EXTRA MISSION 05

Fantastik'eau

I love water. I take care of it!

# ALERT! THERE'S A LEAK!

## CYCLE 3

CIEAU Centre d'interprétation de l'eau

Québec

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**STUDENT WORKBOOK**
**CYCLE 3**

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## BACKGROUND

Conscious Charlie and Wasteful Wally are late for a visit at the aquarium! Wasteful Wally leaves the house in a hurry, carrying Conscious Charlie on his back. He locks the door and rushes out. Walter, who happened to be passing by, notices the two companions forgot to fully turn off the tap of the kitchen sink, and it's slightly dripping! Conscious Charlie and Wasteful Wally are lucky that Walter happened to be there! Since he regularly waters their plants, Walter knew where they kept their spare key. He was able to get inside and close the tap. But what would have happened if no one had been there to turn the water off?

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**

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## YOUR MISSION

**Simulate a water leak and measure the amount of water wasted.**

**AQUA-MARY** : Did you know that leaks can waste a lot of water? That's why it's important to detect and fix them as soon as possible.

## DIRECTIONS

If a leaking faucet lets out one drop of water per second for an entire day (24 hours), how much water is wasted?

**WALTER** : 1 000 litres = 1 cubic metre. That's the volume occupied by a regular-sized fridge.

## SUGGESTED MATERIALS, WITH ADULT SUPERVISION

- One 1 000 millilitres (1 litre) measuring cup
- One 250 millilitres glass made of clear and flexible plastic
- Scissors
- 1 cookie of your choice

## METHOD

Do you have a leaky faucet at home? If so, it would give you the perfect opportunity to do this activity!

You can also simulate a leak by turning on the faucet of your sink very slightly, until only one drop per second comes out.

Place a measuring cup under the leak, and observe how much time it takes to fill it with 200 millilitres of water.

Before you get started, try to guess how much time it will take to reach 200 millilitres of water. It might be a lot quicker than you think!

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## WHAT'S THE COOKIE FOR?

If you want to make this activity even funnier, you can make a bet with a friend or family member. Place the cookie on a little stand you can make by cutting a plastic glass. Make sure this stand is the same height as the 200 millilitres line of your measuring cup.

Make two slits on the sides of your stand. This will allow the water to circulate and prevent the stand from tipping over.

The person whose estimation of how much time it takes the water to reach 200 millilitres is the furthest from the actual result must drink the glass of water containing a wet cookie!

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You surely noticed that the time it takes to reach 200 millilitres of water, in the measuring cup with the cookie, can vary greatly from one experiment to another. The time it takes depends on the speed at which each drop of water falls.

## CALCULATIONS

How do you calculate the amount of water wasted by a single leak?

Let's use the experiment you just did to calculate the amount of water wasted by an imaginary leak (but one that could be real!). Let's say we lose one drop of water per second and the water reaches the 200 millilitres line in 10 minutes:

How much water would be wasted in 1 minute (litres)? _____

How much water would be wasted in 1 hour (litres)? _____

How much water would be wasted in 1 day (litres)? _____

How much water would be wasted in 1 year (litres)? _____

Use the hints below to make your calculations.

| HINT TO CALCULATE THE VOLUMES |
| --- |
| 1 000 ml = 1 L |

| HINTS TO CALCULATE THE TIME | |
| --- | --- |
| 1 minute = 60 seconds | 1 day = 24 hours |
| 1 hour = 60 minutes | 1 year = 365 days |

## YOUR CALCULATIONS

Use this space to show how you made your calculations.

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## DIVING DEEPER

Calculate the amount of water wasted in a town of 10 000 inhabitants, where 10% of the people have a similar leak that would go unfixed for a period of 1 year. _____

How much would this loss cost the city in total, if it costs the city in total $1.50 to produce 1 000 L of drinking water (and to treat this water after it is used)? _____

If an Olympic swimming pool can contain up to 3 500 000 L of water, how many Olympic swimming pools can we fill with this wasted water in 1 year? _____

If a standard above-ground swimming pool that stands 21 feet tall can contain up to 40 000 L of water, how many above-ground swimming pools can we fill with wasted water in 1 year? _____

## YOUR CALCULATIONS

Use this space to show how you made your calculations.

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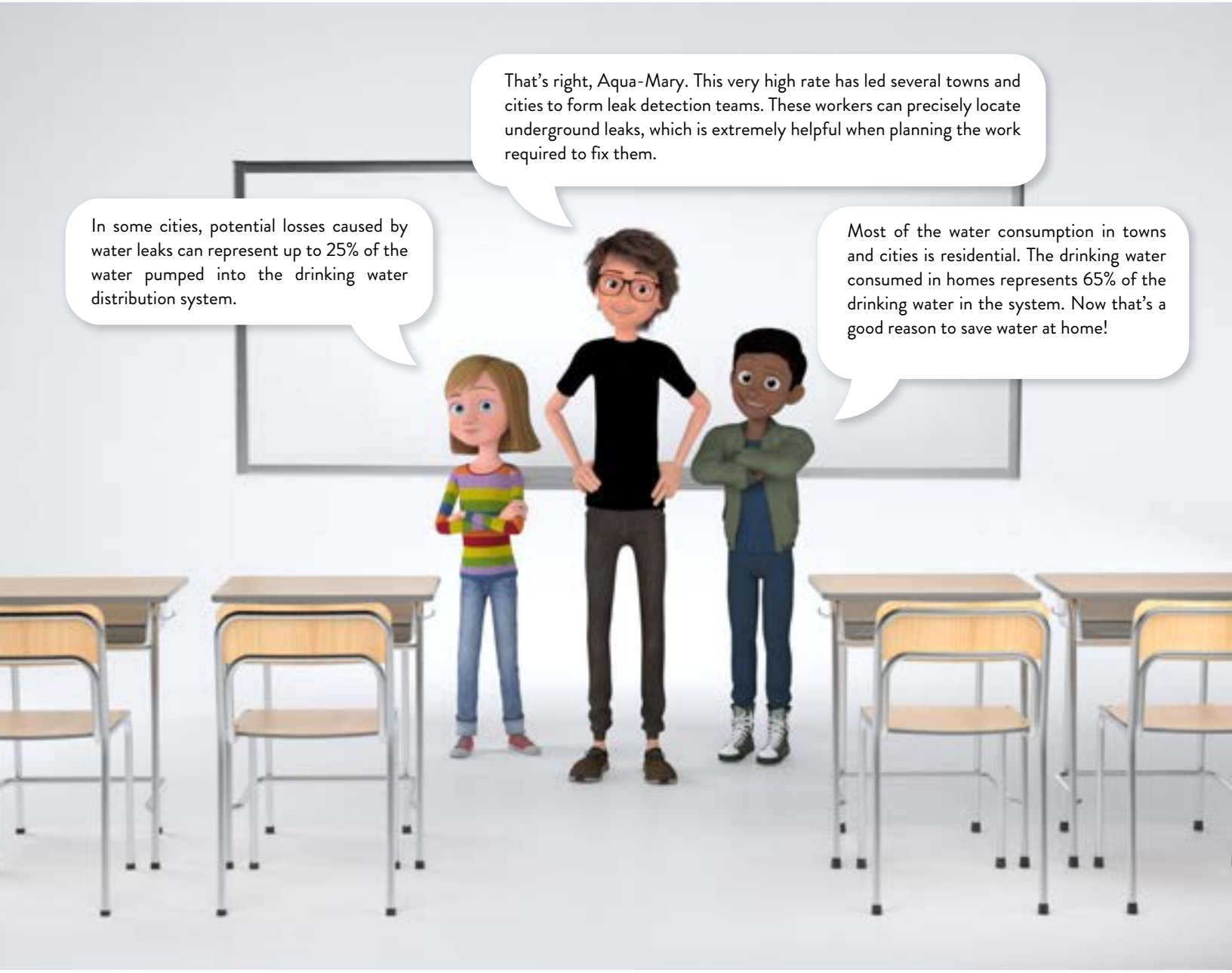
## CONCLUSION

At home, you won't always have someone to check that the faucets are properly turned off. Make sure you do it after using them!

## USEFUL TO KNOW



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## ANSWER KEY
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## ANSWER KEY

Your students probably noticed that the time it takes to reach 200 millilitres of water, in a measuring cup with a cookie, can vary from one experiment to another. Depending on the speed at which each drop of water falls, the time required may vary!

## CALCULATIONS

How do you calculate the amount of water wasted by a single leak?

Let's use the experiment you just did to calculate the amount of water wasted by an imaginary leak (but one that could be real!). Let's say we lose one drop of water per second and the water reaches the 200 millilitres line in 10 minutes:

*To simplify calculations, we start by finding the quantity of water wasted per minute, then convert it into litres. We also calculate the time using decimal values. Once this is done, we must always go back to the answer of the previous question to make the following calculation:*

**Amount of water wasted in one minute (litres)**

Calculations:

1. Find the volume of water wasted in millilitres:
   200 ml of water ÷ 10 minutes = 20 ml of water per minute.
2. Calculate the volume in litres:
   [20 ml of water ÷ 1 000 ml x 1 L] = 0.02 L in 1 minute.

## ANSWERS

**Quantity of water wasted in 1 hour (litres)**

[Quantity of water wasted in 1 minute] X 60 minutes

**Answer: 0.02 L x 60 minutes = 1.2 L per hour**

**Quantity of water wasted in 1 day (litres)**

[Quantity of water wasted in 1 hour] X 24 hours

**Answer: 1.2 L x 24 hours = 28.8 L of water per day**

**Quantity of water wasted in 1 year (litres)**

[Quantity of water wasted in 1 day] X 365 days

**Answer: 28.8 L x 365 days = 10 512 L of water per year**

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## DIVING DEEPER

If your Cycle 3 students are receptive and advanced in calculations, here are some additional questions we have included in the student workbook.

**Calculate the amount of water wasted in a town of 10 000 inhabitants, where 10% of the people have a similar leak that would go unfixed for a period of 1 year.**

[Amount of water wasted in 1 year] X 10 000 X 10 ÷ 100

**Answer: 10 512 L x 10 000 x 10 ÷ 100 = 10 512 000 L**

**How much would this loss cost the city in total, if it costs the city $1.50 to produce 1 000 L of drinking water (and to treat this water after it is used)?**

[Amount of water wasted in 1 year by the town] ÷ 1 000 L X $1.50

**Answer: 10 512 000 L ÷ 1 000 L x $1.50 = $15 768**

**If an Olympic swimming pool can contain up to 3 500 000 L of water, how many Olympic swimming pools can we fill with this wasted water in 1 year?**

[Amount of water wasted in 1 year by the town] ÷ 3 500 000 L

**Answer: 10 512 000 L ÷ 3 500 000 L = +/- 3 Olympic swimming pools**

**If a standard above-ground swimming pool that stands 21 feet tall can contain up to 40 000 L of water, how many above-ground swimming pools can we fill with wasted water in 1 year?**

[Amount of water wasted in 1 year by the town] ÷ 40 000 L

**Answer: 10 512 000 L ÷ 40 000 L = +/- 263 above-ground swimming pools**

## EXCERPT FROM:

Fantastik'eau! I love water, I care for it! :
The Fantastik'eau educational package: Complete Guide, 2nd edition

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## CREDITS

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Collaboration—education: Virus 1334, Le Récit
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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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## WEBOGRAPHY

All links associated with the references in this webography were functional on November 24, 2021.

American Water Works Association. Organization dedicated to water resource management. www.awwa.org

Centre d'interprétation de l'eau (C.I.EAU) www.cieau.org

Centre d'information sur l'eau. Les ressources en eau dans le monde.
www.cieau.com/les-ressources-en-eau/dans-le-monde/ressources-en-eau-monde

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# Fantastik'eau

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**ENJOYED THE EXPERIENCE? VISIT THE C.I.EAU'S WEBSITE FOR EVEN MORE EDUCATIONAL CONTENT:**

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