Treasure hunt

Activity title

Wonderful Wind

Time required

2 hours

Activity summary

Making a device to measure wind speed

By the end of this activity, you will be able to:

- Describe what is meant by wind.
- Construct a simple mechanical device.
- Understand that the movement of air can be measured by an anemometer.

What equipment will you need?

Parts and components:

- A polystyrene ball (25 - 40 mm diameter)
- 3 wood or bamboo skewers
- Putty (such as Blutack or Whitetak) OR modelling clay (such as clay, Plasticine or Playdough)
- 6 paper cups and sticky tape OR 4 paper cups and a plastic water bottle with a sports cap.

Tools and equipment:
A fan or hair-dryer and a stop watch.

How to do it

You are going to make a device that measures how fast wind moves. This is called an anemometer.

This anemometer has a series of cups mounted off a central shaft. As the wind blows, the cups spin round. How many times the cups go round (the number of revolutions per minute, rpm) is a measure of the wind speed.

THE ROBINSON ANEMOMETER.

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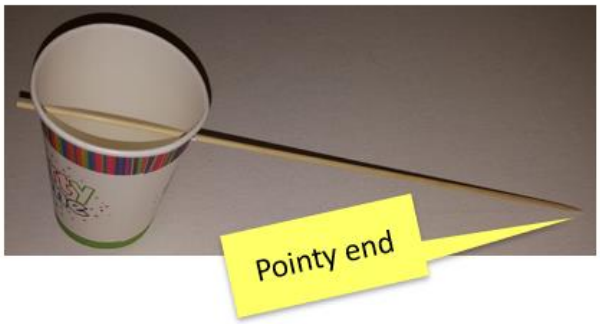
Now try this

1. Push a skewer through one cup:
- Put the putty on a surface.
- Place the side of the cup on the putty.
- Push the pointy end of the skewer through the side of the cup into the putty.
- Pull out the skewer.
- Repeat on the opposite side of the cup.
- Once you have two holes, push the skewer through both, so the blunt end is sticking out about 10 mm



2. Push the polystyrene ball on to the skewer. It should end up about halfway along the skewer.

3. Push a second cup onto the other end of the skewer. The pointy end should stick out about 10 mm from the cup.

4. Repeat step 1, making another cup on a skewer.

5. Push the skewer through the polystyrene ball. The ball should end up about halfway along the skewer.

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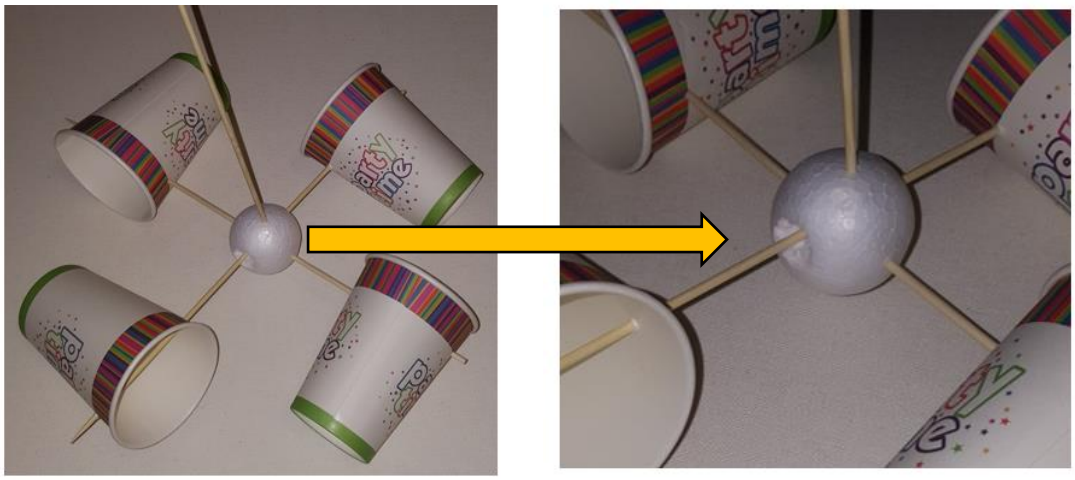
6. Push a second cup onto the other end of the skewer. The pointy end should stick out about 10 mm from the cup.

7. Push the central skewer into the polystyrene ball. It doesn't have to stick out of the other side.



If you have a bottle with a sports cap, now do this:

8. Final Assembly (Bottle Base)

- Push the central skewer into the hole in the middle of the sports top.
- The cups should spin freely.
- The cups must stay in position, so they look like they are on their sides.
- If they move, use a piece of tape or putty to hold them firm to a skewer.

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If you are using six cups (no bottle), use two of the cups to make a base by doing this:

8. Make holes in the base of the two cups. The holes should be in the exact centre of the base.

9. Using sticky tape, attach the rims of the two cups together.

10. Final Assembly (Cup Base)

- Push the central skewer through the two holes in the holder.
- The top should spin freely.
- The cups must stay so they look like they are on their sides.
- If they move, use a piece of tape or putty to hold them firm to a skewer.

For examples of making anemometers:

- https://stclares6th.wordpress.com/2014/03/14/making-an-anemometer/
- https://www.teachengineering.org/activities/view/cub_energy2_lesson07_activity1
- https://www.sciencelearn.org.nz/resources/2204-making-an-anemometer

You could also find out

1. Test your anemometer. Mark one of the cups and count how many times it passes the same point when it turns. Using the table below record the following information:

- How many times does your anemometer spin in five seconds when you blow on it?
- How many times does your anemometer spin in ten seconds when a fan or hair dryer blows on it?
- How many times does your anemometer spin in ten seconds when the wind blows on it outside?

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Number of turns	Time (seconds)	Revolutions per minute (rpm)

2. Now convert your collected data into the number of revolutions per minute (rpm) as follows:

$$\text{rpm} = \text{turns} \times \frac{60}{\text{Time (in seconds)}}$$

Further activities you could carry out

You could make another anemometer with different numbers of cups (e.g. 3 or 6) and see how this affects the measured rpm.

For an example of how to measure wind speed:

Making an anemometer and using it to measure wind speed
http://tryengineering.org/lesson-plans/measuring-wind

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What results were expected?

1. Examples of anemometers

2. RPM conversion:
   For example, the anemometer turns 15 times in 10 seconds.

$$\text{RPM} = \text{turns} \times \frac{60}{\text{Time (in seconds)}}$$

$$15 \times \frac{60}{10} = 90 \text{ rpm}$$