Equations with Fractions

The one other thing that might throw you off is when you see a bunch of *fractions* in the problem. Not to worry, remember that you have power to do anything you want to the equation. For example:

$$\frac{3}{8}x - \frac{5}{8} = \frac{7x}{8}$$ might be easier to look at if there weren't so many fractions in the way. Well, get rid of them. Multiply by 8 on both sides.

$$^{(8)}\frac{3}{8}x - {}^{(8)}\frac{5}{8} = {}^{(8)}\frac{7x}{8}$$ which makes it become:

3x – 5 = 7x   (not bad at all)
   -5 = 4x
   $-\frac{5}{4}$ = x   Ta Da.

Worse example:
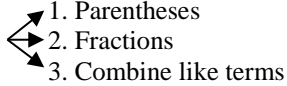
$$\frac{2}{7} - \frac{x-3}{4} = 5$$ looks scary.

You have the ability to wipe out all of the fractions. Fractions are simply statements of division. The opposite of division is multiplication – and you have the power to multiply both sides of the equation by anything you want to. The question is, what will undo a division by 7 and by 4; the answer is multiplication by 28. Here is what it looks like:

1. Simplify

$$\frac{2}{7} - \frac{x-3}{4} = 5$$

$$(28)\frac{2}{7} - (28)\frac{x-3}{4} = 5(28)$$ (multiplying everything by 28)

$$(4)2 - (7)(x-3) = 140$$ (28/7 = 4 and 28/4 = 7)

$$8 - 7x + 21 = 140$$ (Distribute the -7)

$$-7x + 29 = 140$$ (Combine numbers)

2. Subtract ⟶ $-7x = 111$ (Subtract 29 from both sides)

3. Divide ⟶ $x = -\frac{111}{7}$ (Not a nice looking answer, but it is right!)

Every problem can be boiled down to three steps:

Linear Equations
1. Simplify
    1. Parentheses
    2. Fractions
    3. Combine like terms
2. Add/Subtract
3. Multiply/Divide

Section 3.2 Exercises Part B

1. 35 less than 7 times a number is 98. What is the number?

2. Two numbers add to 351 and the second is 71 bigger than the first. What are the two numbers?

Solve.

    3. $7p + 12 = 33 - 4p$ **4.** $3n + 48 = 7 - 2(n - 2)$ **5.** $5x - 10 = 5(x - 2)$

    6. $3x - 7 = 15x$ **7.** $5x - 7(x+3) = -2x + 12$ **8.** $.09x = 13 - .18x$

    9. $.8(3x - 2) = 9.5x + 1$ **10.** $.2x - 7 + 2x = 3x - 5$ **11.** $12m = 70 + .4m$

    12. $5(x - 5) - x = 4x - 20$ **13.** $9x - 4(x - 3) = 15x + 7$ **14.** $8x - 12x + x = 9x + 8x$

    15.   85 is what percent of 39?   **16.**   85 is 54% of what?

    17.   What is 19% of 2,340?   **18.**   What is 23% of 79?

    19.   119 is 18% of what?   **20.**   43 is what percent of 174?

    21.   Original Price:$72.56   **22.**   Original Price:
            Tax: 7.3%   Discount: 30%
            Final Price: Final Price: $49.70

    23.   Original Price: **24.**   Original Price: $55.50
            Tax: 5%   Discount: 40%
            Final Price: $339.50   Final Price:

25. If the population of a town grew 31% up to 17,049. What was the population last year?

26. If the price of an object dropped 35% down to $101.25, what was the original price?

Solve.

Example:

$\frac{2}{3}$ (x+4) − 5 = $\frac{1}{2}$ x + $\frac{5}{3}$	
$^{(12)}\frac{1}{3}$ (x+4)–5$^{(12)}$= $^{(12)}\frac{1}{4}$ x +$^{(12)}\frac{5}{6}$	Clear fractions by multiplying by 12
4(x+4) − 30 = 3x + 10	
4x + 16 − 30 = 3x + 10	Distribute through parentheses
x − 14 = 10	Combine, getting x to one side
x = 24	Add 14 to both sides

27. $\frac{7}{3}$ t − 5 = 19

28. $-\frac{3}{8}$ (x − 7) = 5 + 3x

29. $\frac{2}{3}$ x − 6 = 3 + $\frac{1}{2}$ x

30. $\frac{4}{5}$ x = 2x - $\frac{5}{3}$

31. $\frac{3}{5}$ x − $\frac{2}{5}$ (x-3) = $\frac{1}{5}$ x +3

32. $\frac{3x+2}{7} = \frac{4x-1}{5}$

33. .9(-4x − 5) = 2.5x + 6

34. .0005x + .0045 = .004x

35. $\frac{x+7}{4} = 8 - \frac{5}{6}$ x

Preparation.

36. Describe the best way to get rid of fractions in an equation.

Answers:

1.	19	**28.**	$x = -\frac{19}{27}$
2.	140, 211	**29.**	$x = 54$
3.	$p = \frac{21}{11}$	**30.**	$x = \frac{25}{18}$
4.	$n = -\frac{37}{5}$ or -7.4	**31.**	no solution
5.	All numbers	**32.**	$x = \frac{17}{13}$
6.	$x = -\frac{7}{12}$	**33.**	$x = -\frac{105}{61}$
7.	no solution	**34.**	$x = \frac{9}{7}$
8.	$x = 48.15$	**35.**	$x = \frac{75}{13}$
9.	$x = -.366$	**36.**	Discuss together.
10.	$x = -2.5$		
11.	$m = 6.03$		
12.	no solution		
13.	$x = \frac{1}{2}$		
14.	$x = 0$		
15.	218%		
16.	157.4		
17.	444.6		
18.	18.17		
19.	661.1		
20.	24.7%		
21.	$77.86		
22.	$71.00		
23.	$323.33		
24.	$33.30		
25.	13,015		
26.	$155.77		
27.	$t = \frac{72}{7}$		