

Weather Vane

Category: Earth Science, Meteorology

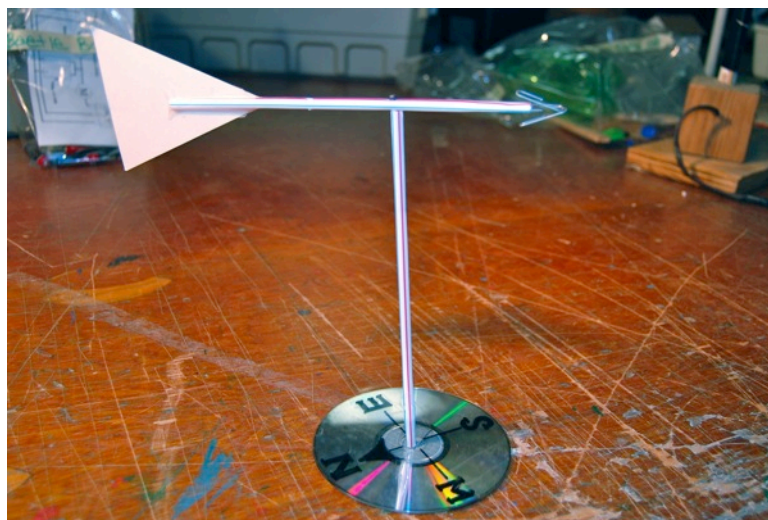
Type: Make & Take

Rough Parts List:

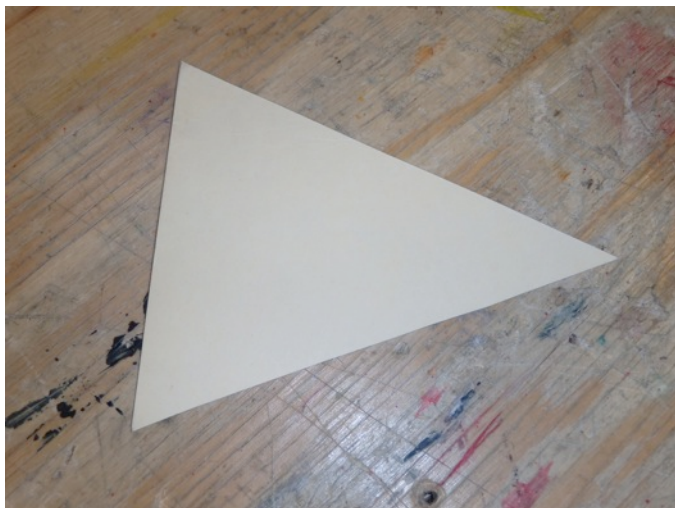
2	Straws
1	CD
2	Large paperclips
2	Nails
	Cardstock
	Tape, duct and scotch

Tools:

Hot glue gun
Scissors



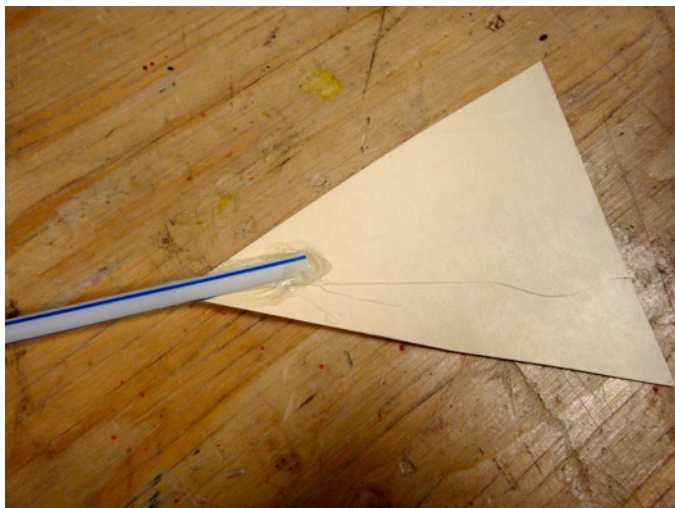
How To:



Cut a triangle out of cardstock to create a tail for the weathervane.



Cut a slit through the center of one end of a straw.



Slip the cardstock through the slit in the

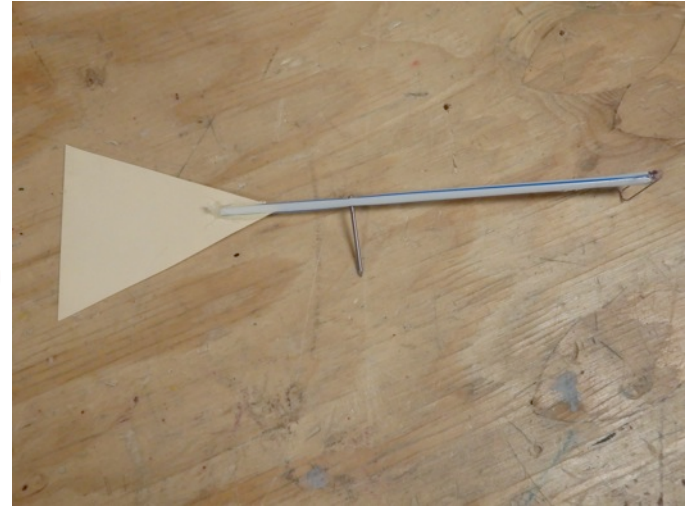


Bend a paperclip as shown.

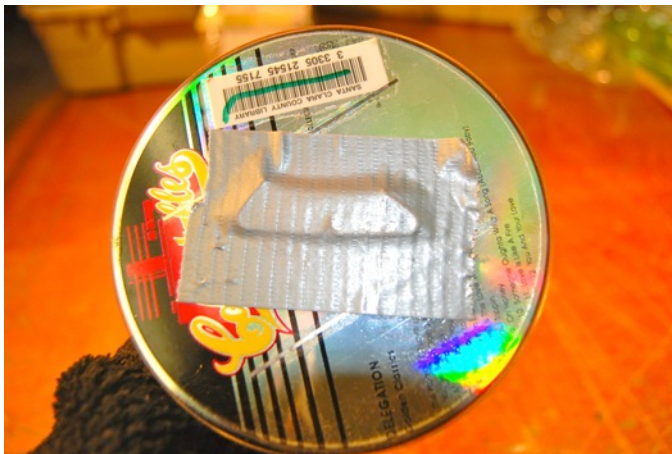
straw and glue into place.



Slip the paperclip into the other end of the straw.



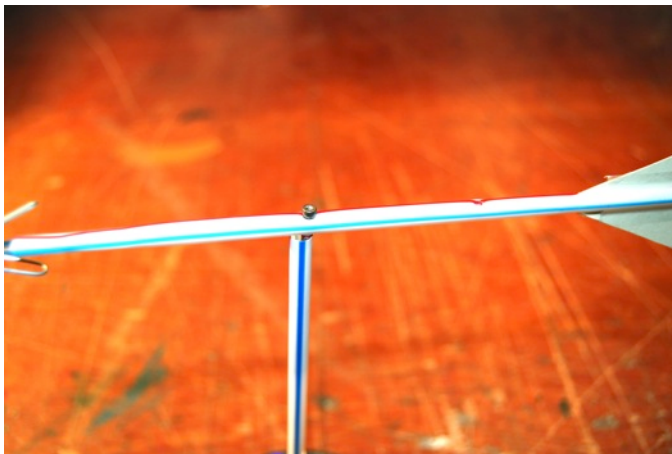
Find the center of mass of the straw and poke a nail through it.



Open a second paperclip. Straighten one end of the paperclip and poke it through the CD hole. Tape the bottom half of the paperclip to the bottom of a CD.



Make sure that the straightened paperclip that pokes through the CD is perpendicular to the CD. Stick a straw on top of the straightened paperclip. Use a permanent marker to mark directions on the CD.



Stick the nail into the standing straw to support the top straw.

Fine Points:

- An easy way to find the center of the mass of the straw is by balancing it on your finger.
- It is important that the straightened edge of the paperclip that the straw sits on is as straight as possible so the weather vane stands upright.
- When setting up the wind vane outside, use a compass to align the directions.

Concepts Involved:

- Wind is air in motion.
- Fins on an object help to orient it toward the wind. The larger air resistance of the fins keep them pointing away from the direction of the wind.
- Wind direction is important for understanding and predicting weather patterns.

Focus Questions:

1. Why do you think it is important to know which way the wind is blowing?
2. It is also helpful to know how strong the wind is. How would you design an instrument to measure wind strength or speed?

Elaboration:

The weather vane is an ancient instrument. It is an elegant and reliable way to tell the direction of wind. Wind is the movement of air. Our planet is surrounded by a layer of gases that we call air. Air is affected by temperature and pressure; these differences create wind. Since the molecules that make up air are constantly in motion, wind can be viewed as energy moving from place to place.

Knowing the direction of wind can be used to understand weather patterns, allowing predictions about weather to be made. When air from the north comes in, it is usually colder. When air from a body of water comes in, it is usually more humid. Air also has a certain pressure, and when a high or low pressure comes in, this can also change the weather.

The weather vane in this project points toward the wind for the same reason that rockets and arrows point forward as they fly. The air is pushing on the back of the vane with more force than it is pushing on the point. Thus, the fins pivot to the rear, while the point pivots to the front. Try pushing the vane against the wind; you'll notice that the back of the vane has force on it that makes this difficult. You have to apply your own force to counteract the force applied by wind.

Links to k-12 CA Content Standards:

Grades k-8 Standard Set Investigation and Experimentation:

Scientific progress is made by asking meaningful questions and conducting careful investigations. As a basis for understanding this concept and addressing the content in the other strands, students should develop their own questions and perform investigations.

Grades k-12 Mathematical Reasoning:

1.0 Students make decisions about how to approach problems:

1.1 Analyze problems by identifying relationships, distinguishing relevant from irrelevant information, sequencing and prioritizing information, and observing patterns.

1.2 Determine when and how to break a problem into simpler parts.

2.0 Students use strategies, skills, and concepts in finding solutions:

1.1 Use estimation to verify the reasonableness of calculated results.

1.2 2.2 Apply strategies and results from simpler problems to more complex problems.

- 1.3 Use a variety of methods, such as words, numbers, symbols, charts, graphs, tables, diagrams, and models, to explain mathematical reasoning.
- 2.5 Indicate the relative advantages of exact and approximate solutions to problems and give answers to a specified degree of accuracy.
- 3.0 Students move beyond a particular problem by generalizing to other situations:
 - 3.1 Evaluate the reasonableness of the solution in the context of the original situation.
 - 3.2 Note the method of deriving the solution and demonstrate a conceptual understanding of the derivation by solving similar problems.
 - 3.3 Develop generalizations of the results obtained and apply them in other circumstances.

Grade 3 Standard Set 1: Physical Sciences (Energy and Matter)

- 1.d Students know energy can be carried from one place to another by waves, such as water waves and sound waves, by electric current, and by moving objects.

Grade 8 Standard Set 2: Forces

Unbalanced forces cause a change in velocity.

- 2.a Students know that a force has both direction and magnitude.
- 2.c Students know when the forces on an object are balanced, the motion of an object does not change.
- 2.e Students know that when the forces on an object are unbalanced, the object will change its velocity (that is it will speed up, slow down, or change direction).