Panel 1

$$Y = a|x - h| + k$$

a:
- Pos: opens up
- Neg: Opens down
- a=slope of sides

h:
- x-h: h units right
- x+h: h units left

k:
- +k: k units up
- - k: k units down

Panel 2

$$Y = a|x - h| + k$$

Vertex: (h, k)

Panel 3

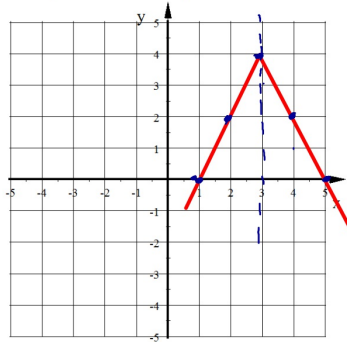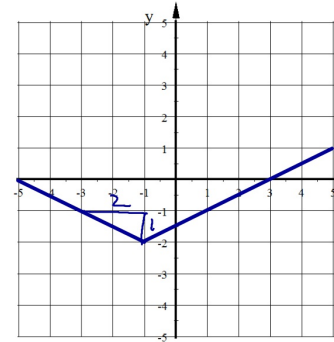Graph this equation:

$$y = -2|x - 3| + 4$$

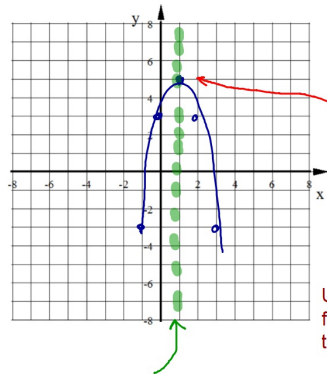vertex is 3 right 4 up, from the origin.

V-shape opens down.

Sides have a slope of 2/1

Panel 4

Write the equation of this graph:

$$y = \tfrac{1}{2}|x + 1| - 2$$

Panel 1 (top-left)

$y = -2(x - 1)^2 + 5$ ⌐5 up
∟1 RT

What will this graph look like?

Parabola that opens down

What will the vertex be?

(1,5)

What numbers would you use in a table to find the rest of the graph?

x	y
2	3
3	-3

Use two numbers for x that are close to the vertex (1)

Line of Symmetry

Reflect these points over the Line of Symmetry to get the remaining points.

Panel 2 (top-right)
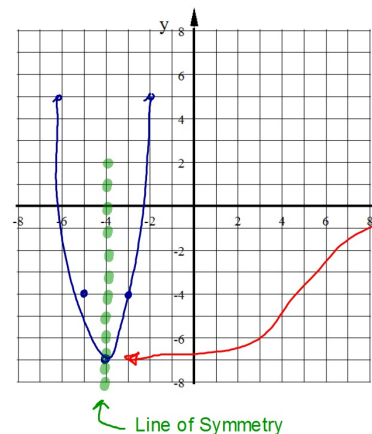
$y = 3(x + 4)^2 - 7$ 4 left 7 down
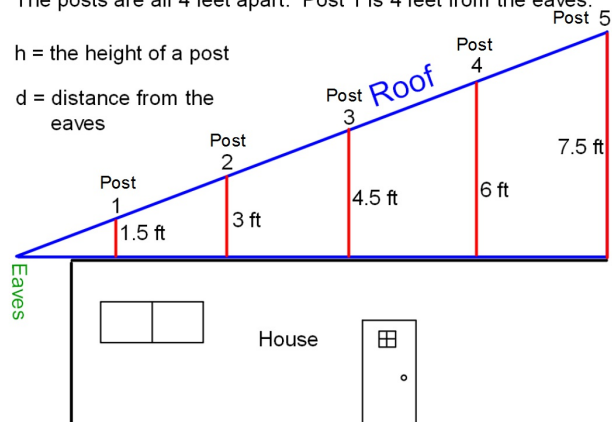
Vertex (-4, -7)

x	y
-3	-4
-2	5

Use two numbers for x that are close to the vertex (-4)

Reflect these points over the Line of Symmetry to get the remaining points.

Line of Symmetry

Panel 3 (bottom-left)

The posts are all 4 feet apart. Post 1 is 4 feet from the eaves.

h = the height of a post

d = distance from the eaves

Post 5
Post 4
Post 3 Roof
Post 2
Post 1

7.5 ft
6 ft
4.5 ft
3 ft
1.5 ft

Eaves

House

Panel 4 (bottom-right)

Find the ratio $\frac{h}{d}$ for each post.   Write it first as a fraction then convert it to a decimal.

POST	d	h	$\frac{h}{d}$	
1	4	1.5	$\frac{1.5}{4}$	.375
2	8	3	$\frac{3}{8}$	.375
3	12	4.5	$\frac{4.5}{12}$	.375
4	16	6	$\frac{6}{16}$	.375
5	20	7.5	$\frac{7.5}{20}$	.375

This shows that

$\frac{h}{d}$ is a

Constant Ratio

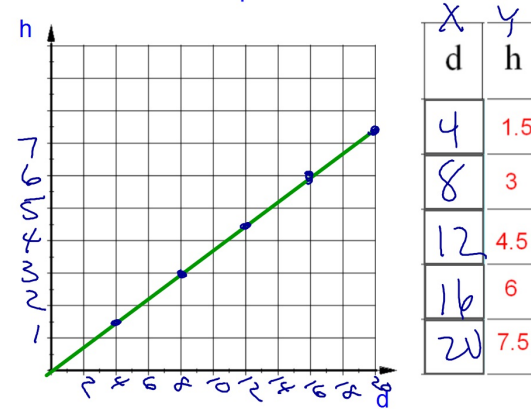Direct Variation is a special Linear Function.

- It has a constant ratio $\dfrac{Y}{X} = k$

  k = the Variation Constant

  - Direct Variation Equation:
    $$\frac{y}{x} = k \quad \text{or} \quad y = kx$$

Make a scatter plot of the data in the table.

x	y
d	h
4	1.5
8	3
12	4.5
16	6
20	7.5

Graph of direct variation

- The graph must be a line that passes through the origin.