Inequalities and you 2 Solutions NAME:

We will solve these inequalities both algebraically and graphically so you can see how the two solutions correspond. You should get the exact same solutions with algebraic and graphical means.

1. Solve the given inequality **algebraically**. Write your solution in both inequality and interval notation (circle both) and graph your solution on the real number line below. (Hint: Remember, the ideas we have developed for equations works here; think about what was done to *x* and unbury it.)

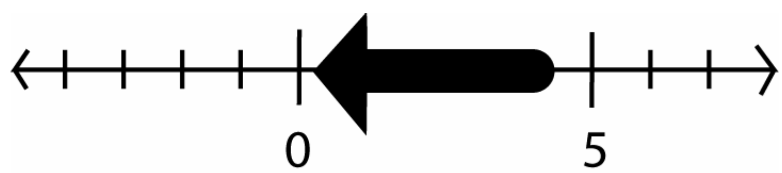
$4(3x-5) \le 28$

$3x-5 \le 7$

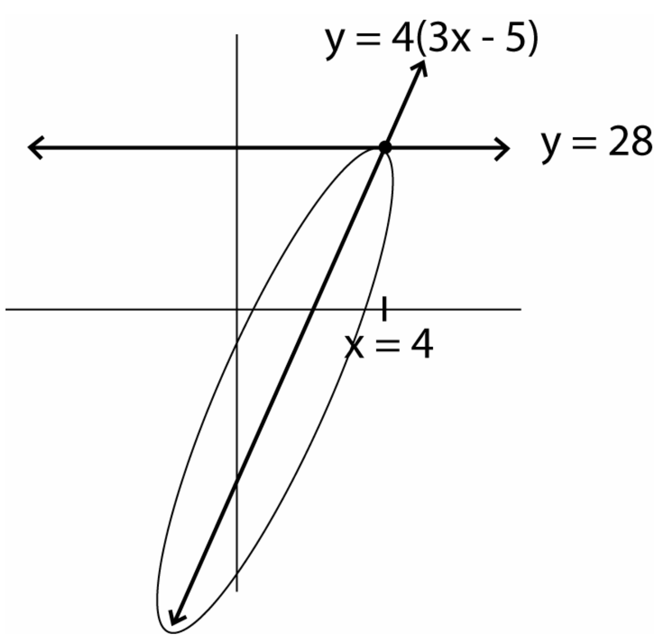
$3x \le 12$

$x \le 4$

Divide by 4, add 5, and divide by 3, in that order to undo what was done to x. We never multiplied or divided by a negative, so we never switched the sign. Solution in interval notation: $(-\infty,4]$



2. Now solve the inequality $4(3x-5) \le 28$ **graphically**. Provide an appropriate graph. Label exactly what you have graphed. Circle the part of the graph that indicates the solution, as I have done in the notes. Does your solution match the algebraic one? (Make sure to label the intersection or *x*-intercept, whichever is important to your solution.)



I used a window of [-10, 10] x [-25, 35]. Notice the circled part is where 4(3x – 5) is ***less*** *than 28. Trace along the graph if you need to verify this for yourself. The intersection is where 4(3x – 5) is* ***equal*** *to 28. So we want all these x values in our solution.*

Solution: $(-\infty,4]$

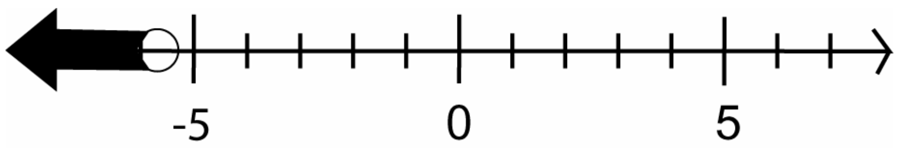
3. Solve the given inequality **algebraically**. Write your solution in both inequality and interval notation (circle both) and graph your solution on the real number line below. (Hint: Remember, the ideas we have developed for equations works here; think about what was done to x and unbury it.)

$-6x-15>20$

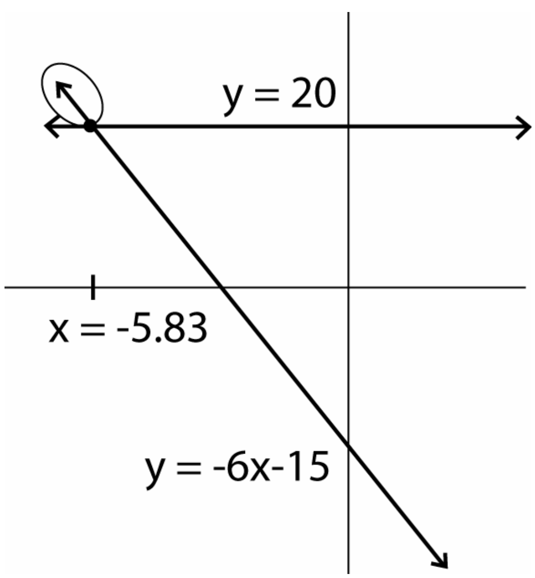
$-6x>35$

$x<-5.83$

Add 15 and then divide by -6 to undo what was done to x. Notice we switched the sign when we divided by the -6.
Solution in interval notation: $(-\infty,-5.83)$



4. Now solve the inequality $-6x-15>20$ **graphically**. Provide an appropriate graph. Label exactly what you have graphed. Circle the part of the graph that indicates the solution, as I have done in the notes. Does your solution match the algebraic one? (Make sure to label the intersection or x-intercept, whichever is important to your solution.)

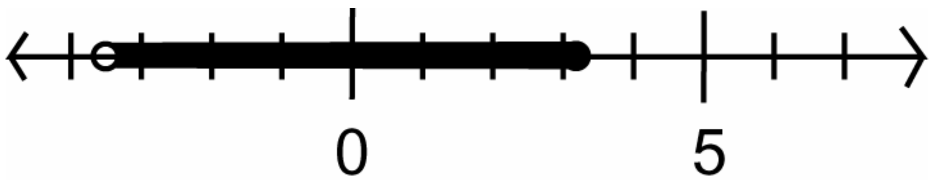


We graphed the left and right sides. We are looking for where the left side is greater than (or above) the right side. The circled part indicates the solution $(-\infty,-5.83)$. *I used a window of [-10, 10] x [-25, 25].*

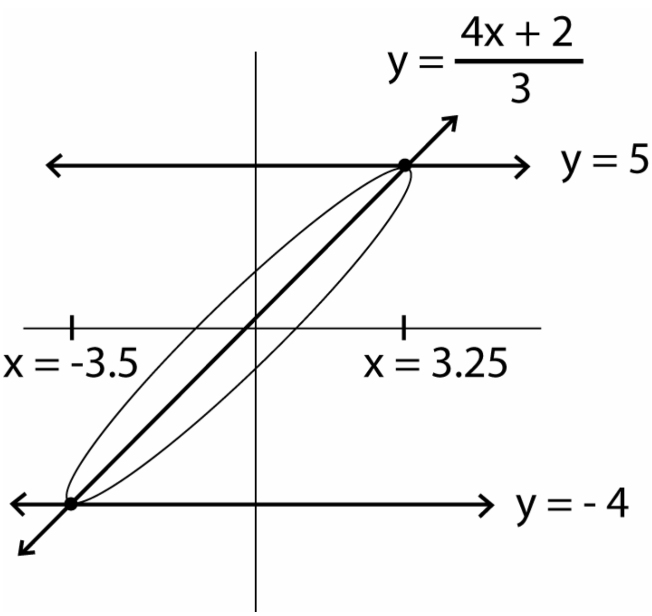
5. Solve the given inequality **algebraically**. Write your solution in both inequality and interval notation (circle both) and graph your solution on the real number line below. (Hint: Remember, the ideas we have developed for equations works here; think about what was done to *x* and unbury it.)

$$-4 < \frac{4x+2}{3} \le 5$$
$$-12 < 4x + 2 \le 15$$
$$-14 < 4x \le 13$$
$$-3.5 < x \le 3.25$$

To undo what was done to x, multiply by 3, subtract 2, and then divide by 4. Do these operations to all three sides of the inequality. The solution in interval notation is (-3.5, 3.25].



6. Now solve the inequality $-4 < \frac{4x+2}{3} \le 5$ **graphically**. Provide an appropriate graph. Label exactly what you have graphed. Circle the part of the graph that indicates the solution, as I have done in the notes. Does your solution match the algebraic one? (Make sure to label the intersection or *x*-intercept, whichever is important to your solution.)



Here, graph all three sides of the inequality. We are looking for where the diagonal line is above (greater than) the line y = -4 but below (less than) the line y = 5. I have circled this part. Also, notice we want the intersection of the diagonal line with the line y = 5. This is where $\frac{4x+2}{3}$ *is equal to 5. So 3.25 is in the solution set. Notice the x values of this part correspond to the solution found above.*