Unit 7, Lesson 8

Writing and Graphing Inequalities

Let's write inequalities.

8.1 Estimate Heights

CC BY NC Illustrative Mathematics, based on IM 6–8 Math, CC BY Open Up Resources.

8.2 How High and How Low Can It Be?

Here is a picture of a person next to a basketball hoop and a ladder. Use the picture to make reasonable estimates for the minimum and maximum heights of the basketball hoop.

1. Complete the first blank in each sentence with an estimate, and complete 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. Use your estimate to write an inequality statement that describes the minimum height of the basketball hoop. Use the variable h to represent the unknown height.

3. Use your estimate to write an inequality statement that describes the maximum height of the basketball hoop. Use the variable h to represent the unknown height.

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 your reasoning.

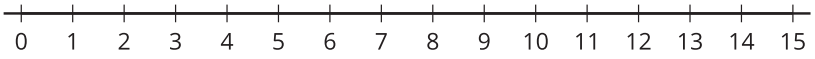
8.3 Stories about 9

1. Your teacher will give you a set of cards containing stories and questions, descriptions of values, math statements, and number lines. Match each story and question with 3 other representations. Be prepared to explain your reasoning.

2. Compare your matching decisions with another group. If you disagree, work to reach an agreement. Then, record your final matching decisions here.

   a. A fishing boat can hold fewer than 9 people. How many people can it hold?

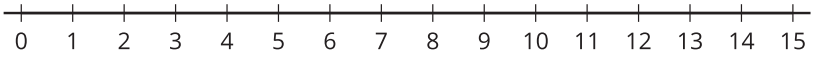
      - Description of values:
      - Number line:



      - Equation and/or inequality:

   b. Lin needs more than 9 ounces of butter to make some breadsticks. How many ounces of butter would be enough for the breadsticks?

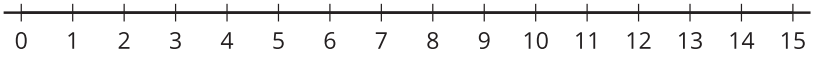
      - Description of values:
      - Number line:



      - Equation and/or inequality:

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

      - Description of values:
      - Number line:

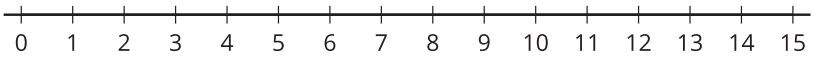


      - Equation and/or inequality:

CC BY NC Illustrative Mathematics, based on IM 6–8 Math, CC BY Open Up Resources.

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

- Description of values:
- Number line:



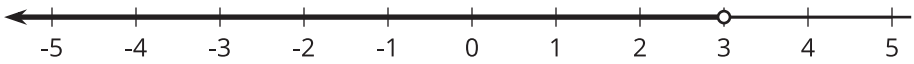
- Equation and/or inequality:

Lesson 8 Summary

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

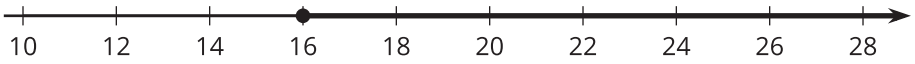
Suppose we know the temperature is *less than* 3°F, but we don't know exactly what it is. To represent what we know about the temperature t in $^\circ\text{F}$, we can write the inequality $t < 3$.

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: $a > 16$ or $a = 16$.

CC BY NC Illustrative Mathematics, based on IM 6–8 Math, CC BY Open Up Resources.