October 20, 2022

QUADRATIC FUNCTIONS

$y = ax^2$ ✓ standard form

$\boxed{y = ax^2 + bx + c}$

$y = 2x^2 + 9x - 1$

$y = 4x^2$

Parabola

x	y
0	0
-1	4
-2	16
-3	36

Vertex Form

$y = a(x-h)^2 + k$

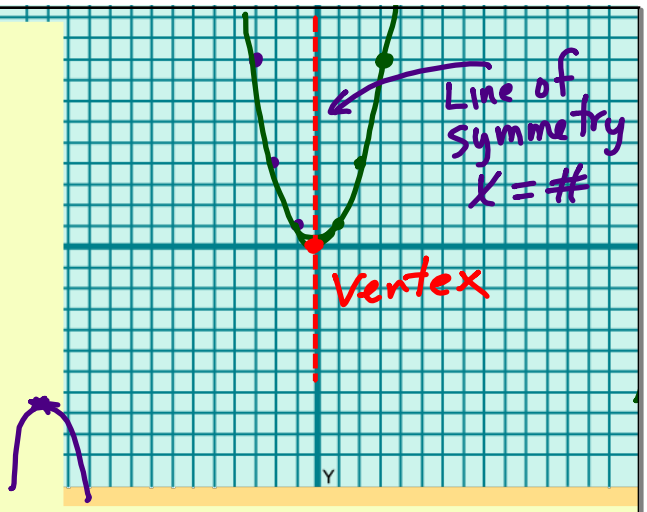
(change sign) (don't change sign)

Vertex: (h, k)

direction: $+a$ up
$-a$ down

line of symmetry: $x =$

width: $|a| > 1$ narrow
$|a| = 1$ normal
$0 < |a| < 1$ wide



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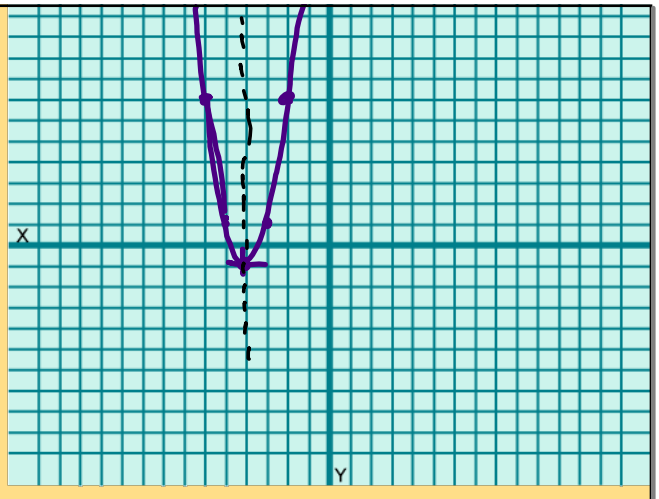
$y = 2(x+4)^2 - 1$

left 4 down 1

x	y
0	0
1	2
2	8
3	18

line of symmetry

$x = -4$

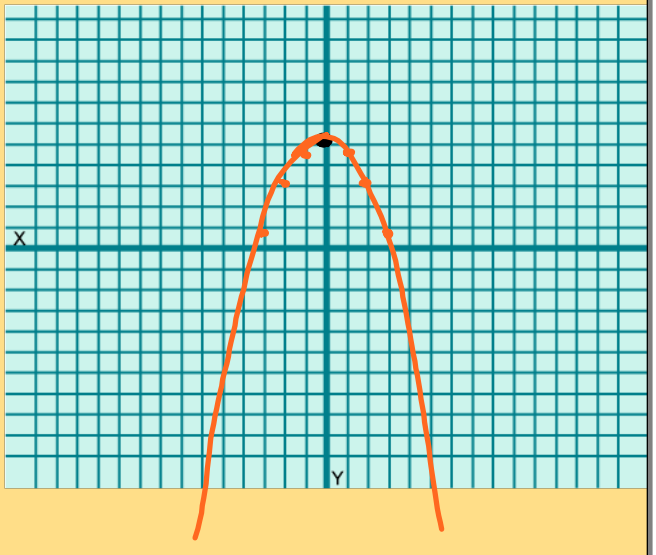


$y = -\frac{1}{2}x^2 + 5$

no horiz shift

5 up

x	y
0	0
1	-1/2
2	-2
3	-4.5



$y = -2(x-4)^2 + 7$

Vertex: $(4, 7)$

direction: down

line of symm: $x = 4$

width: narrow

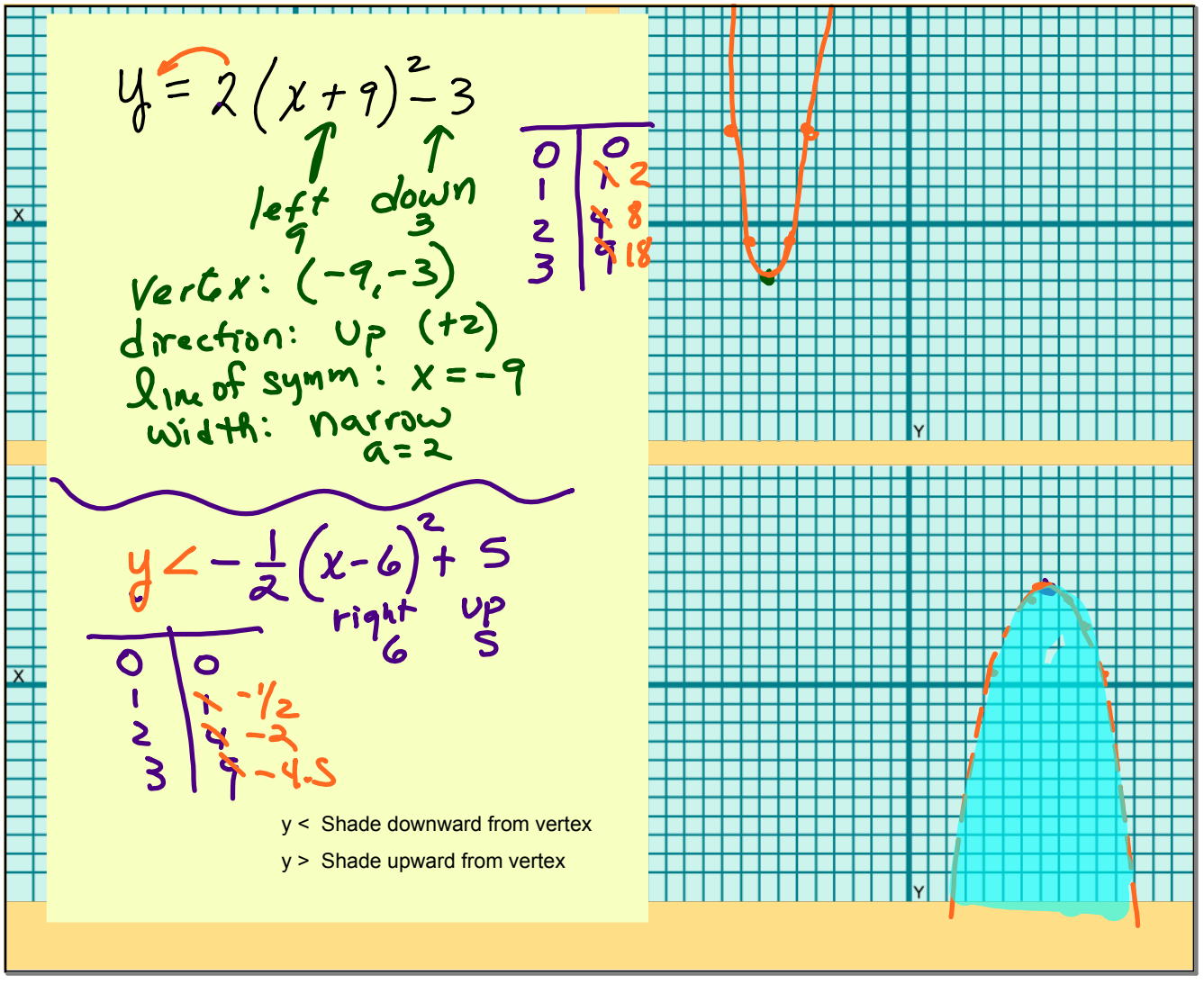
$y = \frac{2}{3}x^2 - 5$

Vertex: $(0, -5)$

direction: up

line of symm: $x = 0$

width: wide


$y = 2(x+9)^2 - 3$
left 9
down 3
Vertex: (-9, -3)
direction: up (+2)
line of symm: x = -9
width: narrow
a = 2
0 | 0
1 | 2
2 | 8
3 | 18
$y < -\frac{1}{2}(x-6)^2 + 5$
right 6
up 5
0 | 0
1 | -1/2
2 | -2
3 | -4.5
y < Shade downward from vertex
y > Shade upward from vertex
X
Y
X
Y

$y < -\frac{1}{2}(x+6)^2 + 4$

dotted

left 6

up 4

x	y
0	0
1	-1/2
2	-2
3	-4.5

y < Shade downward from vertex

y > Shade upward from vertex

$y \leq 3(x-2)^2 - 10$

(2, -10)

right 2

down 10

x	y
0	0
1	3
2	12
3	27