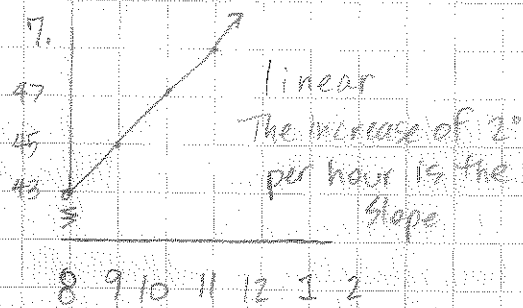


# 1.2 Families of Functions, Transformations

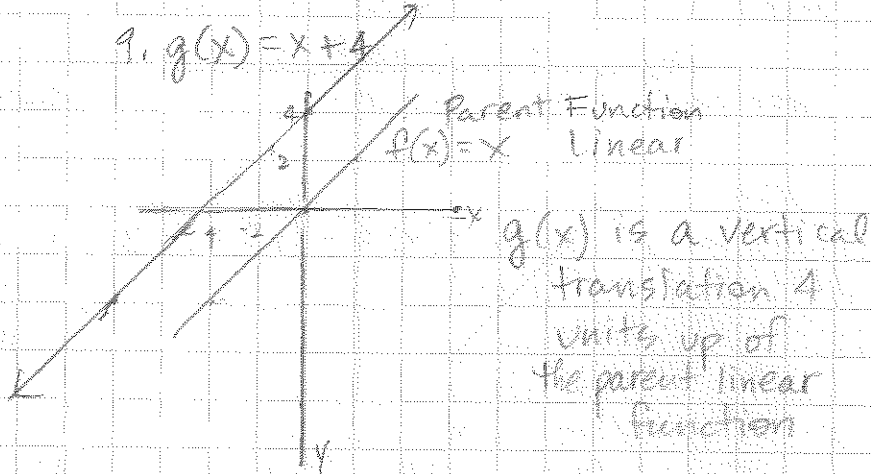
p. 14: 1, 3, 4, 6, 7, 8, 9-25 odd. Graph at least 1 of each family  
 27-35 odd, 45, 47, 49, 50, 51, 55, 57, 61  
 Extra: 24, 28, 34, 44, 46, 52, 53  
 Advanced: 54

- 1. parent function
- 3. absolute value
- 4. quadratic
- 6. Constant

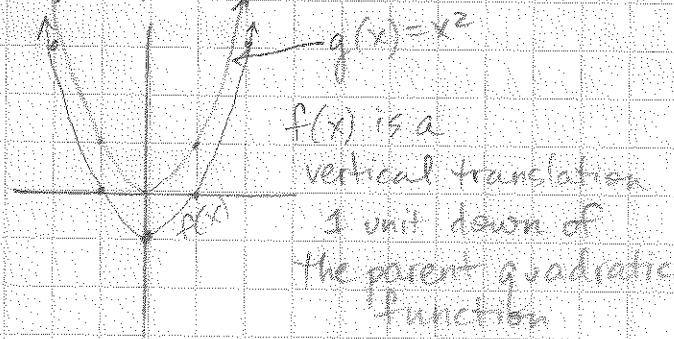


8.  $f(x) = 10000 - 250x^2$  quadratic

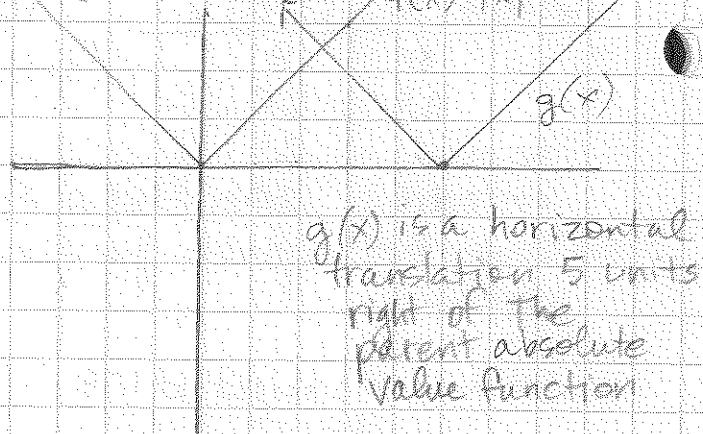
9.  $g(x) = x + 4$



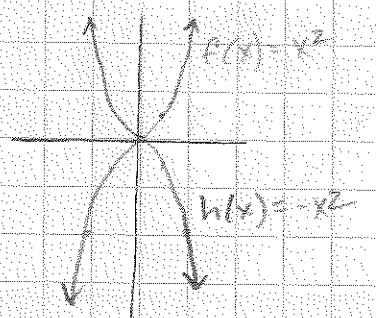
11.  $f(x) = x^2 - 1$



13.  $g(x) = |x - 5|$

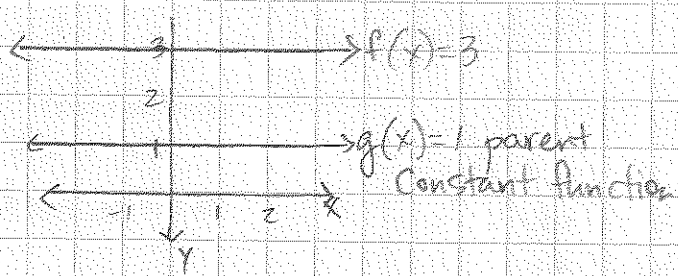


15.  $h(x) = -x^2$



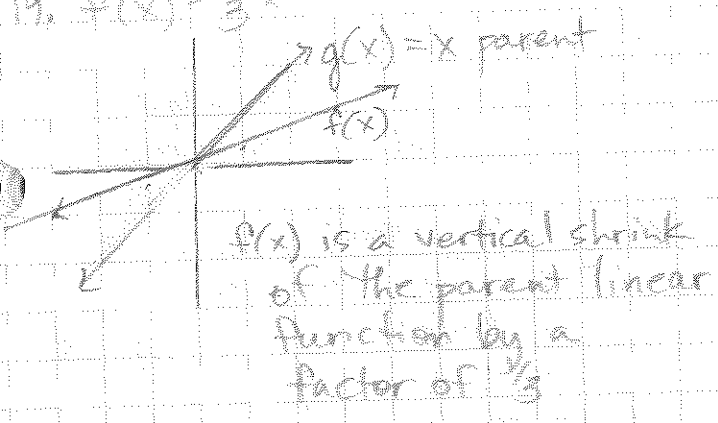
$h(x)$  is a reflection across the x-axis of the parent quadratic function

17.  $f(x) = 3$

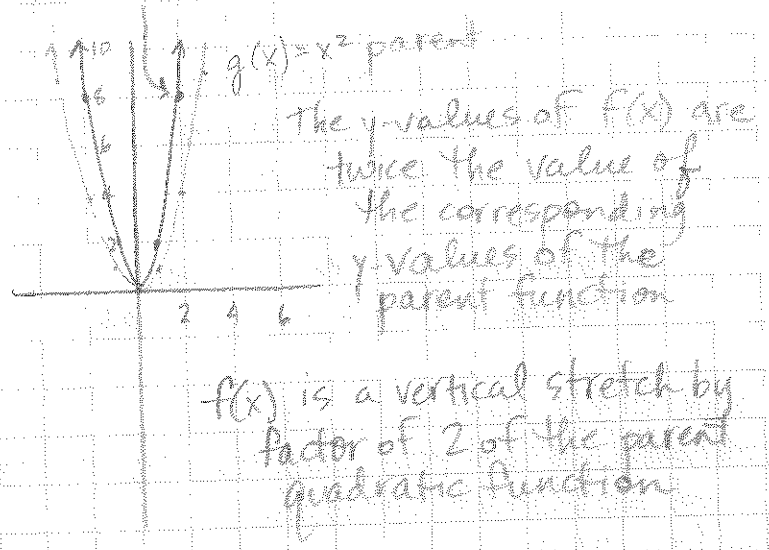


$f(x)$  is a vertical translation 3 units up of the parent constant function

19.  $f(x) = \frac{1}{3}x$



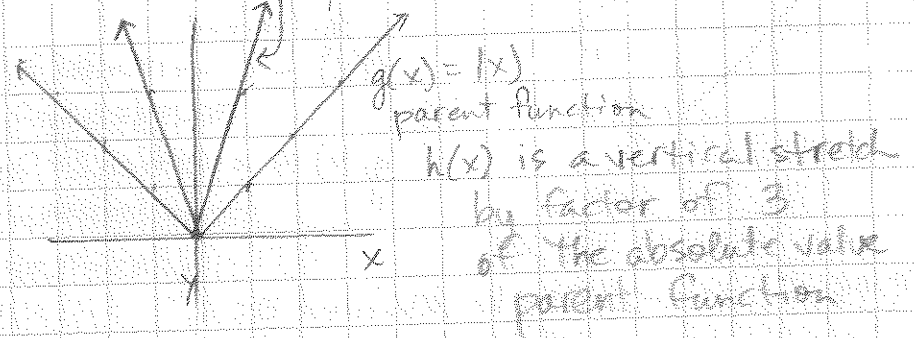
21.  $f(x) = 2x^2$



23.  $h(x) = \frac{3}{4}x$

similar to #19  
 $h(x)$  is a vertical shrink of the parent linear function by factor of  $\frac{3}{4}$

25.  $h(x) = 3|x|$



27.  $f(x) = 3x + 2$

$f(x)$  is vertical stretch of the parent linear function by factor of 3, then it is translated up 2 units

29.  $h(x) = -3|x| - 1$

$h(x)$  is a reflection across the x-axis and a vertical stretch by a factor of 3 of the absolute value function. Then it is vertically translated down 1 unit.

31.  $g(x) = \frac{1}{2}x^2 - 6$

$g(x)$  is a vertical shrink of the quadratic function by a factor of  $\frac{1}{2}$ , then it is shifted down 6 units

38.  $f(x) = -(x+3)^2 + \frac{1}{4}$

$f(x)$  is a reflection of the quadratic function in the x-axis, followed by a horizontal translation left 3 units and a vertical translation  $\frac{1}{4}$  unit up

35. It is a vertical stretch, not a vertical shrink.

$f(x) = x^2$  passes thru (2, 4)  
 $f(x) = -x^2$  passes thru (2, -4)  
This graph passes thru (2, -8)  
The y-values are further from the x-axis than their corresponding values in the parent function.

24.  $g(x) = \frac{4}{3}x$

vertical stretch of linear parent function

28.  $h(x) = -x + 5$  reflection of linear function across x-axis followed by translation up 5

34.  $g(x) = -|x-1| - \frac{1}{2}$

reflection of absolute value parent function over x-axis and horizontal shift right 1 unit followed by vertical translation down  $\frac{1}{2}$  unit

44.  $f(x) = -2x^2 + 6$

reflection in x-axis and vertical stretch of parent quadratic function by factor of 2, followed by shift up 6 units

- \*48. a. g is a vertical shrink of f because the y-values of g are  $\frac{1}{2}$  of the y-values of f.
- b. to get h, reflect f in the x-axis and stretch vertically by a factor of 2

52.

Time, x	Battery life remaining, y
1	80%
3	40%
5	0%
6	20%
8	60%

decreasing  
↓  
increasing  
↓

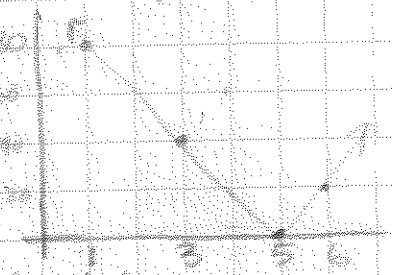
Check the slope

$$\frac{40-80}{3-1} = \frac{-40}{2} = -20$$

$$\frac{20-0}{6-5} = \frac{20}{1} = 20$$

Opposite Slopes.  
Must be Absolute Value

Graph



- 53. a.  $f(x) = 2|x| - 3$  vertical translation
- b.  $f(x) = (x-8)^2$  horizontal translation
- c.  $f(x) = |x+2| + 4$  horizontal & vertical translation
- d.  $f(x) = 4x^2$  neither

\*54a.  $f(x) = 3x^2 + 1$

b.  $f(x) = |2x-6| - 2$

c.  $f(x) = -x^2 + 1$

d.  $f(x) = 2$