

EXTRA  
MISSION

06

# Fantastik'eau

I love water. I take care of it!

## THE SONOSCOPE IS LISTENING



CYCLE 3

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STUDENT WORKBOOK  
CYCLE 3

**BACKGROUND**

Conscious Charlie is worried about the tap that has been leaking because of Wasteful Wally's careless behaviour. He suspects that there are other leaks in the house. But how to discover them? Aqua-Mary has an idea, but she needs your help to make it happen!



THIS IS A JOB FOR  
**THE  
FANTASTIK'EAU  
CREW!**

**DO THIS ACTIVITY  
WITH JÉRÉMIE**

Watch the short video featuring Jérémie, and do the activity with him! All of the Fantastik'eau content and videos are available on the C.I.EAU's website at:

[www.cieau.org/fantastikeau](http://www.cieau.org/fantastikeau)

EXTRA  
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06**YOUR MISSION**

Make a sonoscope to listen to the water flowing through the pipes and detect any leaks.

**DURATION**

45 minutes

**SUGGESTED MATERIALS, WITH ADULT SUPERVISION**

- 1 pushpin to pierce holes and 1 nail to enlarge them !
- 2 glasses made of clear, flexible plastic that each hold 250 millilitres of liquid
- 1 nail that is 10 centimetres long !
- 1 aluminum plate whose bottom has a diameter of about 6 centimetres
- Hot glue gun (or adhesive putty)
- Adhesive tape

**GOALS OF THE ACTIVITY**

- Recognize the distinctive sound that water makes when a leak is present.
- Learn how certain devices, such as the sonoscope, amplify sound and therefore help to detect water leaks.

**WARNING**

It is recommended to have an adult use a drill, a hole puncher or another tool to pierce a hole.

Make sure an adult is present when piercing holes in the glasses, handling the aluminum plate, and/or using the hot glue gun. The edges of the aluminum plate can become sharp.

If the sonoscope must be brought home, take some adhesive tape and wrap it around the edge of the nail several times.

To minimize the risk of injuries, you can slightly blunt the end of the nail using a file.

**OPTIONS AND TIPS**

Make holes in several glasses at once by sliding them one inside the other (if the chosen tool allows it) to speed things up.

Choose glasses made of flexible and clear plastic because they will allow you to see and better understand the final setup.

Make sure the nail tip touching the tube is very thin to help the sound spread as effectively as possible.



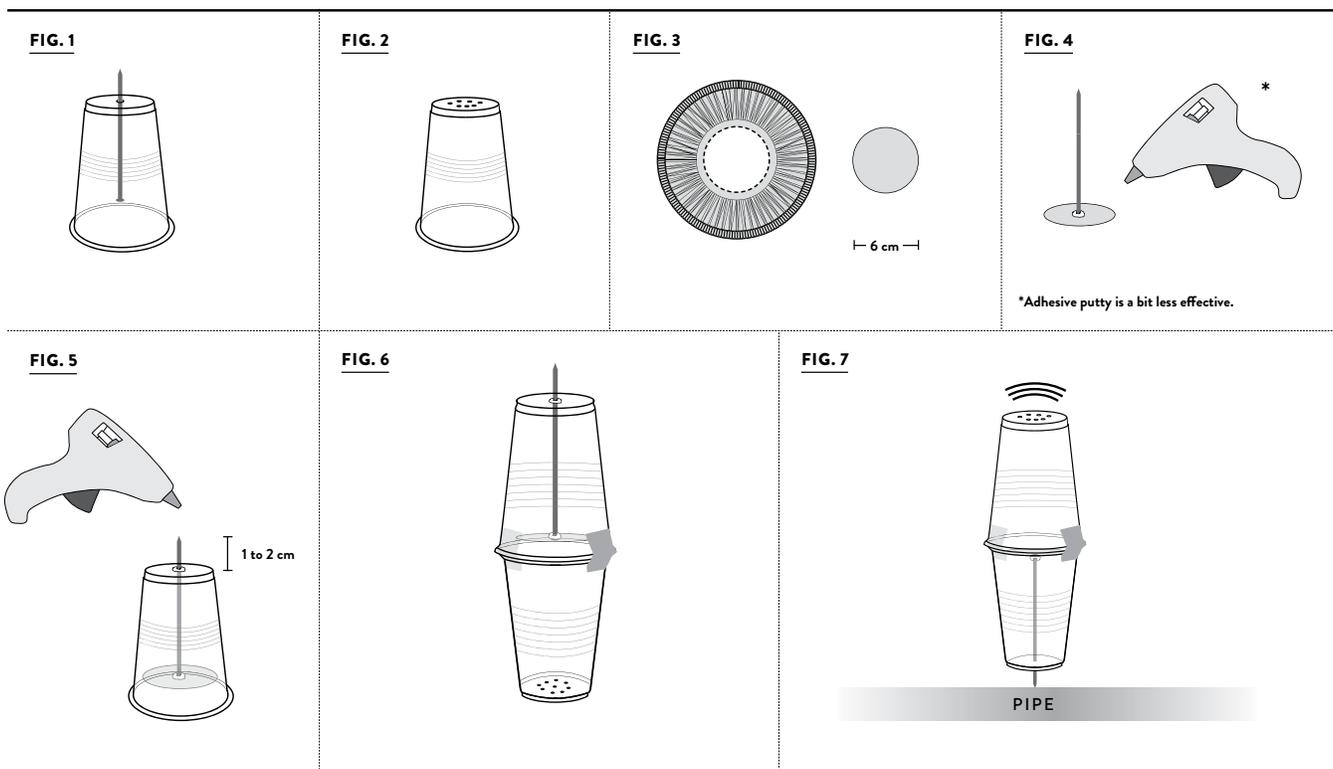
**CRYSTAL CLEARWATER** : Sound is in fact a vibration that can travel wherever there is matter. For instance, it travels through the air by making air molecules vibrate from the source of the sound to your ears. Sound can also travel through solid objects, such as a nail, by causing the particles that form this object to vibrate. With this sonoscope, the sound will be louder if it travels through a solid object then through a gas such as air. The sound will travel through the nail and then be amplified in the empty glass.



### DESIGNING THE PROTOTYPE OF THE SONOSCOPE

- In one of the glasses, pierce a hole using the pushpin in order to help insert a nail in it. ① !
- In the bottom of the other glass, pierce 8 to 12 holes using the pushpin. ② !
- In the bottom of the plate, cut out a circle with a 6 centimetres diameter. ③
- Using a few drops of hot glue (we strongly recommend you ask an adult for help with the glue gun) or adhesive putty, stick the nail head in the centre of the circle you just cut out. ④
- Insert the nail in the bottom of the glass (you should see about 1 to 2 centimetres of it sticking out from under the glass), and stick it into place (the aluminum plate must not touch the edges of the glass). ⑤
- Using adhesive tape, stick the other glass to your device. It will be used as a resonator. ⑥
- Place the tip of the nail on a water pipe. The pipe doesn't have to be close to a tap.
- Place your ear at the other end of the device, as if you were listening to a telephone.

### FIGURES



### WARNING

It is recommended to have an adult use a drill, a hole puncher or another tool to pierce a hole.



## CONCLUSION

Why use a metal nail instead of a plastic or wooden tip?

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Why do cities try to detect water leaks in pipes?

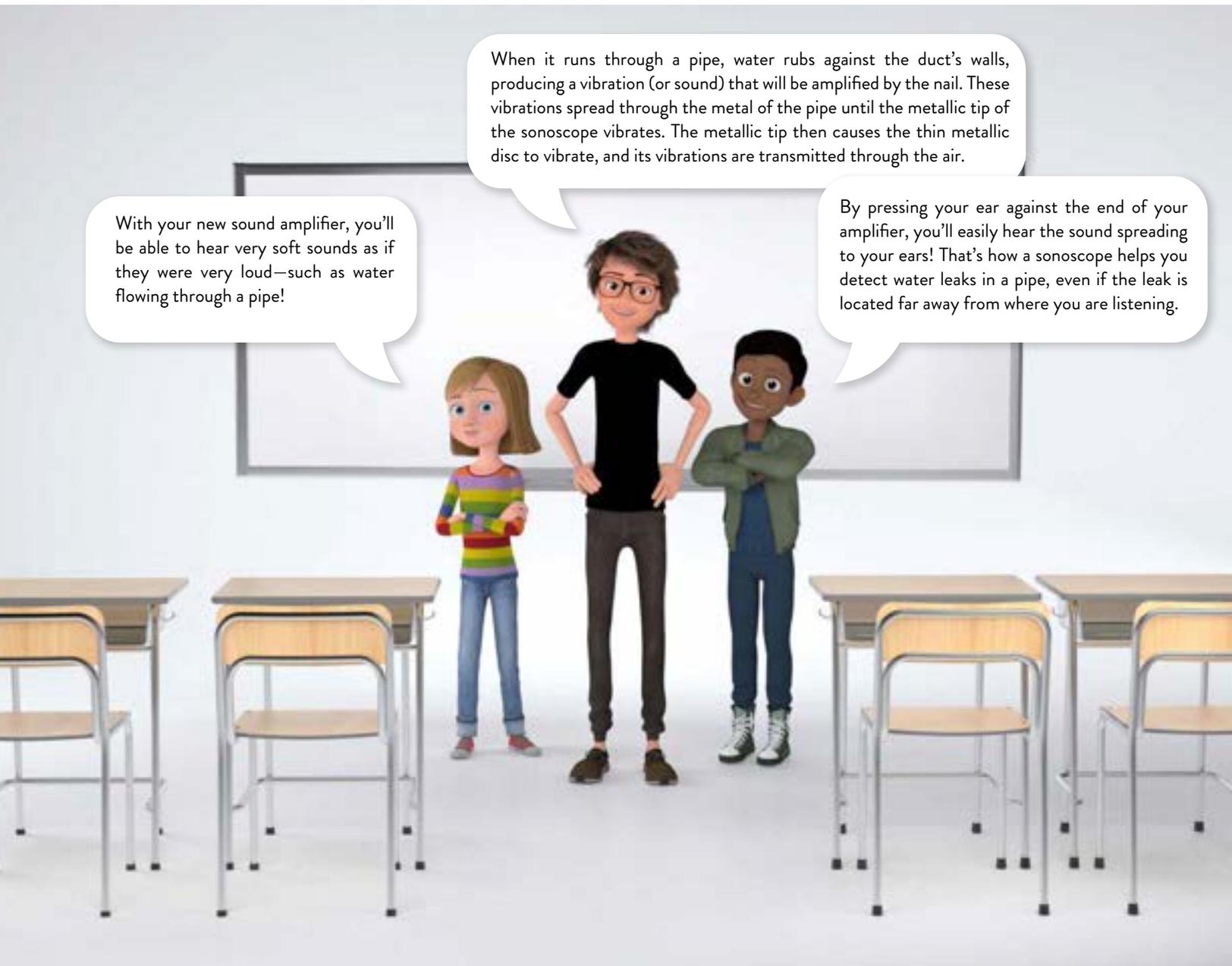
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## USEFUL TO KNOW

With your new sound amplifier, you'll be able to hear very soft sounds as if they were very loud—such as water flowing through a pipe!

When it runs through a pipe, water rubs against the duct's walls, producing a vibration (or sound) that will be amplified by the nail. These vibrations spread through the metal of the pipe until the metallic tip of the sonoscope vibrates. The metallic tip then causes the thin metallic disc to vibrate, and its vibrations are transmitted through the air.

By pressing your ear against the end of your amplifier, you'll easily hear the sound spreading to your ears! That's how a sonoscope helps you detect water leaks in a pipe, even if the leak is located far away from where you are listening.



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ANSWER KEY  
CYCLE 3



### ANSWER KEY

**Why use a metal nail instead of a plastic or wooden tip?**

Metal vibrates better than plastic or wood, which allows the sound to travel better.

**Why do cities try to detect water leaks in pipes?**

Because leaks in distribution systems are invisible, but they contribute in a major way to the water waste generated by drinking water treatment plants.

## EXCERPT FROM:

Fantastik'eau! I love water, I care for it! :

The Fantastik'eau educational package: Complete Guide, 2<sup>nd</sup> edition

This educational package was created by the CENTRE D'INTERPRÉTATION DE L'EAU

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## CREDITS

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The full list of people who contributed to the project (employees, volunteers, contract workers) is displayed on the C.I.EAU's website.

Collaboration—education: Virus 1334, Le Récit

Graphic design: Virus 1334

Illustrations: Simon Says Design

The following is a list of books, websites, pages, and publications dealing directly with the subjects covered in the Fantastik'eau educational package.

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Centre d'interprétation de l'eau (C.I.EAU) [www.cieau.org](http://www.cieau.org)

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Directory of drinking water distribution systems, groundwater supplied (French only):

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Directory of drinking water distribution systems, freshwater supplied (French only):

[www.environnement.gouv.qc.ca/eau/potable/production/index.asp](http://www.environnement.gouv.qc.ca/eau/potable/production/index.asp)

Réseau Environnement - *PEXEP-T Programme d'excellence en eau potable - Traitement*

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## **SPECIAL THANKS**

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