S-A2 Algebra 2 Sessim 9 7/9

Find the equatin for the line with the points:

(8, 2) and (12, -4)

1.) Find the slope

2.) Find $y = mx + b$

① slope = $m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{-4-2}{12-8} = \frac{-6}{4} = \frac{-3}{2}$

(8, 2)

$y = mx + b$

$2 = \left(\frac{-3}{2}\right)(8) + b$

$2 = -12 + b$

$+12 \quad +12$

$14 = b$

$\boxed{y = -\frac{3}{2}x + 14}$

Find the equation for a line perpendicular to $y = \frac{3}{4}x + 2$ that goes through $(-9, 3)$

$y = mx + b$

1. Find given slope → Needed slope

Given slope: $\frac{3}{4}$

Needed slope $\frac{3}{4}$ → opp $-\frac{3}{4}$ → inv $\boxed{-\frac{4}{3}}$

2. Find $y = mx + b$

$y = mx + b$

$3 = \left(-\frac{4}{3}\right)(-9) + b$

$3 = 12 + b$

$-12 \quad -12$

$-9 = b$

$\boxed{y = -\frac{4}{3}x - 9}$

Find the equation for a line parallel to $4x + 8y = 10$ that goes through $(2, -4)$

1.) Find the given slope

$4x + 8y = 10$

$-4x \qquad -4x$

$\frac{8y}{8} = \frac{-4x}{8} + \frac{10}{8}$

$y = -\frac{1}{2}x + \frac{5}{4}$

slope $= -\frac{1}{2}$

$m = -\frac{1}{2}$

parallel slopes are equal

Needed slope $= -\frac{1}{2}$

$y = mx + b$

$-4 = \left(-\frac{1}{2}\right)(2) + b$

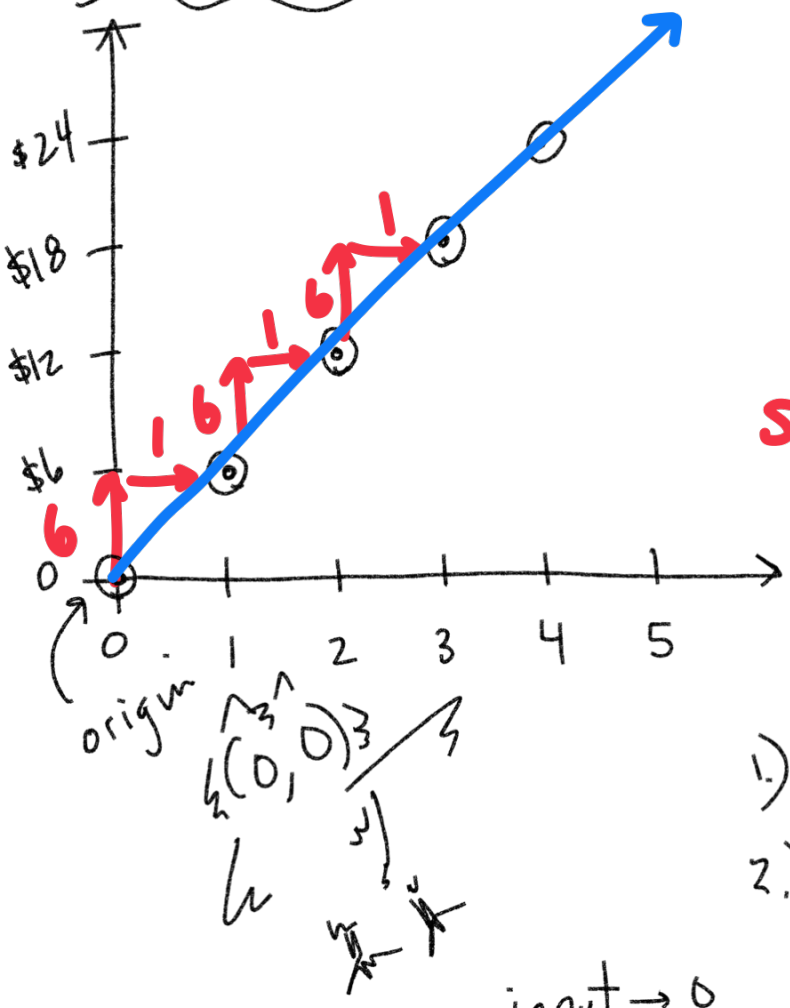
$-4 = -1 + b$

$+1 \quad +1$

$b = -3$

$\boxed{y = -\frac{1}{2}x - 3}$

Direct Variation



$y \propto x$ ← proportional to

$y \uparrow \quad x \uparrow$

$y \downarrow \quad x \downarrow$

slope: $\frac{6}{1}$

$y = mx + b$

$y = 6x$

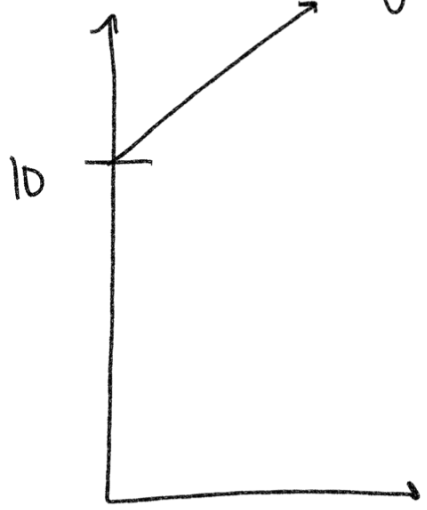
Direct Variation

1.) Constant, linear slope ✓

2.) Must go through the origin.

input → 0
output → 0

$y = mx + b$ ← 0



$y = mx$

$y = kx$

k = constant of variation (slope)

$y = 3x + 10$

Not direct variation

Is it direct variation

1.) $y = 2x$ (k) — yay! $k = 2$

2.) $y = 4x - 6$ — Not — naw!

3) $4x + 8y = 0$

$-4x$ yay! $-4x$

$\frac{8y}{8} = \frac{-4x}{8}$

$y = -\frac{1}{2}x$

$k = -\frac{1}{2}$

If $y = 8$ when $x = 4$ (2 *)

find y (12) when $x = 6$ (2 *)

$\left[\frac{y}{x} = \frac{kx}{x}\right]$

$k = \frac{y}{x}$

slope $= \frac{\text{rise}}{\text{run}}$ $\frac{\Delta y}{\Delta x}$

1.) find k

$k = \frac{y}{x} = \frac{8}{4} = 2$

2.) Find $y = kx$ $y = 2x$

3.) Plug in x or y $y = 2x$

$y = 2(6) = 12$

$\boxed{y = 12}$

If $y = 33$ when $x = 6$

Find y when $x = 10$

$$k = \frac{y}{x} = \frac{33 \div 3}{6 \div 3} = \frac{11}{2}$$

1.) Find k

2.) Find $y = kx$ $\quad y = \frac{11}{2}x$

3) Plug in, solve $\quad \frac{11}{2}(10) = 55$

$\boxed{y = 55}$

If $y = 12$ when $x = 28$

Find x when $y = 30$

$$k = \frac{y}{x} = \frac{12 \div 4}{28 \div 4} = \frac{3}{7}$$

$y = kx$

$\downarrow$

$y = \frac{3}{7}x$

$y = \frac{3}{7}x$

$\downarrow$

$\frac{7}{3}(30) = \left(\frac{3}{7}x\right)\frac{7}{3}$

$30 \div 3 = 10$

$\boxed{x = 70}$

x	y	$k = \frac{y}{x}$
0	0	$\frac{0}{0}$
1	3	$\frac{3}{1} = 3$ ✓
-3	-9	$\frac{-9}{-3} = 3$ ✓
4	12	$\frac{12}{4} = 3$ ✓

origin $(0,0)$

Is this direct variation?

$y = kx$ $\quad k = \frac{y}{x}$

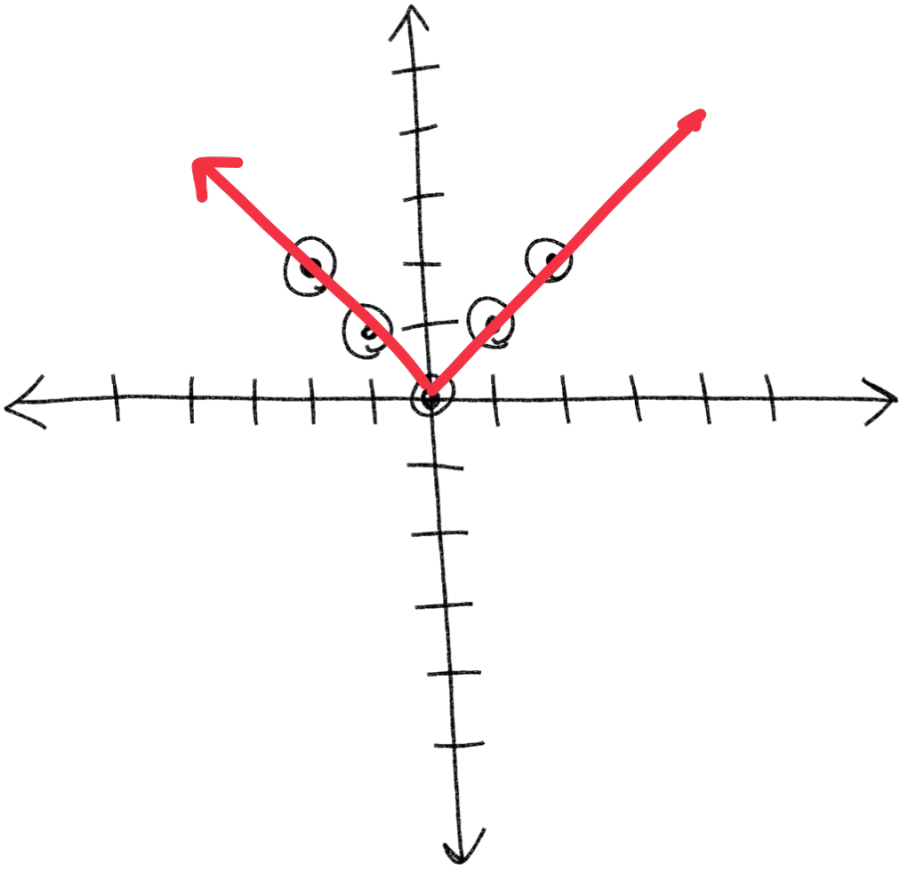
yay!

$y = 3x$

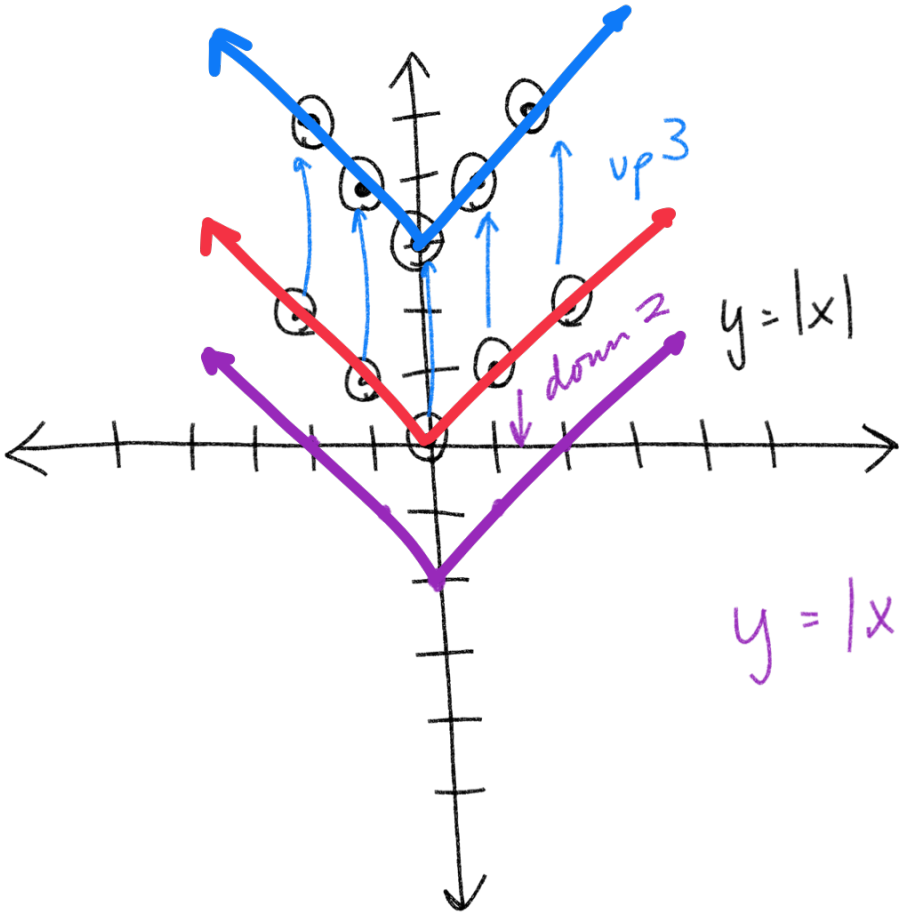
$k = 3$

Absolute Value Function

$y = |x|$



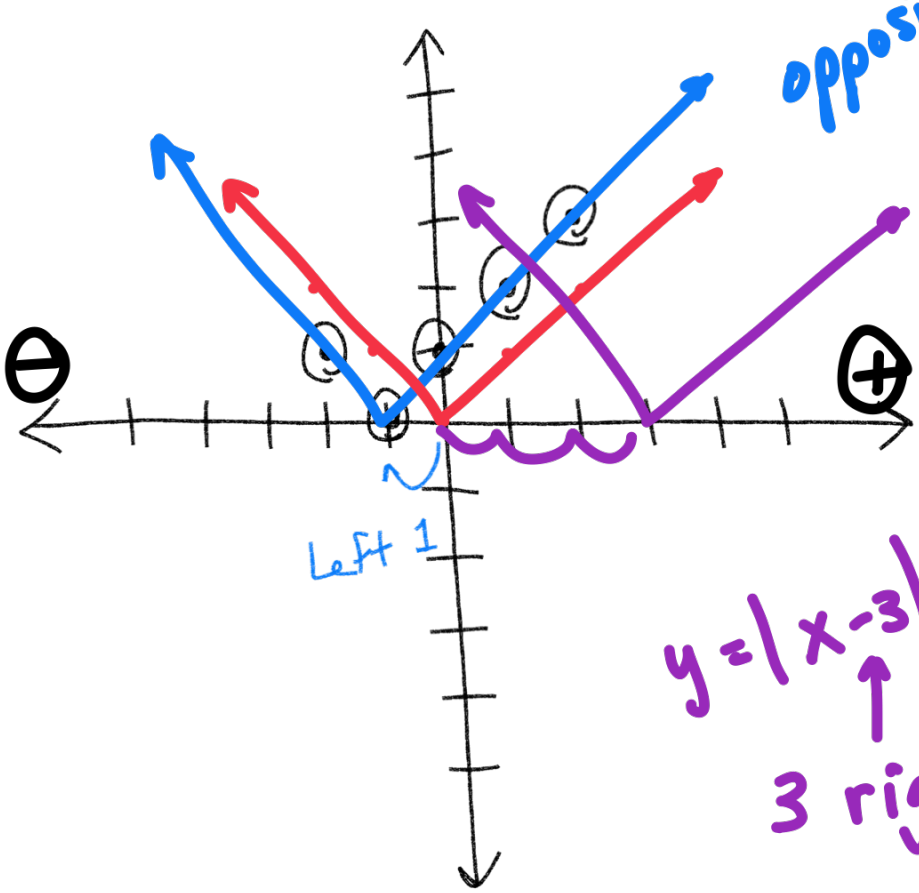
x	$\lvert x \rvert$	y
-2	$\lvert -2 \rvert$	2
-1	$\lvert -1 \rvert$	1
0	$\lvert 0 \rvert$	0
1	$\lvert 1 \rvert$	1
2	$\lvert 2 \rvert$	2



$y = |x| + 3$ (outside: +up, −down)

x	|x| +3	y
−2	|−2| +3 = 2 +3	5
−1	|−1| +3 = 1 +3	4
0	|0| +3	3
1	|1| +3	4
2	|2| +3	5

$y = |x| - 2$ — down 2

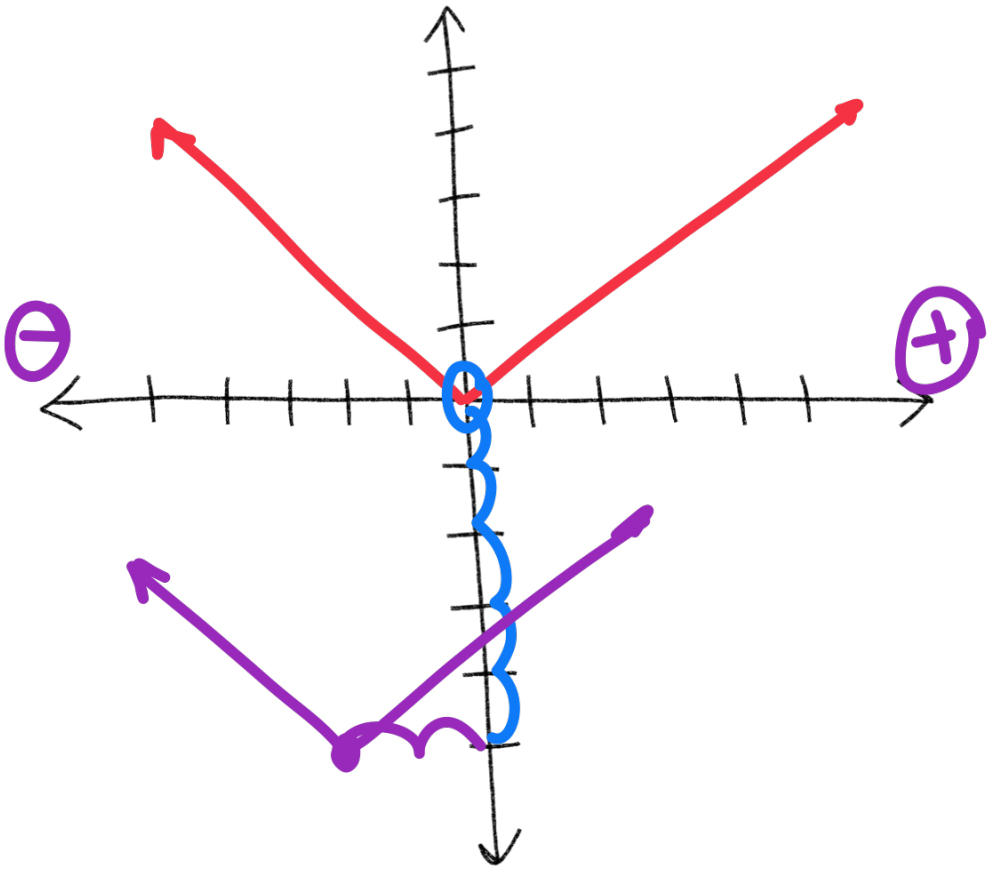


opposite

$y = |x + 1|$ — Left + Right; Move Left 1

x	|x+1|	y
−2	|−2+1| = |−1|	1
−1	|−1+1| = |0|	0
0	|0+1| = |1|	1
1	|1+1| = |2|	2
2	|2+1| = |3|	3

$y = |x - 3|$ — 3 right

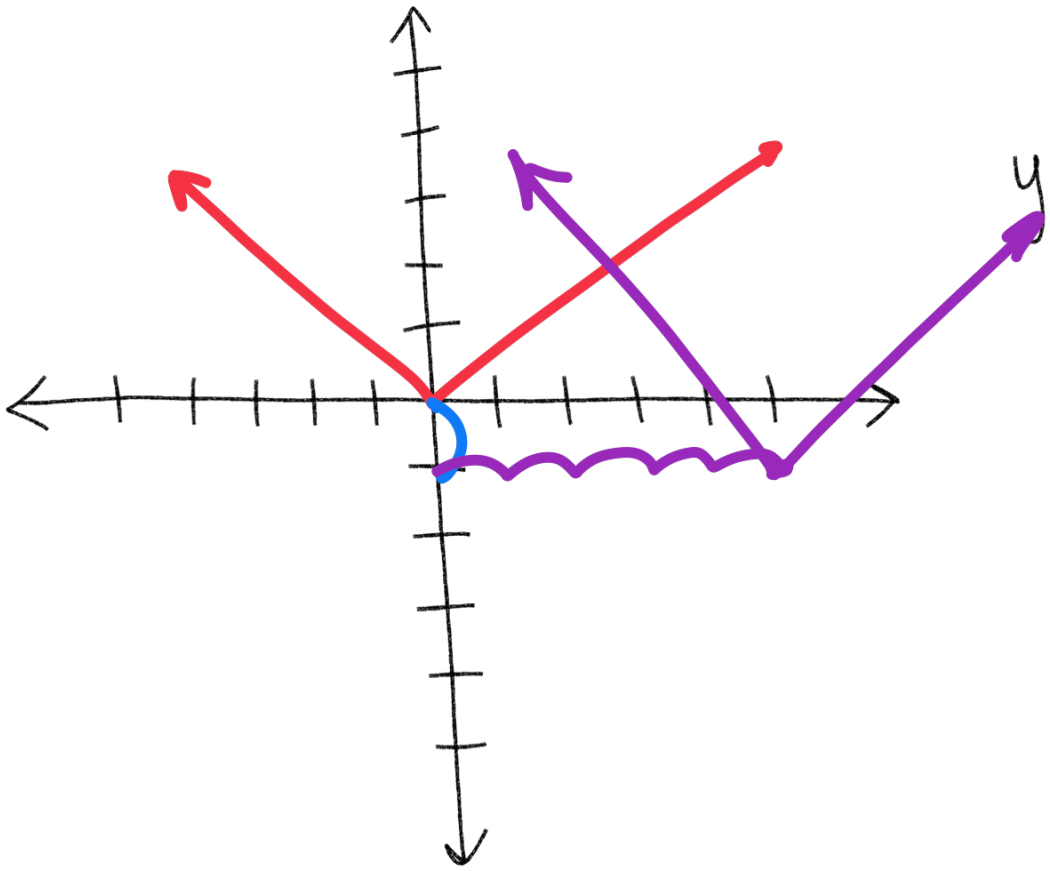


opposite

2 left

$y = |x + 2| - 5$

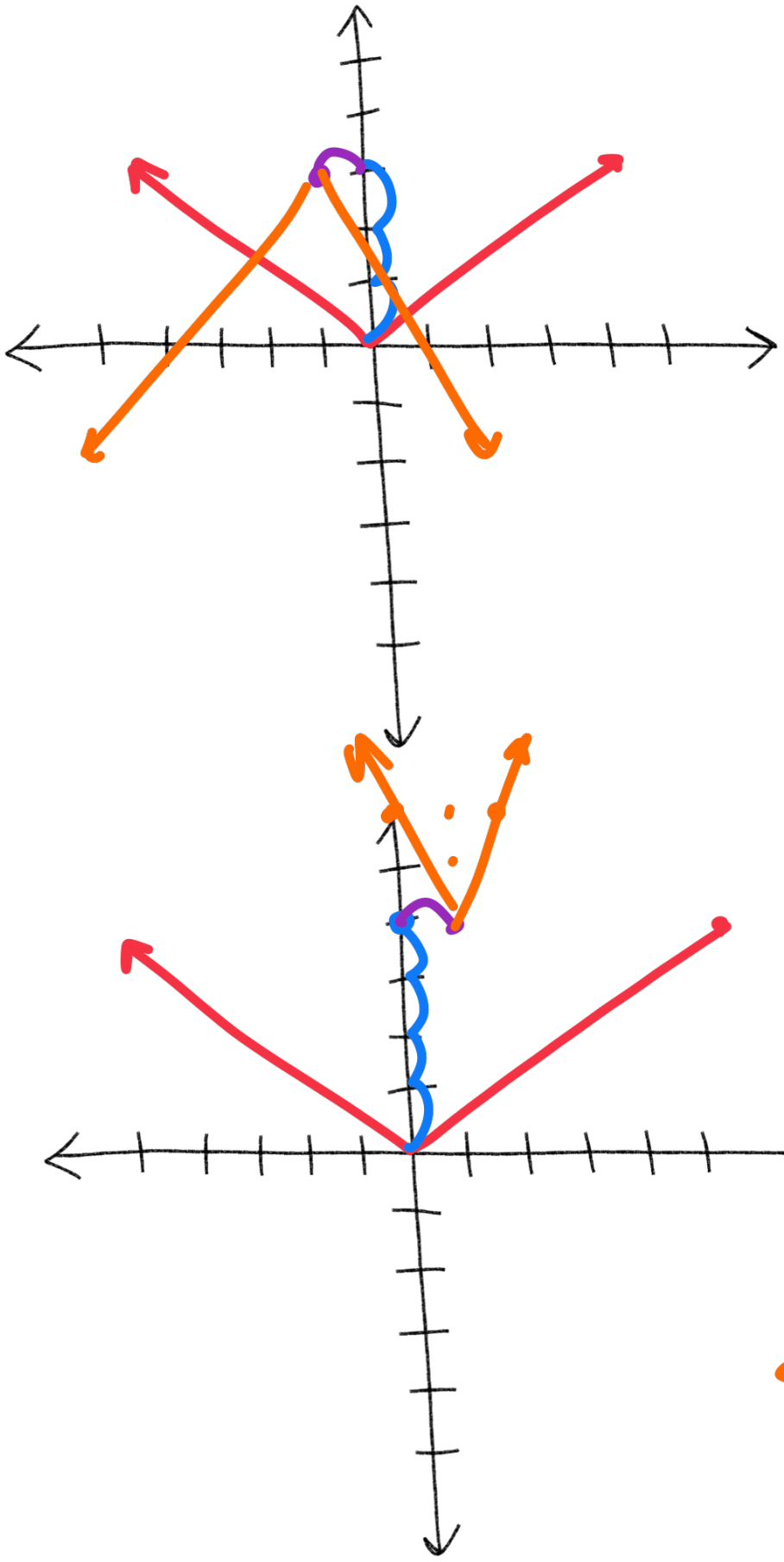
down 5



Right 5

$y = |x - 5| - 1$

down 1



Left 1

$y = -|x+1| + 3$

flip

up 3

you must factor it out!!

$y = \left|\frac{2x}{2} - \frac{2}{2}\right| + 4$

right 1

$y = |2(x-1)| + 4$

up 4

slope $\frac{\text{up } 2}{1 \text{ over}}$