

# Decisions Using Data!

## Unit Overview (Remote Version)

The purpose of this unit is to introduce students to what data is, how to collect, visualize, and present data, and how to use data to make predictions or decisions.

The unit culminates in students performing their own surveys of the class and then presenting their results based on the data they gathered. This is the Remote Version of the unit that makes the use of Google Forms for conducting surveys and presenting results more explicit.

**Lesson 1: What is Data?** - Students will be able to define data and use data to predict an outcome. (DA-04)

**Lesson 2: Cause/Effect in Science** - Students will be able to identify the effects of an event and given a set of data, be able to identify when a certain event occurred. (DA-04)

**Lesson 3: Designing Surveys** - Students will be able to gather data through surveying. It will help them gain a better understanding of quick, simple data collection. (DA-03, DA-04)

**Lessons 4/5: Modeling and Interpreting Survey Results** - Students will learn how to visualize data through the use of different types of graphs such as bar charts and pie charts. They will also be able to interpret what these results mean and draw conclusions from them. (DA-03, DA-04)

*Note: Lessons 4/5 are effectively one lesson, but since it is longer, we describe it as being 2 lesson plans.*

**Lessons 6: Presenting Data** - Students will present their data collected to the class. (DA-03, DA-04)

# What is Data? (R)

Decisions Using Data: Lesson 1

## Lesson Overview



Introduction

5 minutes



Using Data for Decision-Making

10 minutes



Using Data for Predicting

10 minutes



Reflection

5 minutes

## Standards

DA-04 Communicate using data



## Introduction

Today, we are starting a new unit on “data.” Ask specific students to share what they think of when they hear the word “data.” After a couple of students share their thoughts, you can say that data is simply “pieces of information.” Now, the question is, why is data important? You can again call on a couple of students to answer why they think data is important, before stating that data can be used to share an idea, make a decision, or predict what might happen in the future.



## Using Data for Decision-Making

Now students will participate in an activity that models an example of using data to make a decision. Say that the class is a soccer team and they are trying to choose a color for their uniforms. What are some ways the group can decide on a color when there’s a lot of people on the team? Ask specific students to share their answers and try to get responses beyond just voting. Some examples include randomization, having parents/guardians or the teacher choose, or choose it based off of a mascot or school colors.

Voting as a group is usually the best option, so we’ll use this as an example of how to get more information about what the group likes and organize it to make a decision.

Ask students for suggestions for five different uniform colors, and list them. Use this chart to keep track of student votes. You may share if you have a screen sharing application.



## Using Data for Decision-Making (cont.)

	Vote One	Vote Two
Red		
Blue		
Green		
Yellow		
Pink		

First, have students vote for their favorite color in the Private Chat, but they only get one vote! After tallying the votes under Vote One, you can share the results and ask the students to share what this says about what the group should do as a team.

Next, have the students vote again, but they can vote multiple times. If a student likes red and blue, they can raise their hand for both of these options. After tallying these votes under Vote Two, explain how this was different from the first vote and what this says about what the group should do.

This is a really important idea in data collection; how the questions are structured makes a significant difference in the information that is collected and the conclusions that we can generate.



## Using Data for Predicting

The previous activity used data to communicate an idea. Now the students will use data to try and predict an outcome. In this activity, students will try to guess each other's favorite food using collected data. Ask for suggestions for foods and make a table as shown below as with the above.

Foods	Votes
Pizza	
Tacos	
Hamburger	
Pasta	

Have a few students share their favorite food with the teacher privately, as with using the private chat feature on your lecture application. If this cannot be done, try and choose some generic but safe food choices (like the above).

The rest of the class will conduct a blind vote through the private chat feature, if applicable. Like the first round of the previous activity, each student can only vote once.

Show the students this data and have them predict any other random student's favorite food. Also have them justify their choice.

After, you can show the real response of said specific student. The students can discuss if the prediction was accurate, and what that means about how to predict outcomes using data.



## Reflection

- Why is data helpful?
- What are some ways that we used data today?
- Do you think it is better to have more data or less data when you are making a choice? Explain your answer.

# Cause/Effect in Science (R)

## Decisions Using Data: Lesson 2

### Lesson Overview



Introduction

5 minutes



Guided Cause/Effect in Weather

10 minutes



Cause/Effect in the Forest

10 minutes



Reflection

5 minutes

### Standards

DA-O4 Communicate using data

### Materials

1 1 Wk. Grph (prvd.)

2 2 Wk. Grph (prvd.)

3 Deer Pop (prvd)

4 Paper and Pencil



## Introduction

Today's lesson will be looking at data to determine cause and effect relationships. It would be helpful to review the last lesson by having students volunteer to answer the following questions: What is data? How can we use data to make a decision? How can we use data to predict an outcome?

A cause and effect relationship is when some event happens that **causes** an **effect**, which can be something new that happens or something being changed. One example is cutting a piece of paper in half to get 2 smaller pieces of paper. Cutting the paper is the cause, and the effect is the one piece of paper is now two pieces of paper! Select specific students to think of more cause and effect examples. Be sure to say why something a student says is or is not a cause and effect relationship.



## Cause and Effect in Weather

The first activity will be guided then the next one will allow the students to work through one more independently. Be sure to upload the One and Two Week Weather Graph document, or prepare to screen share it before the lesson.

The One Week Weather Graph shows the average temperatures for each day in a week. Ask the students if they notice any cause and effect relationships here. Any patterns? Call on volunteers until someone correctly answers that the rain caused the temperatures to drop.



## Cause and Effect in Weather

Now show students the next graph, Two Week Weather Graph, with average temperatures over two weeks. Let the students think for a few minutes to hypothesize which days it rained on. Students should be able to identify it rained on the days where the temperatures dropped afterwards: both Wednesdays and the second Monday.

Through the activity, the students have synthesized information by figuring out there is a cause and effect relationship between rain and temperature and using that to hypothesize what days it rained on!

Tell the students that cause and effect relationships unfortunately are not always true. For example, the weather might get colder even if it didn't rain, and even if it does rain the weather might not get colder. However, the data is useful in that it allows us to make an educated guess about information that we do not know.



## Cause and Effect in Forest

For the second activity, upload or screen share the Deer Population Graph.

Introduce it by saying that it shows us the amount of deer in a certain forest over time. At some point, a population of wolves moved into the forest. Have the students individually think about the year they think the wolves moved into the forest and why. Also have them think about what year they believe there will be no deer left in the forest and why.

Give the students 5-7 minutes to work on this. Then, call on students to share their answers and make it clear what the correct answers are.

(Correct answers: Wolves moved into the forest in 2003, and since the population has been decreasing by 100 each year since then, we should hypothesize the population would reach 0 in 2 years, 2007)



## Reflection

- What is an example of a cause and effect relationship?
- Why is being able to identify cause and effect relationships useful?

# Designing Surveys (R)

## Decisions Using Data: Lesson 3

### Lesson Overview



#### Introduction

5 minutes



#### Surveying

20 minutes



#### Reflection

5 minutes

### Standards

DA-O3 Organize and Present Data

DA-O4 Communicate using data

### Materials

1 Writing Utensil

2 Paper



## Introduction

This lesson will introduce students to using surveys through an interactive activity. Start by saying that today, the students will try to plan a future party using the class's preferences. After explaining the goal, ask for suggestions on how to collect this data. You can provide feedback on the suggestions and then guide the classroom to one method: surveys.

Remind students of the first lesson in this unit when they voted on what color their soccer uniforms should be. That was an example of a survey with one question, but surveys can have many questions!



## Surveying

Since the students are not sure what to get for the future class party, surveying the class will help solve the problem. Provide the students with three general steps on collecting surveys, but allow them to create questions.

Here are the three steps.

1. Create the Questions
2. Ask the Questions
3. Tally the Results



## Surveying (cont.)

The students should follow these steps and produce the results. This activity can be conducted in groups, pairs, or individually depending on your students and remote situation.

Since you will be using computers, students will create their surveys using Google Forms, a free surveying tool! Watch this Youtube video explaining the basics of Google Forms: <https://www.youtube.com/watch?v=fhA1A5T-Zc8>

Students can spend a portion of class time answering other student's linked surveys. Have them collect and think about their results (we'll use them later).



## Reflection

- How similar or different is your data compared to your peers? Why do you think it is similar or different?
- What made you ask the questions you asked?
- Did you expect different results? If so, why? Why do you think they were different?
- How could your survey collecting improve? What are the pros and cons?

# Modeling and Interpreting Survey Results (R)

Decisions Using Data: Lesson 4 & 5

## Lesson Overview



Introduction

5 minutes



Graphing and Interpreting Results

20 minutes



Group Work - Design Posters

30 minutes



Reflection

5 minutes

## Standards

DA-O3 Organize and Present Data

DA-O4 Communicate using data

## Materials

1 Posters

2 Rulers

3 Colored Pencils



## Introduction

Remind students that in our last lesson they designed a survey of questions, administered the survey, and collected the results. Now that they have data to work with, this lesson is about visualizing data!



## Graphing and Interpreting Results

While we could just present our results by saying what the most popular answer to each survey question was, a more interesting and powerful way to share our survey results is by using graphs. Ask if anyone knows different types of graphs. Acknowledge and write student responses.

The two we will focus on are bar graphs and pie charts.

Screen share or link a simple bar graph and go over what everything means.

- On the x-axis (along the bottom), we want to place our different options. For example, if this was a question about favorite ice cream flavors, we would put the different ice cream flavors here.
- On the y-axis (up the side), we put the number of responses for the corresponding category. For each option, we draw a bar up to the number of votes that option got. For example, if 10 people said their favorite ice cream was vanilla, we would draw a graph with a height of 10 for vanilla.
- The most popular result is the one with the largest bar - the least popular result is the one with the smallest bar.



## Graphing and Interpreting Results (cont.)

If you want, you can show that you can do a horizontal bar chart. Ask the students how we can tell what the most popular/least popular data points are.

Next, screen share or upload a pie chart and go over what everything means.

- Each piece of the pie is divided up based on all of our different options
- How big a piece is refers to the number of votes that option received. The larger the piece, the more people that chose this option.
- The biggest segment is the most popular result and the smallest segment is least popular.
- With pie charts, the key thing is to understand about how big each piece should be compared to the other pieces. Make two pie charts with this example data, one with correct piece sizes and one with incorrect piece sizes and have students vote on which one makes more sense given this data: Vanilla - 10, Chocolate - 20, Strawberry - 15, Mint Chocolate Chip - 5



## Design Posters

Since students used Google Forms, they can use Forms to create charts for them! Have students explore the different types of charts (specifically the bar and pie chart) which they can use to represent their data.

Have the students explain their interpretations of their data for each graph - what the most popular choice was, what the least popular choice was, etc.



## Reflection

- Why is having graphs useful?
- How is the data presented better using graphs? If at all?
- Compare and contrast bar graphs and pie charts and their usefulness.

# Presenting Data (R)

## Decisions Using Data: Lesson 6

### Lesson Overview



#### Introduction

5 minutes



#### Gallery Walk

20 minutes



#### Reflection

5 minutes

### Standards

DA-O3 Organize and Present Data

DA-O4 Communicate using data

### Materials

1 Posters/Graphs



## Introduction

We are ending the unit by having students present their survey results to the class! Remind students that everyone worked hard on these projects, and that we want to show support for each other and be very respectful. Also, it's good to ask questions about the survey questions and results.

Start by telling students how we will be doing the presentations. Students can present in groups/individually through Screen Share. First you must enable this feature in your remote teaching software, then tell students/groups to share in some order.

Have students focus on what their graph explains, why they chose particular questions, etc.



## Gallery Walk

Now to do the presentations as described above!

After each presentation, have a few volunteers give short feedback. Some examples of what they can say are “My favorite question you asked was ....”, or “I like how you displayed this result” The feedback should not be generic like “good job!” It should include something specific from the presentation.



## Reflection

- What do you think you did well on in this assignment?
- What is something you would do differently next time?

# Resources

Monday	Tuesday	Wednesday	Thursday	Friday
68°F	69°F 	62°F	64°F 	58°F

Monday	Tuesday	Wednesday	Thursday	Friday
58°F	60°F	59°F	53°F	54°F
Monday	Tuesday	Wednesday	Thursday	Friday
57°F	49°F	52°F	45°F	48°F

Deer Population in Wonder Mountain Forest

