

## Warm-Up : Solve

$$1) x^2 + 14x - 6 = 0$$

$+6$        $+4$

$$\begin{aligned} & \frac{x^2 + 14x + 49}{\sqrt{(x+7)^2}} = 6 + 49 \\ & \sqrt{(x+7)^2} = \sqrt{55} \\ & x+7 = \pm \sqrt{55} \\ & x = [-7 \pm \sqrt{55}] \quad \text{SOL} \end{aligned}$$

$$\begin{aligned} & x^2 + 14x + 49 = 55 \\ & (x+7)^2 = 55 \\ & \quad -55 \\ & (x+7)^2 - 55 = 0 \\ & (-7, -55) \end{aligned}$$

$$2) \frac{2x^2 - 4x + 7}{-7} = 0$$

$$\begin{aligned} & 2x^2 - 4x = -7 \\ & 2(x^2 - 2x + 1) = -7 + 2 \cdot 1 \\ & \frac{2(x-1)^2}{2} = -\frac{5}{2} \\ & \sqrt{(x-1)^2} = \sqrt{-\frac{5}{2}} \end{aligned}$$

$$x-1 = \pm i\sqrt{\frac{5}{2}}$$

$$x = 1 \pm i\sqrt{\frac{5}{2}}$$

$$1 + i\sqrt{\frac{5}{2}} \text{ or } 1 - i\sqrt{\frac{5}{2}}$$

$$2(x^2 - 2x + 1) = -5$$

$$2(x-1)^2 + 5 = 0$$

$$\uparrow \sqrt{(-1, 5)}$$

$$\text{S by } \underline{R1} \quad \underline{\sqrt{5}}$$

$$x = \pm 4\sqrt{5} - 8$$

$$3(x^2 - 2x + 1)$$

3.  $x^2 + 12x + 43 = 0$

$$\begin{aligned} x^2 + 12x + \underline{36} &= -43 + \underline{36} \\ (x+6)^2 &= \underline{-7} \\ x+6 &= \pm i\sqrt{\underline{7}} \\ x &= -6 \quad \boxed{-6 \pm i\sqrt{7}} \\ x &= \pm i\sqrt{7} - 6 \end{aligned}$$

4.  $3x^2 - 6x - 45 = 0$

$$\begin{aligned} 3x^2 - 6x + \underline{1} &= 45 + \underline{1} \\ 3(x^2 - 2x + 1) &= 45 + 3 \cdot \underline{1} \\ 3(x-1)^2 &= 48 \\ \sqrt{(x-1)^2} &= \sqrt{\frac{48}{3}} \\ x-1 &= \pm 4 \\ x &= 1 \pm 4 \end{aligned}$$

$$x = 5 \text{ or } -3$$

- 1) BEGIN with  $ax^2 + bx + c = 0$  and MULTIPLY "a" to "c"
- 2) REWRITE  $x^2 + bx = -c \cdot a$
- 3)  $x^2 + bx + \underline{\quad} = -c \cdot a + \underline{\quad}$
- 4) COMPLETE THE SQUARE by taking half of b; square it and ADD IT TO BOTH SIDES of the equation in the blanks.
- 5) FACTOR the perfect square trinomial.
- 6) Take the SQUARE ROOT of both sides. Don't forget to include a  $\pm$  to create 2 solutions.
- 7) SOLVE both equations. SIMPLIFY all irrational and complex solutions.
- 8) DIVIDE by "a" and REDUCE all final solutions.

5.  $3x^2 + 10x - 8 = 0$

$$\begin{aligned} 3(x^2 + \frac{10}{3}x + \frac{100}{36}) &= \frac{49}{3} \quad 3x^2 + 10x + \underline{8} = 8 \\ 3(x^2 + \frac{10}{3}x + \underline{\frac{100}{36}}) &= 8 + 3 \cdot \frac{100}{36} \\ 3(x + \frac{10}{6})^2 - \frac{49}{3} &= \frac{10}{3} \cdot \frac{1}{2} \quad (\frac{10}{6})^2 = \frac{100}{36} \\ \sqrt{(-\frac{10}{6}, -\frac{49}{3})} &= \frac{49}{3} \cdot \frac{1}{3} \quad \sqrt{(x + \frac{10}{6})^2} = \sqrt{\frac{49}{9}} \\ \sqrt{(-\frac{5}{3}, -\frac{49}{3})} &= \frac{49}{9} \cdot \frac{1}{3} \quad x + \frac{10}{6} = \pm \frac{7}{3} - \frac{10}{6} \\ &= \frac{7}{3} - \frac{10}{6} \quad x = \frac{7}{3} - \frac{10}{6} \\ &= -4, 2/3 \quad x = \end{aligned}$$

6.  $4x^2 - 8x + 3 = 0$

$$\begin{aligned} x^2 - 2x + \frac{1}{4} &= 0 \\ (x - \frac{1}{2})(x - \frac{3}{2}) &= 0 \\ (2x - 3)(2x - 1) &= 0 \\ x = \frac{3}{2} & \quad x = \frac{1}{2} \end{aligned}$$

7.  $4x^2 - 16x + 71 = 0$

$$\begin{aligned} 4x^2 - 16x &= -71 \\ 4(x^2 - 4x + \underline{4}) &= -71 + 4 \cdot \underline{4} \\ 4(x-2)^2 &= -\frac{55}{4} \\ \sqrt{(x-2)^2} &= \sqrt{-\frac{55}{4}} \\ x-2 &= \pm i\sqrt{\frac{55}{4}} \\ x &= 2 \pm i\sqrt{\frac{55}{4}} \end{aligned}$$

8.  $3x^2 + 6x - 4 = 0$

$$\begin{aligned} 3x^2 + 6x &= 4 \\ 3(x^2 + 2x + \underline{1}) &= 4 + 3 \cdot \underline{1} \\ 3(x+1)^2 &= \frac{7}{3} \\ \sqrt{(x+1)^2} &= \sqrt{\frac{7}{3}} \\ x+1 &= \pm \sqrt{\frac{7}{3}} \end{aligned}$$

$$x = -1 \pm \sqrt{\frac{7}{3}}$$

Math 2 – Honors  
 Unit 3 – Quadratic Functions Continued  
 Lesson 3 → Completing the Square HOMEWORK

Name \_\_\_\_\_  
 Date \_\_\_\_\_ Pd \_\_\_\_\_

SOLVE BY COMPLETING THE SQUARE:

1.  $x^2 + 14x - 51 = 0$

2.  $x^2 - 12x + 23 = 0$

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

4.  $x^2 - 10x + 18 = 0$

5.  $x^2 + 18x - 40 = 0$

6.  $4x^2 + 4x + 36 = 0$

7.  $x^2 + 2x + 20 = 0$

8.  $3x^2 + 12x + 21 = 0$   
 $\quad \quad \quad -21 \quad -21$

$3x^2 + 12x = -21$

$3(x^2 + 4x + \underline{\underline{4}}) = -21 + 3 \cdot \underline{\underline{4}}$

$\cancel{3} \cancel{(x+2)^2} = \frac{-9}{3}$

$\sqrt{(x+2)^2} = \pm \sqrt{3}$

$x+2 = \pm i\sqrt{3}$

$x = -2 \pm i\sqrt{3}$