

5.6 #53

$$\begin{aligned} & 18x^4 + 21x^3 + 6x^2 \\ = & 3x^2(6x^2 + 7x + 2) \\ = & 3x^2(2x + 1)(3x + 2) \end{aligned}$$

5.7 Special Products Impatica

Perfect Square Trinomials

Difference of Two Squares

Sum & Difference of Two Cubes.

$$(x-2)^2 = (x-2)(x-2) = x^2 - 2x - 2x + 4 = x^2 - 4x + 4$$

$$(x+3)^2 = (x+3)(x+3) = x^2 + 3x + 3x + 9 = x^2 + 6x + 9$$

$$(a+b)^2 = a^2 + 2ab + b^2$$

$$(a-b)^2 = a^2 - 2ab + b^2$$

$$\begin{aligned} (3x-7)^2 &= (3x)^2 - 2 \cdot 3x \cdot 7 + 7^2 \\ &= 9x^2 - 42x + 49 \end{aligned}$$

Factor

$$x^2 - 8x + 16 = (x-4)^2$$

$$(3x+2)^2 - 8(3x+2) + 16 = ((3x+2)-4)^2$$

↓
 $3x+2$ 4
 $2 \cdot 4 \cdot (3x+2)$

$$\boxed{}^2 - 8\boxed{} + 16 = (\boxed{}-4)^2$$

↑
 $\boxed{ }$
 ↑
 $\boxed{} \cdot \boxed{} \cdot 4 = 8\boxed{}$

Factor

$$x^2 - 8x + 16 = (x-4)^2$$

Difference of Two Squares

$$x^2 - 16 = (x-4)(x+4)$$

Sum/Difference of two cubes.

$$(x-2)(x^2 + 2x + 4) = x^3 + 2x^2 + 4x - 2x^2 - 4x - 8$$

$$\begin{array}{r} x^3 - 8 \\ \uparrow \quad \uparrow \quad \uparrow \\ x^3 - 2^3 \end{array}$$

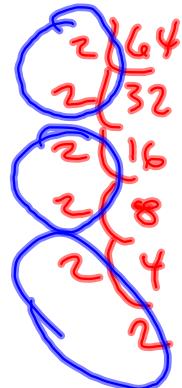
$$(x+3)(x^2 - 3x + 9) = \dots = x^3 + 27$$

$$a^3 + b^3 = (a+b)(a^2 - ab + b^2)$$

$$a^3 - b^3 = (a-b)(a^2 + ab + b^2)$$

↳ Newer Factors.

$$\begin{aligned} & 27x^3 - 64 \\ &= 3^3 x^3 - 4^3 \\ &= (3x)^3 - 4^3 \\ &= (3x - 4)((3x)^2 + (3x)(4) + 4^2) \\ &= (3x - 4)(9x^2 + 12x + 16) \end{aligned}$$



Good Bonus Material.

zero Product Principle

$$AB = 0 \implies$$

$$A = 0 \quad \text{OR} \quad B = 0$$

$$3x = 0 \implies$$

~~$3=0$~~ OR $x=0$

$$\frac{3}{0} = \infty$$

undefined

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

$$\begin{array}{l} x-2 = 0 \quad \text{OR} \quad x+5 = 0 \\ +2 = 2 \qquad \qquad -5 = -5 \end{array} \quad \begin{array}{l} \frac{3x}{3} = \frac{0}{3} = 0 \\ x = 2 \qquad \quad x = -5 \end{array}$$

$$x^2 - 7x + 12 = 0 \implies (37x-13)(42x+5) = 0$$

$$(x-3)(x-4) = 0$$

~~$x-3=0$~~ OR $x-4=0$

$x=3$ $x=4$

$x \in \{3, 4\}$

$$(37x-13)(42x+5) = 0$$

⋮

$$x \in \left\{ \frac{13}{37}, -\frac{5}{42} \right\}$$

$$ax^2 + bx + c = 0 \rightarrow$$
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$



$$\begin{aligned} n(3+n) &= n^2 + 4n \\ 3n + \underline{n^2} &= \underline{n^2} + 4n \\ 3n &= 4n \\ -4n &= -4n \\ \hline -n &= 0 \\ n &= 0 \end{aligned}$$

$$\left(\frac{y^2}{30} = \frac{y}{15} + \frac{1}{2} \right) (30)$$

$$y^2 = 2y + 15$$

$$y^2 - 2y - 15 = 0$$

$$(y-5)(y+3) = 0$$

$$y \in \{-3, 5\}$$

Test Monday
Q5 homework
finish by Friday.