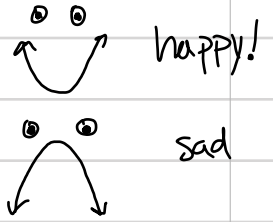


12/6/12 Graphing $f(x) = ax^2 + bx + c$

Note:

If a is \oplus , then the parabola opens up.

If a is \ominus , then the parabola opens down.



Get the function into $y - k = a(x - h)^2$ form

Ex

① Replace $f(x)$
w/ y

② Divide all by " a "

③ Complete the
square

④ Mult by " a "

⑤ get $y - k = a(x - h)^2$

① $f(x) = 4x^2 - 8x + 2$

$$\frac{y}{4} = \frac{4x^2}{4} - \frac{8x}{4} + \frac{2}{4}$$

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

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

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

$$y = 4(x-2)^2 - 14$$

$$y + 14 = 4(x-2)^2$$

② $g(x) = 2x^2 + 8x - 3$

$$\frac{y}{2} = \frac{2x^2}{2} + \frac{8x}{2} - \frac{3}{2}$$

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

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

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

$$y = 2(x+2)^2 - 11$$

$$y + 11 = 2(x+2)^2$$

③ $f(x) = 3x^2 - 12x + 8$

$$\frac{y}{3} = \frac{3x^2}{3} - \frac{12x}{3} + \frac{8}{3}$$

$$\frac{y}{3} = x^2 - 4x + \frac{8}{3}$$

$$3 \left(\frac{y}{3} = (x-2)^2 - 4 + \frac{8}{3} \right)$$

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

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

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

④ $h(x) = 2x^2 + 4x - 6$

$$\frac{y}{2} = \frac{2x^2}{2} + \frac{4x}{2} - \frac{6}{2}$$

$$\frac{y}{2} = x^2 + 2x - 3$$

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

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

$$y = 2(x+1)^2 - 8$$

$$y + 8 = 2(x+1)^2$$

⑤ $f(x) = -x^2 + 4x - 5$

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

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

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

$$y = -(x-2)^2 + 4 - 5$$

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

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

Note:

The maximum or minimum value of a quadratic is just the y coordinate of the vertex.