

1. CHALLENGE PROBLEM #1 (HL extension):

1. You are given the linear system defined by $\begin{cases} 2x + By = 9 \\ -3x + 4y = C \end{cases}$. For what value(s) of B and C will this system have:

- a. Infinite solutions b. No solutions c. One unique value

2. If the solution to the linear system $\begin{cases} px + (9 - q)y = -10 \\ (3p - 1)x - (q - 6)y = -21 \end{cases}$ is $(-2, 1)$, find the values of p and q.

2. CHALLENGE PROBLEM #2 (HL extension)

We will now incorporate absolute value function concepts into our study of linear systems. We will let

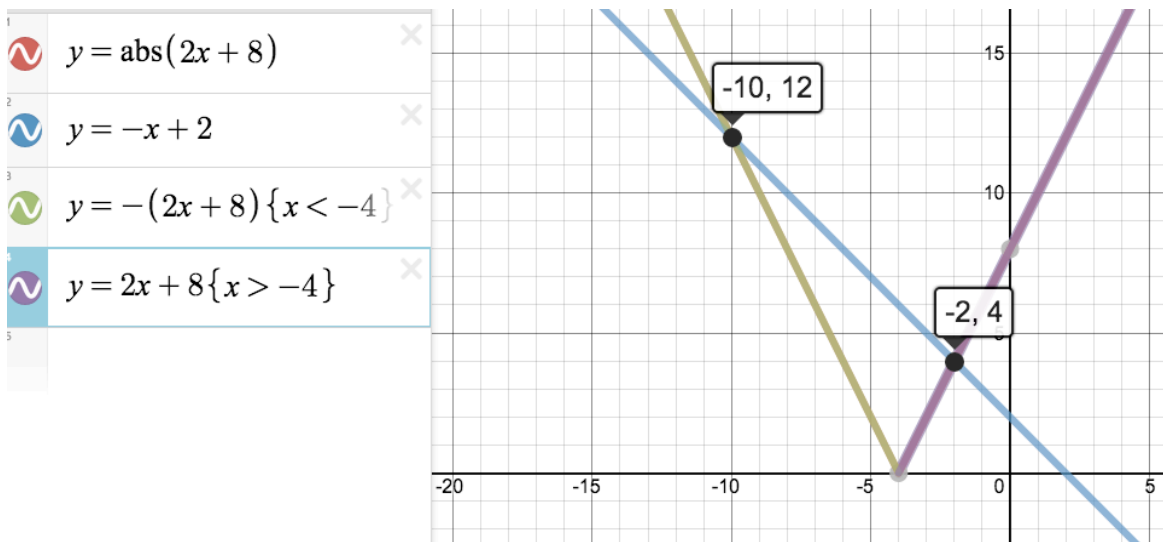
$f(x) = |2x + 8|$ and $g(x) = -x + 2$. Graph both functions using DESMOS and sketch a copy of the graph into your work.

a. Using your graphic representation, explain what the equation $f(x) = g(x)$ means in this context.

b. To provide an algebraic solution to the equation: Explain why the function $f(x) = |2x + 8|$ can be

understood to be a piecewise linear function as shown here $\rightarrow f(x) = |2x + 8| = \begin{cases} -(2x + 8) & x < -4 \\ 2x + 8 & x \geq -4 \end{cases}$

c. Now solve $-(2x + 8) = -x + 2$ for $x < -4$ and then solve $2x + 8 = -x + 2$ for $x \geq -4$ (see diagram below on next page from DESMOS)



d. Solve the following equations involving absolute value ALGEBRAICALLY.

(i) $|-x + 8| = \frac{1}{2}x + 10$

(ii) $|-3x - 1| - x - 5 = 0$

(iii) $x + 7 - |2x + 5| = 0$

(iv) $4 - |2x| = 6 + x$