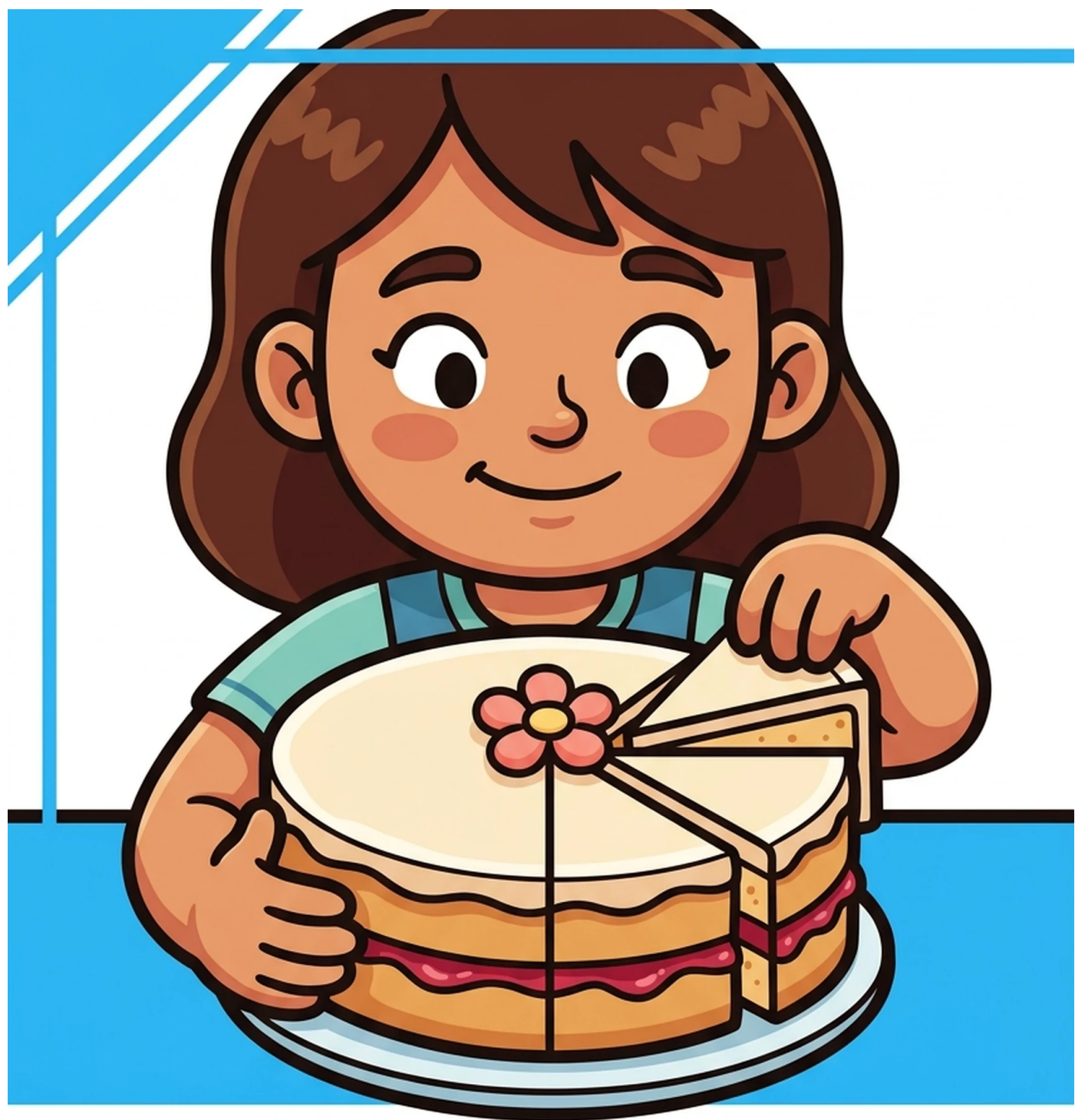




FractionForge

Meet the Cast

STANDARD EDITION

Spark & Anvil

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This book collects 6 chapter books from the *FractionForge* cast — each character embodies a different curricular primitive; together they teach the full subject.

Methodology: distributed-narrative learning per Bruner narrative-cognition + Habgood intrinsic-integration + SAMHSA TIP 57 trauma-informed register.

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This is Volume 2 of 2 of the *FractionForge* — *Meet the Cast* series; each volume is a complete standalone book you can read on its own.

For everyone who learns by hearing a story first.

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Introduction

The FractionForge cast was authored to embody the curriculum, not decorate around it. Each of the 6 characters you'll meet in this book teaches a specific primitive — a particular tactic, a particular technique, a particular way of seeing. Together they form an ensemble: the cast IS the curriculum.

Read in any order. Each chapter stands alone.

Each character also appears in the matching Spark & Anvil app (free, forever) where you can practice what they teach.

— *The editors at Spark & Anvil*

Dot

DECIMAL POINT — a special-case fraction notation where the denominator is always a power of 10. $0.3 = 3/10$. $0.07 = 7/100$. The decimal point's position determines the denominator.



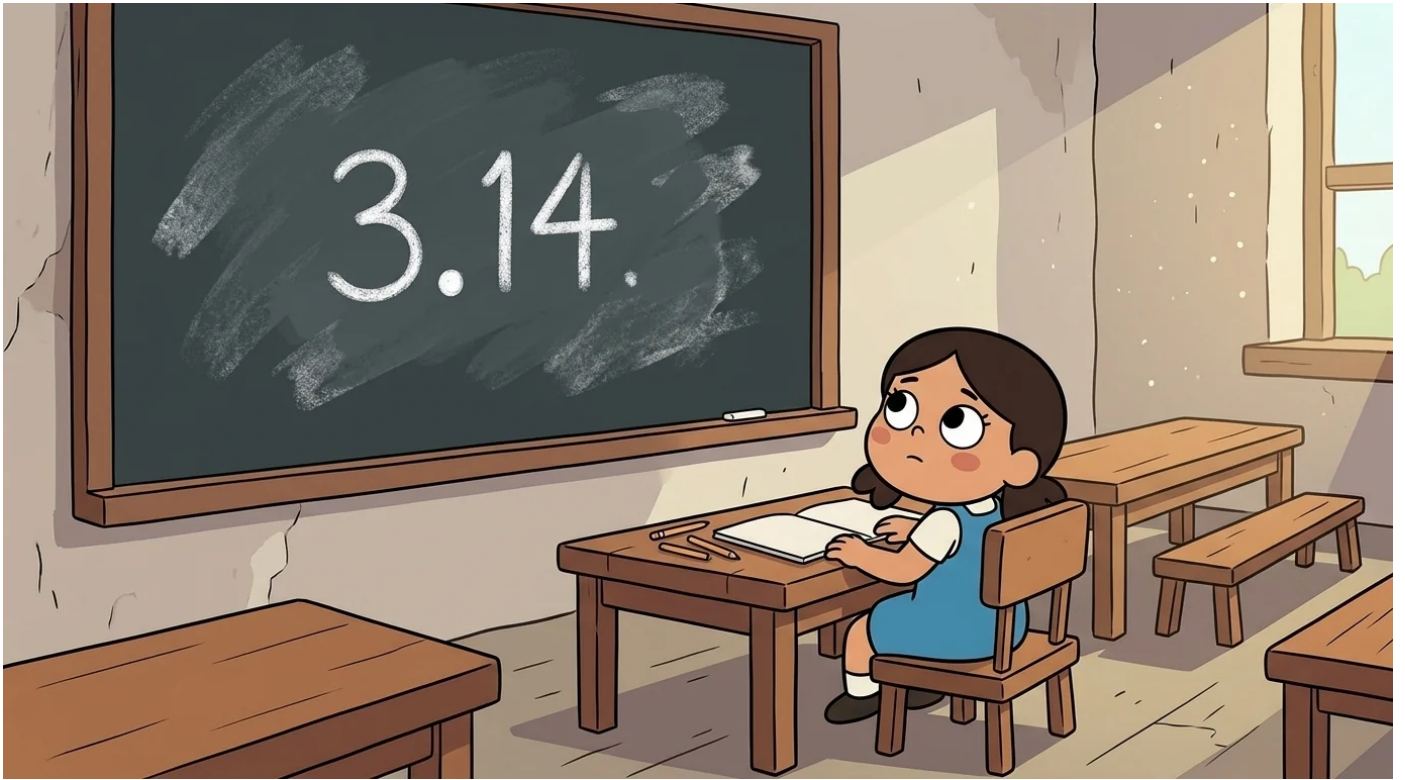
Dot was, for most of her childhood, *the smallest person in every room*.

This is, when you are a child, a *strange feeling*. Adults always see you. Adults often address you as if you were younger than you are. Adults sometimes step around you because they did not notice you were there, and then they apologize, and then they ask if you are all right, and then they pat you on the head, which is not necessarily what a small person wants. The world, when you are small, is *full of large things politely trying not to bump into you*.

Dot — whose given name was *Mila*, though she has gone by Dot since her older brothers nicknamed her at age four — grew up in a household of *tall, loud, fast-moving siblings*. She had four older brothers. They were all, even by adult standards, large. By the time her oldest brother was seventeen and Mila was four, he could pick her up under one arm and carry her up the cottage's stairs without breaking stride. (He did this often. He thought it was funny. Mila thought it was *deeply unfair* and would have *much preferred to walk up the stairs herself*, but she did not yet have the words to object.)

Her brothers called her Dot because she was *a small dot in the family painting*. She did not mind the name. She liked it, actually. *Dot* felt accurate. She was a dot.

But — and this is the chapter's essential fact — *Dot understood, very early, that her smallness did not mean she was unimportant*. She understood that *small things, placed correctly, could mean a great deal*.



This was a thing she learned from her grandmother.

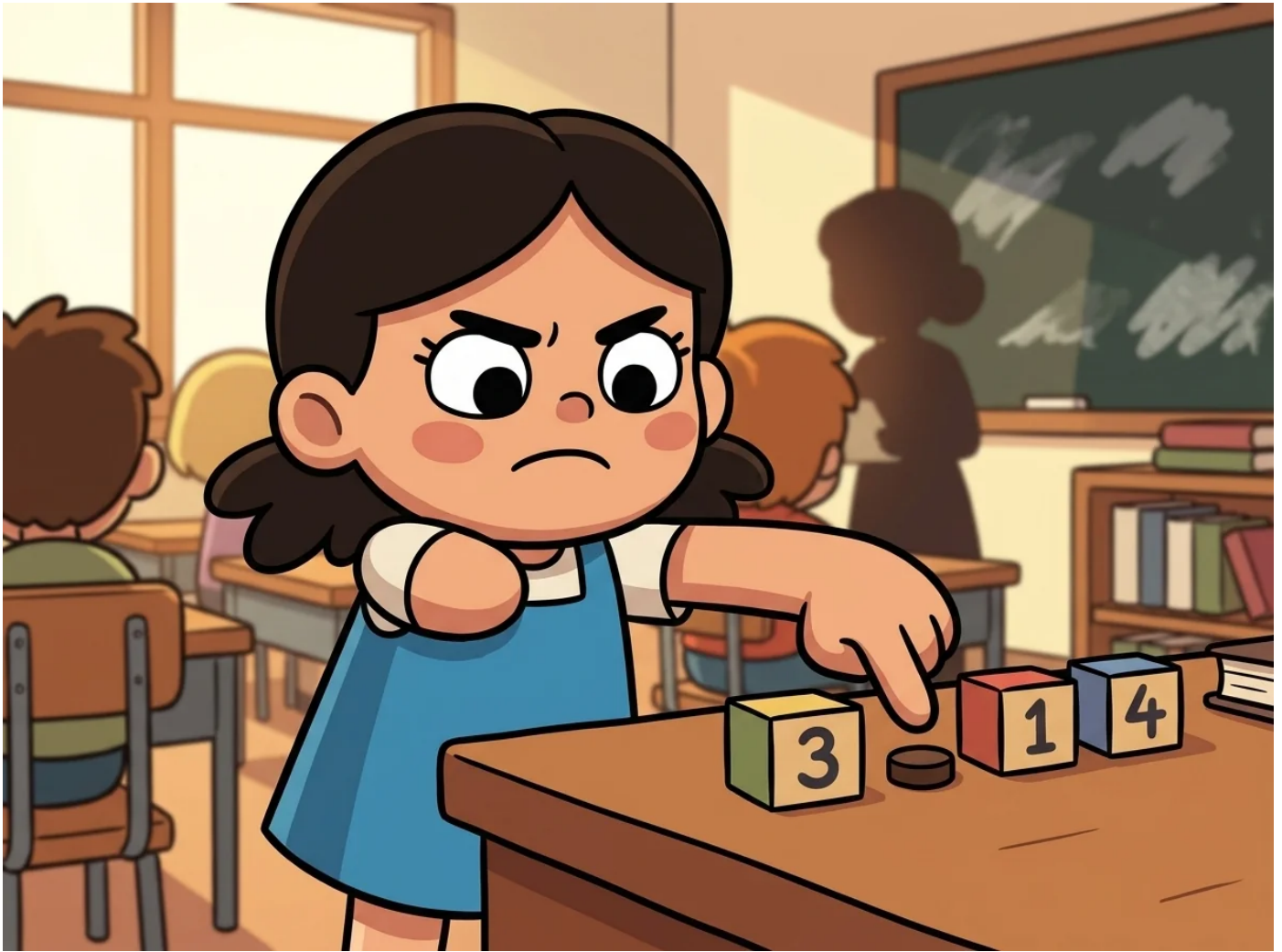
Her grandmother — *Vade*, who had been a calligrapher in her younger years and who still maintained the family's library of carefully-lettered books — had taught Dot to read by *pointing at each letter with a fingertip*. The fingertip touched the letter for a heartbeat. The fingertip moved to the next letter. Vade said, very slowly: *"Each letter is small. Each letter only has meaning *in its place*. If you move the letter, the word changes. If you remove the letter, the word breaks. Small things matter when their *place* matters."*

Dot understood this immediately. She had been four. She had learned to read in three months.

Over the next several years, Dot internalized the principle. *Small things, placed correctly, were not unimportant. They were the placement itself*. A comma in the wrong place changed a sentence. A grain of sand in a clock's gears stopped the clock. A small candle in a dark room *was* the light.

When Dot was nine, she encountered decimals at the village school. The schoolteacher wrote on the board:

3.14.



The schoolteacher said: **"This is a decimal number. The dot between the 3 and the 14 is called *the decimal point*. It separates the whole part from the fractional part. The 3 is three whole units. The 1 is one-tenth. The 4 is four-hundredths."**

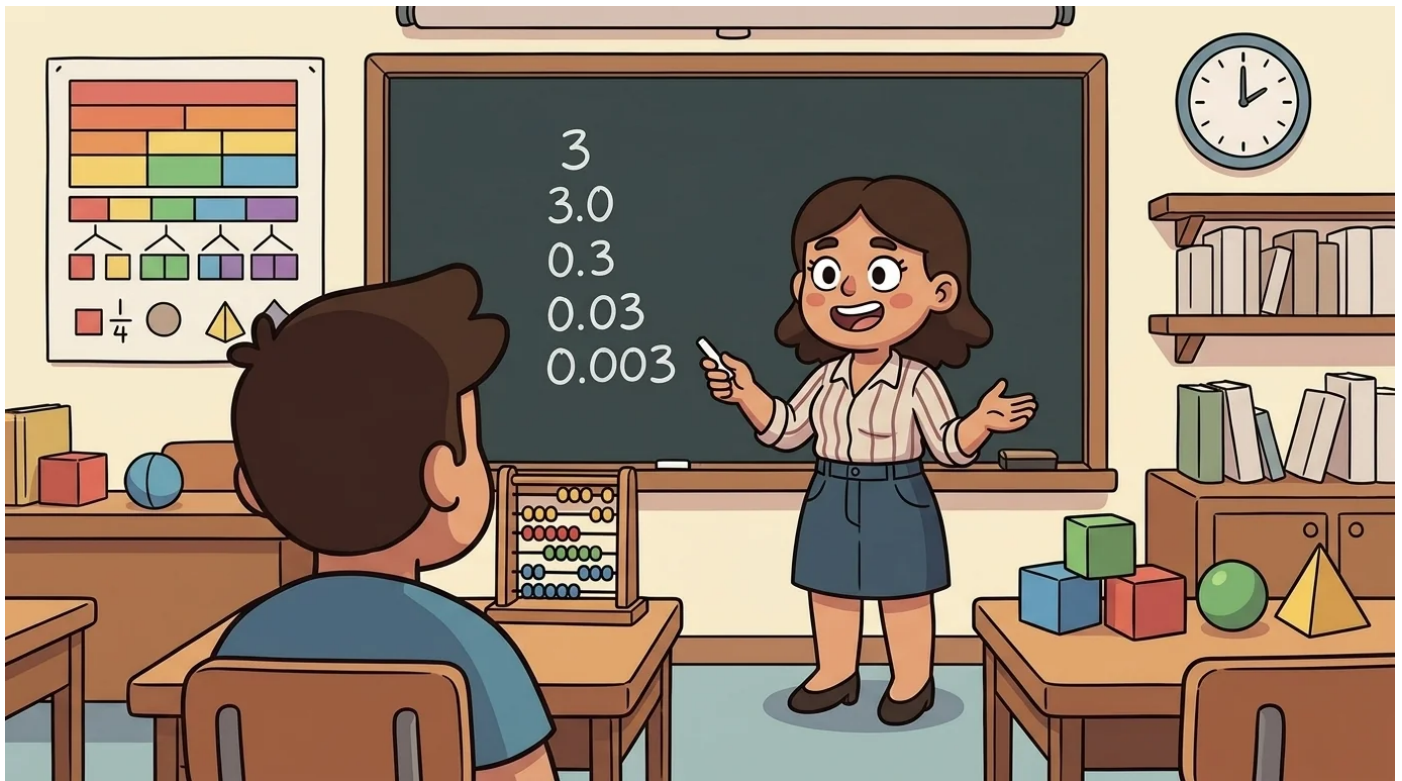
Dot stared.

She said: *"The dot is the most important part of the number."*

The schoolteacher said: *"Why?"*

Dot said: **"It tells you *which digit means what*. Without the dot, you would have the number 314, which is three hundred fourteen. *With* the dot, you have 3.14, which is three-and-some-fraction. The dot decides whether the 3 is *three units* or *three hundred units*. The dot is small. The dot decides everything."**

The schoolteacher was, by his own later admission, *struck*. He had been teaching decimals for fifteen years. He had not heard anyone state the case for the decimal-point's importance quite that directly.



He said: "Yes. That is exactly right. The decimal point is small but it is *essential*. Its position determines what every digit means. Move the decimal point one place to the right, and every digit moves one place to the *left* in value — every digit becomes ten times bigger. Move the decimal point one place to the left, and every digit becomes ten times smaller."

Dot nodded. She thought of her grandmother. *Small things, placed correctly, were the placement itself*. The decimal point was such a small thing. The decimal point *was* the placement.

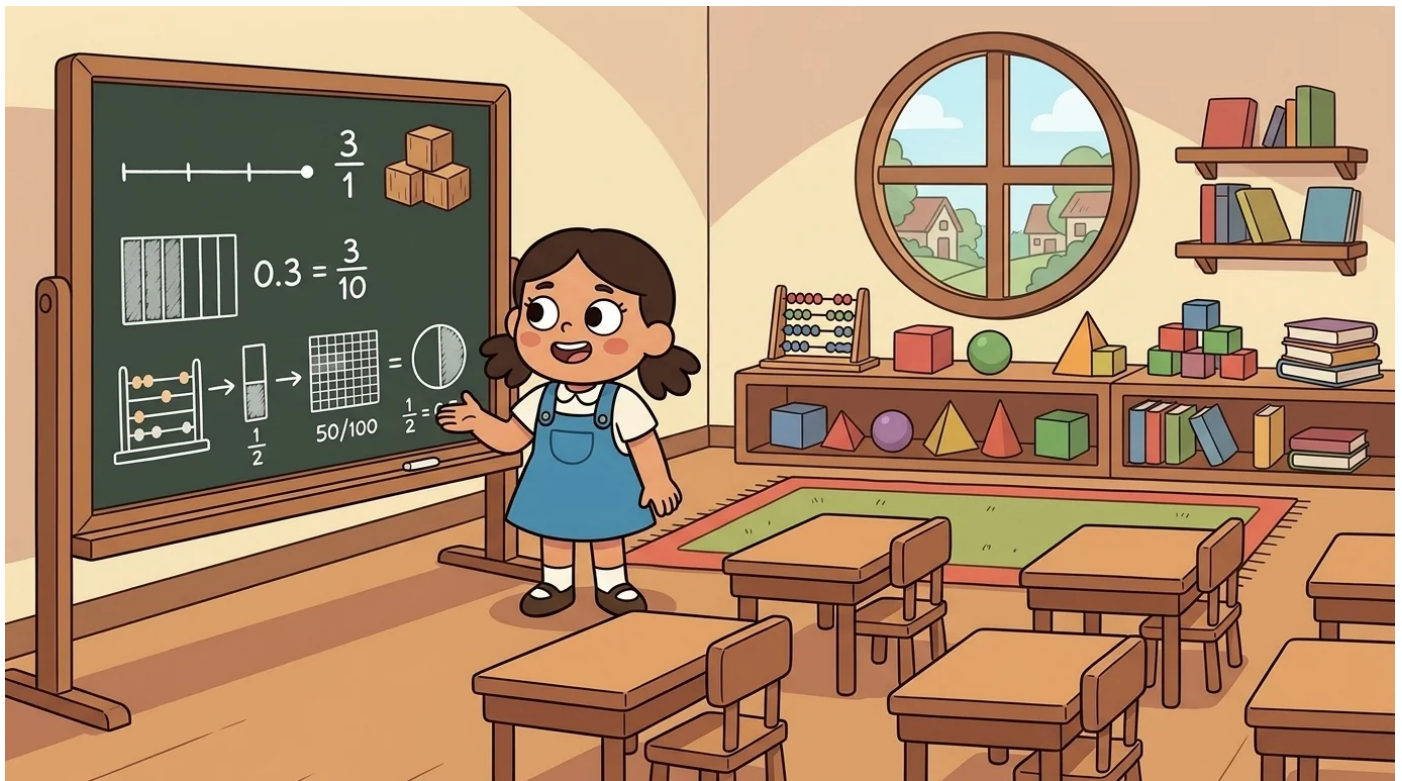
She has been teaching the decimal point ever since. She studied at the FractionForge academy from sixteen to nineteen. She joined the faculty at twenty. She is now thirty-one. She is no longer the smallest person in every room (she had a late growth spurt and is now of slightly-above-average height) but she is *still called Dot* and she does not mind.

In her classroom, she begins every first-day lesson the same way. She writes on the board:

3 3.0 0.3 0.03 0.003.

She turns to the class. She says: "*These all contain the digit 3. They are not the same number. What makes them different?*"

The children — always — say *the dot*. (Sometimes they say *the decimal point*, but most of them call it the dot.)



Dot smiles. She says: "The dot is small. The dot decides everything. 3 is three whole units. 3.0 is also three whole units (the zero is just confirming there is nothing in the tenths position). 0.3 is three tenths. 0.03 is three hundredths. 0.003 is three thousandths. The digit 3 is the same. The *place* changes. The *value* changes by a factor of ten with every step."

She then writes: $\frac{1}{2} = 0.5 = 50\%$. She says: "Decimals are fractions. 0.5 means $\frac{5}{10}$, which equals $\frac{1}{2}$. Percentages are fractions with denominator one hundred. 50% means $\frac{50}{100}$, which equals $\frac{1}{2}$. These three are the *same value* in three different writing systems. The fraction, the decimal, the percent. All three are equivalent."

The children — always — see it. Once Dot has made the connection between fractions and decimals, the rest of the curriculum opens up.

When children ask whether decimals are hard, Dot always says the same thing:

"They are not hard. They are *fractions with denominator a power of ten*. The decimal point's *place* tells you which power of ten the denominator is. Tenths after the dot is *over ten*. Hundredths is *over one hundred*. Thousandths is *over one thousand*. Decimals are just a different way to write the same fractions you already know."

She still has her grandmother's calligraphy slate. She brings it to class sometimes. She points at letters. She says: "My grandmother taught me about placement before I knew there was such a thing as a decimal point. The same idea. Different letters."

And every time she holds that worn old slate, something in her goes warm and quiet. The smallest person in the room, once. Never invisible. Never unimportant. Just waiting for the moment her place would matter — and glad, deep down, that it finally did.

Liner

NUMBER-LINE PLACEMENT — every fraction has an exact spot on the number line between the whole numbers. $\frac{3}{4}$ lives three of four equal steps from 0 to 1. A fraction is a place you can always find.



Liner walked a straight line. She always had.

Down the middle of the FairShare Village academy floor ran a long painted stripe, from one wall to the other. It started at a big chalk **0** and ended, far away, at a big chalk **4**. To everyone else it was just a line on the floor. To Liner it was the most interesting road in the world.

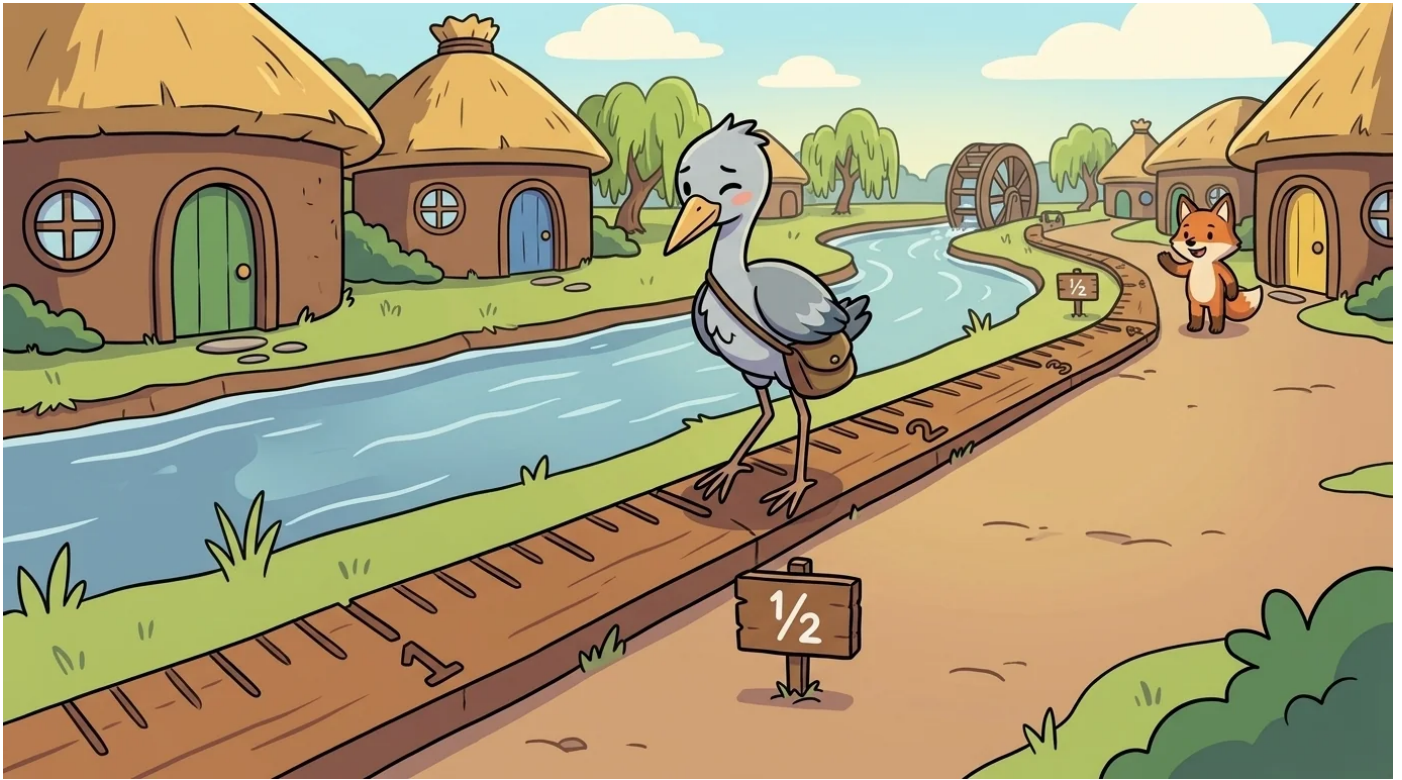
She was a careful heron, tall and grey, with long careful legs made for stepping exactly where she meant to step. A satchel of little flags hung at her side. Each flag had a tiny number written on it.

She paced the line slowly. When she reached the spot exactly halfway between 0 and 1, she stopped, reached into her satchel, and planted a flag. The flag read **$\frac{1}{2}$** .

"There you are," she said softly, the way you'd greet a friend.

A young rabbit named Theo watched from the doorway. He didn't understand. "It's just a spot on the floor," he said.

Liner smiled. "Every spot on this line is a number," she said. "Even the spots between the big ones. Especially those."



When Liner was small, she got lost. A lot.

She lived in a village built around a long, winding river, and all the houses looked the same to her — round and brown, with the same little doors. She would set out for her grandmother's house and end up at the baker's, or the well, or somewhere she'd never seen before, blinking back tears.

"I can't find anything," she told her grandmother one evening, after a kind fox had walked her home for the third time that week.

Her grandmother didn't scold her. Instead she took Liner down to the riverbank, where a long wooden measuring rail ran along the path, marked off in even steps. **0** at the bridge. **1** at the old willow. **2** at the mill.

"You don't need to remember every house," her grandmother said. "You need to remember the line. Our house is here." She tapped a spot exactly halfway between the willow and the mill. "Not at 1. Not at 2. Right in the middle. Halfway between."

Liner stared at the spot. It wasn't a whole number. It was a place *between* the numbers. And it was exact. It was always in the same place. It would never move.

"Halfway between 1 and 2," she whispered. For the first time in her life, she knew exactly where home was.

She never got lost again.



Liner arrived at the academy carrying her satchel of flags and nothing else.

The head of the academy, a slow old tortoise named Slice, met her at the painted line on the floor. "I hear you place numbers," he said.

"I place all of them," Liner said. "Even the ones that hide between the whole numbers."

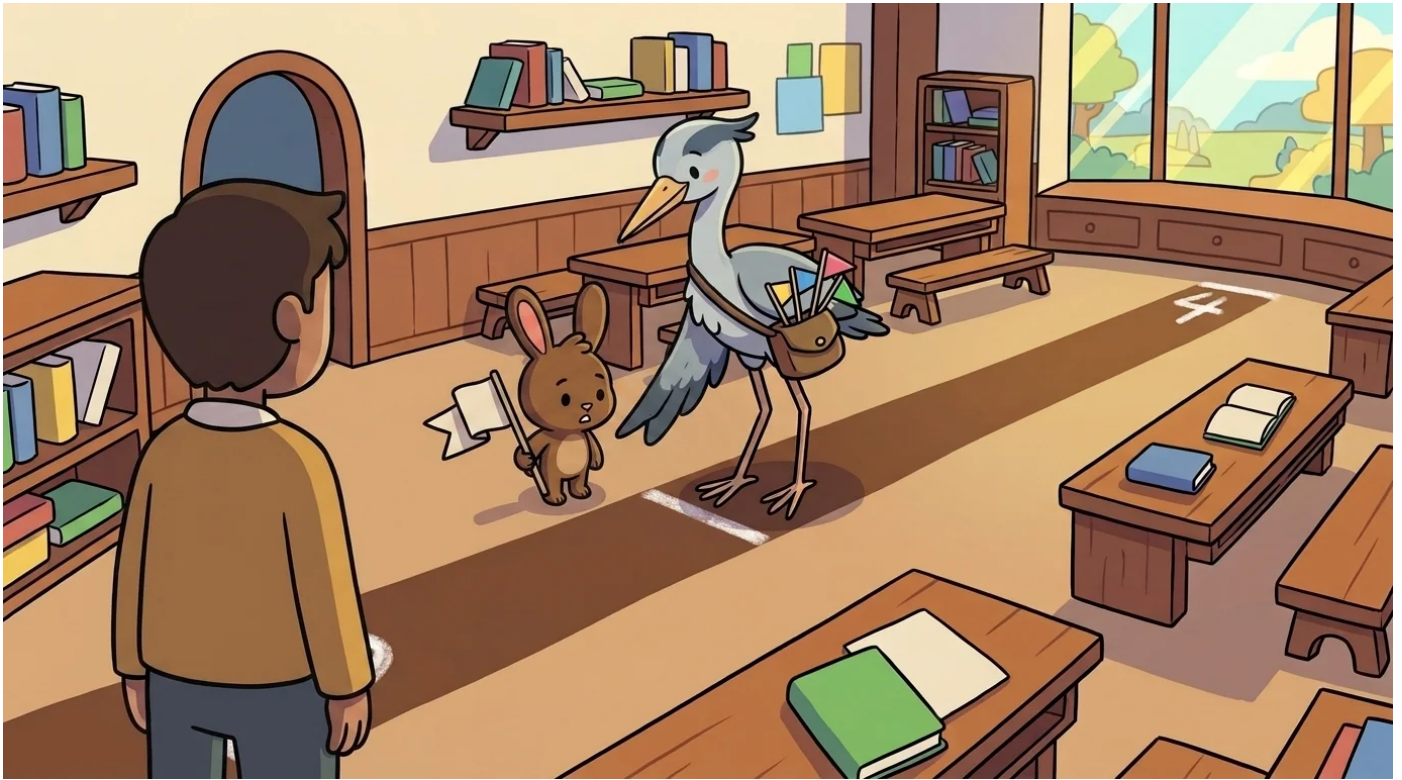
Slice pointed to the line. "Show me three-quarters."

Liner didn't hurry. She walked to the **0**, then to the **1**, measuring the distance with her careful steps. Then she went back and divided that one step into four equal parts, marking each with a light scratch of her claw. One. Two. Three. She planted a flag on the third scratch. **3/4**.

"Three-quarters isn't three pizza slices," she said. "It's a *place*. Three of the four equal steps from 0 to 1. It lives right here. It always has."

Slice looked at the flag for a long moment. He had taught fractions for sixty years, mostly with pies and cakes. He had never watched anyone *walk* to one before.

"You may stay," he said.



In her corner of the academy, Liner kept her long line and her satchel of flags. One afternoon Theo the rabbit came back, holding two cards. He looked upset.

"These are supposed to be different," he said. He showed her the cards. One read $\frac{1}{2}$. The other read $\frac{2}{4}$. "Half, and two-quarters. They have different numbers. So they have to be different. But my teacher says they're the same and that makes no sense."

"Let's not argue about it," Liner said. "Let's walk it."

She handed Theo the $\frac{1}{2}$ flag. "Go stand where one-half lives."

Theo measured from 0 to 1, found the middle, and stood there, holding his flag.

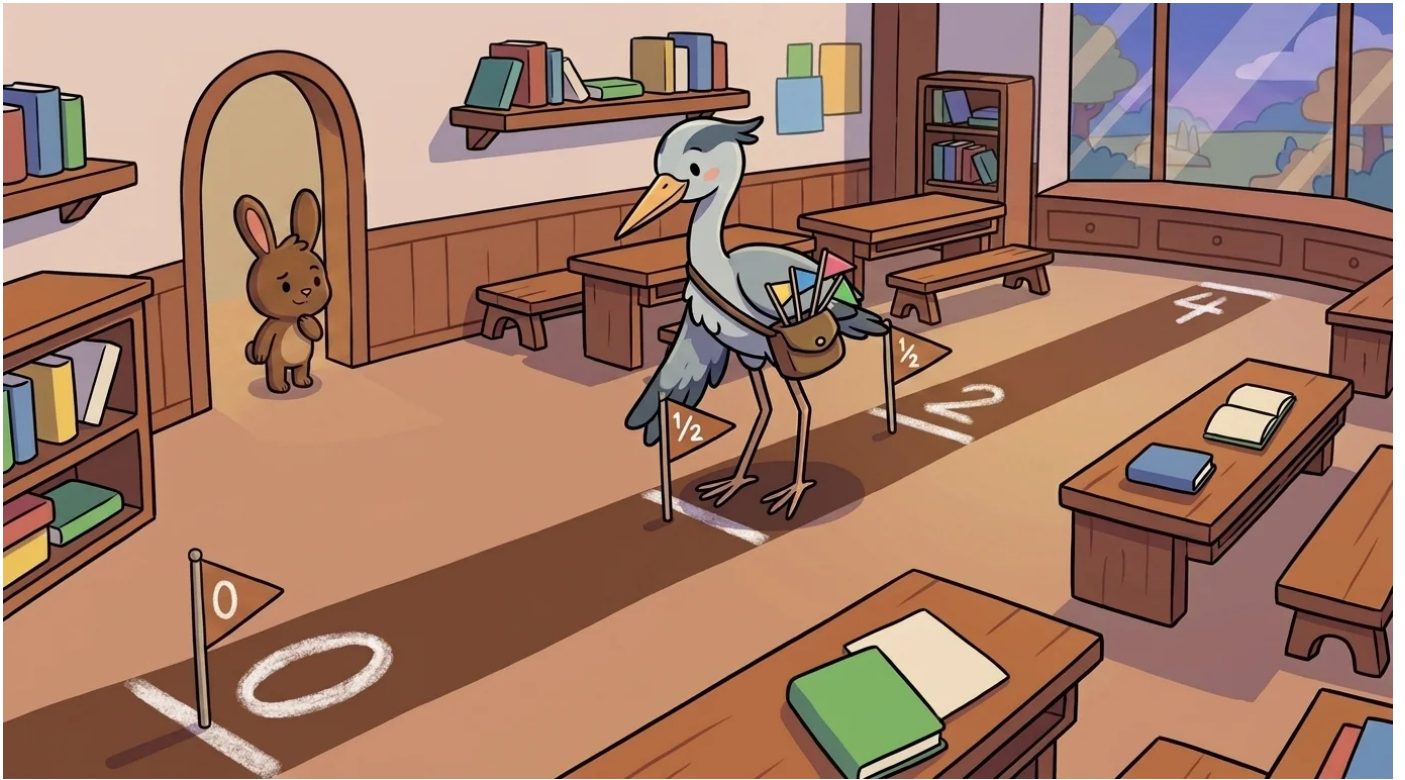
Then Liner took the $\frac{2}{4}$ flag and measured for herself. She divided the step from 0 to 1 into four equal parts. She counted two of them. One. Two. And she stopped — standing right beside Theo. The very same spot.

Theo looked down at his feet, then at Liner's feet. They were in the same place.

"They land here," Liner said gently. "The same place. Different names, same spot. That's what *equivalent* means. Half of the way, or two-quarters of the way — it's the same distance from where you started."

Theo's ears went up. "So they're not lying. They're just... two flags for one place."

"Two flags for one place," Liner agreed.



Later, when Theo had gone and the academy was quiet, Liner walked her line one more time, the way she did every evening.

She passed the flag for $\frac{1}{2}$. She passed the flag for $\frac{3}{4}$. She passed a dozen quiet places she had named over the years, each one exactly where she had left it. None of them had moved. None of them ever would.

She stopped at the spot halfway between 1 and 2 — the spot that, on a different line, in a different village, a long time ago, had been home.

A small voice came from the doorway. Theo again, ready to head out, but with one more question. "Liner? What if I forget where a fraction goes?"

Liner looked at him kindly. "You won't have to remember every one," she said. "You just have to remember the line. Count the steps from 0. The fraction will be right where it always is, waiting for you."

Theo nodded slowly, and headed home along the road, counting his steps in the dark, and not getting lost at all.

Gather

ADDING AND SUBTRACTING FRACTIONS — you can only add or take away pieces that are the same size. $\frac{1}{5} + \frac{2}{5} = \frac{3}{5}$ because the pieces match. To combine fifths and quarters, you must first make the pieces the same.



Gather collected things. It was the most natural thing in the world to him.

He was a round, busy badger with a big woven basket strapped to his back, and he spent his days at the FairShare Village academy gathering up fraction pieces and adding them together. Someone would hand him two-fifths of a ribbon and one-fifth of a ribbon, and he'd drop them in his basket, give it a little shake, and announce the total.

"Three-fifths," he'd say, holding up the combined ribbon. "Two pieces, then one more piece. All the same size. Three-fifths."

He made it look easy. Drop the pieces in, count them up, done.

A young mouse named Pip watched him work. "So adding fractions is just... counting?" she asked.

"When the pieces match," Gather said cheerfully, "it really is. The trouble only starts when they *don't*."



When Gather was a kid, he learned this the hard way.

He grew up helping at his family's button stall in the market. People brought scraps of cloth and his job was to add up how much they had. One afternoon a tailor dumped a pile on the counter: some pieces were cut into fifths, some into quarters, all jumbled together.

"How much cloth altogether?" the tailor asked.

Little Gather started counting pieces. One, two, three, four, five, six. "Six pieces!" he said proudly.

The tailor frowned. "Six pieces of *what*, though? These three are fifths. These three are quarters. They're not the same size. You can't just say six."

Gather looked at the pile. The fifths were skinny. The quarters were wider. He had counted them like they were all the same — but they weren't. Six pieces, sure. But six pieces of nothing in particular.

His ears went hot. He had been adding things up his whole life, and he'd been doing it *wrong* — or at least, half-right. You could count pieces. But only if the pieces were the same size.

"How do I fix it?" he asked.

The tailor smiled. "You make them match first. Then you count."



Gather came to the academy years later, basket on his back, determined to teach the one thing that had tripped him up.

Slice, the old tortoise who ran the place, set a test on the table: two-sixths of a chocolate bar and three-sixths of a chocolate bar. "Add them," he said.

Gather dropped both into his basket and gave it a shake. "Five-sixths," he said at once. "Both in sixths. Pieces match. Two plus three is five. Five-sixths."

Then Slice slid over a trickier pair: one-half of a bar, and one-third of a bar. "And these?"

Gather did *not* shake his basket. He stopped. He set the two pieces side by side and looked at them carefully. The half was big. The third was smaller. They didn't match.

"I can't add these yet," he said. "Not honestly. The pieces are different sizes. If I just say 'two pieces,' I'd be lying about how much there is." He looked up. "First I have to make them the same. I'd cut both into sixths. The half becomes three-sixths. The third becomes two-sixths. *Now* they match. *Now* I can gather them. Five-sixths."

Slice nodded slowly. "Most people shake the basket first and think later," he said. "You think first. You may stay."



In his corner of the academy, surrounded by baskets, Gather met a frustrated otter named Wren.

"I hate adding fractions," Wren announced, dropping into a chair. "I did one-fourth plus one-half and I got two-sixths. My teacher said it's wrong. But I added the tops AND the bottoms, which is what you do with regular numbers!"

"Ah," Gather said kindly. "That's the trap. Let's gather them for real." He took out a fourth-piece and a half-piece and set them in the basket. "Look. These don't match. The half is bigger. If we just smush the numbers together, the basket doesn't know what size the pieces are."

He took the half-piece and showed Wren how it could be cut into two equal fourths. "Watch. One half is the same as two-fourths. *Now* both pieces are fourths. They match." He dropped them in. "One-fourth plus two-fourths. Three pieces, all fourths. Three-fourths."

Wren stared. "So the bottom number stays the same once they match?"

"The bottom number tells you the *size* of the pieces," Gather said. "Once the sizes match, you stop touching the bottom. You just gather the tops. Three-fourths."

Wren laughed, a little stunned. "I was adding the sizes together. That's like saying two baskets plus two baskets equals four... basket-baskets."

"Exactly," Gather grinned. "Keep the size. Gather the count."



At the end of the day, when the academy emptied out, Gather sat with his basket and tidied his pieces, sorting them by size the way some people fold laundry.

He thought about that afternoon at the button stall, his ears hot, six pieces of nothing in particular sitting on the counter. He hadn't been *bad* at adding. He'd just been skipping the quiet first step — the step where you make sure the pieces match before you trust the total.

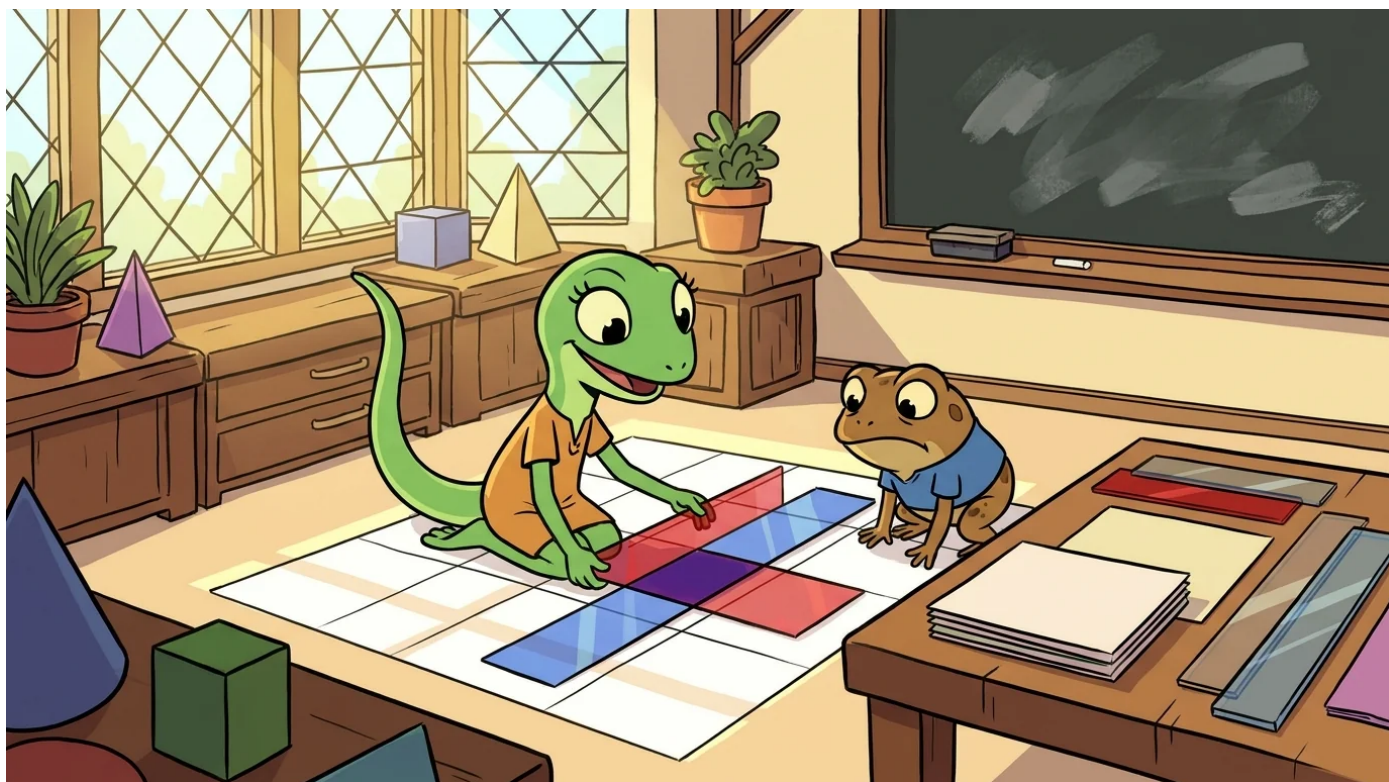
Wren poked her head back in on her way out. "Gather? What if I forget to check whether the pieces match?"

Gather patted his basket. "Then your basket will tell you," he said. "If the answer feels too big or too small — if a fourth plus a half somehow comes out *smaller* than a half — stop. Look at the pieces. They probably don't match yet. Make them match. Then gather."

Wren nodded, and headed out into the evening, already cutting halves into fourths in her head, just to feel them line up.

Times

MULTIPLYING FRACTIONS — multiplying by a fraction means taking a fraction *OF* something. Half of a third is a sixth. Lay one strip across another; the overlap where they cross is the answer. Multiplying by a fraction makes things smaller.



Times made shadows cross.

In a sunny corner of the FairShare Village academy, she kept two long strips of colored glass — one red, one blue — and a patch of white floor to lay them on. She was a quick, bright lizard with sharp eyes, and she spent her days laying one strip across another and watching where they overlapped.

A young toad named Bo watched her work. She laid the blue strip down so it covered one-third of the floor patch. Then she laid the red strip *across* it, sideways, so the red covered one-half of the patch the other way.

Where the two strips crossed, the light turned deep purple — a small rectangle, much smaller than either strip.

"That purple piece," Times said, pointing, "is one-half of one-third. And do you know what it works out to?" She traced the little rectangle. "One-sixth. Half of a third is a sixth."

Bo frowned. "But... it got *smaller*. You multiplied. Things are supposed to get bigger when you multiply."

Times grinned. "That's the surprise, isn't it? Let me tell you how I figured it out."



When Times was small, she got the surprise herself, and it bothered her for a week.

She was helping her uncle in his greenhouse, where seedlings grew under colored cloth. "Take half of that tray," he said, pointing to a tray that was already only a third full of sprouts.

Little Times scooped up half of the third-full tray and carried it over. Then she stopped, holding the small handful, confused.

"This is way less than half a tray," she said. "But you said *half*. Half is a lot."

Her uncle knelt down. "Half *of what*, though? Half of a whole tray would be big. But you took half *of a third*. You took part of a part. A part of a small thing is a smaller thing still."

Times stared at the little handful of sprouts. Half of a whole would have been huge. But half of a *third* was tiny. The word "multiply" had always meant *more* to her. Now here it was, quietly meaning *less*.

"Part of a part," she whispered. It made her dizzy and delighted at the same time.

That afternoon she went home and laid two strips of paper across each other, just to watch the overlap shrink. She never got tired of it.



Times arrived at the academy carrying her two glass strips wrapped in a cloth.

Slice, the old tortoise, set her a problem. "What is two-thirds of three-quarters?" he asked. "No tricks. Show me."

Times laid down her first strip to cover three-quarters of the white floor patch. Then she turned her second strip sideways and laid it across to cover two-thirds of the patch the other way.

Where they overlapped, a block of doubled color appeared. She counted the little squares the two strips had cut the patch into. "The whole patch is cut into twelfths now — four columns, three rows. And the overlap covers six of those twelfths." She looked up. "Six-twelfths. Which is the same as one-half."

Slice raised an eyebrow. He had taught multiplication with rules — *top times top, bottom times bottom* — for sixty years. He had never seen a student lay the answer out in *light* before.

"The rule still works," Times added quickly. "Two times three is six, four times three is twelve, six-twelfths. But I like to *see* it. The overlap doesn't lie."

"You may stay," Slice said.



In her sunny corner, Times met a grumpy beetle named Cricket who slammed a worksheet down.

"Multiplying fractions is broken," Cricket announced. "I did one-half times one-fourth and got one-eighth. One-eighth is *smaller* than both of them. Multiplication is supposed to make things bigger. The math is wrong."

"The math is fine," Times said gently. "It's the word that's tricking you. Watch." She laid down a strip covering one-fourth of the patch, then crossed it with a strip covering one-half the other way. The overlap was a tiny rectangle. "One-half *of* one-fourth. You're not stacking two things up. You're taking a *part* of a part. A part is always smaller than the whole thing you took it from."

Cricket squinted at the little overlap. "So 'times' here means 'of.'"

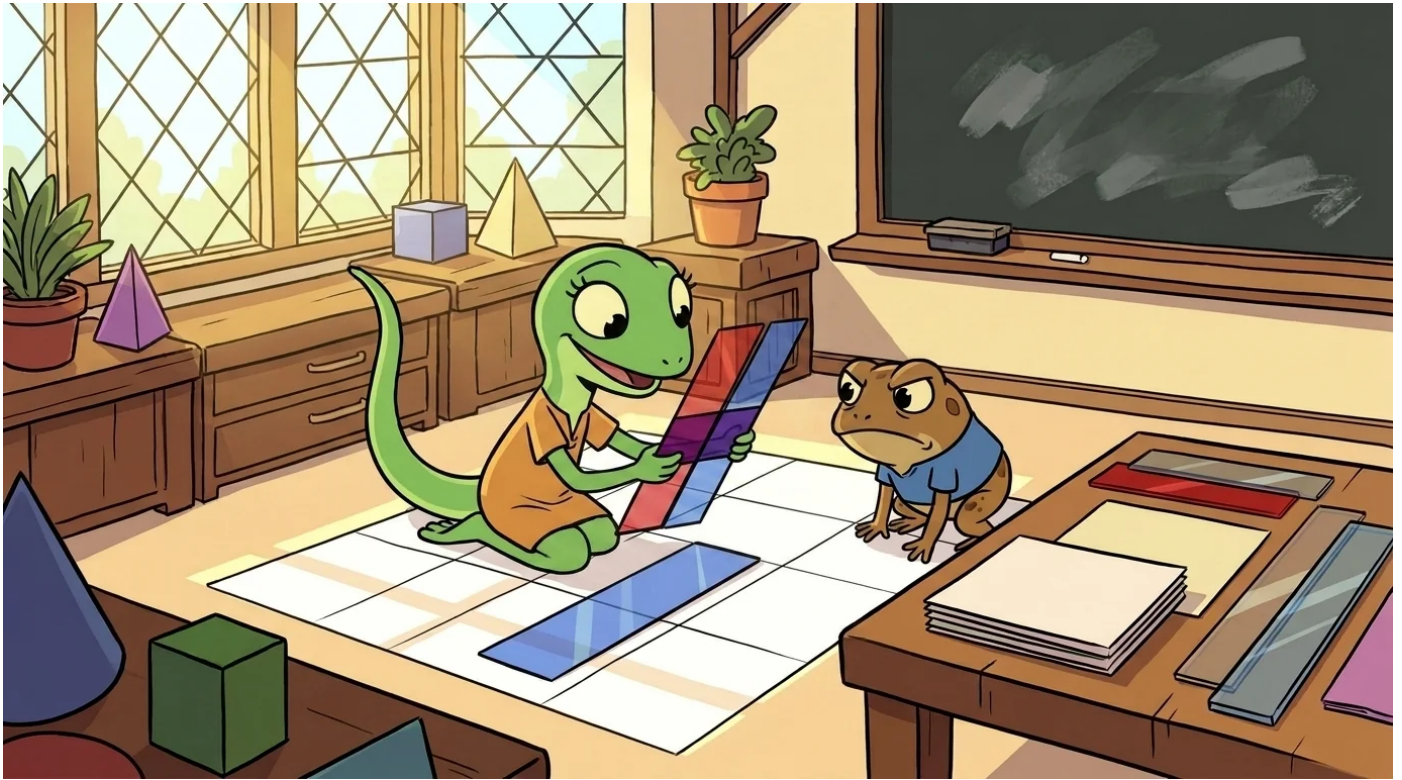
"That's the secret," Times said. "When you multiply by a fraction, 'times' means 'of.' Half *times* a fourth is half *of* a fourth. And half of something small is smaller still."

Then she did something that made Cricket's antennae twitch. She picked up the strips and swapped them — laid the fourth where the half had been, and the half where the fourth had been. The overlap rectangle was exactly the same size.

"Half of a fourth, or a fourth of a half," Times said. "Same answer. One-eighth, either way. The order doesn't change the overlap."

Cricket stared. "Two different sentences. One little purple square."

"One little purple square," Times agreed, delighted.



When the sun moved off her corner and the colored strips went dark, Times wrapped them in their cloth for the night.

She thought about her uncle's greenhouse — the tiny handful of sprouts, half of a third, the word *multiply* quietly turning soft and small in her hands. She had been so sure multiplying meant *more*. It had taken a crossed pair of shadows to show her that taking part of a part means *less*, and that this wasn't a mistake. It was the whole beautiful point.

Bo the toad, still there at closing time, asked one last question. "Times? How will I remember that multiplying makes it smaller?"

Times smiled and held up her two strips, crossing them in the last of the light, the overlap shrinking to a sliver.

"You don't have to remember a rule," she said. "Just remember the word *of*. Half *of* a third. A part *of* a part. And a part is always smaller than what you started with. The overlap will always tell you the truth."

Bo nodded, watching the little crossed shadow, and headed home thinking about all the parts of parts in the world, each one smaller than the last, each one exactly where it should be.

Tenth

DECIMAL PLACE VALUE — the columns after the decimal point each shrink by ten. Tenths, then hundredths, then thousandths. The 7 in 0.7 means seven-tenths; the 7 in 0.07 means seven-hundredths. The column tells you the size.



Tenth lined things up in columns. To her, a messy number was an unmade bed.

In her room at the FairShare Village academy, she kept a set of nesting boxes on a shelf — a big one, then a smaller one that fit inside it, then a smaller one inside that, on and on, each box exactly ten times smaller than the box before it. She was a tidy little dormouse with a pencil always tucked behind one ear.

A young sparrow named Fen came to her with a number written on a card: **0.7**.

"What does the seven mean?" Fen asked.

Tenth took the seven and set it gently into the very first box after the point — the biggest of the small boxes. "It means *seven-tenths*," she said. "Seven pieces, and each piece is one-tenth of a whole. The seven isn't just a seven. It's a seven *living in the tenths box*. Where it sits is what tells you how big it is."

Fen blinked. "The *spot* matters more than the number?"

"Oh, the spot matters more than almost anything," Tenth said. "Let me show you why."



When Tenth was small, she didn't understand columns at all, and it cost her a prize.

There was a village guessing jar — fill in the weight of a giant pumpkin, win the pumpkin. Little Tenth wrote down what she thought was a clever, precise answer. But she crammed all her digits together without minding where they sat, and her careful guess came out meaning something wildly different from what she'd intended. A guess that should have been close was suddenly off by a huge amount.

The grocer who ran the jar wasn't unkind about it. He pulled out a set of little cups, each one ten times smaller than the one before. He poured a big cup of water into a smaller cup until it overflowed. "See? Ten of the little ones fill one of the big ones. That's how the columns work. Ones, then tenths, then hundredths. Each step to the right, ten times smaller."

He pointed at her crammed-together guess. "Your digits were fine. They were just sitting in the wrong cups."

Tenth stared at the cups, the water still dripping. A 7 in the tenths cup was seven-tenths. The *same* 7 in the hundredths cup was seven-hundredths — ten times smaller. Same digit. Different home. Different size.

She went home and built her own set of nesting boxes that night. She never crammed a number together again.



Tenth came to the academy with her nesting boxes under her arm.

Slice, the old tortoise, wrote two numbers on the board: **0.7** and **0.07**. "Same digit," he said. "Tell me the difference."

Tenth didn't rush. She set up her boxes in a row: the ones place, then a little dot, then the tenths box, then the hundredths box. She placed a 7-tile into the tenths box of the first number. "Seven-tenths. Seven of the bigger small pieces."

Then she placed a 0 in the tenths box of the second number, and slid the 7 one box over, into the hundredths box. "Seven-hundredths. The zero is holding the tenths spot empty — saying *no tenths here* — and pushing the seven into the next box down. Ten times smaller."

"The zero isn't nothing," she added. "It's a placeholder. It keeps the seven in the right box. Take the zero away and the seven slides back up and becomes ten times bigger. The whole number changes."

Slice nodded slowly. He had taught decimals as *just numbers with a dot* for years. He had never watched anyone treat a zero as a careful little fence before. "You may stay," he said.



In her tidy room, Tenth met a flustered frog named Bramble who had two coins and a complaint.

"Decimals are sneaky," Bramble said. "I wrote thirty cents as 0.30 and my friend wrote it as 0.3 and we got in a fight about who was right. We can't both be right!"

"Let's box it up," Tenth said calmly. She set out her columns. In Bramble's number she placed a 3 in the tenths box and a 0 in the hundredths box. "Three-tenths, and zero-hundredths." Then in the friend's number she placed a 3 in the tenths box and left the hundredths box empty. "Three-tenths, and... nothing after."

She tilted her head. "Both of you put a 3 in the tenths box. That's the part that carries the value. Three-tenths of a dollar is thirty cents either way. The extra zero in the hundredths box just says *and zero hundredths* — true, but it doesn't add anything. You're *both* right."

Bramble's eyes went wide. "So the zero at the *end* is just polite. But the zero in the *middle* — like in 0.07 — that one's doing a job."

"Now you've got it," Tenth said, delighted. "A zero that holds a spot between other digits is doing a real job — it keeps everyone in the right box. A zero hanging off the very end is just being tidy. The boxes tell you which is which."

Bramble laughed. "I'll never trust a zero the same way again."



When evening came and the academy went quiet, Tenth straightened her nesting boxes on the shelf, big to small, each one ten times tinier than the last.

She thought about the guessing jar, all those years ago — her clever answer ruined not because the digits were wrong, but because they'd been sitting in the wrong cups. The grocer's kindness. The overflowing water. *Your digits were fine. They were just sitting in the wrong homes.*

Fen the sparrow, still perched in the doorway, asked the last question of the day. "Tenth? How do I always know which box a digit goes in?"

Tenth pointed at her shelf of nesting boxes. "Start at the point and walk right," she said. "First box, tenths. Next box, hundredths. Next, thousandths. Each step, ten times smaller. The digit hasn't changed — but the box it sits in tells you exactly how much it's worth. Find the box, and you'll always know the size."

Fen looked at the row of boxes, big to small, and nodded. Then he flew home, picturing every number he passed tucked neatly into its own little nesting box, each one in exactly the right place.

Rank

COMPARING FRACTIONS — you can tell which fraction is bigger by reasoning, not only by converting. Benchmark against $\frac{1}{2}$. Same top, smaller bottom means bigger pieces. Same bottom, bigger top means more pieces.



Rank loved a good line-up.

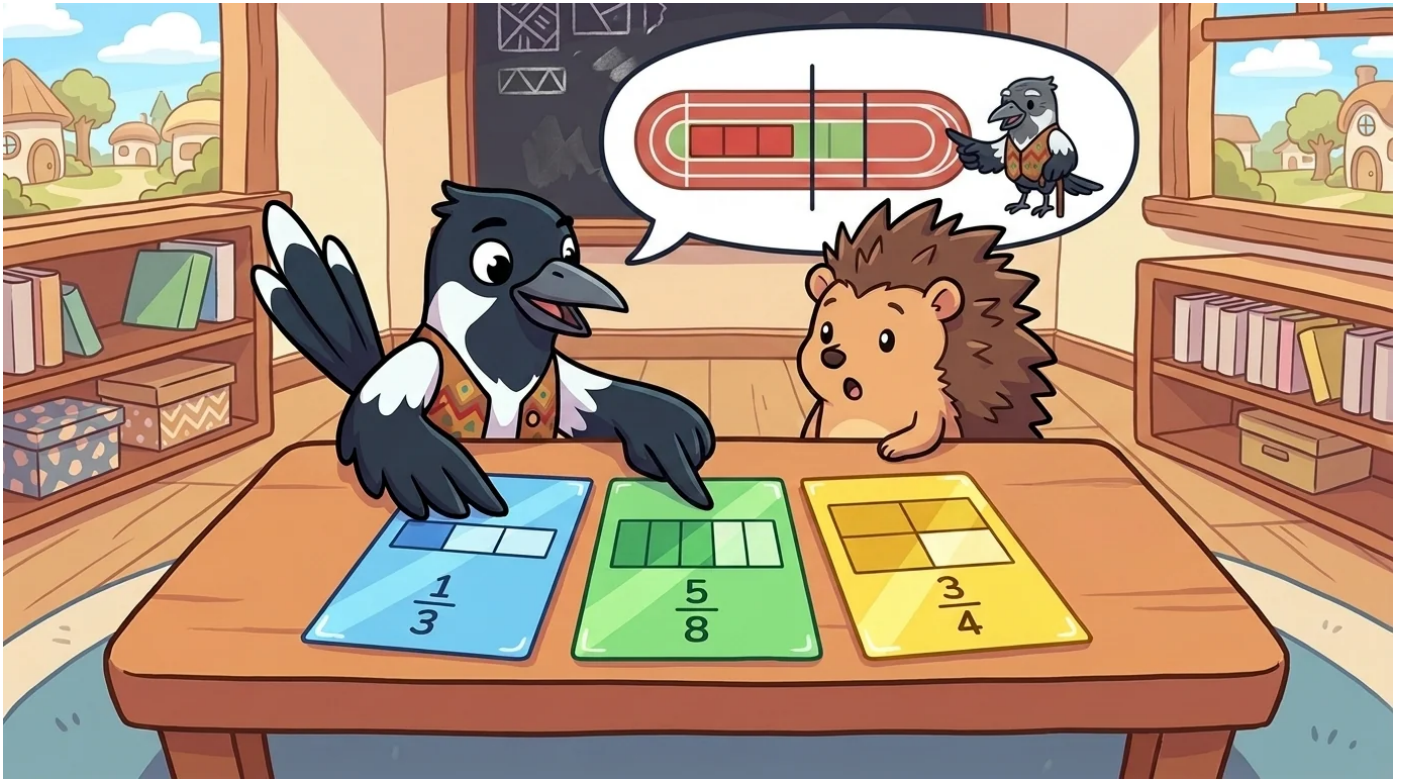
At the FairShare Village academy, whenever a pile of fraction cards got jumbled, Rank was the one who sorted them — smallest to largest, left to right, like kids lining up by height. He was a brisk, friendly magpie with a bright eye for which thing was bigger than which.

A young hedgehog named Sol dumped a handful of cards in front of him: $\frac{3}{4}$, $\frac{1}{3}$, $\frac{5}{8}$. "Put them in order," Sol said, "but I bet you have to do a ton of math first."

Rank barely glanced at them. He slid $\frac{1}{3}$ to the left. "Smallest — that's less than half." He slid $\frac{3}{4}$ to the right. "Biggest — that's more than half." He set $\frac{5}{8}$ in the middle. "And this one's just a hair over half. So: a third, then five-eighths, then three-quarters."

Sol's spines stood up. "You didn't even calculate anything!"

"I compared them to *half*," Rank said. "Half is my middle marker. Once you know which side of half each one is on, you're most of the way there. Let me show you how I learned that."



When Rank was small, comparing fractions made his head hurt.

His family ran the village relay races, and every race ended in arguments: whose runner had covered more of the track? One had run three-fifths of the way. Another had run two-thirds. The kids would shout numbers at each other and nobody could tell who'd won.

Little Rank tried to settle it by converting everything — cutting the track into tiny matching pieces, fifteenths, counting them all up. It worked, but it was slow, and by the time he finished, everyone had wandered off.

His grandfather, who judged the races, took him aside. "You don't always need the whole calculation," he said. "Look. Is three-fifths more than half the track, or less?"

Rank thought. Half of five-fifths would be two-and-a-half fifths. Three-fifths was past that. "More than half."

"And two-thirds?"

Half of three would be one-and-a-half thirds. Two-thirds was past that, too. "Also more than half." Rank frowned. "That doesn't settle it."

"No," his grandfather agreed, "but now you only have two *close* ones to think hard about, instead of a whole jumble. You've already thrown out the easy cases. *Half* did most of the work for you."

Rank stared at the track. Half. The middle marker. Suddenly comparing didn't feel like a wall of math anymore. It felt like *sorting*.



Rank came to the academy with a deck of fraction cards he could shuffle and sort faster than anyone.

Slice, the old tortoise, fanned out four cards: **$2/5$, $4/4$, $1/6$, $7/8$** . "Order them," he said. "Out loud. Tell me how."

Rank didn't reach for a pencil. "Four-fourths is a whole one — that's the biggest, it's a complete thing. One-sixth is a tiny sliver, way under half — smallest. Two-fifths is under half too, but bigger than that little sliver. And seven-eighths is almost a whole, just under four-fourths." He laid them out left to right. "One-sixth, two-fifths, seven-eighths, four-fourths."

"And if two are both close to half?" Slice asked.

"*Then* I think harder," Rank said. "Same top number? The one with the smaller bottom is bigger — fewer, fatter pieces. Same bottom number? The one with the bigger top is bigger — more pieces. And if I'm really stuck, I'll do it Stretch's way and give them a common bottom. But most of the time, reasoning gets me there first."

Slice looked at the tidy row of cards. He had taught comparison as *always convert first* for sixty years. He had never watched a student sort by thinking out loud. "You may stay," he said.



In his corner, Rank met a worried vole named Wisp clutching two cards.

"I have to figure out which is bigger," Wisp said, "three-fourths or two-thirds, and I always get them mixed up."

"Middle marker first," Rank said. "Are they over half or under half?"

Wisp thought. "Three-fourths... half of four is two, three is past two, so over half. Two-thirds... half of three is one-and-a-half, two is past that, so also over half." Wisp sagged. "They're both over half. Now I'm stuck again."

"Good — you've earned the harder look," Rank said warmly. "Now think about how far *past* a whole they each fall short. Three-fourths is missing just one-fourth to be a whole. Two-thirds is missing one-third to be a whole." He held up two fingers a little apart. "Which gap is bigger — a fourth or a third?"

Wisp pictured the pieces. "A third is bigger than a fourth. So two-thirds is missing a *bigger* chunk."

"So which one is closer to a whole?"

"Three-fourths! It's only missing a little fourth. So three-fourths is bigger!" Wisp nearly dropped the cards. "I figured it out by thinking about what was *missing*."

"That's the magpie's trick," Rank grinned. "Sometimes the easiest way to see which is bigger is to see which one has less missing."



At the end of the day, when the academy emptied and the card piles were all sorted, Rank shuffled his deck one last time, just for the pleasure of putting it back in order.

He thought about the old relay races — the shouting, the arguments, his slow careful fifteenths while everyone wandered away. His grandfather's quiet question. *Is it more than half, or less?* That one marker had turned a wall of math into a simple line-up. He'd never been afraid of comparing since.

Sol the hedgehog, still hanging around, asked the last question. "Rank? What if I get two that are really, really close?"

"Then you slow down and do it carefully — benchmark to half, check what's missing, and if you still can't tell, give them a common bottom like Stretch does," Rank said. "But start by *thinking*. Most of the time, a fraction will tell you which side of half it's on, and that sorts the line-up before you've done a single sum."

Sol nodded, gathered the cards, and headed home, quietly sorting every pair of fractions he could think of — over half, under half, almost a whole — putting the whole world in order, one quick comparison at a time.

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Methodology

Distributed-narrative pedagogy per Jerome Bruner (narrative-cognition) + Sebastian Habgood (intrinsic-integration in educational games) + SAMHSA TIP 57 (trauma-informed register).

Trauma-informed-design framework per Eggleston et al. (2025) and Stoltenburg et al. (2024).

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