Why not add a y?

Most of the real and theoretical scenarios that you will come across will be in an equation. Ie: $y = ax^2 + bc + c$. The graph will show a region on the cartesian plane with the parabola being the border of solution points.

Remember:
The parabola that $y = ax^2 + bx + c$ is the bandry that divides the Cartesian plane into two regions.

- ➔ When the inequality sign is $\leq$ or $\geq$, the points on the boundary are part of the sol^n and the line is solid.
- ➔ When the inequality sign is $<$ or $>$, the points on the boundary are not part of the sol^n and the line is dashed.

Solve Graphically:

$y \leq (x-1)^2 - 4$

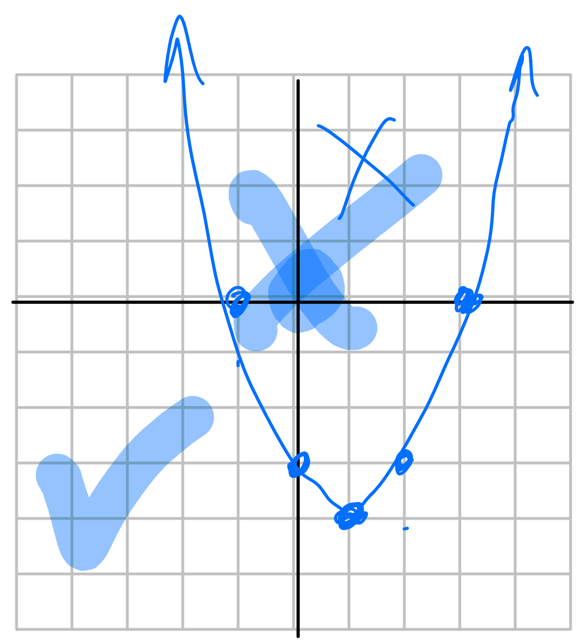
test point
(0, 0)

$0 \leq (0-1)^2 - 4$

$0 \leq 1 - 4$

$0 \leq -3$

X



Steps to graph a quadratic inequality in 2 variables:

- ➔ Complete the square
- ➔ Find your center
  - ◆ $y = a(x-p)^2 + q$ Left/Right by p, and up/down by q.
- ➔ Find your next 4 points: Stretched or shrunk by a.
- ➔ Use a test point or see which side of the line y is to find which region is the solution set.

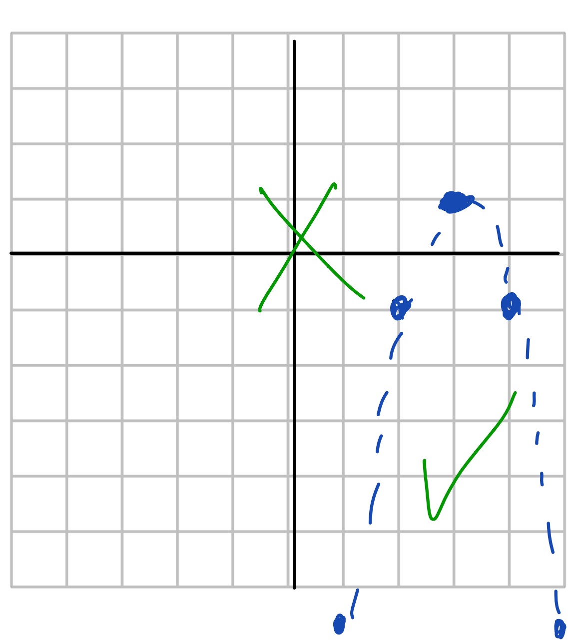
$y < -2(x-3)^2 + 1$

test $(0, 0)$

$0 < -2(0-3)^2 + 1$

$0 < -2(9) + 1$

✗



$y \geq x^2 - 4x - 5$

$y \geq (x-2)^2 - 4 - 5$

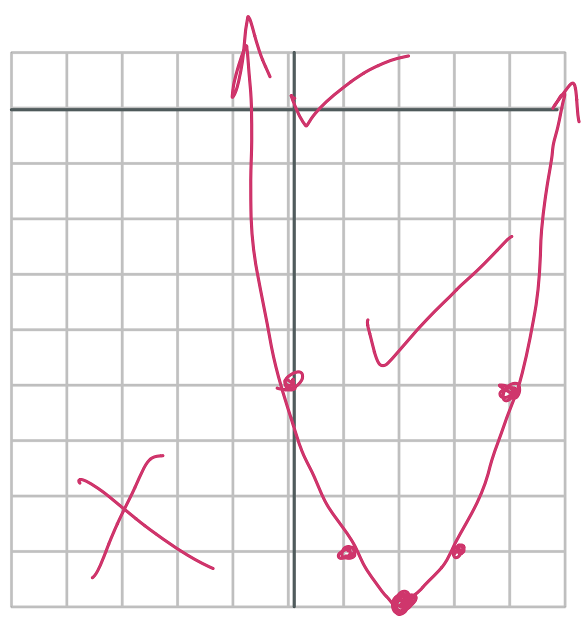
$y \geq (x-2)^2 - 9$

test $(0, 0)$

$0 \geq 0^2 - 4(0) - 5$

$0 \geq -5$

✓



Reverse Engineer the equation:

vertex (2, 4)

y □ $A(x - p)^2 + q$

y □ $A(x - 2)^2 + 4$

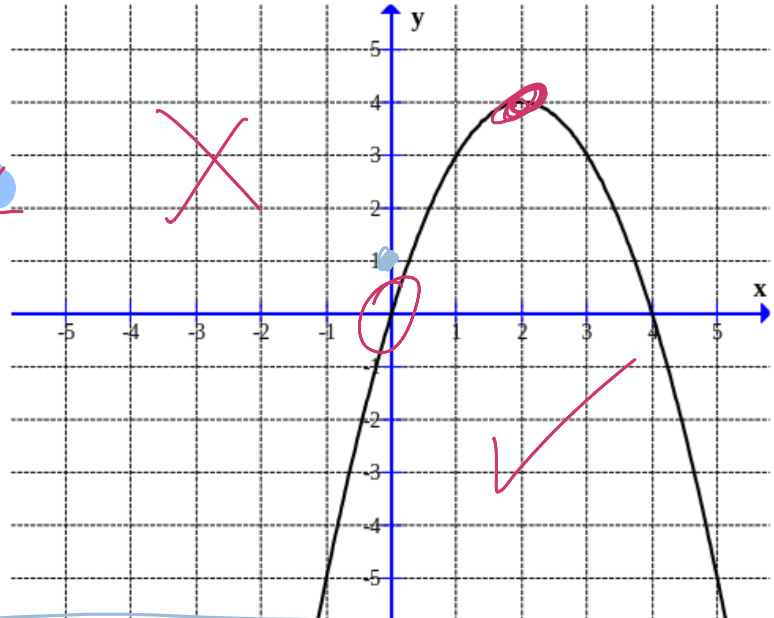
point (0, 0)

0 □ $A(0 - 2)^2 + 4$

−4 □ A4

$\frac{-4}{4}$ □ A

−1 □ A



y □ $-(x - 2)^2 + 4$

test (0, 1)

1 □ $-(0 - 2)^2 + 4$

1 < 0 ✗

y □ = $A(x - p)^2 + q$

y □ $A(x + 1)^2 - 4$

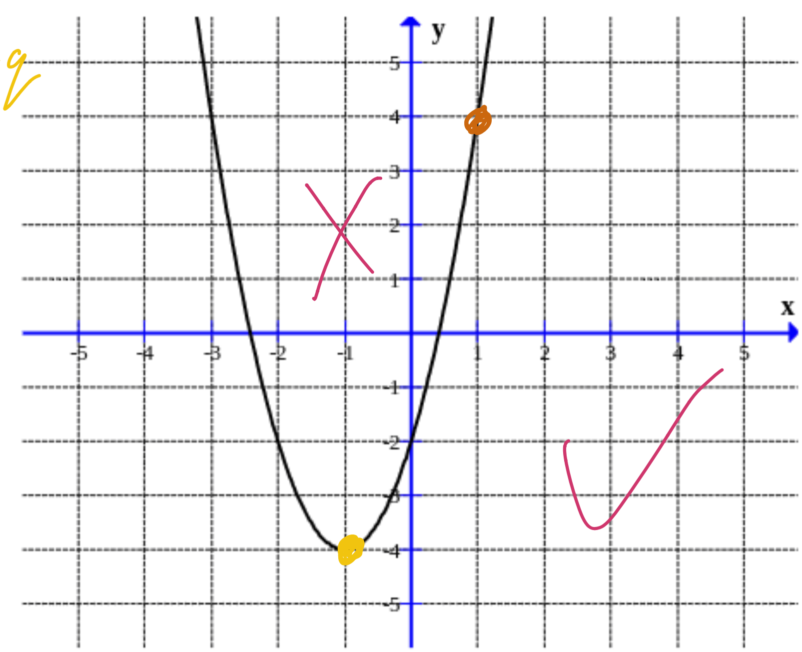
point (1, 4)

$4 = A(1 + 1)^2 - 4$

$4 + 4 = 4A$

$\frac{8}{4} = A$

$2 = A$



y □ $2(x+1)^2 - 4$ test (0, 0)

0 □ $2(0+1)^2 - 4$

4 0 2