Lesson 8: Writing and Graphing Inequalities

Let's write inequalities.

8.1: Estimate Heights of People

1. Here is a picture of a man.

a. Name a number, in feet, that is clearly too high for this man's height.

b. Name a number, in feet, that is clearly too low for his height.

c. Make an estimate of his height.

Pause here for a class discussion.

2. Here is a picture of the same man standing next to a child.

If the man's actual height is 5 feet 10 inches, what can you say about the height of the child in this picture?

Be prepared to explain your reasoning.

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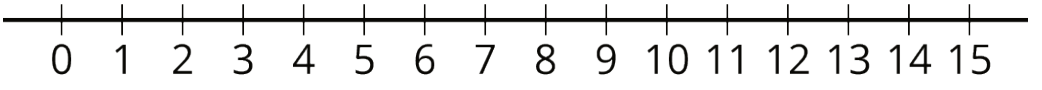
8.2: Stories about 9

1. Your teacher will give you a set of paper slips with four stories and questions involving the number 9. Match each question to three representations of the solution: a description or a list, a number line, or an inequality statement.

2. Compare your matching decisions with another group's. If there are disagreements, discuss until both groups come to an agreement. Then, record your final matching decisions here.
   a. A fishing boat can hold fewer than 9 people. How many people (x) can it hold?

   ■ Description or list:

   ■ Number line:

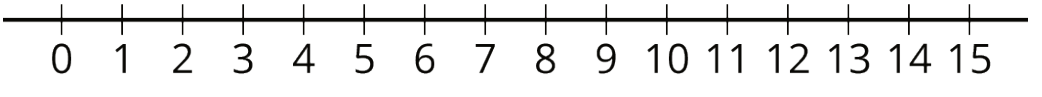
   

   ■ Inequality:

   b. Lin needs more than 9 ounces of butter to make cookies for her party. How many ounces of butter (x) would be enough?

   ■ Description or list:

   ■ Number line:

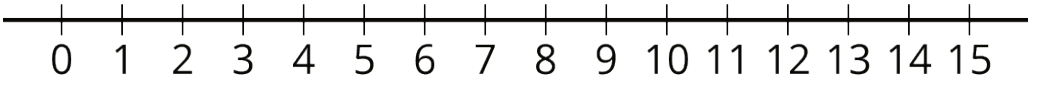
   

   ■ Inequality:

   c. A magician will perform her magic tricks only if there are at least 9 people in the audience. For how many people (x) will she perform her magic tricks?

   ■ Description or list:

   ■ Number line:

   ■ Inequality:

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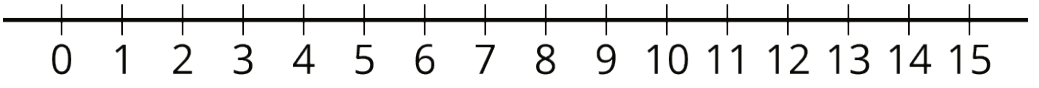
d. A food scale can measure up to 9 kilograms of weight. What weights (x) can the scale measure?

- Description or list:
- Number line:



- Inequality:

8.3: How High and How Low Can It Be?

Here is a picture of a person and a basketball hoop. Based on the picture, what do you think are reasonable estimates for the maximum and minimum heights of the basketball hoop?

1. Complete the first blank in each sentence with an estimate, and the second blank with "taller" or "shorter."

a. I estimate the *minimum* height of the basketball hoop to be _____ feet; this means the hoop cannot be _____ than this height.

b. I estimate the *maximum* height of the basketball hoop to be _____ feet; this means the hoop cannot be _____ than this height.

2. Write two inequalities—one to show your estimate for the *minimum* height of the basketball hoop, and another for the *maximum* height. Use an inequality symbol and the variable h to represent the unknown height.

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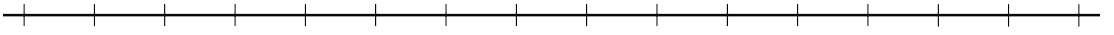
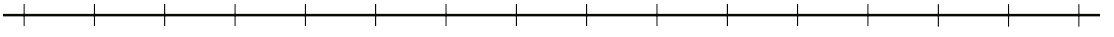
3. Plot each estimate for minimum or maximum value on a number line.
   - Minimum:



   - Maximum:

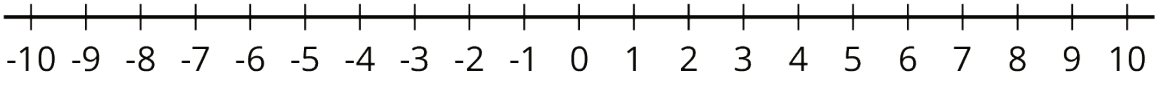


4. Suppose a classmate estimated the value of h to be 19 feet. Does this estimate agree with your inequality for the maximum height? Does it agree with your inequality for the minimum height? Explain or show how you know.

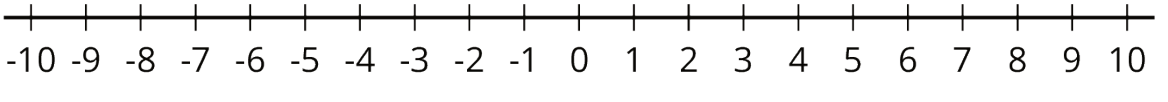
5. Ask a partner for an estimate of h. Record the estimate and check if it agrees with your inequalities for maximum and minimum heights.

Are you ready for more?

1. Find 3 different numbers that a could be if $|a| < 5$. Plot these points on the number line. Then plot as many other possibilities for a as you can.



2. Find 3 different numbers that b could be if $|b| > 3$. Plot these points on the number line. Then plot as many other possibilities for b as you can.



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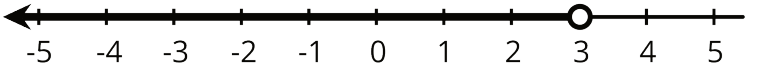
Lesson 8 Summary

An inequality tells us that one value is *less than* or *greater than* another value.

Suppose we knew the temperature is *less than* 3°F, but we don't know exactly what it is. To represent what we know about the temperature t in $^\circ\text{F}$ we can write the inequality:

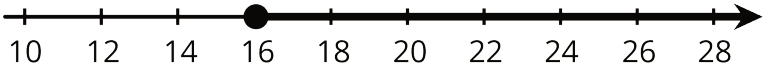
$$t < 3$$

The temperature can also be graphed on a number line. Any point to the left of 3 is a possible value for t. The open circle at 3 means that t cannot be *equal* to 3, because the temperature is *less than* 3.



Here is another example. Suppose a young traveler has to be at least 16 years old to fly on an airplane without an accompanying adult.

If a represents the age of the traveler, any number greater than 16 is a possible value for a, and 16 itself is also a possible value of a. We can show this on a number line by drawing a closed circle at 16 to show that it meets the requirement (a 16-year-old person can travel alone). From there, we draw a line that points to the right.



We can also write an inequality and equation to show possible values for a:

$$a > 16$$
$$a = 16$$

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