How Clear is the ≋?

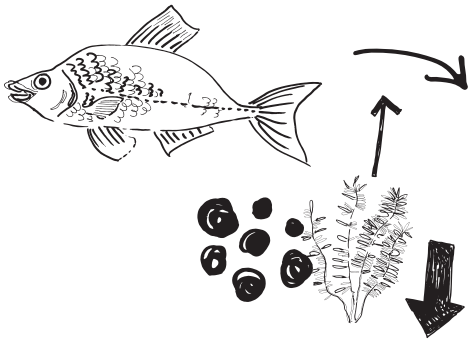
SMART KIDS LAB
Step by Step

SMART KIDS LAB

How clean is the air you breathe? Is swimming water the same as drinking water? How many microbes live in the soil beneath your feet? And what does it all mean? DISCOVER how healthy your neighbourhood is and what you can do to improve it. SMART KIDS LAB lets you examine the water, noise, air, earth and light around you with homemade measuring instruments. On the smartkidslab.nl website, you'll find out how to make the measuring instruments (meters) and how you can GET STARTED.

HOW CLEAR IS THE WATER ??

YOU'LL BE INVESTIGATING HOW CLEAR THE WATER IN YOUR AREA IS. If water isn't clear, not enough light can get through, which makes it difficult for plants and animals to thrive. Aquatic plants make oxygen and help ensure the water stays clear by producing substances that stop the growth of algae. In a HEALTHY water system, you'll find aquatic plants, fish, minerals, and small amounts of algae and waste. Water that contains too much algae can be dangerous to both humans and animals. You've probably heard about BLUE ALGAE if you swim regularly in natural waters. If you aren't allowed to swim in the lake, it's probably because there's TOO MUCH algae!



HOW DOES IT WORK?

It all begins with the QUESTION: What do you want to measure? Do you already know? GREAT! Now you can GET GOING.

STEP 1.

You start by making the MEASURING INSTRUMENT. *What you'll need: Smart Kids Lab / making meters. There you'll find all the information you need to get started.

STEP 2.

Now it's time to go do RESEARCH and experiment. Before you start, think about what you want to investigate in your area and how to go about doing it.

For example, you could investigate the quality of the water in the swimming pool. Or you could see how healthy the water in a river or stream is for the fish or frogs. TIP: You'll get a more complete picture of the water's quality if you research the CLARITY and the MINERAL CONTENT of the water.

*What you'll need: the Smart Kids Lab / experiments worksheet. This explains how to use your homemade meter to collect data.

STEP 3.

Collect the measurement DATA on the Smart Kids Lab worksheet. *What you'll need: the Smart Kids Lab / experiments worksheet. You can record your measurements here.

STEP 4.

Go grab the COMPARE-O-METER so you can compare your measurement data to that of others. You'll also find a lot of interesting information here. *For this you'll need: Smart Kids Lab / compare-o-meter worksheet.

STEP 5.

Take a picture of your measurement data and put it on the GREAT DATA MAP. You can find it at smartkidslab.nl.

*What you'll need: You can take a photo with a phone or digital camera. THE GREAT DATA MAP can be found at smartkidslab.nl (in the menu bar).

This project has been co-funded by the European Commission within the Call H2020 ICT2015 Research and Innovation action. The grant agreement number is 688620

Making Sense · CINEKID · waag society · SEC Stichting Educatie en Cultuur · Rijksinstituut voor Volksgezondheid en Milieu, Ministerie van Volksgezondheid, Welzijn en Sport

How Clear is the ≈?

SMART KIDS LAB
compare-o-meter

SUNLIGHT isn't just important for life on land ... it's also essential for plants and animals underwater!

TRANSPARENCY

DEPTH IN CM

10 REALLY CLOUDY
20 CLOUDY
30
40
50 CLEAR
60
70
80 VERY CLEAR
90
100 SUPER CLEAR

COMPARE YOUR DATA

clear water → happy fish

party hat

In clear water sunlight can reach aquatic plants!

Aquatic plants provide oxygen in the water. They also produce substances that prevent the overgrowth of algae!

pike like to lay their eggs between aquatic plants

DANGER!

BLUE-GREEN ALGAE grows well in cloudy water during warm weather. It can make you sick! So no swimming!

this fish can't breathe!

grit in your gills? not nice!

Too much ALGAE makes the water cloudy. Because of waste products from farming, factories, and even our homes, more and more (bad) minerals are released into the water. This provides food for algae, which means these tiny living organisms multiply very quickly. That's BAD for fish and aquatic plants because the algae block out the sunlight. Less plants means less oxygen and food for the fish! NOT GOOD!

In really clear water, you could see this bike lying on the bottom, but in turbid (cloudy) water you'd miss it!

How Clear is the ≈?

SMART KIDS LAB
making Meters

DISCOVER HOW HEALTHY YOUR NEIGHBORHOOD IS AND WHAT YOU CAN DO TO IMPROVE IT!

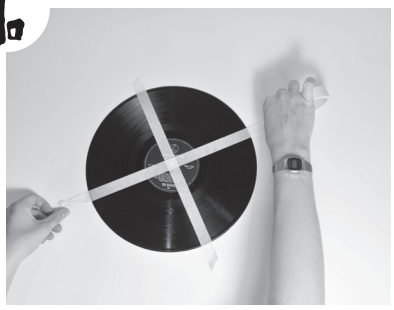
If water doesn't let through enough light, it becomes difficult for plants and animals to live. Aquatic plants help the water stay clean and clear. But sewage can introduce too many minerals into the water, which causes algae to grow and the water to become cloudy. This means there is less light in the water for aquatic plants to grow, which means less oxygen and less fish ... and a lot more stinky smells! BLECH!

Create this TRANSPARENCY METER (or Secchi disk) to measure how far you can see in the water.

WHAT DO YOU NEED?

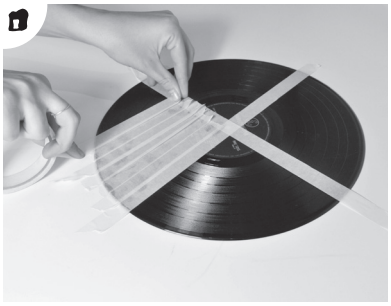
- Old LP (record)
- Masking / painter's tape
- White paint (waterproof) / spraypaint
- Face mask
- Long rope (minimum 2 meters)
- Measuring tape

1.



With the painter's tape, make a large X on the LP. Press the tape down firmly.

2.



Cover two opposite sections completely with tape. You don't want paint in these areas.

3.

Put on your face mask and spray paint the parts of the LP you didn't cover with tape. Allow to dry. If the record still shows through the paint, add another layer.

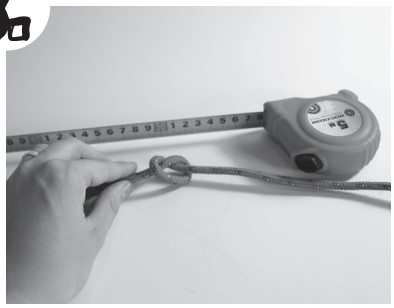
4.

Wait until the paint is completely dry and carefully remove the tape.

5.

Insert a rope through the hole in the LP from the painted front side to the back. Tie a knot on both sides of the record.

6.



Measure 10 cm away from the LP along the rope. Tie a knot here. Make another knot every 10 cm until the end of the rope.

7.

Choose a place along the water or on a pier (don't fall in!). Slowly lower the disc into the water and count the knots as they go underwater. The depth at which you can no longer see the difference between the dark and light faces is the 'Secchi depth'.

To ensure that the LP will SINK properly, you can tie something HEAVY to the bottom of the rope!

TIP Take measurements in DIFFERENT PLACES to compare water clarity. For instance, compare flowing water from a stream, canal, or river with stagnant water in a park pond.

! BUDDY SYSTEM: always do this with a friend or parent. If you fall into the water (DON'T), they can save you!

Fish need CLEAR WATER to survive, less than 40 cm of visibility is really not enough for them.

How Clear is the ≋?

SMART KIDS LAB experiments

Step 1 Make a TRANSPARENCY METER (Secchi disc) and choose 3 different places where you want to measure the clearness of the water. For example, a canal, pond and a flowing stream or river. You can leave the disc in the water from the bank, a bridge, or a boat. Of course you should also be careful! You could also compare 3 different places in the same water. For example, is there a difference between one side of the pond and the other? Or on different days or at different times?

Step 2 Take a measurement between 10:00am and 2:00pm when there is enough sun. Lower the disc straight into the water until you no longer see any difference between the dark and light areas on the disc. The depth at which you can no longer see the difference between the dark and light faces is the light limit or 'Secchi depth'. Count the number of knots that went below the water as you pull the disk up again. Do this a few times to be sure your measurement is correct.

Step 4 Compare your measurements with the compare-o-meter to determine how clear or cloudy the water is. Can you explain the differences between the places? What might be needed to improve the water's clarity?

MY RESEARCH CONCLUSION:

Step 3 Below, draw your disc at the Secchi depth you measured. Above, draw the places where measured and what you saw in and around the water.

Place A: .....

0 cm
50 cm
100 cm
150 cm

Water colour: .....

The water smells like .....

Clearness of water: .....

date: .....time of day: .....

Place B: .....

0 cm
50 cm
100 cm
150 cm

Water colour: .....

The water smells like .....

Clearness of water: .....

date: .....time of day: .....

Place C: .....

0 cm
50 cm
100 cm
150 cm

Water colour: .....

The water smells like .....

Clearness of water: .....

date: .....time of day: .....

Step 5 Take a picture of this worksheet & put it on the BIG data map at SMARTKIDSLAB.NL