



Fraction of a Whole Number

$1/2 \times 6$ asks for **half of 6**. The word **of** does the work.

1. $1/2 \times 6$. Six counters. Click to shade half of them, then count the shaded ones.

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$$\frac{1}{2} \times 6 = \underline{\hspace{2cm}}$$

2. $1/3 \times 12$, then use that answer for $2/3 \times 12$. Two thirds is just two of the one-third answer.

$$\frac{1}{3} \times 12 = \underline{\hspace{2cm}}$$

$$\frac{2}{3} \times 12 = \underline{\hspace{2cm}}$$

3. $3/4 \times 8$. Find one fourth first, then take three of them.

$$\frac{1}{4} \times 8 = \underline{\hspace{2cm}}$$

three of them: $\underline{\hspace{2cm}}$

$$\frac{3}{4} \times 8 = \underline{\hspace{2cm}}$$

Multiplying by a fraction less than 1 **takes a part**, so the answer shrinks.



Fraction of a Fraction

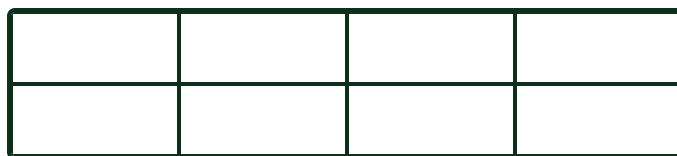
Shade one fraction, then shade the other on top. The **overlap** is the answer.

1. $\frac{1}{2} \times \frac{1}{3}$. The grid shows thirds across and halves down. One third is shaded light. Half of it is shaded deep. Count: the deep piece is 1 of how many equal pieces?



$$\frac{1}{2} \times \frac{1}{3} = \underline{\hspace{2cm}}$$

2. $\frac{1}{2} \times \frac{3}{4}$. Fourths across, halves down. Click to shade $\frac{3}{4}$ of the **top row only**. That is half of three fourths. Count your shaded pieces out of the whole grid.



$$\frac{1}{2} \times \frac{3}{4} = \underline{\hspace{2cm}}$$

3. Look at both grids. Where do the **denominators** of the answers (6 and 8) come from?

The grid multiplies the denominators **for** you: rows $\times$ columns.



Roots of Reason

Name _____

Date _____

Multiply Across

Multiply the numerators, then the denominators. Simplify if you can.

1. Multiply across. Type fraction answers like $3/8$, and simplify where you can.

$$\frac{1}{2} \times \frac{1}{3} = \underline{\hspace{2cm}}$$

$$\frac{2}{3} \times \frac{3}{4} = \underline{\hspace{2cm}}$$

$$4 \times \frac{2}{5} = \underline{\hspace{2cm}}$$

$$\frac{5}{6} \times 1 = \underline{\hspace{2cm}}$$

2. $3/4 \times 8/9$. Multiply across, then simplify the result.

tops: $3 \times 8 = \underline{\hspace{2cm}}$ bottoms: $4 \times 9 = \underline{\hspace{2cm}}$ simplified: $\underline{\hspace{2cm}}$

3. **Find the flaw.** A student computes $1/2 \times 1/3$ by multiplying the numerators and **adding** the denominators, and gets $1/5$. Use the grid from page 2 to explain what the denominators do.

The denominators **multiply** because cutting cuts every piece again.

Name _____ Date _____

Same move as 83×2 : **split, multiply the pieces, add.**

- $$2 \frac{1}{2} \times 3 = (2 \times 3) + (\frac{1}{2} \times 3) = \underline{\hspace{2cm}} + \underline{\hspace{2cm}} = \underline{\hspace{2cm}}$$

- $$3\frac{1}{4} \times 2 = (\underline{\hspace{2cm}} \times 2) + (\underline{\hspace{2cm}} \times 2) = \underline{\hspace{2cm}} + \underline{\hspace{2cm}} =$$

$$1 \frac{2}{3} \times 6 = \underline{\hspace{2cm}}$$

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When **both** numbers are mixed, rename them as fractions, then multiply across.

- $$1 \frac{1}{2} = \underline{\hspace{2cm}}$$

$$2 \frac{2}{3} = \underline{\hspace{2cm}}$$

$$3 \frac{1}{4} = \underline{\hspace{2cm}}$$

- $$\frac{3}{2} \times \frac{8}{3} = \underline{\hspace{2cm}} = \underline{\hspace{2cm}}$$

renamed: _____ × _____

answer: _____

Roots of Reason



Fraction Multiplication Stories

For each story: write the equation, show your work, answer with a **unit**.

1. A recipe needs $\frac{3}{4}$ cup of flour. You make half the recipe. How much flour?

equation:

answer:

2. A garden bed is $2\frac{1}{2}$ meters long and 3 meters wide. What is its area?

equation:

answer:

3. A hiker walks $\frac{2}{3}$ mile every day for 6 days. How far in all?

equation:

answer:

Story 1 shrinks, stories 2 and 3 grow. The fraction tells you **which way** before you compute.