Enrichment Topic B

Inequality conjunctions and disjunctions

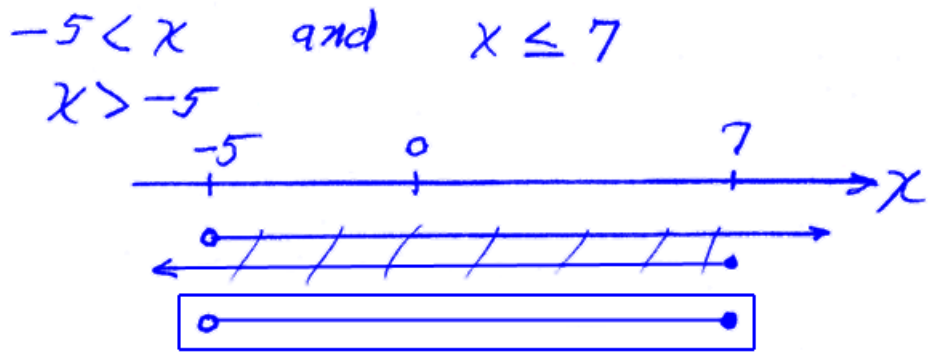
Consider the inequality **conjunction**:

$-5 < x \leq 7$

This is equivalent to

$-5 < x$ **and** $x \leq 7$ where the "and" implies an **intersection** (overlap) of the answers from each part.

Example 1: Draw the values of *x* given by $-5 < x \leq 7$ on a number line.



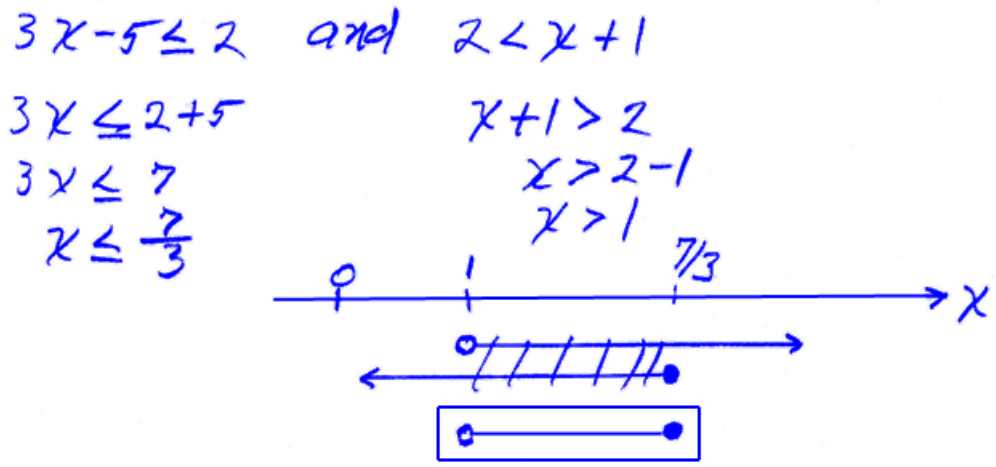
In a similar way

$3x - 5 \leq 2 < x + 1$

is an inequality conjunction that can be separated into two parts:

$3x - 5 \leq 2$ **and** $2 < x + 1$ where, again, the "and" is implied.

Example 2: Solve $3x - 5 \leq 2 < x + 1$

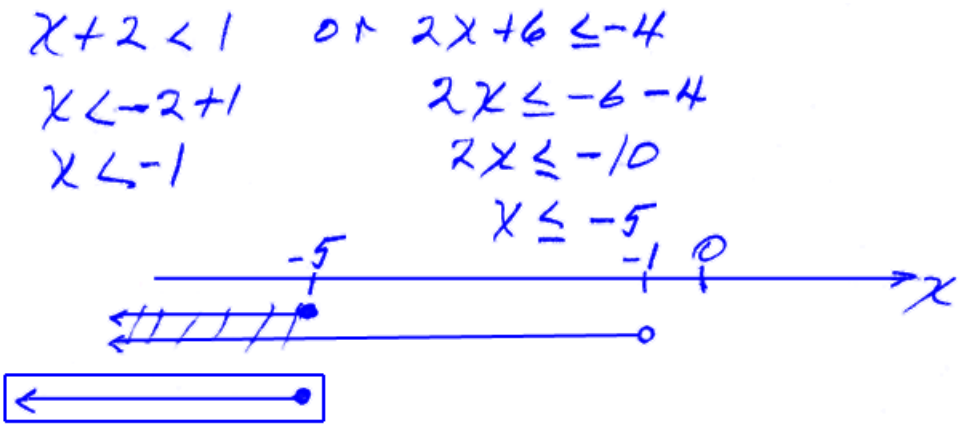


An inequality **disjunction** is always written with an **explicit** "**or**" (with a conjunction, the "and" is often implied) and typically looks like this:

(Inequality statement #1) or (Inequality statement # 2)

The "or" indicates that the **union** is to be taken of the answers from both parts. The union, in turn, means to "take everything".

Example 3: Find the solution to $x + 2 < 1$ or $2x + 6 \leq -4$



Assignment:

1. Separate $-5 < x \leq -17$ into two different inequalities.

$-5 < x$ and $x \leq -17$

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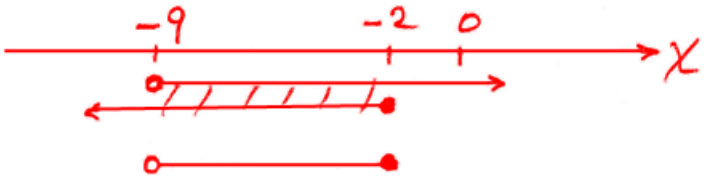
2. Separate $-9 < x \leq -2$ into two different inequalities and then graph the indicated values of *x* on a number line.

$-9 < x$ and $x \leq -2$

$x > -9$



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3. Separate $-1 \leq x + 3 < 8$ into two different inequalities and then graph the indicated values of *x* on a number line.

$-1 \leq x+3$ and $x+3 < 8$

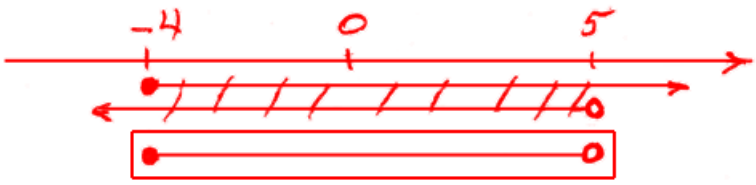
$x+3 \geq -1$

$x \geq -3-1$

$x \geq -4$

$x < 8-3$

$x < 5$



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4. Graph the indicated values of *x* on a number line for this inequality disjunction:

$x > 2$ or $x < -8$

5. Graph the indicated values of *x* on a number line for this inequality conjunction:

$x > -11$ and $x < 2$

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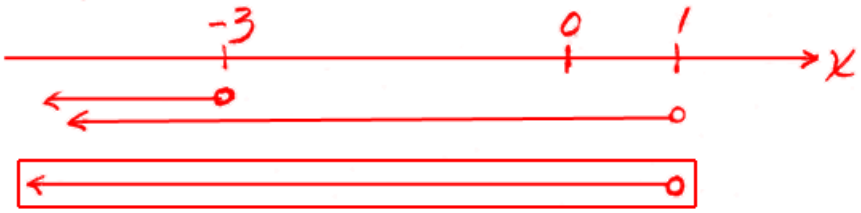
6. On a number line graph the values of *x* indicated by these inequalities:

$-2x + 1 > 7$ or $x + 4 < 5$

$-2x + 1 > 7$ or $x + 4 < 5$

$-2x > 6$ $x < 5 - 4$

$x < -3$ $x < 1$



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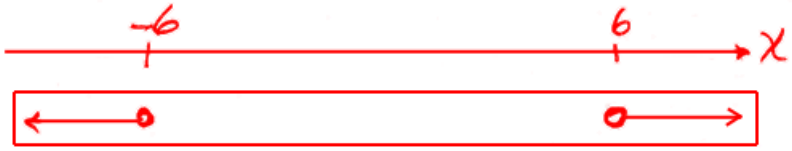
7. On a number line graph the values of *x* indicated by these inequalities:

$x + 3 > 9$ or $x + 4 < -2$

$x + 3 > 9$ or $x + 4 < -2$

$x > 9 - 3$ $x < -4 - 2$

$x > 6$ $x < -6$



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8. "and" is associated with

A. conjunction
B. disjunction
C. neither

A

9. "or" is associated with

A. conjunction
B. disjunction
C. neither

B