



Do-Nothing Numbers and Undo Partners



Identity and inverse: the numbers that change nothing, and the partners that undo everything.

Name _____

Date _____

Words we use (say the math word, then the plain English)

Adding

Additive identity = 0, the do-nothing number for adding.

$$a + 0 = a$$

Additive inverse = the opposite, the undo partner for adding. It brings you back to 0.

$$a + (-a) = 0$$

Multiplying

Multiplicative identity = 1, the do-nothing number for multiplying.

$$a \times 1 = a$$

Multiplicative inverse = the reciprocal, the undo partner for multiplying. It brings you back to 1.

$$a \times \frac{1}{a} = 1$$

PART A Fill in the table

Write each number's opposite and reciprocal, then show the check. Row 1 is done for you.

Number	Opposite (additive inverse)	Check: adds to 0	Reciprocal (multiplicative inverse)	Check: multiplies to 1
5	-5	$5 + (-5) = 0$	$\frac{1}{5}$	$5 \times \frac{1}{5} = 1$
9				
-4				
$\frac{2}{3}$				
1				
$2\frac{1}{2}$				
0				

Hint for the last row: is there any number you can multiply 0 by to get 1?

PART B Which one is it?

Circle the two words that describe each statement.

- | | | |
|---|--------------------|----------------------|
| 1. $8 \times 1 = 8$ | identity / inverse | adding / multiplying |
| 2. $-3 + 3 = 0$ | identity / inverse | adding / multiplying |
| 3. $\frac{2}{7} \times \frac{7}{2} = 1$ | identity / inverse | adding / multiplying |
| 4. $0 + 15 = 15$ | identity / inverse | adding / multiplying |

PART C Find the hidden 1 or hidden 0

You already know how to do these. This time say the secret out loud: fill in the blanks to show where the do-nothing number is hiding.

- $\frac{2}{5} = \frac{6}{15}$ because we multiplied $\frac{2}{5}$ by _____, and that fraction equals _____.
- 3 yards = 9 feet because $3 \text{ yd} \times \frac{? \text{ ft}}{1 \text{ yd}} = 9 \text{ ft}$. What goes in place of the ? _____ That fraction equals _____ because 3 feet and 1 yard are the same amount.
- To solve $x + 8 = 20$, add _____ to both sides. The left side becomes $x + \text{_____}$, which is just x . So $x = \text{_____}$.
- To solve $5x = 35$, multiply both sides by _____. The left side becomes _____ $\cdot x$, which is just x . So $x = \text{_____}$.
- To add $\frac{1}{2} + \frac{1}{6}$, rewrite $\frac{1}{2}$ as $\frac{?}{6}$ by multiplying $\frac{1}{2}$ by _____. The ? is _____, and the sum is _____.

PART D Solve it and say the secret

Solve each equation. For each one, write the undo partner (inverse) you used and the do-nothing number (identity) that showed up.

Equation	Inverse I used	Identity that appeared	Solution
$x + 11 = 4$			
$6x = 42$			
$(\frac{3}{4})x = 9$			
$y - 7 = 10$			

Tip for $y - 7 = 10$: subtracting 7 is the same as adding -7 . What is the opposite of -7 ?

PART E In your own words (exit ticket)

Short answers are fine. Use the math word and the plain English.

- What is the reciprocal of $\frac{3}{8}$? What do you get when you multiply $\frac{3}{8}$ by its reciprocal?

- Rewrite $\frac{5}{6}$ as $\frac{?}{18}$. Circle the 1 you multiplied by.

- How are opposites and reciprocals alike? (One sentence.)

- Why is 1 the do-nothing number for multiplying, and not 0?



Answer Key



Accept any wording that names the do-nothing number and the undo partner correctly.

PART A Fill in the table

Number	Opposite (additive inverse)	Check: adds to 0	Reciprocal (multiplicative inverse)	Check: multiplies to 1
9	-9	$9 + (-9) = 0$	$\frac{1}{9}$	$9 \times \frac{1}{9} = 1$
-4	4	$-4 + 4 = 0$	$-\frac{1}{4}$	$-4 \times (-\frac{1}{4}) = 1$
$\frac{2}{3}$	$-\frac{2}{3}$	$\frac{2}{3} + (-\frac{2}{3}) = 0$	$\frac{3}{2}$	$\frac{2}{3} \times \frac{3}{2} = \frac{6}{6} = 1$
1	-1	$1 + (-1) = 0$	1 (it is its own reciprocal)	$1 \times 1 = 1$
$2\frac{1}{2}$	$-2\frac{1}{2}$	$2\frac{1}{2} + (-2\frac{1}{2}) = 0$	$\frac{2}{5}$ ($2\frac{1}{2} = \frac{5}{2}$)	$\frac{5}{2} \times \frac{2}{5} = 1$
0	0 (its own opposite)	$0 + 0 = 0$	None. No number times 0 gives 1.	—

PART B Which one is it?

1. identity, multiplying 2. inverse, adding 3. inverse, multiplying 4. identity, adding

PART C Find the hidden 1 or hidden 0

- Multiplied by $\frac{3}{3}$, which equals 1.
- $3 \text{ yd} \times \frac{3 \text{ ft}}{1 \text{ yd}} = 9 \text{ ft}$. The fraction equals 1.
- Add -8 to both sides. Left side becomes $x + 0$. $x = 12$.
- Multiply both sides by $\frac{1}{5}$. Left side becomes $1 \cdot x$. $x = 7$.
- $\frac{1}{2} = \frac{3}{6}$, multiplied by $\frac{3}{3}$. Sum: $\frac{3}{6} + \frac{1}{6} = \frac{4}{6} = \frac{2}{3}$.

PART D Solve it and say the secret

Equation	Inverse used	Identity that appeared	Solution
$x + 11 = 4$	add -11 (the opposite of 11)	$x + 0$	$x = -7$
$6x = 42$	multiply by $\frac{1}{6}$ (the reciprocal of 6)	$1 \cdot x$	$x = 7$
$(\frac{3}{4})x = 9$	multiply by $\frac{4}{3}$ (the reciprocal of $\frac{3}{4}$)	$1 \cdot x$	$x = \frac{36}{3} = 12$
$y - 7 = 10$	add 7 (the opposite of -7)	$y + 0$	$y = 17$

PART E In your own words

- $\frac{8}{3}$. Multiplying gives $\frac{24}{24} = 1$, the multiplicative identity (the do-nothing number for multiplying).
- $\frac{5}{6} \times \frac{3}{3} = \frac{15}{18}$. The circled 1 is $\frac{3}{3}$.
- Both are undo partners that bring a number back to its do-nothing number (0 or 1).
- $7 \times 1 = 7$ (unchanged), but $7 \times 0 = 0$ (wiped out). Each operation has its own do-nothing number.