



Stuck? Scan
for the anchor
chart

NUMBER SENSE SET • SHEET 1 OF 7

The Bar Is a Division Sign

Name _____ Date _____

4 granola bars, 5 people. Everyone gets the same amount. Three ways to write the exact same situation:

$$4 \div 5 \quad 5 \overline{)4} \quad \frac{4}{5}$$

Same numbers, same answer. The fraction bar IS a division sign.

1. Here are the 4 bars. Cut each one into **5 equal pieces** (draw the cut lines), then shade what **one person** gets.

Four horizontal bars, each representing a whole unit, intended for students to draw cut lines and shade one-fifth of each bar.

One person gets of a bar.

2. Finish the chain. Each blank is the same number wearing different clothes.

$$\frac{4}{5} = 4 \div 5 = \boxed{}$$

Hint: $4 \div 5$ means 40 tenths $\div$ 5. How many tenths does each person get?

Roots of Reason

Number Sense Set · Sheet 2 of 7

How Many Fit

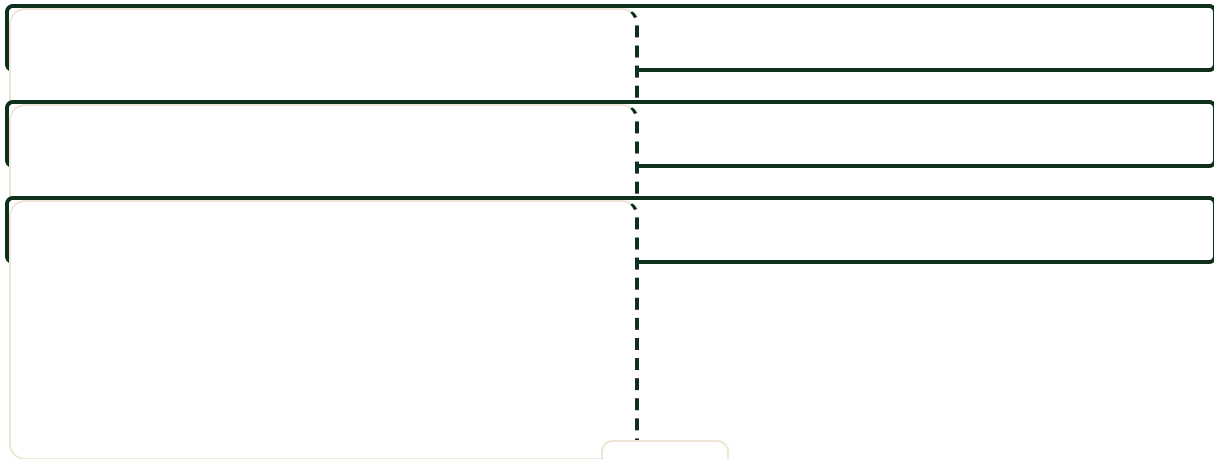
Division can ask: how many of THIS fit inside THAT? That question works for fractions too.

1. $12 \div 3$ asks: how many 3s fit in 12? Circle groups of 3, then count the circles.



$$12 \div 3 = \boxed{} \text{ (the number of circles)}$$

2. Same question, fraction edition. $3 \div \frac{1}{2}$ asks: **how many halves fit in 3 wholes?** Each strip below is one whole, already split into halves. Count the halves.



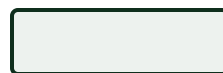
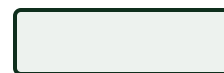
$$3 \div \frac{1}{2} = \boxed{}$$

Dividing by a half gave a BIGGER answer. Hold that thought for Sheet 4.

✂ **Cut-apart check.** Cut out these two strips. Physically lay half-strips along the whole strip: how many fit?



1 whole

 $\frac{1}{2}$  $\frac{1}{2}$

Roots of Reason

Number Sense Set · Sheet 3 of 7

 $\times 10$ and $\div 10$, Both Directions*The digit never changes. It just slides. Left means times 10, right means divided by 10.*← $\times 10$ each step $\div 10$ each step →

hundreds	tens	ones	·	tenths	hundredths
		5	.		

Start: the 5 lives in the ones place. Every problem below is this same chart with the 5 in a new home.

1. Slide the 5 and write the number it becomes.

$5 \times 10 = \boxed{}$

$5 \div 10 = \boxed{}$

$5 \times 10 \times 10 = \boxed{}$

$5 \div 10 \div 10 = \boxed{}$

$0.5 \times 10 = \boxed{}$

$50 \div 10 = \boxed{}$

2. Finish the sentence with a **number**:Moving one place to the **left** multiplies by $\boxed{}$.Moving one place to the **right** divides by $\boxed{}$.✂ **Cut-and-slide.** Cut out the digit tile. Slide it one column at a time across the chart above and say the number out loud at each stop.

5

Roots of Reason

Number Sense Set · Sheet 4 of 7

When Multiplying Makes It Smaller

Predict FIRST. Circle before you compute. No fair calculating and then circling.

12×2

The answer will be:

bigger than 12

smaller than 12

same as 12

=

12×1

The answer will be:

bigger than 12

smaller than 12

same as 12

=

$12 \times \frac{1}{2}$

The answer will be:

bigger than 12

smaller than 12

same as 12

=

12×0.5

The answer will be:

bigger than 12

smaller than 12

same as 12

=

$12 \times \frac{1}{4}$

The answer will be:

bigger than 12

smaller than 12

same as 12

=

Look back: two of these rows are the exact same problem in different clothes. Which two?

$$\begin{array}{r} 12 \\ \times \end{array}$$

and

$$\begin{array}{r} 12 \\ \times \end{array}$$

Multiplying by a number smaller than 1 takes only part of 12. That is why the answer shrinks.

Roots of Reason

Number Sense Set · Sheet 5 of 7

One Rectangle, Four Problems

The same rectangle answers all four. Only the units change.

1. Each square is worth 1. The rectangle shows $3 \times 4 =$

2. Now each square is worth 100 (the sides are 30 and 40). Same rectangle: $30 \times 40 =$

3. Shade $\frac{3}{4}$ of the rectangle above. How many squares did you shade? $\frac{3}{4}$ of 12 =

4. Now the whole rectangle is worth 1, so each side is a decimal: 0.3 and 0.4. Each little square is worth **0.01** (one hundredth). The rectangle covers 12 squares, so:

$$0.3 \times 0.4 = 12 \text{ hundredths} =$$

That is the whole secret of decimal multiplication: tenths times tenths makes hundredths. Two decimal places, and now you know why.

Roots of Reason

Number Sense Set · Sheet 6 of 7

Fraction, Decimal, Same Number

There is no conversion rule to memorize. The bar is a division sign, so divide.

Example

$$\frac{1}{2} = 2 \overline{) 1.0}^{0.5} = 0.5$$

2 does not fit into 1, so trade 1 for 10 tenths. 10 tenths ÷ 2 = 5 tenths.

1. Divide it out: $\frac{3}{4} = 3 \div 4$

$$4 \overline{) 3.00}$$

 $\frac{3}{4} =$

2. Divide it out: $\frac{1}{8} = 1 \div 8$

$$8 \overline{) 1.000}$$

 $\frac{1}{8} =$

3. Prediction only, no dividing: will $\frac{3}{8}$ be bigger or smaller than 0.5? Circle one, then say why out loud.

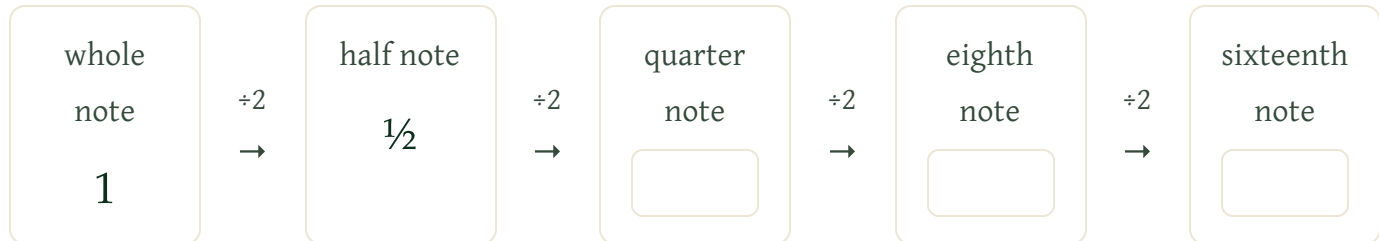
bigger than 0.5

smaller than 0.5

Note Values Are the Fraction System

Every note is half the one before it. Music has been running on $\div 2$ the whole time.

1. Fill in the missing fractions. Each step is $\div 2$.



2. A **4/4 time signature** is a fraction sitting in plain sight: 4 beats per measure, and the quarter note gets the beat. One measure below is split into quarter-note beats. How many **eighth notes** fit in the measure?



Eighth notes in one 4/4 measure:

3. This is Sheet 2's question with sound: **how many eighth notes fit in a half note?** A half note lasts 2 beats. An eighth note lasts $\frac{1}{2}$ beat. Play it on the keyboard and count, then write the division it matches.

$2 \div \frac{1}{2} =$ (you can hear this answer)



NUMBER SENSE SET · 7 SHEETS

Answer Key

Sheet 1 · The Bar Is a Division Sign

1. Each bar cut in 5; one person gets *4/5 of a bar* (one piece from each bar). 2. $4/5 = 4 \div 5 = 0.8$

Sheet 2 · How Many Fit

1. 4 circles 2. $3 \div \frac{1}{2} = 6$ halves Cut-apart: *2 halves fit in 1 whole*

Sheet 3 · $\times 10$ and $\div 10$

1. 50, 0.5, 500, 0.05, 5, 5 2. left multiplies by 10; right divides by 10

Sheet 4 · When Multiplying Makes It Smaller

$12 \times 2 = 24$ (bigger) · $12 \times 1 = 12$ (same) · $12 \times \frac{1}{2} = 6$ (smaller) · $12 \times 0.5 = 6$ (smaller) · $12 \times \frac{1}{4} = 3$ (smaller).
Same problem twice: *$\frac{1}{2}$ and 0.5*

Sheet 5 · One Rectangle, Four Problems

1. 12 2. 1200 3. 9 squares 4. 0.12

Sheet 6 · Fraction, Decimal, Same Number

1. $\frac{3}{4} = 0.75$ 2. $\frac{1}{8} = 0.125$ 3. *smaller than 0.5* ($\frac{3}{8}$ is less than $\frac{1}{2} = 4/8$)

Sheet 7 · Note Values

1. quarter $\frac{1}{4}$, eighth $\frac{1}{8}$, sixteenth $\frac{1}{16}$ 2. 8 eighth notes 3. $2 \div \frac{1}{2} = 4$

Watch Sheet 4 closely. If the prediction is wrong but the computation is right, the rule "multiplication makes bigger" is still running underneath. Reteach from Sheet 2's strips, not from more practice problems.