3-1 Inequalities and Their Graphs

OBJECTIVE: I can write algebraic expressions

With the person sitting next to you, <u>discuss</u> the problem provided and <u>document</u> your response

By law, the height of a newly constructed building in Washington, D.C., can be no greater than the width of the adjacent street, plus 20 feet. Pennsylvania Avenue, shown at the right, is the widest street in Washington, D.C. What is the maximum allowable height of a new building? Explain your reasoning.

Essential Understanding An inequality is a mathematical sentence that uses an inequality symbol to compare the values of two expressions. You can use a number line to visually represent the values that satisfy an inequality.

Example #1 Writing Inequalities

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.

1. What is an inequality that represents the verbal expression?

all real numbers p greater than or equal to 1.5

#2 Identifying Solutions by Evaluating

A solution of an inequality is any number that makes the inequality true. The solutions of the inequality x 6 5 are all real numbers x that are less than 5. You can evaluate an expression to determine whether a value is a solution of an inequality.

Is the number a solution of $2x + 1 > -3$?

A -3

B -1

2. Consider the numbers −1, 0, 1, and 3. Which are solutions of $13 - 7y \leq 6$?

You can use a graph to indicate all of the solutions of an inequality.

Inequality   **Graph**

$n < 1$

The open dot shows that 1 is *not* a solution.
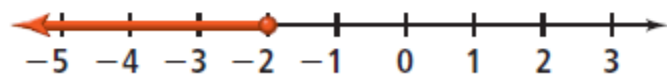Shade to the left of 1.

$a \geq 0$

The closed dot shows that 0 is a solution.
Shade to the right of 0.

$f > -3$

The open dot shows that -3 is *not* a solution.
Shade to the right of -3.

$-2 \geq x$

The closed dot shows that -2 is a solution.
Shade to the left of -2.

You can also write $-2 \geq x$ as $x \leq -2$.

Example #3 Graphing an Inequality

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

3. What is the graph of the inequality?

$3 \leq n$

Example #4 Writing an Inequality From a Graph
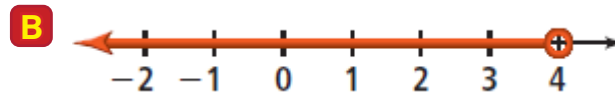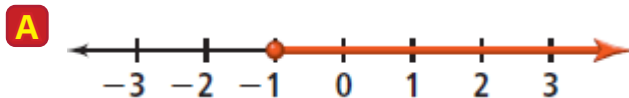
What inequality represents the graph?

A
```
    +----+----+----●━━━━+━━━━+━━━━+━━━▶
   -3   -2   -1   0    1    2    3
```

B
```
◀━━━━+━━━━+━━━━+━━━━+━━━━+━━━━⊕----+
     -2   -1   0    1    2    3    4
```

4. What inequality represents each graph?

A

B