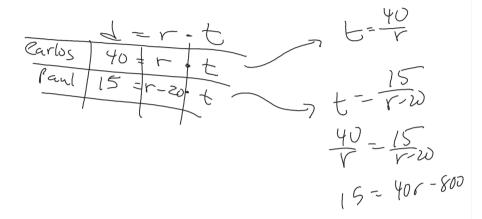**4. 6. 9.** $\dfrac{2}{3x-5}=\dfrac{4}{x-}$

14 15. 21. $\dfrac{5}{2x}-\dfrac{2}{3}$

22. Carlos can travel 40 mi on his motorbike in the ~~same time~~ it takes Paul to travel 15 mi on his bicycle. If Paul rides his bike 20 mi/h slower than Carlos rides his motorbike, find the speed for each bike.
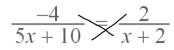
$d = r \cdot t$

Carlos	$40 = r$	t
Paul	$15 = r-20$	t

$t = \dfrac{40}{r}$

$t = \dfrac{15}{r-20}$

$\dfrac{40}{r} = \dfrac{15}{r-20}$

$15 = 40r - 800$

Solve.

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

Extraneous Solutions: Solutions that don't make the original equation true.

Cros Multiply:

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

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

~~$x=-2$~~

This is an extraneous solution because it makes the denominators of the original problem zero!

Since the only solution we found is an extraneous solution this equation has
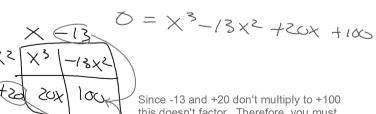
(NO Solution)

Basic Steps:

1. Eliminate ALL denominators from the equation

2. Solve the equation that remains after eliminating denominators

3. Check for extraneous solutions

Don't forget this step!!!

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

You can try cross multiplying.

$x^2 - 100 = x^3 - 12x^2 + 20x$

After moving all terms to one side you can try to factor.

$0 = x^3 - 13x^2 + 20x + 100$

	x	-13
x^2	x^3	$-13x^2$
$+20$	$20x$	100

Since -13 and +20 don't multiply to +100 this doesn't factor. Therefore, you must try another method to solve the original equation.

Factor all denominators then get them to all be the same. You can then cancel all denominators and solve the remaining equation.

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

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

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

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

$(x-5)(x+2) = 0 \longrightarrow \boxed{x = -2, 5}$

Multiply both sides by all the factors in denominators to eliminate all denominators from the problem.

Solve. $(x+8)(x-5)\left(\dfrac{4}{x-5} + \dfrac{38}{x^2+3x-40}\right) = \left(\dfrac{x}{x+8}\right)(x+8)(x-5)$

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

$4(x+8) + 38 = x(x-5)$

$4x + 32 + 38$

$4x + 70 = x^2 - 5x$

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

$\begin{array}{c} -20 \\ -14 \\ -9 \end{array}\Big\backslash +5$

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

$\boxed{x = 14, -5}$

Solve. $\dfrac{2x}{x^2-1} = \dfrac{4}{x^2+2x-3}$ $\Rightarrow$

If you cross multiplied you'd get something that isn't factorable.

$4x^2 - 4$

$= 2x^3 + 4x^2 - 6x$

$0 = 2x^3 - 6x - 4$

Therefore, try another method such as getting all denominators to be the same then cancelling them and solving the remaining equation.

$\dfrac{(x+3)}{(x+3)} \cdot \dfrac{2x}{(x+1)(x-1)} = \dfrac{4}{(x+3)(x-1)} \cdot \dfrac{(x+1)}{(x+1)}$

$2x^2 + 6x = 4x + 4$

$\dfrac{2x^2 + 2x - 4}{2} = \dfrac{0}{2}$

$x^2 + x - 2 = 0$

$(x-1)(x+2) = 0 \qquad \Rightarrow \boxed{x = --2}$