

THE TRUE LINE · BOOK TWO

The Secret of the Fall



How plumbers use gravity, air, and a quiet little moat so water leaves the house and sewer gas does not come in.

THE TRUE LINE

The Secret of the Fall

A True Line Book
Laid True · Ash's Yard

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A gift from Valley Tile
Northridge, California

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Written for young builders ages 8 to 18.
Free to read. Free to share with a family.

These methods are real. Tools can bite. Work with a grown-up.
Local building codes always beat a picture book.

The True Line · Six Books

Book One The Secret of Square, Level & Plumb

Book Two The Secret of the Fall

Book Three The Secret of the Waste Side

Book Four The Secret of the Scribe

Book Five The Secret of the Bed

Book Six The Secret of the Dry Room

How to Read a True Line Book

These books keep real trade secrets. Younger readers follow Ash and the pictures. Older readers use the green boxes and go outside with an adult. If you are sitting in a showroom, or in the car on the way to look at stone, the watching lists in the back will give your eyes something honest to do.

IF YOU ARE 8 TO 12

- Read the story first. Look hard at the pictures.
- Try the backyard tests with an adult.
- You do not need a job site. A hose, a board, and chalk are enough.
- New words live in the Word Chest at the back.
- If the house is being remodeled, watch one thing at a time.

IF YOU ARE 13 TO 18

- Read the green boxes. Those are working rules.
- Scale the numbers up. Bigger layouts, smaller percent error.
- Check your tools before you trust them.
- Saws, solder, drain chemicals, and live water are grown-up jobs.
- A trade is a promise: do the work true, even when no one is looking.



TWO KINDS OF WATER

Push and Fall

Ash the mason brought a friend. “This is Wren,” he said. “Wren talks to water for a living.” Supply pipes push. Drain pipes fall. Most plumbing secrets belong to the falling kind. Gravity is still the boss. The plumber only aims it. If you are watching a bathroom come apart, the pretty fixtures come off first. Under them is a hill, a moat, and a pipe that lets the house breathe. Those three things are older than copper and plastic. The Romans knew the hill. Every honest drain still owes them.

The Goldilocks Slope



Too flat, the waste sits. Too steep, the water races away and leaves the solids behind. Just right is a gentle hill: one quarter of an inch down for every foot forward. That number is not a fashion. It is a speed. Water and what travels with it have to stay together.

TRY THIS

On a long board, mark every foot. Drop each mark $\frac{1}{4}$ inch. Rest a tube on the marks. Pour a little water. Watch it walk, not sprint.

FOR OLDER BUILDERS

House drains 2-1/2 inches and smaller usually want $\frac{1}{4}$ in. per foot. Larger pipes may be allowed $\frac{1}{8}$ in. per foot. A belly — a sag between hangers — is a clog waiting to happen. Lay out the fall before you glue.

Why the Number Is $\frac{1}{4}$ Inch

That slope aims for about two feet per second. Fast enough to carry solids. Slow enough that water does not abandon them.

TOO FLAT

Water and waste sit. The pipe becomes a swamp.

JUST RIGHT

Water and solids travel together. That is the whole secret.

TOO STEEP

Water outruns the solids. The solids dry and clog.

A BELLY

A dip between supports is a trap you did not mean to build.

The Little Moat



Look under a sink. The pipe makes a U. Water stays in the bottom. That standing water is a trap. It is a tiny moat that sewer gas cannot cross. Castles used water to keep trouble out. Your house uses a cup of it under every drain. If the moat dries, the smell wins. That is not a mystery. That is a missing seal.

TRY THIS

With an adult, shine a light under a sink. Find the U. Run the tap. Watch the water hold the bend after the sink empties.

FOR OLDER BUILDERS

A trap seal is usually 2 to 4 inches of water. If a drain is too long or too steep before it meets a vent, flowing water can siphon the moat dry. Then the smell wins.

The Pipe That Breathes



Drains need air as much as they need slope. A vent is a pipe that lets air in so rushing water cannot suck the trap dry. The roof pipe is the house taking a breath. A bottle will not pour well if the cap stays on. A drain is the same idea with worse consequences.

TRY THIS

Fill a bottle, cap it, and try to pour. Slow, right? Now open the cap. Air in, water out. That is a vent.

FOR OLDER BUILDERS

Each trap needs a vent close enough that the drop to the vent is not more than one pipe diameter. Vents pitch up toward the stack so condensation runs back to the drain, not into the attic.

Two Systems, Two Rules

Never mix them up in your head. One system pushes clean water in. The other lets used water fall out. They meet at the fixture and nowhere else if the work is honest.

SUPPLY

Pressurized. Hot and cold. Must not freeze. Must not leak into drinking water.

DRAIN-WASTE-VENT

No pump in a simple house drain. Slope, trap, vent, cleanout.

CLEANOUT

A capped door in the pipe so a clog can be reached without breaking the wall.

ROUGH-IN

Pipes in the walls before finish. Inspected before anyone hides them.

Wren's Layout Habits

Plumbers measure from finished floors and finished walls — the world people will live in — not from a random stud.

MARK THE FALL FIRST

Know how much drop you have before you cut a joist or glue a fitting.

SUPPORT THE PIPE

Hangers keep the slope you set. Unsupported pipe sags into a belly.

USE THE RIGHT FITTING

Drains like sweeping Ys and sanitary tees. A sharp 90 can snag waste.

TEST BEFORE YOU HIDE IT

A rough-in is filled or pressurized so leaks show while the walls are still open.

Three Real Projects

The Slope Board

Ages 8+

Build the 1/4-inch-per-foot board. Race a marble or a sip of water on flat, steep, and just-right ramps. Name which one walks and which one sprints.

The Bottle Vent

Ages 8+

Pour from a closed bottle, then an open one. Name which bottle is the vented drain. Then look under a sink and find the real U.

The Fixture Map

Ages 12+

On graph paper, draw a bathroom. Mark drain direction with arrows and a note: 1/4 in. down per foot. Put a trap under each fixture and a vent nearby.

What to Watch in a Bath

Remodels are noisy. The quiet secrets hide under the noise. Watch from the doorway.

THE U UNDER THE SINK

After the water runs, a little should stay. That is the moat.

THE HILL IN THE FLOOR

Drain pipe should tip downhill. Flat pipe is a future clog.

THE PIPE THROUGH THE ROOF

That is the house breathing. Do not let a ball or a bird claim it.

HOT AND COLD

Supply is the push side. It does not use gravity the same way. Do not mix the stories.

THE TEST

If someone fills a pipe before the wall closes, they are telling the truth early.

THE CLEANOUT

A cap you can open later is respect for the next person in the house.

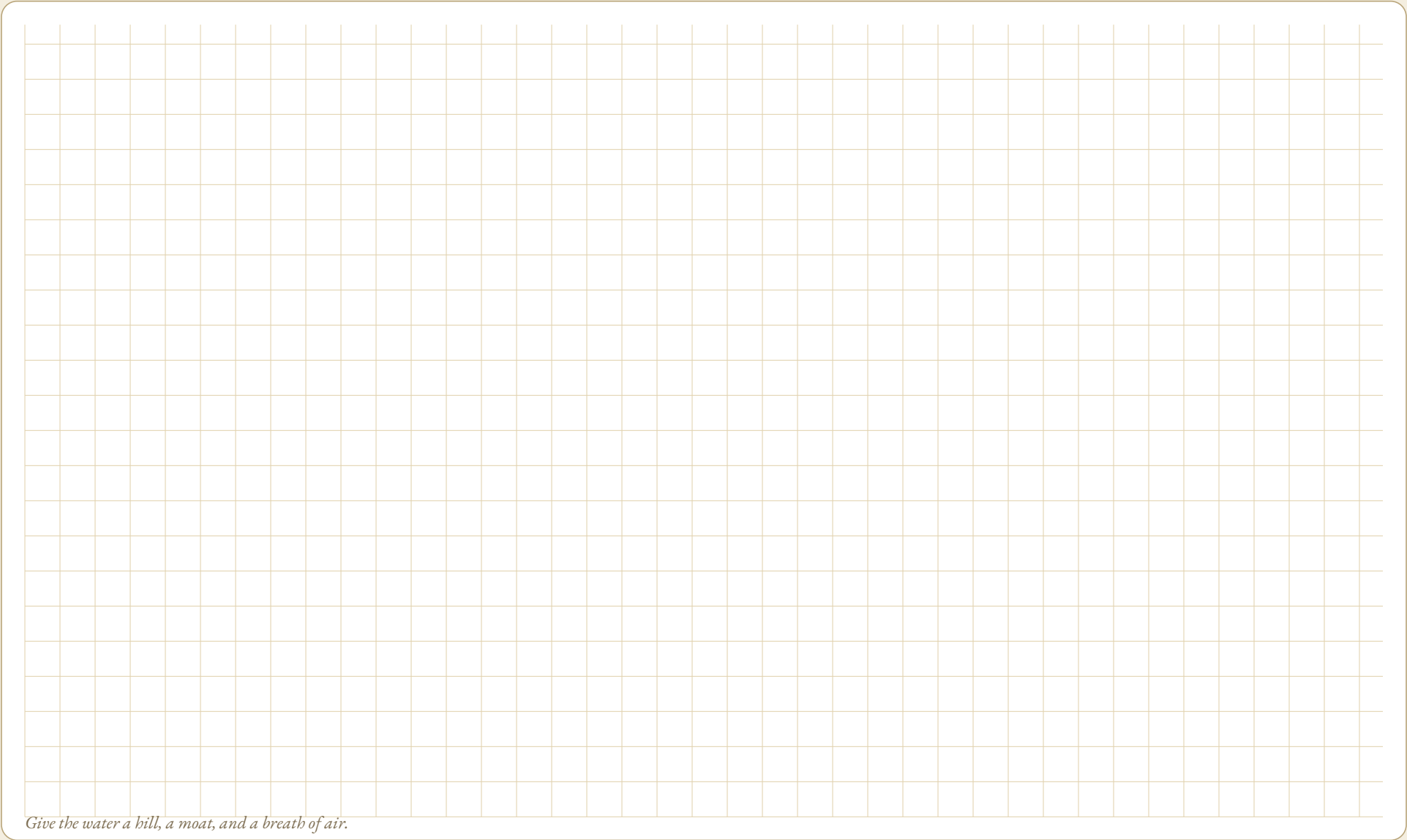
Questions Worth Asking

Water is honest. These questions are too.

- 01 Why does a drain that is too steep cause a clog, when “faster” sounds better?
- 02 What job does the standing water in a trap do that a dry pipe cannot?
- 03 How is a vent like taking the cap off a bottle?
- 04 Why test a pipe before the wall is closed, even if it takes another hour?
- 05 Wren aims gravity. He does not invent it. What else in good work is like that — using a law instead of fighting it?

Map a Bathroom

Draw a simple bathroom: toilet, sink, tub. Draw arrows for the fall. Mark each trap with a U. Mark a vent that goes up. Write 1/4 in. per foot on the main drain.

A large rectangular area filled with a light gray grid, intended for drawing a bathroom layout. The grid is composed of small squares, approximately 1/4 inch wide and 1/4 inch high. The grid is bounded by a thin gray line on the top, bottom, and sides, with a slightly thicker line on the left side. The grid is empty, ready for a student to draw a bathroom plan.

Give the water a hill, a moat, and a breath of air.

The Word Chest

Belly

An accidental sag in a drain that collects waste.

Cleanout

A capped opening for clearing clogs.

DWV

Drain, waste, and vent — the falling-water system.

Fall / pitch / slope

How much a pipe drops over a distance.

Fixture

A sink, toilet, tub, or shower.

Rough-in

The hidden pipes, placed and tested before finish walls.

Siphon

Suction that can steal the water out of a trap.

Stack

The main vertical drain or vent pipe.

Trap

The U-bend that holds a water seal against sewer gas.

Vent

A pipe that lets air into the drain so traps stay full.

Weir

The top of the water in a trap — the edge of the moat.

Sanitary tee

A fitting shaped so waste turns without a sharp snag.

The Builder's Promise

Craft is courage plus care. A young builder works with a grown-up until the habits are as true as the work.

- 01** Ask an adult before using saws, torches, drain chemicals, live water, or anything heavier than a backpack.
- 02** Wear closed shoes. Use eye protection for cutting or chipping.
- 03** Do not climb roofs or unfinished walls. Do not work under hanging pipe or lumber.
- 04** Wash dust off your hands. Fine dust does not belong in lungs.
- 05** Never pour mystery chemicals into a drain for fun. Some mix badly. Some burn pipes.
- 06** Do not open a sewer cleanout without an adult. The smell is the least of the problems.

ASH'S LAST WORD

Water is honest. Give it a hill, a moat, and a breath of air, and it will leave the house without a fuss.



THE LINE IS STILL THERE
Level. Gauge. Plumb. Straighten.

THE TRUE LINE · A GIFT FROM VALLEY TILE · AGES 8 TO 18 · PRACTICE WITH A GROWN-UP · CHECK TWICE