convex lens at least 50 millimeters in diameter and a focal length of between 200 and 300 millimeters. For the secondary lens I

recommend you get a convex lens that is between 10 and 25 millimeters wide with a focal length of less than 75 millimeters.

There are several things you can do to make this telescope even better. First off you could make a tube out of something more durable than cardboard tubes. Secondly, this type of telescope will invert images so everything appears upside down which is ok for viewing the sky but is very awkward for viewing things on the earth. You can solve this by using a concave lens for the eyepiece rather than a convex lens.

You can purchase the lenses individually from online surplus stores and there are several kits readily available that give you all the necessary materials to make this kind of telescope. They also come in bulk units for classroom and group use. A kit like this typically gives you all the materials needed to make ten or more telescopes.

Let's Make this Telescope

In this part of the telescope making tutorial I show you the nuts and bolts of how to make and assemble the telescope. I also have a video that shows you this and how to find the focal length of a lens. The picture below shows the parts needed to make this telescope.



Parts and tools

- Two cardboard tubes around 12" each; one should slide into the other
- Two lenses of differing focal length
- Two small pieces of corrugated cardboard
- Scissors, pencil, razor knife, paint and glue

In part two you figured out the focal lengths of your lenses and you cut your tubes to appropriate lengths now all you really have to do is cleanly attach the lenses to the tubes. This can be a bit tricky and I went through a whole bunch of trials before I found a way that was easy and worked well. Here is what you do:



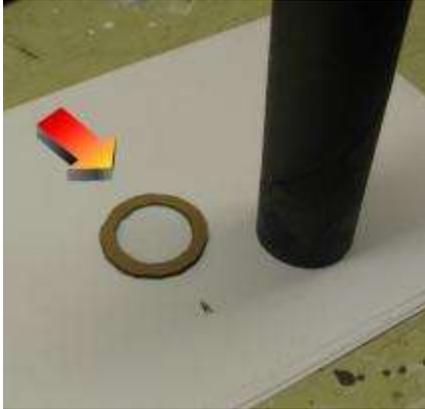
Put a lens down on the square of corrugated cardboard and draw a line around it. Do this whole process for both lenses. (make two of these)



Using an X-acto or razor knife cut the circle out. You can use scissors but it is rather difficult because you will tend to bend and distort the cardboard. Try to cut the circle so the hole is just a tiny bit smaller than the lens. Maybe about $1/32$ of an inch



Pop your lens right into the cardboard. Because of the thickness of the cardboard you should be able to squeeze the lens right in there and it will hold tight. If you have trouble or it doesn't hold tight then just use a little bit of glue and let it dry



Now, with a pair of scissors trim the cardboard ring so it is the same diameter as the tube. Remember that you have two tubes and each one is a different size because one slides into the other. Trim the ring with the long focus lens so it is the same size as your thicker outer tube. And trim the ring with the short focus lens so it is the same size as your thinner inner tube.



Now glue each ring onto its respective tube.

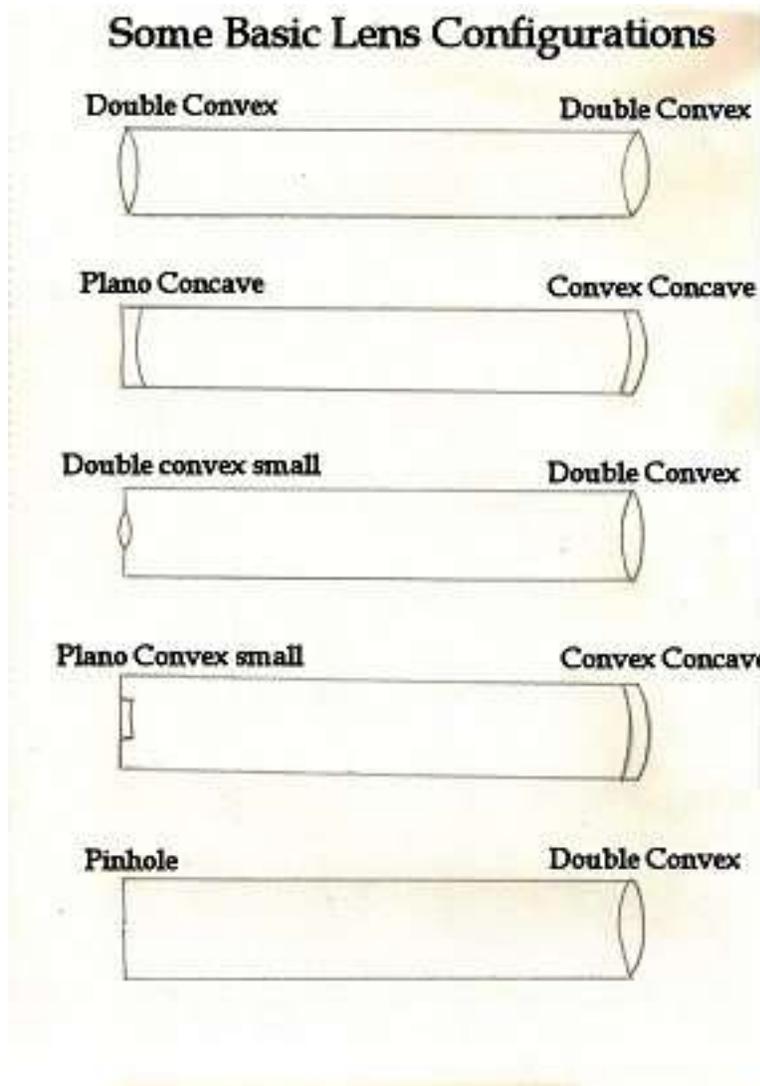


Slide the thinner tube into the thicker tube and your telescope is complete. Have fun!

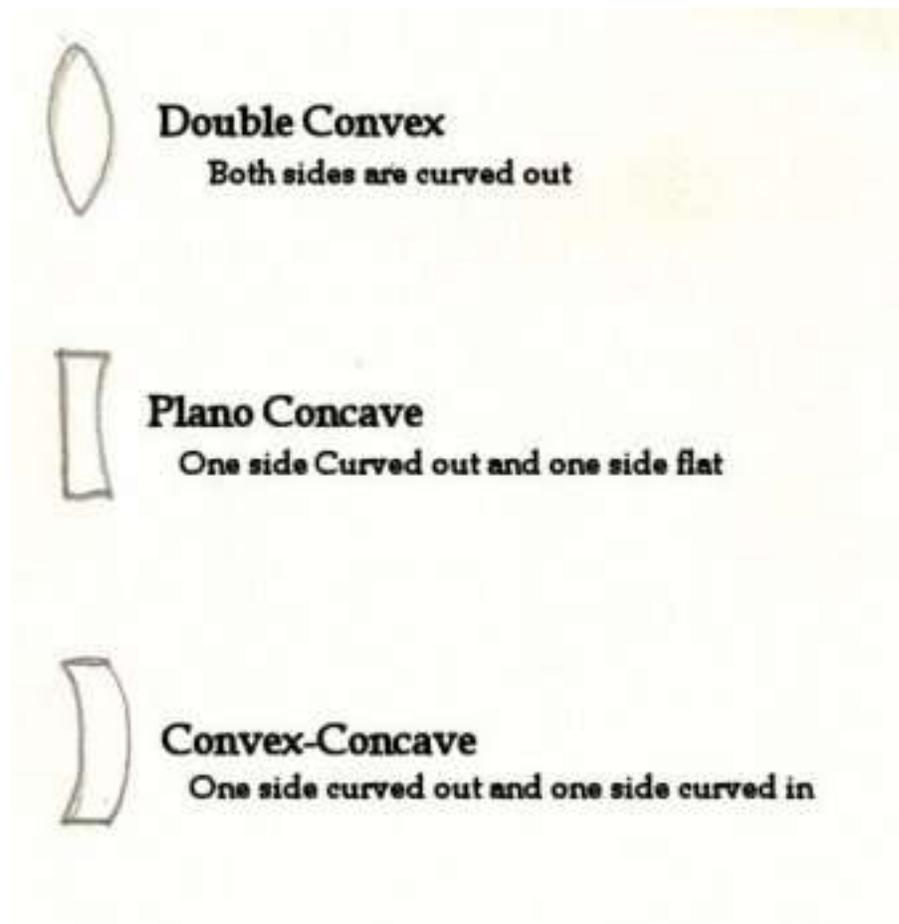
Understanding the Optics of the telescope and lenses

In this part of the tutorial on telescope making I will give you some specific advice on how to make a simple telescope with small lenses. There are several different configurations that you can use and I will explain them to you. This way you have the flexibility to scrounge up or purchase various parts.

In the following drawing there are five different telescope configurations you can make. This way you can make use of a variety of lenses and a variety of lens sizes. If you only have one lens you can also make a successful and useful telescope by using a pinhole.



And here is a closer look at the types of lenses:



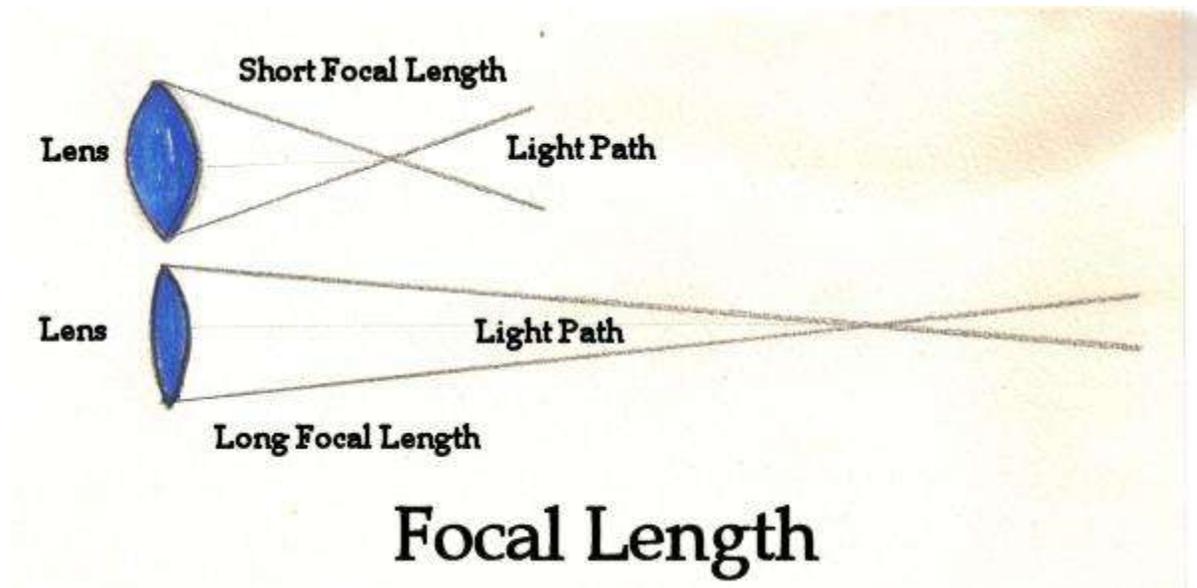
If you already have lenses check to see what type they are so you can use the appropriate set. If you don't yet have lenses I recommend you get a double convex and a plano convex. This will give you the best performing set and this is the same lens set that Galileo used to make his telescope.

Now lets talk a little bit more about the lenses and specifically about the focal length.

The focal length of the lens is important. This is the distance it takes the lens to bend light down to a point. For a home made telescope you need two lenses; one with a long focal length (this is the main lens furthest away from you and called the Objective). and a second lens with a short focal length (This is the eyepiece lens closest to your eye).

You have a lot of wiggle room when it comes to selecting lenses of various focal lengths because you are making a sliding tube telescope that will adjust to the focal length.

Typical focal length: If you are purchasing lenses here are the focal lengths I recommend: For the objective or main lens you should get something with a focal length of anywhere between 200 and 300 mm. You can go as high as 1000 mm if that is all you have. For the eyepiece lens you should pick something with a focal length less than 75 mm. 25 to 75mm would be good.



One thing to notice about the lenses in the illustration above is that the lens with the sharper and more pronounced curve has the shorter focal length. So, if you are looking at lenses you can get a sense for how long the focal length is by looking at the curve.

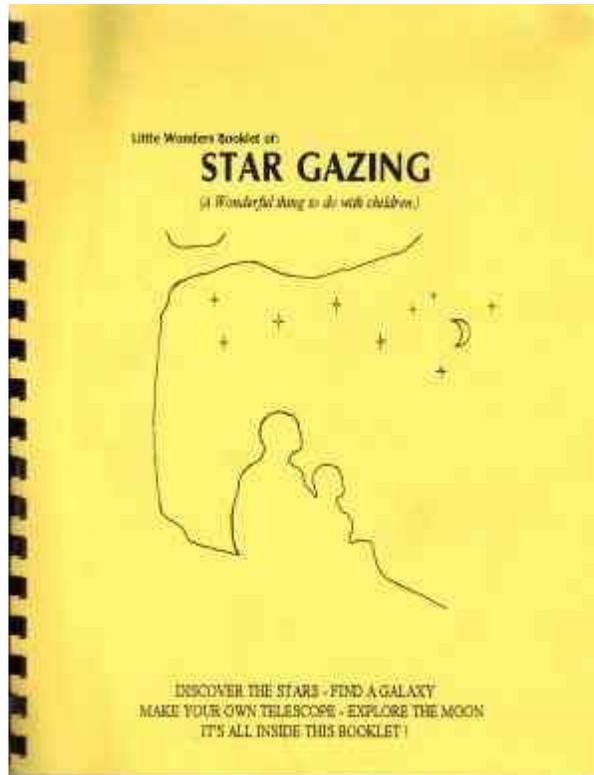
Lens Diameter - You have a lot of leeway when it comes to selecting lens diameter too. You can select two lenses that have the same diameter or you can choose One lens of a certain diameter for the objective and another lens that is about half that diameter for the eyepiece lens. When it comes to selecting lenses it is generally better to get the biggest lenses you can get. This means the telescope will gather more light and give you better viewing.

Magnification of Your Telescope

The magnification of your telescope will depend on the focal lengths of the lenses you choose. There is an easy formula you can follow: The magnification = the focal length of objective divided by the focal length of the eyepiece lens. In the project I make here the objective has a focal length of 30cm and the eyepiece is 5 so $30 \div 5 = 6$. The magnification of my little telescope is 6x.

[Video Tutorial on how to make this telescope](#) (This video also contains advice on how to find the focal length of a lens)

Learn about the Night Sky



The Night Sky

Until Recent times it was generally thought that the sky was some type of sphere or dome and the stars were either attached to it or were holes in it. We now have a better understanding of the heavens and we know that the stars are actually suns very similar to our own sun and that they are of many different sizes and colors. We also know that some are much larger than our sun and some are smaller. Some are blue giants and some are red dwarfs.

To the naked eye it is estimated that a person can see approximately two thousand stars on a clear night. The vast majority of these stars are part of a light band that crosses the sky called the Milky Way galaxy. The Milky Way can be seen on a clear night at different times of every night of the year. A small telescope or binoculars will reveal the Milky Way to be composed even further of an innumerable number of stars not visible to the naked eye.

Stars are loosely grouped together into patterns called constellations and there are 88 generally accepted constellations and the 48 we can see from North America are the same as they were catalogued by an ancient Greek called Ptolemy who lived almost two thousand years ago. These constellations were named after mythological heroes and animals such as Orion the mighty hunter and Taurus the great bull.

You are probably familiar with some of the constellations like the Big Dipper and the Little Dipper. You may even be able to identify them. But did you know that they are also called Ursa Major (The Big Bear) and Ursa Minor (The Little Bear)?

There is an interesting myth about these two bears in the sky.

There was a beautiful Arcadian nymph called Callisto. The Goddess Juno, jealous of her beauty, punished her by turning her into a bear and condemning her to roam the forests forever. The son of Callisto, Arcas, was hunting in the forest and he discovered the bear and decided to kill it. He did not know it was his mother. When the great god Jupiter realized this was going to happen he prevented it by turning Arcas into a bear and by placing both bears into the sky to roam forever.

Other than stars there are many more interesting objects to observe in the sky. Several of the planets are easily found throughout the year. Jupiter and Saturn often shine very brightly, and Venus is often brighter than any other celestial object except for the moon. With the aid of our star maps you will be able to find the Andromeda Galaxy which can be seen with the naked eye on clear dark nights. You will also find a nebula which is a huge cloud of gas in space and a globular star cluster which is a group of thousands of stars close together.

Meteor Showers occur on the same dates throughout the year from the same areas of the sky and you can learn when and how to watch for them. Of course, you will learn about our closest neighbor in space, the moon. With the aid of a small telescope you can identify its major seas and craters and explore the infinite variety of features on its surface.

The night sky holds an incredibly rich variety of interesting objects and phenomenon for you to observe and enjoy. Within a small amount of time you can easily become familiar with many of them. So let's prepare ourselves for the little wonder that is star gazing.

Tips and Hints for Star Gazers

There are three important factors to consider before you begin star gazing.

1- Weather Conditions

2- Personal Comfort

3 Equipment and accessories

Weather conditions are of course extremely important. The night sky must be free of clouds and disturbances. The phase of the moon is also a factor. If the moon is full or near full it will wash out a good portion of the sky making it impossible to see most of the stars. Only a few of the brightest stars will be available to see.

So unless you are observing the moon itself you should do your stargazing only when there is no moon or just a small sliver of moon illuminated.

Light pollution is also a factor. you should choose a location that is as far as possible from light sources such as street lamps. If you cannot remove yourself from the area of bright lights you should try to choose a location that places a tree or a building between you and the lights. This acts as a screen. Sky conditions in the suburbs or country will inevitably be better because there will be much less light pollution.

Your Personal comfort

Your personal comfort is extremely important when star gazing. In the winter months you should dress extremely warm and bring along warm drinks in a thermos. Lounge chairs that recline are also recommended to avoid standing and craning your neck for long periods of time,. You can even lay a blanket down on the ground if you desire.

And you should take care to protect your eyes from any bright lights. You have to wait several minutes in the dark so your eyes can adjust as your pupils slowly open up to receive a maximum amount of light. You can help this by closing your eyes for several minutes. If you should look toward a bright light such as from a street light or a car your night vision will be ruined and you will have to wait several more minutes for them to re-adjust.

Accessories And equipment

Be sure to bring along your star maps. And in order to read them easily in the dark you may want to bring along a flashlight. You should first prepare the flashlight by covering the lens with red cellophane or any other type of transparent red material. The bright white light of a flashlight can ruin your night vision so always cover your flashlight.

You will need to determine which direction is north. If you do not already know which way is north you can bring along a compass or road map. If you do not have any of these options you should be able to find north simply by using the constellations just like the ancient sailors did.

Checklist for Star gazing:

Is the sky clear and cloud free?

Have you found a dark spot shielded from bright lights?

Are you dressed appropriately for the weather?

Do you have your star maps and accessories?

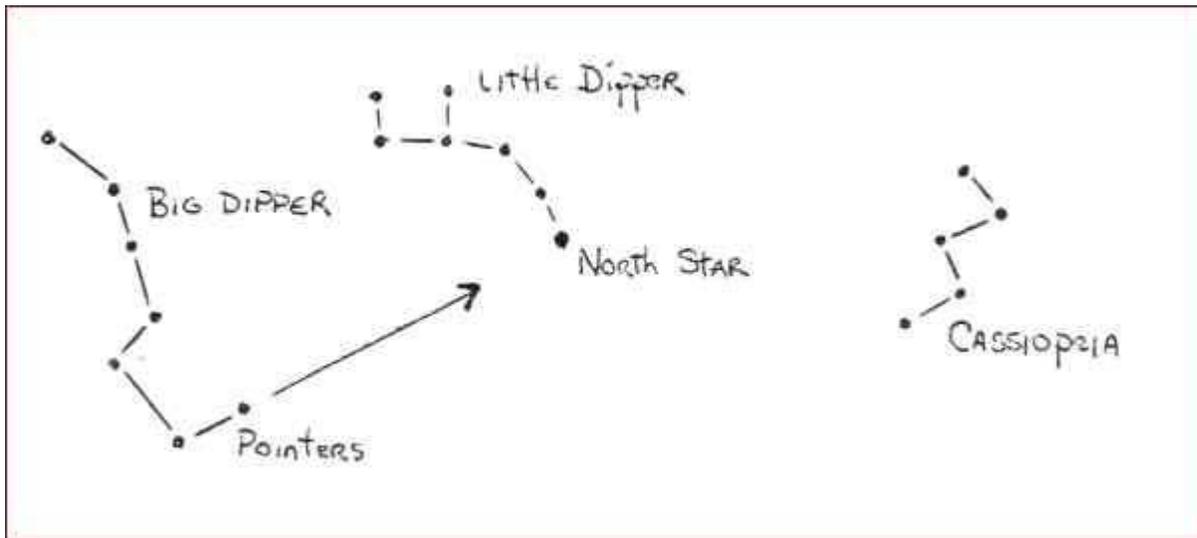
Is your flashlight lens covered with a red material?

Will you bring lounge chairs or blankets?

The Stars and Constellations

Because of the rotation of the earth the stars will move across the sky during the course of the evening. The only star that does not move is the north star. This is because the north star is aligned directly with the axis of the earth. The north star is not very bright but you can find it easily if you first find the big dipper. The big dipper is probably the easiest constellation to find. Look to the north and see if you can find it. When you have found it you can use it to find the north star and the little dipper. The two end stars in the bowl point directly toward the north star.

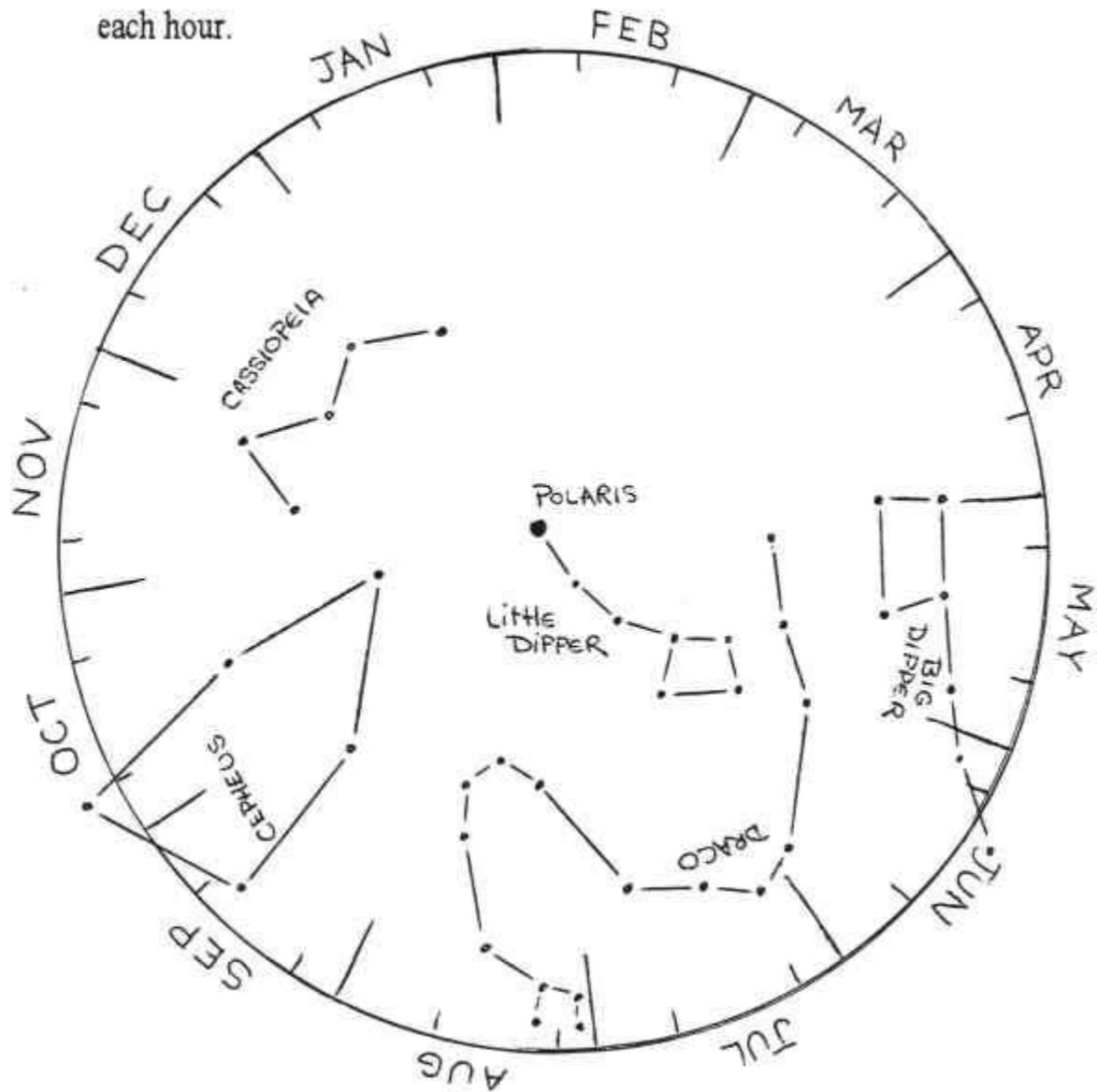
Remember that because of the rotation of the earth the big dipper may be turned in a different orientation than that shown in the following drawing.



Having found the big dipper and the north star you should be able to make out the other stars that make up the little dipper. And on the other side of the little dipper you can see a W shaped constellation that is called Cassiopeia the queen of Ethiopia. There are five constellations in the general area of the north star that make up a group called the circumpolar constellations. The remaining two are called Cepheus the king of Ethiopia and Draco the Dragon. The star map below will help you to find them.

Using The Star Chart

For ease of use you should carefully cut out the circular star chart and glue it to a piece of cardboard. Face north and with your chart held in front of you rotate the chart so that the current calendar month is directly up. This is the way the circumpolar stars are aligned at approximately 9 pm (10 pm Daylight savings time). If the hour is earlier rotate the chart clockwise the distance of one of the smaller lines - one line for each hour. If the time is later rotate the star chart counter clockwise one line for each hour.



The Constellations:

Some of the constellations are easier to identify than others. You should first try to find the easy ones and then use them to help you find the harder ones that are nearby. Be patient. With a little bit of time and practice you will be able to identify all the constellations and if you have found two or three in one evening then you have done very well. In the springtime a good first constellation to start with is Leo. In the summer begin with Hercules. In autumn Pegasus is a good place to start and in winter Orion is an easily found constellation.

The Milky Way

The Milky Way is visible at almost any hour throughout the year. There are dashed lines on the star map below to show you how it stretches itself across the sky. To see it you must be sure that your eyes are

well adapted to the dark and there is very little light pollution. It will appear to be a faint white band almost like a whisp of cloud.

The Planets

If you find a bright star in the sky that is not on the star map you may have found a planet! Venus, Jupiter, Mars, and Saturn all can be very bright and easily seen at different times of the year. If all the stars twinkle and shimmer but the star you have found does not twinkle then it is most like a planet. Planets do not twinkle like stars do. Because the planets change their positions among the stars throughout the course of the year you should consult a website, almanac, or magazine about astronomy in order to find their exact locations for any given evening.

The star map below shows the major constellations that are visible n the whole sky. You use this map in the same way as the previous map. Below the map is a list of the major constellations and the names of some of the brighter stars.

How to take Star Photos and Star Trails without a Telescope

The picture below shows a picture I took of the constellation Sagittarius. The bright object is Jupiter. This was done with a 30 second exposure and 800 speed 35 mm film.

[The Video Tutorial for this is located on my youtube channel here](#)



Some basic tips for starting out

You need two things to get started in taking photos of stars, planets and constellations. First you need a camera with a bulb setting so you can leave the shutter open for long periods of time. Second you need the camera to be very stable so you need a tripod or some kind of set up that will hold it very still.



This photo here is a good example of why the camera needs to be very stable. With just a 30 second exposure and me holding the shutter button down the stars come out as blobs. They are not sharp at all. Still a nice picture of the dipper but would be much better if the stars were pinpoint sharp.



A Shutter release cable is an inexpensive little cable that will allow you to hold the shutter open for long periods of time without touching the camera. This cable has a little lock on it so I can open the shutter and then lock it open.



Here is the best way to take your pictures without introducing any shake. Cover the lens with a dark object like a hat, trip the shutter release so the shutter is open, then remove the hat for your duration of exposure. After your time is up put the hat back over the lens and then close the shutter.

This way there is no shake of the camera, neither you nor the shutter have any effect on the picture.



Alternatively, you don't need a shutter release cable. You can use a rubber band just like I have shown here. I have used this method very successfully. Just make sure you do it in conjunction with the hat method of exposing the film.

Some Guidelines for taking the Pictures

- Find the darkest skies available to you, it makes better pictures
- Take a notebook with you and take notes of the different exposures you take. This way you can get a good look at which exposures come out the best for your next trip with a new roll of film
- Get fast film 1000 would be great, 800 speed is what I used for these photos but 400 will work well too
- Vary your exposure, start out with 1 second, then try 5 seconds, 15 seconds and 30 seconds
- Usually 30 seconds is about the longest you can go before the stars start to trail but experiment with this on your own.
- For good looking star trails try exposing for at least 20 minutes. The longer the exposure the longer the trail and the best star trails are if you point right at the north star. This causes a nice circular pattern with the north star right in the middle



More Star Pictures

The Constellation Lyra

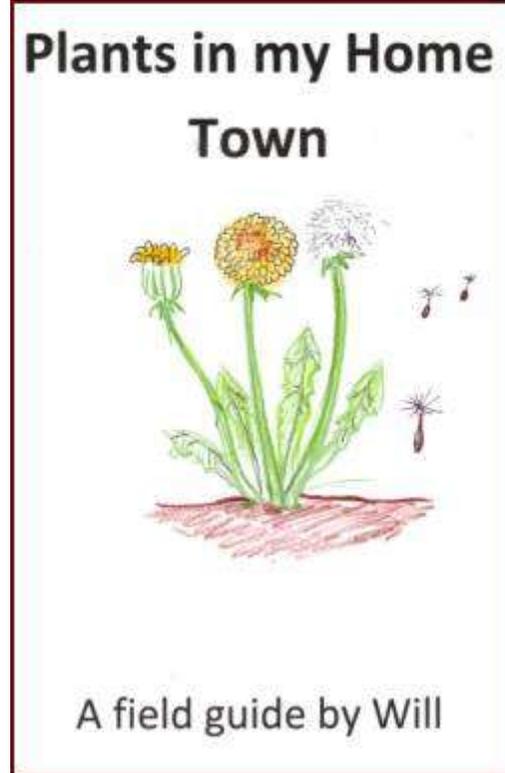


The Constellation Casseopeia



[The Video Tutorial for this is located on my youtube channel here](#)

Nature Walk Ideas and Projects



Getting outside and experiencing nature in itself is a wonderful activity but you can take this experience to another level by turning it into an active experience. Let me give you some examples of what I mean and how to do it.

The main idea is to captivate the imagination and creativity of children by giving them a particular pursuit when involved in a nature walk. They do this by creating some kind of a guide or collection in whatever interests them. They get to make their own guide, booklet, or collection from their discoveries. You might be pleasantly shocked to discover you have opened up a whole new world to a child and they will often continue with their new found pursuit long after the initial nature walk is over. When I was younger I had quite an extensive collection of plants and minerals. It really brought a lot of fun and discovery into my life.

There are about a thousand pursuits that the kids could be interested in and I will give you some examples with the projects you can have them do.

Botany and Plants: Take along a notebook and colored pencils and have them draw and catalog interesting plants that they find. You can also collect samples then take them home and iron them between sheets of wax paper. This is something that I did when I was young and it brings back very fond memories. I had a very large collection of botanical samples and I still remember the challenge of trying to iron an acorn between two sheets of wax paper.

Insects and Entymology: This is sometimes looked upon as being not for the squeamish but some children really enjoy it. Bring along a magnifying glass a variety of small vials or containers for collecting samples and a pack or box to hold everything in. You can also just have the children do drawings of the various insects they find if they would rather not collect them.

Rocks and Minerals: This is a really fun pursuit and the ultimate goal is to collect small pieces of a variety of minerals and rocks. This tends to be a bit more of a physical pursuit and it is great if you can bring along a variety of tools for digging and chipping. Just make sure everybody wears safety gloves and goggles when chipping at rocks.

Bird Watching: (Ornithology): A great pursuit that lends itself well to photography and with an inexpensive digital camera you can collect quite an amazing variety of pictures of birds. You can also transform this into the songs of birds. By either taking notes about how they sing or even bringing along some kind of recorder.

Archaeology: Wouldn't it be fun to actually do your own digs? Maybe you will discover something!

Micro Biology: This works really well when you are exploring tide pools, streams, ponds or other water systems like marshes. You bring along a microscope and then create a guide with drawings of the various microscopic life you discover.

Animal Watching: This can be a bit of a challenge if you plan on having your nature walk on a trail or park in or near a big city. But you would still be amazed by the variety of creatures you will discover when you are actively looking for them. Squirrels, pigeons, mice, chipmunks, birds, and so much more. You can take pictures, do drawings or even create logs noting where you spot them.

Cartography: You would be surprised by how fun this is. You can simply create your own maps of the landscape as you explore it. It turns your walk into a Lewis & Clark adventure. Write on the map things other than terrain features. You can add landmarks, interesting trees, big stone outcroppings, the locations of animals and nests. Whatever you want to put on your map is ok.

Treasure Hunting: You can bring along a metal detector and search for traditional treasure like gold and coins. Or you can even do mineral treasure hunting like looking for veins of semi-precious and precious materials. Or you can do panning for gold which can be a lot of fun - especially if you find some. At first glance treasure hunting might not seem to fit well into the concept of nature walking but it does fit very well in that you can learn a lot about geology and terrain. Learning about these things is an integral part of any good treasure hunt. You can even look for meteorites!

Terrarium Building: This is a challenging yet very rewarding nature walk theme. You can set out with the intent of finding plants in their natural habitat then transplanting them into a terrarium that simulates their natural habitat. Lot of fun and a really great learning experience that can go on much longer than the original walk as you and the child care for your new eco system terrarium. If you are interested in terrariums I have a whole section devoted to them. Terrarium Man

Eco-System Nature Walks: Your nature walk doesn't have to focus on a particular science. It can focus on eco-systems like Tide Pools, Forests, Woods, Ponds, Rivers, Streams, Oceans, Prairies, or just about any other type of eco system or sub system.

Eco Awareness projects: You can also focus on environmental issues and environmental friendly subjects by joining a volunteer organization that does clean up or simply by doing your own clean up. You may even consider making your own composting heap in the back yard.

Some tips and Tools for your Outdoor Adventure Walks

You should decide on the theme of your walk ahead of time. This way you can take all the appropriate materials with you. And before I talk about suggested materials you should also consider some of the more pragmatic aspects of a nature hike.

Remember that you might be outdoors for a full day or for at least several hours and this means a bit of thought to safety should be considered. Bring sun screen, hats, and make sure everybody dresses appropriately. I also recommend you bring drinking water. Being engrossed in a new pursuit can take our minds off of the necessity of drinking water throughout the day. Get a canteen is what I say! It makes the walk a bit more of an adventure and is also eco friendly. No need to add to the litter with throw away plastic water bottles.

An opportunity to convey respect for nature: A nature walk is a great opportunity to talk with the children about conservation and respect for nature. Reinforce the values of being respectful toward nature and of leaving things the same way you found them.

Some tools and stuff to bring along:

- Binoculars - these are always a great idea
- Microscope - is a lot of fun
- Small telescope
- Drawing tools like colored pencils, crayons, markers and sketch pads
- Digital camera or disposable
- Tape Recorder for recording sounds
- Magnifying Glass
- Small vials or jars for collecting samples
- Back pack for carrying all your stuff
- Digging tools like small shovel and hammer
- Walking Sticks
- Metal Detector

Getting A Field Guide: While this often costs money you can sometimes get field guides really cheap at second hand book stores and yard sales. I do recommend you get a field guide though, if you can swing it. It is just simply amazing how much more you see and discover when you know what to look for. If the kids are interested in geology for the walk and you don't know much about it a field guide would be a valuable additon.

An Introduction to Model Rocketry

Model Rocketry is the hobby of building and launching model rockets. Sounds kind of silly but that's what it is. It is called "model" rocketry because the rockets are typically built by the hobbyist -much like model airplanes and other things are built. So, one of the best aspects of the hobby is that there are two distinct phases. The first phase is the building of the rockets and the second phase is the launching of the rockets.

This is a three page introduction. On this first page I show you the materials you need. In the second part I show you how the rockets are made and in the third part I show you how to launch rockets.

Part 1: What do you need to try out model rocketry as a hobby?

If you are starting with no materials at all here is a basic list of what you need:

A model rocket kit (so you can build the rocket)

Some engines (these are the power packs that make the rocket go)

some fireproof wadding

A Launching Pad

Let's take a closer look at these items:



A Model Rocket Kit: This kit comes with two rockets that you build and the launching pad that you also build. There are lots of other kits you can purchase. I like this one because it is cheap, gives you two rockets and the launching pad. It's a good place to start the hobby inexpensively.

Model Rocket Engines: These are what makes the rocket go and each one can be used only once so you need to buy a supply of them. They are usually sold in packs of three.

A Typical model rocket engine.



Rocket Wadding - This is a package of sheets of wadding. It is very similar to heavy paper tissues but it is fireproof. This is an important part of rocketry. It helps prevent your rocket or parachute from catching on fire. I will show you how this is used.



Here is a typical launching pad. This is the one that comes with the Estes tandem-x kit. It is about three feet in height and how you see it in this picture is similar to how you would use it to launch rockets. The rocket sits on the metal plate and when it is launched it runs up the metal rod. There is a small guide tube on the rocket that the rod goes through.

The little black box you see is the launch controller. This has the button that you press to launch the rocket. This also comes with the kit. The red package are the wires that go from the controller to the launch pad. This way you can stand back when it launches. I will show you more about this.

Okay, Aside from that all you need now is 4 AA batteries for the launch controller and you are ready to start your hobby. Now in the next section I will take you through the steps of what you do. This is the fun part!

An Introduction to Model Rocketry Part 2: What you do

Okay, you have a sense of what you need to pursue this fun hobby. Now I will explain what you will do. This is a typical process for a model rocket enthusiast.



Assemble the Launch Pad: It's a pretty easy thing to do and a nice place to start. It gets you warmed up for your rocket building.

Now Build Your rocket or rockets

There are lots of different rockets you can build and how you build it will depend on the kit you buy. But for the most part there are two basic types of rockets. The first type is the traditional balsa wood and cardboard tube rocket. And the second style is the plastic rocket.

Note: The Estes Tandem-X kit comes with both these types of rockets and I have a complete tutorial for each type here: [The crossfire balsa wood rocket assembly instructions](#) , the [Amazon Plastic Rocket assembly instructions](#)

The Balsa wood and cardboard tube rockets generally take a little bit more work to make and the plastic rockets often are snap together. If this has you worried don't ! Each rocket will come with complete instructions. But you will need a few materials and tools for making them. The balsa wood rocket will need an xacto knife and some wood or white glue and the plastic rocket will need some plastic cement or plastic glue.



The above illustration shows the fins for the balsa wood rocket. They are stamped and pre-cut but you will need a sharp knife to cut the small tabs and remove them from the sheet of wood.



The picture above shows the almost completed rocket. The fins have been glued on and the parachute and nose cone assembly is in place. It is almost ready for painting and stickers.



The most difficult part of the balsa wood assembly is the engine mount. This takes a little bit of care and a little bit of work but it comes with complete instructions. This engine mount gets inserted into the rocket and the engine will go into it.



The Plastic Model Rocket is much easier to build and this picture shows the engine mount and the fins.



The fins and engine mount are glued together and ready to put mount to the rocket tube.

It's not that hard and it is a lot of fun to build your rockets. Each one should take you between one and two hours to build and they always come with complete step-by-step instructions. Okay, let's take a look at launching your rockets and what you do.

An Introduction to Model Rocketry Part 3: Launching Rockets

This is of course the fun part! While I thoroughly enjoy the arts and crafts feel of making rockets there is nothing that compares to getting them out into an open field and launching them off! For all launching you should always follow all National Association of Rocketry (NAR) safety codes.

Find a Safe Launch Field

This is important! A safe field is necessary because you are using pyrotechnics and a rocket is a missile that travels at high speed. Estes recommends you find a field of at least 500 feet with no dry weeds or brown grass. The large field is important too because you will want to follow and recover your rocket! Football fields and playgrounds are great for this. You should also launch when there is little or no wind and good visibility.

Installing the Engine



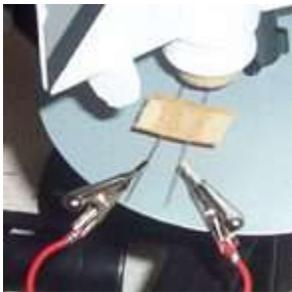
Now it's time to get the rocket ready for flight by prepping the engine. You do this by inserting the igniter into the engine. This igniter works by electricity from the hand-held launch controller. When you press the button on the controller electricity passes through the igniter and it heats up to the point of fire. This fire will ignite the solid fuel inside the engine. (Think of the igniter as a filament inside a lightbulb). This picture shows the engine, the igniter and the igniter plug that you use for this step of the process.



This picture shows the igniter and plug in place and ready to be installed into the rocket. Your rocket kit comes with complete instructions on how to do this.



Now you install the engine into the rocket then place the rocket onto the launching pad by threading it onto the guide bar.



Now you connect the wires from the launch controller to the igniter and you are ready to go! Unwind the controller and stand back!



You are ready to stand back and fire off your rocket!

Remember: This is just a guide to give you an idea about what it takes to make and launch model rockets. You must follow all guidelines that come with your rocket, your rocket engines and your controller! You must also follow all safety requirements as laid out by the NAR.

Where do you go from here?

Get your first kit and have some fun!! I have plenty of Rocket stuff on my website at:
StormTheCastle.com

The whole field of model rocketry is very wide open and once you have begun you can take many avenues including designing and building your own rocket designs from scratch and building multi-stage rockets that will soar to tremendous heights. You can also get all kinds of special rockets like ones with cameras or even digital video cameras right on board.

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Radio Controlled Airplanes – An Introduction

RC (or radio controlled) airplanes are a lot of fun. This is a really exciting summertime hobby and there are a lot of different levels that you can enjoy it at. In this project I am going to assume you know very little about the hobby and give you a bit of an introduction so it is clear and you can decide if and how you want to try it.

RC Airplanes can be a complex hobby. If you want to learn more [you can visit my website](#).

The Types of Airplanes

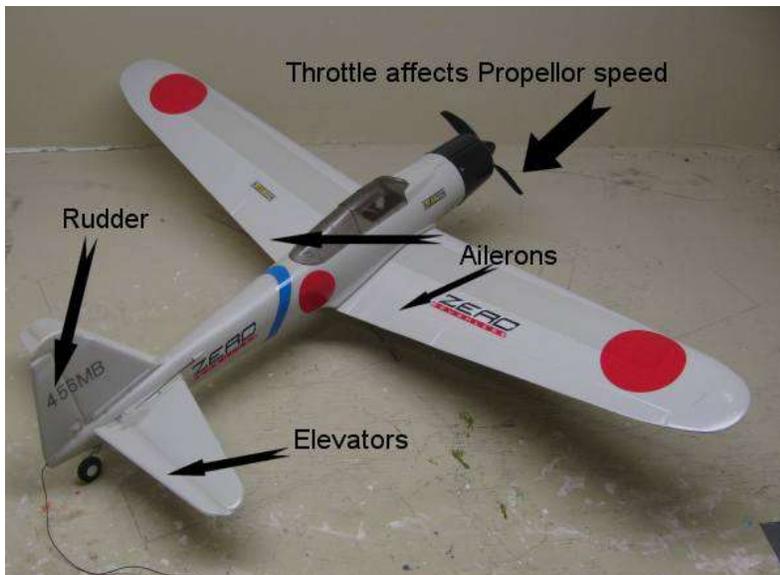
There are several levels of RC airplanes and I will describe this a bit.

For an entry level where you have done something like this you would start out with something called a “Park Flyer” . These are durable and easy to fly airplanes that are almost always electrically operated. Typically you buy them in a complete kit with everything that is needed including the plane and the hand held transmitter. You just have to add batteries. Sometimes there is some easy assembly required.

But in less than an hour you can have this type of airplane at the park and flying. And you can usually spend between 50 and 100 dollars for this type of RC experience.



This airplane is a good example of this. It is made out of a durable foam and it comes with everything you need. There is only a small amount of assembly. Something like this usually costs less than 50 dollars and you can get some fun flying out of it. But I recommend you buy extra propellers. They tend to break easily upon a shaky landing.



This type of plane is larger and it comes with a bit more serious electric engine. It is more powerful and more durable. It also came in a complete kit and it runs around 100 dollars.

This picture also shows you the controls of a typical airplane. It is these controls that you operate from your hand held transmitter. It will speed up the plane, make it climb or dive or turn it in arcs.

That second plane (The Japanese Zero) is plastic so it is pretty durable. And both of these planes are hand launched. They don't take off by running along a runway. You gently throw them into the air and then control them.

So, if you are brand new to RC Airplanes you might want to consider starting out with something like these two .

But if you want to get more serious or get more of a challenge you could consider getting a gas powered airplane that needs some building.



This is one of those airplanes. It is made out of balsa wood that is covered over by a special skin. This is a large plane that is about 4 feet long with a 5 foot wingspan. This type of plane is called an "ARF" which means almost ready to fly. All of the hard work has been done and about 10% of the work still remains for you to do. But this still could amount to a good 20 hours of work. It did for me. I built this very plane.

But if you really like building things then you might want to consider something like this.

The plane itself cost around 100 dollars but there is a lot more that is needed in order to get it flying and you will spend at least another 200-300. These needed things include an engine, hand held transmitter, receiver, special battery, fuel tubes, glue, rubber bands, fuel and more.

And you can't normally just take something like this to the nearby park. You need a big area to fly it. Typically you can find a local RC plane club that has a designated place for flying.

So, if you have never tried RC planes before I recommend you start with one of the simpler park flyers before moving on to something like this.

An Overview of what RC Model Airplanes as a Hobby is all about

Remote Control airplanes have one basic main tenet. They are planes that you can fly by using some kind of a hand-held controller or transmitter. That is the overall most important thing. But from there there are many variations in the hobby and one of the most important things is the amount of work put into the plane before it is ready to fly. Planes come in many different levels of completion ranging from ready to fly right out of the box to Almost ready to fly. This type of almost ready to fly usually requires just a small amount of assembly, often with no tools or just a small screwdriver. From there the amount of work involved can get right to the level of having to completely assemble a wooden frame, fuselage and wings then applying a skin over it all. This type of model can often take weeks to build. In this beginners guide we will just be looking at the Ready to Fly and the almost ready to fly models. Although I will talk a little bit about the more complex models.

Trainers and Acrobatic Planes

When it comes to flying a plane there are many different skill levels and some planes are referred to as "Trainers" This type of plane is specifically designed to be durable and very stable in flight. They are used for training hobbyists that are new to the hobby. If you are looking to purchase your first plane finding one that is designated as a Trainer is a safe first choice. As you get better at flying and controlling planes you can move on to more challenging models including planes specifically designed to do aerial acrobatics. But this plane is not for beginners.

Price

Model airplanes run in a very wide spectrum of prices and you can purchase them brand new anywhere from \$40 to \$1,000 depending on a lot of factors. The high end of this price range is not typical and if you are a beginner you can usually get started in the \$40 to \$100 dollar range depending on your goals.

Stuff Needed

When purchasing your first airplane you should pay close attention to any of the specifics that come with the plane. Kits will tell you what is included and what is needed. Typically with a beginner Ready or almost ready to fly model the only thing you will need is batteries for the transmitter. These are usually AA. But some planes will require you to buy batteries specifically for the plane and will require some small hand tools for basic assembly.

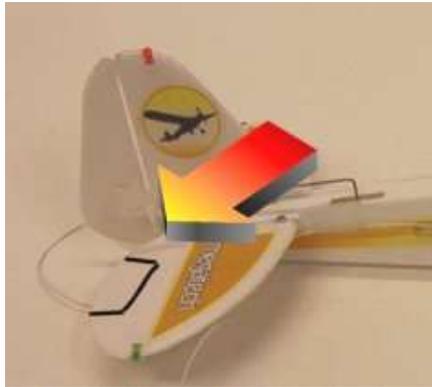
What does the 2, 3 or 4 channel Mean?

The transmitter that you carry out onto the field with you to operate the plane with will have a variety of channels. Each channel will control a function on the airplane. In the picture below the airplane has two channels. One channel operates the propeller and the other channel operates the rudder in the back to turn the airplane to the left or right. This left and right motion is called Yaw.



Here is the transmitter for the plane above. The joystick on the left is one channel and it controls the propellor. The joystick on the right is on a second channel and it controls the rudder which turns the plane. This is a simple two frequency set up and something you can expect in a very basic and inexpensive beginner plane.

A Three Channel transmitter and plane will often have one channel for the throttle, one channel for the rudder (left and right turning or Yaw) and one channel for the elevator which will make the plane go up and down. (This is called Pitch.)



This picture shows the elevator on the horizontal stabilizer. Moving this up and down would change the pitch of the plane and make it go up and down.

A Four channel transmitter would have all the previous three functions and a fourth that controls the ailerons. These ailerons control the Roll of the airplane Roll tips one wing or the other down while simultaneously tipping the other up. This is an effective and controlled way of turning the airplane. Serious RC plane enthusiasts use this control to turn the plane.



This picture shows an airplane with the Ailerons in red. When the aileron signal is activated the aileron on one wing tilts down while the aileron on the other wing tilts up. This is an effective way of rolling the airplane roll one way or the other.

More Channels: Some controller and planes can have even more channels like a channel to control the flaps of the plane which help produce drag upon take off and landing or a separate channel for the landing gear.

Flying Area - How much room do you need?

It is hard to say how much room you need to fly your airplane and the bigger the airplane the bigger the area you need. Often times baseball or soccer fields are sufficient for flying. You have to assess the situation and the area you are thinking about. Starting with a smaller starter plane is a great way to get a feel for how much room you need. And many of the smaller planes are hand launched which means you don't need a runway. If you are going to be using a large open space that has a very hard surface like a parking lot you have to consider this will be more dangerous for the plane. It is more likely to suffer damage if you crash it.

Will The Plane fly away from you?

Yes, every plane has the potential to fly away from you! You can fly it off in a direction until it gets out of transmitter range. Then you would have to go get it! Some planes need you to control the throttle which means when they go out of range the throttle will stop and the plane will come down. At least it won't keep on flying until the batteries run out. The range on the transmitters is substantial though and you

shouldn't have a problem like this. You will be turning the airplane in large circles around you which should be sufficiently in range.

Some Final Tips

If you have never done any RC Airplane stuff I recommend you start out real cheap and inexpensive just to get a feel for things. This also minimizes your monetary losses if you suffer serious crashes. Just think of this first plane as an investment in learning. Once you have gotten your feet wet and have learned a few things you can start to expand your hobby and upgrade to something a little more serious. I also recommend you do some more research and one of the best ways to do that is to get a book. I have a selection of books available at amazon.com on my website here: [RC Airplane books](#)

There are also many groups of RC Airplane enthusiasts and these groups are all over the country. Getting in touch with one of these groups or joining one is the best way to learn about the hobby. You will meet and learn from people that are experienced in the hobby. A good way to find groups local to you is through the Academy of Model Aeronautics

Backyard Siege Engines

I have a whole lot of various siege engines, catapults, trebuchets and more on my website here: StormTheCastle.com. They come in all different shapes and sizes from palm sized office catapults to popsicle stick catapults, table top trebuchets and more backyard sized catapults and trebuchets. This particular tutorial is for one of my more popular projects. It is the fast and easy tennis ball trebuchet.

I also have a video showing this trebuchet in action and I go over some of the parts: [Make a tennis ball trebuchet video](#)

The fast, easy, Tennis ball Trebuchet

This is a tennis ball trebuchet that I whipped up in a couple of hours. The goal of this project was to build a powerful trebuchet quickly and with a minimum of parts. I used just a few different things and a few pieces of 2x4. If you are going to build a tennis ball trebuchet similar to this one, or if you are going to follow these plans I also give you lots of alternatives so you can scrounge up materials. The goal is to make it fast and that it cost nothing. You can see by the picture that I used two ten pound dumbbells as the counterweight. And they were easily strapped into place with a single hose clamp. This is just the way I did it and you can improvise any number of things including using free weights.

I also have a video showing this trebuchet in action and I go over some of the parts: [Make a tennis ball trebuchet video](#)

The heavier the counterweight the better your trebuchet will perform but I would say that 20 pounds is about the limit for this design.



What you need to do this project:

- 2 2x4's that are 36 inches long and 2 2x4's that are 12 inches long (these form the base)
- 2 2x4's that are 23 inches long (the uprights)
- 1 2x4 that is 40 inches long (swing arm)
- 1 piece of 1/4 inch plywood that is approximately 20 inches square. Cut this diagonally to form the two sides. Anywhere from 20-24 inches square is ok.
- 1 piece of flat wood (plywood or something similar) that is 10-12 inches wide and 36 inches long. This is the platform that the string and pouch rest/slide on.
- Approximately 5 feet of string
- A piece of cloth for the pouch that is 10 inches by 6 inches
- 1 dowel or broomstick or pipe that is about 1 inch thick and at least 15 inches long

Tools

- Electric drill
- 1" drill bit
- Hammer
- Saw
- Some nails and screws
-

Hardware

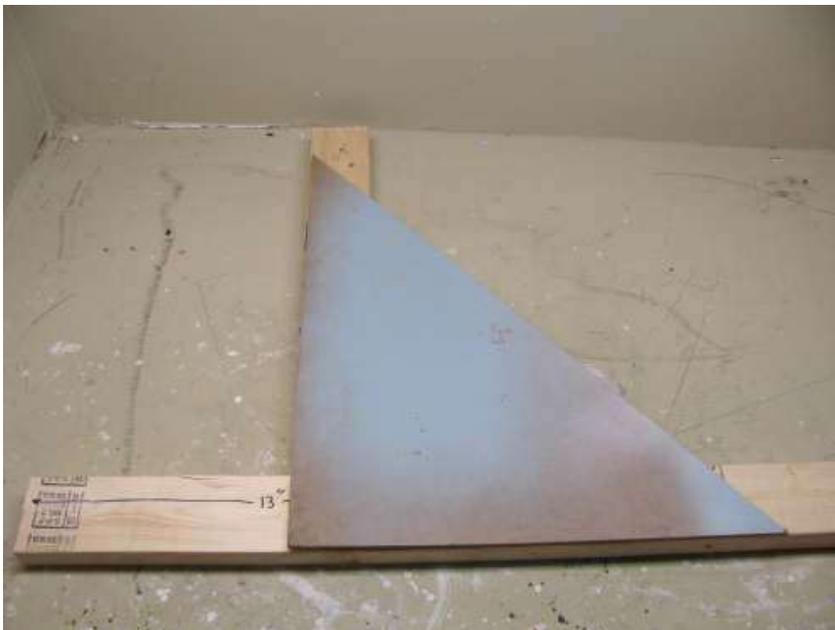
- Some screws and nails
- 4 eyehooks
- 1 thin and long nail (this is the pouch release nail)

Let's Begin

Layout two of the 2/4's this way



Lay your triangular piece on top of the two by fours as shown and nail it all down securely.



Repeat this procedure again but do a mirror image of this.



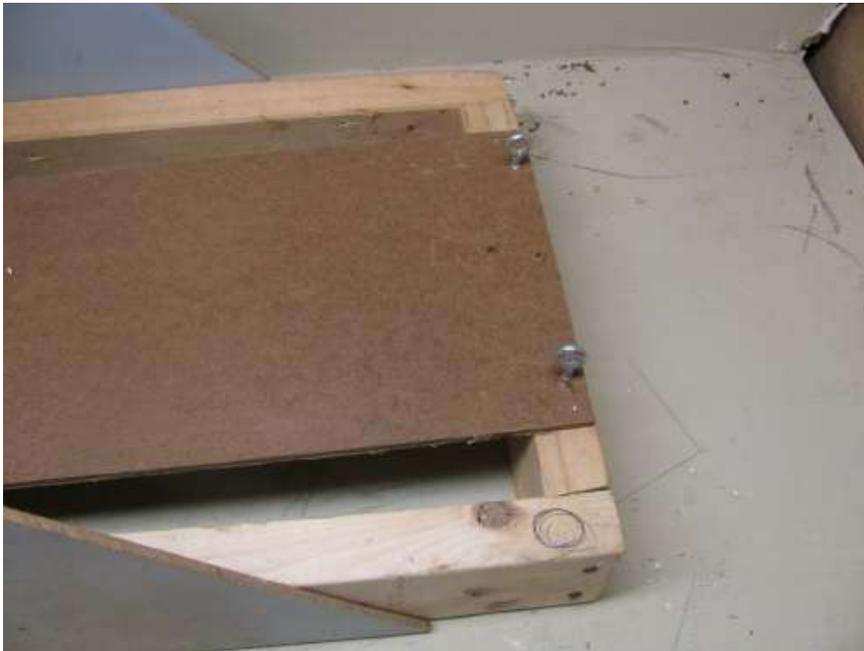
Stand these two piece up as shown in the picture below and screw in the two 12 inch pieces as shown. Your trebuchet is half done! I told you this was a fast and easy project!



Drill two holes about 2 inches from the top so your bar or dowel fits through them as shown.



Now screw or nail the baseboard into the trebuchet and screw in two of the eyehooks as shown in the picture below.

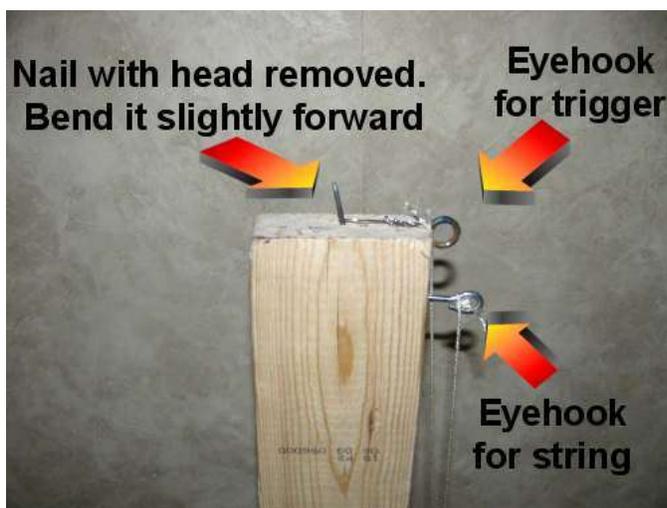


Now, take the 40 inch long swing arm and measure from one end ten inches. Drill a hole at that point. Make the hole big enough so your rod, pipe or broomstick will fit easily through it and rotate without any friction. It should be loose.



Now this is a little bit tricky but you have to put two eyehooks and 1 nail on the other end of the swing arm. Do it as shown in the picture. The nail is a straight nail with the head cut off. This is important, you don't want any kind of head on the end of this nail so the string and loop can easily slip off it. When the string and loop slips off this nail the pouch is opened and the projectile flies.

Firing Note: When you are testing your trebuchet you are going to adjust the angle of this nail. Leaning it slightly more forward will have the tennis ball release a bit later (lower arc) and leaning it toward the back will have the tennis ball release a bit earlier (higher arc) This dramatically affects how your trebuchet performs so experiment with this angle. the angle I have shown here works perfectly for my trebuchet.



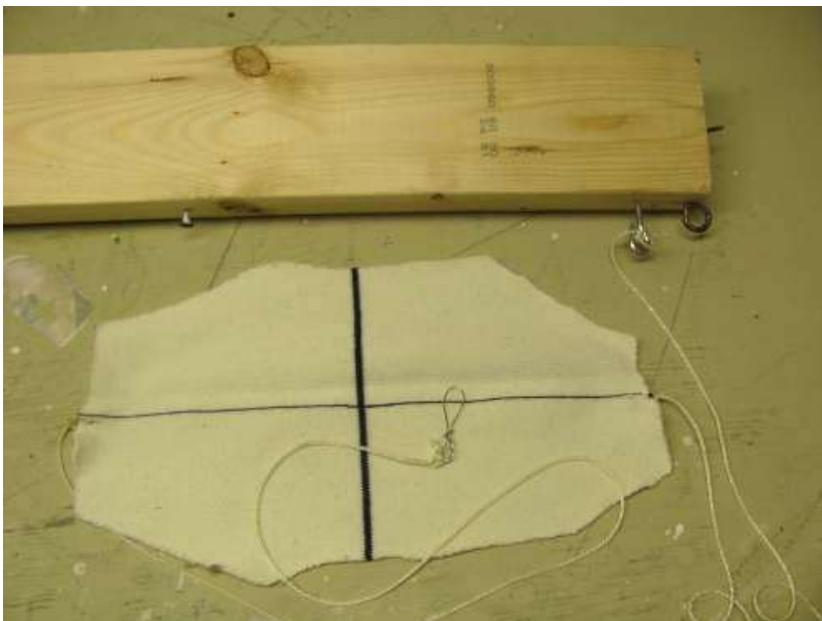
Now, this next part can be a bit tricky. I don't know what you have as an available counterweight! But if you use two ten pound dumbbells like I have here you can simply use a hose clamp to clamp them in place. Improve whatever you need to get this right.



Make your pouch out of thick fabric. I used an old sweater. It is approximately 12 x 6 inches in size.

Tie a string approximately 24 inches to one end and attach the other end of the string to the eye hook as shown.

Tie a string that is approximately 27 inches to the other end of the pouch and attach it to a small wire hook that you make out of wire.



Finish the assembly by putting the swing arm into the middle of the uprights and feeding the rod or dowel through all three.



With the trebuchet in the loaded and ready to fire position as shown in the picture below you put the little ring you made onto the straight nail. When the catapult fires this little ring will come off the nail and allow the pouch to open and release the tennis ball.



The Locking mechanism and trigger.- The coat hanger goes through one eyehook then through the eyehook on the swing arm and finally through the eyehook on the far side. Pulling on the string releases the swing arm.



The picture below shows the trebuchet ready to fire the tennis ball. Notice how the strings are nice and straight along the bottom and how the tennis ball sits in the pouch. Adjust the lengths of the strings as needed to get everything nice and even like this.



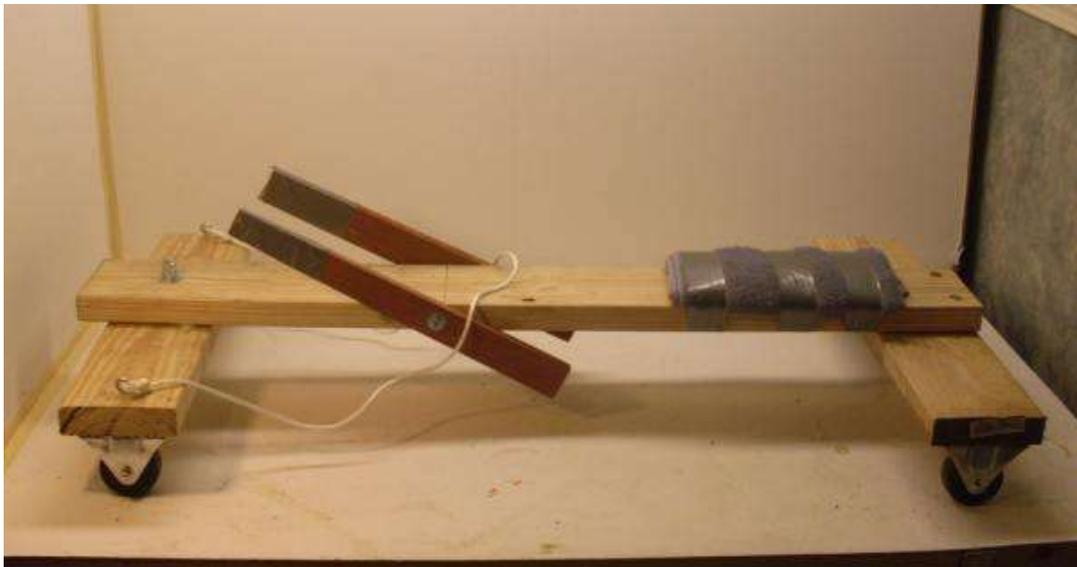
Your Trebuchet is complete. Now Go Storm Some Castles!

How to Make a Go Kart (The Wyvern)

[I also have a youtube video that shows this whole process.](#)

This is complete tutorial with video that shows you how to make a simple wooden go Kart. It gives you all the instructions and plans you need. And it is pretty inexpensive. You might be able to find most of the parts without a trip to the home improvement store. I bought a lot of the materials new. You can follow my go Kart making instructions exactly if you want, and I provide the plan and a parts list. But you can also use my plan to modify your go Kart and make it custom depending upon what materials you have on hand.

The picture below shows you the completed Go Kart that we make in this tutorial. It took me about three hours to make it. It should take you about the same depending on your skill and familiarity with wood working and tools.



Features of this Go Kart

It is cheap and easy to make. Just requires a little bit of wood. The biggest problem or expense is the wheels and maybe you can scrounge some up. It is steered by one of two ways. You sit on the padded seat on the right and you put your feet on the front cross piece and you can steer by pushing either your left or right foot. That front piece pivots on a big bolt. You can also steer by pulling on the rope which is a nice addition for dragging the go Kart back up a hill. This Kart also has a nice braking system which is important. Don't just mount one brake, you may slide to one side when stopping. Having two brakes will allow you to stop better and stay straighter.



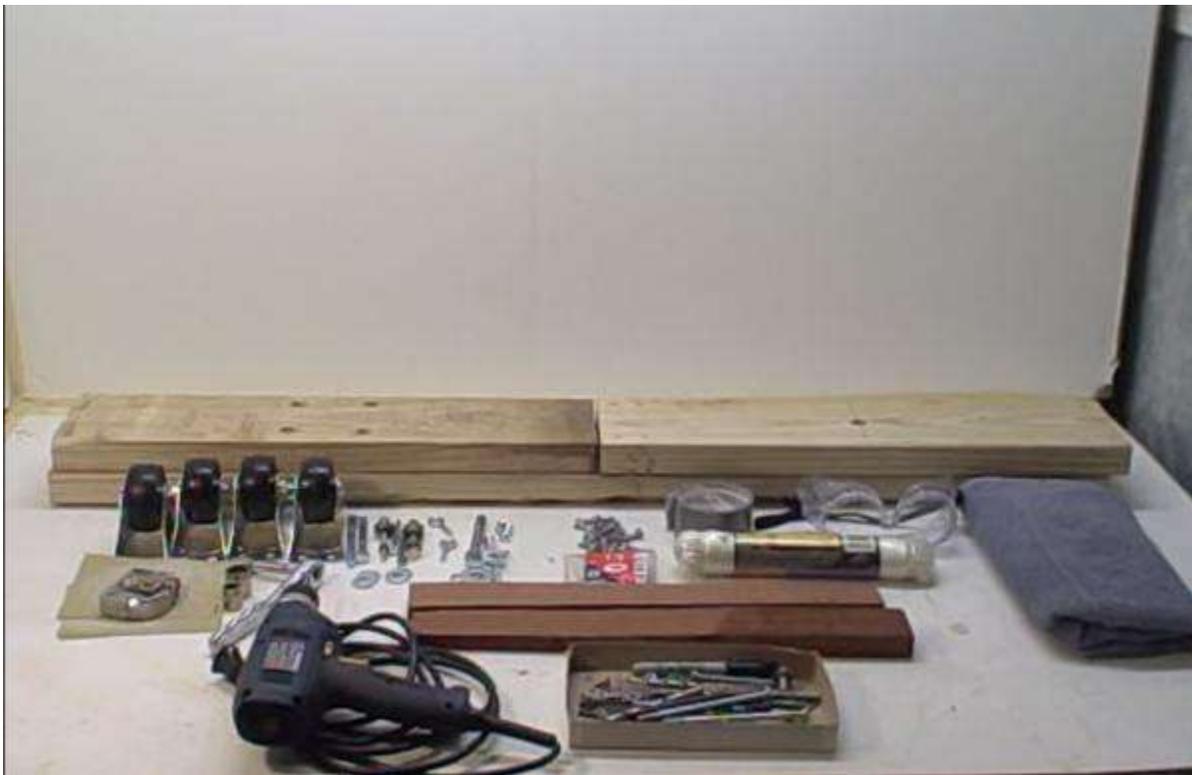
I took my Go Kart one step further and mounted a small bucket seat from a volkswagen. Now this is riding in style. I got it from an old junk car for free. You have lots of options like this when making your go Kart. The big thing is to remember safety. Be safe when building it and be safe when riding it.

Some Safety Notes:

When Building this Go Kart - Always have an adult supervise you when making something like this. If you use any power tools be sure to use them safely and to always wear safety glasses at all times. Use strong wood and very oversized bolts and screws. I am talking big here. (the parts I used are listed in this tutorial) You do not want any part of this go Kart to fall apart while you are riding it.

When Riding It: Have an adult supervise your riding of it and make sure you wear a bicycle helmet when riding it. Test it on small hills to be sure everything (especially the brakes) works well.

Okay Lets Go Over the Parts Used for this HomeMade Go Kart



The above picture shows you everything I used to make this go Kart. It takes just a few tools, a few pieces of wood and a bunch of nuts, bolts and screws.

Parts List:

Tools I used:

- Circular Saw (You can use a hand saw)
- Power Drill
- Drill Bits: variety of sizes
- Crescent wrench with sockets
- Open end wrenches
- Tape Measure
- Sand Paper
- Safety Goggles
- Duct Tape

Wood

- 1 piece of 2x6 that is 8 feet long. You cut this in half. then cut one of the halves in half. You end up with a piece that is 48 inches long and two pieces that are each 24 inches long.
- 2 pieces of wood about 20 inches long and around 2 inches wide and 1 inch thick. These are the brakes. In the picture these pieces of wood are reddish in color.

Major Components:

4 inch casters that do not swivel (Quantity:4) I am using 4 inch casters to keep my price down and because I won't be using this go Kart much. Just a few test drives for me. I recommend if you can afford it to get 5 inch or even 6 inch casters. They will perform better and wear better. You can get them online from amazon.com or you can find them at your local hardware or home improvement store. Make sure you get the type of caster that does not swivel.

Miscellaneous Items:

- A Towel for the seat, you can use foam or even a seat cushion
- rope for steering

Bolt, Screw and Hardware List. This list is for the picture at left. Each one is in order shown from top to bottom



1 1/2 inch threaded hex head bolt that is 4 1/2 inches long, including four washers for it and 2 nuts. The picture below shows only two washers but you need four. This is the steering bolt for the front of the GoKart.

18 heavy duty screws that are hex head and 1/4 inch by 1 inch long, including 18 washers. 16 of these screws are used for the wheels and 2 are used as stops for the brake handles.

2 Hex head screws that are 3/8 by 3 inches long. These are used for mounting the brakes.

2 Heavy Duty Eye Hooks - For the steering Rope

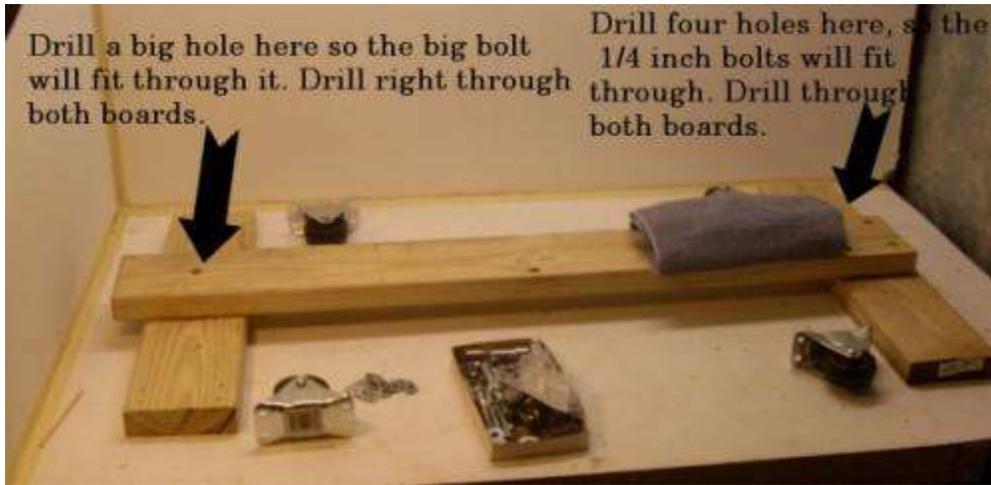
4 - 1/4 x 3 inch bolts with two washers for each and a nut for each. These are the bolts that secure the back of the go Kart.

Okay, that's all the parts you need to make this Go Kart. And of course you don't have to follow my directions exactly. The basic idea of the go Kart is easy to understand. You can improvise but remember to use big bolts and screws for safety. Nothing should be skimpy or shaky. Everything needs to be built nice and solid.

Okay, Let's start building this GoKart!

In this section we build the actual go Kart and it shouldn't take you long. If you have wood working skills you can probably do it in 1-2 hours. If you are an amateur it might take you 3-4 hours. Remember: When building this GoKart to be safe. Use all recommended safety precautions and gear. Get an adult to supervise. And wear safety goggles!

1. Cut your 2 x 6 piece of wood so you end up with one piece that is 48 inches long and you have two pieces that are each 24 inches long. Now arrange the three boards as shown in the picture and drill the holes as described.



Install the big bolt in the front of the goKart. Do it this way. Insert it from the bottom with a washer between it and the bottom of the bottom board. Then insert two washers between the boards then insert one washer on the top. Finally put a nut on it and tighten it so it is tight but the board still smoothly moves as you would push it with your feet. Now install a second bolt and tighten it very tight against the first bolt. This allows it to stay tight without moving. With the nuts on top like this you can keep an eye on it to make sure it doesn't come loose as you ride. I also recommend you put a product called loctite on the nuts and threads.

This will hold everything in place.



Counterbore the back holes on the top board and on the bottom side of the bottom board. This way the bolts will sit inside the wood and not stick out. Insert the 1/4 inch by 3 inch bolts through each hole and put a washer both top and bottom. No washers go between the boards. Screw these down tight and use a lock washer against the nut, and apply loctite if you have some.

Make sure this is nice and tight and there are no sharp bolt edges sticking out anywhere.



Now turn the Kart over and bolt down the wheels using the 1/4 inch by 1 inch screws. put a washer under each one. The picture shows a nice assembly tip. Do not put a screw in and tighten it. It makes it hard to get the other ones in. Put all four in and wind them down partially. Once the wheel is lined up nice and straight then tighten all four down.



Optionally, you can attach the wheels to the 24 inch boards before you attach the boards to the main board. You can see here I have everything pre-drilled and ready to assemble.



Now lets install our seat. First sit on the go Kart and see how it feels. Put your feet on the front axle and make sure your knees are bent so you can turn the Kart with your legs/feet. Now make a note of where you are sitting. This is where you mount your seat. Just put the foam, towel or other material down and tape it securely in place.



Again, sit on the Go Kart and pick up the two pieces of wood that will be used as brakes. Now place them, either inside or outside your legs, whatever is comfortable for you, and find a good location where you can reach them nicely. Mark the wood, drill a hole in the brakes and then secure them to the body of the goKart using the big 3 inch hex head screws with a washer on the outside. I drilled my hole in the brakes about 8 inches from one end. Make sure that when you pull on the brakes they actually lift the Kart off the ground. You may have to vary how you mount the brakes because of the size of your wheels.

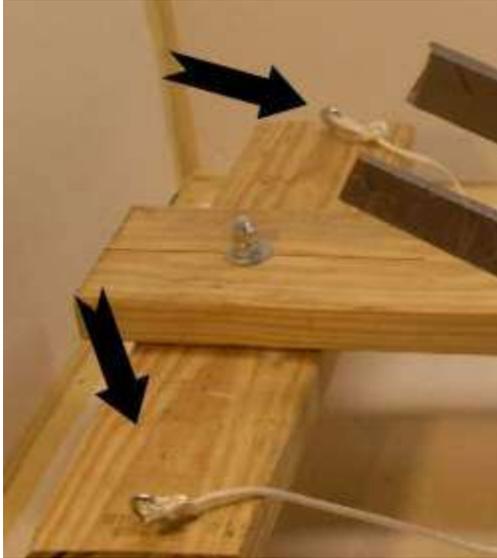


You want your brakes to lean forward like shown in the picture at left. This way they are easy to grab and they don't rub on the ground when you don't want them to. You do this by screwing a stop bolt near each brake. This is shown in the next picture.



This picture shows the stop bolt in place. These are the two left over 1 inch screws you had after screwing down the wheels.

Make sure you put lots of duct tape at the top section of the brakes so you don't get splinters when you grab them. The brakes should rest naturally on the stop and everything is perfect. They are there when you need them and do not touch the ground during normal riding.



Okay, The final step is to install the steering rope eye hooks. Tie a bowline knot in the rope so it doesn't come out and you are ready to take this baby out for a test ride. Look over everything to make sure you didn't forget anything and check all the bolts and screws to make sure they are tight.

Have Fun!

Some tips on making your Go Kart Faster and Better

You should paint it! That would make it a lot better looking, and you can get creative with the seat just like I did. Also if you want it to go faster you can lubricate the wheels or get better quality wheels. The quality of the wheel makes a

difference in the speed. Bigger wheels are preferable and will give you more speed.