Math 1 Period: _____ Name: _____

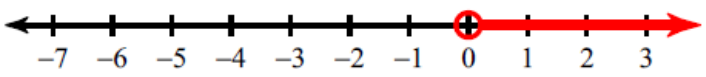
Unit 1.7 Solving Multi-Step Inequalities

Solve each inequality. Graph its solution. Write the interval notation.

1) $0 < -n + 4n$

$0 < -n + 4n$	Write the original problem
$0 < 3n$	Combine like terms
$\frac{0}{3} < \frac{3n}{3}$	Divide both sides by 3
$0 < n$	Simplify
$n > 0$	Flip inequality around so variable is on left side

GRAPH:



<,> signs are open circles
> Sign means graph to the right

INTERVAL NOTATION:

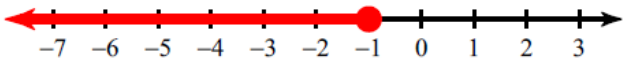
$(0, \infty)$

(, because <,> signs are parathesis
0, ∞, because arrow goes from 0 to ∞ forever to the right
), because ∞ is always)

3) $7 \leq -4r - 3r$

$7 \leq -4r - 3r$	Write the original problem
$7 \leq -7r$	Combine like terms
$\frac{7}{-7} \geq \frac{-7r}{-7}$	Divide both sides by -7, flip inequality sign because divide by negative
$-1 \geq r$	Simplify
$r \leq -1$	Flip inequality around so variable is on left side

GRAPH:



$\leq, \geq$ signs are closed circles
$\leq$ Sign means graph to the left

INTERVAL NOTATION:

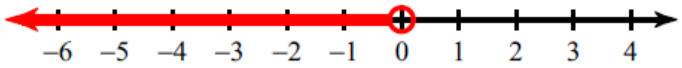
$(-\infty, -1]$

(, cause $-\infty$ is always (
$-\infty, -1$ because arrow goes from -1 to $-\infty$ forever to the left
], because $\leq, \geq$ signs are brackets

5) $1 > 1 + 2n + n$

$1 > 1 + 2n + n$	Write the original problem
$1 > 1 + 3n$	Combine like terms
$1 - (1) > 1 - (1) + 3n$	Subtract 1 from both sides
$0 > 3n$	Simplify
$\frac{0}{3} > \frac{3n}{3}$	Divide both sides by 3
$0 > n$	Simplify
$n < 0$	Flip inequality around so variable is on left side

GRAPH:



<,> signs are open circles
< Sign means graph to the left

INTERVAL NOTATION:

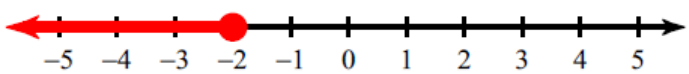
$(-\infty, 0)$

(, because $-\infty$ is always (
$-\infty$, 0 because arrow goes from 0 to $-\infty$ forever to the left
), because <,> signs are parathesis

7) $-8 \geq n + 3n$

$-8 \geq n + 3n$	Write the original problem
$-8 \geq 4n$	Combine like terms
$\frac{-8}{4} \geq \frac{4n}{4}$	Divide both sides by 4
$-2 \geq n$	Simplify
$n \leq -2$	Flip inequality around so variable is on left side

GRAPH:



≤,≥ signs are closed circles
≤ Sign means graph to the left

INTERVAL NOTATION:

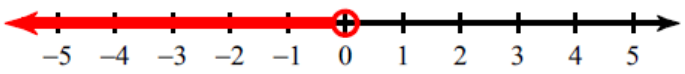
$(-\infty, -2]$

(, because $-\infty$ is always (
$-\infty$, -2 because arrow goes from -2 to $-\infty$ forever to the left
], because ≤,≥ signs are brackets

9) $2 > 2 + 2a + 4a$

$2 > 2 + 2a + 4a$	Write the original problem
$2 > 2 + 6a$	Combine like terms
$2 - (2) > 2 - (2) + 6a$	Subtract 2 from both sides
$0 > 6a$	Simplify
$0 > \frac{6a}{6}$	Divide both sides by 6
$0 > a$	Simplify
$a < 0$	Flip inequality around so variable is on left side

GRAPH:



<,> signs are open circles
< Sign means graph to the left

INTERVAL NOTATION:

$(-\infty, 0)$

(, because $-\infty$ is always (
$-\infty$, 0 because arrow goes from 0 to $-\infty$ forever to the left
), because <,> signs are parathesis

11) $4 \leq x + 2 - x$

$4 \leq x + 2 - x$	Write the original problem
$4 \leq 2$	Combine like terms
No variables left means:	if statement is FALSE then "No Solution" If statement is TRUE then "All Real Solutions"

4 is not less than 2, so FALSE
Therefore,
No Solution

GRAPH:

No Solution, so no graph

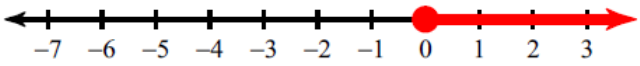
INTERVAL NOTATION:

No Solution, so no interval solution

13) $-4x-2(-2x-1)\geq 2(1-3x)$

$-4x-2(-2x-1)\geq 2(1-3x)$	Write the original problem
$-4x-2\cdot(-2x)-2\cdot(-1)\geq 2\cdot(1)+2\cdot(-3x)$	Distribute
$-4x+4x+2\geq 2-6x$	Simplify
$2\geq 2-6x$	Combine like terms
$2-(2)\geq 2-(2)-6x$	Subtract 2 from both sides
$0\geq -6x$	Simplify
$\frac{0}{-6}\leq\frac{-6x}{-6}$	Divide both sides by -6, flip inequality sign because divide by negative
$0\leq x$	Simplify
$x\geq 0$	Flip inequality around so variable is on left side

GRAPH:



$\leq,\geq$ signs are closed circles
$\geq$ Sign means graph to the right

INTERVAL NOTATION:

$[0,\infty)$

[, because $\leq,\geq$ signs are brackets
$0,\infty$ because arrow goes from 0 to ∞ forever to the right
), because ∞ is always)

15) $-2a - 3a < 2(4 - a) - 3(a - 3)$

$-2a - 3a < 2(4 - a) - 3(a - 3)$	Write the original problem
$-2a - 3a < 2 \cdot (4) + 2 \cdot (-a) - 3 \cdot (a) - 3 \cdot (-3)$	Distribute
$-2a - 3a < 8 - 2a - 3a + 9$	Simplify
$-5a < 17 - 5a$	Combine like terms
$-5a + (5a) < 17 - 3a + (5a)$	Add 5a to both sides
$0 < 17$	Simplify and Combine like terms

No variables left means: if statement is FALSE then "No Solution"
If statement is TRUE then "All Real Solutions"

0 is less than 17, so TRUE
Therefore,
All Real Solutions

GRAPH:

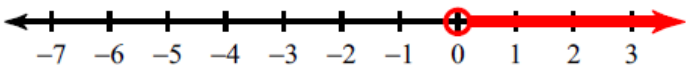
INTERVAL NOTATION:

$(-\infty, \infty)$ **$-\infty, \infty$ because arrow goes from $-\infty$ to ∞ forever to the left and right (, because $-\infty$ is always (, and), because ∞ is always)**

17) $2(1+x) < -2 + 4(1+2x)$

$2(1+x) < -2 + 4(1+2x)$	Write the original problem
$2 \cdot (1) + 2 \cdot (x) < -2 + 4 \cdot (1) + 4 \cdot (2x)$	Distribute
$2 + 2x < -2 + 4 + 8x$	Simplify
$2 + 2x < 2 + 8x$	Combine like terms
$2 + 2x - (2x) < 2 + 8x - (2x)$	Subtract 2x from both sides
$2 < 2 + 6x$	Simplify and Combine like terms
$2 - (2) < 2 - (2) + 6x$	Subtract 2x from both sides
$0 < 6x$	Simplify
$\frac{0}{6} < \frac{6x}{6}$	Divide both sides by 6,
$0 < x$	Simplify
$x > 0$	Flip inequality around so variable is on left side

GRAPH:



<,> signs are open circles
> Sign means graph to the right

INTERVAL NOTATION:

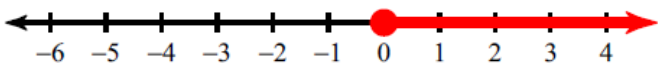
$(0, \infty)$

(, because <,> signs are parathesis
$0, \infty$ because arrow goes from 0 to ∞ forever to the right
), because ∞ is always)

19) $-2(x-1) \leq -3x + 2(x+1)$

$-2(x-1) \leq -3x + 2(x+1)$	Write the original problem
$-2 \cdot (x) - 2 \cdot (-1) \leq -3x + 2 \cdot (x) + 2 \cdot (1)$	Distribute
$-2x + 2 \leq -3x + 2x + 2$	Simplify
$-2x + 2 \leq -x + 2$	Combine like terms
$-2x + (2x) + 2 \leq -x + (2x) + 2$	Add 2x to both sides
$2 \leq x + 2$	Simplify and Combine like terms
$2 - (2) \leq x + 2 - (2)$	Subtract 2 from both sides
$0 \leq x$	Simplify
$x \geq 0$	Flip inequality around so variable is on left side

GRAPH:



≤,≥ signs are closed circles
≥ Sign means graph to the right

INTERVAL NOTATION:

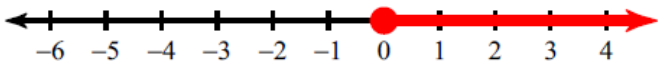
$[0, \infty)$

[, because ≤,≥ signs are brackets
0, ∞ because arrow goes from 0 to ∞ forever to the right
), because ∞ is always)

21) $-3-3(1+3B) \geq 2-4(2+3B)$

$-3-3(1+3B) \geq 2-4(2+3B)$	Write the original problem
$-3-3\cdot(1)-3\cdot(3B) \geq 2-4\cdot(2)-4\cdot(3B)$	Distribute
$-3-3-9B \geq 2-8-12B$	Simplify
$-6-9B \geq -6-12B$	Combine like terms
$-6-9B+(12B) \geq -6-12B+(12B)$	Add 12B to both sides
$-6+3B \geq -6$	Simplify and Combine like terms
$-6+(6)+3B \geq -6+(6)$	Add 6 to both sides
$3B \geq 0$	Simplify
$\frac{3B}{3} \geq \frac{0}{3}$	Divide both sides by 3,
$B \geq 0$	Simplify

GRAPH:



≤,≥ signs are closed circles
≥ Sign means graph to the right

INTERVAL NOTATION:

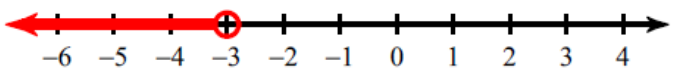
$[0, \infty)$

[, because ≤,≥ signs are brackets
0, ∞ because arrow goes from 0 to ∞ forever to the right
), because ∞ is always)

23) $-2(p-2)-4>-p+3(p+4)$

$-2(p-2)-4>-p+3(p+4)$	Write the original problem
$-2\cdot(p)-2\cdot(-2)-4>-p+3\cdot(p)+3\cdot(4)$	Distribute
$-2p+4-4>-p+3p+12$	Simplify
$-2p>2p+12$	Combine like terms
$-2p-(2p)>2p-(2p)+12$	Subtract 2p from both sides
$-4p>12$	Simplify and Combine like terms
$\frac{-4p}{-4}<\frac{12}{-4}$	Divide both sides by -4, flip inequality sign because divide by negative
$p<-3$	Simplify

GRAPH:



<,> signs are open circles
< Sign means graph to the left

INTERVAL NOTATION:

$(-\infty,-3)$

(, because $-\infty$ is always (
$-\infty$, 0 because arrow goes from 0 to $-\infty$ forever to the left
), because <,> signs are parathesis