Two trains leave a station and travel for the same amount of time. The first train travels to Chicago, 480 miles away. The second train travels 5 mph faster and travels to Pittsburgh, 510 miles away. Find the speed at which each train has traveled.

$d = r \cdot t$ → $t = \frac{d}{r}$

| | d | r | t |
|---|---|---|---|
| CHI | 480mi | r | t |
| PIT | 510m | r + 5 | t |

$\frac{480}{r} = \frac{510}{r+5}$

now cross-multiply and solve

$480r + 2400 = 510r$

$-480r \quad -480r$

$\frac{2400}{30} = \frac{30r}{30}$

$r = 80$

Speed to Chicago = r = 80 mph

Speed to Pittsburgh = r + 5 = 85 mph

Solve.

$$\frac{-4}{5x+10} = \frac{2}{x+2}$$

One method to solve is to cross multiply.

$2(5x+10) = -4(x+2)$

$10x + 20 = -4x - 8$

$+4x \qquad +4x$

$14x + 20 = -8$

$-20 \qquad -20$

$\frac{14x}{14} = \frac{-28}{14}$

$x = -2$

**If you got x=-2 then all of your work is correct but....**

**-2 is NOT the solution!**

Steps to follow when solving equations

1. Blah, Blah, Blah
2. Blah, Blah, Blah

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•
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Last Step: Check your answers!!!!

**Extraneous Solutions**

Solve.

$$\frac{-4}{5x+10} = \frac{2}{x+2}$$

**x = -2 is an extraneous solution because it makes the equation undefined!**

This equation has NO solution

Solve. $\frac{x}{x^2-100} = \frac{1}{x^2-12x+20}$

$\frac{(x-2)}{(x-2)} \cdot \frac{x}{(x+10)(x-10)} = \frac{1}{(x-10)(x-2)} \cdot \frac{(x+10)}{(x+10)}$

$x^2 - 2x = x + 10$

$x^2 - 3x - 10 = 0$

$(x-5)(x+2) = 0$

$x = 5, -2$

olve. $\frac{(x+8)}{x+8} \cdot \frac{4}{x-5} + \frac{38}{x^2+3x-40} = \frac{x}{x+8} \cdot \frac{(x-5)}{x-5}$

$(x+8)(x-5)$

$4x + 32 + 38 = x^2 - 5x$

$0 = x^2 - 9x - 70$

$0 = (x-14)(x+5)$

$x = -5, 14$

## Problems similar to "book" problems

$\frac{2x+8}{x^2-16} + \frac{7}{-x-4} = \frac{5}{x-4}$

It's easier to work with a positive coefficient of x. To accomplish this you can multiply this ratio by -1/-1:

$\frac{2x+8}{x^2-16} + \frac{7}{-x-4} \cdot \frac{-1}{-1} = \frac{5}{x-4}$

$\frac{2x+8}{x^2-16} + \frac{-7}{x+4} = \frac{5}{x-4}$

Now you can finish solving this equation the way you normally would.

## Problems similar to "book" problems

$\frac{3}{5-x} - \frac{4x}{x^2-25} = \frac{8}{x+5}$

It's easier to work with a positive coefficient of x. To accomplish this you can multiply this ratio by -1/-1:

$\frac{-1}{-1} \cdot \frac{3}{5-x} - \frac{4x}{x^2-25} = \frac{8}{x+5}$

$\frac{-3}{x-5} - \frac{4x}{x^2-25} = \frac{8}{x+5}$

Now you can finish solving this equation the way you normally would.