

"Parent" graphs

$f(x) = c$  - constant function

$f(x) = mx + b$  - linear function

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

$f(x) = x^3$  - cubic function

$f(x) = |x|$  - absolute value

$f(x) = \sqrt[3]{x}$  - cube root

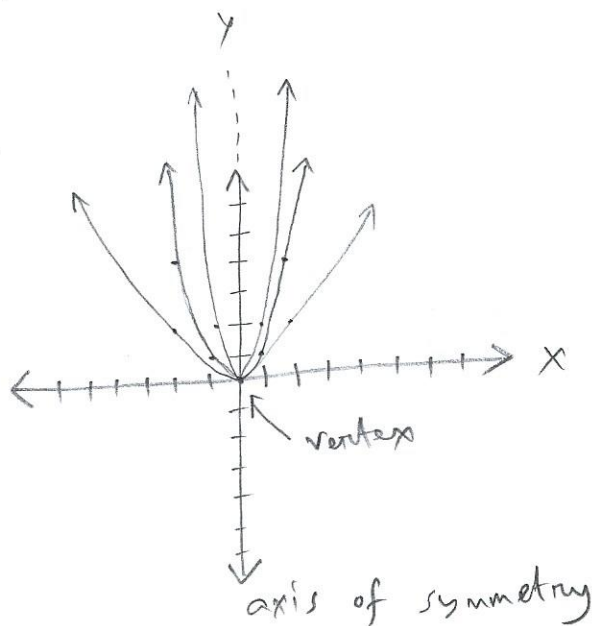
$f(x) = \sqrt{x}$  - square root

$f(x) = 1/x$  - reciprocal

Graphing using transformations:

$f(x) = x^2$

X	Y
2	4
1	1
0	0
-1	1
-2	4



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

① The graph of the quadratic function is called a parabola.

② Vertex is  $(h, k)$

③ If 'a' is positive, the parabola opens upward.

If 'a' is negative, the parabola opens downward.

④ The axis of symmetry is  $x = h$

⑤ If  $|a| > 1$ , then the parabola will be narrower than  $x^2$  graph.  
 If  $|a| < 1$ , then the parabola will be wider than  $x^2$  graph.

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

x	y
2	8
1	2
0	0
-1	2
-2	8

$$g(x) = \frac{1}{2}x^2$$

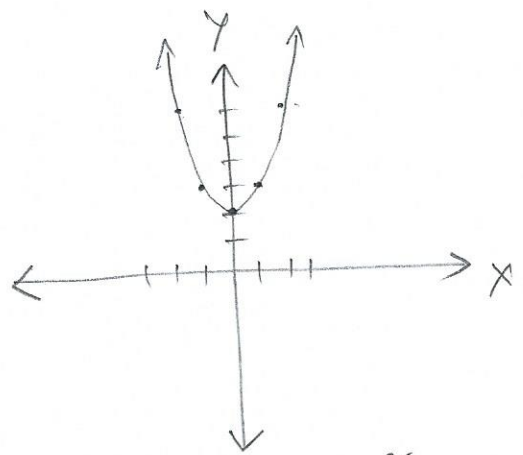
x	y
2	2
1	1/2
0	0
-1	1/2
-2	2

$$f(x) = x^2 + 2$$

$$f(x) = (x - 0)^2 + 2$$

↑
↑  
 h            k

x	y
2	4+2=6
1	3
0	2
-1	3
-2	6

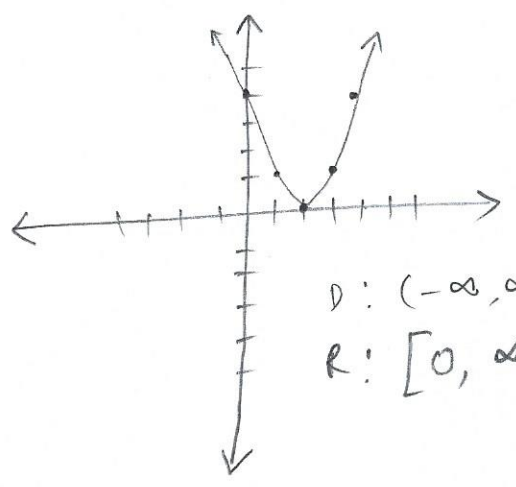


$$p(x) = (x - 2)^2 + 0$$

horizontal shift to right two units

+ 0  
↑  
No vertical shift

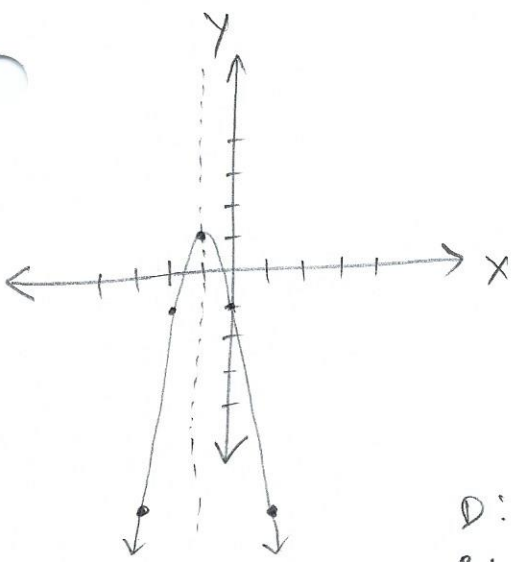
x	y
4	4
3	1
2	0
1	1
0	4



D:  $(-\infty, \infty)$   
 R:  $[0, \infty)$

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

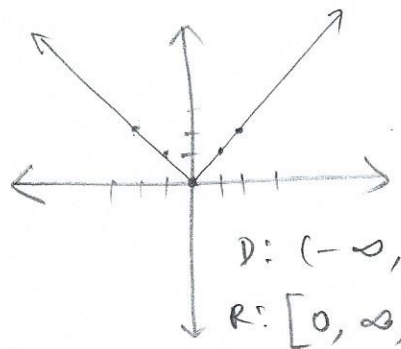
- ① opens downward
- ② vertex: (-1, 1)



x	y
-3	-7
-2	-1
-1	1
0	-1
1	-7

D:  $(-\infty, \infty)$   
 R:  $(-\infty, 1]$

$$f(x) = |x|$$

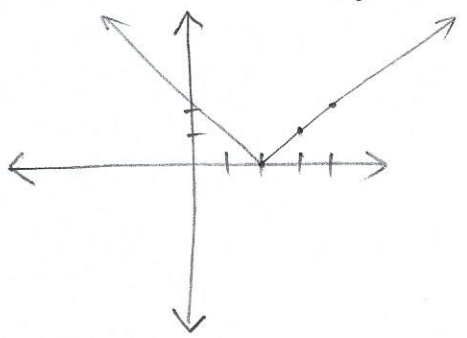


x	y
2	2
1	1
0	0
-1	1
-2	2

D:  $(-\infty, \infty)$   
 R:  $[0, \infty)$

$$g(x) = |x-2|$$

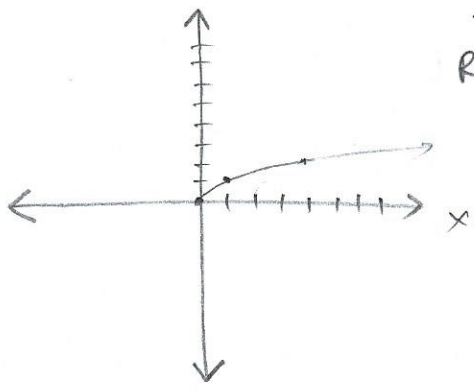
horizontal shift right two units



x	y
1	1
2	0
3	1

$$f(x) = \sqrt{x}$$

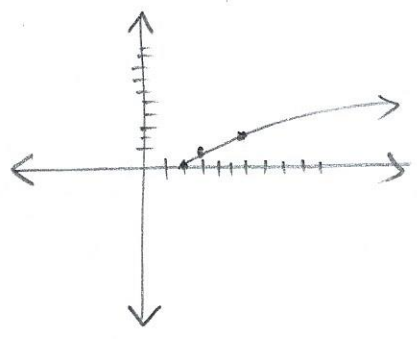
x	y
0	0
1	1
4	2



D:  $x \geq 0$   $[0, \infty)$   
 R:  $[0, \infty)$

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

x	y
2	0
3	1
6	2



D:  $x-2 \geq 0$   
 $x \geq 2$

$$f(x) = ax^2 + bx + c$$

$$f(x) = x^2 + 8x + 13$$

$$f(x) - 13 + 16 = x^2 + 8x + \boxed{16}$$

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

vertex:  $(-4, -3)$

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

$$f(x) = \underbrace{2x^2 - 12x + 16}$$

$$f(x) - 16 + 18 = 2(x^2 - 6x + \boxed{9})$$

$$f(x) + 2 = 2(x-3)^2$$

$$f(x) = 2(x-3)^2 - 2$$

① Find the slope and y-int & graph the line.

$$f(x) = mx + b$$

② Find the slope and y-int & graph  $f(x) = e$ .

③ center and radius of circle & graph

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

④ complete the square to find center and radius and then graph circle.

⑤ Identify vertex of parabola and graph.

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

⑥ Identify vertex of parabola and graph.

$$f(x) = ax^2 + bx + c \quad \text{where, } a = 1$$

⑦ Domain square root ex:  $f(x) = \sqrt{2x+3}$

⑧ Domain fraction  $f(x) = \frac{1}{2x+3}$

⑨ Domain polynomial  $f(x) = 2x+3$

⑩ There is a graph and you have to read it to find

ex:  $f(-2)$ ,  $f(4)$ , Domain etc.  
Range

⑪ Graph  $f(x) = \sqrt{x}$  function

⑫ Graph  $f(x) = |x|$  function