Mathematics 10D

5.3 – $y=a(x-h)^2+k$

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

- a is the same "a" as in the other forms.
- (h,k) is the vertex

The vertex form is important as it allows us graph the parabola.

First, let's convert from vertex to standard to zeros form:

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

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

$y = 2(x^2 + 8x + 16) - 2$

S $y = 2x^2 + 16x + 30$

$y = 2(x^2 + 8x + 15)$ (×) 15, (+) 8

Z $y = 2(x+3)(x+5)$

vertex $(-4, -2)$

y-int: 30

Zeros: $x = -3$

$x = -5$

Graph $y = a(x-h)^2 + k$ by using transformations

Vertical Stretch / compression.

$a > 1$ → $0 < a < 1$

↳ you multiply the stretch with the original y values.

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

Horizontal Shift

↳ add or subtract to the original x-values

Vertical Shift

↳ add or subtract to the stretched y-values

Graph $y = 2(x-3)^2 + 5$

V. Str

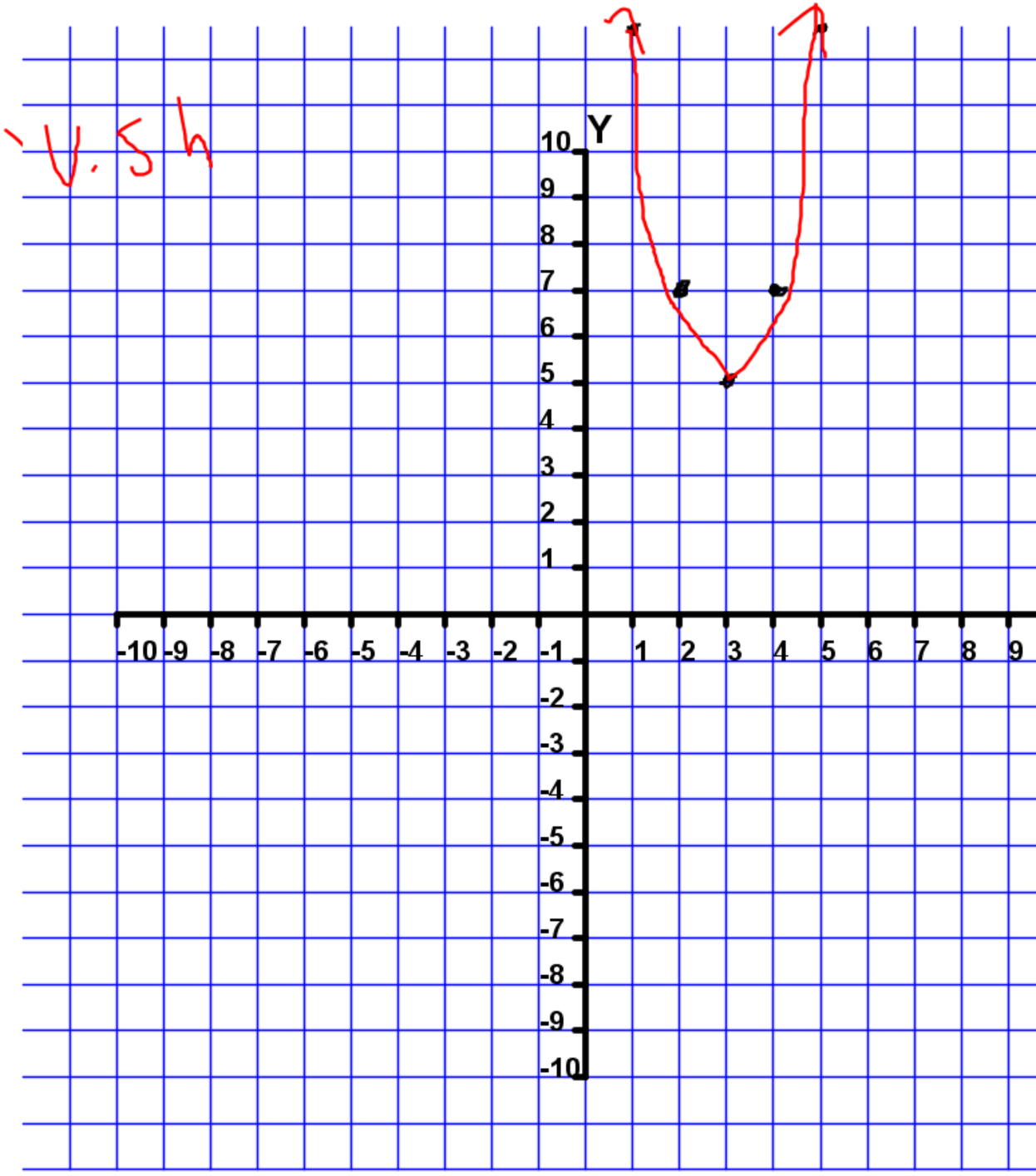
H. Sh

V. Sh

$y = x^2$

x	y
-2	4
-1	1
0	0
1	1
2	4

x + 3	2y + 5
1	13
2	7
3	5
4	7
5	13



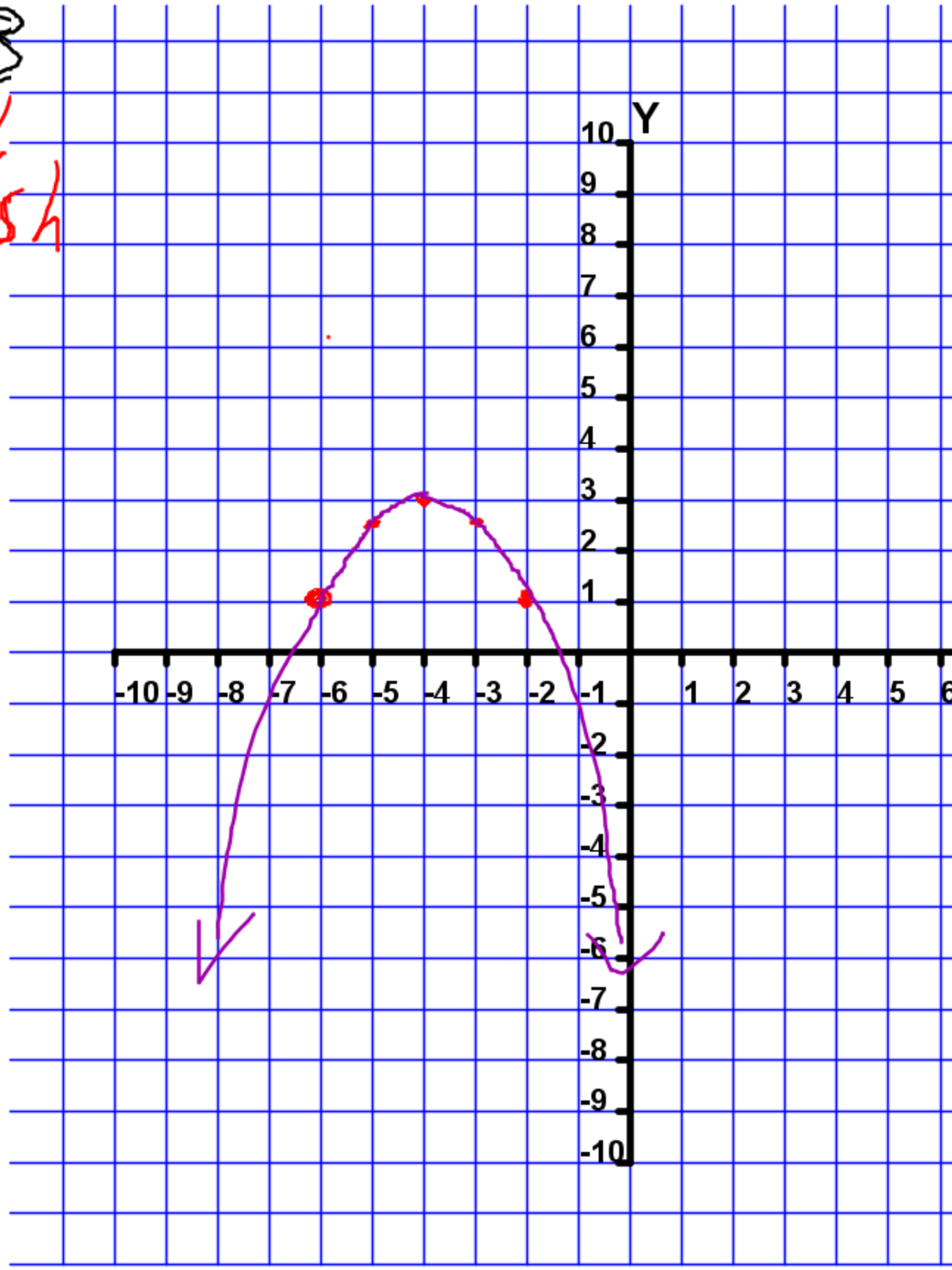
Graph $y = -\frac{1}{2}(x+4)^2 + 3$

V. Str H. Sh V. Sh

$y = x^2$

x	y
-2	4
-1	1
0	0
1	1
2	4

$x-4$	$-\frac{1}{2}y+3$
-6	1
-5	2.5
-4	3
-3	2.5
-2	1



$y = (x+2)^2 + 3$ V.Str $\Rightarrow 1$

$y = 2x^2 - 3$

$= 2(x+0)^2 - 3$ H.Sh $= 0$

$y = 3(x-2)^2$ V.Sh $= 0$