

THE TRUE LINE · BOOK SEVEN

The Secret of Rise and Run



The math a builder actually uses — square, circle, stair, roof, miter, and pipe.

THE TRUE LINE

The Secret of Rise and Run

A True Line Book
Laid True · Ash's Yard

Written by Bryan Blair
A gift from Valley Tile
Northridge, California

© 2026 Bryan Blair. All rights reserved.
Written for young builders ages 8 to 18.
Free to read. Free to share with a family.

These methods are real. Saws and solder bite. Work with a grown-up.
Local building codes always beat a picture book.

The True Line

Book One Square, Level & Plumb
Book Two The Fall
Book Three The Waste Side
Book Four The Scribe
Book Five The Bed
Book Six The Dry Room
Book Seven Rise and Run

How to Read a True Line Book

This book is the numbers behind the other six. Younger readers follow Ash and the pictures. Older readers use the green boxes and do the problems with a pencil. You do not need algebra class. You need a tape, a square, and the patience to check twice.

IF YOU ARE 8 TO 12

- Read the story. Look at the pictures.
- Try the backyard tests with an adult.
- A tape, chalk, and a stick are enough.
- New words live in the Word Chest.
- If a house is being remodeled, watch one number at a time.

IF YOU ARE 13 TO 18

- Read the green boxes. Those are working formulas.
- Do the problems. Then check them on a real floor.
- Codes beat rules of thumb. Always.
- Saws, solder, and roofs are grown-up jobs.
- A trade is a promise: measure twice, cut once, tell the truth.



THE YARD

Numbers That Stand Up

Ash tapped the table. “A wall is not a feeling. A stair is not a wish. A roof is not a guess. Every true thing in a house is a number that agreed with gravity.” The kids wanted magic. Ash gave them a tape. Square is a triangle. Level is still water. Plumb is a hanging weight. A circle is a radius kept honest. A stair is rise and run sharing the work. A roof is the same idea stood on a rafter. A miter is half of a corner. Builders found these laws the hard way, then wrote them down so the next person would not have to guess. Math in the trades is not a classroom trick. It is how a house keeps its promise.

Five Trades, One Language

Carpentry, cabinetry, tile, stone, and plumbing look like different jobs. They share the same few laws. Learn the laws once. Carry them into every room.

CARPENTRY

Square, plumb, pitch, rise and run, miters. A house frame is a set of triangles that agreed to stand together.

CABINETRY

Boxes that are square, reveals that match, counters that sit level. Diagonals tell the truth before the doors do.

TILE AND STONE

Coverage, waste, radii, fall to a drain. A slab is geometry you can put your hand on.

PLUMBING

Fall per foot, offsets, travel on a 45. Water only goes where the numbers send it.

Square Is a Number



A thinker named Pythagoras wrote it. Rope stretchers in Egypt used it first. If a triangle has sides 3, 4, and 5, the corner between the 3 and the 4 is square — ninety degrees, not almost. Square the two short sides. Add them. You get the square of the long side. $3 \times 3 = 9$. $4 \times 4 = 16$. $9 + 16 = 25$. $5 \times 5 = 25$. That is the law.

TRY THIS

On dirt or a sidewalk, mark 3 feet one way and 4 feet the other. The diagonal must be 5. If it is short, swing the side out. If long, swing it in.

FOR OLDER BUILDERS

Any multiple works: 6-8-10, 9-12-15, 12-16-20. Use the biggest triangle that fits. Bigger baseline, smaller percent error. Keep the tape on the same edge of every mark.

The Family of Right Triangles

Once you trust 3-4-5, you own a whole family. Builders keep these in their heads the way cooks keep a pinch and a cup.

3-4-5

Small work. A tabletop. A sample board. A shower curb corner.

6-8-10

A bathroom layout. A garden bed. A closet.

5-12-13

The other famous right triangle. Useful on roofs and long runs.

EQUAL DIAGONALS

On a rectangle, both long X lines must match. Then prove one corner with 3-4-5.

The Honest Circle



A radius is a promise: every point on the circle is the same distance from the center. That is how a setter lays a round mosaic, how a carpenter cuts a radius corner on a counter template, how a plumber knows a pipe's size. Diameter is two radii. Circumference is the trip around. People call the magic number pi. It is a little more than 3. About 3.14. Around is a bit more than three times across.

TRY THIS

Tie chalk to a string. Pin the other end. Walk a circle on a driveway. Measure across through the pin. Measure around with a string. Around should be about 3.14 times across.

FOR OLDER BUILDERS

Formulas: $C = \pi \times d$. $\text{Area} = \pi \times r \times r$. A 12-inch circle has a 6-inch radius and about 113 square inches of face. Pipe is named by inside or outside diameter — ask which, or you will buy the wrong fitting.

Where Circles Live on a Job

A house is full of circles pretending to be something else. Name them and they stop being mysterious.

RADIUS CORNER

A counter template with a 1½-inch radius. The fabricator needs that number, not “round it a little.”

ARC ON A FLOOR

String and chalk. Keep the pin from walking. Mark the waste side of the line.

PIPE

Inside diameter is the hole. Outside diameter is what a wrench grabs. Copper and PVC do not share names the way you think.

WHEEL AND SAW

A circular saw blade is a radius spinning. The kerf is the waste. Leave the line. That is Book Three, still true.

Rise and Run



A stair is a triangle you walk. Rise is the up. Run is the forward. Ash's old rule: rise plus run should land near 17 or 18 inches. Two rises plus one tread should land near 24 or 25. Too tall a rise and your knees complain. Too short a run and your toes hang off. Codes set limits. Comfort lives inside those limits.

TRY THIS

Count the steps in your house. Measure one rise and one run. Add them. Write the two numbers. See if they sit near 17 and 18.

FOR OLDER BUILDERS

Total rise ÷ chosen riser height = number of risers. Number of treads is usually one less than risers. Keep every rise the same. The first and last riser lying is how people fall.

Stair Numbers That Behave

These are working habits, not a license to ignore code. An adult checks the book before anyone cuts a stringer.

TYPICAL RISE

About 7 to 7¾ inches in a house. Steeper than 8 starts to feel like a ladder.

TYPICAL RUN

About 10 to 11 inches of tread, nosing extra. Toes need a place to land.

STRINGER

The sawtooth board. A framing square walks rise and run down the board. Same pair, every step.

HEADROOM

You need air above your head on the way up. Math that forgets the body is only half true.

A Roof Is Rise Over Twelve



Pitch is written like a fraction: 4-in-12 means the roof rises 4 inches for every 12 inches it runs. A 6-in-12 is steeper. A 12-in-12 is a 45-degree roof. Low pitches need better water sense. Steep pitches need better feet. The same triangle from the stair lives here. Rise, run, and the rafter's long edge — the hypotenuse — keep Pythagoras honest.

TRY THIS

On graph paper, draw 12 squares across and 4 up. Connect them. That line is a 4-in-12 roof. Draw 6 up. That is 6-in-12. Feel how the angle changes.

FOR OLDER BUILDERS

Rafter length is the hypotenuse. For a 4-in-12, each 12 inches of run has a rise of 4, so the rafter travels about 12.65 inches. Builders use a rafter table on a framing square so they do not do that math in the wind.

Pitches You Will See

California houses wear many hats. Name the pitch and you can talk to a roofer without waving your hands.

2-IN-12 TO 4-IN-12

Low. Looks calm. Water is slower to leave. Flashings have to be right.

6-IN-12

A common honest roof. Walkable with care. Classic.

12-IN-12

A 45-degree roof. Steep. Handsome. Not a place for guessing.

HIP AND VALLEY

Two pitches meeting. The hip rafter is a longer hypotenuse. That is compound thinking — two triangles at once.

Crown Is Not Base



Base molding sits flat on the floor and flat on the wall. A 90-degree corner takes two 45-degree miters. Simple. Crown molding leans. Part of it kisses the wall. Part of it kisses the ceiling. That lean is the spring angle — often 38 and 52, or 45 and 45. Because crown is sprung, a corner cut is a compound miter: the saw swings and the blade tilts. Cut it like base and the joint opens like a mouth.

TRY THIS

Hold a book against a wall-and-ceiling corner. Notice it cannot sit flat on both at once unless it leans. That lean is why crown is a different animal.

FOR OLDER BUILDERS

Inside corners on painted trim are often coped: one piece squares in, the other is cut to the profile with a coping saw. The joint stays tight when the house moves. Outside corners stay miters.

Cuts That Close

A good joint is two numbers that agreed, then a sharp saw that left the line.

FLAT MITER

Base, casing, a picture frame. Half the corner. 90 becomes 45. 135 becomes 67½.

COMPOUND MITER

Crown. Swing and tilt. Set the saw from a chart for that spring angle, or the joint will grin.

COPE

Inside corner that hides movement. Cut the profile, not just the angle.

LAYERED MOLDING

Base plus cap, or crown plus bed. Each layer has its own cut. Measure the reveal. Keep it even, or the eye will catch you.

Boxes That Tell the Truth



A cabinet is a box that has to stay square after it is moved, scribed, and loaded with plates. Measure both diagonals of the face. If they match, the box is square. If they do not, the doors will show it for the rest of their lives. Reveals — the little shadows around doors and drawers — only look calm when they are the same. Same is a number, not a mood.

TRY THIS

Draw a rectangle. Measure both diagonals with a ruler. Push one corner until the two numbers agree. That is a cabinetmaker's first habit.

FOR OLDER BUILDERS

Kitchen counters sit on cabinets that were set level and scribed to the wall. Stone does not bend. If the boxes are out, the slab will lip or the backsplash will gap. Math under the pretty part. That is Book Five again.

Water Does Math Too



A drain falls. In a house, a common number is a quarter inch per foot. Ten feet of pipe wants about two and a half inches of drop. Too flat and it sits. Too steep and the water outruns the solids. A 45-degree offset around a beam has a travel of about 1.414 times the offset. That 1.414 is the square root of two — Pythagoras again, wearing work clothes.

TRY THIS

On graph paper, draw a 10-foot pipe as 10 squares. Drop $2\frac{1}{2}$ little units. That is a quarter inch per foot. Draw a 45 kick around a square beam and measure the long side.

FOR OLDER BUILDERS

Volume matters when you flood-test a shower. Area times depth. A pan 4 feet by 5 feet with an inch of water holds a little over 10 gallons. Know the number before you fill, and know where it will go if the test fails.

Tile and Stone Arithmetic

Pretty stone still has to be paid for by the square foot, cut with waste, and laid to a line.

SQUARE FEET

Length times width. A room 10 by 12 is 120. Subtract the tub. Add the niche. Count the walls separately.

WASTE

Straight lay, about a tenth extra. Diagonal or wild pattern, more like a sixth. Radius work wastes more. Buy the extra once.

DIAGONAL LAYOUT

A 12-inch tile on the diagonal covers less distance across the room than you think. Snap center lines. Dry-lay. Then cut.

SLAB YIELD

A slab is not a room. Seams, sink holes, and bad veins eat stone. Plan the book-match before the saw sings.

Ash's Working Laws

Write these in the front of a notebook. They outlast brands and fashions.

- 01** Square is 3-4-5, or matching diagonals, or both.
- 02** Level is still water. Plumb is a hanging weight. Do not argue with either.
- 03** A circle keeps one radius. If the pin walks, the circle lies.
- 04** A stair shares the height in equal rises. One tall step is a trap.
- 05** Pitch is rise over twelve. Name it before you climb it.
- 06** Crown leans. Base does not. Half a corner is only the start of the cut.
- 07** Water wants a quarter inch in a foot unless the code says otherwise.
- 08** Leave the line. The waste side is named that for a reason.

ASH'S LAST WORD

A house is a pile of numbers that agreed to stand in the weather. Make them agree on purpose.

Three Jobs You Can Do

The Dirt Triangle

Ages 8–12 · backyard

Stake a 3-4-5 triangle with string. Check the corner with a carpenter square if you have one. Then scale it to 6-8-10. Notice how a bigger triangle is kinder when your marks are a little sloppy. Write the three numbers in a notebook.

The Stair Census

Ages 10–16 · any staircase

Count risers. Measure one rise and one run. Add them. Multiply two rises plus one tread. Compare your house to 17–18 and 24–25. Do not change anything. Just see if the carpenter who built it was paying attention.

The Pitch Card

Ages 12–18 · graph paper

Draw 2-in-12, 4-in-12, 6-in-12, and 12-in-12. Label each. Stand the paper up and look. Then walk your block and guess pitches from the sidewalk. Check later with a pitch app or a framing square on a scrap, with an adult.

The Word Chest

Hypotenuse

The long side of a right triangle. The 5 in 3-4-5. The rafter. The stair stringer's slope.

Pi

A bit more than 3. Around a circle is about 3.14 times across.

Radius

Center to edge. Keep it honest and you get a true circle.

Rise

The up part of a stair or a roof.

Run

The forward part of a stair or a roof.

Pitch

Rise over twelve on a roof. 6-in-12 means 6 inches up in 12 inches over.

Spring angle

How crown leans between wall and ceiling.

Compound miter

A cut that swings and tilts. Crown lives here.

Cope

An inside-corner cut that follows the profile so the joint stays tight.

Offset

How far a pipe steps over. Travel on a 45 is about 1.414 times that.

Reveal

The little even shadow around a door or a molding layer.

Diagonal

Corner to corner. On a rectangle the two must match.

Problems Worth a Pencil

Do these on paper. Then, if you can, do them again on a floor with an adult. Answers are in the work, not in the back of the book.

01 A corner is 6 feet one way and 8 feet the other. What must the diagonal be if the corner is square?

02 A circle is 10 inches across. About how far is it around? About how many square inches is the face?

03 A stair rises 105 inches. You want $7\frac{1}{2}$ -inch risers. How many risers? How many treads?

04 A drain runs 16 feet at a quarter inch per foot. How much total fall?

05 A pipe must step over 8 inches on a 45. About how long is the travel piece?

06 A kitchen is 12 feet by 14 feet. How many square feet of floor tile before waste? With a tenth extra?

What to Watch

If you are sitting in a kitchen that is being remodeled, or in a car on the way to a slab yard, give your eyes one honest job.

THE FIRST CORNER

Did anyone pull 3-4-5 or check diagonals before the cabinets landed?

THE STAIR

Are the rises the same? Put a tape on two of them.

THE CROWN

Does the corner close, or is there a grin? That is a compound cut talking.

THE DRAIN

Does the pipe fall toward the stack, or sit tired and flat?

THE SLAB

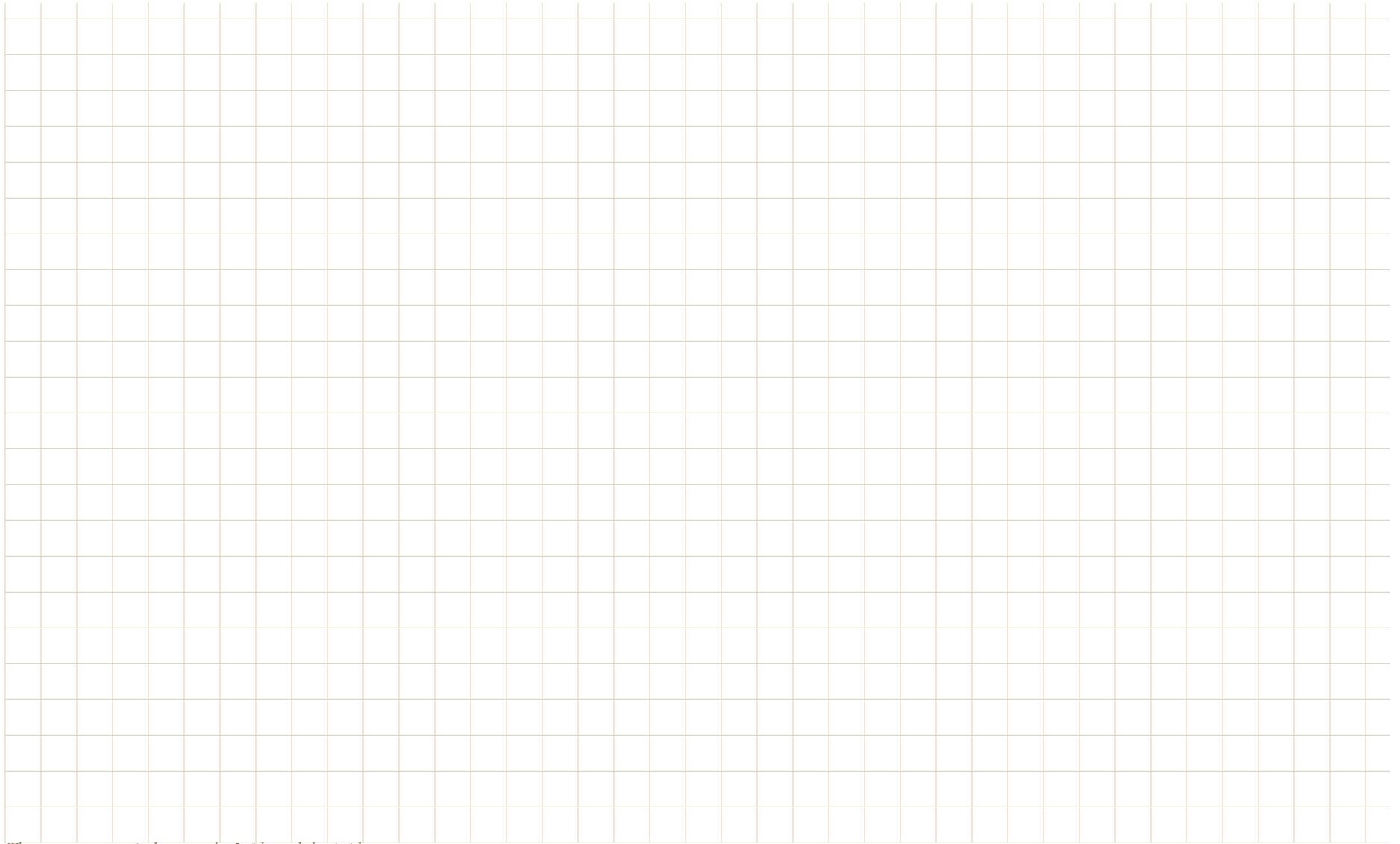
Did they plan seams and the sink hole, or hope the stone would forgive them?

THE REVEAL

Do the door shadows match, or does one side look pinched?

Draw the Triangle

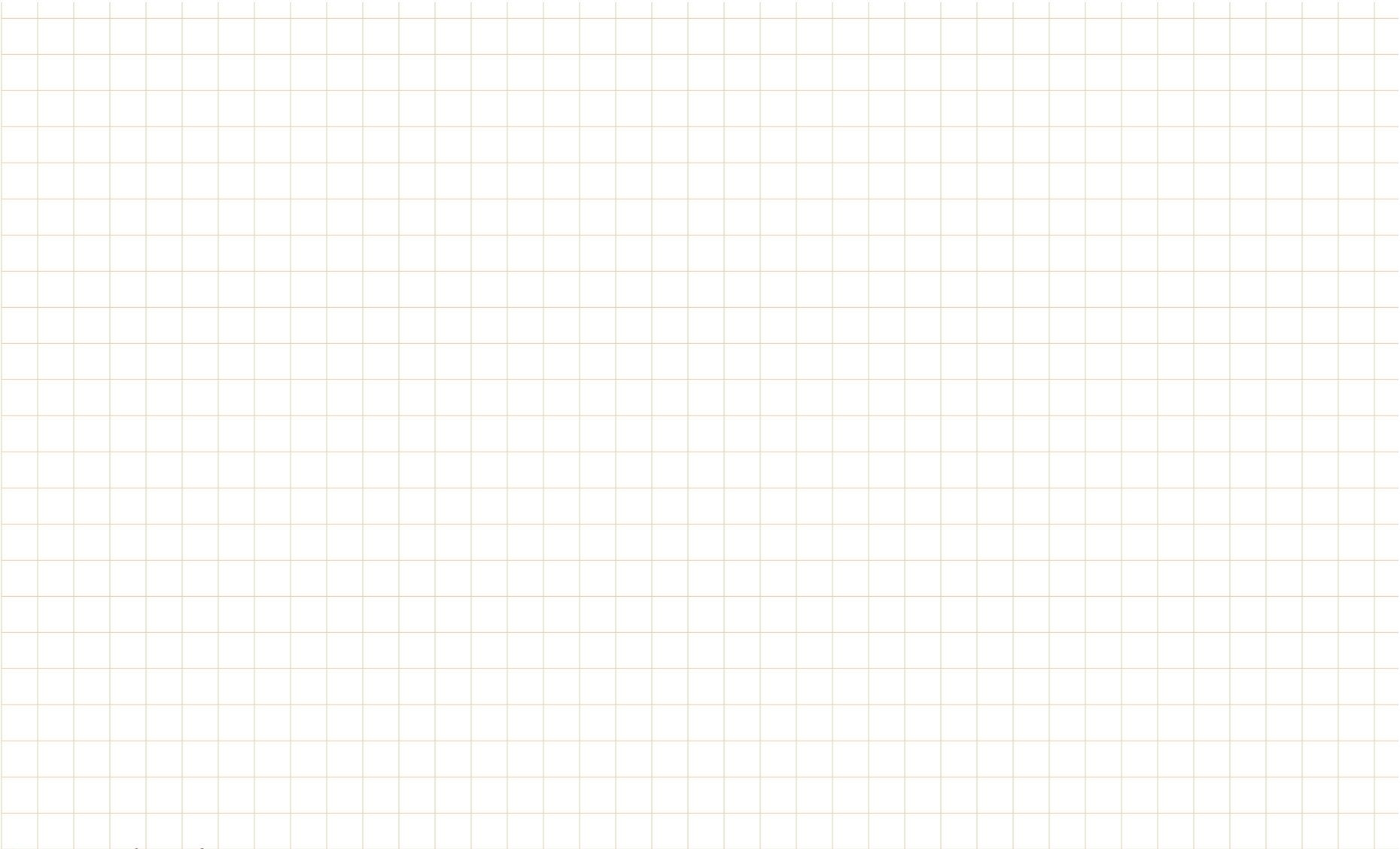
On this grid, draw a 3-4-5 triangle. Then draw a 6-8-10 on top of it in a second color. Label the square corner.



The square corner sits between the 3-side and the 4-side.

Draw Four Pitches

Use twelve squares for the run. Draw rise of 2, 4, 6, and 12. Label each 2-in-12, 4-in-12, 6-in-12, 12-in-12.



A large grid of 24 squares by 24 squares, intended for drawing roof pitches. The grid is composed of thin, light-colored lines forming a uniform pattern of squares.

A 12-in-12 is a 45-degree roof. You can see it.



MEASURE TWICE. CUT ONCE. TELL THE TRUTH.

The True Line · Book Seven · Rise and Run

A GIFT FROM VALLEY TILE · NORTHRIDGE, CALIFORNIA · WRITTEN BY BRYAN BLAIR