Name: _____   Date: _____

INTERVAL NOTATION
COMMON CORE ALGEBRA I

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.
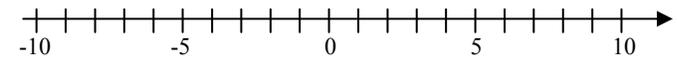
Exercise #1: For each of the following, graph the portion of the number line described by the inequality and then write the equivalent using **interval notation**.
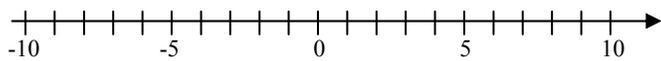
(a) $-3 \le x \le 5$
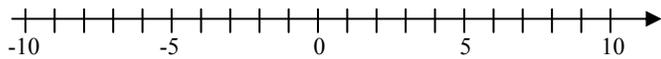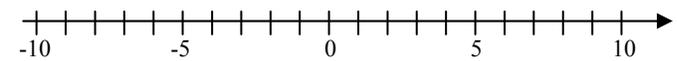
Equivalent Interval Notation: _____

(b) $-6 < x < 4$

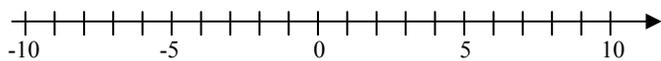Equivalent Interval Notation: _____

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

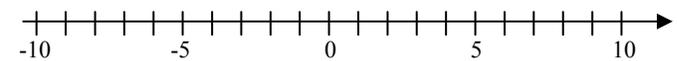Equivalent Interval Notation: _____

(d) $x \ge 4$

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 $-12 \le x < 4$?
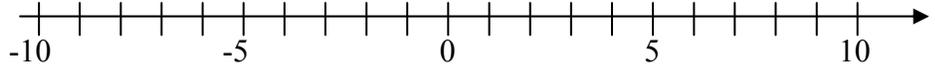
(1) $(-12, 4)$

(2) $(-12, 4]$

(3) $[-12, 4)$

(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.

$12 - 4x > 0$

Interval Notation: _____

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). 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) $4 \leq t < 8$ (3) $4 < t < 8$

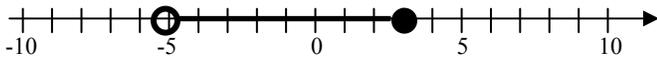(2) $0 \leq t < 18$ (4) $8 \leq t \leq 18$

Name: _____   Date: _____

INTERVAL NOTATION
COMMON CORE ALGEBRA I HOMEWORK
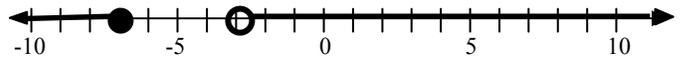
FLUENCY

1. Write sets using **interval notation** for the sections of the number lines shown graphed below.

   (a)

   Equivalent Interval Notation: _____
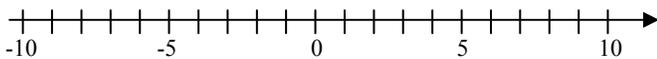
   (b)

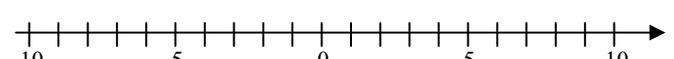
   Equivalent Interval Notation: _____

2. For each of the following, graph the portion of the number line described by the inequality and then write the inequality using **interval notation**.
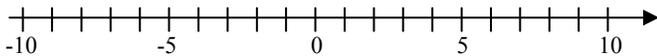
   (a) $x > 4$

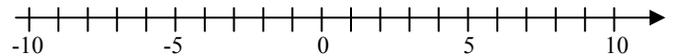   Equivalent Interval Notation: _____

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

   Equivalent Interval Notation: _____
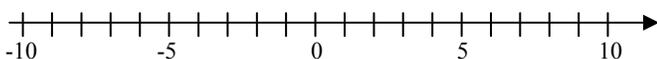
   (c) $-3x + 2 < 17$

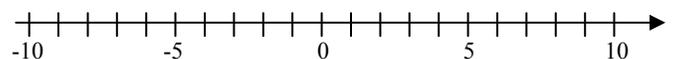   Equivalent Interval Notation: _____

   (d) $2x + 5 \ge -6$

   Equivalent Interval Notation: _____

   (e) $x \ge 3$ or $x < 2$

   Equivalent Interval Notation: _____

   (f) $x \ge 4$ and $x < -4$

   Equivalent Interval Notation: _____

3. Cookies have to be in the oven between 8 and 12 minutes and brownies have to be in the oven between 9 and 14 minutes. Which of the following represents all times, t, when both are in the oven at the same time?

(1) $9 \le t \le 12$ (3) $8 \le t \le 14$

(2) $8 \le t \le 14$ (4) $12 \le t \le 14$

APPLICATIONS

4. A new office-residential building just opened in Lagrangeville and the contractor is monitoring the water use. For the most part, water is used by the office between the hours of 7 AM – 7 PM and the residential section between 12AM – 9 AM or 3PM – 12AM, including the endpoint times.

(a) Create a compound inequality written in interval notation that represents the hours that both sections (residential and office) are using water at the same time. Graph the solution on the number line given. Assume that 12 AM corresponds to zero and a time such as 3 PM corresponds to 15. As a start, it might help to graph each individual section's water use and see where they overlap.

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 +————+————+————+————+————▶
 0    6    12   18   24
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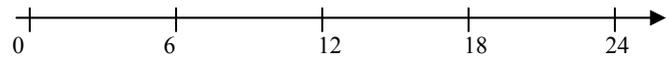
(b) If the water heater in the building cannot sustain more than 4 hours of use from both parties at the same time, will there be a period of the day that cold water will start to be produced? Explain

REASONING

5. Aidan wrote the interval $(-5, 4]$ and claimed it was equivalent to the graph below. Explain what he did wrong and correct his mistake.

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 -10      -5      0      5      10
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