# 3-5-1 Distribution in Equations

$3(2x-8)=12$ To solve this equation,

$6x-24=12$ First distribute. Now the equation is a two step equation.

$\underline{+24 \quad +24}$ Add or subtract first.

$6x=36$

$\frac{6x}{6}=\frac{36}{6}$ Then divide.

$x=6$

Sometimes like terms result after distribution.
The steps are **Distribute, Combine like terms, Solve** the two step equation that results.

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|---|---|---|
| $45=7(2x-8)-(7+5x)$ | | $-8+7x-(4x-1)-3(-x-8)=-70$ |
| $45=14x-56-7-5x$ | Distribute. | $-8+7x-4x+1+3x+24=-70$ |
| $45=9x-63$ | Combine like terms. | $6x+17=-70$ |
| $\underline{+63 \quad +63}$ | Add or Subtract | $\underline{-17 \quad -17}$ |
| $108=9x$ | | $6x=-87$ |
| $\frac{108}{9}=\frac{9x}{9}$ | Divide. | $\frac{6x}{6}=\frac{-87}{6}$ |
| $12=x$ | | $x=-87/6=-29/2=-14\frac{1}{2}$ |

If the equation contains nested parenthesis, work the distribution from the inside out.

| | | |
|---|---|---|
| $4-3(2x+4(7-6x))=90$ | Distribute. | $3(4x-5(2x-6)+7)-(x-(x-1))=200$ |
| $4-3(2x+28-24x)=90$ | Combine like terms. | $3(4x-10x+30+7)-(x-x+1)=200$ |
| $4-3(28-22x)=90$ | Distribute. | $3(-6x+37)-(1)=200$ |
| $4-84+66x=90$ | Combine like terms. | $-18x+111-1=200$ |
| $66x-80=90$ | | $-18x+110=200$ |
| $\underline{+80 \quad +80}$ | | $\underline{-110 \quad -110}$ |
| $66x=170$ | Add or subtract. | $-18x=90$ |
| $\frac{66x}{66}=\frac{170}{66}$ | | $\frac{-18x}{-18}=\frac{90}{-18}$ |
| $x=170/66=85/33=2\frac{19}{33}$ | Divide. | $x=-90/18=-10/2=-5$ |

$4\frac{1}{2}=\frac{1}{2}(6-5x)-4\frac{2}{3}x$

$4\frac{1}{2}=3-\frac{5}{2}x-4\frac{2}{3}x$ Add fractions by getting a common denominator.
The $15/6$ could be simplified if desired.

$4\frac{1}{2}=3-\frac{15}{6}x-4\frac{4}{6}x$

$4\frac{1}{2}=3-4\frac{19}{6}x$ Simplify.

$4\frac{1}{2}=3-7\frac{1}{6}x$

$\underline{-3 \quad -3}$ Add or subtract.

$1\frac{1}{2}=-7\frac{1}{6}x$

$\frac{3}{2}\div(-\frac{43}{6})=\frac{3}{2}\cdot(-\frac{6}{43})=\frac{3}{1}\cdot(-\frac{2}{43})=-\frac{6}{43}$ To divide fractions, change them to improper fractions, invert the second fraction and multiply.