Equivalent Forms of the Equation of a Quadratic Function

Tuesday, October 22, 2019 1:54 PM

Review: Factor ① $x^2+6x+9 = (x+3)^2$

② $x^2-12x+36 = (x-6)^2$

Convert from general form ($y=ax^2+bx+c$) to standard form ($y=a(x-p)^2+q$)

$y = x^2 - 6x + 10$

$y = (x^2-6x+9) + 10 - 9$

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

Eg $y = 2x^2+8x+3$

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

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

Try $y = -3x^2 - 18x + 10$

$y = -3(x^2+6x+9) + 10 - (-3)(9)$

$y = -3(x+3)^2 + 10 + 27$

$y = -3(x+3)^2 + 37$

$-2 \div \frac{1}{4} = -2 \times \frac{4}{1} = -8$

Eg $y = \frac{1}{4}x^2 - 2x - 5$

$y = \frac{1}{4}(x^2 - 8x + 16) - 5 - \frac{1}{4}(16)$

$y = \frac{1}{4}(x-4)^2 - 5 - 4$

$y = \frac{1}{4}(x-4)^2 - 9$

Try $y = \frac{1}{2}x^2 + 3x + 7$

$y = \frac{1}{2}(x^2 + 6x + 9) + 7 - \frac{1}{2}(9)$

$y = \frac{1}{2}(x+3)^2 + 7 - 4\frac{1}{2}$

$y = \frac{1}{2}(x+3)^2 + 2\frac{1}{2}$

vertex $(-3, 2\frac{1}{2})$

Eg $y = -2x^2 + 5x - 7$

$y = -2(x^2 - \frac{5}{2}x + \frac{25}{16}) - 7 - (-2)(\frac{25}{16})$

$-\frac{5}{2} \times \frac{1}{2} = -\frac{5}{4}$ $y = -2(x - \frac{5}{4})^2 - 7 + \frac{25}{8}$

$(-\frac{5}{4})^2 = \frac{25}{16}$ $y = -2(x - \frac{5}{4})^2 - 3\frac{7}{8}$

vertex $(1\frac{1}{4}, -3\frac{7}{8})$

Try: $y = -3x^2 + 9x + 5$

$y = -3(x^2 - 3x + \frac{9}{4}) + 5 - (-3)(\frac{9}{4})$

$(-\frac{3}{2})^2 = \frac{9}{4}$ $y = -3(x - \frac{3}{2})^2 + 5 + \frac{27}{4}$

$y = -3(x - \frac{3}{2})^2 + 4\frac{1}{4}$

$5 + \frac{27}{4}$

$\frac{20}{4} + \frac{27}{4}$

vertex $(1\frac{1}{2}, 11\frac{3}{4})$

Pg 315 - 318 # 3-4

① $y = x^2 \rightarrow y = x^2 - 7$ down 7

$y = (x+4)^2$ left 4

② $y = -2(x+2)^2 + 4$

down (1/2)

$(-2, 4)$ (1)

$x = -2$ (1)

$y = -2(0+2)^2 + 4$

$= -2(4) + 4$

$= -8 + 4$

$= -4$ (1/2)

y-int $(0, -4)$ (1/2)

$0 = -2(x+2)^2 + 4$

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

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

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

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

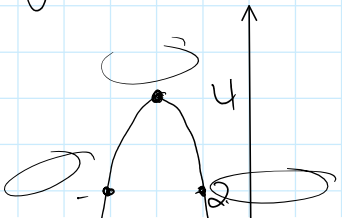
$(-2+\sqrt{2}, 0)(-2-\sqrt{2}, 0)$ (1)

$(-2 \pm \sqrt{2}, 0)$

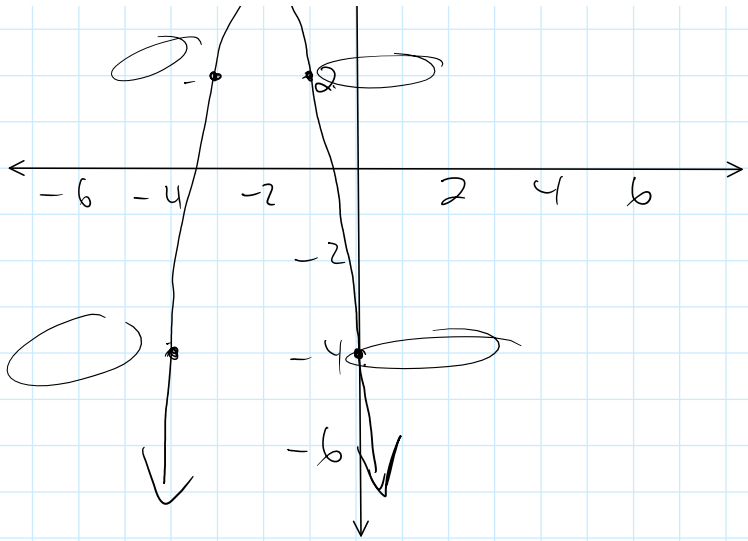
$(\pm 2, 0)$

domain $x \in R$ (1/2)

range $y \leq 4$ (1)



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



3c)

$\frac{5}{2}$ .25

$-\frac{3}{5} \times \frac{1}{2} \left(\frac{-3}{10}\right)^2 = \frac{9}{100}$

$-\frac{3}{5} \div \frac{2}{1} = -\frac{3}{5} \times \frac{1}{2}$

8b) $y = -4x^2 + 11x + 12$

$y = -4\left(x^2 + \frac{11}{4}x + \frac{121}{64}\right) + 12 - (-4)\left(\frac{121}{64}\right)$ $\frac{121}{16}$

$y = -4\left(x + \frac{11}{8}\right)^2 + 12 + \frac{121}{16}$

$\frac{192}{16} + \frac{121}{16}$

$\frac{11}{4} \times \frac{1}{2} = \frac{11}{8}$

$\left(\frac{11}{8}\right)^2 = \frac{121}{64}$

$y = -4\left(x + \frac{11}{8}\right)^2 + \frac{313}{16}$

y value $\frac{313}{16} = 19\frac{9}{16}$

8c) $y = 1.2x^2 + 6x - 2$

$y = 1.2\left(x^2 + 5x + \frac{25}{4}\right) - 2 - 1.2\left(\frac{25}{4}\right)$

$\left(\frac{5}{2}\right)^2 = \frac{25}{4}$ $1.2\left(x + \frac{5}{2}\right)^2$

$x = 2.5$ $x = 2\frac{1}{2}$