

HOMWORK: COMPLETE THE SQUARE

NAME: _____ DAY 15 DUE: _____

Solve the functions.

<p>1. $y = x^2 - 20x + 100$</p> $0 = x^2 - 20x + 100 \quad \left(\frac{-20}{2}\right)^2 = 100$ $\sqrt{0} = \sqrt{(x-10)^2}$ $0 = x - 10$ $\begin{array}{r} +10 \\ +10 \end{array}$ <div style="border: 1px solid black; padding: 5px; display: inline-block; margin-top: 10px;">$10 = x$</div>	<p>2. $y = x^2 + 12x + 35$</p> $0 = x^2 + 12x + 35$ $\begin{array}{r} -35 \\ -35 \end{array}$ $-35 = x^2 + 12x$ $\begin{array}{r} +36 \\ +36 \end{array} \quad \left(\frac{12}{2}\right)^2 = 36$ $\frac{1}{-35} = x^2 + 12x + 36$ $\sqrt{1} = \sqrt{(x+6)^2}$ $\pm 1 = x + 6$ $\begin{array}{r} x+6 = \pm 1 \\ -6 \quad -6 \end{array}$ $x = -6 \pm 1$ $x = -6 + 1, -6 - 1$ <div style="border: 1px solid black; padding: 5px; display: inline-block; margin-top: 10px;">$x = -5, -7$</div>
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Solve the equations by completing the square.

<p>3. $x^2 + 2x = 9$</p> $\begin{array}{r} +1 \quad +1 \\ \hline x^2 + 2x + 1 = 10 \end{array} \quad \left(\frac{2}{2}\right)^2 = 1$ $\sqrt{(x+1)^2} = \sqrt{10}$ $\begin{array}{r} x+1 = \pm\sqrt{10} \\ -1 \quad -1 \end{array}$ <div style="border: 1px solid black; padding: 5px; display: inline-block; margin-top: 10px;">$x = -1 \pm \sqrt{10}$</div>	<p>4. $x^2 - 4x = 2x + 35$</p> $\begin{array}{r} -2x \quad -2x \\ \hline x^2 - 6x = 35 \end{array} \quad \left(\frac{-6}{2}\right)^2 = 9$ $\begin{array}{r} +9 \quad +9 \\ \hline x^2 - 6x + 9 = 44 \end{array}$ $\sqrt{(x-3)^2} = \sqrt{44}$ $x-3 = \pm 2\sqrt{11}$ $\begin{array}{r} +3 \quad +3 \end{array}$ <div style="border: 1px solid black; padding: 5px; display: inline-block; margin-top: 10px;">$x = 3 \pm 2\sqrt{11}$</div>
<p>5. $x^2 + 20x + 104 = 0$</p> $\begin{array}{r} -104 \quad -104 \\ \hline x^2 + 20x = -104 \end{array} \quad \left(\frac{20}{2}\right)^2 = 100$ $\begin{array}{r} +100 \quad +100 \\ \hline x^2 + 20x + 100 = -4 \end{array}$ $\sqrt{(x+10)^2} = \sqrt{-4}$ $\begin{array}{r} x+10 = \pm 2i \\ -10 \quad -10 \end{array}$ <div style="border: 1px solid black; padding: 5px; display: inline-block; margin-top: 10px;">$x = -10 \pm 2i$</div>	<p>6. $x^2 - 17x + 200 = 13x - 43$</p> $\begin{array}{r} -13x \quad -13x \\ \hline x^2 - 30x + 200 = -43 \end{array} \quad \left(\frac{-30}{2}\right)^2 = 225$ $\begin{array}{r} -200 \quad -200 \\ \hline x^2 - 30x = -243 \end{array}$ $\begin{array}{r} +225 \quad +225 \\ \hline x^2 - 30x + 225 = -18 \end{array}$ $\sqrt{(x-15)^2} = \sqrt{-18}$ $x-15 = \pm 3i\sqrt{2}$ $\begin{array}{r} +15 \quad +15 \end{array}$ <div style="border: 1px solid black; padding: 5px; display: inline-block; margin-top: 10px;">$x = 15 \pm 3i\sqrt{2}$</div>
<p>7. $4x^2 + 8x + 280 = 0$</p> $\begin{array}{r} -280 \quad -280 \\ \hline 4x^2 + 8x = -280 \end{array} \quad \left(\frac{2}{2}\right)^2 = 1$ $\frac{4x^2 + 8x}{4} = \frac{-280}{4}$ $x^2 + 2x = -70$ $x^2 + 2x + 1 = -69$ $\sqrt{(x+1)^2} = \sqrt{-69}$ $\begin{array}{r} x+1 = \pm i\sqrt{69} \\ -1 \quad -1 \end{array}$ <div style="border: 1px solid black; padding: 5px; display: inline-block; margin-top: 10px;">$x = -1 \pm i\sqrt{69}$</div>	<p>8. $6x^2 + 300 = 84x$</p> $\begin{array}{r} -84x \quad -84x \\ \hline 6x^2 - 84x + 300 = 0 \end{array} \quad \left(\frac{-14}{2}\right)^2 = 49$ $\begin{array}{r} -300 \quad -300 \\ \hline 6x^2 - 84x = -300 \end{array}$ $\frac{6x^2 - 84x}{6} = \frac{-300}{6}$ $x^2 - 14x = -50$ $x^2 - 14x + 49 = -50 + 49$ $\sqrt{(x-7)^2} = \sqrt{-1}$ $\begin{array}{r} x-7 = \pm i \\ +7 \quad +7 \end{array}$ <div style="border: 1px solid black; padding: 5px; display: inline-block; margin-top: 10px;">$x = 7 \pm i$</div>

9. Solve by completing the square.

$$\begin{array}{cc} x^2 + 2x = -17 \\ +1 \quad +1 \end{array}$$

$$\left(\frac{2}{2}\right)^2 = 1$$

$$x^2 + 2x + 1 = -16$$

$$\sqrt{(x+1)^2} = \sqrt{-16}$$

$$\begin{array}{cc} x+1 = \pm 4i \\ -1 \quad -1 \end{array}$$

$$\boxed{x = -1 \pm 4i}$$

10. Solve by completing the square.

$$\begin{array}{cc} 4x^2 + 16x = -12 \\ 4 \quad 4 \end{array}$$

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

$$\begin{array}{cc} x^2 + 4x = -3 \\ +4 \quad +4 \end{array}$$

$$x^2 + 4x + 4 = 1$$

$$\sqrt{(x+2)^2} = \sqrt{1}$$

$$\begin{array}{cc} x+2 = \pm 1 \\ -2 \quad -2 \end{array}$$

$$x = -2 \pm 1$$

$$x = -2 + 1, -2 - 1$$

$$\boxed{x = -1, -3}$$

11. Convert to vertex form.

$$y = 3x^2 - 12x + 8$$

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

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

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

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

$$y = 3(x-2)^2 - 12 + 8$$

$$\boxed{y = 3(x-2)^2 - 4}$$

12. Convert to vertex form.

$$y = x^2 + 12x + 35$$

$$\left(\frac{12}{2}\right)^2 = 36$$

$$y = x^2 + 12x + 36 - 36 + 35$$

$$\boxed{y = (x+6)^2 - 1}$$