

① Solve by factoring:  $\sqrt{7-4x} = 2-2x$

$$7-4x = (2-2x)(2-2x)$$

$$7-4x = 4 - 4x - 4x + 4x^2$$

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

⊗  $-12 \mid (-6, 2)$   $0 = 4x^2 - 6x + 2x - 3$

⊕  $-4 \mid -4$   $0 = 2x(2x-3) + 1(2x-3)$

$$0 = (2x-3)(2x+1)$$

$$x = \frac{3}{2}$$

$$x = -\frac{1}{2}$$

check  ~~$x = \frac{3}{2}$~~

$$\sqrt{7-4\left(\frac{3}{2}\right)} = 2-2\left(\frac{3}{2}\right)$$

$$\sqrt{7-6} = 2-3$$

$$1 = -1$$

$x = -\frac{1}{2}$

$$\sqrt{7-4\left(-\frac{1}{2}\right)} = 2-2\left(-\frac{1}{2}\right)$$

$$\sqrt{7+2} = 2+1$$

$$\sqrt{9} = 3 = 3 \checkmark$$

② Solve by Completing the Square:  $\frac{-2}{x-2} + \frac{3x}{x+2} = \frac{-8}{x^2-4} \cdot (x^2-4)$

$$\cancel{(x-2)}(x+2) \cdot \frac{-2}{\cancel{x-2}} + \cancel{(x-2)}(x+2) \cdot \frac{3x}{\cancel{x+2}} = -8$$

$$-2(x+2) + 3x(x-2) = -8$$

$$-2x-4 + 3x^2-6x = -8$$

$$3x^2 - 8x + 4 = 0$$

$$3 \left[ \left( x^2 - \frac{8}{3}x + k \right) - k \right] + 4 = 0$$

$\left( \frac{1}{2} \left( -\frac{8}{3} \right) \right)^2 = \left( -\frac{4}{3} \right)^2 = \frac{16}{9}$

$$3 \left[ \left( x^2 - \frac{8}{3}x + \frac{16}{9} \right) - \frac{16}{9} \right] + 4 = 0$$

$$3 \left( x - \frac{4}{3} \right)^2 - \frac{16}{9} \cdot 3 + 4 = 0$$

$$3 \left( x - \frac{4}{3} \right)^2 - \frac{16}{3} + 4 = 0$$

$$3 \left( x - \frac{4}{3} \right)^2 - \frac{4}{3} = 0$$

$$3 \left( x - \frac{4}{3} \right)^2 = \frac{4}{3}$$

$$\left( x - \frac{4}{3} \right)^2 = \frac{4}{9}$$

$$x - \frac{4}{3} = \pm \sqrt{\frac{4}{9}}$$

$$x = \frac{4}{3} \pm \frac{2}{3} = \frac{6}{3} \text{ or } \frac{2}{3}$$

$$= 2 \text{ or } \frac{2}{3}$$

Check  ~~$x=2$~~

$\frac{-2}{2-2} + \frac{3(2)}{2+2} = \frac{-8}{2^2-4}$   
 $\frac{-2}{\text{undefined}} + \frac{6}{4} = \frac{-8}{0}$

$x = \frac{2}{3}$

$$\frac{-2}{\frac{2}{3}-2} + \frac{3\left(\frac{2}{3}\right)}{\frac{2}{3}+2} = \frac{-8}{\left(\frac{2}{3}\right)^2-4}$$

$$\checkmark \frac{-72}{32} = \frac{-72}{32}$$

③ Solve using the quadratic formula:  $\frac{1}{2}x^4 - 6x^2 + 10 = 0$

$$z = x^2$$

$$\frac{1}{2}z^2 - 6z + 10 = 0$$

$$x = \frac{-(-6) \pm \sqrt{(-6)^2 - 4(\frac{1}{2})(10)}}{2(\frac{1}{2})} = \frac{6 \pm \sqrt{36 - 20}}{1} = 6 \pm \sqrt{16}$$

$$z = 6 \pm 4$$

$$x^2 = 10, 2$$

$$x = \pm\sqrt{10}$$

$$x = \pm\sqrt{2}$$

④ Jerry and Millie are washing cars. Working alone, Jerry takes 5 minutes more than Millie to wash a car. Working together, it takes them 10 minutes.

a) How long does it take Millie to wash a car?

b) How long does it take Jerry to wash a car?

	time	Rate	
Jerry	$x+5 \text{ min}$	$\frac{1}{x+5}$	Add the rates $\Rightarrow \frac{1}{x+5} + \frac{1}{x} = \frac{1}{10}$
Millie	$x$	$\frac{1}{x}$	
together	$10 \text{ min}$	$\frac{1}{10}$	

$$x(x+5) \left( \frac{1}{x+5} + \frac{1}{x} \right) = \left( \frac{1}{10} \right) x(x+5)$$

$$x(x+5) \cdot \frac{1}{x+5} + x(x+5) \cdot \frac{1}{x} = 0.1 \cdot (x^2 + 5x)$$

$$x + x+5 = 0.1x^2 + 0.5x$$

$$0 = 0.1x^2 - 1.5x - 5$$

$$x = \frac{-(-1.5) \pm \sqrt{(-1.5)^2 - 4(0.1)(-5)}}{2(0.1)}$$

$$= \frac{1.5 \pm \sqrt{2.25 + 2}}{0.2} = 17.81, -2.81$$

neg time

a) 17.81 min

b) 22.81 min