SOURDOUGH RECIPE HYDRATION CALCULATOR · EDUCATIONAL MATH LESSON

Lesson 1: Calculating Hydration with 100% Starter (1:1 Ratio)

Demonstrates how 100 g starter containing equal parts flour and water shifts a recipe from **70.00%** shorthand ratio to **72.73%** actual total hydration.

Added Flour (F)	Added Water (W)	Starter Mass (S)	Starter Hydration (h)
500 g	**350 g**	**100 g**	**100% (1:1 flour:water)**

Naive Shorthand: 350 g water / 500 g flour = **70.00%**. *Why this is incomplete:* The 100 g starter is not neutral - it injects substantial flour and water into the dough mass.

Step	Formula & Algebraic Derivation	Calculated Value
1. Starter Flour	Starter Flour = S / (1 + h / 100) = 100 / (1 + 1.00) = 100 / 2	**50.00 g**
2. Starter Water	Starter Water = S - Starter Flour = 100 - 50.00	**50.00 g**
3. Total Flour	Total Flour = Added Flour + Starter Flour = 500 + 50.00	**550.00 g**
4. Total Water	Total Water = Added Water + Starter Water = 350 + 50.00	**400.00 g**
5. True Total Hydration	100 * (Total Water / Total Flour) = 100 * (400 / 550) = 72.727273% • Exact ratio: 400 / 550 = 8 / 11 | Percentage: 100 * (8 / 11) = 72.727272...% • **Educational table / handout (2 decimals): 72.73%** (+2.73 percentage points shift over shorthand) • **Interactive calculator card (1 decimal): 72.7%** • **Loader internal target (6 decimals): 72.727273%**	**72.73%**

Practice Worksheet: Calculate Your Own Sourdough Formula

Parameter / Calculation	Formula / Instruction	Your Recipe Numbers
Your Added Flour (F)	*Enter base flour from your recipe*	[ ] g
Your Added Water (W)	*Enter water added directly to dough*	[ ] g
Your Starter Weight (S)	*Enter starter mass used*	[ ] g
Your Starter Hydration (h)	*Hydration of starter (e.g., 100% or 50%)*	[ ] %
Starter Flour	S / (1 + h / 100)	**[ ] g**
Starter Water	S - Starter Flour	**[ ] g**
Total Flour	Added Flour + Starter Flour	**[ ] g**
Total Water	Added Water + Starter Water	**[ ] g**
True Total Hydration	100 * (Total Water / Total Flour)	**[ ] %**

Calculation Notes & Primary Educational Reference:

• Method reference: https://www.kingarthurbaking.com/blog/2023/01/11/bread-hydration (King Arthur Baking on counting starter flour and water).

• Educational arithmetic lesson for hydration calculations; not baking results, crumb structure guarantees, expert validation, or hydration recommendations. Flour blend and salt apply to added flour only.

Lesson 2: Calculating Hydration with 50% Stiff Starter (2:1 Ratio)

Demonstrates how 100 g stiff starter containing twice as much flour as water shifts a recipe from **70.00%** shorthand ratio down to **67.65%** actual total hydration.

Added Flour (F)	Added Water (W)	Starter Mass (S)	Starter Hydration (h)
500 g	**350 g**	**100 g**	**50% (2:1 flour:water)**

Naive Shorthand: 350 g water / 500 g flour = **70.00%**. *The Stiff Starter Effect:* Because a 50% starter provides 66.67 g flour but only 33.33 g water, it dilutes the overall water ratio, pulling hydration down below 70%.

Step	Formula & Algebraic Derivation (Unrounded Arithmetic)	Calculated Value
1. Starter Flour	Starter Flour = S / (1 + 50 / 100) = 100 / 1.50 = 200 / 3 g • Exact: 200 / 3 g | Decimal approximation: 66.666667 g | Table display: **66.67 g**	**66.67 g**
2. Starter Water	Starter Water = S - Starter Flour = 100 - (200 / 3) = 100 / 3 g • Exact: 100 / 3 g | Decimal approximation: 33.333333 g | Table display: **33.33 g**	**33.33 g**
3. Total Flour	Total Flour = 500 + (200 / 3) = 1700 / 3 g • Exact: 1700 / 3 g | Decimal approximation: 566.666667 g | Table display: **566.67 g**	**566.67 g**
4. Total Water	Total Water = 350 + (100 / 3) = 1150 / 3 g • Exact: 1150 / 3 g | Decimal approximation: 383.333333 g | Table display: **383.33 g**	**383.33 g**
5. True Total Hydration	100 * (Total Water / Total Flour) = 100 * ((1150/3) / (1700/3)) = 100 * (1150 / 1700) = 67.647059% • Exact reduced ratio: 2300 / 34 = 1150 / 17 | Decimal percentage: 67.6470588...% • **Educational table / handout (2 decimals): 67.65%** (-2.35 percentage points shift vs shorthand) • **Interactive calculator card (1 decimal): 67.6%** • **Loader internal target (6 decimals): 67.647059%** • *Important Math Note:* Dividing pre-rounded numbers (383.33 / 566.67) yields 67.646073% (67.6461%). The calculator uses unrounded algebra (1150 / 1700 = 67.647059%) to preserve true mathematical precision.	**67.65%**

Side-by-Side Comparison: Shorthand vs. 100% Starter vs. 50% Starter

Parameter	Shorthand (Ignored)	Case 1: 100% Starter	Case 2: 50% Starter
Added Ingredients	500 g flour, 350 g water	500 g flour, 350 g water	500 g flour, 350 g water
Starter Contribution	*0 g (omitted)*	50.00 g flour, 50.00 g water	66.67 g flour, 33.33 g water
Total Dough Makeup	500 g flour, 350 g water	550.00 g flour, 400.00 g water	566.67 g flour, 383.33 g water
True Total Hydration	**70.00%** baseline	**72.73%** **+2.73 percentage points**	**67.65%** **-2.35 percentage points**

Practice Worksheet: Test Stiff Starter or Custom Recipe

Parameter / Calculation	Formula / Instruction	Your Recipe Numbers
Your Added Flour (F)	*Base flour in recipe*	[ ] g
Your Added Water (W)	*Direct water added*	[ ] g
Your Starter Weight (S)	*Total starter weight used*	[ ] g
Your Starter Hydration (h)	*Starter hydration percentage*	[ ] %
Total Flour & Water	F + S/(1+h/100) & W + (S - StarterFlour)	[ ] g flour, [ ] g water
True Total Hydration	100 * (Total Water / Total Flour)	**[ ] %**

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