

Solve each of the following.

Name Key

Put answers in set building notation and graph the solution.

$$1. \frac{d}{5} - 13 < -8$$

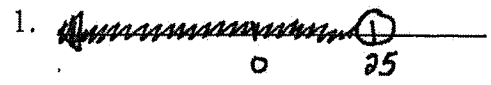
$$\frac{d}{5} < -8 + 13$$

$$\frac{d}{5} < 5$$

$$5 \left[\frac{d}{5} < 5 \right]$$

$$d < 25$$

$$1. \{ d \mid d < 25 \}$$



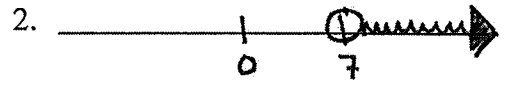
$$2. \left[\frac{k+9}{2} > 8 \right] \cdot 2$$

$$k+9 > 16$$

$$k > 16-9$$

$$k > 7$$

$$2. \{ k \mid k > 7 \}$$



$$3. 4p - 5(p-3) \leq 0$$

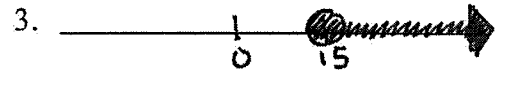
$$4p - 5p + 15 \leq 0$$

$$-p + 15 \leq 0$$

$$-p \leq -15$$

$$p \geq 15$$

$$3. \{ p \mid p \geq 15 \}$$



$$4. 4(3t-11) + 9t < -80$$

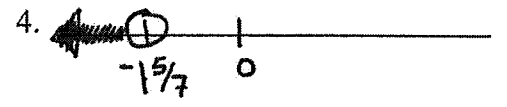
$$12t - 44 + 9t < -80$$

$$21t - 44 < -80$$

$$21t < -80 + 44$$

$$\frac{21t}{21} < \frac{-36}{21}$$

$$4. \{ t \mid t < -1\frac{5}{7} \}$$



$$5. \frac{z}{3} + 9 \geq -4$$

$$\frac{z}{3} \geq -4 - 9$$

$$\frac{z}{3} \geq -13$$

$$3 \left[\frac{z}{3} \geq -13 \right]$$

$$z \geq -39$$

$$5. \{ z \mid z \geq -39 \}$$



Put answers in set building notation and graph the solution.

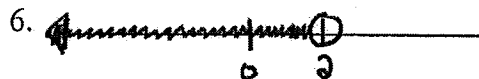
6. $5n - 6 > 12n - 20$

$20 - 6 > 12n - 5n$

$\frac{14}{7} > \frac{7n}{7}$

$2 > n$

6. $\{n | n < 2\}$



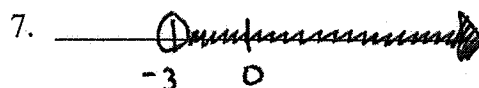
7. $\frac{k+15}{2} > 6$

$k+15 > 12$

$k > 12 - 15$

$k > -3$

7. $\{k | k > -3\}$

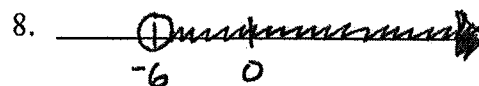


8. $\left[\frac{1}{2}t - \frac{1}{3}t > -1 \right] 6$

$3t - 2t > -6$

$t > -6$

8. $\{t | t > -6\}$



9. $5(3t-2) + 6t < -53$

$15t - 10 + 6t < -53$

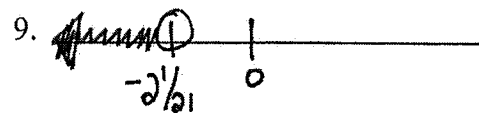
$21t - 10 < -53$

$21t < -53 + 10$

$\frac{21t}{21} < \frac{-43}{21}$

$t < -2\frac{1}{21}$

9. $\{t | t < -2\frac{1}{21}\}$



10. $\left[\frac{2}{3}t - \frac{1}{4} > \frac{1}{2}t + \frac{1}{3} \right] 12$

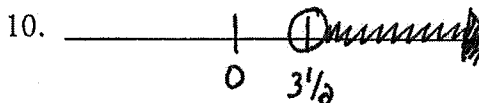
$8t - 3 > 6t + 4$

$8t - 6t > 4 + 3$

$2t > 7$

$t > 3\frac{1}{2}$

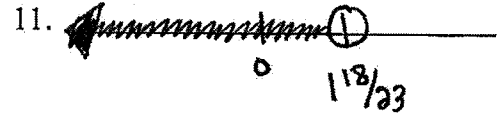
10. $\{t | t > 3\frac{1}{2}\}$



Put answers in set building notation and graph the solution.

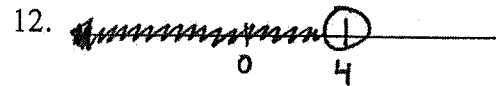
$$\begin{aligned}
 11. \quad & \frac{4}{5}(15t-30) + 5t < \frac{-2}{7}(21t-35) + 7 \\
 & 12t - 24 + 5t < -6t + 10 + 7 \\
 & 17t - 24 < -6t + 17 \\
 & 17t + 6t < 17 + 24 \\
 & \frac{23t}{23} < \frac{41}{23} \\
 & t < 1\frac{18}{23}
 \end{aligned}$$

$$11. \{t \mid t < 1\frac{18}{23}\}$$



$$\begin{aligned}
 12. \quad & 5w > 4(2w-3) \quad \text{and} \quad 5(w-3) + 2 < 7 \\
 & 5w > 8w - 12 \quad \quad \quad 5w - 15 + 2 < 7 \\
 & 5w - 8w > -12 \quad \quad \quad 5w - 13 < 7 \\
 & \frac{-3w}{-3} > \frac{-12}{-3} \quad \quad \quad \frac{5w}{5} < \frac{20}{5} \\
 & w < 4 \quad \text{AND} \quad w < 4
 \end{aligned}$$

$$12. \{w \mid w < 4 \text{ and } w < 4\}$$



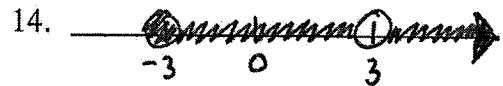
$$\begin{aligned}
 13. \quad & 4t + 8 \geq t + 6 \quad \text{or} \quad 7t - 14 \geq 2t - 4 \\
 & 4t - t \geq 6 - 8 \quad \quad \quad 7t - 2t \geq -4 + 14 \\
 & 3t \geq -2 \quad \quad \quad \frac{5t}{5} \geq \frac{10}{5} \\
 & t \geq -\frac{2}{3} \quad \text{or} \quad t \geq 2
 \end{aligned}$$

$$13. \{t \mid t \geq -\frac{2}{3} \text{ or } t \geq 2\}$$



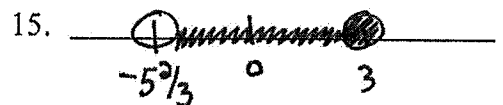
$$\begin{aligned}
 14. \quad & 5r - 2 \geq -17 \quad \text{and} \quad r \neq 3 \\
 & 5r \geq -17 + 2 \\
 & \frac{5r}{5} \geq \frac{-15}{5} \\
 & r \geq -3 \quad \text{AND} \quad r \neq 3
 \end{aligned}$$

$$14. \{r \mid r \geq -3 \text{ and } r \neq 3\}$$



$$\begin{aligned}
 15. \quad & -15 < 3a + 2 \leq 11 \\
 & -15 < 3a + 2 \quad \text{AND} \quad 3a + 2 \leq 11 \\
 & -15 - 2 < 3a \quad \quad \quad 3a \leq 11 - 2 \\
 & \frac{-17}{3} < \frac{3a}{3} \quad \quad \quad \frac{3a}{3} \leq \frac{9}{3} \\
 & -5\frac{2}{3} < a \quad \quad \quad a \leq 3
 \end{aligned}$$

$$15. \{a \mid a > -5\frac{2}{3} \text{ and } a \leq 3\}$$



Put answers in set building notation and graph the solution.

16. $|2x+5| < 23$

$2x+5 < 23$ AND $2x+5 > -23$

$2x < 23-5$

$2x > -23-5$

$\frac{2x}{2} < \frac{18}{2}$

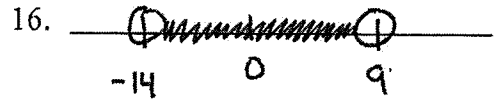
$\frac{2x}{2} > \frac{-28}{2}$

$x < 9$

AND

$x > -14$

16. $\{x | x < 9 \text{ AND } x > -14\}$



17. $\left| \frac{3j+2}{4} \right| \geq 7$

$\frac{3j+2}{4} \geq 7$ or $\frac{3j+2}{4} \leq -7$

$3j+2 \geq 28$

$3j+2 \leq -28$

$3j \geq 28-2$

$3j \leq -28-2$

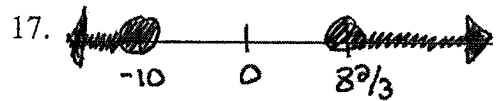
$\frac{3j}{3} \geq \frac{26}{3}$

$\frac{3j}{3} \leq \frac{-30}{3}$

$j \geq 8\frac{2}{3}$

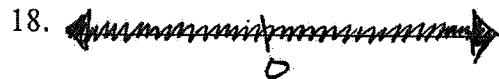
or $j \leq -10$

17. $\{j | j \geq 8\frac{2}{3} \text{ or } j \leq -10\}$



18. $|3x-11| \geq -15$

18. $\{x | x \geq -4/9 \text{ or } x < 28/9\}$
 $\{ \mathbb{R} \}$



19. $|3x+5| < -17$

19. $\{ \emptyset \}$



Bonus I: $\frac{3}{4}(2x+5)+4 \leq |4x+1|-9$

(hint: arrange the problem so it looks similar to all the other ones we have done in class)

$$|4x+1|-9 \geq \frac{3}{4}(2x+5)+4$$

$$|4x+1| \geq \frac{3}{2}x + \frac{15}{4} + 4 + 9$$

$$|4x+1| \geq \frac{3}{2}x + 16\frac{3}{4}$$

$$4x+1 \geq \frac{3}{2}x + 16\frac{3}{4} \quad \text{or} \quad 4x+1 \leq -\frac{3}{2}x - 16\frac{3}{4}$$

$$4x - \frac{3}{2}x \geq 16\frac{3}{4} - 1 \quad \quad \quad 4x + \frac{3}{2}x \leq -16\frac{3}{4} - 1$$

$$5\frac{1}{2}x \leq -17\frac{3}{4}$$

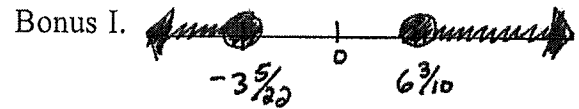
$$2\frac{1}{2}x \geq 15\frac{3}{4} \quad \quad \quad \text{or} \quad x \leq -3\frac{5}{20}$$

Bonus II. $\frac{1}{5}(10x+15) < |3x-8| \leq 6(\frac{1}{6}x+5)$

(hint: keep it simple silly, then expand the crunch statement, work the two problems out entirely and graph, finally the graphs for those two answers must be inspected to see where they both exist at the same time, that will be your final graphed answer.)

And

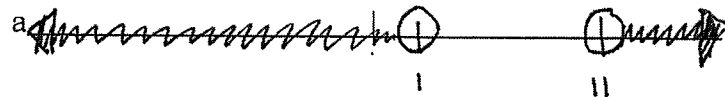
Bonus I. $\{x|x \geq 6\frac{3}{10} \text{ or } x \leq -3\frac{5}{20}\}$



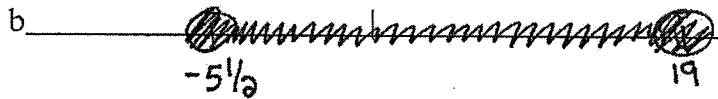
a $\{x|x > 11 \text{ or } x < 1\}$

And

b $\{x|x \leq 19 \text{ AND } x \geq -5\frac{1}{2}\}$



And



$$\text{BONUS II. } \frac{1}{5}(10x+15) < |3x-8| \leq 6\left(\frac{1}{6}x+5\right)$$

$$\frac{1}{5}(10x+15) < |3x-8| \quad \text{AND} \quad |3x-8| \leq 6\left(\frac{1}{6}x+5\right)$$

$$|3x-8| > 2x+3 \quad \text{AND} \quad |3x-8| \leq x+30$$

$$3x-8 > 2x+3 \quad \text{or} \quad 3x-8 < -2x-3$$

$$3x-2x > 3+8 \quad 3x+2x < -3+8$$

$$x > 11 \quad \text{or} \quad \begin{array}{l} 5x < 5 \\ x < 1 \end{array}$$

$$3x-8 \leq x+30 \quad \text{AND} \quad 3x-8 \geq -x-30$$

$$3x-x \leq 30+8 \quad 3x+x \geq -30+8$$

$$2x \leq 38 \quad 4x \geq -22$$

$$x \leq 19 \quad \text{AND} \quad x \geq -5\frac{1}{2}$$

Matching - Match the **best** response to each statement.

Statements

1. C The “or” compound inequality

2. J $|9x + 5| \geq -17$

3. F Changing the direction of an inequality sign

4. B $|5x - 3| < 22$

5. I The “and ” compound inequality

6. L Absolute value

7. G $|4x + 1| < -13$

8. M Set Building Notation

9. K Significance of shaded region for “or ” statements

10. H $m \neq 7$

11. N Significance of shaded region for “and” statements

12. Q $|5x + 12| \geq 17$

13. D Finite Set

Responses

- A. This is the term used to describe a number in front of a variable.
- B. Example of absolute value inequality that will be written as a compound “and” statement and will have a traditional answer.
- C. Usually has a solution that graphs as tails, on occasion will have an answer as \mathbf{R} , statement that cannot be crunched together.
- D. Used to signify that there are multiple solutions, these solutions can be counted to determine a total number of solutions to a problem, e.g. $x = \{-3, 1, 4, 15\}$
- E. This is the set of numbers that need to be tested in an open sentence.
- F. This is done anytime multiplication or division by a negative number occurs.
- G. Example of absolute value inequality that will have $\{\}$ - “the empty set” as a solution.
- H. Restricted value - means that any number other than that particular one can be used.
- I. Usually has a solution that graphs as dumb-bell, on occasion will answer as $\{\}$, statement that can be crunched together.
- J. Example of absolute value inequality that will have \mathbf{R} - “all reals” as a solution.
- K. The graphical solution that is interpreted as the only numerical values capable of solving either statement in an “or” compound inequality.
- L. Defined as a measure of magnitude, results in non-negative numbers being reported.
- M. Used to signify that there are too many solutions to list, but all those solutions will share some notable characteristic, e.g. $\{x \mid x > 5\}$
- N. The graphical solution that is interpreted as the only numerical values capable of solving both statements in an “and” compound inequality.
- Q. Example of absolute value inequality that will be written as a compound “or” statement and will have a traditional answer.
- R. When solving equations there are numbers with variables and then there are numbers without any variable. Those numbers not associated without any variables are called . . .