Name: _____ Date: _____

SETS OF NUMBERS
N-GEN MATH® ALGEBRA I

*The idea of a **set** is extremely important in math, and it is also extremely simple. A **set** is just **a collection of things**, which could be numbers, but do not have to be. The things "inside" of a set are called its **elements**. In this lesson, we will learn about various sets of numbers and how to represent them.*

***Exercise* #1:** When we can **list** the elements of a set, we will often write the set in **roster** form. Write each of the following sets in roster form.

(a) all integers that are at least 12 and at most 17

(b) all integers that are greater than -5

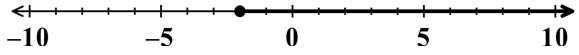
*Notice that sets in roster form can have an **infinite number** of elements, as in Exercise #1(b). Sometimes, sets cannot be written in roster form.*

***Exercise* #2:** Why would it be impossible to write the set of all fractions (rational numbers) between 0 and 1 in roster form (list form)?

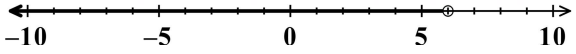
*Recall that the **set of real numbers** is all the numbers that you now know of, including negative and positive integers, **rational numbers (fractions)**, and **irrational numbers** like π (pi). When we have continuous sets of real numbers, we will often represent these sets using **set-builder notation**.*

***Exercise* #3:** Each number line below shows a set of real numbers. Write the set using set-builder notation.

(a)



(b)



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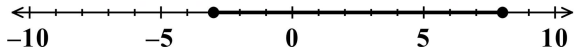
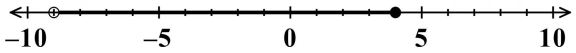


(d)



Set-builder notation can be used to represent elements of a set even when the set does not have an infinite number of elements.

***Exercise* #4:** Consider set shown below in roster form.

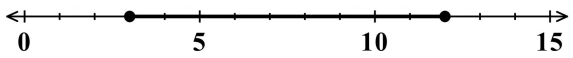
$$\{-3, -2, -1, 0, 1, 2, 3, 4, 5, 6, 7\}$$

(a) Explain why would it be incorrect to write the set as $\{x \text{ is any real number} \mid -3 \le x \le 7\}$?

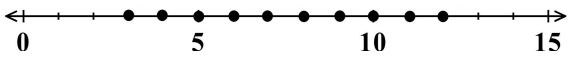
(b) Write two correct ways to write this set using set-builder notation. (There are four distinctly correct ways).

***Exercise* #5:** Each number line below shows a set of numbers. Write the set using set-builder notation.

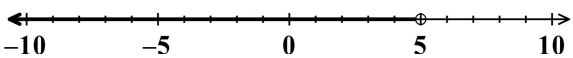
(a)



(b)



(c)



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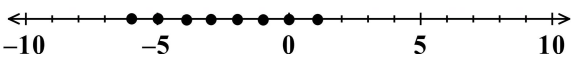


***Exercise* #6:** Indigo records the ages of all of the kids at her birthday party. She describes all of the ages using the set shown below:

$$\{a \text{ is any integer} \mid 13 \le a < 18\}$$

(a) Rewrite this set using roster notation.

(b) How many elements are in the set?

Name: _____ Date: _____

SETS OF NUMBERS
N-GEN MATH® ALGEBRA I HOMEWORK

FLUENCY

1. Which of the following is the name given for the things that are collected in a set?

   (1) items

   (2) elements

   (3) settlings

   (4) variables

   _____

2. Write out sets in **roster form** that meet the each of the descriptions below:

   (a) all integers that are at least 7 and at most 12

   (b) all integers that are greater than -2 and are less than 5

   (c) all integers that are at least 8

   (d) all integers that are less than 10

3. Which set of numbers would be impossible to write in roster form?

   (1) all integers that are at least three and at most nine

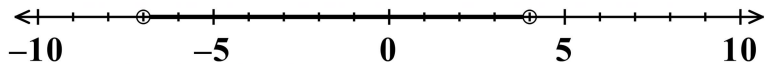
   (2) all integers that are greater than four

   (3) all rational numbers that are at least five and at most five

   (4) all rational numbers greater than zero

   _____

4. Which of the following sets describes all of the numbers represented on the number line below?



   (1) $\{x \text{ is any real number} \mid -7 < x < 4\}$

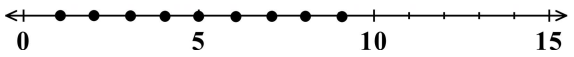
   (2) $\{x \text{ is any integer} \mid -7 < x < 4\}$

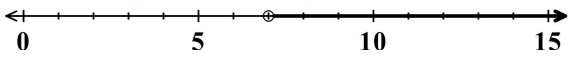
   (3) $\{x \text{ is any real number} \mid -7 \le x \le 4\}$

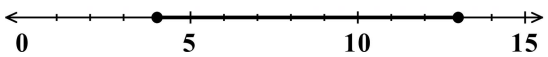
   (4) $\{x \text{ is any integer} \mid -7 \le x \le 4\}$

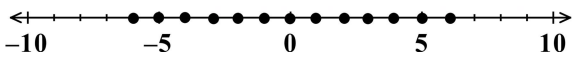
   _____

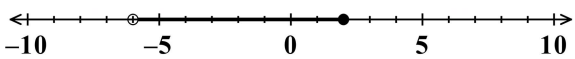
5. For each set of numbers shown on the number lines below, write the set using set-builder notation. There may be more than one correct way to write some of them.

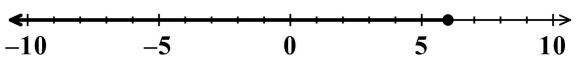
(a) 

(b) 

(c) 

(d) 

(e) 

(f) 

APPLICATIONS

6. A recipe for a roast chicken states that it must be kept in the oven for at least 55 minutes and for at most 80 minutes. Which of the following would be the correct way to describe the set of all times, in minutes, that the chicken can be in the oven?

   (1) $\{m \text{ is any real number} \mid 55 \le m \le 80\}$

   (2) $\{m \text{ is any integer} \mid 55 \le m \le 80\}$

   (3) $\{m \text{ is any real number} \mid 55 < m < 80\}$

   (4) $\{m \text{ is any integer} \mid 55 < m < 80\}$

7. In order to operate, a bus tour must have at least 5 people take the tour. The bus, though, cannot hold more than 30 people (not including the driver). Write a set, using set-builder notation, for the number of people, p, who could possibly be on a given bus tour.

REASONING

8. A set is given using set-builder notation as $\left\{x \text{ is any integer} \mid \frac{13}{4} \le x \le \frac{31}{8}\right\}$. Explain why this set has no elements in it (known as an **empty set).**