

INDEPENDENT VARIABLE

IDV WORKSHEETS



HOW TO SOLVE EQUATIONS STEP-BY-STEP TABLES

ONE-STEP | TWO-STEP | VARIABLES ON BOTH SIDES

ANIMATED
POWERPOINT:
DOES THE WORK
FOR YOU!

FULL ANSWER
KEYS
INCLUDED

28 EXAMPLE
PROBLEMS
8 PRACTICE
SHEETS

PRACTICE BY
PART, FIND
THE MISTAKE
+ MAZE

MORE PRACTICE. LESS PREP. BETTER OUTCOMES.

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Inside the Animated Lesson

INDEPENDENT VARIABLE

GRADE 7-8 • SOLVING EQUATIONS

HOW TO SOLVE EQUATIONS

STEP-BY-STEP TABLES | ONE-STEP | TWO-STEP | THREE-STEP

Animated PowerPoint lesson
 28 animated tables, one row per click
 8 table practice sheets • Find the Mistake • Maze

MORE PRACTICE, LESS PREP, BETTER OUTCOMES.
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9	=	3x + 5	
-5	=	-5	Get rid of the number by the variable (add/subtract)
4	=	3x	Isolate
/3	=	/3	Divide both sides by the variable (multiply)
4/3	=	x	Write the answer
9	=	3(4/3) + 5	Check: put the answer back in

LESSON OVERVIEW

Today's Goals

I CAN...

- Solve one-step equations with a table: add, subtract, divide, or multiply by the reciprocal.
- Solve two-step and three-step equations, one row at a time.
- Check every answer by putting it back in.

KEY VOCABULARY

Variable the letter, x	Inverse the opposite move: + and -, × and ÷
Both sides do every move to both sides	Reciprocal the fraction flipped over
Rewrite write what is left	Check put the answer back in

STANDARDS
 CCSS 7.EE.B.4a CCSS 8.EE.C.7d

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PART 1 • NOTES

Add or Subtract

NOTES • GUIDED PROBLEMS: PART 1

Additive inverse: get rid of the number by the variable. Do the **opposite** to both sides.

x + 4: **subtract 4**. x - 5: **add 5**.

-x? Multiply each side by **-1** to make x **positive**.

Check: put the answer **back in**. Both sides are **equal**.

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PART 1 • GUIDED PROBLEM 1 • GUIDED PROBLEMS: PART 1

One-Step: Additive Inverse

x + 4 = 3	Copy the problem.
-4 = -4	Get rid of the number by the variable, 4: subtract 4 from both sides.
x = -1	Write the answer.
(-1) + 4 = 3 ✓	Check: both sides are 3. ✓

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PART 1 • GUIDED PROBLEM 5 • GUIDED PROBLEMS: PART 1

One-Step: Additive Inverse

-8 = -x + 5	Copy the problem.
-5 = -5	Get rid of the number by the variable, 5: subtract 5 from both sides.
-13 × (-1) = -x × (-1)	Rewrite: -13 = -x. Multiply each side by -1 to make x positive.
13 = x	Write the answer.
-8 = -(13) + 5 ✓	Check: both sides are -8. ✓

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PART 2 • NOTES

Divide

NOTES • GUIDED PROBLEMS: PART 2

Multiplicative inverse: 3x means 3 **times** x, so **divide** both sides by 3.

A fraction by x: multiply both sides by the **reciprocal** (flip the fraction).

Multiply fractions: **top × top, bottom × bottom**. Simplify if you can.

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PART 2 • GUIDED PROBLEM 5 • GUIDED PROBLEMS: PART 2

One-Step: Multiplicative Inverse

$\frac{2}{3}x = 4$	Copy the problem.
$\frac{2}{3} \cdot \frac{3}{2}x = \frac{4}{1} \cdot \frac{3}{2}$	Multiply both sides by the reciprocal (flip the fraction): top × top, bottom × bottom.
x = $\frac{12}{2} = 6$	Write the answer. Simplify.
$\frac{2}{3}(6) = 4 \checkmark$	Check: both sides are 4. ✓

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PART 4 • GUIDED PROBLEM 1 • GUIDED PROBLEMS: PART 4

Three-Step: Variables on Both Sides

3x + 1 = 6x + 5	Copy the problem.
-3x = -3x	Get rid of the smallest variable term, 3x: subtract 3x from both sides.
1 = 3x + 5	Rewrite. Now it is a two-step equation.
-5 = -5	Get rid of the number by the variable, 5: subtract 5 from both sides.
-4 = 3x	Rewrite.
/3 = /3	Divide both sides by 3, the number with x.
$-\frac{4}{3} = x$	Write the answer.
$3(-\frac{4}{3}) + 1 = 6(-\frac{4}{3}) + 5 \checkmark$	Check: both sides are -3. ✓

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Directions: Fill in the notes. Copy each problem from the slide into its table and solve it with the slides.

NOTES

Additive inverse: get rid of the number by the variable. Do the _____ to both sides.

$x + 4$: _____ 4. $x - 5$: _____ 5.

$-x$? Multiply each side by _____ to make x _____.

Check: put the answer _____. Both sides are _____.

PART 1: ADD OR SUBTRACT (ADDITIVE INVERSE)

1)

	=		
	=		Get rid of the number by the variable (both sides)
	=		Write the answer
	=		Check: put the answer back in

2)

	=		
	=		Get rid of the number by the variable (both sides)
	=		Write the answer
	=		Check: put the answer back in

3)

	=		
	=		Get rid of the number by the variable (both sides)
	=		Write the answer
	=		Check: put the answer back in

4)

	=		
	=		Get rid of the number by the variable (both sides)
	=		Write the answer
	=		Check: put the answer back in

5)

	=		
	=		Get rid of the number by the variable (both sides)
	=		Multiply both sides by -1 to make x positive
	=		Write the answer
	=		Check: put the answer back in

6)

	=		
	=		Get rid of the number by the variable (both sides)
	=		Multiply both sides by -1 to make x positive
	=		Write the answer
	=		Check: put the answer back in

Directions: Solve the equations for x. Use the example as a guide. Fill in every row, then check.

Example: how to solve it with the table

$x + 4 = 3$	
$-4 = -4$	Get rid of the number by the variable (both sides)
$x = -1$	Write the answer
$(-1) + 4 = 3 \checkmark$	Check: put the answer back in

$x + 2 = 3$	
$-2 = -2$	Get rid of the number by the variable (both sides)
$x = 1$	Write the answer
$(1) + 2 = 3 \checkmark$	Check: put the answer back in

$x + 2 = 2$	
$-2 = -2$	Get rid of the number by the variable (both sides)
$x = 0$	Write the answer
$(0) + 2 = 2 \checkmark$	Check: put the answer back in

1) $x + 7 = 3$	
$=$	Get rid of the number by the variable (both sides)
$x =$	Write the answer
$=$	Check: put the answer back in

2) $x + 1 = 4$	
$=$	Get rid of the number by the variable (both sides)
$x =$	Write the answer
$=$	Check: put the answer back in

3) $x + -1 = 5$	
$=$	Get rid of the number by the variable (both sides)
$x =$	Write the answer
$=$	Check: put the answer back in

4) $x + 6 = -2$	
$=$	Get rid of the number by the variable (both sides)
$x =$	Write the answer
$=$	Check: put the answer back in

5) $x + 7 = -4$	
$=$	Get rid of the number by the variable (both sides)
$x =$	Write the answer
$=$	Check: put the answer back in

6) $x + -3 = 5$	
$=$	Get rid of the number by the variable (both sides)
$x =$	Write the answer
$=$	Check: put the answer back in

7) $6 + x = -3$	
$=$	Get rid of the number by the variable (both sides)
$x =$	Write the answer
$=$	Check: put the answer back in

8) $7 + x = 2$	
$=$	Get rid of the number by the variable (both sides)
$x =$	Write the answer
$=$	Check: put the answer back in

9) $-3 + x = 4$	
$=$	Get rid of the number by the variable (both sides)
$x =$	Write the answer
$=$	Check: put the answer back in

10) $8 + x = -2$	
$=$	Get rid of the number by the variable (both sides)
$x =$	Write the answer
$=$	Check: put the answer back in

11) $2 + x = -4$	
$=$	Get rid of the number by the variable (both sides)
$x =$	Write the answer
$=$	Check: put the answer back in

12) $-6 + x = 5$	
$=$	Get rid of the number by the variable (both sides)
$x =$	Write the answer
$=$	Check: put the answer back in

13) $10 = x + 5$	
$=$	Get rid of the number by the variable (both sides)
$= x$	Write the answer
$=$	Check: put the answer back in

14) $9 = 5 + x$	
$=$	Get rid of the number by the variable (both sides)
$= x$	Write the answer
$=$	Check: put the answer back in

15) $-9 = x - 6$	
$=$	Get rid of the number by the variable (both sides)
$= x$	Write the answer
$=$	Check: put the answer back in

Directions: Fill in the notes. Copy each problem from the slide into its table and solve it with the slides.

NOTES

Multiplicative inverse: $3x$ means 3 _____ x , so _____ both sides by 3.

A fraction by x : multiply both sides by the _____ (flip the fraction).

Multiply fractions: _____, _____. Simplify if you can.

PART 2: DIVIDE (MULTIPLICATIVE INVERSE)

1)		=		
		=		Divide both sides by the number with x
		=		Write the answer
		=		Check: put the answer back in

2)		=		
		=		Divide both sides by the number with x
		=		Write the answer
		=		Check: put the answer back in

3)		=		
		=		Divide both sides by the number with x
		=		Write the answer
		=		Check: put the answer back in

4)		=		
		=		Divide both sides by the number with x
		=		Write the answer
		=		Check: put the answer back in

5)		=		
		=		Multiply both sides by the reciprocal
		=		Write the answer
		=		Check: put the answer back in

6)		=		
		=		Multiply both sides by the reciprocal
		=		Write the answer
		=		Check: put the answer back in

Directions: Solve the equations for x. Simplify the answer if you can. Check each answer.

Example: how to solve it with the table

$2 = 3x$	
$\div 3 = \div 3$	Divide both sides by the number with x
$\frac{2}{3} = x$	Write the answer
$2 = 3\left(\frac{2}{3}\right) \checkmark$	Check: put the answer back in

$x + 2 = 3$	
$-2 = -2$	Get rid of the number by the variable (both sides)
$x = 1$	Write the answer
$(1) + 2 = 3 \checkmark$	Check: put the answer back in

$\frac{2}{3}x = 4$	
$\frac{2}{3} \cdot \frac{3}{2}x = \frac{4}{1} \cdot \frac{3}{2}$	Multiply both sides by the reciprocal
$x = \frac{12}{2} = 6$	Write the answer
$\frac{2}{3}(6) = 4 \checkmark$	Check: put the answer back in

2)

$3 = 4x$	
$=$	Divide both sides by the number with x
$= x$	Write the answer
$=$	Check: put the answer back in

$x + 3 = 5$	
$=$	Get rid of the number by the variable (both sides)
$x =$	Write the answer
$=$	Check: put the answer back in

$\frac{4}{3}x = 6$	
$=$	Multiply both sides by the reciprocal
$x =$	Write the answer
$=$	Check: put the answer back in

3)

1)

$3 = 5x$	
$=$	Divide both sides by the number with x
$= x$	Write the answer
$=$	Check: put the answer back in

$x + 4 = 9$	
$=$	Get rid of the number by the variable (both sides)
$x =$	Write the answer
$=$	Check: put the answer back in

$\frac{3}{4}x = 9$	
$=$	Multiply both sides by the reciprocal
$x =$	Write the answer
$=$	Check: put the answer back in

$4 = 6x$	
$=$	Divide both sides by the number with x
$= x$	Write the answer
$=$	Check: put the answer back in

$x + 1 = 9$	
$=$	Get rid of the number by the variable (both sides)
$x =$	Write the answer
$=$	Check: put the answer back in

$\frac{2}{5}x = 4$	
$=$	Multiply both sides by the reciprocal
$x =$	Write the answer
$=$	Check: put the answer back in