LESSON PLAN

Redistricting Unplugged

Grade Levels: 9-12
Duration: 60 min

In this multidisciplinary activity, students explore the process of redistricting, examining how information is filtered to create an abstract model of the electorate. Students use abstraction to redraw a series of maps according to different political parameters as they apply computational thinking to this real-world problem.

Outline	
Frame the Activity	10 min
Activity	40 min
Debrief	10 min

Grade Levels: 9-12

Duration: 60 min

Concepts/Skills
Computational thinking, social science, redistricting, abstraction, civics, gerrymandering, political parties

Objectives
Students will:
- Explore the process of redistricting by redrawing a political map.
- Use abstraction to solve a real-world problem.
- Consider how different maps can favor certain perspectives.

Materials and Preparation

Materials

- Colored marker or highlighter (1 per student)
- *Optional:* Pencils (1 per student)

- Redistricting Unplugged Handout (print in color, 1 per student)
  - **Handout Includes:**
    - Directions - Page 1
    - Voter Trait Maps - Page 2
    - Blank Map - Page 3

Preparation

1. Print the handouts and prepare the materials.
2. Review the Redistricting Unplugged Handout along with the additional information, resources, and extensions provided throughout this resource.
   - Plan how you will adjust the timing and focus according to your subject area, setting, and goals.
   - Try doing the activity yourself. This will give you experience so that you can anticipate student questions.
3. Create groups of four to five students.
   - Half of each group will be strategists for the Star Party and the other half will be strategists for the Circle Party.
   - At the end of the activity, the two halves of each group will share their maps with each other and compare.

Background Information

Computational thinking is a problem-solving process that is used in everyday life as well as on computer programs. This activity focuses on the computational thinking skill of abstraction, a cornerstone of computer modeling.

Abstraction is a computational thinking skill. It involves the process of filtering out — ignoring — the characteristics of a problem that we don't need in order to concentrate on those that we do.

Real-world examples of abstraction

Word problems
Pull out the numbers and information that is needed to solve the problem.

Public transit maps
Remove extra geographic information to focus on the details passengers need, such as the direction they're headed and public transit stops.

See The Tech's Computational Thinking Resources for more information, Tech Tips, and other lesson plans.

The filtering process used in abstraction is very similar to the steps taken during redistricting. The traits and characteristics of individuals are filtered and manipulated to form an abstract map.

How might abstraction be applied to redistricting?

- Generalizing a state's electoral votes
- Generalizing the political tendencies of cities/counties
- Generalizing who individuals will vote for based on past voting habits

This modeling is so complex that some governments have turned to computer science to try to solve this problem, designing algorithms to develop unbiased district maps.

Frame the Activity

1. Use the design scenario provided in the **Redistricting Unplugged Handout** to connect students to the real-world problem.

> *Today, you are all **political strategists** in a state that is about to redistrict. You have been tasked with recommending district lines on behalf of two different parties (Stars or Circles). Each party is interested in manipulating the district lines to benefit their candidates, also known as **gerrymandering**.*

2. Provide **Background Information** and context as needed on computational thinking, abstraction, redistricting, and gerrymandering.
   - If students are new to the concept of redistricting, make sure they understand how it is intended to account for changes in the population and ensure the people are represented accurately.
   - Use introductory resources like these to provide context on gerrymandering as well.

Gerrymandering 101

- **"What is Gerrymandering?"** *Washington Post* video (2:42 min)
- **"This is the Best Explanation of Gerrymandering You Will Ever See,"** *Washington Post* article
- **"Gerrymandering: How Drawing Jagged Lines Can Impact an Election,"** TED Ed video (3:52 min)
- **"Gerrymandering: Is Geometry Silencing Your Vote?"** KQED and PBS video (5:17 min)

3. Once students have a foundational understanding of redistricting, abstraction, and gerrymandering, pass out the materials and review the directions, design problem, criteria, and constraints.

Design Problem	Create a favorable electoral map for your political party.

Part 1: Use abstraction to fill in the rest of the rectangles on the Blank Map with circles or stars. This should illustrate your prediction of whether an area will vote for the Star or Circle party.

Part 2: Redistrict by drawing geographical lines in a way that favors your political party, using the criteria and constraints provided.

Criteria	Constraints
• Districts must be closed, **contiguous** shapes, but those shapes can be unusual. • Each district must contain approximately 250,000-300,000 people (5-6 rectangles). • Every rectangle must be included in a district. • There must be a total of 11 districts.	• No single rectangle can be divided in half, or smaller sections. • There's a time limit (we suggest 20-30 minutes).

Activity

1. Place students in their groups of four to five.
   - Within each group, determine which half of the students will work together as the Star Party and which half as the Circle Party.
2. Demonstrate the analysis used on the Voter Trait Maps by filling in one of the squares with circles or stars.
3. While students are working, check on teams and provide additional support as needed.
   - Some teams may find it useful to fill in all of the rectangles on the Voter Trait Maps with the appropriate shapes before using abstraction to fill in the shapes on the Blank Map.
   - If students want to try drawing districts a few different ways, they can use a pencil before creating their final boundaries with a marker or highlighter.
4. Ask open-ended questions to guide students through the process:
   - *What traits are identified for these areas? What party platform (Circle or Stars) do those traits align with?*
   - *What political party seems more popular in this area?*
   - *How can you draw this district to benefit your political party?*
   - *How could you pack the other party's areas together or crack and divide them to benefit you?*
5. Give teams 20-30 minutes to complete the first two steps of the activity.
   - If they finish early, have students begin Part 3 by pairing with the other political party in their group and comparing maps.

More Maps

Interested in digging deeper into the data behind redistricting and how maps are drawn? Check out some of these resources and their interactive maps and models.

- **"Can You Gerrymander Your Party to Power? Draw Your Own Districts,"** *New York Times* interactive tool
- **"GerryMander"** GameTheoryCo voting district game
- **Districtr tool, MGGG Redistricting Lab**
- **"The Gerrymandering Project,"** FiveThirtyEight and ABC News
- **"How Algorithmic Redistricting Detects Gerrymandered Congressional Maps,"** *Washington Post* article
- **"The Algorithm That Could Help End Partisan Gerrymandering,"** Vox video (3:18 min)
- **"All About Redistricting"** guide by Prof. Doug Spencer, Loyola Law School
- **"50 State Guide to Redistricting,"** Brennan Center for Justice

Debrief *(5 min)*

1. After teams have finished redrawing their maps, have them do Part 3 and compare with the other half of their group.
   - *How were their maps similar and different?*
   - *Are their maps **fair**? Why or why not?*
2. Bring the class back together for a larger discussion of how they used abstraction.
   - Remind students that they used abstraction to decide what information to use in their model. Filtering out and focusing on certain information is an important skill that computer scientists use. This decision-making process is also essential to redistricting in the real world.
   - Have students consider how the role of these decision makers, the process they use, and the information they consider or ignore can have an impact on communities and voting outcomes.
     - *What information did you focus on as you decided on districts? What did you ignore? Why?*
     - *Where does gerrymandering happen in the real world? What are the consequences of that?*
     - *How would your map change if:*
       - *the information you used to analyze your maps changed?*
       - *you ignored certain information?*
       - *you emphasized certain information, giving it higher priority?*
     - *What would fair maps look like? How would you determine what was fair?*
       - *Think about this for both the process of redistricting and its outcomes.*

Voting Rights Act

The Voting Rights Act made it illegal to redistrict in a way that discriminates on the basis of race, color, or membership in a language minority group. This applies to both the process used and the result.

- Have students consider how these factors are considered or ignored by district planners.
- For example, some states and groups that seek to undermine the Voting Rights Act argue that maps should be drawn in a "race-blind" or "race-neutral" way so that race is not considered. Excluding this information entirely, however, makes it impossible to determine if discrimination has occurred.
- In addition, note that our data about race and ethnicity depends on the census, which also uses abstraction by choosing to count only certain groups. (For example: The 2020 U.S. census included Middle Eastern and North African responses in the White category.)

Provide a safe space for students to discuss these issues and refer to current events. See, for example, **"Inside the Fight over Alabama's Congressional Maps," NPR article.**

Share your experience

At The Tech we are constantly iterating and improving. We'd love to hear from you as you use this resource. Let us know what worked and what didn't. How would you adjust this lesson to increase engagement? Contact us at **education@thetech.org**.

Extensions

- **Independent Commission:** Create an independent commission with representatives from different parties. See if students can redraw a fair map together. Have them compare their maps with other commissions. How were their maps similar or different?
- **Algorithm:** Have students think about how they could create an algorithm that would draw a fair map. They can try this out by coming up with a series of steps on paper, or even try coding something on a computer.
- **Get Local:** Have students research redistricting in their area. How are the maps created in your state, county, or school district? Are there special redistricting commissions? Are they using algorithms or computer programs to redistrict? Have there been concerns about gerrymandering, voting rights violations, or vote dilution?
- **Districtr:** Students could even try their hand at applying abstraction to redraw their local districts using a tool like **Districtr from MGGG Redistricting Lab**. This free tool lets them decide what layers of data to include as they create and share local maps.

Standards Connections

California History-Social Science Standards

Grade	Standard	Description
9-12	HSS.12.6.6	**Analyze** trends in voter turnout; the **causes and effects of** reapportionment and **redistricting**, with special attention to spatial districting and the rights of minorities; and the function of the Electoral College.

California Computer Science Standards

Grade	Standard	Description
9-12	9-12.DA.8	**Translate between different representations of data abstractions of real-world phenomena,** such as characters, numbers, and images. (P4.1)

Vocabulary

- **Contiguous:** Sharing a common border, touching.
- **Cracking:** Diluting the opposing party's voters by dividing them up.
- **Gerrymandering:** Redistricting political boundaries to give one party or socioeconomic group an advantage in elections.
- **Independent Commission:** Independent commissions vary by state but they are usually separate from the legislature and designed to be impartial to political parties.
- **Packing:** Grouping the opposing party's voters together in smaller districts so they are less influential.
- **Political strategists:** Promote the election of certain candidates or the interests of certain groups or political parties.
- **Redistricting:** Redraw, divide, and organize lines on a map to create new districts for elections.

Name(s): **Date:**

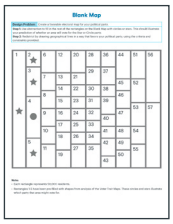
Redistricting Unplugged

Today, you are all political strategists in a state that is about to redistrict. You have been tasked with recommending district lines on behalf of two different political parties (Stars ★ or Circles ●). Each party is interested in manipulating the district lines to benefit their candidates, also known as gerrymandering.

You have two sets of materials to help you solve this problem:

Voter Trait Maps (Page 2)
These three maps show detailed information about the characteristics of residents in these areas.

Blank Map (Page 3)
This is the map of your state, which includes some examples with pre-filled information.



Directions:

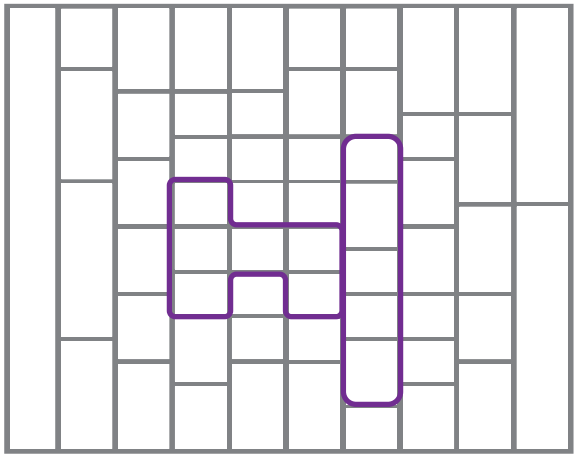
Part 1: Abstraction

- Analyze the Voter Traits Maps on Page 2.
- Look for patterns across all three maps provided. Which party seems most popular in each area?
- Then fill in the rest of the rectangles on the Blank Map with a circle or star to illustrate your predictions of which party that area might vote for.

For example: Area 1 is likely to vote for the Star Party because two out of three traits, represented by different colors, indicate that these voters prefer Star candidates.

Part 2: Redistricting

- Draw lines to create districts on the Blank Map on Page 3.
- Try to make your party win as many districts as possible.
- Make sure you meet the criteria and constraints below!



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Part 3: Debrief

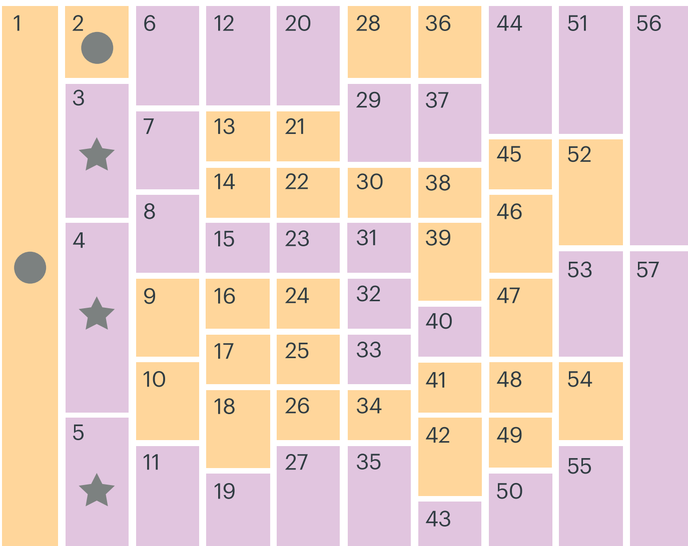
- When finished, share your map with the other half of your team.
  - Where do you have similarities and differences?
  - Would your maps be fair? Why or why not?

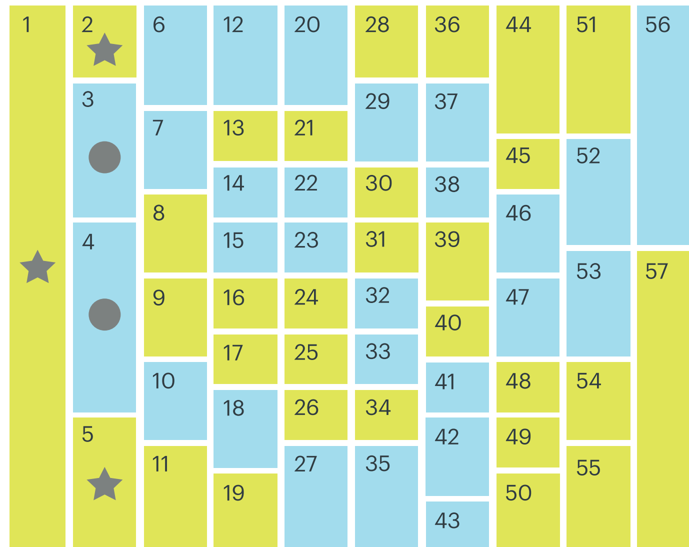
Notes:

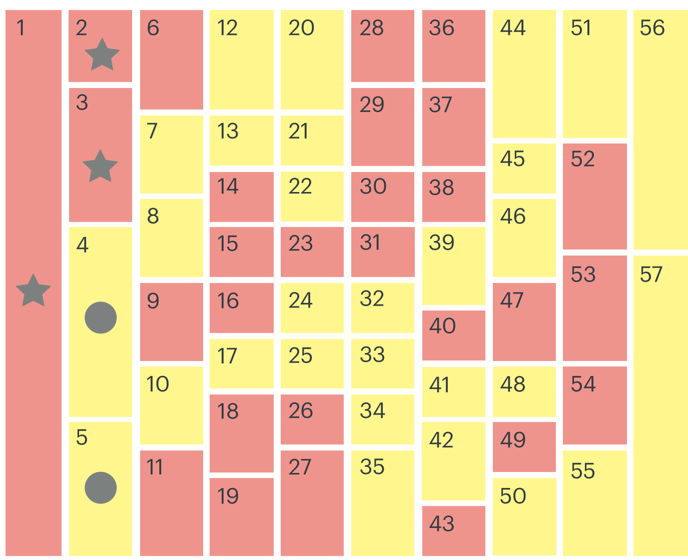
Voter Trait Maps

Part 1: Abstraction

Use these maps and the legend below to analyze which political party each area is likely to vote for.
Then fill in your predictions on the Blank Map on the next page.







Legend

Each color represents traits that can be used to predict which party a person is more likely to vote for.

- *For example,* purple/orange might represent the age of the voter, while blue/green might represent their education level.

Trait	Purple	Orange	Green	Blue	Yellow	Red
Party	★	●	★	●	●	★

Blank Map

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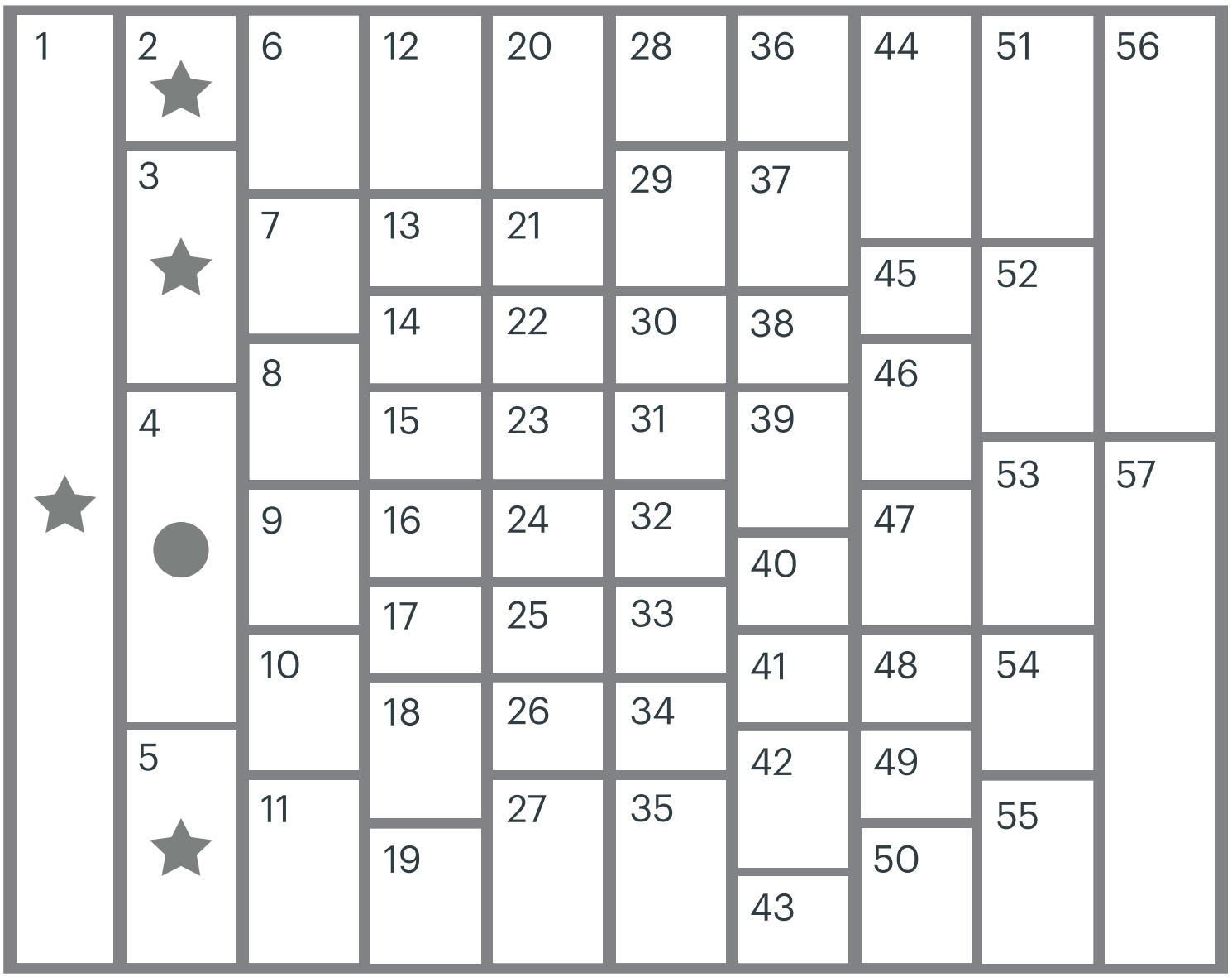

Note:

- Each rectangle represents 50,000 residents.
- Rectangles 1-5 have been pre-filled with shapes from analysis of the Voter Trait Maps. These circles and stars illustrate which party that area is more likely to vote for.