PCFU – Piecewise Functions & Absolute Value Graphing (A8-A11) Name _____

1) Match the piecewise functions to their graphs:

Function A = Graph 2

Function A must go with Graph 2 because Function A begins with a negative linear function ($-\frac{7}{3}x-\frac{8}{3}$). You can tell it's negative by the -a value ($-\frac{7}{3}x$). On the graph this will be a linear function that is going down. Looking at the graphs, 3 is eliminated because it starts with a positive linear function. $-\frac{7}{3}x-\frac{8}{3}$'s domain is $-5 \le x \le 1$; which means that function only exist from an x value of -5 to 1. Therefore, it must be graph 2 because graph 1's negative linear function's domain is from $-3 \le x \le -1$.

Function B = Graph 3

Function B must go with Graph 3 because Function B begins with a positive linear function ($2x$). You can tell it's positive by the +a value. On the graph this will be a linear function going up. Graph 3 is the only graph that starts with a positive linear function.

Function C = Graph 1

Function C must go with Graph 1 because it's the only option left.

A

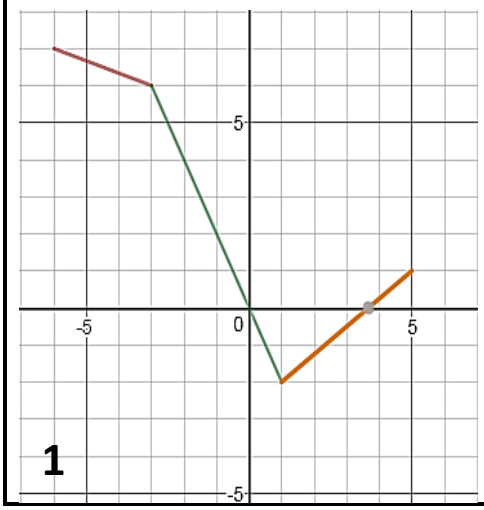
$$f(x)=\begin{cases}-\frac{7}{3}x-\frac{8}{3}, & -5 \le x \le 1\\ -\frac{2}{3}x-\frac{13}{3}, & 1 \le x \le 4\\ \frac{5}{2}x-17, & 4 \le x \le 6\end{cases}$$

B

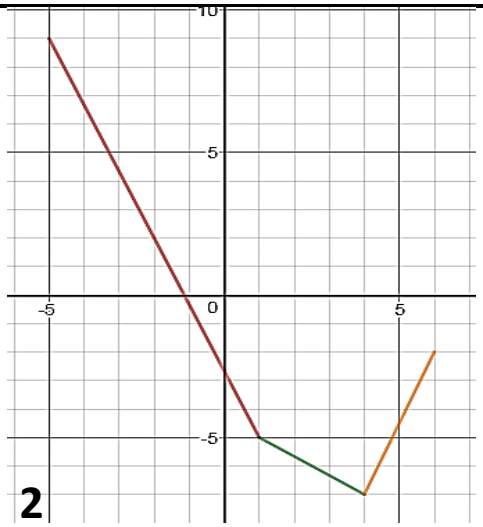
$$f(x)=\begin{cases}2x, & -3 \le x \le -1\\ -2, & -1 \le x \le 2\\ -\frac{1}{2}x-1, & 2 \le x \le 6\end{cases}$$

C

$$f(x)=\begin{cases}-\frac{1}{3}x+5, & -6 \le x \le -3\\ -2x, & -3 \le x \le 1\\ \frac{3}{4}x-\frac{11}{4}, & 1 \le x \le 5\end{cases}$$



1



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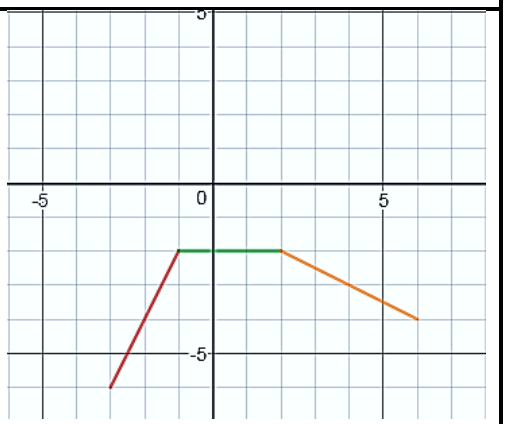


3

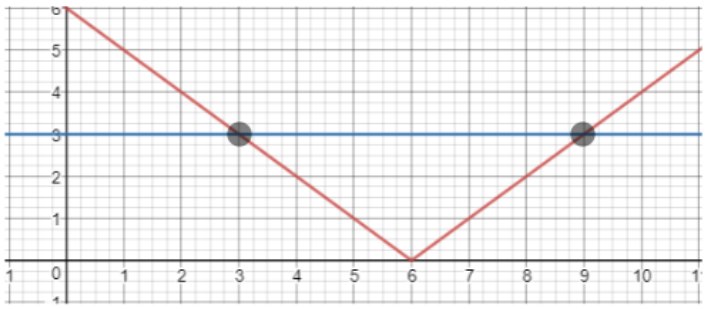
2) Fred's Fabulous Fitness Center charges $29.99 for the first ten weeks of membership. After the first ten weeks, the center charges $10.00 for every additional week. Write a piecewise function for this situation where w is the number of weeks and $c(w)$ is the amount charged.

$$c(w) = \begin{cases} 29.99; & 0 < w \leq 10 \\ 29.99 + 10(w - 10); & w > 10 \end{cases}$$

The first part of the piecewise function represents the first 10 weeks of membership; which is why the domain is $0 < w \leq 10$. The price is only $29.99 for the first ten weeks. After that, the price increases by $10 for every week after 10 weeks. Since w represents the total number of weeks, you must subtract w from the 10 weeks you've already paid for so you're only getting charged $10 for each additional week over 10 weeks; which is why the domain is $w > 10$.

3) Solve the following absolute value equation by graphing: $|x - 6| < 3$

Write your solution as a compound inequality **AND** graph on a number line.



After putting $|x - 6|$ into y_1 and 3 into y_2, I determined that the graphs intersect at x=3 and x=9. The inequality is $|x - 6| < 3$; therefore, we must determine where $|x - 6|$ has smaller y-values than 3. This happens between x=3 and x=9. I can tell because the absolute value function is below the horizontal line between those two x-values.

In inequality form, this would be represented as:

$$3 < x < 9$$

This shows that the inequality is satisfied between 3 and 9 but not including those numbers.

On a number line, this would be represented as:

The circles on 3 and 9 would be left open because these x-values are not included in the solution set.

Additional Problems:

1) On a movie subscription service, you can watch the first two movies for free, but then you get charged $5 per movie watched after that. Write a piecewise function to represent the total money, *d*, that you would spend in dollars after watching, *n*, number of movies? (Assume that you can be charged a partial fee for watching a partial movie)

$$d(n) = \begin{cases} \_\_\_\_\_, & \_\_\_\_\_ \\ \_\_\_\_\_, & \_\_\_\_\_ \end{cases}$$

2) Solve the following absolute value equation by graphing: $|x - 3| \geq 6$.
Write your solution using inequalities AND graph on a number line.