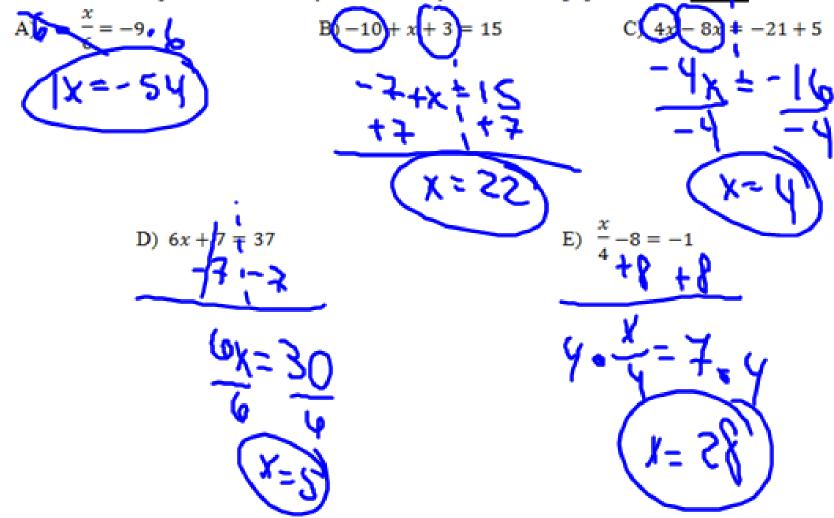Get out your homework and have it ready to check. Grab the Warm Up from the front table and get to work!

Classwork - Solving Equations with Fraction Coefficents

$$x - 7 = 15$$

Solve the following equations. If you need to simplify the left or right side before you solve, do so and then rewrite the new equation. Make sure you show how you are undoing operations on **BOTH** sides of the equation.

A) $\dfrac{x}{6} = -9$

$$x = -54$$

B) $-10 + x + 3 = 15$

$$-7 + x = 15$$
$$+7 \qquad +7$$
$$x = 22$$

C) $4x - 8x = -21 + 5$

$$\dfrac{-4x}{-4} = \dfrac{-16}{-4}$$
$$x = 4$$

D) $6x + 7 = 37$

$$-7 \quad -7$$
$$\dfrac{6x}{6} = \dfrac{30}{6}$$
$$x = 5$$

E) $\dfrac{x}{4} - 8 = -1$

$$+8 \quad +8$$
$$4 \cdot \dfrac{x}{4} = 7 \cdot 4$$
$$x = 28$$

A) $4x + 9 = 37$

$\underline{-9 \quad -9}$

$\dfrac{4x}{4} = \dfrac{28}{4}$

$\boxed{x = 7}$

B) $-3x - 8 = 22$

$\underline{+8 \quad +8}$

$\dfrac{-3x}{-3} = \dfrac{30}{-3}$

$\boxed{x = -10}$

C) $\dfrac{t}{4} + 8 = 20$

$\underline{-8 \quad -8}$

$4 \cdot \dfrac{t}{4} = 12 \cdot 4$

$\boxed{t = 48}$

D) $5 + 9x = 41$

$\underline{-5 -5}$

$\dfrac{9x}{9} = \dfrac{36}{9}$

$\boxed{x = 4}$

E) $\dfrac{x}{6} - 7 = -25$

$\underline{+7 \quad +7}$

$6 \cdot \dfrac{x}{6} = -18 - 6$

$\boxed{x = -108}$

F) $-6 + 3x = -15$

$\underline{+6 +6}$

$\dfrac{3x}{3} = \dfrac{9}{3}$

$\boxed{x = -3}$

G) $-18 = 4y + 10$

$\underline{-10 -10}$

$\dfrac{-28}{4} = \dfrac{4y}{4}$

$\boxed{-7 = y}$

H) $\dfrac{x}{3} + 10 = 3$

$\underline{-10 \quad -10}$

$3 \cdot \dfrac{x}{3} = -7 \cdot 3$

$\boxed{x = -21}$

I) $-24 - a = -15$

$\underline{+24 +24}$

$\dfrac{-a}{-1} = \dfrac{9}{-1}$

$\boxed{a = -9}$

Solving 2-step equations

Solving 2-step equations means we need to undo 2 operations before finding the value of 1x or x.

Process:
1) Look at what operations are acting on your variable
2) Undo the multiple operations that are acting on your variable
   First: Undo Addition or Subtraction
   Second: Undo Multiplication or Division
3) Find the value of 1x
4) Check your answer

For the following problems, you will be given a two-step equation. Following the instruction above and undo the operations acting on x until you find the value of 1x or x.
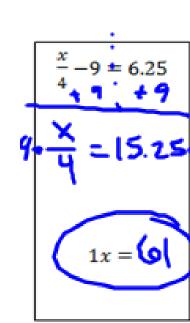
$-5x - 6 = 19$ $1x =$	**What operations are acting on x?** 1st Undo____ by ____ on **BOTH** sides Rewrite the new equation 2nd Undo____ by ____ on **BOTH** sides State the value of 1x or x. Check the answer.	$\frac{x}{7} + 8 = -5$ $1x =$	**What operations are acting on x?** 1st Undo____ by ____ on **BOTH** sides Rewrite the new equation 2nd Undo____ by ____ on **BOTH** sides State the value of 1x or x. Check the answer.

Box 1 (top left):

$$\frac{x}{4} - 9 \div 6.25$$

(handwritten: $\cdot 9 \ \div \ +9$)

$$9 \cdot \frac{x}{4} = 15.25$$

$$1x = 61$$

What operations are acting on x?

1st
Undo _9_ by _+9_ on **BOTH** sides

Rewrite the new equation

2nd
Undo _÷4_ by _•4_ on **BOTH** sides

State the value of 1x or x.

Check the answer.

Box 2 (top right):

$$12 - 9x = 66$$

$$-12 \qquad -12$$

$$\frac{-9x}{-9} = \frac{54}{-9}$$

$$1x = -6$$

What operations are acting on x?

1st
Undo ____ by _-12_ on **BOTH** sides

Rewrite the new equation

2nd
Undo _-9_ by _÷-9_ on **BOTH** sides

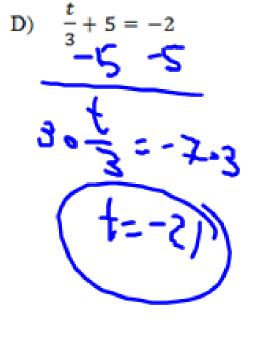State the value of 1x or x.

Check the answer.

Solve the following 2-step equations using the exact same process as we did above.

A) $3x + 15 = -45$

$$-15 \quad -15$$
$$\frac{3x}{3} = \frac{-60}{3}$$
$$x = -20$$

B) $-12x + 5 = 137$

$$-5 \quad -5$$
$$\frac{-12x}{-12} = \frac{132}{-12}$$
$$x = -11$$

C) $\frac{t}{8} - 6 = 9$

$$+6 \quad +6$$
$$8 \cdot \frac{t}{8} = 15 \cdot 8$$
$$t = 120$$

D) $\frac{t}{3} + 5 = -2$

$$-5 \quad -5$$
$$3 \cdot \frac{t}{3} = -7 \cdot 3$$
$$t = -21$$

Fractional Coefficients in Equations

Sometimes, the number being multiplied by the variable is a fraction. Before we get to that, let's look at taking a fraction of number.

$\frac{1}{2}$ of 10 $\qquad\qquad$ $\frac{2}{3}$ of 9 $\qquad\qquad$ $\frac{3}{4}$ of 16

$\frac{1}{2} \cdot 10 = 5$ $\qquad\qquad$ $\frac{2}{3} \cdot 9 = 6$ $\qquad\qquad$ $\frac{3}{4} \cdot 16 = 12$

You can write a fraction multiplying a whole number as one larger fraction:

How to write a fraction times a number as a single fraction:	Write the multiplications above as a single fraction:
$\frac{1}{2} \cdot 10 = \frac{1 \cdot 10}{2}$ Multiply whole # with the numerator	$\frac{1}{2} \cdot 10 =$ $\qquad$ $\frac{2}{3} \cdot 9 = \frac{18}{3} = 6$ $\qquad$ $\frac{3}{4} \cdot 16 = \frac{48}{4} = 12$ $\frac{2}{7} \cdot 42 =$ mult. by $\underline{1}$ $\qquad$ mult. by $\underline{2}$ $\qquad$ mult. by $\underline{3}$ $\qquad$ mult. by $\underline{}$ divide by $\underline{2}$ $\qquad$ divide by $\underline{3}$ $\qquad$ divide by $\underline{4}$ $\qquad$ divide by $\underline{}$

How could you write the following multiplication of fractions and variables as a single fraction?

$\frac{1}{2}x =$ $\frac{1x}{2}$ $\qquad\qquad$ $\frac{2}{3}x =$ $\frac{2x}{3}$ $\qquad\qquad$ $\frac{3}{4}x =$ $\frac{3x}{4}$

Mult. x by $\underline{1}$ $\qquad\qquad$ Mult. x by $\underline{2}$ $\qquad\qquad$ Mult. x by $\underline{3}$
Divide x by $\underline{2}$ $\qquad\qquad$ Divide x by $\underline{3}$ $\qquad\qquad$ Divide x by $\underline{4}$

Problem 1

$$\frac{1}{2}x = 13$$

Handwritten work:
$$2 \cdot \frac{1x}{2} = 13 \cdot 2$$
$$\boxed{1x = 26}$$

$$1x =$$

What operations are acting on x?

Rewrite the equation so the term with the variable is a single fraction

1st
Undo $\div 2$ by $\cdot 2$ on **BOTH** sides

Rewrite the new equation

2nd
Undo ___ by ___ on **BOTH** sides

State the value of 1x or x.

Check the answer.

Problem 2

$$\frac{2}{6}x = 9$$

Handwritten work:
$$6 \cdot \frac{2x}{6} = 9 \cdot 6$$
$$\frac{2x}{2} = \frac{54}{2}$$
$$\boxed{1x = 27}$$

What operations are acting on x?

Rewrite the equation so the term with the variable is a single fraction

1st
Undo $\div 6$ by $\cdot 6$ on **BOTH** sides

Rewrite the new equation

2nd
Undo $\cdot 2$ by $\div 2$ on **BOTH** sides

State the value of 1x or x.

Check the answer.

Problem 3

$$-\frac{1}{3}x = 12$$

Handwritten work:
$$3 \cdot \frac{-1x}{3} = 12 \cdot 3$$
$$\frac{-1x}{-1} = \frac{36}{-1}$$
$$\boxed{1x = -36}$$

What operations are acting on x?

Rewrite the equation so the term with the variable is a single fraction

1st
Undo $\div 3$ by $\cdot 3$ on **BOTH** sides

Rewrite the new equation

2nd
Undo $\cdot -1$ by $\div -1$ on **BOTH** sides

State the value of 1x or x.

Check the answer.

Problem 4

$$\frac{2}{3}x = -8$$

Handwritten work:
$$3 \cdot \frac{2x}{3} = -8 \cdot 3$$
$$\frac{2x}{2} = \frac{-24}{2}$$
$$\boxed{1x = -12}$$

What operations are acting on x?

Rewrite the equation so the term with the variable is a single fraction

1st
Undo $\div 3$ by $\cdot 3$ on **BOTH** sides

Rewrite the new equation

2nd
Undo $\cdot 2$ by $\div 2$ on **BOTH** sides

State the value of 1x or x.

Check the answer.