Quadratic Transformations

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

Shows 2 things:
* If (-) graph reflects
* If less than 1, graph will be wider. This is called a vertical shrink.
* If greater than 1, graph will be thinner. This is called a vertical stretch.

Dilation

Vertical Shift V.S.
* If (-) move down
* If (+) move up

Horizontal Shift H.S.
* If (-) move right
* If (+) move left

Example

$f(x) = -5(x + 4)^2 - 6$

a = -5, therefore...
* The graph reflects
* There is a vertical stretch meaning graph will get thinner.

(x + 4) tells me:
* Graph moves left 4

- 6 on the end tells me:
* Graph moves down 6

Identify the transformations for each of the following:

8. $f(x) = 2(x + 3)^2 - 4$

Reflection? Yes (No)
V.S.? Down 4
H.S.? Left 3
Dilation? vertical stretch (thinner)

9. $f(x) = -1(x - 6)^2 - 7$

Reflection? (Yes) / No
V.S.? Down 7
H.S.? Right 6
Dilation? n/a

10. $f(x) = \frac{1}{2}(x + 8)^2 + 5$

Reflection? Yes / (No)
V.S.? up 5
H.S.? left 8
Dilation? vertical shrink (wider)

11. $f(x) = -2(x - 5)^2 - 2$

Reflection? (Yes) / No
V.S.? down 2
H.S.? right 5
Dilation? vertical stretch (thinner)

12. $f(x) = 4(x + 3)^2 + 3$

Reflection? Yes / (No)
V.S.? up 3
H.S.? left 3
Dilation? vertical stretch (thinner)

13. $f(x) = -\frac{1}{2}(x - 8)^2 + 3$

Reflection? (Yes) / No
V.S.? up 3
H.S.? right 8
Dilation? vertical shrink (wider)