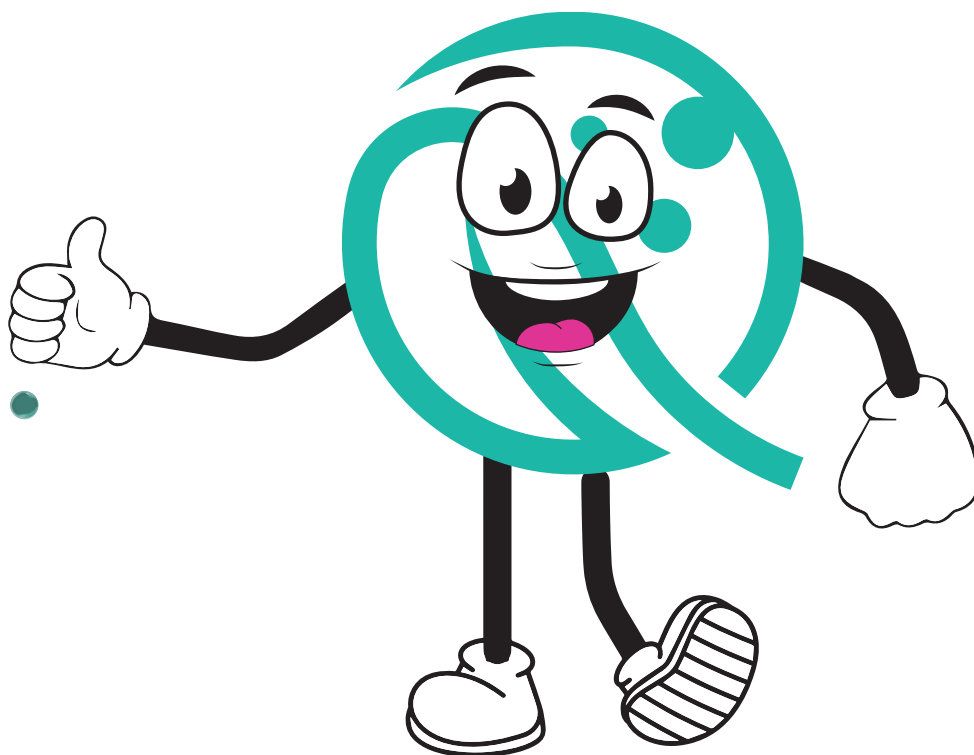


WORKBOOK

TO LEARN ABOUT THE INDOOR AIR QUALITY



EVIDENCE DRIVEN INDOOR AIR QUALITY IMPROVEMENT



THIS PROJECT HAS RECEIVED FUNDING FROM THE
EUROPEAN UNION'S HORIZON EUROPE RESEARCH AND
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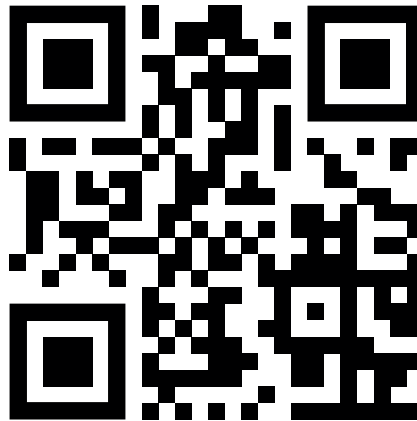
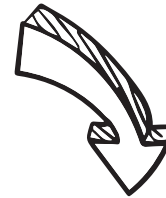


What is EDIAQI?

EDIAQI is a research and innovation project that focuses on the study of indoor air pollution in European cities. Its main objective is to understand the sources, exposure pathways, and health effects of indoor air pollution.

The project brings together 18 organizations from 11 different European countries, providing a combination of interdisciplinary skills and expertise in various fields.

Learn more about EDIAQI



EDIAQI Website

WELCOME!

Do you want to learn more about the pollutants present in the air around us? With the help of this workbook, you can engage in various activities to understand indoor air pollution.

In addition to learning about the types of pollutants, you will discover their sources, the effects they have on our health and the environment.

Best of all, you will also learn how you can contribute to ensuring that indoor spaces maintain good air quality!

Are you ready?

Let's go!

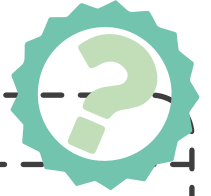
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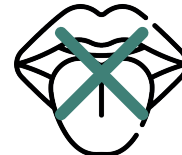
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AIR QUALITY



What is air?

To learn about indoor air quality, we first need to understand what air is. Air is a mixture of invisible gases that surrounds our planet. It is colorless, odorless, and tasteless, meaning we can't see it because it has no color, we can't smell it, and we can't taste it.

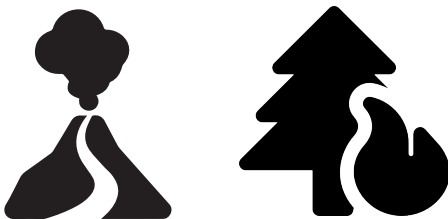


Air is crucial for all living beings, including humans, animals, and plants, as it contains the oxygen we breathe. That's why we all need clean air to grow and live healthy and strong.



How is outdoor air polluted?

Air can be contaminated in different ways, stemming from sources of natural origin (coming from the environment) and sources of artificial origin (produced by humans).



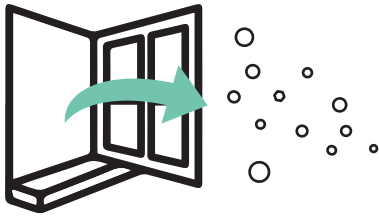
A small portion of pollution comes from natural sources, such as gases produced by volcanic eruptions or forest fires—events that we cannot control.



The majority of pollution is caused by contaminants produced by artificial sources. An example of these sources includes gases emitted by factories or vehicle exhaust gases, such as those from cars.

How is indoor air polluted?

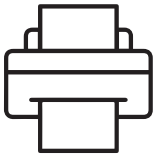
Indoor air can become contaminated for various reasons:



If outdoor air is polluted, opening doors and windows allows the pollution to enter.



Due to the use of cleaning products, air fresheners, perfumes, tobacco, etc.



Through the use of printers, photocopiers, ionizers, etc.

What is air quality index?

Air can be contaminated to a greater or lesser extent. When the air is less contaminated, we say there is good air quality, and when the air is more polluted, we say there is poor air quality. Air quality is measured using the air quality index. Therefore, we refer to air quality when we want to classify how polluted the air is.



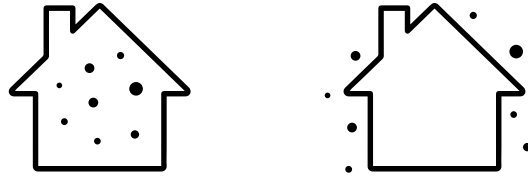
POOR AIR QUALITY



GOOD AIR QUALITY

Why is it important to care for indoor air quality?

Outdoor air pollution in cities has increased in recent years. This directly impacts the air we breathe indoors, especially in densely populated areas like large cities.



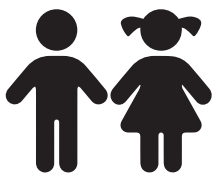
On average, people spend 90% of their time indoors, such as in school, at work, or at home.



How does poor indoor air quality affect us?

Air pollution affects everyone, but it is particularly dangerous for children like you, pregnant women, and older individuals, such as your grandparents.

Additionally, people with respiratory or cardiovascular diseases are more vulnerable.



Breathing in polluted air can cause headaches, affect our lungs, and also impact our heart.



iNDOOR AiR POLLUTANTS

CARBON DIOXIDE

What is it?

Carbon Dioxide (CO₂) is a gas that we cannot see or smell. All humans exhale carbon dioxide when we breathe. While **carbon dioxide is not an air pollutant**, it serves as an indirect indicator of the relative humidity level, the presence of aerosols, particles, viruses, and bacteria in the air we breathe. Therefore, it is crucial to know its value as it allows us to regulate ventilation indoors.

Effects on health

High concentrations of carbon dioxide influence our respiratory system, cardiovascular system, and cognitive system.

Depending on the concentration of carbon dioxide, we may experience symptoms such as a sore throat, eye irritation, sneezing, increased blood pressure, decreased concentration and performance, among others.

Learn a bit more...

The concentration of CO₂ in the air is measured in parts per million (PPM). Outdoors, carbon dioxide levels are usually around 420 PPM. In closed environments, such as schools or homes, there are no unified limits for all countries on the maximum CO₂ concentration, but there are recommended values. The recommended values for indoor carbon dioxide concentration are indicative and are commonly around:



>1200 PPM



>800 PPM



<600 PPM

NOW THAT YOU'VE LEARNED MORE ABOUT CO₂, LET'S DO AN ACTIVITY!

GO TO THE PAGE
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OZONE

What is it?

Ozone (O₃) is a colorless and odorless gas. At high levels in the atmosphere (stratospheric ozone) it protects us from the sun's rays and ultraviolet radiation. However, at low levels in the atmosphere where we live (tropospheric ozone), it acts as a greenhouse gas, trapping heat and having negative effects on our health.

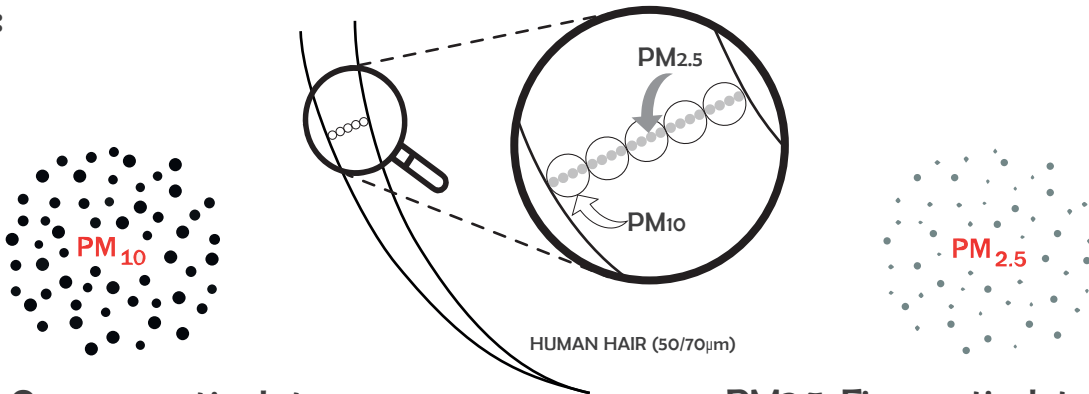
NOW THAT YOU'VE LEARNED MORE ABOUT O₃, LET'S DO AN ACTIVITY!

GO TO THE PAGE
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PARTICULATE MATTER

What is it?

Particulate Matter (PM) is composed of very small liquid and solid elements, sometimes we can't see it. They are classified based on the size of its particles:



PM₁₀_Coarse particulate matter: It has a larger diameter and when breathed in it stays in our lungs. (Dust, pollen, mold, etc.)

PM_{2.5}_Fine particulate matter: It has a smaller diameter and when breathed in can enter our bloodstream. (Particles from car exhaust pipes, etc.)

NOW THAT YOU'VE LEARNED MORE ABOUT PM, LET'S DO AN ACTIVITY!

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VOLATILE ORGANIC COMPOUNDS

What are they?

Volatile Organic Compounds (VOCs) are chemical substances found in a gaseous state in the air. VOCs are among the primary pollutants in indoor spaces. Examples of products we use in our daily lives that release VOCs into the air we breathe include perfumes, some cleaning products or air fresheners.

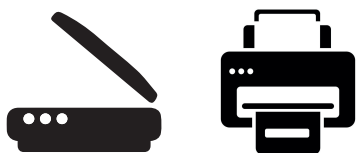
NOW THAT YOU'VE LEARNED MORE ABOUT VOCs, LET'S DO AN ACTIVITY!

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Principal indoor sources

O₃

Ozone is emitted by electronic equipment such as printers or scanners.



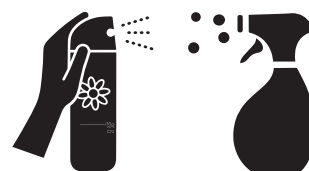
PM

PM are emitted by cigarette smoke or when we are cooking.



VOCs

VOCs are emitted by perfumes, air fresheners or some cleaning products.



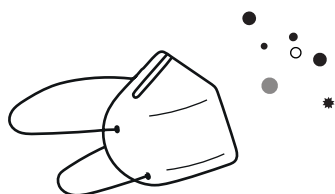
Effects on health

This pollutants affects our health and can cause, depend of the type of pollutant, coughing, fatigue, nausea, allergies, irritation in the nose and eyes, respiratory, cardiovascular diseases or damage to the central nervous system.



RECOMMENDATIONS

What to do if there is poor indoor air quality (IAQ)?



Use masks to avoid breathing in contaminants present in the air.

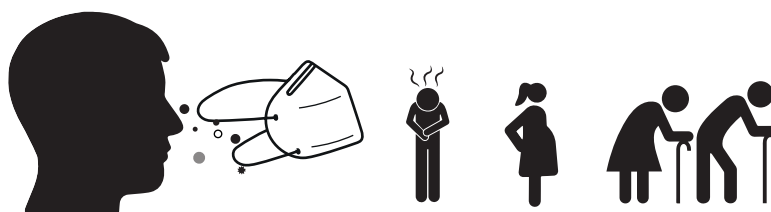


Turn on mechanical ventilation or open windows and doors to naturally ventilate the space.



Identify the possible source of contamination and remove it from the area.

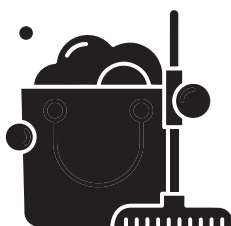
How can we improve indoor air quality (IAQ)?



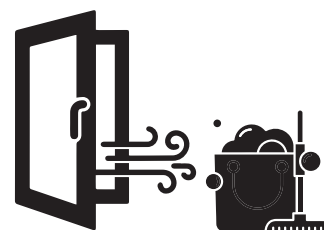
Use masks when in indoor spaces with many people, especially if they are sick, elderly, or pregnant. Additionally, always use a mask if you have a contagious disease like a cold or flu to prevent spreading the illness through the air.



Share what we have learned with our family and friends so they can also learn about air quality and contribute to its improvement.



Maintain good cleanliness of ventilation ducts and indoor spaces. Avoid the use of air fresheners.



When performing cleaning tasks, open windows to prevent the concentration of contaminants from cleaning products.

ACTivITieS

OUTDOOR SOURCES

There are various sources of outdoor air pollution; let's see if you can identify them. Look at the drawing and think about which external sources of pollution are present in the image, then point them out/circle them. Remember that there are both natural and artificial sources of pollution.



CO₂ CONCENTRATION

Since we know humans exhale carbon dioxide when we breathe, the more people in an unventilated indoor space, the higher the concentration of this gas.

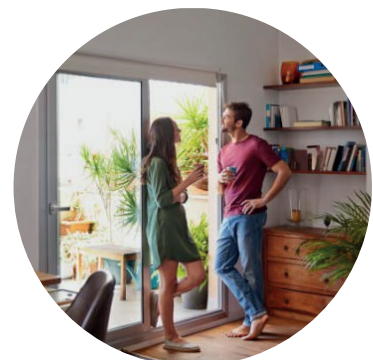
Knowing the recommended concentrations of CO₂ in indoor spaces, can you guess at what concentration levels you think there will be in these unventilated indoor spaces?



>1200 PPM

>800 PPM

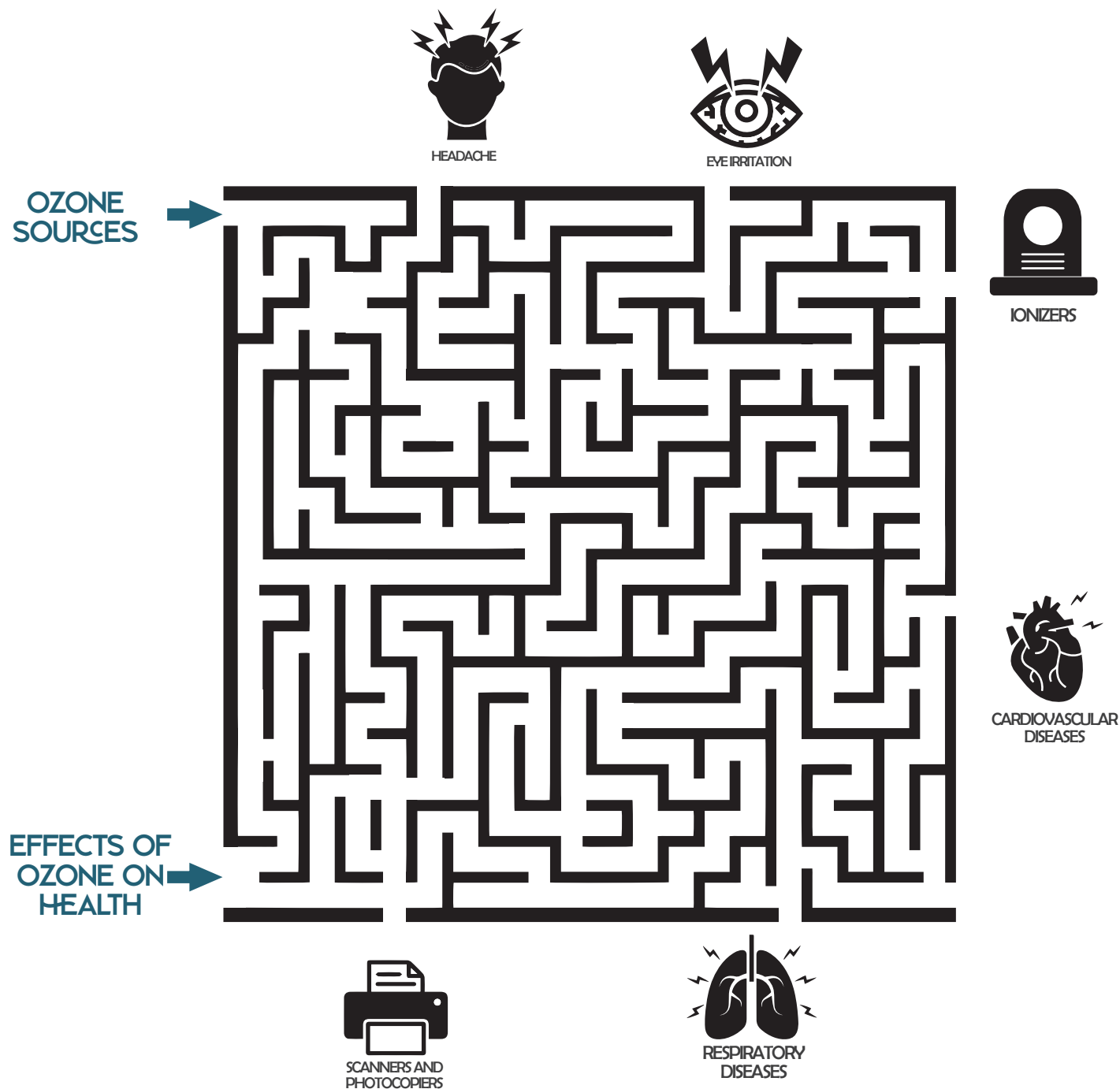
<600 PPM



THE MAZE

As we have learned, Ozone causes various negative effects on our health and comes from different sources. Would you be able to find the correct path to the effects and sources?

Let's go!



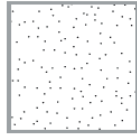
SURFACE CLEANING

Through this activity, we will determine the amount of particulate matter in our surroundings. Particulate matter in the air settles on the surfaces of the objects around us.

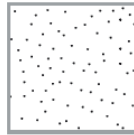
Pollution Level



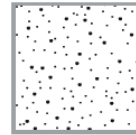
1
NOT
CONTAMINATED



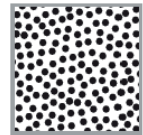
2
SOMEWHAT
CONTAMINATED



3
CONTAMINATED



4
FAIRLY
CONTAMINATED



5
VERY
CONTAMINATED


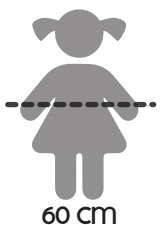
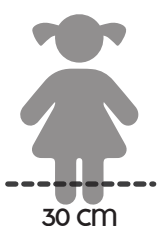
Take the cotton balls dampened with water. Collect samples from different elements at various heights, such as walls, doors, or furniture. Simply drag the cotton ball over the surface of the element as if you were cleaning it.

Surface 1:


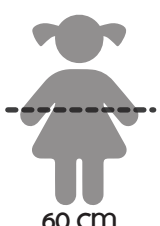
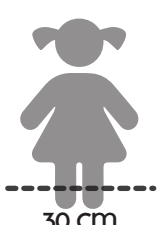
HEIGHT	PLACE YOUR SAMPLE HERE	LEVEL 1-5
 90 cm		
 60 cm		
 30 cm		

cm = centimeters

Surface 2:

HEIGHT	PLACE YOUR SAMPLE HERE	LEVEL 1-5
 90 cm		
 60 cm		
 30 cm		

Surface 3:

HEIGHT	PLACE YOUR SAMPLE HERE	LEVEL 1-5
 90 cm		
 60 cm		
 30 cm		

VOCs SOURCES

As we've learned, many products we use emit volatile organic compounds (VOCs) into the air we breathe. Can you find the 5 elements that pollute indoor air by emitting VOCs?



WORD SEARCH

Identify Contaminants

Can you find the 10 types of indoor air pollutants hidden in this word search? Give it a try!

I	P	M	R	I	U	X	N	J	F	U	Y	S	M
D	T	O	B	A	C	C	O	E	P	O	L	V	O
U	Q	T	M	A	D	H	L	V	F	K	F	L	H
S	E	W	O	O	C	A	Z	P	I	A	O	I	D
T	M	P	R	E	S	O	R	A	H	M	R	C	L
S	G	W	A	J	C	K	L	E	N	B	M	O	E
P	C	C	M	M	D	O	C	O	X	I	A	N	N
F	H	T	I	E	O	I	L	H	G	E	L	P	C
C	A	I	R	F	R	E	S	H	E	N	E	R	E
M	L	Z	C	T	A	A	I	J	B	T	E	I	N
O	K	A	B	A	N	W	N	A	I	A	H	N	O
L	S	E	Q	D	E	O	D	O	R	A	N	T	I
D	L	V	S	I	E	U	M	M	H	O	D	E	L
V	D	B	N	E	S	C	A	N	N	N	E	R	N

1. AIR FRESHENER

2. PRINTER

3. SCANNER

4. DEODORANT

5. DUST

6. MOLD

7. COLOGNE

8. TOBACCO

9. CHALK

MAKE YOUR OWN POSTER

Now It's time to tell everyone what you have learned! Create a poster to tell the whole school how the air gets polluted, the main sources of pollution, and some recommendations that can be implemented to improve indoor air quality. Use any materials you want!

Some tips...

1. Write large titles

Remember that a title grabs attention, so others will come to see your poster because they will be interested.

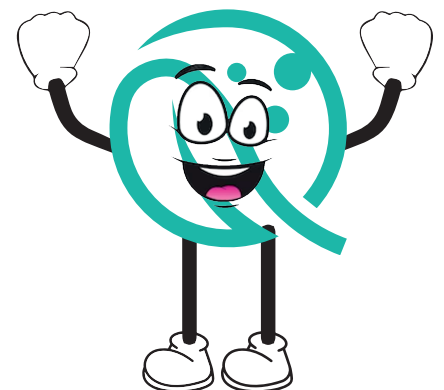
2. Include drawings

It's important that the poster explains what you have learned, and there's no better way to do this than through drawings.

3. Write information

You can make a poster explaining everything you have learned or focus on an aspect that caught your attention (for example, sources of pollution, types of pollutants, or recommendations to improve indoor air quality).

STICK IT ON THE WALL FOR EVERYONE TO SEE!





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