



This Investigation Guide aims to present some suggestions for activities to promote science education during the A/B-weeks. These activities can be integrated into the A-week lessons if teachers choose, or children can simply use them on their own during B-weeks. Below are suggestions for integrating activities Prior, During and After student investigations.

STAGES	DESCRIPTION
Entry	Engage your students into the topic by gathering their initial ideas on the topic and asking guiding questions.
Extension	Depending on students' ideas, possible guiding questions are included.
Further	Depending on students' ideas, possible next investigations are included.
General	Include something fun and memorable to trigger students' interest in the topic.

→ Relation between stage and level of difficulty: **Entry** should be used as an initiation to the topic; **Extension** as a way to consolidate with a question that links the topic to content; and **Further** implies a deepening of content and ideas for students to pursue further investigations.

PRIOR STAGE: PREPARATION IN THE CLASS

STEP 1 – WHOLE GROUP BRAINSTORMING		
INTRODUCING THE TOPIC		
Stages	Description	Suggestions
Entry	Engage your students into the topic of weather by gathering their initial ideas on the topic and asking guiding questions.	<ul style="list-style-type: none"> • What is the weather like? • What do you know about weather? • Why is this topic important? • Which meteorological phenomena can you name or describe?
Extension	Depending on students' ideas, it is possible to add an extension question.	<ul style="list-style-type: none"> • Climate and weather, are they the same?
Further	Ask questions that can serve to further guide discussion, depending on students' ideas.	<ul style="list-style-type: none"> • <u>Clouds</u>: What do you already know about clouds? What do they do? Are they the same or different? • <u>Rain and snow</u>: How do you think rain occurs? How do you think snow is produced? How are snow and rain the same? How are they different? • <u>Wind</u>: What is wind?
General	Include something fun and memorable to trigger interest in the topic.	<ul style="list-style-type: none"> • Do you know any songs or sayings related to the weather? Which ones?

STEP 2 – VISITING A WEATHER FORECAST WEBSITE		
EXPLORING TO THE TOPIC		
Stages	Description	Suggestions
Entry	Show children a weather forecast website (for example: meteolux.lu), and gather their current knowledge about weather tracking by asking guiding questions while showing the parts of the website.	<ul style="list-style-type: none"> Do you or your family members ever check the weather forecast? Why can it be useful to do this?
Extension	Children can identify the icons in the weather forecast and relate them to their meaning.  	
Further	Raise questions that can serve to further guide discussion, depending on students' ideas.	<ul style="list-style-type: none"> Have you ever thought about how scientists predict the weather? What information is important in a weather forecast? How are these data recorded? How accurate do you think a forecast can be?

STEP 3 – INTRODUCE THE WEEK B ACTIVITIES
EXPLORING TO THE TOPIC
Explain to children that the topic of weather will be the focus of scientific investigations that they will be doing independently during week B, and clarify the particular expectations for completion within the weekly plan. Be sure to let children know if there will be the opportunity for follow-up activities and discussion when they return to the school in the next week A so that there can be group connections made after the investigations have been completed individually.

USEFUL RESOURCES FOR THE PREPARATION STEPS

INFORMATION

The MeteoLux website
(<https://www.meteolux.lu/?lang=fr>)

“Les paramètres-clés utilisés pour l'étude du climat sont :

- les précipitations
- la pression atmosphérique
- le vent de surface
- l'humidité
- la température de l'air
- l'insolation”



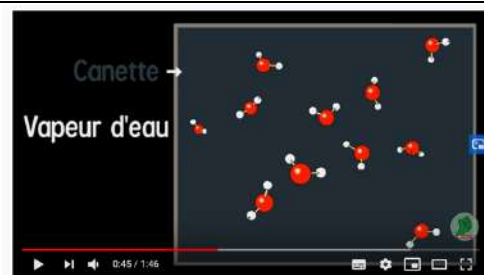
EXPERIMENT

Demonstrations might be a useful resource to support children's understanding of concepts such as atmospheric pressure. We usually do not feel the air pressure in our daily lives, meaning the weight of air molecules on our bodies' surfaces, because we are immersed in air, surrounded from our feet up to our heads. Air has weight, and this weight would push us towards one side if there was no air on the other side. This is exactly what happens when heavy colder air moves to the areas left by lighter warmer air, causing wind.

A simple experiment to show air pressure can be carried out with a can, water and ice.

You can find it here:

<https://www.youtube.com/watch?v=7cbTSTV3pWI>



Canette VS Pression atmosphérique

USEFUL LINKS

The next links are to short science shows related to weather and the weather forecast that can serve as supplemental activities, either to view together in week A, or independently in week B.

- A TV science show *C'est pas sorcier* about meteo:
<https://www.youtube.com/watch?v=ldlhPV5uOjk>
- An episode of *Sendung mit der Maus* about weather:
<https://www.wdrmaus.de/filme/sachgeschichten/wetterbericht.php5>

WEATHER INVESTIGATION: WEEK PLAN

TASKS AND EXPERIMENTS							
ACTIVITY	TIMING	TYPE	MON	TUES	WEDN	THUR	FRI
WEATHER JOURNAL	EVERYDAY 5-10 minutes	Observation and data collection					
CLOUDS KEY	EVERYDAY approx. 20 min.	Observation and classification					
WEATHER VANE*	ONE OF FIRST DAYS approx. 40 min.	Instrument building					
WHERE DOES WATER GO	EVERYDAY 5-10 minutes	Experiment					
WIND EXPERIMENT	20-30 minutes	Experiment					
	WARNING: ADULT IS NEEDED, INVESTIGATION INCLUDES FIRE						
WEATHER REPORT	LAST DAY approx. 40 min	Data treatment and interpretation					

* If this investigation is done at the beginning of the week, the instrument can be used in daily observation and included in the weather journal

ANY OTHER IDEAS?

AFTER STAGE: SUGGESTIONS FOR WHEN CHILDREN COME BACK TO SCHOOL

STEP 1 – WHOLE GROUP BRAINSTORMING	
CONCLUSIONS ON THE TOPIC	
WHAT TO DO	HOW TO DO IT
Create Weather Graphs	Produce charts with the data the children collected, including the evolution of variables documented, such as wind and temperature.
Discuss investigations (air movement, clouds, evaporation)	Engage the class in whole group talk about their independent investigations, including discussing observations, results, conclusions, as well as surprises and difficulties experienced.
Introduce a weather saying	Bring weather-related sayings in different languages, translate them and explain their meaning. As the children, Can you relate this saying to what you have learned with the weather activities?
Play a weather quiz	Develop a quiz to be elaborated by children by assigning each child to bring in one question and the answer, and then compile these together into a playful quiz.
Share children's weather documentations	Collect photos of children's documentations to display to the class. These can be sent via email to the teacher so they can be projected in the classroom for discussion and comparison.

USEFUL RESOURCES
<p>USEFUL LINKS</p> <p>Science.lu has numerous interesting videos that can support further extensions for discovering weather phenomena, for example:</p> <ul style="list-style-type: none"> ● Where do clouds come from in the sky: https://science.lu/de/wei-entsti-wolleken-um-himmel ● More clouds: https://science.lu/de/wiederballon/wei-entsti-wolleken ● Where does wind come from: https://science.lu/de/kuck-leiwer-op-sciencelu/wei-du-wees-net-wei-wand-entsteet ()

Which cloud is it?

Look carefully at your cloud. Answer the questions below and follow the instructions. When you reach a cloud name in bold, that is the type of cloud you are observing.

1. Does it Rain?

No → go to number 2.

Yes → with thunder, lightning, & heavy rain - your cloud is a **cumulonimbus**.



Yes → but only drizzly, with small raindrops - your cloud is a **nimbostratus**.



2. Is it a high wispy cloud, like a horse's tail?

No → go to number 3.

Yes → your cloud is a **cirrus**.



3. Is it flat & layered, puffy & bumpy, or some of both?

Flat & layered → go to number 4.

Puffy & bumpy → go to number 5.

Both → If your cloud is a nearly solid layer of large puffs (the size of your fist or larger), your cloud is a **stratocumulus**.



4. Determine how high and how thick your flat layered cloud is.

If your cloud is high, thin, and the sun is shining casting distinct shadows, it is a **cirrostratus**.



If it is thicker, the sun is dimmer, and there are hardly any shadows, it is an **altostratus**.



If it is a low cloud, so low it's hard to see the bottom and it covers most of the sky, it is a **stratus**.



5. Hold your hand up toward your cloud. Look at the size of the puffs. Compare them to your hand.

If the puffs are the size of your fingernail (very small), your cloud is a **cirrocumulus**.



If the puffs are the size of your thumb (medium-sized), your cloud is an **altocumulus**.



If the puffs are the size of your fist (large), your cloud is a **cumulus**.



WEATHER JOURNAL

You will need: Pen, pencil, markers, And... your eyes.
Weather observation grid,

What to do: Record weather data every day for this week, ideally at the same time and same place.

- TIPS:**
- Document your findings, including recording the temperature and noting the wind direction.
 - Choose the most appropriate icon for the day, and describe the weather characteristics on the accompanying data sheet.
 - Be sure to look up at the sky and observe the clouds!
 - What does today's weather make you feel like? What do you like doing in this type of weather?
 - Turn the page and draw a picture that relates to today's weather.



WEATHER JOURNAL

WEATHER OBSERVATION GRID						
Date & Day	Temp.	Wind direction	Icon	Describe the weather	Clouds	Today's weather... reminds me of / makes me feel / is ideal for doing...

CLOUD IDENTIFICATION KEY

Did you document clouds in your weather journal yet? If so, how did you describe them? Do clouds all look the same? In this investigation you will learn to identify them using a dichotomous key.

You will need: Clouds Key.

What to do: Look up at the sky and spend a few minutes observing the clouds. What do you notice? Describe what you see, including the clouds as well as their movement and location in the sky. Use the following key to try to identify the kinds of clouds in the sky today, and include the name of the clouds in your weather journal if you have one!

TIPS:

- Start with question 1, and let your answers choose the path on the key, until you end with the name for the type of cloud.

BUILD A WEATHER VANE

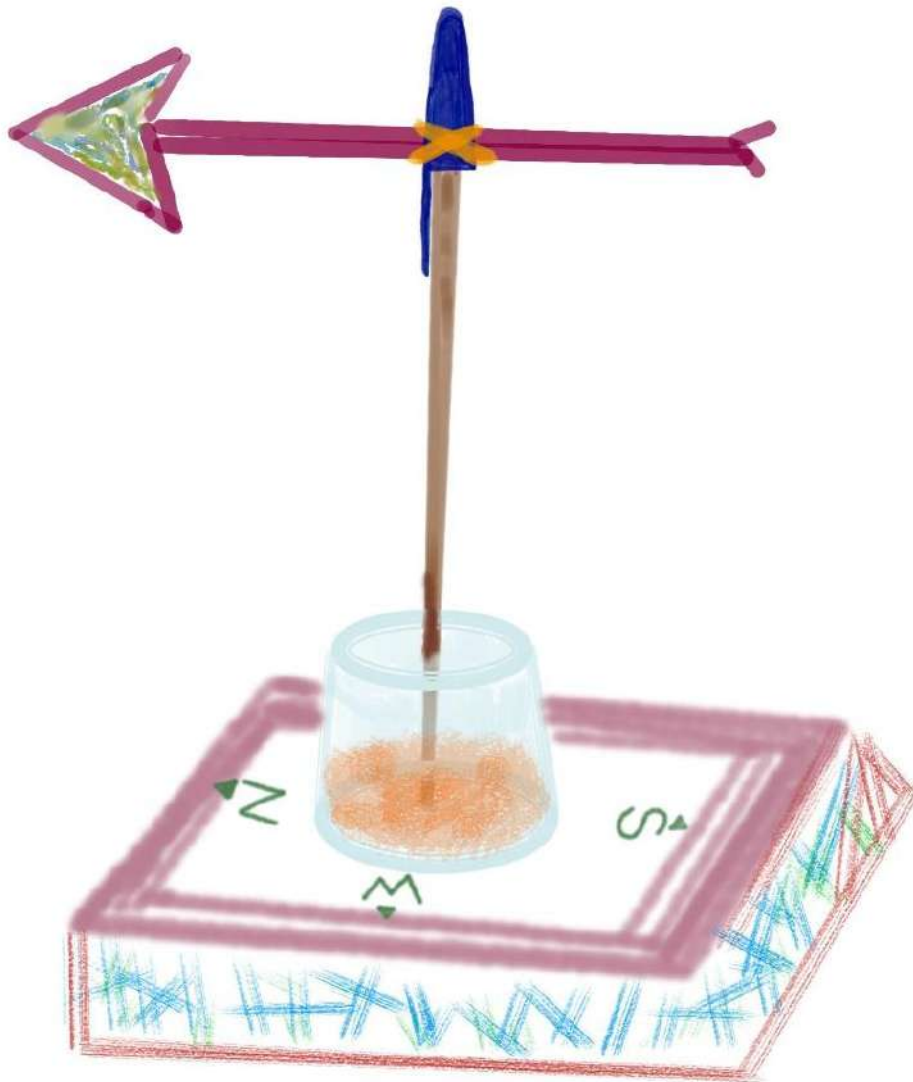
There are several different types of weather instruments that you can build to use at home. Recording data in this way can help you understand weather patterns and this can support making predictions about the forecast ahead. One instrument that has been used for thousands of years is a weather vane, and there are many different sizes and shapes possible.

You will need: Cardboard and card box
Scissors
Glue and tape
Pen, pencil, paint or markers
Thin stick

Something to hold the vane, such as a plastic cup with a hole in the bottom or an empty flower pot with small rocks, sand or soil to hold the vane steady

What to do: For your weather documentation, you will build a weather vane to track wind speed and direction.

- TIPS:**
- Draw an arrow roughly the size of your hand on the cardboard. Decorate it as much as you like.
 - Cut the arrow and stick it to the pen's top. Place the top on the thin stick.
 - If you are using a cup, cut a hole on the bottom, place it upside down and stick the stick.
 - Now, here comes a little challenge!!! In order to determine the wind's direction, you need to locate west, east, south and north. *Clue 1:* The sun comes from the east in the morning and leaves through the west at night-time. *Clue 2:* You can also use a compass or a compass app.
 - Once you have located these four cardinal points, draw four arrows pointing to each on a piece of paper and place the cup over it in the appropriate direction.
 - Be sure to secure your weather vane so it does not fly over. For instance, by attaching it to a heavy card box with tape.
 - Use your wind vane to collect weather data every day. Where does it point to? Which direction is the wind coming from? Where is the wind going to? Can you describe its speed?



WHERE DOES WATER GO?

Have you ever wondered where the water goes after it rains?
This activity can help you investigate the question, where does water go?

You will need: Pencil, colors
Water, four glasses (same size) and two plates
Ruler or measuring tape

What to do: You will observe what happens to water that you leave out in an open glass versus what happens to water left out in a closed glass.

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- TIPS:**
- Set up your first investigation: Fill the first glass with water. Measure the height of water and place the glass somewhere that it can remain undisturbed. Fill the second glass with the same amount of water, but this time, place a cover of some sort over it. Leave it next to the first glass, also undisturbed.
 - Then, set up a second investigation, in which you do the same thing again, with two glasses (one open and one covered). This time, find a place outside to leave them.
 - Every day, measure the height of water and document it in a table.
 - Make a drawing about the experiment and write your conclusions.
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WHERE DOES WATER GO?

OBSERVATION GRID				
Date & Day	Open Glass (inside)	Closed Glass (inside)	Open Glass (outside)	Closed Glass (outside)



WEATHER REPORT

You will need: Pen, pencil
Completed weather journal from the week

Optional:
phone, tablet or computer.

What to do: Review the weather data that you have collected this week. How can you describe the weather? What patterns do you see? Write a 1-2 paragraph summary of the weather, including all of the data you have collected.

- TIPS:**
- Assume that the person you are writing to was not in Luxembourg this past week. How can you take all your data and make it descriptive enough that a reader has a good understanding of the week's weather?
 - Make sure that you use weather vocabulary (rain, gusts of wind coming from NW, ...).
 - Optionally, you can watch a weather forecast to get inspiration about how meteorologists explain their predictions and discuss their data. Record yourself describing the weather. Today you can be the "meteorologist"!
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