An Illustrated Guide to

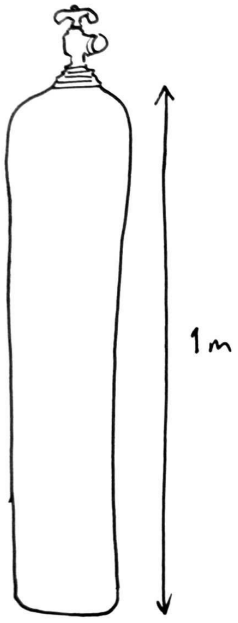
Grassroots Mapping with Balloons or Kites

By Jeffrey Warren (v1.1)

Do you want to make maps? Do you need satellite images but can't afford them? Do you want to see your home from above? Follow these instructions and you can, for as little as $100!

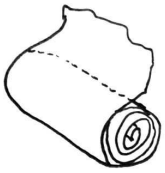
To learn more, visit http://grassrootsmapping.org

What you'll need:

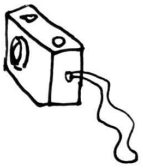


A tank of helium, ~80 cubic feet

One 2 meter-wide weather balloon



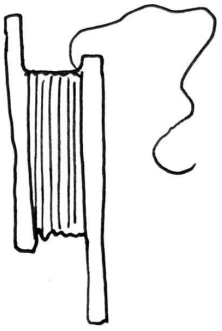
or several large plastic bags

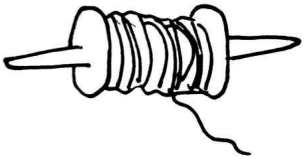


A small digital camera

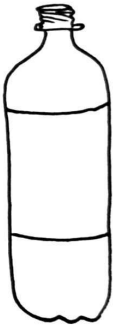
Scissors and rubber bands

2km, 5kg nylon string for balloons



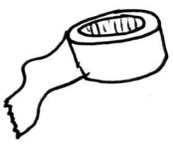


500-1000m, 30kg nylon string for

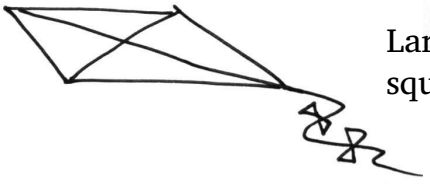


A plastic soda bottle

Cloth or leather gloves



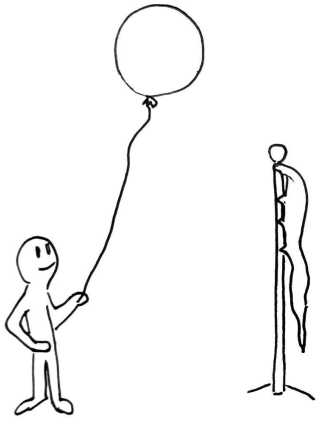
Clear plastic packing tape



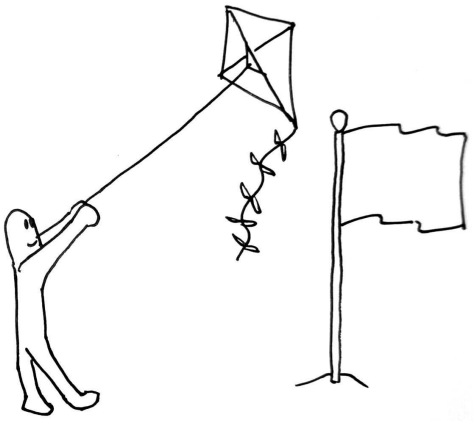
Large kite, 1.5 square meters

Balloon or kite?

Decide whether to use a balloon or a kite. Prepare for both; you won't know until the day comes:



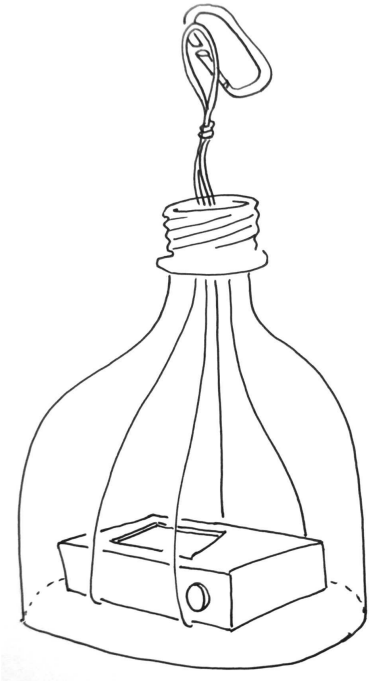
In wind below 10kph, fly a balloon.



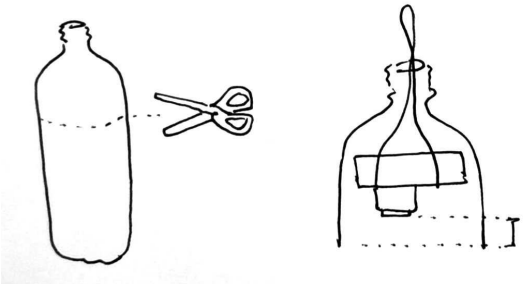
In wind above 10kph, fly a kite. Look at a flag to decide.

Build your camera capsule

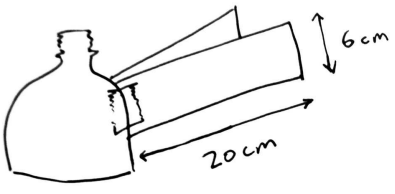
This simple protective cover stops your lens from hitting the ground, and protects your camera from hitting walls and trees.

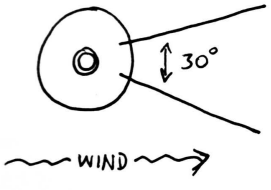


Cut a soda bottle in half and put the camera inside the top with the loop through the bottle neck.

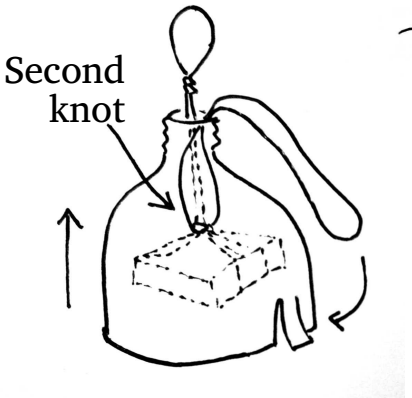


Tape on some cardboard 'wings' to stabilize it in the wind.





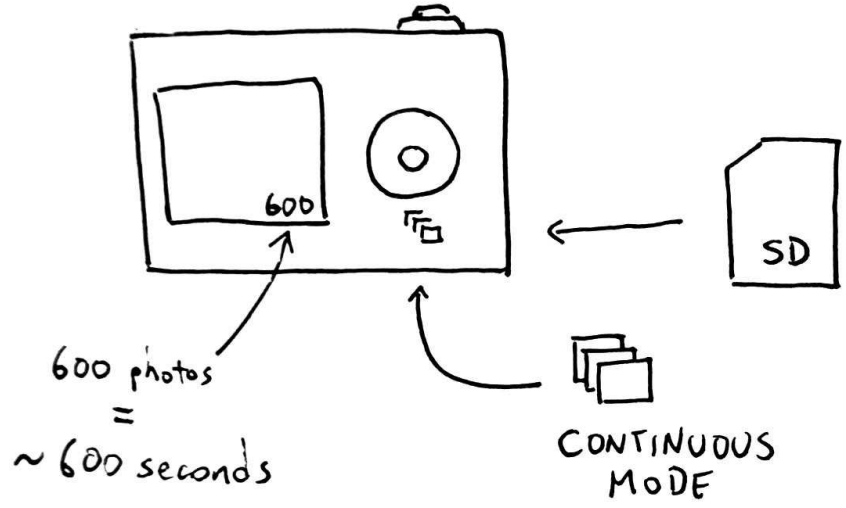
A rubber band through a second knot can be used to pull the camera snugly against the bottle.



Pull the rubber band out the top and hook it on a tab cut on the bottom of the bottle

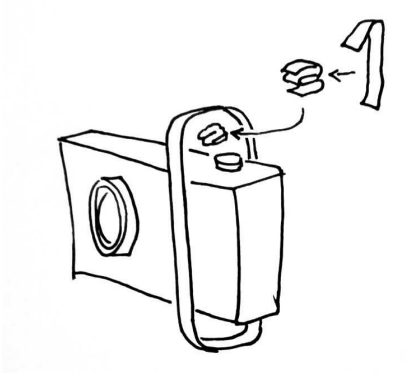
Prepare your camera

Any digital camera around 2-300 grams that has a 'continuous mode' can work. You can also use a Canon camera with the CHDK to trigger a photo every 5 seconds.



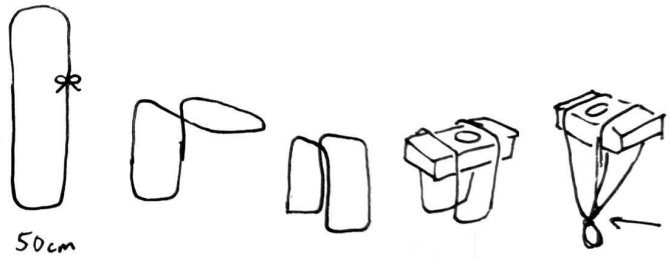
To fly longer, you may need a newer battery, a larger memory card, or you can set your camera to a lower resolution.

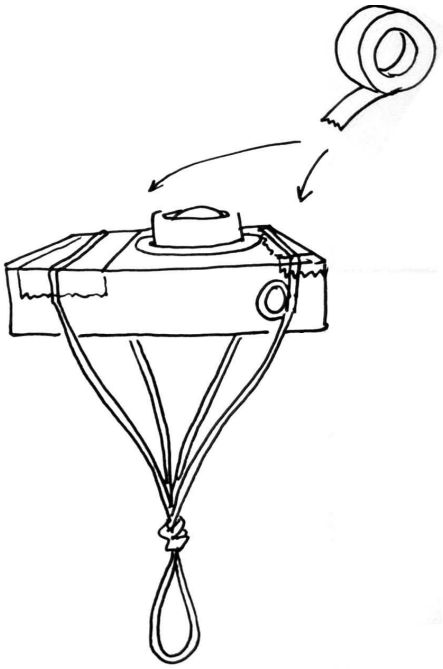
In 'Continuous Mode' a camera takes a picture every 1 second if the trigger is held down. Your display will show how many pictures you have.



Wad up a bit of card paper or use a pencil eraser to hold down the camera trigger. Use a rubber band to hold it in place and apply pressure. Be sure the button is being pressed.

Move the rubber band to one side until you're ready to start.



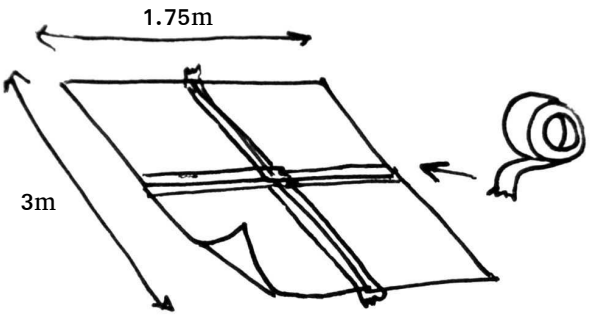


Fold a loop of string and tape it firmly onto your camera. Be sure the tape doesn't stop the lens from extending.

Press the tape down hard - its the only thing keeping your camera from slipping out of the string at 500 meters high!

Building and filling the balloon

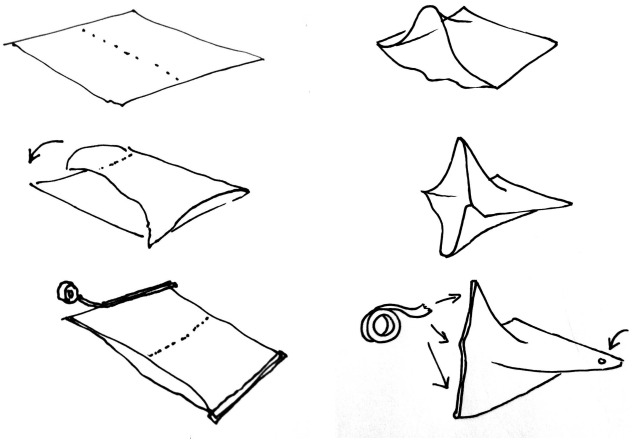
If you can't get a big enough balloon, you can make one from giant trash bags. White plastic works best - you'll need a 1.75m x 3m sheet.



Cut open the bags into rectangles, and tape them together into a larger rectangle.

Be sure to do this on a smooth, clean floor or a blanket so you don't puncture the bags.

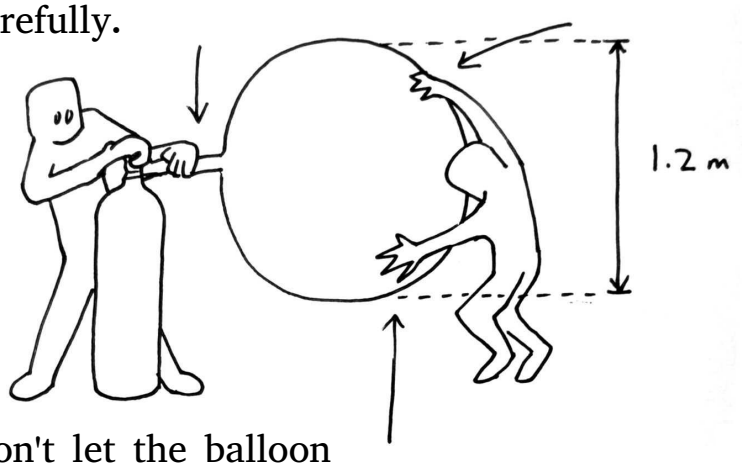
Fold the rectangle in half, and tape the sides. Open the 'pocket' until it closes vertically, then tape that shut too.



Punch a hole in one corner to fill the bag.

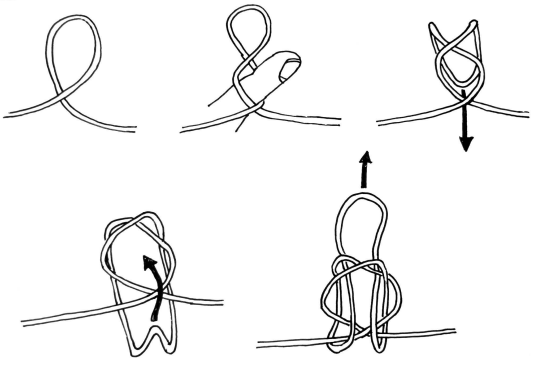
Hold the balloon onto the valve and fill slowly and carefully.

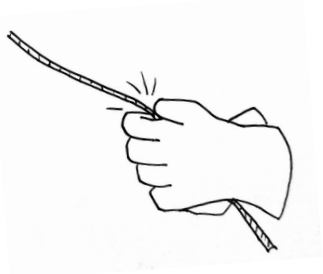
As the balloon fills it will rise and twist the neck, so hold it down gently.



Don't let the balloon touch the ground!

When you're ready to attach the camera to the kite or balloon string, tie a knot in a loop of string and clip on the camera.

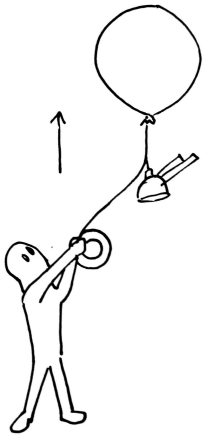


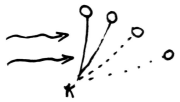


Always use gloves when flying kites - the string can burn your hands!

Flying your balloon or kite

The highest wind is usually around 2pm, and the lowest is at dawn. Bring water and sunscreen if it's hot out, and charge your camera batteries the night before!

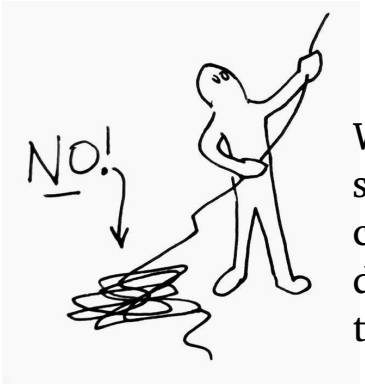




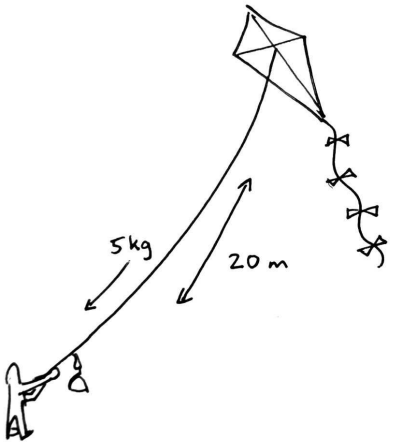
Let balloons rise as fast as you can. The wind will push them down as soon as you stop letting them rise.

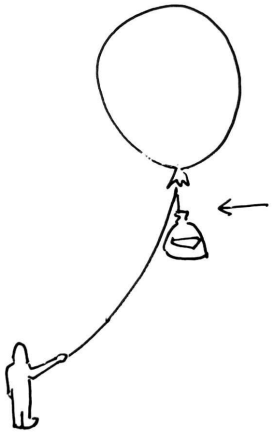
When using kites, be sure there is at least 5kg of pull, and let out 20 meters of string before making a loop and attaching the camera.

When using balloons, attach the camera just below the balloon.



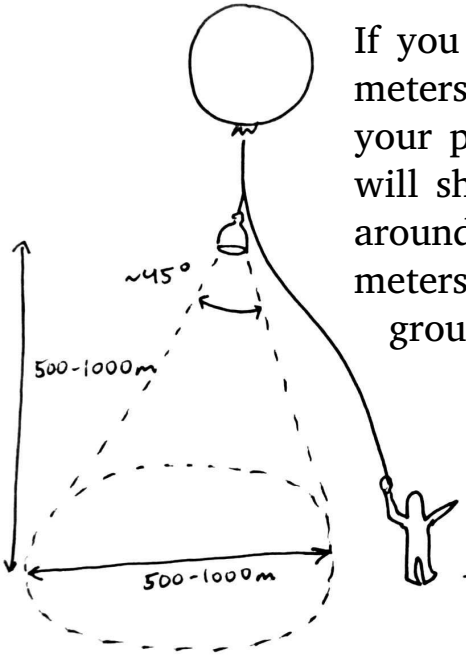
Wind the string carefully - don't let it tangle!





The camera has a field of view of roughly 45 degrees.

Bring a GPS if you have one, and write down the latitude and longitude.



If you fly 1000 meters high, your pictures will show around 1000 meters on the ground.

A small map usually takes around 2 hours to make.

Once the balloon is 500-1500 meters high, try walking around to take pictures of a greater area.