

Name: _____

Date: _____

Introduction to Inequalities Algebra 1

For any two real numbers a and b , one of three possibilities exists: either a is less than b ($a < b$), a is equal to b ($a = b$), or a is greater than b ($a > b$). When comparing the values of two numbers on a real number line, the larger one is to the right of the smaller one. If the two numbers have the same value, then their graphs are at the same location on the real number line.

Exercise #1: State whether the given inequality represents a true (T) statement or a false (F) statement.

- | | | |
|---------------------------------------|---|-----------------------------------|
| (a) $7 > 5$ _____ | (e) $\frac{3}{5} > \frac{12}{20}$ _____ | (i) $\sqrt{10} < \sqrt{11}$ _____ |
| (b) $-7 > -2$ _____ | (f) $-2.6 > -4.1$ _____ | (j) $\sqrt{0} > -\sqrt{4}$ _____ |
| (c) $0 < -4$ _____ | (g) $\pi > \sqrt{2}$ _____ | (k) $-\sqrt{1} < -1$ _____ |
| (d) $\frac{1}{2} > \frac{1}{4}$ _____ | (h) $-\sqrt{35} > -6$ _____ | (l) $ -2 < -5 $ _____ |

Recall: $a \leq b$ means that “ a is less than or equal to b .” and $a \geq b$ means that “ a is greater than or equal to b .”

Exercise #2: State whether the given inequality represents a true (T) statement or a false (F) statement.

- | | | | |
|-----------------------------------|--|------------------------|------------------------|
| (a) $-2 \geq -\frac{12}{6}$ _____ | (b) $\frac{2}{5} \leq \frac{12}{30}$ _____ | (c) $-7 \leq -5$ _____ | (d) $-4 \geq -3$ _____ |
|-----------------------------------|--|------------------------|------------------------|

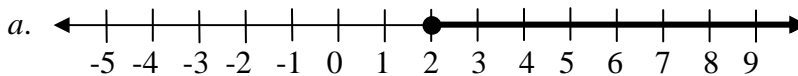
Exercise #3: Circle each replacement for x from the accompanying list that makes the inequality true.

- | | |
|-----------------------|--|
| (a) $x \geq -5$ | $-14, -11, -8, -5, -2, -1, 0, 3, 7, 10$ |
| (b) $x \leq -2$ | $-14, -11, -8, -5, -2, -1, 0, 3, 7, 10$ |
| (c) $ x \leq 3$ | $-8, -7, -6, -5, -4, -3, -2, -1.5, -1, -0.6, 0, 1, 1.25, 2, 3, \pi, 4, 5, 5.8, 6$ |
| (d) $ x \geq 2$ | $-8, -7, -6, -5, -4, -3, -2, -1.5, -1, -0.6, 0, 1, 1.25, 2, 3, \pi, 4, 5, 5.8, 6$ |
| (e) $x < 5$ | $\sqrt{22}, \sqrt{23}, \sqrt{24}, \sqrt{25}, \sqrt{26}, \sqrt{27}, \sqrt{28}$ |
| (f) $x > \frac{5}{3}$ | $0, 1, \frac{7}{5}, \frac{3}{2}, \frac{10}{6}, \frac{15}{9}, \frac{20}{12}, 2, 3, 4$ |

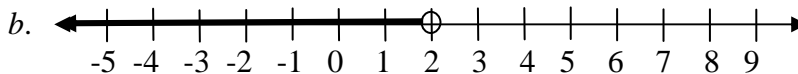
When we graph solutions to an inequality on a real number line, we darken all numbers on the number line that make the inequality true. We call the set of all solutions the **solution set**.

Exercise #4: Match each inequality with the graph of its solution set.

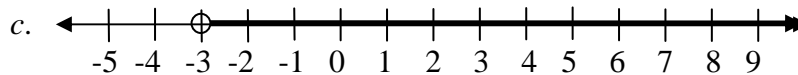
1. $x \leq -3$ _____



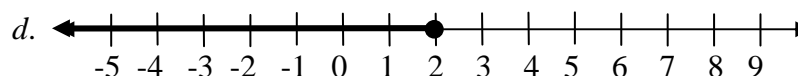
2. $x > -3$ _____



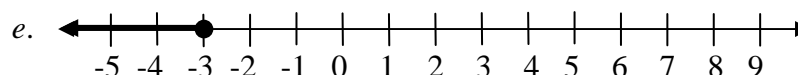
3. $x > 2$ _____



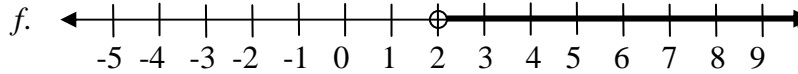
4. $x \geq 2$ _____



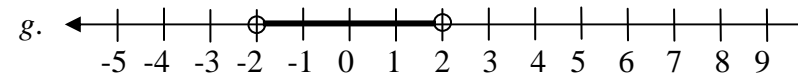
5. $x < 2$ _____



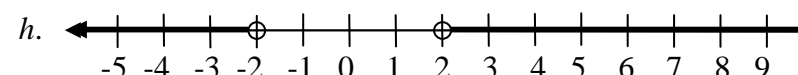
6. $x \leq 2$ _____



7. $|x| > 2$ _____

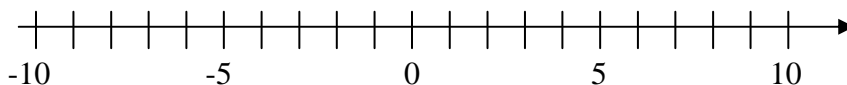


8. $|x| < 2$ _____

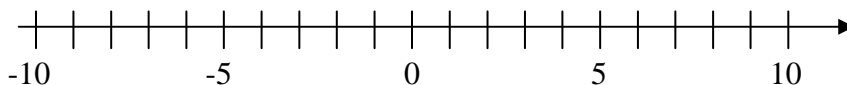


Exercise #5: Graph the solution set for each inequality on the accompanying number line.

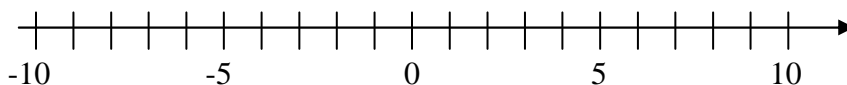
(a) $x \leq -1$



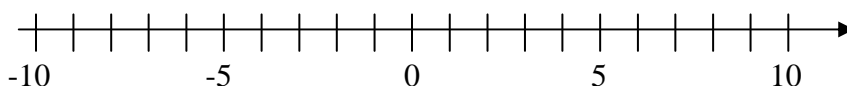
(b) $x > 4$



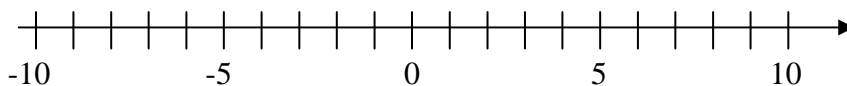
(c) $x \geq 6$



(d) $|x| \leq 3$



(e) $|x| > 1$



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Introduction to Inequalities Algebra 1 Homework

Skills

1. State whether the given inequality represents a true (T) statement or a false (F) statement.

(a) $8 < 6$ _____ (e) $1.25 \leq \frac{5}{4}$ _____ (i) $-\sqrt{9} \leq -3$ _____

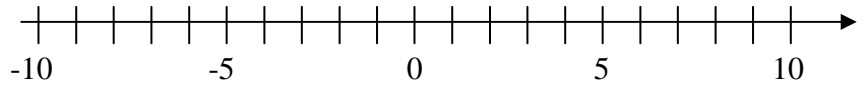
(b) $-11 > -12$ _____ (f) $-3 \geq -5$ _____ (j) $|-2| > |-1|$ _____

(c) $-3 < 0$ _____ (g) $\pi \leq 4$ _____ (k) $|-3| < |1|$ _____

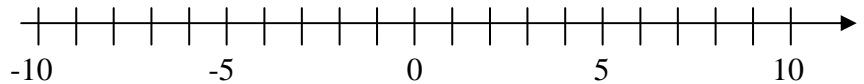
(d) $\frac{2}{3} > \frac{3}{4}$ _____ (h) $-\sqrt{12} < -3$ _____ (l) $\sqrt{0} \geq 0$ _____

2. Graph the solution set for each inequality on the accompanying number line.

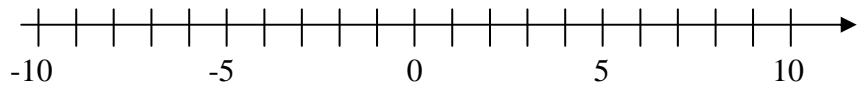
(a) $x \leq -3$



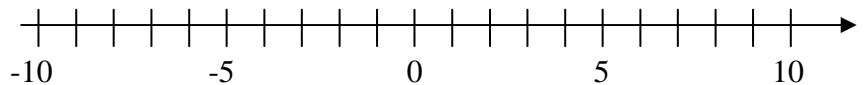
(b) $x \geq 7$



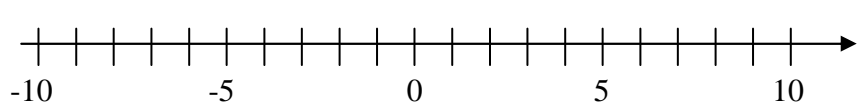
(c) $x > 0$



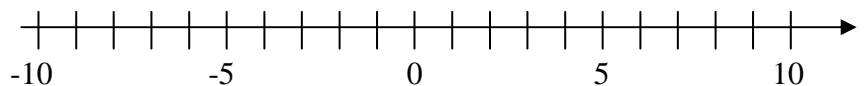
(d) $x \geq -5$



(e) $x > 5\frac{1}{2}$

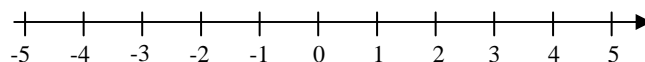


(f) $x \leq -1.5$



Applications

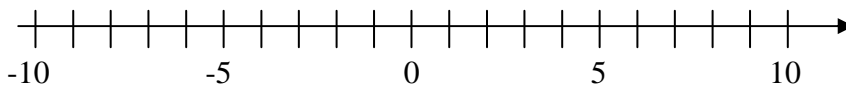
3. The price charged by the U.S. Postal Service to mail an envelope first class exceeds \$0.41 if the weight of the envelope is greater than one ounce. Graph all numbers of ounces for which the cost to mail an envelope first class exceeds \$0.41 using the number line below.



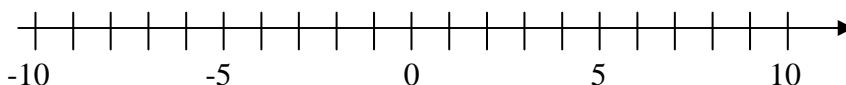
Reasoning

4. Graph the solution set for each inequality on the accompanying number line.

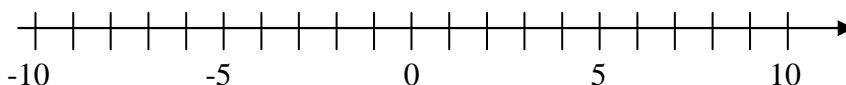
(a) $|x| \leq 4$



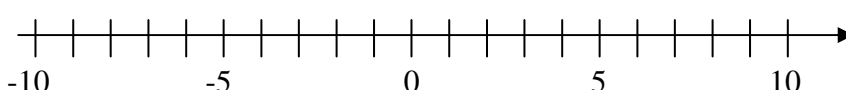
(b) $|x| \geq 2.5$



(c) $|x| > 1.5$



(d) $|x| < 5$



5. Classify each of the following as either true (T) or false (F).

(a) For any real numbers a , b , and c , if $a < b$ and $b < c$, then $a < c$. _____

(b) For any real numbers a , b , and c , if $a < b$, then $a + c < b + c$. _____

(c) For any real numbers a and b , if $a < b$, then $|a| < |b|$. _____

6. The following exercise investigates a property of inequalities that will be needed later in the course.

(a) Complete the last column in the following chart by placing “<” or “>” in the given circle in order to make a true statement.

original true statement	operation on both sides of the inequality	final true statement
$2 < 3$	multiply by -2	$-4 \bigcirc -6$
$4 > 2$	multiply by -1	$-4 \bigcirc -2$
$-3 < -1$	multiply by -4	$12 \bigcirc 4$
$4 > -6$	divide by -2	$-2 \bigcirc 3$
$9 < 12$	divide by -3	$-3 \bigcirc -4$

(b) Based upon your work in the table in part (a), complete the following property of inequalities by selecting the correct phrase to fill in the blank.

MULTIPLICATION PROPERTY OF INEQUALITIES

When multiplying or dividing both sides of an inequality by any **negative** number, the inequality sign **must** _____ in order to keep a true statement.

remain the same

be changed to =

be reversed