Name: _____   Date: _____

Unit 3 Lesson 5: Interval Notation! ☺

We will often want to talk about **continuous segments** of the **real number line.** We've already done work with this in the last lesson using what is known as **inequality or set-builder notation.** Today we will see a very simple way of showing these segments.
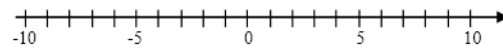
Exercise #1: For each of the following, graph the portion of the number line described by the inequality and then write the equivalent using **interval notation**.
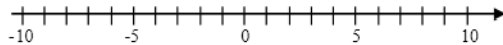
(a) $-3 \leq x \leq 5$
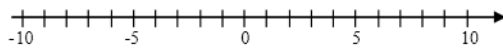
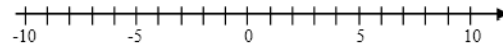Equivalent Interval Notation: _____

(b) $-6 < x < 4$

Equivalent Interval Notation: _____

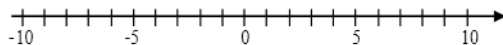(c) $-4 < x \leq 8$

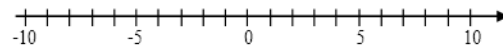Equivalent Interval Notation: _____

(d) $x \geq 4$

Equivalent Interval Notation: _____

(e) $x < 5$

Equivalent Interval Notation: _____

(f) $-4 < x$

Equivalent Interval Notation: _____

One of the great advantages of **interval notation** is that we essentially need to know a starting value, an ending value and then whether they are included or not.
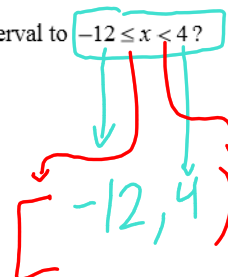
Exercise #2: Which of the following represents the equivalent interval to $-12 \leq x < 4$?

(1) $(-12, 4)$ (3) $[-12, 4)$
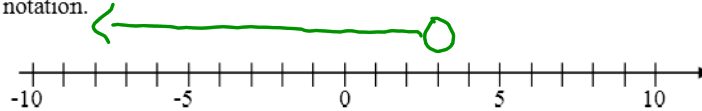
(2) $(-12, 4]$ (4) $[-12, 4]$

$[-12, 4)$

Eventually, we will use **interval notation** to express solutions sets to inequalities as well as to describe sets of interest to us.

Exercise #3: Solve the inequality given below for all values of x. Graph the solution on the number line given and state the solution set using interval notation.

Solve: $12 - 4x > 0$

$$\underline{-12 \quad\quad -12}$$

$$-4x > -12$$

$$\frac{-4x}{-4} > \frac{-12}{-4}$$

$$x < 3$$

Interval Notation: $(-\infty, 3)$

Intervals express information about particular values of a variable. We can look at the same types of problems from the last lesson, where intervals combine in various ways.

Exercise #4: Two inequalities have solution sets given in interval notation below.
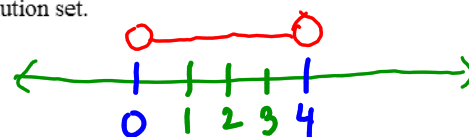
Inequality #1: $[-3, 2)$ Inequality #2: $(0, 4)$

(a) Write an interval that represents all values that are solutions to both inequalities (AND). Draw number lines to help you think about the solution set.

(b) Write an interval that represents all values that are solutions to either of the inequalities ~~(OR)~~ **(AND)**. Draw number lines to help you think about the solution set.

Exercise #5: At a hydroelectric plant, Pump #1 is on for all times on the interval $[0, 8)$ and Pump #2 is on for all times in the interval $[4, 18)$. Which of the following represents all times, t, when both pumps are on?

(1) $4 \le t < 8$ (3) $4 < t < 8$

(2) $0 \le t < 18$ (4) $8 \le t \le 18$

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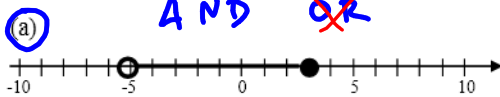### INTERVAL NOTATION…
HOMEWORK

FLUENCY! $<$ $>$ ○ ⟶ ( ) $\leq$ 2 ● ⟶ [ ]   UNION

1. Write sets using **interval notation** for the sections of the number lines shown graphed below.
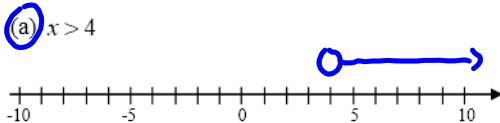
(a)   AND   ~~OR~~

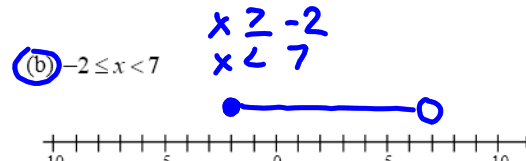Equivalent Interval Notation: $(-5, 3]$

(b)   AND, OR

Equivalent Interval Notation: $(-\infty, -7] \cup (-3, \infty)$
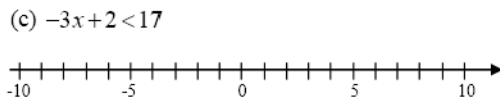
2. For each of the following, graph the portion of the number line described by the inequality and then write the equivalent using **interval notation**.
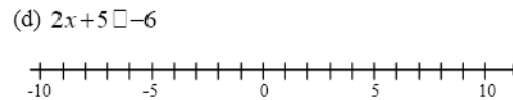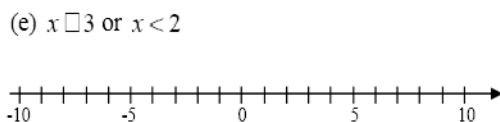
(a) $x > 4$

Equivalent Interval Notation: $(4, \infty)$

(b) $-2 \leq x < 7$

$x \geq -2$
$x < 7$

Equivalent Interval Notation: $[-2, 7)$

(c) $-3x + 2 < 17$

Equivalent Interval Notation: _____

(d) $2x + 5 \,\square\, -6$

Equivalent Interval Notation: _____

(e) $x \,\square\, 3$ or $x < 2$

Equivalent Interval Notation: _____

(f) $x \,\square\, 4$ and $x < -4$

Equivalent Interval Notation: _____