

Rev Solving Inequalities

Your Name

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8/26/21

Notes

$$x = 5$$



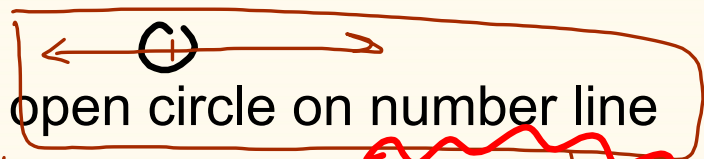
Graphing Inequality Signs

Remember:

bigger



Strictly less than <



open circle on number line

greater than >

We only shade solutions

less than or equal to \leq



closed circle on the number line

greater than or equal to \geq

is a solution

Solving Addition/ Subtraction Inequalities

To solve: pretend like it is an = sign

1. Pretend like it is an = sign

- undo addition with subtraction
- undo subtraction with addition

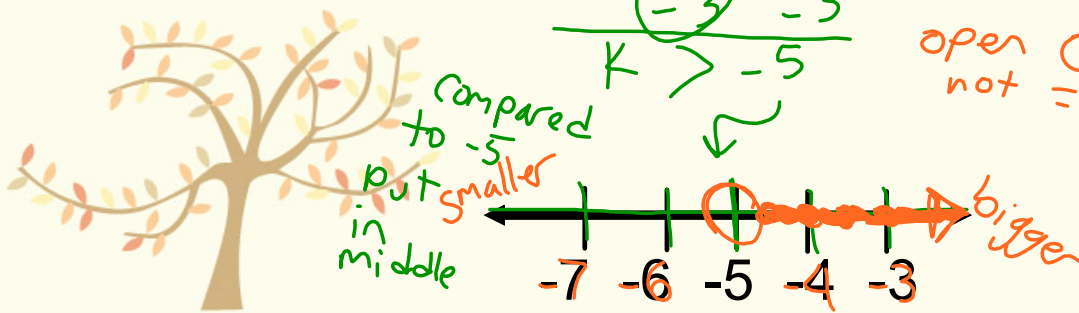
2. graph your solution set on the number line

Remember: closed (filled in) circle if =
open (not fill in) circle if not =

ex 1. $k + 3 > -2$

$$\begin{array}{r} k + 3 > -2 \\ -3 \quad -3 \\ \hline k > -5 \end{array}$$

open \circ
not = -5



Solving Multiplication/ Division Inequalities

To solve: pretend like it is an = sign

- undo multiplication with division
- undo division with multiplication

One Catch... or \div by $- \#$
if you have to multiply or divide by a negative number on both sides to isolate the variable...you must flip the inequality sign.

FLIP

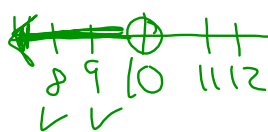
$$\frac{-x}{-5} > \frac{-2}{-1} \cdot \frac{-5}{-1}$$

$x < 10$

DON'T FLIP

$$\frac{9x}{9} \leq \frac{-81}{9} \leftarrow \div \text{ by a positive } \#$$

$x \leq -9$



When the variable is on the right side

*** Inequality sign will not match the arrow
Solve and graph and rewrite so the variable is on the left

$-6 > n - 5$
 $+5 \quad +5$

$-1 > n$
 rewrite! strictly greater not equal to -1
 $n < -1$

n was on pointing less than side

$\frac{1}{2} < 2 + a$
 $-2 \quad -2$

$-1.5 < a$
 $a > -1.5$
a was on open bigger side rewrite

Check:

$-1 > 1$ False
 $-1 > 0$ False

Decimal Inequalities

$x - 2.7 \geq -5.2$
 $+2.7 \quad +2.7$

$x \geq -2.5$
x is equal to -2.5

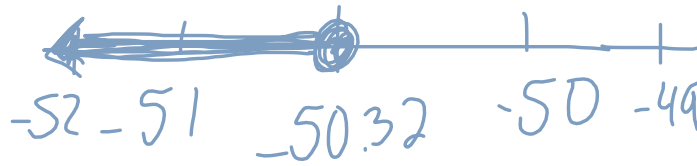
Take a step to rewrite or simplify before solving!

$$w - (-.32) \leq -50$$

$$w + 0.32 \leq -50$$

$$\begin{array}{r} -0.32 \quad -0.32 \\ \hline w \leq -50.32 \end{array}$$

$$\begin{array}{r} 50.00 \\ + 00.32 \\ \hline 50.32 \end{array}$$



If the variable is on the right

Rewrite it (before you start or at the end) keeping the expression on the lesser end still on the lesser end.

rewrite before you start

$$40 \geq -4x$$

$$\begin{array}{r} -4 \quad -4 \\ \hline -4 \cdot x \leq 40 \end{array}$$

Flip sign b/c we multiplied by a negative

$$x \geq -10$$

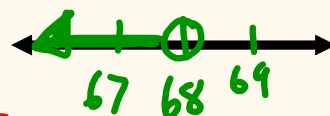
$$-2 \cdot (-34) < \left(\frac{p}{-2} \right) \cdot -2$$

Flip

$$68 > p$$

rewrite

$$p < 68$$



Solving
Inequalities
with
Fractions

To "divide" by the fraction, multiply by the reciprocal (multiply by the flipped fraction)

$$-\frac{3}{2} \left(\frac{-2x}{3} \right) > \left(\frac{9}{1} \right) \cdot \frac{3}{2} \quad \frac{2}{1} \left(\frac{-36}{1} \right) < \left(\frac{1p}{2} \right) \cdot \frac{2}{1}$$

Flip

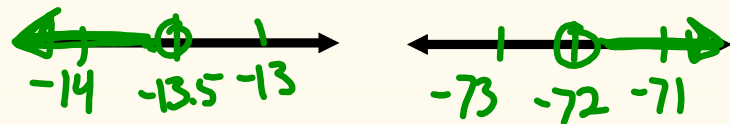
$$x < -\frac{27}{2}$$

$$x < -13.5$$

$$-72 < p$$

rewrite

$$p > -72$$



Write
Multiplication
and Division
Inequalities

A number x divided by fifteen is greater than or equal to sixty.

$$\frac{x}{15} \geq 60$$

A number multiplied by negative two thirds is less than zero.

$$< 0$$

Solve and graph the solutions

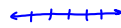
1. $w + 7 \leq 12$



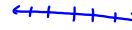
2. $3x - 9 > 15$



3. $-8 - 2y < 20$



4. $11 \leq a \leq 1$



Notice: the variable is not on the left

5. $x + 7 < -2x - 12$

$$\begin{array}{r} x + 7 < -2x - 12 \\ +2x \quad +2x \\ \hline 3x + 7 < -12 \\ -7 \quad -7 \\ \hline 3x < -19 \\ \div 3 \quad \div 3 \\ x < -6.\bar{3} \end{array}$$

6. $15 \geq x + 35 + 3x$



7. $21 \leq x - (-5)$



Notice: Numbers here are decimals.
Write out the work but use
a calculator to help you
add and subtract the amounts.

8. $2.50 + x \geq 17.99$



9. $x + 2 \geq 5$



10. $x + 2x \geq 5$



11. $-3x - 2x < 5$



12. $-(2 + 2m) - 2 > 6$



13. $-9 \geq -8(1 + 6v) - 1$



14. $8(1 - 4x) > 40$

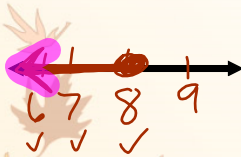


Solve and graph



$$u - 5 \leq 3$$

$$\begin{array}{r} +5 \quad +5 \\ \hline 4 \leq 8 \end{array}$$



Check

$$(8) - 5 \leq 3$$

$$3 \leq 3$$

True

$$r - 9 \geq 12$$

$$\begin{array}{r} +9 \quad +9 \\ \hline r \geq 21 \end{array}$$

greater than or equal to



check!

$$(21) - 9 \geq 12$$

$$12 \geq 12$$

check 2.2

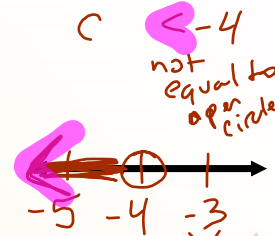
$$(22) - 9 \geq 12$$

$$13 \geq 12$$

yes

$$c + 6 < 2$$

$$\begin{array}{r} -6 \quad -6 \\ \hline c < -4 \end{array}$$



not equal to open circle

Watch out!

check -3

$$(-3) + 6 < 2$$

$$3 < 2$$

false

Solve and Graph

$$-3y < 15$$

$$7m \leq 21$$

$$-z < 3$$

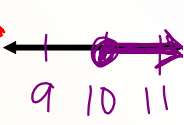
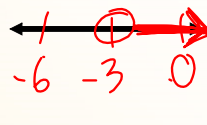
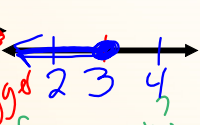
$$\frac{5}{1} t \geq \frac{2}{5}$$

~~-3~~ ~~-3~~ flip: $y > -5$

~~7~~ this is a positive # $m \leq 3$

~~-1~~ ~~-1~~ $z > -3$

$t \geq 10$



smaller
Bigger
What if we didn't flip the sign?

$$y < -5$$

check -6

$$-3y < 15$$

$$-3(-6) < 15$$

$$18 < 15$$

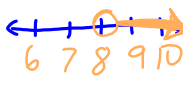
not true

Homework key

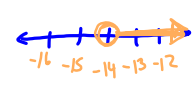
1. $w + 7 \leq 12$

$w \leq 5$ 

2. $3x - 9 > 15$

$3x > 24$
 $x > 8$ 

3. $-8 - 2y < 20$

$-2y < 28$
Flip! $y > -14$ 

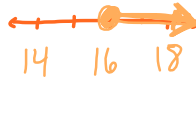
4. $|a| \geq 10$

$a \geq 10$ or $a \leq -10$ 

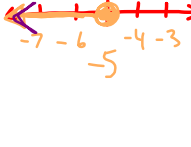
5. $x + 7 < -2x - 12$

$3x < -19$
 $x < -6.3$ 

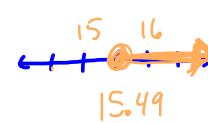
$x - (-5) \geq 21$

7. $21 \leq x - (-5)$
rewrite
 $21 \leq x + 5$
 $-5 \quad -5$
 $16 \leq x$
rewrite
 $x \geq 16$ 

6. $15 \geq x + 35 + 3x$

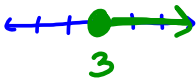
$15 \geq 4x + 35$
 $-20 \geq 4x$
 $-5 \geq x$
rewrite
 $x \leq -5$ 

8. $2.50 + x \geq 17.99$


$-2.50 \quad -2.50$
 $x \geq 15.49$ 

Homework key

9. $x + 2 \geq 5$

$x \geq 3$ 

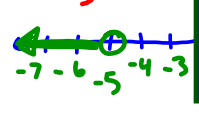
10. $x + 2x \geq 5$

$3x \geq 5$
 $x \geq \frac{5}{3}$ 

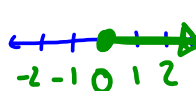
11. $-3x - 2x < 5$

$-5x < 5$
Flip! $x > -1$ 

12. $-(2 + 2m) - 2 > 6$

$-2 - 2m - 2 > 6$
 $-4 - 2m > 6$
 $-2m > 10$
 $m < -5$ 

13. $-9 \geq -8(1 + 6v) - 1$

$-9 \geq -8 - 48v - 1$
 $-9 \geq -9 - 48v$
 $0 \geq -48v$
 $0 \leq v$ Flip!
 $v \geq 0$ rewrite w/ v on left 

14. $8(1 - 4x) > 40$

$8 - 32x > 40$
 $-32x > 32$
 $x < -1$ 