

INEQUALITY NOTES

You will want to remember what each inequality symbol means. This will be easier to do if you remember that the open part of the symbol always faces the larger quantity.

SYMBOL	MEANING
$<$	less than
$>$	greater than
\leq	less than or equal to
\geq	greater than or equal to

Solving Inequalities

- 1) The solution set (group of answers) will contain a group of numbers instead of one number.
- 2) Solve inequalities the same way you solve equations.
- 3) When dividing by a negative number, SWITCH THE DIRECTION OF THE INEQUALITY SYMBOL.
- 4) When the number comes before the variable in the answer, SWITCH THE DIRECTION OF THE INEQUALITY SYMBOL.

Graphing An Inequality

Use an open circle for $>$ or $<$

Use a closed circle for \geq or \leq

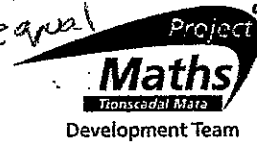
< less than

≤ less than or equal to

> greater than

≥ greater than or equal to

Section A: Student Activity 1



Revision of < and > symbols.

1. The table below contains a number of inequalities. In the space provided, indicate which are true and which are false

$2 < 3$		$4 \leq 5$	
$-1 > 4$		$1 > -4$	
$-2 > -1$		$3 > 4$	
$-1 \leq 4$		$-1 \geq 4$	
$1.2 < 4$		$-1.8 > 4$	
$\frac{1}{2} < \frac{3}{4}$		$\frac{1}{2} > \frac{1}{4}$	
$-\frac{1}{2} < \frac{3}{4}$		$\frac{1}{2} > -\frac{1}{4}$	

2. Insert the appropriate symbol between these numbers.

	Insert < or > between these numbers	
6		10
-6		-10
5		-4
1.5		3.5
-6		-4
$\frac{1}{2}$		$\frac{1}{4}$
$-\frac{1}{2}$		$-\frac{1}{4}$
20% or .20		0.02

3. In each case, below, circle the algebraic expression which represents the statement given.

a	is less than 5	$x > 5$	$x < 5$	$x \leq 5$	$x \geq 5$
b	is more than 8	$x > 8$	$x < 8$	$x \leq 8$	$x \geq 8$
c	is less than or equal to 4	$x > 4$	$x < 4$	$x \leq 4$	$x \geq 4$
d	is greater than or equal to 10	$x > 10$	$x < 10$	$x \leq 10$	$x \geq 10$
e	is at least 10	$x < 10$	$x > 10$	$x \geq 10$	$x \leq 10$
f	is at most 10	$x < 10$	$x > 10$	$x \leq 10$	$x \geq 10$
g	Let r be the amount of rain (in mm) which falls each day. More than 23mm of rain fell yesterday.	$r < 23$	$r > 23$	$r \leq 23$	$r \geq 23$
h	p is no more than 9	$p < 9$	$p > 9$	$p \geq 9$	$p \leq 9$

at least \geq
at most \leq

Solving Inequalities with One Variable

EXAMPLESolve $x - 5 > 3$ for x .

Step 1 Write the inequality.

$$x - 5 > 3$$

Step 2 Add 5 to both sides of the inequality.

$$x - 5 + 5 > 3 + 5$$

Step 3 Simplify.

$$x > 8$$

Note: For inequalities with addition, multiplication, or fractions, solve in the same way as for equations with the same operations.

Directions Solve each inequality.

1) $x - 3 > 0$ _____

2) $5d > 10$ _____

3) $k + 11 < 12$ _____

4) $4q > 48$ _____

5) $c + 3 \leq 40$ _____

6) $g - 1 < 6$ _____

7) $7p < 21$ _____

8) $w + 9 \geq 2$ _____

Directions Solve the problems.

- 9) A school has arranged teaching loads so that no teacher ever has more than 25 students. Describe the school's teaching load using an inequality and the variable t .
- _____

- 10) The sponsor of a concert promises the concert singer a fee based on \$5 per person in the audience. If attendance is below 200, however, the singer will be paid a minimum fee based on 200 seats filled. Using the variable f , write an inequality to represent the singer's minimum fee.
- _____

Name : _____

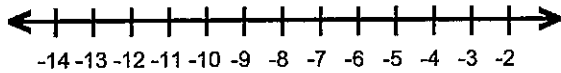
Score : _____

Teacher : _____

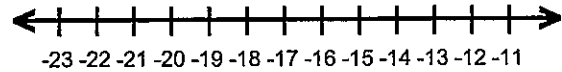
Date : _____

Solve and Graph the Inequalities

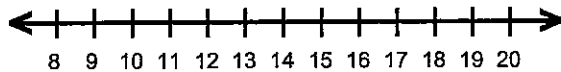
1) $2 - 6b > 50$



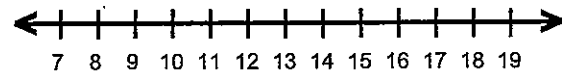
6) $-7 \geq -2 + \frac{s}{4}$



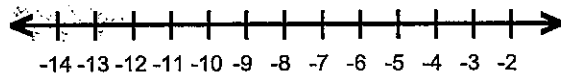
2) $5 - 6p < -55$



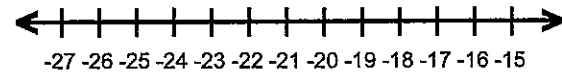
7) $-4c + 6 \leq -34$



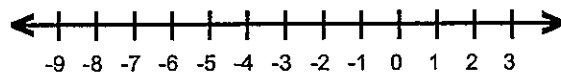
3) $20 < 4 - 2x$



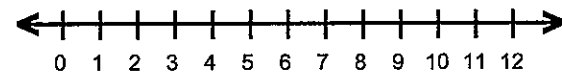
8) $-8 \leq -3 + \frac{a}{4}$



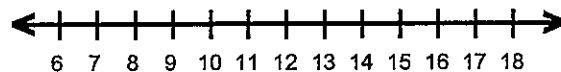
4) $-26 \geq 4k + 2$



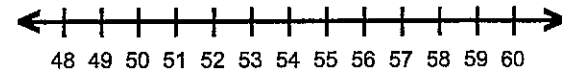
9) $-44 > -5n + 6$



5) $-28 > 5 - 3y$



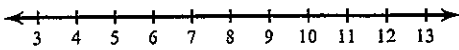
10) $-5 + \frac{q}{4} \leq 9$



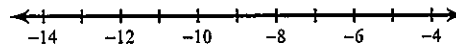
Two-Step Inequalities

Solve each inequality and graph its solution.

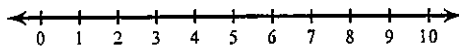
1) $2x + 4 \geq 24$



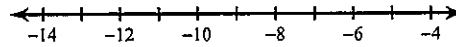
2) $\frac{m}{3} - 3 \leq -6$



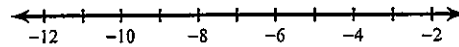
3) $-3(p + 1) \leq -18$



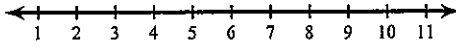
4) $-4(-4 + x) > 56$



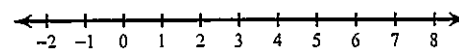
5) $-b - 2 > 8$



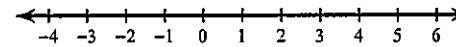
6) $-4(3 + n) > -32$



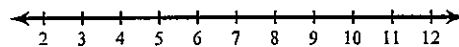
7) $4 + \frac{n}{3} < 6$



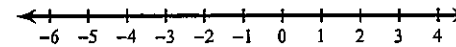
8) $-3(r - 4) \geq 0$



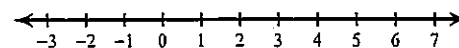
9) $-7x + 7 \leq -56$



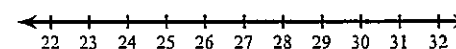
10) $-3(p - 7) \geq 21$



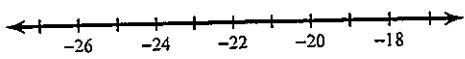
11) $-11x - 4 > -15$



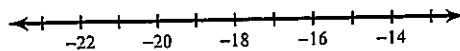
12) $\frac{-9 + a}{15} > 1$



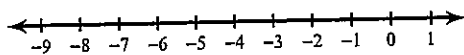
$$13) -1 \leq \frac{v-2}{21}$$



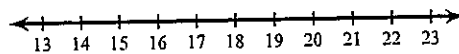
$$14) -132 > 12(n+9)$$



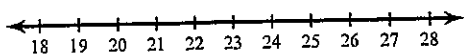
$$15) \frac{-11+n}{15} < -1$$



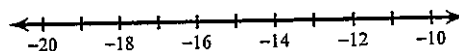
$$16) -90 \geq -5(k-3)$$



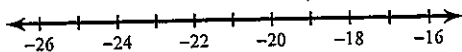
$$17) 4 < 1 + \frac{n}{7}$$



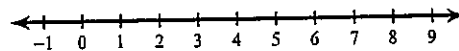
$$18) -1 > \frac{12+x}{4}$$



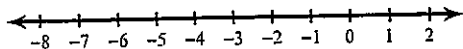
$$19) 7n - 1 > -169$$



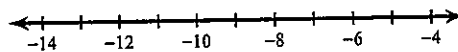
$$20) -4b - 5 > -25$$



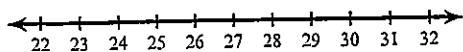
$$21) 84 \geq -7(v-9)$$



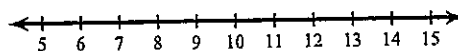
$$22) \frac{-8+r}{2} > -8$$



$$23) \frac{x}{-6} - 8 \leq -12$$

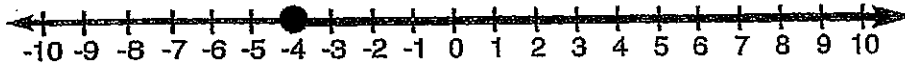


$$24) \frac{m-3}{2} \leq 5$$



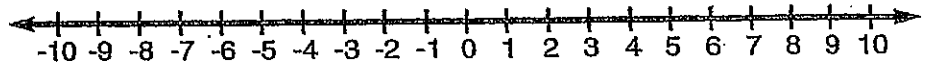
Solving Inequalities with Multiple Operations

$$\begin{aligned} -11n + 4 &\leq 48 \\ -11n + 4 - 4 &\leq 48 - 4 \\ -11n &\leq 44 \\ n &\geq -4 \end{aligned}$$

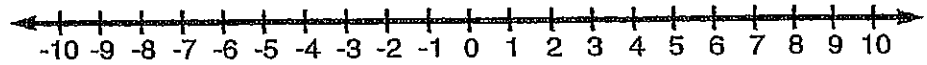


Solve each inequality and graph its solution set.

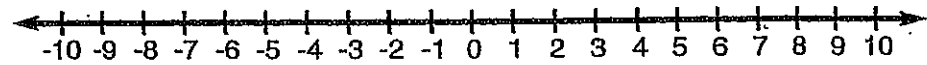
1. $6x - 3 > 21$



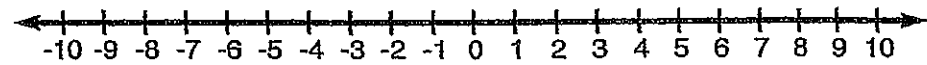
2. $5 > 4x - 7$



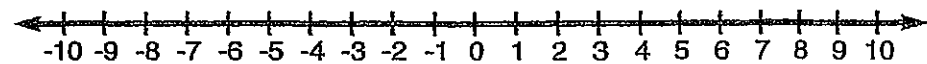
3. $3(3c - 4) \geq 15$



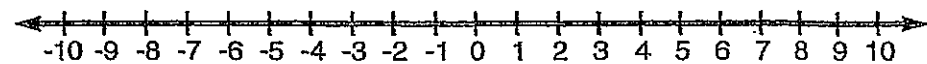
4. $-5x - 10 \geq -10$



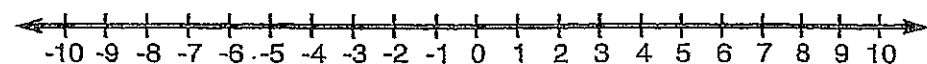
5. $-15 > -3x - 45$



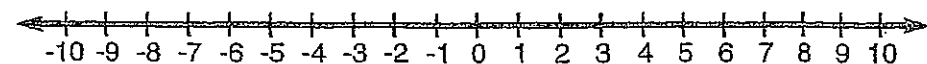
6. $-6(3t + 2) \leq 6$



7. $5x - 1 > 9$

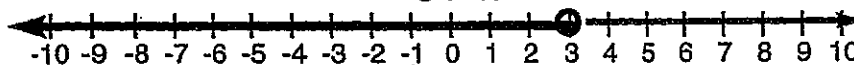


8. $4x - 7 < 9$

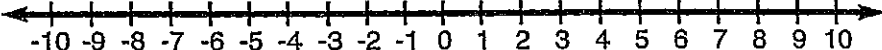


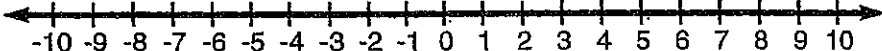
Solving Inequalities with Variables on Both Sides

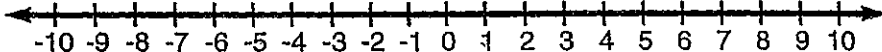
$$\begin{aligned}
 -10x + 6 &> 2x - 30 \\
 -10x + 10x + 6 &> 2x + 10x - 30 \\
 6 &> 12x - 30 \\
 30 + 6 &> 12x - 36 + 36 \\
 36 &> 12x \\
 3 &> x
 \end{aligned}$$

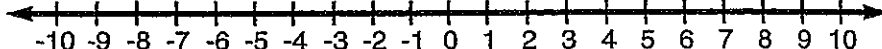


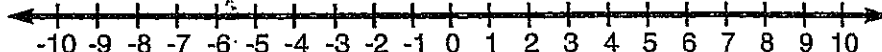
Solve each inequality and graph its solution set.

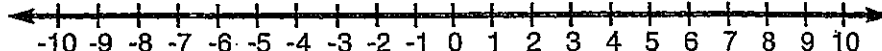
1. $5x + -3 > 2(3 + x)$ 

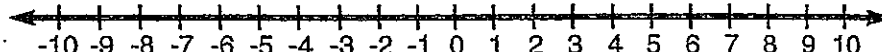
2. $-9 - e > 3e + 11$ 

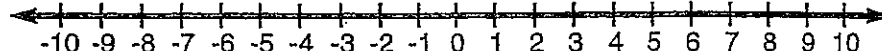
3. $3(2x + 4) \geq 7x + 8$ 

4. $7m + 9 \leq 5(m + 3)$ 

5. $5x - 20 > 2x + 1$ 

6. $2(k + 4) \leq 3(2k - 4)$ 

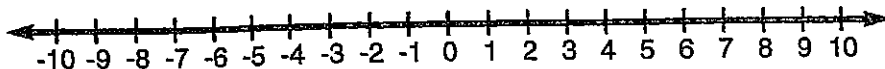
7. $5c + 2 < 2c + -7$ 

8. $3(s - 4) \geq 4s - 12$ 

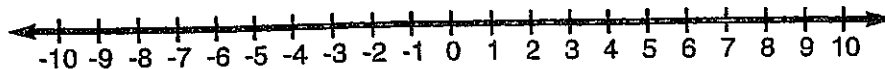
Practice Solving Inequalities

Solve each inequality and graph its solution set.

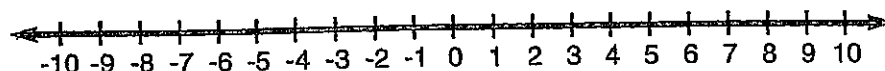
1. $12d < d + 11$



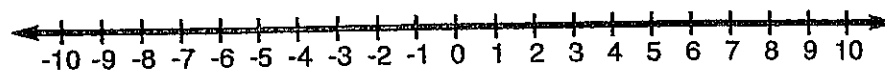
2. $5x \geq -20$



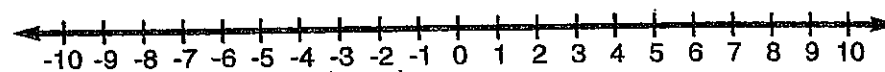
3. $14h \leq 126$



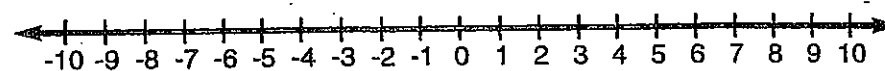
4. $11 \leq 6y - 13$



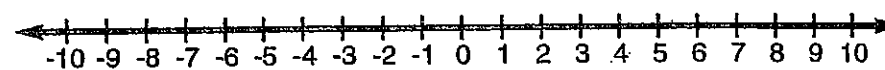
5. $6x - 4 > 2(x - 6)$



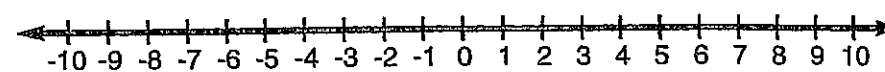
6. $-13t > 52$



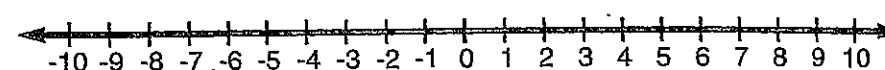
7. $r + 15 \geq 9$



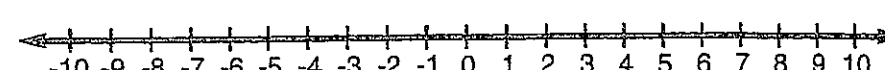
8. $4a - 3 \leq -27$



9. $14 + 3x > 6x - 7$



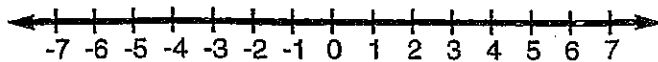
10. $\frac{a}{4} + 3 \leq 5$



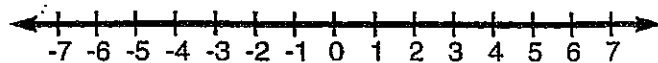
Practice Solving Inequalities

Solve each inequality and graph its solution set.

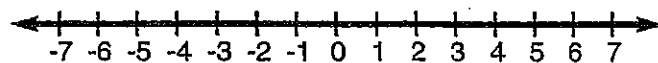
1. $4w > 2w + 6$



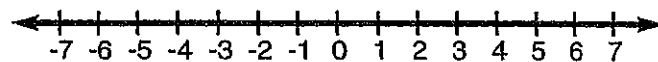
2. $5n + 3 \geq -12$



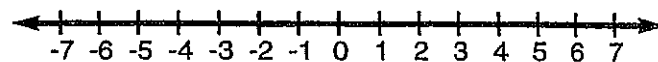
3. $-2a < 5 + 3a$



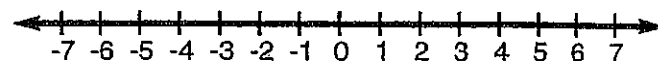
4. $-3.6 > 0.6x$



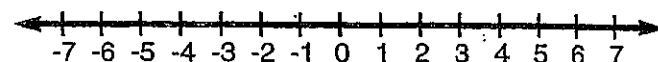
5. $13x \geq -39$



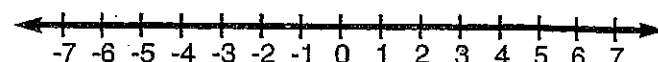
6. $6d < 3d - 18$



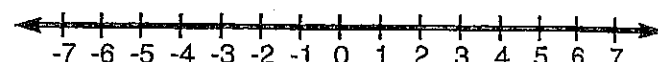
7. $7c - 8 \geq 6$



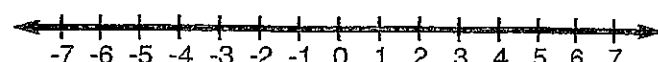
8. $15e - 3 \leq 20e + 12$



9. $7k < -28$



10. $4 + 6r > -8$



Name: _____



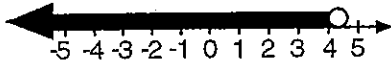
- 1) What is the solution to the inequality $x - 18 < -13$?
- A) $x < 5$ B) $x > 5$ C) $x < 31$ D) $x > 31$
- 2) Which number is in the solution set of the inequality $5x + 3 > 38$?
- A) 6 B) 8 C) 5 D) 7
- 3) In the set of positive integers, what is the solution set of the inequality $2x - 3 < 5$?
- A) $\{1,2,3,4\}$ B) $\{0,1,2,3,4\}$ C) $\{1,2,3\}$ D) $\{0,1,2,3\}$

Questions 4 through 6 refer to the following:

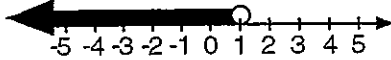
Determine the solution set and graph for the given inequality:

4) $3x + 5 > 8$

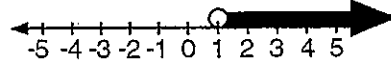
A) $x < \frac{13}{3}$,



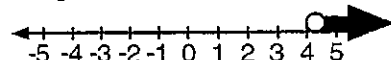
B) $x < 1$,



C) $x > 1$,

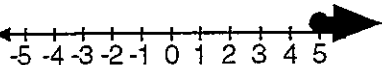


D) $x > \frac{13}{3}$,



5) $12 \geq 3x + 3$

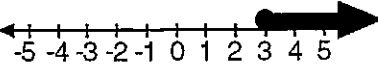
A) $x \geq 5$,



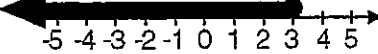
B) $x \leq 5$,



C) $x \geq 3$,

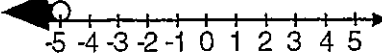


D) $x \leq 3$,

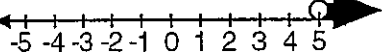


6) $-2x + 7 > 17$

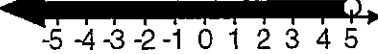
A) $x < -5$,



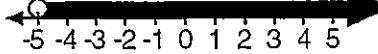
B) $x > 5$,



C) $x < 5$,



D) $x > -5$,



Name : _____

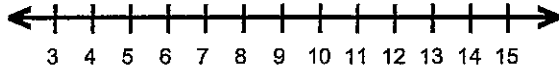
Score : _____

Teacher : _____

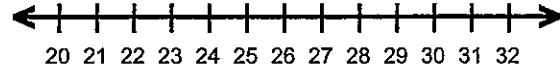
Date : _____

Solve and Graph the Inequalities

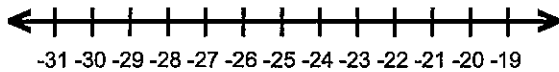
1) $6(5 - 3n) - 4n > 8n - 180$



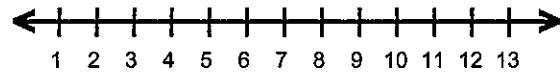
6) $-4a + 2a < -48$



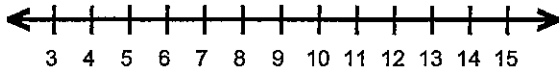
2) $3g + 2g \leq -110$



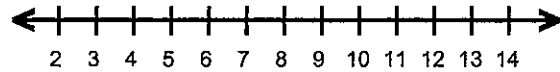
7) $9p - 93 \geq 2(6 - 3p)$



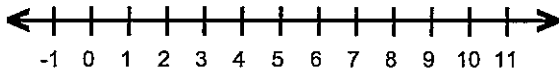
3) $4q - 130 \geq 6(4 - 3q)$



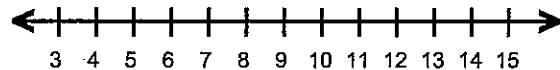
8) $5y - 9 + 3y \geq 31$



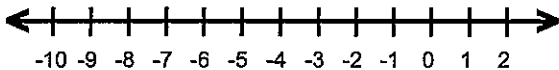
4) $2(5 - 4x) < 5x - 68$



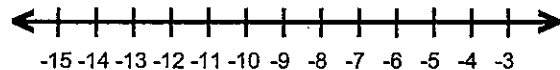
9) $4b - 116 < 5(4 - 2b) - 3b$



5) $24 > -5k + 2k$



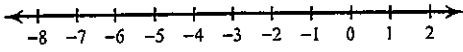
10) $6z - 4 + 3z > -121$



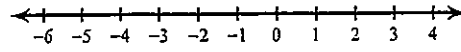
Multi-Step Inequalities

Solve each inequality and graph its solution.

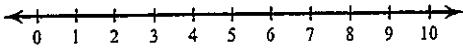
1) $3 < -5n + 2n$



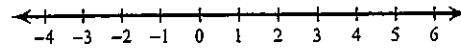
2) $6x + 2 + 6x < 14$



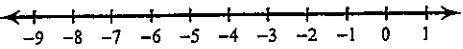
3) $-p - 4p > -10$



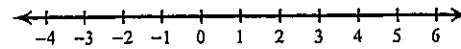
4) $18 \geq 5k + 4k$



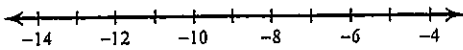
5) $9 \geq -2m + 2 - 3$



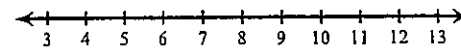
6) $-3 - 6(4x + 6) > -111$



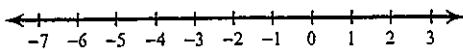
7) $6 - 4(6n + 7) \geq 122$



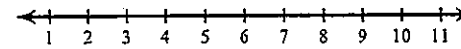
8) $-138 \geq -6(6b - 7)$



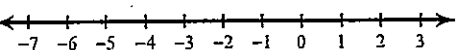
9) $167 < 6 + 7(2 - 7r)$



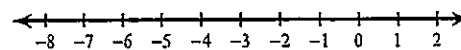
10) $5(6 + 3r) + 7 \geq 127$



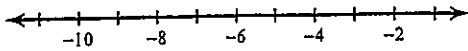
11) $-8x + 2x - 16 < -5x + 7x$



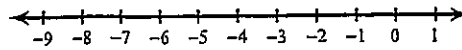
12) $-1 - 6x - 6 > -11 - 7x$



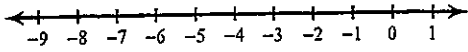
13) $a - 6 \leq 15 + 8a$



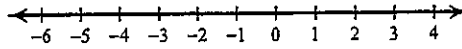
14) $13 + 2v - 8 + 6 > -7 - v$



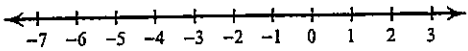
15) $-5n - 6n \leq 8 - 8n - n$



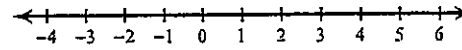
16) $-x < -x + 7(x - 2)$



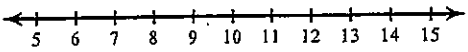
17) $-5n + 6 \geq -7(5n - 6) - 6n$



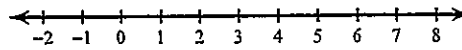
18) $3(p - 3) - 5p > -3p - 6$



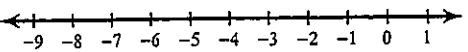
19) $28 - k \geq 7(k - 4)$



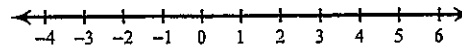
20) $28 - 7x \leq -4(-7x - 7)$



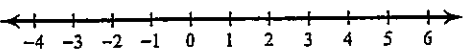
21) $-6(1 + 7k) + 7(1 + 6k) \leq -2$



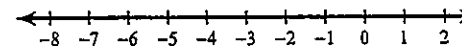
22) $-2(2 - 2x) - 4(x + 5) \leq -24$



23) $3(1 - 2x) > 3 - 6x$



24) $-2(5 + 6n) < 6(8 - 2n)$



Name: Homework 12/18

Questions 1 and 2 refer to the following:

Solve

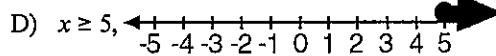
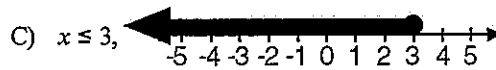
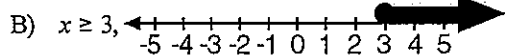
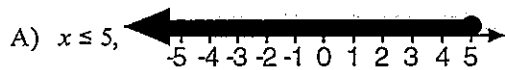
1) $6x - 4 - 8x < 14$

2) $8x \geq 5(2x + 4)$

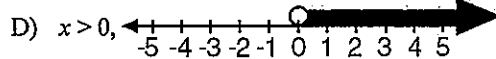
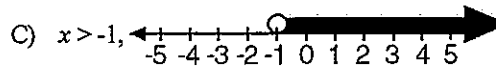
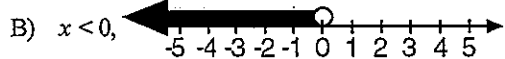
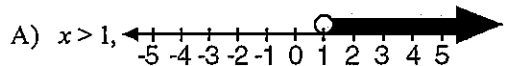
Questions 3 and 4 refer to the following:

Determine the solution set and graph for the given inequality:

3) $12 \geq 3x + 3$



4) $5x + 3x - 4 > 4$



5) Which of the following represents the solution set and graph for the inequality $2x - 7 + 3x \geq 8$?

