#MakingSenseEU
www.making-sense.eu

Making Sense

Original version

waag society

Translation & adaptation

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# SMART KIDS LAB

An introduction to sensing!

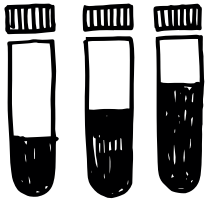
Making Sense

# Making Sense is a project that gets people sensing and understanding their environment, to take action to change the world for the better!

In this book you will find a couple of exercises to try at home!

Making Sense

Advances and experiments in participatory sensing



# HOW ACIDIC IS THE  ? AND THE  ?

EXPERIMENT
1

# COMPARE-O-METER

COMPARE YOUR DATA

DIRTY!

ACID


1

LEMON JUICE

FIZZY DRINKS

2 RED

ACID IS BAD FOR YOUR TEETH. IT MAKES YOUR TOOTH ENAMEL SOFT ... AND HARD ENAMEL PROTECTS THEM AGAINST CAVITIES

3 PINK

BLUE FLOWERS?

THE MORE ACIDIC THE SOIL, THE BLUER THE HYDRANGEA WILL BE. LIME MAKES SOIL LESS ACIDIC AND TURNS THE FLOWERS A LIGHTER SHADE OF BLUE...OR EVEN PURPLE OR PINK!

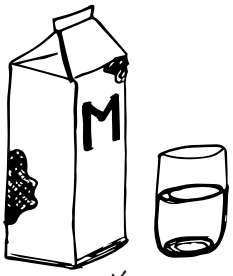
HYDRANGEA

4

COFFEE

5 PURPLE

6




MILK

NEUTRAL

7 BLUE

TAP WATER

8

TREES AND FLOWERBEDS ON THE GROUND HAVE A PH-VALUE BETWEEN 5.5 AND 6.5.

FERTILISED FARMLAND MAKES THE SOIL ACIDIC!

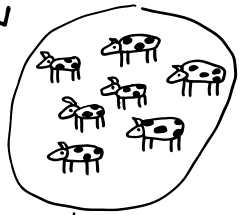
9

A BASE IS THE OPPOSITE OF AN ACID. A LIQUID THAT IS ALKALINE OFTEN FEELS SLIPPERY TO THE TOUCH AND IF YOU WERE TO TASTE IT, IT WOULD TASTE BITTER. **(DON'T DO IT!)**

SOAP

10

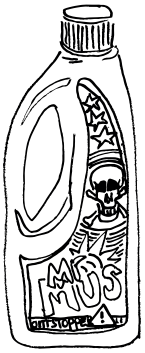
MOST CLEANING PRODUCTS ARE BASIC.



AN ACIDIC SOIL IS A VULNERABLE SOIL. HARMFUL SUBSTANCES SINK TO THE BOTTOM MORE QUICKLY ... EVEN INTO THE GROUNDWATER

11 GREEN

SCRAPS OF RED CABBAGE TURN BLUE WHEN PLUNGED IN (ALKALINE) DISH WASHER




WASHING UP LIQUID

12

BAH!

13 YELLOW

ALKALINE

# HOW ACIDIC IS THE SOIL ?

## EXAMINE THE ACIDITY OF THE SOIL OR WATER IN YOUR AREA.

Lemons and soft drinks are acidic, which you can taste. But how acidic soil? Or ditch water ?! Fortunately, you don't have to 'measure' with your tongue...but you can with **red cabbage**!

a few facts: **ACID** is bad for your teeth. It makes your tooth enamel soft, and we need hard enamel to protect our teeth from cavities.

## HOW DOES IT WORK?

**Step 1.** You start by making the measuring instrument.
* You'll need: to make gauges.

**Step 2.** Then it's time to do research and do experiments. Remember to think about what exactly you want to investigate

For example..do you want to examine how acidic the soil is and what it means? do you want to find out which drink is best for your teeth?

check the compare-o-meter to find more facts.

* You'll need: the worksheet
it explains how you can go out with the homemade gauges to collect measurements (data)

# OR DISH WATER ?

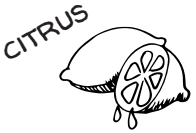

Acid soil or an acidic soil is a vulnerable soil. Harmful substances gather quickly and seep into groundwater. Acidic soil can actually be quite **GOOD** again for some plants. And, the more acidic the soil, the more blue hydrangeas. An **ALKALINE** is the opposite of an acid. A liquid that is basic often feels slippery and if you taste it (do not!) it tastes bitter. most detergents are alkaline.

Everything starts with the question: What do you want to measure? You should have already thought about this. Nice! Now you can get to work.


**Step 3.**

Collect the measured data in the worksheet
* You'll need: The worksheet to write your findings

**Step 4.** Check it with the compare-o-meter, then you can compare your measurements to others. You'll also find lots of facts here.




**PH SCALE** **ACIDIC** PH 0 **NEUTRAL** PH 7 **ALKALINE** PH 14

# Discover how healthy your area is and what you can do to improve it!

Lemons and soft drinks are acidic, which you can taste. But how about acidic soil? and dish water ?! Luckily, you don't have to 'measure' with your tongue ... you can do it with red cabbage! ← just waiting for you at the supermarket!

## Make an ACID METER with magic and RED CABBAGE JUICE ...

### What you'll need

- fresh red cabbage
- blender
- Funnel
- coffee
- Ruler
- Waterproof marker
- Clear plastic cups
- Scale

≈ For testing of WATER or other liquids: Follow steps 1, 2, 3 & 4.

For the testing of SOIL: Follow steps 1, 2, 5 & 6.

**1.**

Pour two glasses of water into the blender and add 4 leaves of red cabbage to. Puree this as fine as possible.

**2.**

Put a coffee filter into the funnel and pour the mixture from the blender into it. collect the liquid in a bottle.

## ≈ For testing water

**3.**

Draw two lines on one of the plastic cups, one at a height of 3 cm and the other at 6 cm. Write on the cup which liquid you are going to test

**4.**

Pour the red cabbage liquid to the first mark (3cm). Next, pour the liquid you want to test to the second mark (6cm)

## for testing soil

**5.**

Draw a line on the second plastic cup at a height of 6 cm. weigh 5 grams of soil and put it in the cup

**6.**

Pour the red cabbage liquid to the mark and stir with a plastic spoon. Wait until the soil settles back to the color to see.

**THE RED CABBAGE LIQUID CHANGES COLOR DEPENDING ON HOW ACIDIC SOMETHING IS.**

Did your cabbage liquid turn ... →

Red or pink? Then the soil or water is acidic...
Purple or blue? Not very acidic or neutral.
Green or yellow? Then it's pretty alkaline.

# Worksheet

STEP 1

Make the PH measurement cups and test out various liquids you have in the house. For example, lemon juice, cola, coffee, milk, tap water and dishwater. Make a nice range of different colors

STEP 2

Write in the box below 3 places you want to test water or soil acidity. Go to these measuring spots and collect some soil or water in some cups.

TIP: compare ditch water with your own spit or water from a fishbowl!

STEP 4

Compare your results with the color solution from step 1 and compare with the acid-o-meter. See any differences? Why is that do you think? Is your saliva as neutral as tap water? Is the water too acidic?

My research conclusion:

STEP 3

Test your soil or water with your ACID METER solution.

What color is it?

PLACE 1

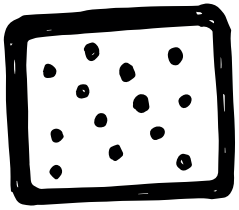
Take a picture of it, print it out and paste it here.

PLACE 2

Put a picture here too!

PLACE 3

and here!



# HOW MUCH POLLUTION IS FLOATING AROUND?

EXPERIMENT
2

# COMPARE-O-METER

COMPARE YOUR DATA

TOO MUCH POLLUTION!

SOME POLLUTION

LESS POLLUTION

GRAIN OF SAND

PARTICULATE MATTER IS REALLY, REALLY SMALL AND FLOATS IN THE AIR...SNEAKY, HARMFUL SMALL PARTICLES THAT CLOG YOUR LUNGS!

VAPOR TRAILS IN THE AIR ARE WATER DROPLETS THAT FORM AROUND THE PARTICULATE MATTER EMISSIONS FROM PLANES

BREATHE IN

BREATHE OUT

SHORTNESS OF BREATH, TIRED QUICKLY... THAT'S NOT NICE!

FACTORIES AND CONSTRUCTION SITES PROVIDE LOOOOOTS OF PARTICULATE MATTER !!

WHEN THERE'S HEAVY POLLUTION BETTER NOT BIKE!

DID YOU KNOW: THERE ARE ALSO MANY FINE PARTICLES HIDDEN IN THE HOUSE? TEDDY BEARS, MUSTY BLANKETS, CARPETS AND CUSHIONS QUICKLY FILL UP WITH PARTICULATE MATTER! ALSO, IT MATTERS WHICH WINDOWS OPEN, AND WHERE THE AIR BLOWS INSIDE FROM!

AIR INSIDE IS ALMOST ALWAYS DIRTIER THAN OUT! VENTILATE!

AIRING!

Gggggg

TIP

SPORT IS GREAT!

SEARCH OPEN GREEN CYCLE ROUTES IN THE CITY WHERE THE WIND BLOWS AND IS NOT TOO CLOSE TO MAJOR ROADS.

A PARK IN THE RAIN HAS SUPER LITTLE PARTICULATE MATTER.

CLEAN AIR!

STADS PARK

# PARTICULATE MATTER!

## LET'S EXAMINE HOW MUCH PARTICULATE MATTER IS IN THE AIR.

These are tiny particles floating in the air. We do not see them, but breathe them every day. Fine Dust! this is bad for our lungs. we can measure the particle with a homemade PARTICULATE METER.

## HOW DOES IT WORK?

**Step 1.** You start by making the measuring instrument.

**Step 2.** Then it's time to do research and do experiments. Remember to think about what exactly you want to investigate

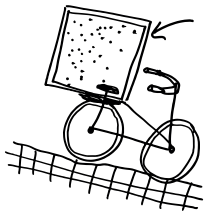
Want to find out for example what the healthiest route is to go to school? Then place your particulates meters at various places along the route.

check the compare-o-meter to find more facts

≠freshAir

You see it when you sweep your hand on the window outside... a lot of fine dust!

SMOG



Everything starts with the question: What do you want to measure? You should have already thought about this. Nice! Now you can get to work.

**Step 3.**

After one or two days collect all the meters, so you can find out where the most particulate matter floating in the air is. and then choose a different path!

* You'll need: the worksheet it explains how you can go out with the homemade gauges to collect measurements (data)

**Step 4.** Check it with the compare-o-meter, then you can compare your measurements to others. You'll also find lots of facts here.

# Discover how healthy your area is and what you can do to improve it!

We do not see them but they breathe every day: FINE DUST! That is bad for your lungs. By knowing where there is a lot of fine dust in the air,, we can choose healthier cycling and walking routes

## Create your own PARTICULATES METER: with a piece MILK CARTON and VASELINE

... of course.

### What you'll need

- Empty carton of milk
- Vaseline
- Double-sided tape
- Scissors
- Ruler

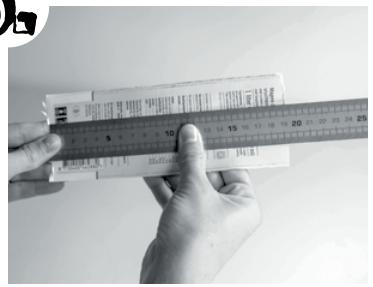
**1.**

Cut the top and bottom of the milk carton off.

**2.**

Cut off the sides along the folds so that you get long strips

**3.**

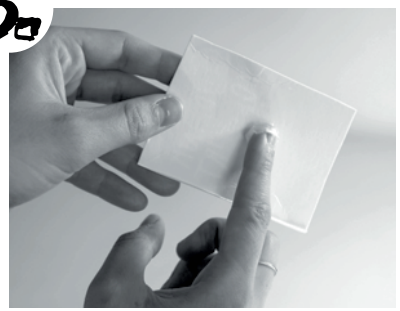


Measure the length of each strip and cut each one to the same size along the creases.

**4.**

Stick double-sided tape to the printed side of the carton strip.

**5.**



Grease Vaseline on the white side over the entire surface.

**6.**

Now carefully remove the skin of the double-sided tape off.

**7.**

Paste your particulates meter on the spot where you want to measure and wait a few days.

Look how DARK SPOTS appear on your meter. The more dots, the more particulate matter, in the air!

**TIP** **Measure a busy street or intersection and a park to see the difference.**

# Worksheet

**STEP 1**

Make 3 particulate meters and hang them in three different places in your area (outside of the window, past your bike trail, at an intersection next to the stove ...)

Wait one or two days (or longer). In the meantime, draw the different places where you have hung up your meters

**STEP 2**

TIP: At your measurement sites, count how much traffic passes in 10 minutes. Which meters do you think are going to catch the largest amount of polluted air matter?

**STEP 4**

Look carefully at the tiny dots on the meters. Can you count them or is it too much? Compare the spots with the fine dust Compare-o-meter. Where is there the most particulate matter floating in the air? And why is that do you think?

My research conclusion:

**STEP 3**

Collect your particulate meter cards and past them here..

Write where they were placed and how long they were hung up.

PLACE 1

paste it here.

from ..... to .....

PLACE 2

here too!

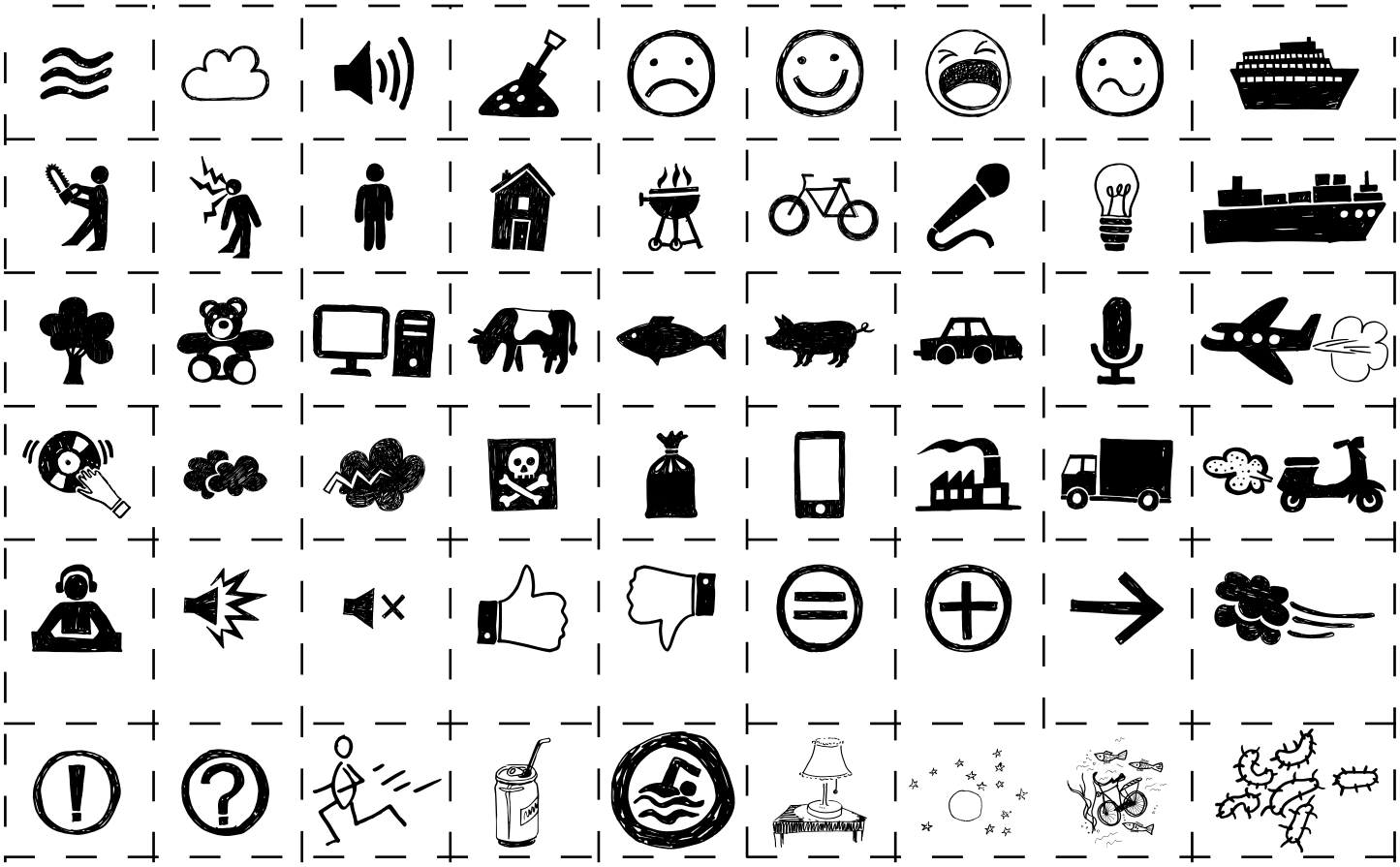
from ..... to .....

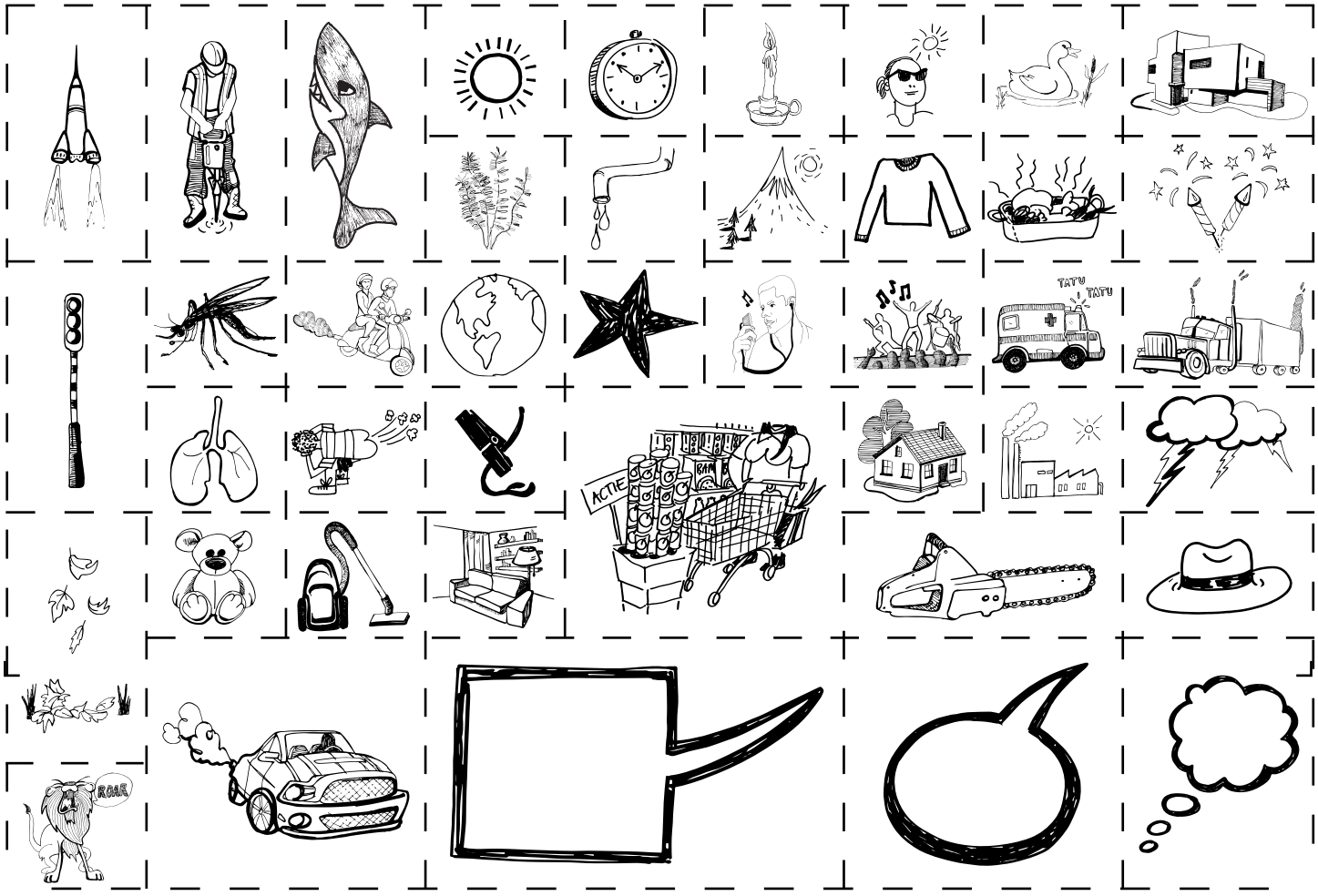
PLACE 3

and here!

from ..... to .....

Use these drawings in the "Do Experiments" section of your worksheets to make your research even better!



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