

The following are not in Enable, but will appear on midterm 2 and the final exam.

Translate the following into absolute value equations or inequalities.

It helps to turn each of these into a sentence of the form

“the distance between \_\_\_\_ and \_\_\_\_ is \_\_\_\_\_”.

The **blue** numbers represent distances,

and the **orange** numbers represent points on a number line.

eg. the distance between  $x$  and **9** is **2** ANSWER:  $|x - 9| = 2$

eg.  $x$  is closer than 6 away from 3 ANSWER:  $|x - 3| < 6$   
ie. the distance between  $x$  and **3** is less than **6**

eg.  $x$  and 2 are at least 5 apart ANSWER:  $|x - 2| \geq 5$   
ie. the distance between  $x$  and **2** is greater than or equal to **5**

[1]  $-8$  is 4 away from  $x$

[2] 7 and  $x$  are farther than 3 apart

[3]  $x$  and 3 are separated by no more than 7

[4]  $x$  is within 7 of 3

[5]  $x$  is at most 7 away from 3

[6]  $x$  is a maximum of 3 away from 7

[7]  $x$  and 7 are no closer than 3 away from each other

[8]  $x$  and 3 are separated by at least 7

[9]  $x$  is beyond 3 of 7

[10]  $x$  is no farther than 7 away from 3

[11]  $x$  is no less than 7 away from 3

[12]  $x$  is a minimum of 3 away from 7

[13] 7 and  $x$  are closer than 3 apart

## SOLUTIONS

- [1]  $-8$  is 4 away from  $x$   
the distance between  $x$  and  $-8$  is 4  $|x - -8| = 4$  or  $|x + 8| = 4$
- [2] 7 and  $x$  are farther than 3 apart  
the distance between  $x$  and 7 is greater than 3  $|x - 7| > 3$
- [3]  $x$  and 3 are separated by no more than 7  
the distance between  $x$  and 3 is less than or equal to 7  $|x - 3| \leq 7$
- [4]  $x$  is within 7 of 3  
the distance between  $x$  and 3 is less than or equal to 7  $|x - 3| \leq 7$
- [5]  $x$  is at most 7 away from 3  
the distance between  $x$  and 3 is less than or equal to 7  $|x - 3| \leq 7$
- [6]  $x$  is a maximum of 3 away from 7  
the distance between  $x$  and 7 is less than or equal to 3  $|x - 7| \leq 3$
- [7]  $x$  and 7 are no closer than 3 away from each other  
the distance between  $x$  and 7 is greater than or equal to 3  $|x - 7| \geq 3$
- [8]  $x$  and 3 are separated by at least 7  
the distance between  $x$  and 3 is greater than or equal to 7  $|x - 3| \geq 7$
- [9]  $x$  is beyond 3 of 7  
the distance between  $x$  and 7 is greater than 3  $|x - 7| > 3$
- [10]  $x$  is no farther than 7 away from 3  
the distance between  $x$  and 3 is less than or equal to 7  $|x - 3| \leq 7$
- [11]  $x$  is no less than 7 away from 3  
the distance between  $x$  and 3 is greater than or equal to 7  $|x - 3| \geq 7$
- [12]  $x$  is a minimum of 3 away from 7  
the distance between  $x$  and 7 is greater than or equal to 3  $|x - 7| \geq 3$
- [13] 7 and  $x$  are closer than 3 apart  
the distance between  $x$  and 7 is less than 3  $|x - 7| < 3$