Goals:

✓ (1) Figure out how stretches work

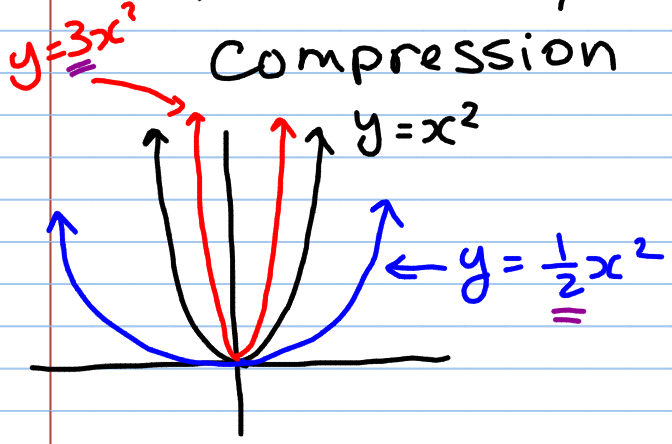
→ (2) Figure out how to find the x-intercepts

"STRETCHES" are more formally known as expansions and compressions.

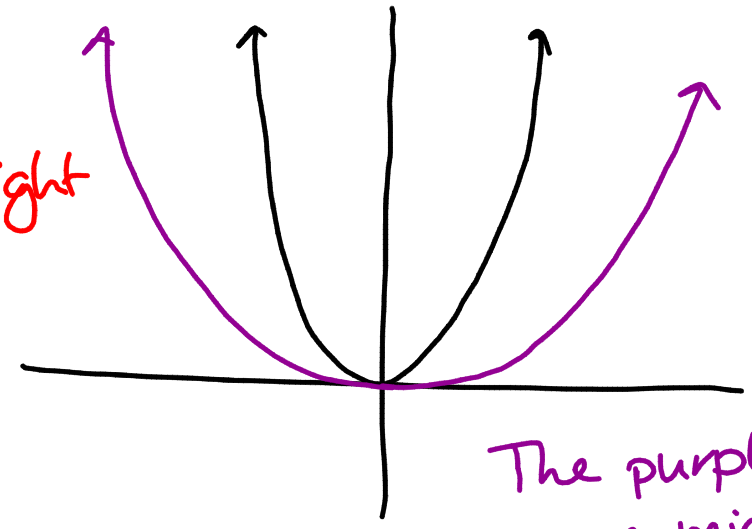
$y = ax^2$

If $a > 1$, then it is a expansion by a factor of a (stretch → skinnier "taller")

If $0 < a < 1$, then it is a compression (squish → flatter)



$y = x^2$



The red one might be:

$y = 5x^2$

$y = 6x^2$

$y = 3x^2$

$y = 36x^2$

$y = 1.5x^2$ or $\frac{3}{2}x^2$ ←

The purple one might be...

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

$y = \frac{1}{9}x^2$

$y = x^2$

$y = \frac{4}{5}x^2$ $\frac{5}{5}$ $y = \frac{6}{5}x^2$

Flatter

Skinnier

less than one

Finding the x-intercepts without graphing

make 0 — isolate

Ex $y = -3[x+4]^2 + 3$ (vertex form)

$(-3, 0)$ $(-5, 0)$

$0 = -3[x+4]^2 + 3$

$-3 \quad -3$

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

$\sqrt{1} = \sqrt{(x+4)^2}$ $\quad (-1)^2 = 1$

$\pm 1 = x+4$ $\quad$ or $(1)^2 = 1$

$1 = x+4$ OR $-1 = x+4$

$-4 \quad -4 \qquad -4 \quad -4$

$x = -3$ OR $x = -5$

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

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

$+4 \qquad +4$

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

$\sqrt{2} = \sqrt{(x-2)^2}$

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

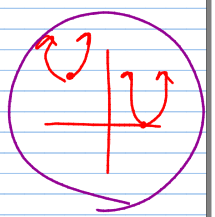
$\sqrt{2} = x-2$ OR $-\sqrt{2} = x-2$

$+2 \quad +2 \qquad +2 \quad +2$

$2+\sqrt{2} = x$ or $2-\sqrt{2} = x$

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

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

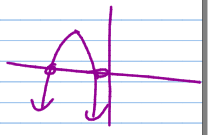


$0 = 2(x+2)^2 + 4$

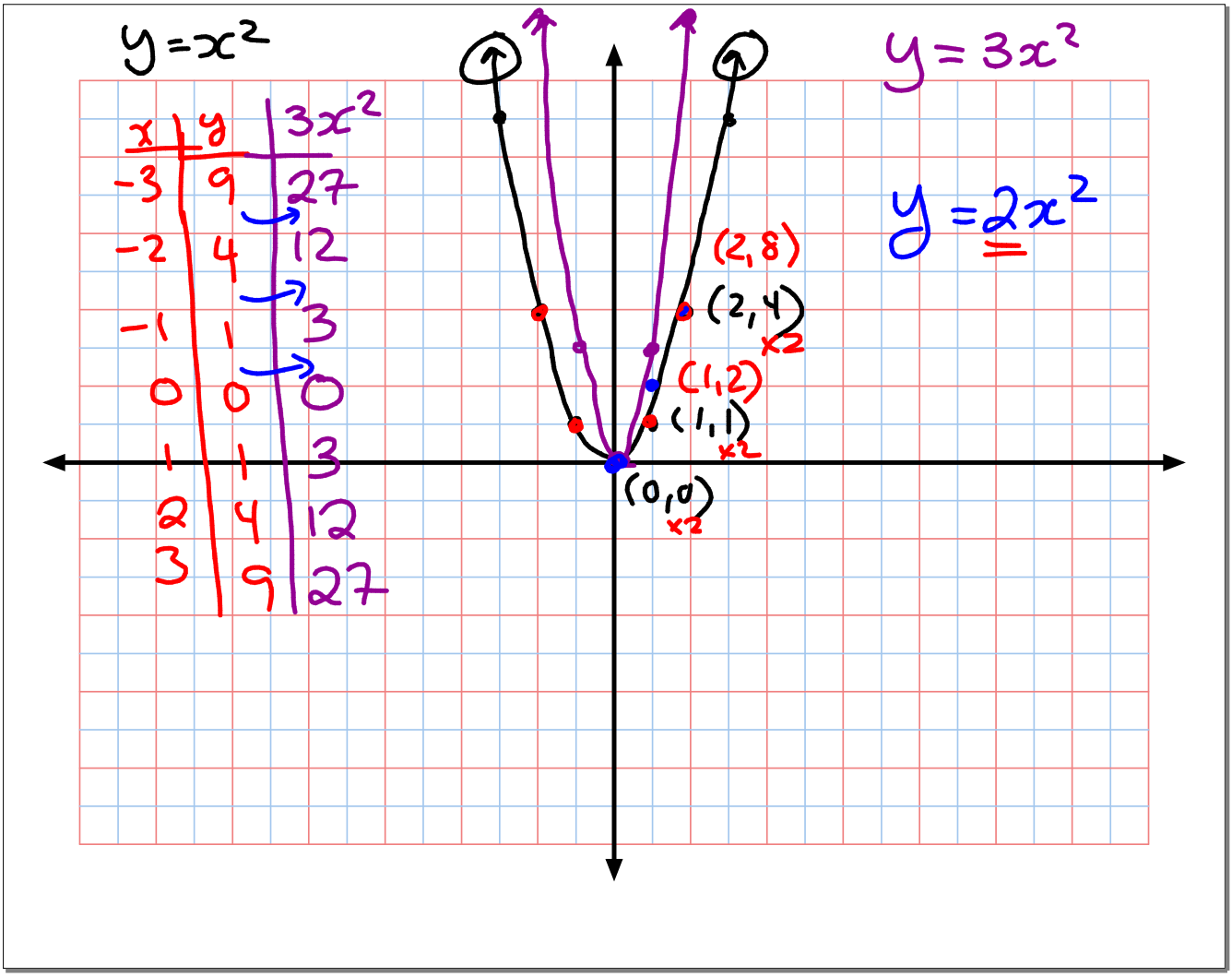
$-4 \qquad -4$

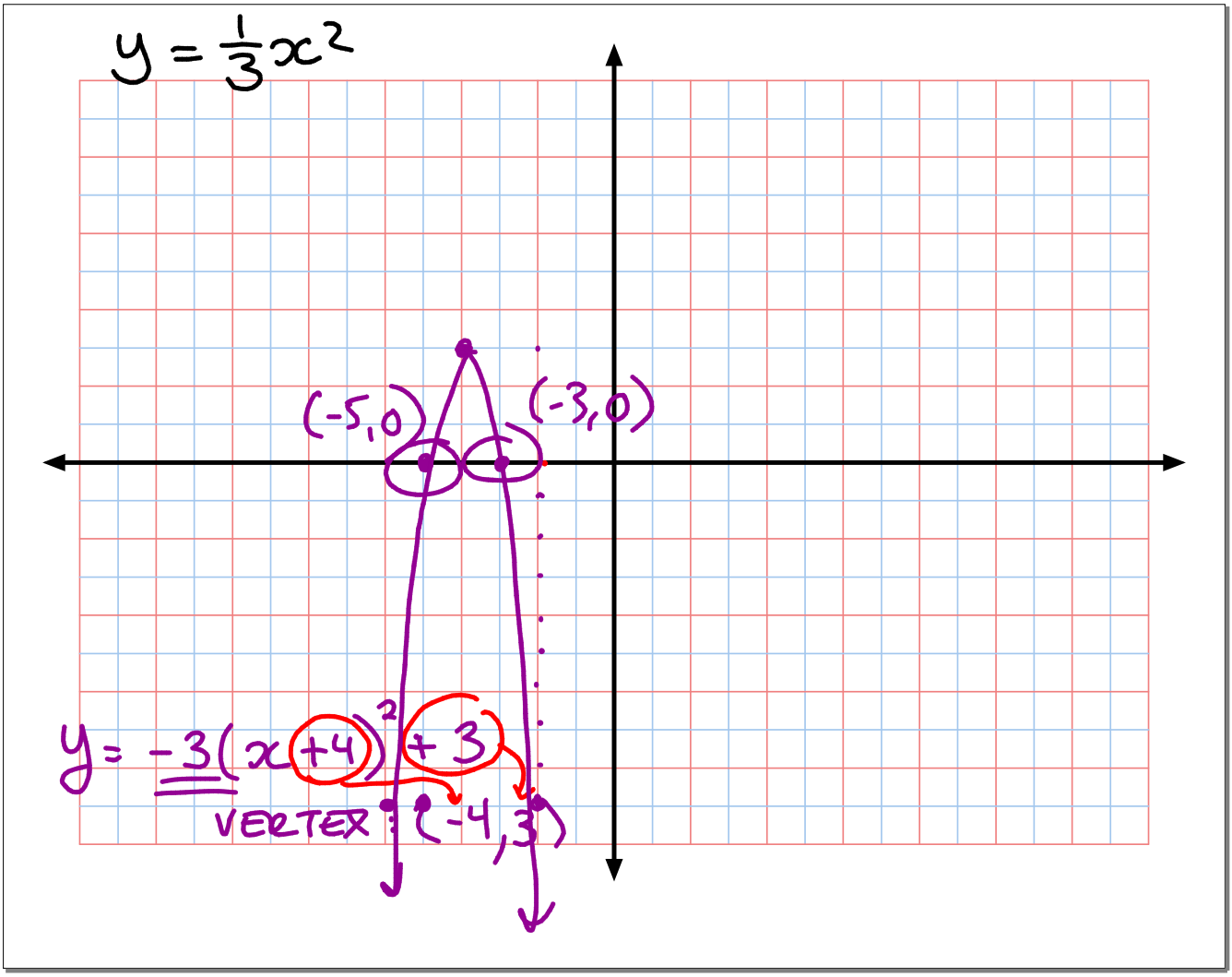
$\frac{-4}{2} = \frac{2}{2}(x+2)^2$

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



No soln $\sqrt{-2} = x+2$


y = x²
x | y | 3x²
-3 | 9 | 27
-2 | 4 | 12
-1 | 1 | 3
0 | 0 | 0
1 | 1 | 3
2 | 4 | 12
3 | 9 | 27
y = 3x²
y = 2x²
(2,8)
(2,4)
x2
(1,2)
(1,1)
x2
(0,0)
x2


$y = \frac{1}{3}x^2$
(-5,0)
(-3,0)
$y = -3(x+4)^2 + 3$
VERTEX: (-4,3)