



Fraction Bars

The bars are drawn and cut. Your only job: **count the pieces.**

1. $2 \div \frac{1}{3}$. How many thirds fit in 2 wholes?



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

2. $4 \div \frac{1}{2}$



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

3. $3 \div \frac{1}{4}$. Cut the bars into fourths yourself, then count.



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

4. Look at your three answers. When you divide by a fraction smaller than 1, is the answer bigger or smaller than the number you started with? Why?

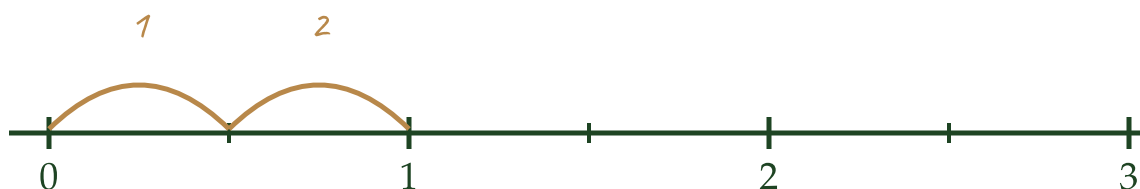
Division still asks the old question: **how many fit?**



Number Line Jumps

Each jump is one divisor. Count the jumps to reach the dividend.

1. $3 \div \frac{1}{2}$. The first two jumps are drawn. Finish the jumps, then count them.



$$3 \div \frac{1}{2} = \underline{\hspace{2cm}} \text{ jumps}$$

2. $2 \div \frac{1}{4}$. Mark the fourths yourself, draw the jumps, count.



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

3. Write the division equation this story matches, then solve it with jumps in your head: "A 4-meter board is cut into $\frac{1}{2}$ -meter shelves. How many shelves?"

equation: _____

shelves = _____

A number line turns division into **counting jumps**.

Name _____ Date _____

Fraction $\div$ fraction: cut the bar into the **divisor's** pieces, count the shaded ones.

- | | | | | | | | |
|-----|-----|-----|-----|--|--|--|--|
| 1/8 | 1/8 | 1/8 | 1/8 | | | | |
|-----|-----|-----|-----|--|--|--|--|

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

- | | | | | | |
|-----|-----|-----|-----|-----|-----|
| 1/6 | 1/6 | 1/6 | 1/6 | 1/6 | 1/6 |
|-----|-----|-----|-----|-----|-----|

$2/3 =$ sixths

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

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

Roots of Reason



Equal Shares

Fraction $\div$ whole number asks: **how big is each share?** Name the answer from the whole.

1. $1/2 \div 3$. The half is split into 3 equal shares. What is one share, named from the whole bar?



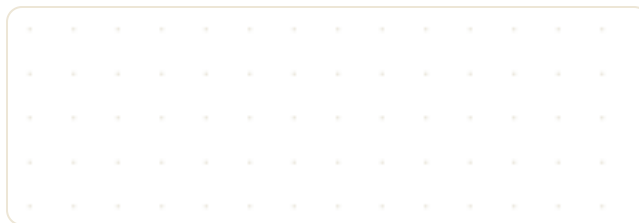
$$\frac{1}{2} \div 3 = \underline{\hspace{2cm}}$$

2. $1/3 \div 2$. Draw the model.



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

3. $3/4 \div 3$. Draw the model.



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

4. $1/2 \div 3$ and $3 \div 1/2$ use the same numbers. Why are the answers so different?

How many fit counts pieces. **How big is each share** names a piece. Different questions, different answers.



Roots of Reason

Name _____ Date _____

Choosing a Model

No bars given. Pick your model: bar, number line, or area. Label everything.

1. $2 \div \frac{2}{3}$. Careful: the last piece may not be whole.

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

2. $\frac{3}{4} \div \frac{1}{4}$

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

3. $\frac{1}{2} \div 4$

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

A model you drew yourself shows **why** the answer is right.



Predicting the Quotient

Before touching a pencil: will the answer be **bigger or smaller** than the first number?

1. Circle your prediction, then compute. Use a model or the reciprocal strategy.

$$5 \div \frac{1}{2} \quad \text{ } \bigcirc \text{ bigger } \bigcirc \text{ smaller} \quad = \underline{\hspace{2cm}}$$

$$\frac{1}{2} \div 5 \quad \text{ } \bigcirc \text{ bigger } \bigcirc \text{ smaller} \quad = \underline{\hspace{2cm}}$$

$$4 \div \frac{2}{3} \quad \text{ } \bigcirc \text{ bigger } \bigcirc \text{ smaller} \quad = \underline{\hspace{2cm}}$$

$$6 \div \frac{3}{4} \quad \text{ } \bigcirc \text{ bigger } \bigcirc \text{ smaller} \quad = \underline{\hspace{2cm}}$$

2. One of your predictions above surprised most students the first time. Which one, and what does it teach?

Dividing by less than 1 **grows** the answer. Dividing by more than 1 shrinks it.

Name _____

Date _____

For each story: write the equation, draw a quick model, answer with a **unit**.

equation: _____

answer: _____

equation: _____

answer: _____

equation:

answer:

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The Reciprocal Strategy

Multiply by the reciprocal of the divisor. Every answer still needs a **reason**.

1. Use the reciprocal strategy: multiply by the reciprocal of the divisor.

$$\frac{3}{4} \div \frac{1}{8} = \underline{\hspace{2cm}}$$

$$5 \div \frac{2}{3} = \underline{\hspace{2cm}}$$

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

2. **Find the flaw.** Leo computes $1/2 \div 1/4 = 1/8$ "because half of a fourth is an eighth." Draw the model that proves him wrong, then explain what he did instead of dividing.

Grid area for drawing a model and explaining the flaw.

$$\frac{1}{2} \div \frac{1}{4} = \underline{\hspace{2cm}} \quad \text{Leo actually found: } \underline{\hspace{4cm}}$$

3. Explain to a 5th grader why $1 \div 2/3 = 3/2$. You may use words, a drawing, or both.

Grid area for explaining the concept.

Use the shortcut only when you can **explain** why it works.