

# 4 Fractions: Cross-Multiply

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Math 9 Ch 6

Level 4: Algebra with Fractions (Part 1: Cross-Multiply)

Name: \_\_\_\_\_ Page 1 of 1

**Learning Outcome 6C:** I can solve algebra equations with fractions.

$$\frac{1}{2} = \frac{5}{10}$$

$$\frac{2}{3} = \frac{4}{6}$$

## Cross Multiplication

$$\frac{a}{b} = \frac{c}{d}$$

$$ad = bc$$

When an equation is of the form  $\frac{a}{b} = \frac{c}{d}$ , we can make it into an easier equation by cross-multiplying.

Example 1:

Solve  $\frac{2}{x} = \frac{6}{30}$

$$6x = 2(30)$$

$$6x = 60$$

$$\frac{6x}{6} = \frac{60}{6}$$

$$x = 10$$

Example 2:

Solve  $\frac{5}{4x} = \frac{10}{1}$

$$(4x)(10) = (5)(1)$$

$$40x = 5$$

$$\frac{40x}{40} = \frac{5}{40}$$

$$x = \frac{1}{8}$$

Example 3:

Solve  $\frac{x-2}{10} = \frac{1}{5}$

$$5(x-2) = 10(1)$$

$$5x - 10 = 10$$

$$+10 \quad +10$$

$$5x = 20$$

$$\frac{5x}{5} = \frac{20}{5}$$

$$x = 4$$

Example 4:

Solve  $\frac{m+7}{m-9} = \frac{28}{12}$

$$12(m+7) = 28(m-9)$$

$$12m + 12(7) = 28m + 28(-9)$$

$$12m + 84 = 28m - 252$$

$$-12m \quad -12m$$

$$84 = 16m - 252$$

$$+252 \quad +252$$

$$336 = 16m$$

$$\frac{336}{16} = \frac{16m}{16}$$

$$m = 21$$

EXERCISES:

Solve each of the following by cross-multiplication.



1.  $\frac{x}{30} = \frac{2}{10}$   
 $10x = 30(2)$   
 $10x = 60$   
 $x = 6$

2.  $\frac{x}{15} = \frac{1}{25}$   
 $25x = 15 \div 5 = \frac{3}{5}$   
 $x = \frac{3}{5}$

3.  $\frac{2}{m} = \frac{6}{30}$   
 $6m = 2(30)$   
 $6m = 60$   
 $m = 10$

4.  $\frac{y}{5} = \frac{-1}{10}$   
 $10y = (-1)(5)$   
 $10y = -5$   
 $y = -\frac{1}{2}$

5.  $\frac{-2}{5} = \frac{k}{2}$   
 $5k = (-2)(2)$   
 $5k = -4$   
 $k = -\frac{4}{5}$

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

7.  $\frac{(b+1)}{2} = \frac{(b-2)}{5}$   
 $2(b-2) = 5(b+1)$   
 $2b - 4 = 5b + 5$   
 $-2b = 9$   
 $b = -\frac{9}{2}$

8.  $\frac{(3-k)}{4} = \frac{(k+3)}{2}$   
 $2(3-k) = 4(k+3)$   
 $2(3) - 2(k) = 4k + 4(3)$   
 $6 - 2k = 4k + 12$   
 $-6 = 6k$   
 $k = -1$

Assignment: "What do you call it when you cut up your credit cards?" Worksheet

$-6 = 6k$   
 $k = -1$