

Solving Equations by Cross Multiplication

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Solve each proportion.

1) $\frac{n}{5} = \frac{6}{7}$

~~$\frac{7n}{7} = \frac{30}{7}$~~

$$n = 30/7$$

or

$$n = 7.5$$

2) $\frac{4}{8} = \frac{v}{6}$

~~$\frac{8v}{8} = \frac{24}{8}$~~

$$v = 3$$

3) $\frac{9}{7} = \frac{k}{2}$

~~$\frac{18}{7} = \frac{7k}{7}$~~

$$k = 18/7$$

4) $\frac{2}{10} = \frac{10}{x}$

~~$\frac{2x}{2} = \frac{100}{2}$~~

$$x = 50$$

5) $\frac{7}{5} = \frac{6}{n}$

~~$\frac{7n}{7} = \frac{30}{7}$~~

$$n = 30/7$$

6) $\frac{4}{9} = \frac{9}{m}$

~~$\frac{4m}{4} = \frac{81}{4}$~~

$$m = 81/4$$

7) $\frac{b}{9} = \frac{10}{3}$

~~$\frac{3b}{3} = \frac{90}{3}$~~

$$b = 30$$

8) $\frac{3}{6} = \frac{5}{r}$

~~$\frac{3r}{3} = \frac{30}{3}$~~

$$r = 10$$

9) $\frac{5}{4} = \frac{p}{5}$

~~$\frac{4p}{4} = \frac{25}{4}$~~

$$p = 25/4$$

10) $\frac{x}{10} = \frac{9}{6}$

~~$\frac{6x}{6} = \frac{90}{6}$~~

$$x = 15$$

$$11) \frac{n+7}{7} = \frac{4}{9}$$

$$9(n+7) = 7 \cdot 4$$

$$9n + 63 = 28$$

$$\begin{array}{r} -63 \quad -63 \\ \hline 9n = -35 \end{array}$$

$$n = -\frac{35}{9}$$

$$12) \frac{6}{9} = \frac{2}{x-5}$$

$$\frac{6(x-5)}{6} = \frac{18}{6}$$

$$\begin{array}{r} x-5 = 3 \\ +5 \quad +5 \\ \hline x = 8 \end{array}$$

$$x = 8$$

Two different ways to solve these

This way is usually easier if you can use it, but with fractions who knows

$$13) \frac{8}{10} = \frac{a+1}{3}$$

$$\frac{10(a+1)}{10} = \frac{24}{10}$$

$$\begin{array}{r} a+1 = \frac{24}{10} \\ -1 \quad -1 \end{array}$$

$$a = \frac{14}{10} = \frac{7}{5}$$

$$a = \frac{7}{5}$$

$$14) \frac{4}{3} = \frac{p+6}{8}$$

$$3(p+6) = 32$$

$$3p + 18 = 32$$

$$\begin{array}{r} -18 \quad -18 \\ \hline 3p = 14 \end{array}$$

$$p = \frac{14}{3}$$

$$15) \frac{8}{m-4} = \frac{6}{2}$$

$$\frac{6(m-4)}{6} = \frac{16}{6}$$

$$\begin{array}{r} m-4 = \frac{8}{3} \\ +12/3 \quad +12/3 \end{array}$$

$$m = \frac{20}{3}$$

$$16) \frac{3}{7} = \frac{5}{n-8}$$

$$3(n-8) = 35$$

$$3n - 24 = 35$$

$$\begin{array}{r} +24 \quad +24 \\ \hline 3n = \frac{59}{3} \end{array}$$

$$n = \frac{59}{3}$$

$$17) \frac{8}{3} = \frac{7}{k-2}$$

$$8(k-2) = 21$$

$$8k - 16 = 21$$

$$\begin{array}{r} +16 \quad +16 \\ \hline 8k = \frac{37}{8} \end{array}$$

$$k = \frac{37}{8}$$

$$18) \frac{7}{10} = \frac{x+3}{4}$$

$$\frac{10(x+3)}{10} = \frac{28}{10}$$

$$\begin{array}{r} x+3 = 2.8 \\ -3 \quad -3 \end{array}$$

$$x = -0.2$$

I used a decimal here just because it was easy

$$19) \frac{3}{10} = \frac{x+2}{8}$$

$$\frac{10(x+2)}{10} = \frac{24}{10}$$

$$\begin{array}{r} x+2 = 2.4 \\ -2 \quad -2 \end{array}$$

$$x = 0.4$$

$$n \quad x = \frac{2}{5}$$

$$20) \frac{7}{8} = \frac{3}{x-6}$$

$$7(x-6) = 24$$

$$7x - 42 = 24$$

$$\begin{array}{r} +42 \quad +42 \\ \hline 7x = \frac{66}{7} \end{array}$$

$$\frac{7x}{7} = \frac{66}{7}$$

$$x = \frac{66}{7}$$

$$21) \frac{n+5}{4} = \frac{n}{6}$$

$$6(n+5) = 4n$$

$$6n + 30 = 4n$$

$$\begin{array}{r} -6n \\ \hline 30 = -2n \\ -2 \quad -2 \end{array}$$

$n = -15$

$$23) \frac{10}{x} = \frac{6}{x-9}$$

$$10(x-9) = 6x$$

$$10x - 90 = 6x$$

$$\begin{array}{r} -10x \\ \hline -90 = -4x \\ -4 \quad -4 \end{array}$$

$x = 90/4$

$x = 22.5$

or $45/2$

$$25) \frac{a}{a-10} = \frac{6}{9}$$

$$9a = 6(a-10)$$

$$9a = 6a - 60$$

$$\begin{array}{r} -6a \\ \hline 3a = -60 \\ 3 \quad 3 \end{array}$$

$a = -20$

$$27) \frac{r}{r+5} = \frac{7}{5}$$

$$5r = 7(r+5)$$

$$5r = 7r + 35$$

$$\begin{array}{r} -7r \\ \hline -2r = 35 \\ -2 \quad -2 \end{array}$$

$r = -35/2$

$r = -17.5$

$$29) \frac{x+10}{x} = \frac{5}{10}$$

$$\frac{10(x+10)}{10x} = \frac{5x}{10}$$

$$x+10 = 0.5x$$

$$\begin{array}{r} -x \\ \hline 10 = -0.5x \\ -0.5 \quad -0.5x \end{array}$$

$x = -20$

You could also distribute

$$22) \frac{n+4}{4n} = \frac{6}{4}$$

$$4(n+4) = 24n$$

$$4n + 16 = 24n$$

$$\begin{array}{r} -4n \\ \hline 16 = 20n \\ 20 \quad 20 \end{array}$$

$n = 16/20$

$n = 4/5$ or 0.8

$$24) \frac{6}{v} = \frac{8}{v+4}$$

$$6(v+4) = 8v$$

$$6v + 24 = 8v$$

$$\begin{array}{r} -6v \\ \hline 24 = 2v \\ 2 \quad 2 \end{array}$$

$v = 12$

$$26) \frac{10}{a} = \frac{8}{a+10}$$

$$8a = 10(a+10)$$

$$8a = 10a + 100$$

$$\begin{array}{r} -10a \\ \hline -2a = 100 \\ -2 \quad -2 \end{array}$$

$a = -50$

$$28) \frac{x}{5} = \frac{x+4}{7}$$

$$7x = 5(x+4)$$

$$7x = 5x + 20$$

$$\begin{array}{r} -5x \\ \hline 2x = 20 \\ 2 \quad 2 \end{array}$$

$x = 10$

$$30) \frac{b}{2} = \frac{b-1}{9}$$

$$9b = 2(b-1)$$

$$9b = 2b - 2$$

$$\begin{array}{r} -2b \\ \hline 7b = -2 \\ 7 \quad 7 \end{array}$$

$b = -2/7$

$$31) \frac{b-8}{8} = \frac{b-9}{2}$$

$$\begin{aligned} 2(b-8) &= 8(b-9) \\ 2b-16 &= 8b-72 \\ -8b+16 &= -8b+16 \\ \hline -6b &= -56 \\ \hline b &= \frac{28}{3} \end{aligned}$$

$$b = \frac{28}{3}$$

$$32) \frac{8}{3} = \frac{r+9}{r+8}$$

$$\begin{aligned} 8(r+8) &= 3(r+9) \\ 8r+64 &= 3r+27 \\ -3r-64 &= -3r-64 \\ \hline 5r &= -37 \\ \hline r &= \frac{-37}{5} \end{aligned}$$

$$r = \frac{-37}{5}$$

$$33) \frac{3}{7} = \frac{x-2}{x-7}$$

$$\begin{aligned} 3(x-7) &= 7(x-2) \\ 3x-21 &= 7x-14 \\ -7x+21 &= -7x+21 \\ \hline -4x &= 7 \\ \hline x &= \frac{7}{-4} \end{aligned}$$

$$x = \frac{-7}{4}$$

$$34) \frac{n-4}{9} = \frac{n+8}{2}$$

$$\begin{aligned} 2(n-4) &= 9(n+8) \\ 2n-8 &= 9n+72 \\ -2n-72 &= -2n-72 \\ \hline -80 &= 7n \\ \hline n &= \frac{-80}{7} \end{aligned}$$

$$n = \frac{-80}{7}$$

$$35) \frac{x+2}{x+7} = \frac{7}{4}$$

$$\begin{aligned} 4(x+2) &= 7(x+7) \\ 4x+8 &= 7x+49 \\ -7x-8 &= -7x-8 \\ \hline -3x &= 41 \\ \hline x &= \frac{41}{-3} \end{aligned}$$

$$x = \frac{-41}{3}$$

$$36) \frac{p+9}{10} = \frac{p-10}{9}$$

$$\begin{aligned} 9(p+9) &= 10(p-10) \\ 9p+81 &= 10p-100 \\ -9p+100 &= -9p+100 \\ \hline 181 &= p \end{aligned}$$

$$181 = p$$

$$37) \frac{v+6}{3} = \frac{v+9}{8}$$

$$\begin{aligned} 8(v+6) &= 3(v+9) \\ 8v+48 &= 3v+27 \\ -3v-48 &= -3v-48 \\ \hline 5v &= -21 \\ \hline v &= \frac{-21}{5} \end{aligned}$$

$$v = \frac{-21}{5}$$

$$38) \frac{6}{k+3} = \frac{5}{k-7}$$

$$\begin{aligned} 6(k-7) &= 5(k+3) \\ 6k-42 &= 5k+15 \\ -5k+42 &= -5k+42 \\ \hline k &= 57 \end{aligned}$$

$$k = 57$$

$$39) \frac{m-8}{5} = \frac{m-6}{6}$$

$$\begin{aligned} 6(m-8) &= 5(m-6) \\ 6m-48 &= 5m-30 \\ -5m+48 &= -5m+48 \\ \hline m &= 18 \end{aligned}$$

$$m = 18$$

$$40) \frac{n+7}{2} = \frac{n-6}{9}$$

$$\begin{aligned} 9(n+7) &= 2(n-6) \\ 9n+63 &= 2n-12 \\ -2n-63 &= -2n-63 \\ \hline 7n &= -75 \\ \hline n &= \frac{-75}{7} \end{aligned}$$

$$n = \frac{-75}{7}$$