Today's Plan:

Learning Target (standard): I will graph functions and describe how the concept of a limit applies to specific x-values.

Students will: Complete practice problems over previous concepts at the boards, put up homework problems on the board and make necessary corrections to their own work, take notes over new material and complete practice problems over new concepts.

Teacher will: Provide practice problems over previous concepts, check homework problems for accuracy and provide students feedback, describe and provide examples of new concepts and assign students assessment problems over new concepts.

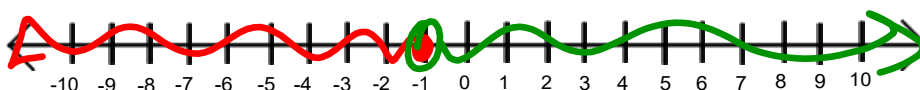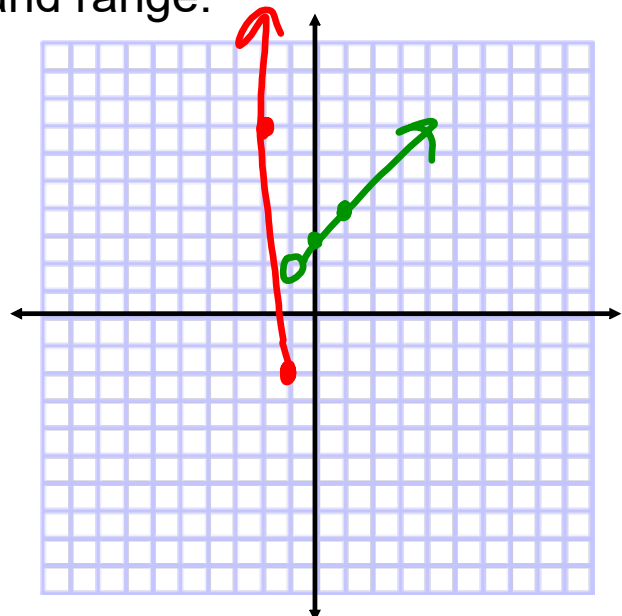*Assessment*: Board work, homework check and homework assignment

Differentiation: Students will work at the board, go over and correct homework at their seats, actively engage in lecture over new concepts, practice new concepts with the aid of other students and the teacher and complete homework assignment.

Graph and find the domain and range.

$$f(x) = \begin{cases} 3x^2 - 5, & x \le -1 \\ x + 3, & x > -1 \end{cases}$$
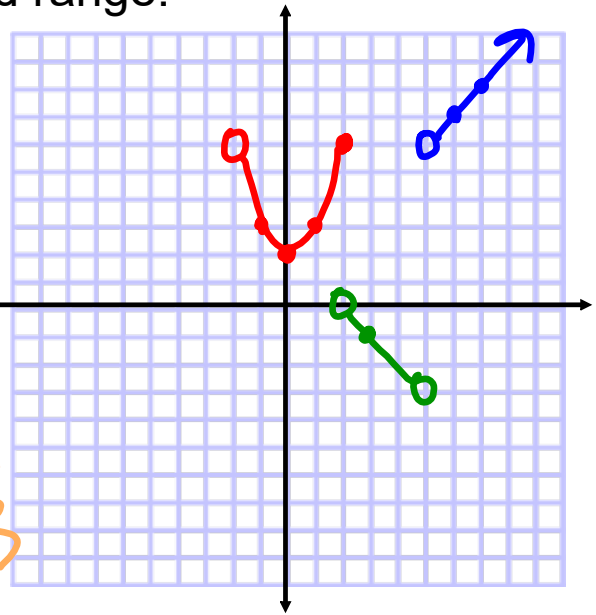
D: $\mathbb{R}$

R: $\{ y \mid y \ge -2 \}$
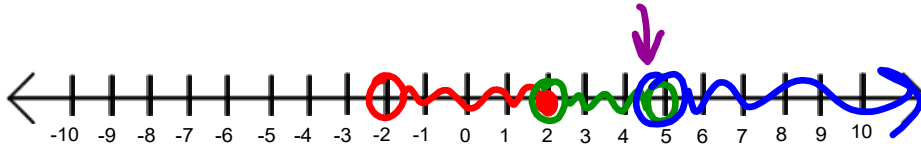
Graph and find the domain and range.

$$f(x) = \begin{cases} x^2 + 2 & -2 < x \le 2 \\ 2 - x & 2 < x < 5 \\ x + 1, & x > 5 \end{cases}$$

$D: \{x \mid x > -2, x \ne 5\}$

$R: \{y \mid -3 < y < 0, y \ge 2\}$

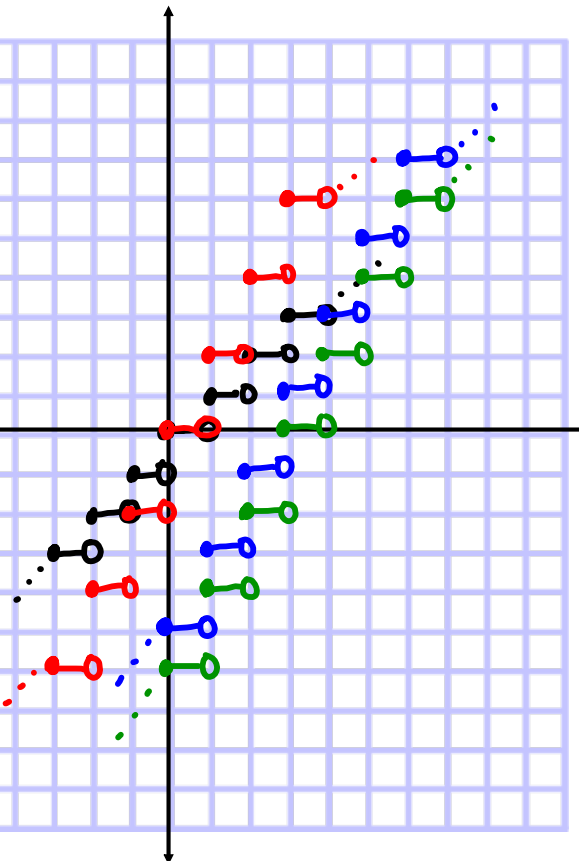## Graph. Find domain.

$f(x) = 2\lfloor x - 3 \rfloor + 1$

parent: $f(x) = \lfloor x \rfloor$

1) $f(x) = 2\lfloor x \rfloor$
   v.s. by 2

2) $f(x) = 2\lfloor x-3 \rfloor$
   shift right 3

3) $f(x) = 2\lfloor x-3 \rfloor + 1$
   shift up 1

$D: \mathbb{R}$

$R: \mathbb{Z}^{odd}$

Definition of a Limit:

- The limit of a function as *x* approaches some number *a* is defined if:

  - As *x* approaches some number *a* from both the left AND the right, the same *y* value of the function has to be approached from the left AND the right

  - The *y* value of the function that is approached from the left AND the right as *x* approaches some number *a* from the left AND the right is the limit of the function at that *x* value.

$$\lim_{x \to a} f(x) = L \quad \leftarrow \text{limit value}$$

Assignment:

- Create an equation for a piecewise *function* that does NOT have a domain that is all real numbers

- Graph the piecewise function

- Find the limit at 3 different x-values and explain why each of these exist

- Determine an x-value on the function that does not have a limit and explain why it does not exist