Relational Mixed Up Dots

Educator's Guide

Overview

CS Hands-On is a 501(c)(3) nonprofit teaching computational thinking skills through technology-free lessons and activities. This curriculum is built to teach fundamental computer science concepts in an engaging, hands-on way. In this mission, students use relational operators to decode a dot-to-dot drawing.

- ### Prerequisite Knowledge

  Student should have completed the Binary Pixel Art activity which introduces the binary number system.

- ### Lesson Details

  Travelling to Logicland, students will learn to break problems down into smaller parts with Lex. Students will learn how to compare numbers using relational operators to decode a dot-to-dot drawing.

  This lesson was developed for students ages 6 to 12, and can be modified for students of all skills and ages. This lesson takes roughly 30 minutes.

Learning Objectives

- ### Key Question

  How can we compare numbers using relational operators?

- ### Key Terms

  Relational Operator: Symbols used to compare two numerical values with each other.

- ### Curriculum Standards

  Students should be able to...

  - Explain and compare numbers with relational operators (Logic)
  - Read and interpret relational operators (Literacy)
  - Use relational operator clues to solve a dot-to-dot drawing (Creative Arts)

  View standards addressed here

Lesson Plan

Materials

- Mixed Up Dots worksheet (per student)
- Writing utensil: Markers, pencils, pens, etc. (per student)

Setup

- Hand out a Mixed Up Dots worksheet to each student
- Set up your classroom to have students sitting individually or in groups

ANSWER KEY & LESSON ANNOTATIONS

Logicland
Mission 2

Name: _____ Date: _____

Relational Mixed Up Dots

Ready, set, compare!

Today in Logicland, Lex will show you all about making comparisons between two numbers. Let's dive right in!

What are Relational Operators?

Below is a list of **relational operators**: symbols we use to compare two numbers (You might recognize these from math!).

Here's how we use relational operators:

4 > 1 means 4 is **less than** 1

9 ≠ 5 means 9 is **not equal to** 5

2 ≤ 3 means 2 is **less than or equal to** 3

Symbol	English
=	Equal to
≠	Not equal to
>	Greater than
<	Less than
≥	Greater or equal to
≤	Less than or equal to

Hungrily Chompin' Away

Lex brought his friend Allie the Hungry Alligator to demonstrate how you can remember the different **relational operator** symbols.

6 > 2 means **6 is greater than 2** **3 < 7** means **3 is less than 7**

Imagine Allie as a less than (<) or greater than (>) symbol. Because Allie is hungry, Allie always wants to eat the **larger** pile of fruit, so her mouth will **open towards the larger pile**. Notice how Allie's mouth always faces the larger number. This is the same way relational operators work!

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Extension

Students can model relational operator symbols with their arms, similar to the alligator modeling with its mouth. To reinforce when we use > versus <, place two numbers on different sides of the classroom. Have students use their arms to face the greater number.

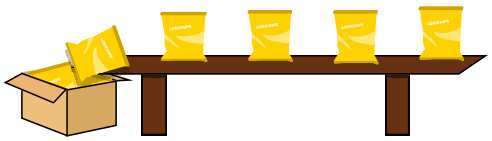
Logichips Factory

You might be wondering: Why are relational operators **important**, and how can they be used? Let's take a look at an example from Logichips, a potato chip factory at Logicland!

Logichips promises that each bag of potato chips has **at least 15 chips** inside.

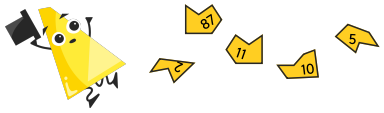
To keep their promise, they have a machine that only packages bags of chips when there are **at least 15 chips** inside. Using relational operators, we can write this as:

Number of chips ≥ 15



Logichips is thankful for relational operators because they help Logichips decide which bags of chips they package. Accordingly, relational operators help us **make decisions** by **comparing two values** with each other.

Dot-To-Dot Fun!



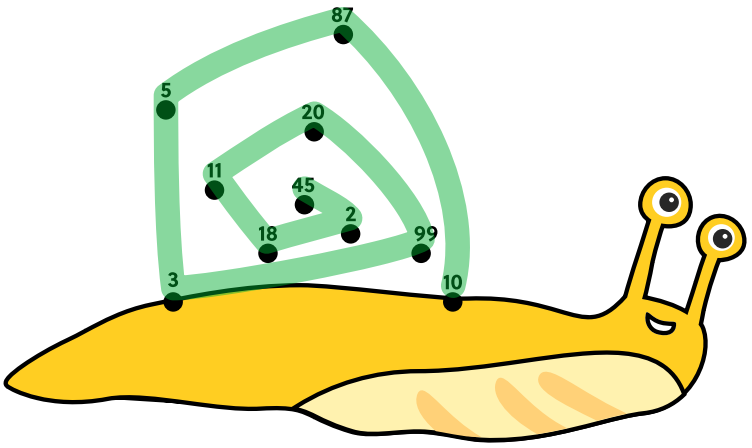
Uh-oh, Lex accidentally dropped his dot-to-dot puzzle on the floor! Now, the numbers on his puzzle are all mixed up and out of order. On the next page, use your knowledge of relational operators to **complete the picture** with hints from Lex's friends!

Reflect

As demonstrated by the Logichips Factory, we can use relational operators to check if we meet specific requirements. What are other scenarios where relational operators are helpful? Examples include:

- Checking if the amount of lead in drinking water is less than 1 ppb (parts per billion).
- Weighing juice pouches to make sure they all have equal amounts.
- Measuring if the weight of a piece of luggage at an airport is less than 50 pounds.

Logicland
Mission 2



- ✓ If 82 = 45, connect 2 to 99
- ✓ If 12 ≤ 13, connect 2 to 18
- ✓ If 93 <= 95, connect 87 to 10
- ✗ If 6 > 9, connect 45 to 2

- ✗ If 322 ≤ 300, connect 10 to 18
- ✗ If 23 >= 25, connect 45 to 5
- ✓ If 92 ≥ 65, connect 3 to 5

- ✗ If 18 > 82, connect 87 to 20
- ✓ If 28 = 28, connect 5 to 87
- ✓ If 38 < 10, connect 20 to 99

- ✓ If 281 > 102, connect 99 to 3
- ✓ If 87 > 86, connect 11 to 20
- ✗ If 100 > 1000, connect 5 to 11
- ✓ If 90 >= 90, connect 18 to 11

Wrap up & reflect

Group students into pairs and have them discuss the following reflection questions. Afterwards, have students share their ideas as a class.

- Why are relational operators important to use? Provide examples.

  Ex.

  Relational operators help us make decisions from the comparison of two numerical values.
  - For instance, we can evaluate if the amount of lead in drinking water is small enough to make the water safe for us to drink.
  - Another example could be checking the amount of gas in a car to ensure it never reaches zero.