Solving & Graphing Quadratic Equations and Inequalities

For each quadratic, determine the vertex, y-intercept and zeros. Then, graph the equation on the right, and graph each different type of inequality below.

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| **1.** $f\left(x\right)=x^{2}-4x+3$ | $$y-intercept$$$$ x=0$$ | $$a= , b= , c= $$Zeros:$$x=\frac{-b\pm \sqrt{b^{2}-4ac}}{2a}$$ | $$f\left(x\right)=x^{2}-4x+3$$ |
| Vertex in standard form:$$\left(\frac{-b}{2a}, plug it in\right)$$ |  |
| $$f\left(x\right)<x^{2}-4x+3$$ | $$f\left(x\right)\leq x^{2}-4x+3$$ | $$f\left(x\right)>x^{2}-4x+3$$ | $$f\left(x\right)\geq x^{2}-4x+3$$ |
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| Solutions:  | Solutions:  | Solutions:  | Solutions:  |

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| **2.** $f\left(x\right)=-x^{2}-2x+8$ | $$y-intercept$$$$ x=0$$ | $$a= , b= , c= $$Zeros:$$x=\frac{-b\pm \sqrt{b^{2}-4ac}}{2a}$$ | $$f\left(x\right)=-x^{2}-2x+8$$ |
| Vertex in standard form:$$\left(\frac{-b}{2a}, plug it in\right)$$ |  |
| $$f\left(x\right)<-x^{2}-2x+8$$ | $$f\left(x\right)\leq -x^{2}-2x+8$$ | $$f\left(x\right)>-x^{2}-2x+8$$ | $$f\left(x\right)\geq -x^{2}-2x+8$$ |
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| Solutions:  | Solutions:  | Solutions:  | Solutions:  |

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| **3.** $f\left(x\right)=3x^{2}-12x+9$ | $$y-intercept$$$$ x=0$$ | $$a= , b= , c= $$Zeros:$$x=\frac{-b\pm \sqrt{b^{2}-4ac}}{2a}$$ | $$f\left(x\right)=3x^{2}-12x+9$$ |
| Vertex in standard form:$$\left(\frac{-b}{2a}, plug it in\right)$$ |  |
| $$f\left(x\right)<3x^{2}-12x+9$$ | $$f\left(x\right)\leq 3x^{2}-12x+9$$ | $$f\left(x\right)>3x^{2}-12x+9$$ | $$f\left(x\right)\geq 3x^{2}-12x+9$$ |
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| **4.** $f\left(x\right)=-x^{2}-4x-4$ | $$y-intercept$$$$ x=0$$ | $$a= , b= , c= $$Zeros:$$x=\frac{-b\pm \sqrt{b^{2}-4ac}}{2a}$$ | $$f\left(x\right)=-x^{2}-4x-4$$ |
| Vertex in standard form:$$\left(\frac{-b}{2a}, plug it in\right)$$ |  |
| $$f\left(x\right)<-x^{2}-4x-4$$ | $$f\left(x\right)\leq -x^{2}-4x-4$$ | $$f\left(x\right)>-x^{2}-4x-4$$ | $$f\left(x\right)\geq -x^{2}-4x-4$$ |
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| **5.** $f\left(x\right)=\left(x-2\right)^{2}-1$ | $$y-intercept$$$$ x=0$$ | *not in standard form* $\rightarrow $ *just set = 0!*Zeros:  | $$f\left(x\right)=\left(x-2\right)^{2}-1$$ |
| Vertex in vertex form:*(Vertex is in the equation)*$$a\left(x\pm OPP.x\right)^{2}\pm SAMEy$$ |  |
| $$f\left(x\right)<\left(x-2\right)^{2}-1$$ | $$f\left(x\right)\leq \left(x-2\right)^{2}-1$$ | $$f\left(x\right)>\left(x-2\right)^{2}-1$$ | $$f\left(x\right)\geq \left(x-2\right)^{2}-1$$ |
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| Solutions:  | Solutions:  | Solutions:  | Solutions:  |

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| **6.** $f\left(x\right)=-\left(x+1\right)^{2}+9$ | $$y-intercept$$$$ x=0$$ | *not in standard form* $\rightarrow $ *just set = 0!*Zeros:  | $$f\left(x\right)=-\left(x+1\right)^{2}+9$$ |
| Vertex in vertex form:*(Vertex is in the equation)*$$a\left(x\pm OPP.x\right)^{2}\pm SAMEy$$ |  |
| $$f\left(x\right)<-\left(x+1\right)^{2}+9$$ | $$f\left(x\right)\leq -\left(x+1\right)^{2}+9$$ | $$f\left(x\right)>-\left(x+1\right)^{2}+9$$ | $$f\left(x\right)\geq -\left(x+1\right)^{2}+9$$ |
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| Solutions:  | Solutions:  | Solutions:  | Solutions:  |

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| **7.** $f\left(x\right)=3\left(x-2\right)^{2}-3$ | $$y-intercept$$$$ x=0$$ | *not in standard form* $\rightarrow $ *just set = 0!*Zeros:  | $$f\left(x\right)=3\left(x-2\right)^{2}-3$$ |
| Vertex in vertex form:*(Vertex is in the equation)*$$a\left(x\pm OPP.x\right)^{2}\pm SAMEy$$ |  |
| $$f\left(x\right)<3\left(x-2\right)^{2}-3$$ | $$f\left(x\right)\leq 3\left(x-2\right)^{2}-3$$ | $$f\left(x\right)>3\left(x-2\right)^{2}-3$$ | $$f\left(x\right)\geq 3\left(x-2\right)^{2}-3$$ |
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| Solutions:  | Solutions:  | Solutions:  | Solutions:  |

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| **8.** $f\left(x\right)=-\left(x+2\right)^{2}$ | $$y-intercept$$$$ x=0$$ | *not in standard form* $\rightarrow $ *just set = 0!*Zeros:  | $$f\left(x\right)=-\left(x+2\right)^{2}$$ |
| Vertex in vertex form:*(Vertex is in the equation)*$$a\left(x\pm OPP.x\right)^{2}\pm SAMEy$$ |  |
| $$f\left(x\right)<-\left(x+2\right)^{2}$$ | $$f\left(x\right)\leq -\left(x+2\right)^{2}$$ | $$f\left(x\right)>-\left(x+2\right)^{2}$$ | $$f\left(x\right)\geq -\left(x+2\right)^{2}$$ |
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| Solutions:  | Solutions:  | Solutions:  | Solutions:  |