Solving Multistep Equations

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Eg $2(3x-7)=12$

$6x-14=12$

$+14 \quad +14$

$\frac{6x}{6}=\frac{26}{6}$

$x=\frac{13}{3}$

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

$\frac{2(3x-7)}{2}=\frac{12}{2}$

$3x-7=6$

$+7 \quad +7$

$\frac{3x}{3}=\frac{13}{3}$

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

variables | numbers

$3x-7+x=3(x+4)$

$4x-7=3x+12$

$-3x \quad | \quad -3x$

$x-7=12$

$+7 \quad +7$

$x=19$

$-2(x+5)-4=3(4x-7)-6x$

$-2x-10-4=12x-21-6x$

$-2x-14=6x-21$

$-6x \quad -6x$

$-8x-14=-21$

$+14 \quad +14$

$\frac{-8x}{-8}=\frac{-7}{-8}$

$x=\frac{7}{8}$

$-2x-14=6x-21$

$+2x \quad +2x$

$-14=8x-21$

$+21 \quad +21$

$\frac{7}{8}=\frac{8x}{8}$

$\frac{7}{8}=x$

Try: Solve $3(2x-7)=4x-7+x$

Try: Solve $3(2x-7) = 4x - 7 + x$

$6x - 21 = 5x - 7$

$-5x \qquad -5x$

$x - 21 = -7$

$+21 \qquad +21$

$x = 14$

Try Solve: $-2(x+5) - 3x = 4(-2x+5) - 12$

$-2x - 10 - 3x = -8x + 20 - 12$

$-5x - 10 = -8x + 8$

$+8x \qquad +8x$

$3x - 10 = 8$

$+10 \qquad +10$

$\frac{3x}{3} = \frac{18}{3}$

$x = 6$

When solving multi-step equations always simplify both sides of the equation first

That means: ① get rid of brackets
② Collect like terms

You are finished simplifying when you have a maximum of 2 terms per side – a variable
– a constant.

To solve move the variable term to one side the constant term to the other.

① $-4(3x-5)$ $\qquad$ $3(-2x+7) - 4(3x-5)$

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

$-12x + 20$

$3(-2x + 7) - 4(\frac{1}{3}x - \frac{1}{5})$

$-6x + 21 \quad -12x + 20$

$-18x + 41$

(2) $\frac{-6x}{-6} = \frac{x}{-6} = -9 \times -6$

$x = 54$

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

$x = -9 \times -6$

$x = 54$

(3) $x - 6 = 13$

$+6 \quad +6$

$x = 19$

(4) $20 - 3x = 14$

$-20 \quad -20$

$\frac{-3x}{-3} = \frac{-6}{-3}$

$x = 2$

(5) $\frac{p}{5} - 9 = 14$

$+9 \quad +9$

$5 \times \frac{p}{5} = 23 \times 5$

$p = 115$

$5(\frac{p}{5}) - 5(9) = 5(14)$

$p - 45 = 70$

$+45 \quad +45$

$p = 115$

(6) $\frac{x}{6} = \frac{9}{3}$

$\frac{3x}{3} = \frac{9 \times 6}{3}$

$x = \frac{54}{3}$

$6 \times \frac{x}{6} = \frac{9}{3} \times 6$

$\frac{6x}{6} = \frac{54}{3}$

$x = 18$

$x = \frac{54}{3}$

$x = 18$

$x = 18$

$6 \times \frac{x}{6} = \frac{9}{3} \times 6^2$

$x = 18$

(7) $\frac{6}{30}\left(\frac{x}{5}\right) + \frac{5}{30}\left(\frac{7}{6}\right) = \frac{6}{30}\left(\frac{6}{5}\right)$ LCD = 30

$\frac{30x}{5} + \frac{210}{6} = \frac{180}{5}$

$6x + 35 = 36$

$-35 \quad -35$

$\frac{6x}{6} = \frac{1}{6}$

$x = \frac{1}{6}$

(29) $-7x + x = -2(-4 - 5x) - 8(x + 7)$

$-6x = 8 + 10x - 8x - 56$

$-6x = 2x - 48$

$-2x \quad -2x$

$\frac{-8x}{-8} = \frac{-48}{-8}$

$x = 6$

(19) $-23 + 7x = -3(-4x + 2) - 2$

$-23 + 7x = 12x - 6 - 2$

$-23 + 7x = 12x - 8$

$-12x \quad -12x$

$-23 - 5x = -8$

$+23 \quad +23$

+20

$$\frac{-5x}{-5} = \frac{15}{-5}$$

$$x = -3$$

(12) $47 = -2(1 - 7n) - 7(7n - 2)$

$47 = -2 + 14n - 49n + 14$

$47 = -35n + 12$

$-12 \qquad -12$

$\frac{35}{-35} = \frac{-35n}{-35}$

$-1 = n$