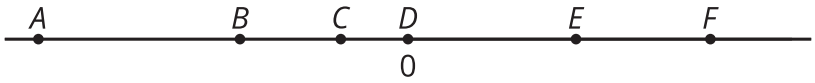
Unit 7, Lesson 9

Solutions of Inequalities

Let's think about the solutions to inequalities.

9.1 Notice and Wonder: Unknowns on a Number Line

What do you notice? What do you wonder?



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9.2 Amusement Park Rides

Priya finds these height requirements for some of the rides at an amusement park.

To ride the . . .	you must be . . .
High Bounce	between 55 and 72 inches tall
Climb-A-Thon	under 60 inches tall
Twirl-O-Coaster	58 inches minimum

1. Write equations and/or inequalities for the height requirements of each ride. Use h for the unknown height. Then, represent each height requirement on a number line.
   - High Bounce



   - Climb-A-Thon



   - Twirl-O-Coaster



2. Han's cousin is 55 inches tall. Han doesn't think she is tall enough to ride the High Bounce, but Kiran believes that she is tall enough. Do you agree with Han or Kiran? Be prepared to explain your reasoning.

3. Priya can ride the Climb-A-Thon, but she cannot ride the High Bounce or the Twirl-O-Coaster. Which of the following could be Priya's height? Be prepared to explain your reasoning.
    - 59 inches
    - 53 inches
    - 56 inches

4. Jada is 56 inches tall. Which rides can she go on?

5. Kiran is 60 inches tall. Which rides can he go on?

6. The inequalities $h < 75$ and $h > 64$ represent the height restrictions, in inches, of another ride. Write three values that are **solutions** to both of these inequalities.

Are you ready for more?

1. Represent the height restrictions for all three rides on a single number line, using a different color for each ride.



2. Which part of the number line is shaded with all 3 colors?

3. Name one possible height a person could be in order to go on all three rides.

9.3 What Number Am I?

Your teacher will give you and your partner two sets of cards—one set shows inequalities represented as statements or number lines, and the other shows numbers. Place the inequality cards face up where everyone can see them. Shuffle the number cards, and stack them face down.

To play:

- Decide which partner will go first.
- One partner picks a number card from the stack without showing it to the other partner.
- This partner gives a clue about what number card they have by selecting an inequality card that describes their number.
- The other partner guesses the number. If they guess correctly, the partners switch roles. If they guess incorrectly, the partner with the number card continues to give additional clues until their partner figures out the number.

Lesson 9 Summary

Let's say a movie ticket costs less than \$15. If c represents the cost of a movie ticket, we can use $c < 15$ to express what we know about the cost of a ticket.

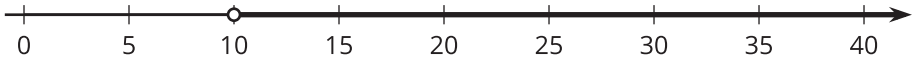
Any value of c that makes the inequality true is called a **solution to the inequality**.

For example, 5 is a solution to the inequality $c < 15$ because $5 < 15$ (or "5 is less than 15") is a true statement, but 17 is not a solution because $17 < 15$ ("17 is less than 15") is *not* a true statement.

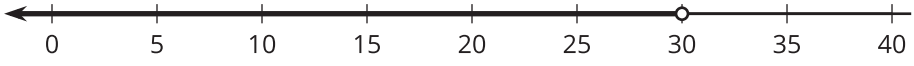
If a situation involves more than one boundary, or limit, we will need more than one inequality to express it.

For example, if we knew that it rained for *more* than 10 minutes but *less* than 30 minutes, we could describe the number of minutes that it rained (r) with the following inequalities and number lines:

$r > 10$



$r < 30$



Any number of minutes greater than 10 is a solution to $r > 10$, and any number less than 30 is a solution to $r < 30$. But to meet the condition of "more than 10 but less than 30," the solutions are limited to the numbers between 10 and 30 minutes, *not* including 10 and 30.

We can show the solutions visually by graphing the two inequalities on one number line.

