Date Completed: _____
Mentor Initials: _____

Absolute Value and Inequalities (Advanced)

1. Which of the following inequalities orders the numbers 1.1, $\frac{8}{7}$, and $\frac{5}{4}$ from least to greatest?

A. $\frac{8}{7} < 1.1 < \frac{5}{4}$

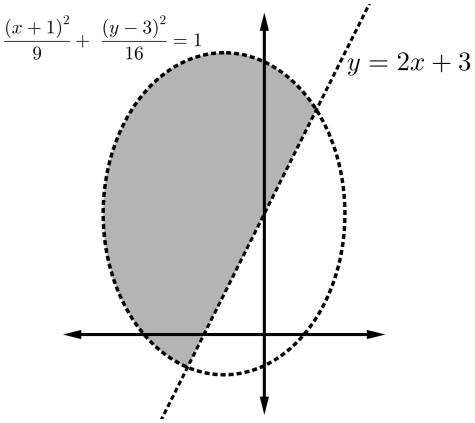
B. $\frac{8}{7} < \frac{5}{4} < 1.1$

C. $\frac{5}{4} < \frac{8}{7} < 1.1$

D. $1.1 < \frac{8}{7} < \frac{5}{4}$

E. $1.1 < \frac{5}{4} < \frac{8}{7}$

2. The shaded region in the graph below represents the solution set to which of the following systems of inequalities?



A. $\begin{cases} y > 2x + 3 \\ \frac{(x+1)^2}{9} + \frac{(y-3)^2}{16} > 1 \end{cases}$

B. $\begin{cases} y < 2x + 3 \\ \frac{(x+1)^2}{9} + \frac{(y-3)^2}{16} < 1 \end{cases}$

C. $\begin{cases} y < 2x + 3 \\ \frac{(x+1)^2}{9} + \frac{(y-3)^2}{16} > 1 \end{cases}$

D. $\begin{cases} y > 2x + 3 \\ \frac{(x+1)^2}{9} + \frac{(y-3)^2}{16} < 1 \end{cases}$

E. $\begin{cases} y - 3 < 3 \\ x - 1 > 3 \end{cases}$

3. If $x > |y|$, which of the following is the solution statement for x when $y = -5$?

A. x is any real number
B. $x < -5$
C. $x > 5$
D. $-5 < x < 5$
E. $x < -5$ or $x > 5$

4. Which of the following is equivalent to the inequality $-13x - 7 > -10x + 2$?

A. $x < -3$
B. $x > -3$
C. $x > 3$
D. $x < 3$
E. $x < 7$

5. If $|x| > y$ which of the following is the solution statement for when x when $y = -5$?

A. x is any real number
B. $x < -5$
C. $x > 5$
D. $-5 < x < 5$
E. $x > 5$ *or* $x < -5$

6. For all real numbers $a, b,$ and c such that $x > y > z$ and $y > 0$, which of the statements below is(are) *always* true?

I. $|y| > |z|$
II. $|x| > |y|$
III. $|x| > |z|$

A. I only
B. II only
C. I and II only
D. II and III only
E. I, II, and III only

7. Which of the following inequalities is equivalent to $(|x| + 2)^2 \leq 9$?

A. $-5 < x < 1$
B. $-1 < x < 5$
C. $-3 < x < 3$
D. $-\sqrt{7} < x < \sqrt{7}$
E. $-1 < x < 1$

8. The set of all values of x that satisfies $|x - 3| < 8$ is the same set of all values x that satisfies:

A. $-11 < x < 11$
B. $0 < x < 11$
C. $-5 < x < 11$
D. $-11 < x < 5$
E. $0 < x < 5$

9. If $x < y$, then $|x - y|$ is equivalent to which of the following?

A. $x + y$
B. $-(x + y)$
C. $\sqrt{x - y}$
D. $x - y$
E. $-(x - y)$

10. The set of all values of x that satisfies $|-3x + 9| < 3$ is the same set of all values x that satisfies:

A. $-12 < x < -6$
B. $-12 < x < 6$
C. $-4 < x < -2$
D. $-4 < x < 2$
E. $2 < x < 4$

11. What is the set of all integer solutions for the inequality $1 \leq x - \sqrt{3} < 4$?

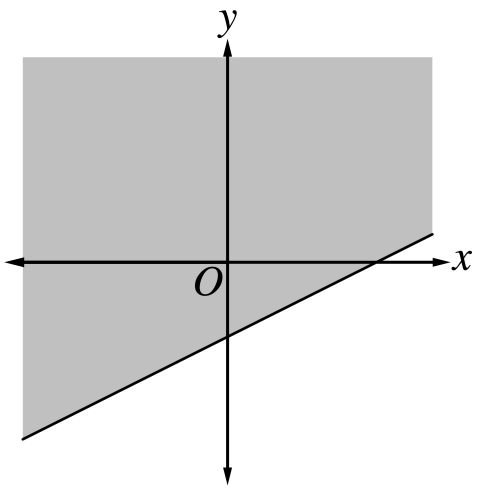
A. $\{1, 2, 3, 4\}$
B. $\{2, 3, 4\}$
C. $\{1, 2, 3, 4, 5\}$
D. $\{2, 3, 4, 5\}$
E. $\{3, 4, 5\}$

12. The solution set of which of the following equations is the set of real numbers that are 10 units away from -8?

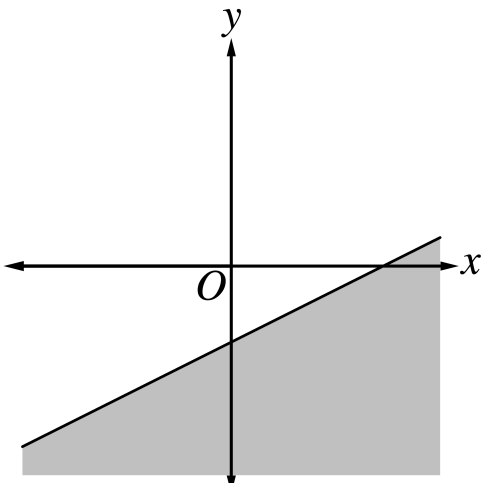
A. $|x + 8| = 10$
B. $|x - 8| = 10$
C. $|x + 10| = 8$
D. $|x - 10| = 8$
E. $|10 - x| = 8$

13. Each of the following graphs in the standard (x, y) coordinate plan has the same scale on both axes. One graph is the graph of $px - ry \leq s$, where $0 < p < r < s$. Which one is it?

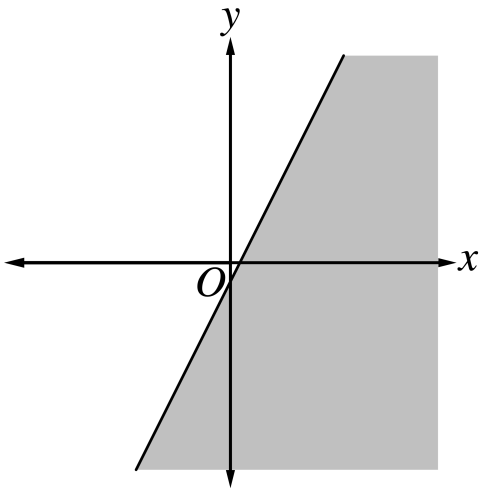
A.



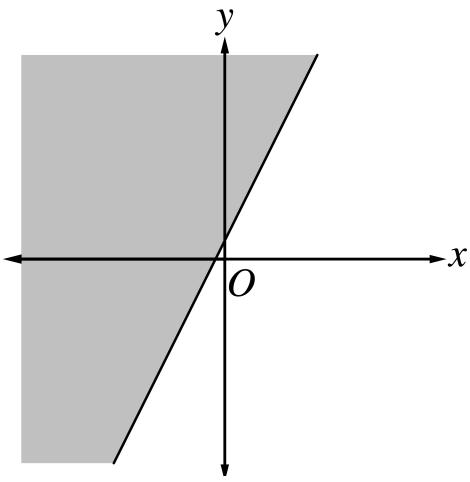
B.



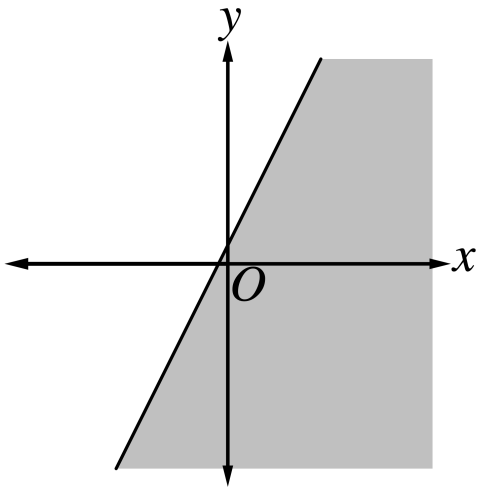
C.



D.



E.



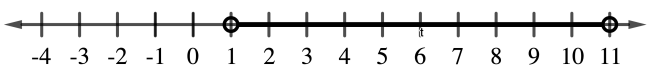
$|a + b| < 13$
$|b - 1| < 10$

14. If the solution set to the above system of inequalities is $x < a + b < y$, then what are x and y?

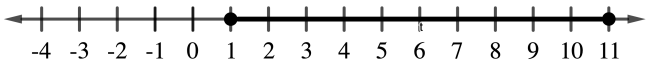
A. $x = -12,\ y = 14$
B. $x = -12,\ y = 12$
C. $x = -13,\ y = 13$
D. $x = -13,\ y = 14$
E. $x = -14,\ y = 13$

15. Which of the following number line graphs shows the solution set to the inequality $|x - 6| \geq -5$?

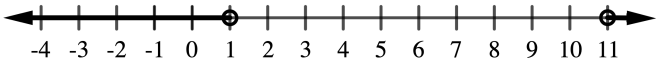
A.



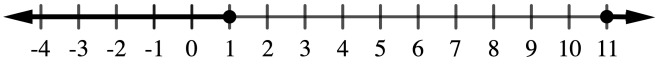
B.



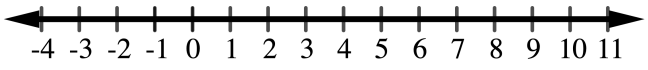
C.



D.



E.



(all real numbers)