

Name _____ ANSWER KEY _____ School Team _____

Event 5: Team Problems (with calculators)

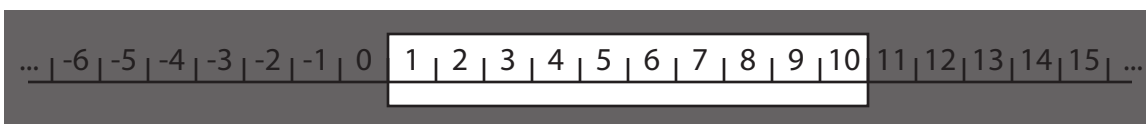
5th/6th grade Math Meet '08

Problem 4: Number line windows

Imagine you have a number line that looks like this:



We can place a window on top of this number line so that some numbers show through the window while others don't:



Then "window functions" can be applied to the window to move the window around. Here are two window functions and what they would produce when applied to the above window:

Window function A:

Left edge \rightarrow 1 Right edge \leftarrow 1 Whole window \rightarrow 4



Window function B:

Left edge \leftarrow 2 Right edge \leftarrow 5 Whole window \leftarrow 1



Problem 4: Number line windows

Apply each of the following window functions, or series of window functions, to a window that shows the numbers 3 through 17. State the new endpoints of the number line that show through the window. (1 pt. each)

Window function A:

Left edge \rightarrow 1 Right edge \leftarrow 1 Whole window \rightarrow 4

Window function B:

Left edge \leftarrow 2 Right edge \leftarrow 5 Whole window \leftarrow 1

Original window: [3 , 17]

1) Apply A: [8 , 20]

2) Apply B: [0 , 11]

3) Apply A, A: [13 , 23]

4) Apply B, B: [-3 , 5]

5) Apply A, B: [5 , 14]

6) Apply A, B, A: [10 , 17]

7) Apply A, B, A, B: [7 , 11]

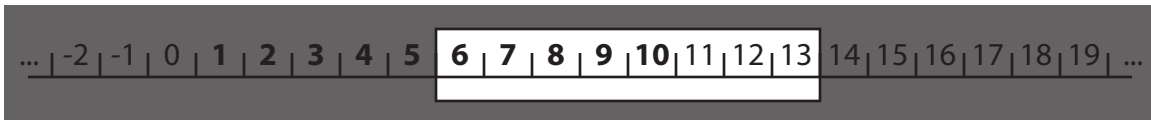
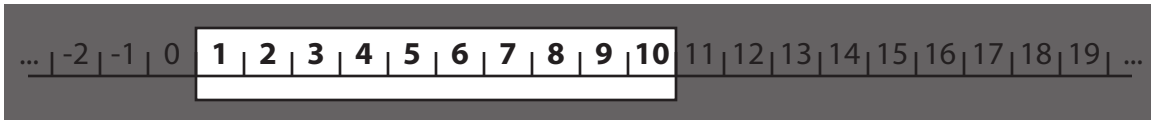
Problem 4: Number line windows

If we apply either of the window functions enough times, the numbers visible through the original window will be covered up.

If we start with the window showing the numbers 1 through 10 and apply A once, we get [6, 13]. Apply A again, and we get [11, 16].

Window function A:

Left edge \rightarrow 1 Right edge \leftarrow 1 Whole window \rightarrow 4



Now none of the numbers we could see through the original window (1 to 10) are currently visible.

Problem 4: Number line windows

For each of the following windows, determine the minimum number of times the given window functions must be applied so that the numbers showing through the original window are no longer visible. Note: each time you apply either A or B, it counts as one time you have applied a window function. (2 pts. each blank)

	[7, 38]	[23, 149]	[53, 1374]
1) Apply A, A, A, ...	$\frac{7}{\text{times}}$	$\frac{26}{\text{times}}$	$\frac{265}{\text{times}}$
2) Apply B, B, B, ...	$\frac{6}{\text{times}}$	$\frac{22}{\text{times}}$	$\frac{221}{\text{times}}$
3) Apply A, B, A, B, ...	$\frac{13}{\text{times}}$	$\frac{51}{\text{times}}$	$\frac{529}{\text{times}}$