
$V = l \times w \times h$
$V = l \times w \times h$
The Hidden World of
Toilets
Volume
Monika Davies

Table of Contents

Toiling Toilets 4

A Whirling History 6

The Birth of the Flush Toilet 10

The Ins & Outs 12

Global Toilets 16

Out-of-This-World Toilets 20

Toilets in Developing Nations 22

Toilets for Tomorrow 26

Problem Solving 28

Glossary 30

Index 31

Answer Key 32

For Review Only

Toiling Toilets

It is estimated that we spend over $1\frac{1}{2}$ hours on toilets each week. That adds up to almost 92 days over a lifetime! We have a pretty serious relationship with our toilets. But, do we take them for granted?

Our toilets **toil** away for us every day. Yet, they get little thanks for their hard work! At first glance, a toilet is a simple device. It's designed to get rid of human waste. That's it; that's all. However, toilets are critical devices for proper **sanitation**.

Many people view their time on the "porcelain throne" as a regular part of their day. However, this is not the case for everyone. Across the globe, there are still 2.4 billion people who do not have access to toilets. This is a critical global issue. And it is a cause that the United Nations (UN) is supporting. Clean toilets for **developing countries** should be a worldwide priority. But the global community needs to work together to make that happen.

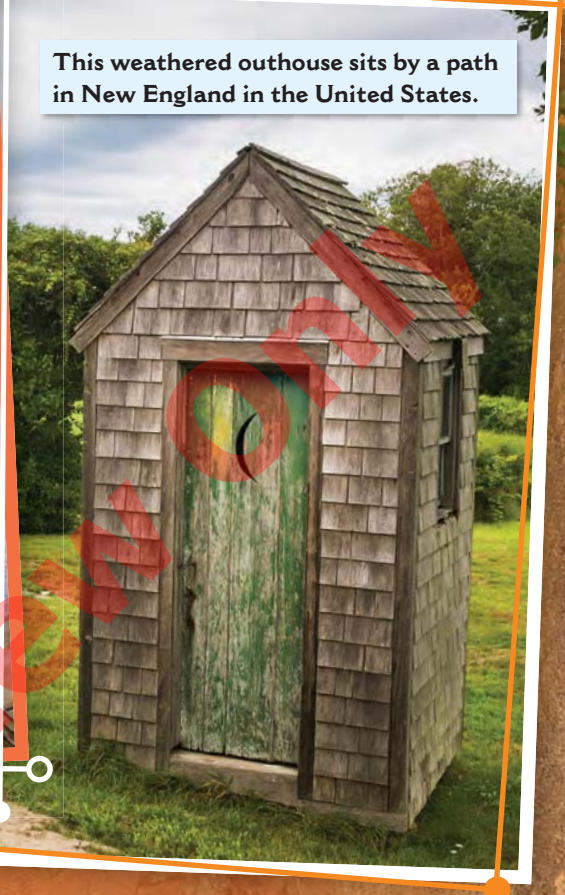
Perhaps you have never thought much about toilets. But, they have a colorful history. When you think of toilets, you probably picture the one in your home. But, toilets can be very different around the world.

Now, let's dive deep into the hidden world of toilets!

For Review Only



These ancient toilet artifacts are on display in a museum in Greece.



This weathered outhouse sits by a path in New England in the United States.

This medieval toilet is located in the castle of Xativa in Spain.

For Review Only

A Whirling History

Throughout history, people have had to deal with human waste. The modern solution is to flush that waste down the toilet. Sewage systems then drag it all far, far away. But, the flushing toilet wasn't always the go-to solution. Over the years, the toilet has taken on many shapes and forms. So, who gets credit for creating the toilet?

Ancient Rome

The toilet's origin story is murky. There is evidence that people from Scotland or Greece may have built the world's first restrooms. But, the ancient Romans built the best aqueducts. Aqueducts are pipe systems that transport water to large cities. They are a great way to import water from faraway sources!

The Romans built many bathhouses and **communal** restrooms. These were large structures that housed long benches where people could sit and "do their business." Rome once had 144 **latrines** and communal restrooms throughout the city!



This illustration shows a nineteenth-century Roman with servants in a communal bathroom.

However, the Romans did not entirely understand good **hygiene**. People could not simply buy toilet paper at a Roman market. Instead, Romans used a communal sponge on a stick to clean themselves. Unfortunately, this practice spread bacteria from person to person.



For Review Only

Let's Explore Math

Scientists estimate that Roman aqueducts carried about 60 cubic meters of water per minute. Imagine that a rectangular prism is filled with 60 cubic meters of water. It has a height of 5 meters. What are all the possible dimensions of its base? Draw and label models to prove your solutions.





public latrines in ancient Rome

For Preview Only

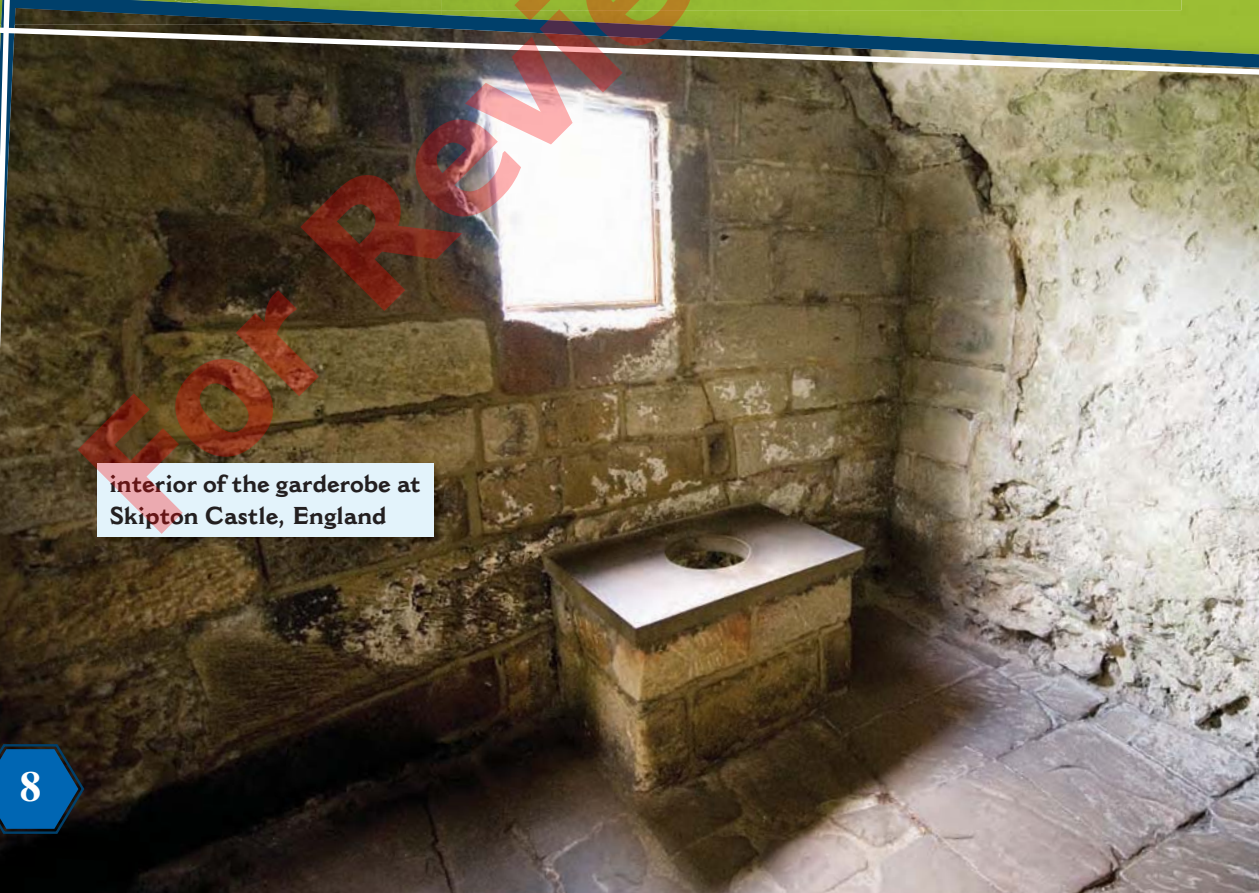
England

Before flush toilets and restrooms, people turned to chamber pots to do their business. These containers were used as **portable** toilets. People often kept them under their beds.

In medieval England, most people used these age-old chamber pots. But, the evolution of the toilet made its next leap in a bigger way. During this time, the garderobe (GAR-drohb) officially entered the toilet world. It was a unique—and smelly—addition to castle homes.



Antique copper chamber-pot



interior of the garderobe at Skipton Castle, England

For Review Only

Garderobes are small rooms tucked into the sides of castles. They can be seen sticking out from the castles. People would go into the room to do their business. Then, the garderobe used gravity to funnel waste away! Some later castles even had garderobes that emptied into the castle's moat.

So, what makes the garderobe so special? Think about the buildings in your city. Most of them have toilets. And, the architects who designed the buildings likely thought about where to put the toilet first. But, medieval England marked the first time and place architects thought about where the toilet should go.



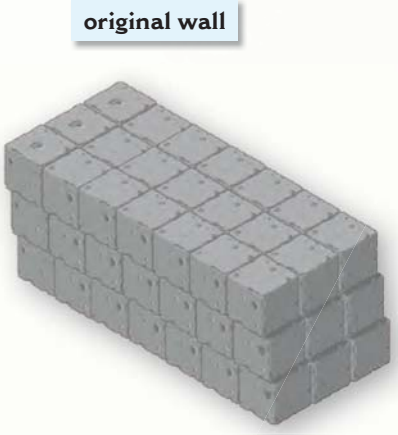
The garderobe at Beauman's Castle in Great Britain sticks out of the wall.

For Review Only

Let's Explore Math

Imagine that a builder in medieval England is doubling the height of the stone wall behind a garderobe, but keeping the other dimensions the same. Each stone is 1 cubic meter. Use the picture of the original wall to answer the questions.

1. What are the dimensions of the taller wall? Draw and label a model to prove your solution.
2. How does the volume of the new wall compare to the volume of the original wall?



Math Talk

1. What strategies do you use to estimate volume?
2. How are solid volume and liquid volume different? How are they similar?
3. What information would you label on a drawing of a rectangular prism? Why?
4. Do tall rectangular prisms always have greater volumes than short rectangular prisms? Why or why not?
5. Marcos says he calculates volume of a rectangular prism by multiplying the area of the base and the height. Mei says, "That won't work. You have to multiply length, width, and height." How do you think Marcos should respond to Mei?
6. How might toilet tank manufacturers need to use volume?

For Review Only