

3-1 Inequalities and Their Graphs^(CED.1)

I can...write, graph, and identify solutions of inequalities.

Vocabulary

Solution of an Inequality _____

$\geq$ _____ $\leq$ _____

$>$ _____ $<$ _____

1. Writing Inequalities

Ex. What inequality represents the verbal expression?

a) All real numbers x less than or equal to -7

b) 6 less than a number k is greater than 13

c) All real numbers p greater than or equal to 1.5

d) The sum of t and 7 is less than -3

2. Identifying Solutions by Evaluating

Ex. Is the number a solution to $2x + 1 > -3$?

a) -3

b) -1

Ex. Consider -1 , 0 , 1 , and 3 . Which are solutions to $13 - 7y \leq 6$?

3. Graphing an Inequality

Ex. What is the graph of $2 \geq a$?

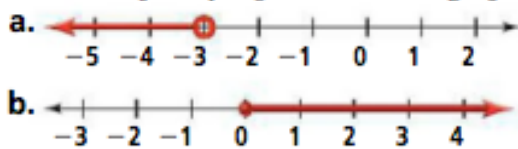
Ex. What is the graph of $3 \leq n$?

Ex. What is the graph of $x > -4$?

Ex. What is the graph of $c < 0$?

4. Writing an Inequality From a Graph

What inequality represents each graph?



5. Writing Real-World Inequalities



What inequality describes the situation?

Words	Symbol	Graph
x is less than 3		
x is greater than -2		
x is less than or equal to 0		
x is greater than or equal to 1		

3-2 Solving Inequalities Using Addition or Subtraction(REF.3)

I can...use addition and subtraction to solve inequalities.

Vocabulary

Equivalent inequality _____

Addition Property of inequality _____

Subtraction Property of inequality _____

1. Using the Addition Property of Inequality

Ex. What is the solution of $x - 15 > -12$? Graph the solution.

Ex. What is the solution of $n - 5 < -3$? Graph the solution.

2. Solving an Inequality and Checking Solutions

Ex. What is the solution of $10 \geq x - 3$? Graph and check the solution.

Ex. What is the solution of $M - 11 \geq -2$? Graph and check the solution.

3. Using the Subtraction Property of Inequality

Ex. What is the solution of $t + 6 > -4$? Graph the solution.

Ex. What is the solution of $-1 \geq y + 12$? Graph the solution.

3-2 Continued

4. Writing and Solving an Inequality

Ex. The hard drive on your computer has a capacity of 120 gigabytes (GB). You have used 85 GB. You want to save some home videos to your hard drive. What are the possible sizes of the home video collection you can save?

Ex. A club has a goal to sell at least 25 plants for a fundraiser. Club members sell 8 plants on wednesday and 9 plants on Thursday. What are the possible numbers of plants the club can sell on Friday to meet their goal?

3-3 Solving Inequalities Using Multiplication or Division(CED.1)

I can...use multiplication or division to solve inequalities.

Vocabulary

Multiplication Property of inequality _____

Division Property of inequality _____

Fray Model(s): Properties of Inequalities

1. Multiplying by a Positive Number

Ex. What are the solutions of $\frac{x}{3} < -2$? Graph the solutions.

Ex. What are the solutions of $\frac{c}{8} > \frac{1}{4}$? Graph the solutions.

2. Multiplying by a Negative Number

Ex. What are the solutions of $-\frac{3}{4}w \geq 3$? Graph the solutions and check.

Ex. What are the solutions of $-\frac{n}{3} < -1$? Graph the solutions and check.

3-3 Continued

2. Dividing by a Positive Number

Ex. You walk dogs in your neighborhood after school. You earn \$4.50 per dog. How many dogs do you need to walk to earn at least \$75?

Ex. A student club plans to buy food for a soup kitchen. A case of vegetables costs \$10.68. The club can spend at most \$50 for this project. What are the possible numbers of cases the club can buy?

2. Dividing by a Negative Number

Ex. What are the solutions of $-9y \leq 63$? Graph the solutions.

Ex. What are the solutions of $-5x > -10$? Graph the solutions.

3-4 Solving Multi-Step Inequalities^(REI.3)

I can...solve multi-Step inequalities.

1. Using More Than One Step

Ex. What are the solutions of $9 + 4t > 21$? Check the solutions.

Ex. What are the solutions of the inequality? Check the solutions.

a) $-6a - 7 \leq 17$

b) $-4 < 5 - 3n$

c) $50 > 0.8x + 30$

2. Writing and Solving a Multi-Step Inequality

Ex. In a community garden, you want to fence in a vegetable garden that is adjacent to your friend's garden. You have at most 42 ft of fence. What are the possible lengths of your garden?

Ex. You want to make a rectangular banner that is 18 ft long. You have no more than 48 ft of trim for the banner. What are the possible widths of the banner?

3. Using the Distributive Property

Ex. What are the solutions of the inequality? Check your solutions.

a) $3(t + 1) - 4t \geq -5$

b) $15 \leq 5 - 2(4m + 7)$

4. Solving an Inequality With Variables on Both Sides

Ex. What are the solutions of the inequality? Check your solutions.

a) $6n - 1 > 3n + 8$

b) $3b + 12 > 27 - 2b$

5. Inequalities With Special Solutions (All Real Numbers or No Solutions)

Ex. What are the solutions of the inequality?

a) $10 - 8a \geq 2(5 - 4a)$

b) $9 + 5n \leq 5n - 1$

c) $8 + 6x \geq 7x + 2 - x$

3-5 Working with Sets(REI.3)

I can...write sets and identify subsets...find the complement of a set.

Vocabulary

Universal Set

Set Builder Notation

Empty Set

Roster form

1. Using Roster Form and Set-Builder Notation

Ex. How do you write “t is the set of natural numbers that are less than 6” in roster form?
In set-builder form?

Ex. N is the set of even natural numbers that are less than or equal to 12. How do you write N in roster form? In set-builder notation?

2. Inequalities and Set-Builder Notation

Ex. In set-builder notation, how do you write the solution of the inequality?

a) $-5x + 7 \leq 17$

b) $9 - 4n > 21$

3-5 Continued

3. Finding Subsets

Ex. What are all the subsets of the set $\{3,4,5\}$?

Ex. What are all the subsets of the set $P=\{a,b\}$? Of the set $S=\{a,b,c\}$

3-6 Compound Inequalities(Q.1)

I can...solve/graph inequalities containing the word *and*...solve/graph inequalities containing the word *or*.

Vocabulary

Interval Notation _____

Fray Model(s): Compound Inequality

1. Writing a Compound Inequality

Ex. What compound inequality represents the phrase? Graph the solutions.

- a) All real numbers that are greater than -2 and less than 6.

- b) All real numbers that are less than 0 or greater than or equal to 5.

- c) All real numbers that are greater than or equal to -4 and less than 6.

- d) All real numbers that are less than or equal to $2\frac{1}{2}$ or greater than 6.

2. Solving a Compound Inequality Involving And

Ex. What are the solutions to the inequalities? Graph their solutions.

a) $-3 \leq m - 4 < -1$

b) $-2 < 3y - 4 < 14$

3-6 Continued

3. Writing and Solving a Compound Inequality

Ex. To earn a B in your algebra course, you must achieve an unrounded test average between 84 and 86, inclusive. You scored 86, 85, and 80 on the first three tests of the grading period. What possible scores can you earn on the fourth and final test to earn a B in the course?

Ex. Suppose you scored 78, 78, and 79 on the first three tests. Is it possible for you to earn a B in the course? Assume that 100 is the maximum grade you can earn in the course and on the test. Explain.

4. Solving a Compound Inequality Involving or

Ex. What are the solutions to the inequalities? Graph their solutions.

$$\begin{array}{ll} \text{a) } 3t + 2 < -7 \text{ or } -4t + 5 < 1 & \text{b) } \\ -2y + 7 < 1 \text{ or } 4y + 3 \leq -5 & \end{array}$$

2. Using Interval Notation

Ex. What is the graph of the interval? How do you write it as an inequality.

$$\begin{array}{lll} \text{a) } [-4, 6) & \text{b) } (-2, 7] & \text{c) } y > 7 \end{array}$$

3-7 Absolute Value Equations and Inequalities^(REI.3)

I can...solve equations and inequalities involving absolute value.

Fray Model(s): Absolute Value Equation

1. Solving an Absolute Value Equation

Ex. What is the solution of the equation? Graph and check the solution.

a) $|x| + 2 = 9$

b) $|n| - 5 = -2$

Ex. Starting from 100 ft away, your friend skates toward you and then passes by you. She skates at a constant speed of 30 ft/s. Her distance d from you in feet after t seconds is given by $d = |100 - 20t|$. At what times is she 40 ft from you?

Ex. Another friend's distance d from you (in feet) after t seconds is given by $d = |80 - 5t|$. What does the 80 in the equation represent? What does the 5 in the equation represent? At what times is she 60 ft from you?

3. Solving an Absolute Value Equation with No Solution

Ex. What is the solution of the equation?

a) $|3x - 6| - 5 = -7$

b) $3|2z + 9| + 12 = 10$

3-7 Continued

4. Solving an Absolute Value Inequality involving $\geq$

Ex. What are the solutions of $|8n| \geq 24$? Graph the solution.

Ex. What are the solutions of $|2x + 4| \geq 5$? Graph the solution.

4. Solving an Absolute Value Inequality involving $\leq$

Ex. A company makes boxes of crackers that should weigh 213 g. A quality-control inspector randomly selects boxes to weigh. Any box that varies from the weight by more than 5 g is sent back. What is the range of allowable weights for a box of crackers?

Ex. A food manufacturer makes 32-oz boxes of pasta. Not every box weighs exactly 32 oz. The allowable difference from the ideal weight is at most 0.05 oz. Write and solve an absolute value inequality to find the range of allowable weights?

3-8 Unions and Intersections of Sets (CED.1)

I can...find unions and intersections of sets.

Vocabulary

Union

Intersection

Disjoint Sets

1. Unions of Sets

Ex. In your left pocket, you have a quarter, a paper clip, and a key. In your right pocket, you have a penny, a quarter, a pencil, and a marble. What is a set that represents the different items in your pockets?

Ex. Write sets P and Q in roster form? What is $P \cup Q$?

$P = \{x | x \text{ is a whole number less than } 5\}$

$Q = \{y | y \text{ is an even natural number less than } 5\}$

2. Intersection of Sets

Ex. Set $X = \{x | x \text{ is a natural number less than } 19\}$

Set $Y = \{y | y \text{ is an odd integer}\}$

Set $Z = \{z | z \text{ is a multiple of } 6\}$

a) What is $X \cap Z$?

b) What is $Y \cap Z$?

3-8 Continued

3. Making a Venn Diagram

Let $A = \{x \mid x \text{ is one of the first five letters in the English Alphabet}\}$

$B = \{x \mid x \text{ is a vowel}\}$, and $C = \{x \mid x \text{ is a letter in the word VEGETABLE}\}$

Ex. What letters are in all three sets?

4. Writing Solutions of an Inequality

Ex. Write the solutions as either the unions or intersection of two sets.

a) $|2x - 1| < 3$

b) $8 \leq x + 5 < 11$

c) $|4x - 6| > 14$