3.4 Solving Linear Inequalities and Applications

There is a **<u>one-to-one correspondence</u>** between the real numbers and the points on a line. That is, each point on a number line corresponds to one real number, and each real number corresponds to one point on a number line.

Examples: Graph the following.

a) $x < 8$

b) $1 \leq t \leq 3$

Open dots indicate that these points are _____ in the graph.

Solid dots indicate that these points are _____ in the graph.

Open Interval $a < x < b$

Closed Interval $a \leq x \leq b$

Half-Open Interval

$a \leq x < b$

$a < x \leq b$

Open Interval

$x < a$

$x > b$

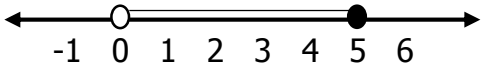
Half-Open Interval

$x \leq a$

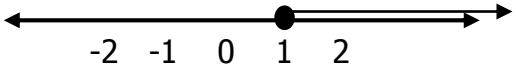
$x \geq b$

Examples: Represent the following graphs by using algebraic notation and tell what kind of interval it is.

a)



b)



When reading an inequality with a variable, read the variable first since reading the variable first will help in understanding the inequalities and drawing the correct related graphs.

For example:

$4 < x$ should be read from right to left as "x is greater than 4"

while $x > 4$ should be read from left to right as "x is greater than 4"

$-2 < x < 5.1$ should be read as follows: "x is greater than -2 and x is less than 5.1"

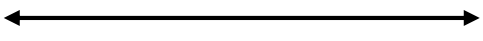
Solving Linear inequalities is identical to solving linear equations with one exception:

_____ or _____ both sides of an inequality by a _____ number causes the inequality to be reversed.

Examples: Solve the following linear inequalities and graph the solutions.

a) $5x + 4 \leq -1$

b) $-4x + 1 > 3 - 2x$



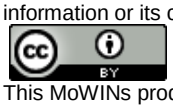
c) $-1 < -2(x + 1) \leq 3$

*NOTE: rewrite with the smaller number on the left, (the preferred way because the numbers are in the same order as on the number line)

d) To receive a B grade, a student must average 80 or more but less than 90. If John received a B in the course and had five grades of 94, 86, 78, 91, and 87 before taking the final exam, what were the possible grades for his final if there were 100 points possible?

e) Ellen is going to buy 30 stamps, some 23-cent and some 41-cent. If she has $8.34, what is the maximum number of 41-cent stamps she can buy?

This document is 100% funded by the MoSTEMWINs $19.7 million grant from the U.S. Department of Labor, Employment and Training Administration (TAACCCT). The product was created by the grantee and does not necessarily reflect the official position of the U.S. Department of Labor. The Department of Labor makes no guarantees, warranties or assurances of any kind, express or implied, with respect to such information, including any information on linked sites and including, but not limited to, accuracy of the information or its completeness, timeliness, usefulness, adequacy, continued availability, or ownership.



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