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**LEARNING OBJECTIVE:** We will solve equations involving factored expressions. (Lesson 92)

## CONCEPT DEVELOPMENT:

**Zero-Product Property:** If $ab = 0$, then either $a = 0$ or $b = 0$ or $a = b = 0$

Example: $(x - 3)(4x - 2) = 0$

$x - 3 = 0$

$x = 3$

$4x - 2 = 0$

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

**Review of Difference of Two Squares $(x + 4)(x - 4) = x^2 - 4^2$**

What if we had $x^2 - 81 = 0$?

$+81 \quad +81$

$\sqrt{x^2} = \sqrt{81}$

$\boxed{x = \pm 9}$

$(x + 9)(x - 9) = 0$

$\{-9, 9\}$

**Factoring Review with linear factors:**

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

1 2 3 4

$(x+3)[(3x+8) - 3x]$

| | |
|---|---|
| $w(w + 5) + 2(w + 5)$<br>$(w+5)(w+2)$ | $(3x - 4)(x + 9) + (3x - 4)(2x - 4)$<br>$(3x-4)[(x+9)+(2x-4)]$<br>$(3x-4)(3x+5)$ |
| $(3x + 6)(5 - 2x) + (x + 2)(x - 7)$<br>$3(x+2)(5-2x) + (x+2)(x-7)$<br>$(x+2)\cdot[3(5-2x)+(x-7)]$<br>$(x+2)(-5x+8)$ | $(4x + 3)(x^2 + x^3) - (2x - 2)(x^2 + x^3)$ |

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## Guided Practice:

**Steps for Solving Equations Involving Factored Expressions**

1. If necessary, find a common factor.
2. Create two equations (if there are two factors), with each factor equal to 0.
3. Solve each equation to find your solution set. Write your answer in set notation.

| | |
|---|---|
| $(x-10)(x+3)=0$<br>$x-10=0$ or $x+3=0$<br>$+10 \quad +10$ $\quad -3 \quad -3$<br>$x=10$ $\quad x=-3$<br>$\boxed{\{10,-3\}}$ | $(x-4)(x+3)=0$<br>$\{4,-3\}$ |
| $2x^2-10x=0$<br>$(2x)(x-5)=0$<br>$2x=0$ or $x-5=0$<br>$x=0$ $\quad x=5$<br>$\{0,5\}$ | $6x^2+42x=0$<br>$6x(x+7)=0$<br>$6x=0$ or $x+7=0$<br>$x=0$ or $x=-7$<br>$6(-7)^2+42(-7)=0$<br>$(6\cdot -7\cdot -7)+(6\cdot 7\cdot -7)=0$ |
| $x(x-5)+4(x-5)=0$<br>$(x-5)(x+4)=0$<br>$x-5=0$ or $x+4=0$<br>$x=5$ $\quad x=-4$<br>$\{5,-4\}$<br>$x^2-x-20=0$ | $x(5x-20)+2(5x-20)=0$<br>$(5x-20)(x+2)=0$<br>$5x-20=0$ OR $x+2=0$<br>$+20 \quad +20$ $\quad -2 \quad -2$<br>$\frac{5x}{5}=\frac{20}{5}$ $\quad x=-2$<br>$x=4$<br>$\boxed{\{4,-2\}}$ |

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| | |
|---|---|
| $(x+3)(x-3)=0$<br>$\{-3,3\}$<br>$x^2-9=0$ | $(x+2)(x-2)=0$<br>$x^2-4=0$<br>$\{2,-2\}$ |
| $x^2-9=5(x-3)$<br>$(x-3)(x+3)=5(x-3)$<br>$-5(x-3) \quad -5(x-3)$<br>$(x-3)(x+3)-5(x-3)=0$<br>$(x-3)[(x+3)-5]=0$<br>$x-3=0$ or $x+3-5=0$<br>$x=3$ $\quad x=2$<br>$\boxed{\{3,2\}}$ | $x^2-4=(x+2)(x-5)$<br>$(x+2)(x-2)=(x+2)(x-5)$<br>$(x+2)(x-2)-(x+2)(x-5)=0$<br>$(x+2)[(x-2)-(x-5)]=0$<br>$(x+2)3=0$<br>$3x+6=0$<br>$-6 \quad -6$<br>$\frac{3x}{3}=\frac{-6}{3}$<br>$x=-2$<br>$\{-2\}$ |
| $(x-2)(2x-3)=(x-2)(x+1)$<br>$(x-2)[(2x-3)-(x+1)]=0$<br>$x-2=0$ $\quad 2x-3-x-1=0$<br>$x-4=0$<br>$\{2,4\}$ | $(3x-2)(x+12)=(3x-2)(2x-10)$<br>$(3x-2)(x+12)-(3x-2)(2x-10)=0$<br>$(3x-2)[(x+12)-(2x-10)]=0$<br>$3x-2=0$ $\quad (x+12)-(2x-10)=0$<br>$x=\frac{2}{3}$ $\quad -x+22=0$<br>$22=x$<br>$\{\frac{2}{3},22\}$ |

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## Independent Practice:

Will be Page s 98 from Alg 1 Mod 1 lesson 17…this is student problem set for lesson.

## Activating Prior Knowledge:

We know how to calculate the difference of two squares using diagrams:

| $(x+y)(x-y)$ | $(20+1)(20-1)$ |
|---|---|
| $x$ $-y$<br>$x$ $x^2$ $-xy$<br>$y$ $xy$ $-y^2$<br>$x^2-y^2$<br>$(x+y)(x-y)$ | $20^2-1^2$<br>$400-1=399$ |

## Closure:

A string 60 inches long is to be laid out on a table top to make a rectangle of perimeter 60 inches. Write the width of the rectangle as $15+x$ inches. What is the expression for its length? What is the expression for its area? What value of $x$ gives an area of largest possible value. Describe the shape of the rectangle for this special value of $x$.

## Notes:

This maps to lesson 17 from Alg 1, Mod 1. Should be good lead in for Mod 4 material on factoring…