Graphing $y = ax^2$

Example) Use a table of values to sketch the graph of each function.

a) $y = x^2$

Pattern:
over 1, up 1, over 1 up 3,
over 1, up 5, etc

b) $y = 2x^2$

x	y
-2	8
-1	2
0	0
1	2
-2	18

Pattern:
over 1, up 2, over 1 up 6,
over 1 up 10, etc

c) $y = \left(\frac{1}{2}\right)x^2$

x	y
-3	4.5
-2	2
-1	0.5
0	0
1	0.5
2	2

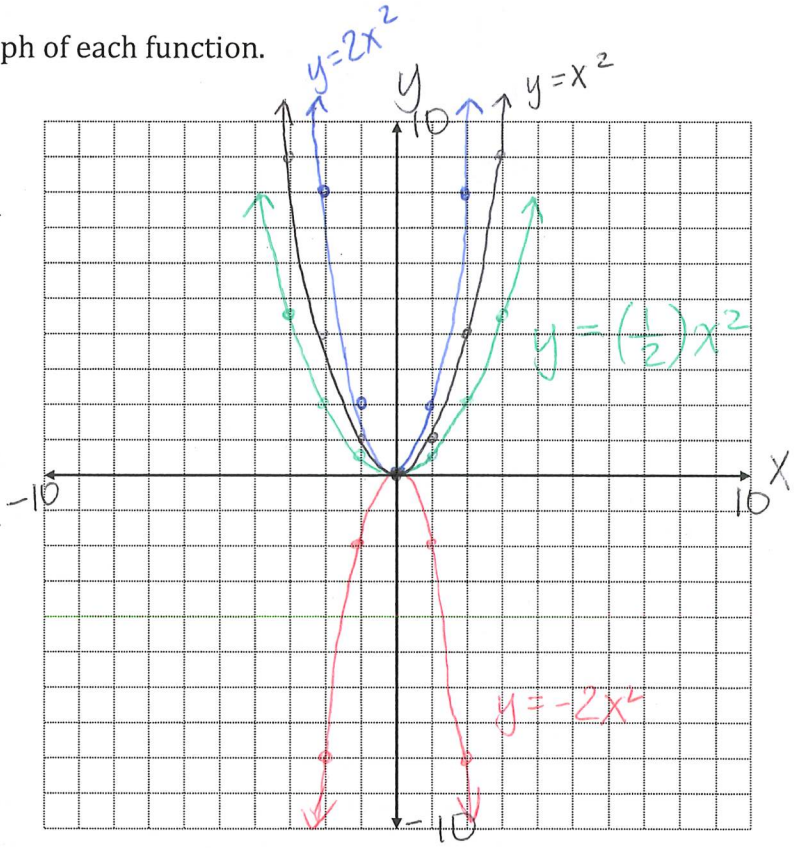
Pattern:
over 1, up ½, over 1,
up 1.5, over 1 up 2.5 etc

d) $y = -2x^2$

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

Pattern:

down 2, down 6, down 10



When the value of *a* is positive, the function opens up.

When the value of *a* is negative, the function opens down.

When the value of *a* is greater than 1, the function is vertically expanded

When the value of *a* is less than 1, the function is vertically compressed.

→ means p and $q = 0$.

Example) Find the equation of the parabola with vertex (0,0) which passes through each point.

a) $(4,48)$

$y = ax^2$

$48 = a(4)^2$

$48 = 16a$

$a = 3$

b) $(2,-2)$

$y = ax^2$

$-2 = a(2)^2$

$-2 = 4a$

$a = -1/2$

a) $y = 3x^2$

b) $y = -\frac{1}{2}x^2$

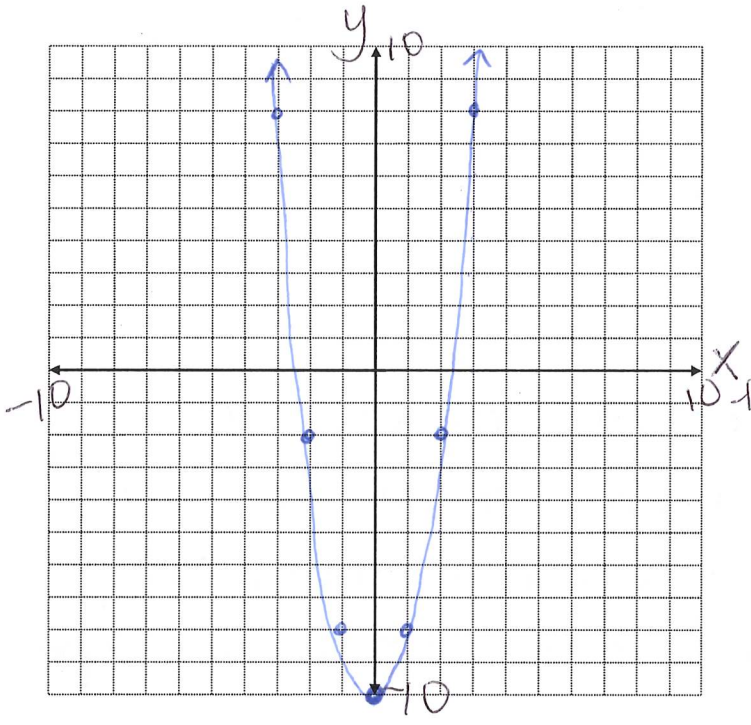
Example) Sketch the graph of each function.

a) $y = 2x^2 - 10$

vertex: $(0,-10)$

direction of opening: up

pattern: 2, 6, 10



b) $y = -\frac{1}{2}(x-3)^2$

vertex: $(3,0)$

direction of opening: down

pattern: -0.5, -1.5, -2.5