The Multiplication Principle for Equations

In some equations the variable is already divided by a number.

$$\frac{x}{5} = 14 \qquad\qquad \frac{x}{25} = {}^{-}18$$

We can use the Multiplication Principle to solve these equations. The Multiplication Principle says that if you multiply both sides of an equation by the same number (except 0), the new equation you get will be equivalent to the equation you started with.

$$\frac{x}{5} = 14 \qquad\qquad \frac{x}{25} = {}^{-}18$$

$$5 \cdot \frac{x}{5} = 14 \cdot 5 \qquad\qquad 25 \cdot \frac{x}{25} = {}^{-}18 \cdot 25$$

$$x = 70 \qquad\qquad x = {}^{-}450$$

$$\begin{array}{r} 18 \\ \times\ 25 \\ \hline 90 \\ 36 \\ \hline 450 \end{array}$$

Solve each equation using the Multiplication Principle.

$6 \cdot \frac{x}{6} = 5 \cdot 6$ $x = 30$	$\frac{x}{-2} = 12$	$\frac{x}{4} = 10$	$\frac{x}{9} = {}^{-}8$
$\frac{x}{10} = 42$	$\frac{x}{-2} = {}^{-}8$	$\frac{x}{-8} = {}^{-}2$	$\frac{x}{6} = 8$
$\frac{x}{11} = 2$	$\frac{x}{27} = {}^{-}1$	$\frac{x}{-10} = {}^{-}10$	$\frac{x}{15} = 0$
$9 = \frac{x}{9}$	$1 = \frac{x}{24}$	$13 = \frac{x}{-3}$	$11 = \frac{x}{80}$
$\frac{x}{22} = 15$	$\frac{x}{-16} = 18$	$\frac{x}{100} = 34$	$\frac{x}{24} = {}^{-}56$

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Some equations, like $5x = 30$, are easy to solve in your head. When the numbers in the equation are larger we can use the Division Principle to find the solution.

The Division Principle says that if we divide both sides of an equation by the same number, the new equation we get will be equivalent to the equation we started with.

$$3x = 192$$

$$\frac{\cancel{3}x}{\cancel{3}} = \frac{192}{3} \longrightarrow$$

$$x = 64$$

$$\begin{array}{r} 64 \\ 3\overline{)192} \\ \underline{18} \\ 12 \\ \underline{12} \\ 0 \end{array}$$

Solve each equation using the Division Principle.

If I multiply by 3, then divide by 3, I get the number I started with: X. $$\frac{\cancel{3}x}{\cancel{3}} = \frac{72}{3}$$ $$x = 24$$	$4x = {}^-96$	$^-3x = {}^-57$
$4x = 112$	$9x = 315$	$^-2x = 656$
$^-455 = 5x$	$^-12x = {}^-288$	$6x = {}^-654$
$25x = 600$	$536 = 8x$	$^-715 = {}^-11x$
$70x = 21000$	$84x = {}^-1260$	$21x = 13419$
	$^-1x = 45$	$^-x = 23$

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