Disaster Deduction Detectives

Teacher Instructions for 7 Generation Games Website

Disaster Deduction Detectives is a five-level game to teach mean, median and basic statistics in context. Students will learn how data tracking and analysis can support important decisions made in real-world scenarios.

Specifically, the game covers mathematics standards to teach students to “recognize that a measure of center for a numerical data set summarizes all of its values with a single number, while a measure of variation describes how its values vary with a single number.”

Through the game, students will be introduced to the concepts of statistical questions and data as well as ways to analyze them. Students will then calculate the mean and median using multiple real-world data sets. Students will be introduced to data visualization through dot plots, variability and the concept of outliers and compute quartiles.

TO START
Players must have an account to sign into their Disaster Deduction Detectives game account. To play Disaster Deduction Detectives, select ‘New Game’ or ‘Continue’ at the beginning of the game.





General Instructions: Click the 'Next' arrows to advance to the next page. 

Level 1: Are You Detective Material?

Concepts Covered

- Statistical questions anticipate and generate data that varies.
- Data is the information gathered from statistical questions.

Summary

You are being recruited to the Disaster Deduction Detective Academy, a school that works to save the world with its math skills. The Disaster Deduction Detectives (DDD) travel the world, preventing disasters. They need a new agent to join their ranks. This level includes an introduction to statistical questions and terminology and two "obstacle course" mazes for new recruits to make it into the DDDA.

Student Scaffolding

- In all levels, click the 'Hint' button to get a hint about what to do next.
- In all levels, when a magnifying glass appears in the upper-right corner of the screen, click it once to turn the mouse cursor into a magnifying glass. Use the magnifying glass to click on highlighted words to see the definitions.

Maze Instructions

Navigate and survive both mazes to locate the academy gate. You have 60 seconds to complete each maze.



Maze Game Controls

- Move in four directions using the arrow keys on keyboard or by clicking the arrows on the screen in the game. To jump two spaces (while facing one direction), press the ‘Spacebar’ or click the ‘jump’ button in-game using the mouse cursor.
- In the first maze, rake leaves for points. Drink water to improve health points. Avoid the guard dogs, trees, and venomous snakes! Encountering a snake will result in game over and you will need to start from the beginning of the maze.
- In the winter maze, chop wood for points and rest by the campfires to improve health. Avoid the rocks, ice holes and trees. To jump in the winter maze, press Shift+Space for a jump.

Level 2: Welcome to the Academy

Concepts Covered

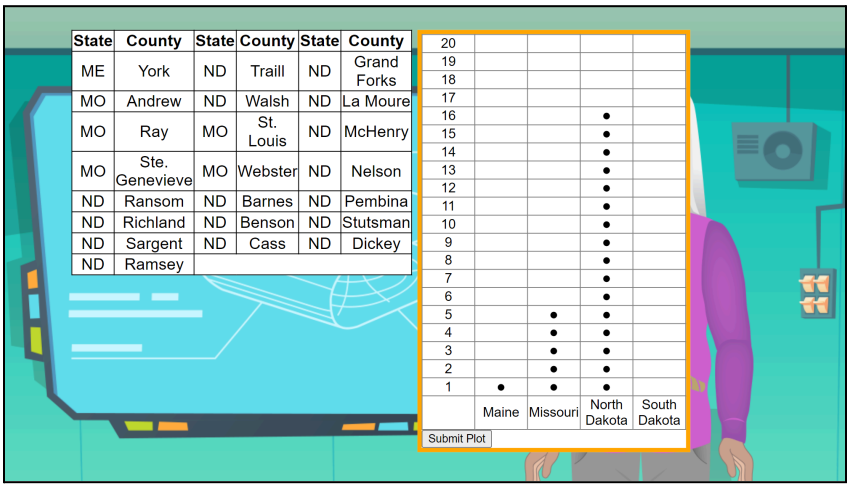
- Display data generated from statistical questions with dot plots.
- Describe data in a dot plot or histogram in terms of symmetry (skewed left, right or symmetrical) and what the shape means as per the data.
- Describe the data in terms of the shape of peaks (most data points), gaps (no data points in the set), clusters (where a group of data points are in the set).
- See the center of the data as the middle of the data set.

Summary

To earn your rookie badge, you will learn how data is used to predict events. In this case, data can help predict natural and man-made disasters. You will analyze the occurrences of fires in a set period of time and plot data. This level includes reading and plotting data and a game where you collect items to prepare to travel to the disaster prevention zone.

Data Plot Activity Instructions

1. One dot represents one fire-prone county. Click on a point in the dot graph to quickly fill the column with dots. You can also complete the dot plot by clicking one dot at a time.
    a. If you need to delete a dot/dots, click the box where you would like the dot plot to fill. For example, if you have accidentally selected 9 and would like to change the answer to 5, click on the corresponding 5 box for that state. Doing this will bring the dots down from 9 to 5.
2. Click ‘Submit Plot’ after plotting your data to check your answer. If you are incorrect, you get a red pop-up box with a hint. (Hint: “Choose the state that had the most floods.”)



Platform Game #1 Instructions

Brr! It’s cold. Collect your items in preparation for your next destination as a D.D.D.A agent.

Game Controls

- Jump: Press Spacebar. Hold the button to jump higher.
- Run: Hold the Shift key.
- Move: Use arrow keys or W, A, S, D.
- Help: Press H to pause and see the controls while playing.
- Hit the spacebar to begin this game. You have five minutes to collect the items. At the end of the game, press Enter or Return key to continue to the Level Up screen.
- Objective: Get all 7 collectibles. Do not fall in the river. If this happens, press Enter or Return on the keyboard to restart.



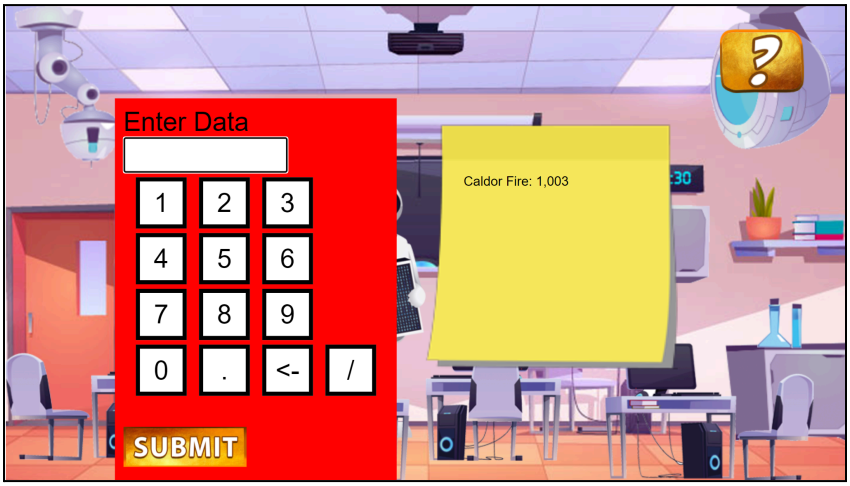
Level 3: Dr. Edwin's Lab

Concepts Covered

- Find the mean for a set of data.
- Find the median for a set of data.
- Center is measured by the median, a number arrived at by counting to the middle of an ordered array of numerical data.
- When the data set is even the median will be the average of the two middle numbers.

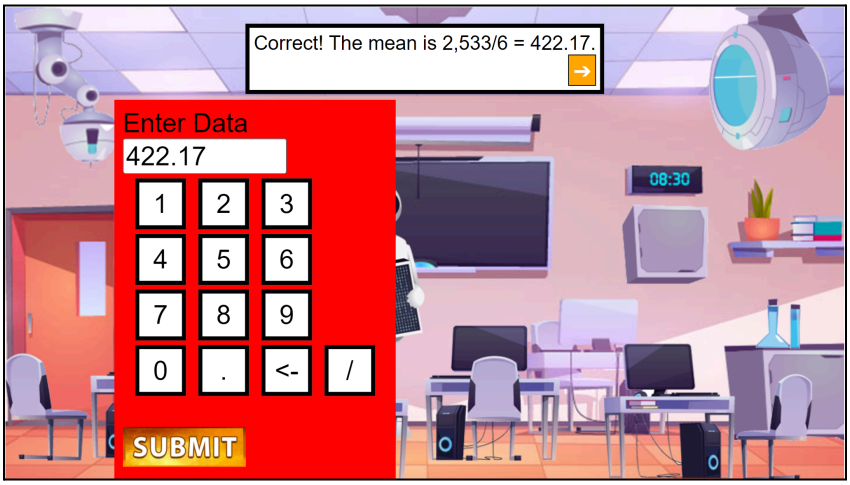
Summary

Level 3 includes a mean and median activity for a set of data. Search, find and enter data with a robot's help from Dr. Edwin's lab notes. Players use math to calculate the mean and median of homes destroyed in wildfires over the past 10 years in three locations.

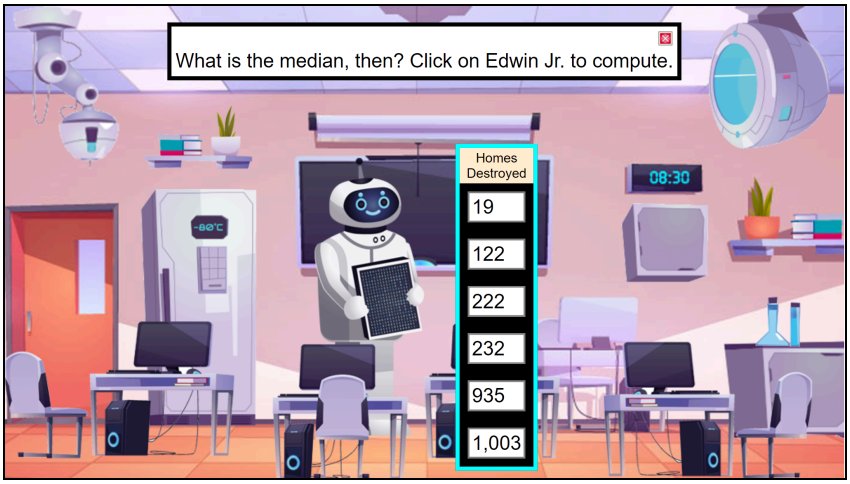


Edwin Jr. Math Activity

1. Click on each yellow note paper to collect it.
    a. Note: Students must click on the yellow note to be able to input it. When they “find”/click on the note, it will become large. If they try to input the number on a note without having clicked on the note first (i.e. the note is still appearing small), they will get an incorrect message. The note must be showing up large - like in the screenshot above - to submit the number.
    b. If students cannot find a note, they can click on the gold “?” button, which will show any notes not yet found or input.
2. Enter the data into Edwin Jr. by clicking on the keypad he is holding to use the red calculator. Type in the numeric values and click 'Submit.' Players calculate the mean of all six fires using the red calculator.



3. To arrange numbers while finding the *median*, click the red ‘Sort’ button on Edwin Jr. Use the purple calculator to calculate the median. If players are incorrect, Dr. Edwin will give a hint: “The median is the average of the middle two numbers in the sorted list.” When the player is correct, the game advances to level 4.



Level 4: Meet Melissa

Concepts Covered

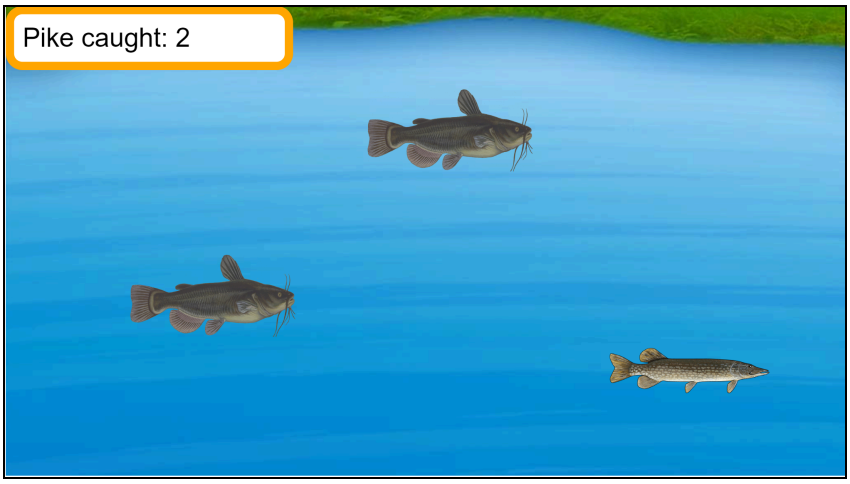
- Find the mean for a set of data.
- Find the median for a set of data.
- Reason about the mean of a set of data.
    a. (What happens if a data point is added or removed: will the mean stay the same, increase, or decrease?)
- Reason about median of a set of data.
    a. (What happens if a data point is added or removed: will the median stay the same, increase, or decrease?)

Summary

Players are introduced data analysis in regards to possible loss of salmon due to invasive pike fish in the Columbia River. This level includes a fishing game, an activity on finding the mean, median and outlier for a set of data, and a game collecting items in preparation for your next mission.

Fishing Game Instructions

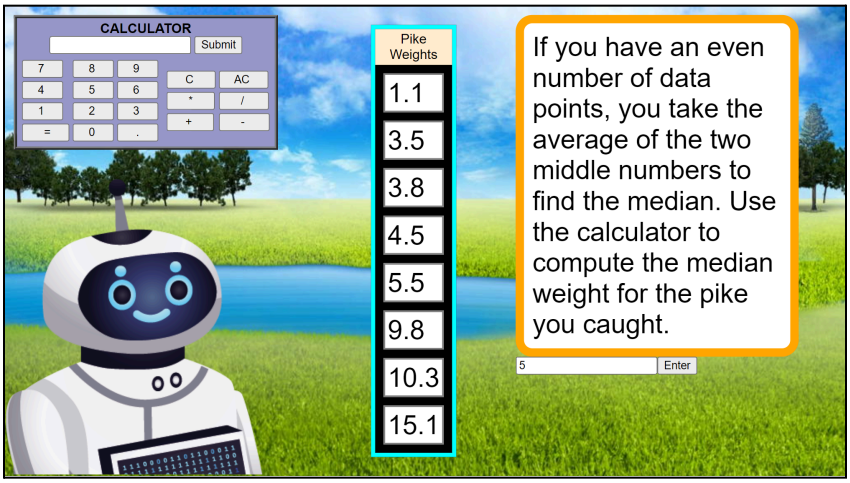
- Catch 8 pike by clicking on the correct fish as they swim by. You'll hear a splash if it's a pike or a buzzer if you caught the wrong fish.
- Once all 8 pike are caught, they will be weighed. The weight for each pike becomes a data set.



Math Activity Instructions

Click on the robot to enter data or solve problems with the calculator. Find the sum, mean, median and outlier using the pike weight data. When the module is complete, the DDD agents will have solved the mystery. The invasive pike are showing signs of growing heavier, which supports the claim that they are feeding off of the local Chinook salmon population.

Note: While students will use the calculator (shown on the left-hand side in the picture below) to do the math - they need to make sure to submit their FINAL answers using the text box under the word problem on the right. A final answer is only recognized when the ENTER button by the textbox is clicked.



Platform Game #2 Instructions

Collect items in preparation for your next destination.

Game Controls

- Jump: Hold Spacebar.
- Run: Hold Shift key.
- Move: Use arrow keys or W, A, S, D.
- Press the Spacebar to start the game.
- Objective: Get all collectibles if you can. Do not fall in the river or you'll be carried off. If this happens, press 'Enter' or 'Return' on the keyboard to restart.
- Completing this game leads to Level 5.



Level 5: Collecting Temperature Data

Concepts Covered

- Basic Statistics: Averages, Median, Distribution, Data analysis using quartiles and bar graphs
- Topics: climate change, global warming, greenhouse effect, and potential causes of climate change.

Summary

Players join Dr. Begay to investigate temperature changes over a period of 50 years. Are the temperature changes indicative of global warming or was it just a single bad year for agriculture? Time to compare and contrast data using statistics and analysis skills learned in the previous levels of the game, while introducing quartiles.

Game Instructions

Dr. Begay walks players through a lesson in statistics and climate change.

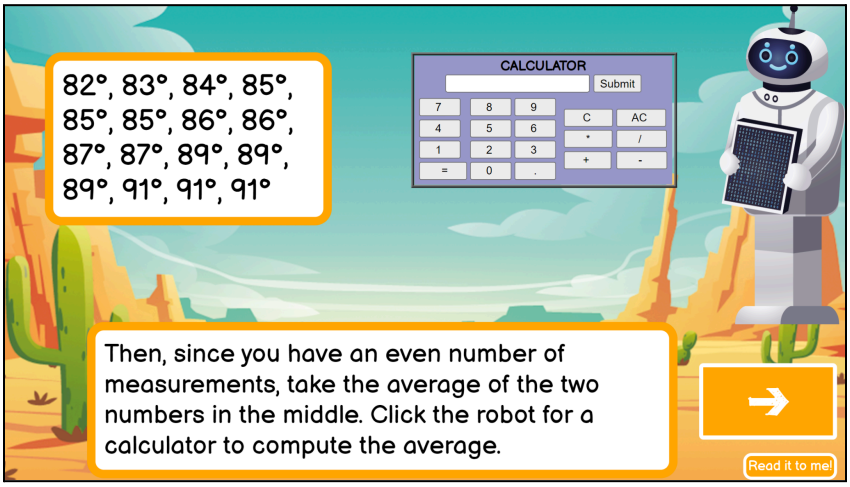
Data Collection Game: Players drive through the desert in a jeep in a linear platform game and jump over obstacles. Don't run into any cacti, sheep, and rattlesnakes. Press Spacebar to jump over obstacles. Double-jump by pressing Spacebar twice. As you drive around you will run out of gas, so collect gas cans to fuel up your jeep. Be sure you don't run out of gas. Crashing into

obstacles causes you to lose 3 gas canisters. Collect 16 temperature readings. Once you are done, a house will appear. If you manage to jump into the house, you win the game!



Analyze your temperature readings with Dr. Begay. Find the median by calculating the average of the two numbers in the middle. Players learn to organize and analyze temperature data using averages, quartiles, median, distribution and bar graphs.

Note: Whenever players need to solve a math exercise, a calculator will be provided on-screen.

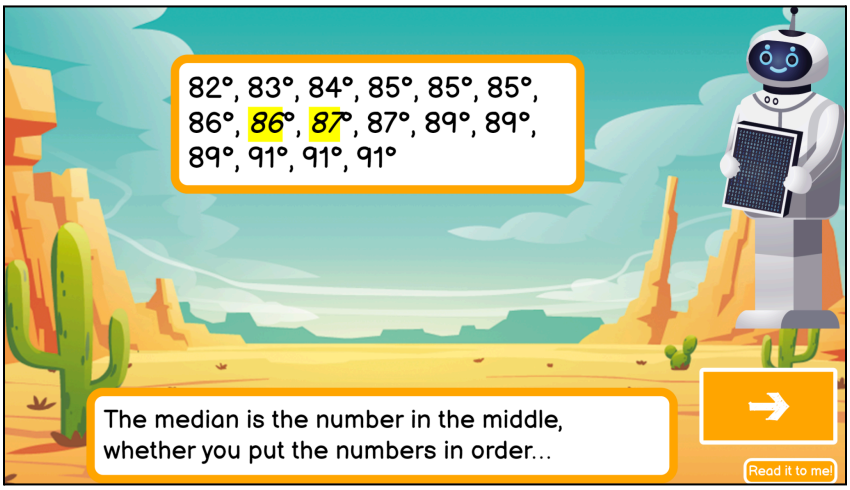


Horned Toads Game

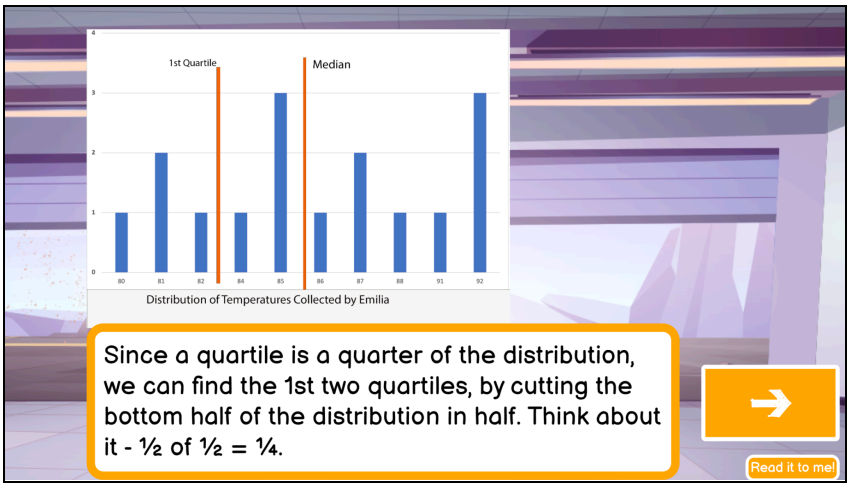
Players need to drive back to the lab, but there are horned toads all over the road. Horned toads are an endangered species. Collect the horned toads from the road so we can go on. Click the horned toads to relocate them safely.



Students review concepts learned in the first four levels and be introduced to new concepts in data analysis that include analyzing bar graphs and calculating *quartiles*.

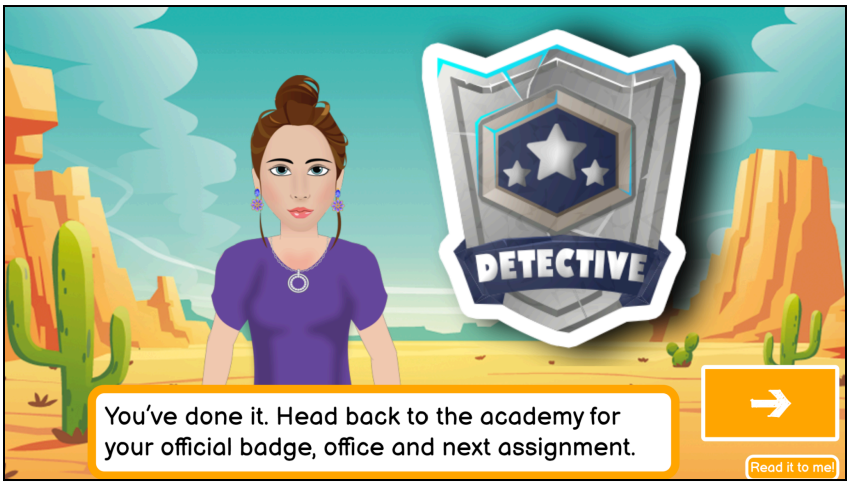


Dr. Begay teaches *quartiles* with temperature values expressed in a bar graph and distribution. Examples and the Hint button will be provided. Students will come to a conclusion about temperature changes: climate change has occurred in the Southwest. It has gotten hotter in the past 50 years.



Game Completion

When the player has completed all five levels of Disaster Deduction Detectives, Emilia will return to give the player accolades. This indicates the student has successfully answered all of the assessment questions.




You've successfully completed
Disaster Deduction
Detectives