

Unit 8 Lesson 1

Introduction to Data

Resources

Teacher Setup for “Data Tracker” Project

This lesson requires a one-time special setup in order to create a form for data collection with the students in your class. Once you have it setup you will use it for several weeks.

Here are the steps:

1. **You must have a Google Account**

If you have a school Google Account you probably want to be logged in with that account. If you do not have a Google account or would prefer not to use Google products for this lesson, see the Alternatives to Google section at the bottom of this setup guide.

2. **Make a copy of the Google Form**

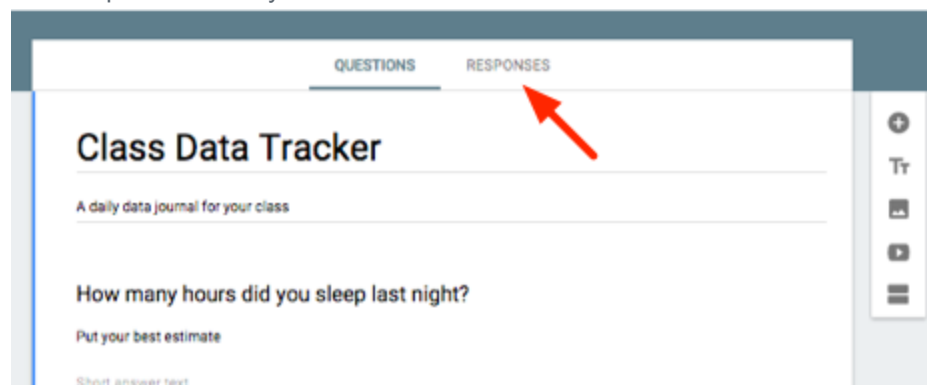
- Click this link: http://bit.ly/CSP_Unit4_DataFormTemplate (This redirects to a *Template* for a Google Form.)
- At the top-left of the screen, you should see something that looks like this:



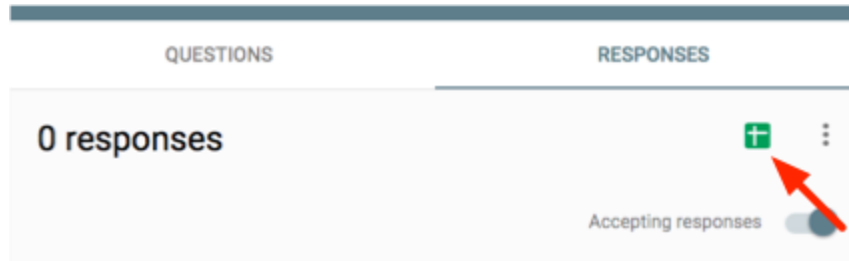
That will make a copy of the form and add it to your Google Drive.

- You will then see an editable version of the “Class Data Tracker” form. (NOTE: If you would like to make changes to this form to add or remove questions please see our notes about doing so below.)
- Add a spreadsheet to collect responses...

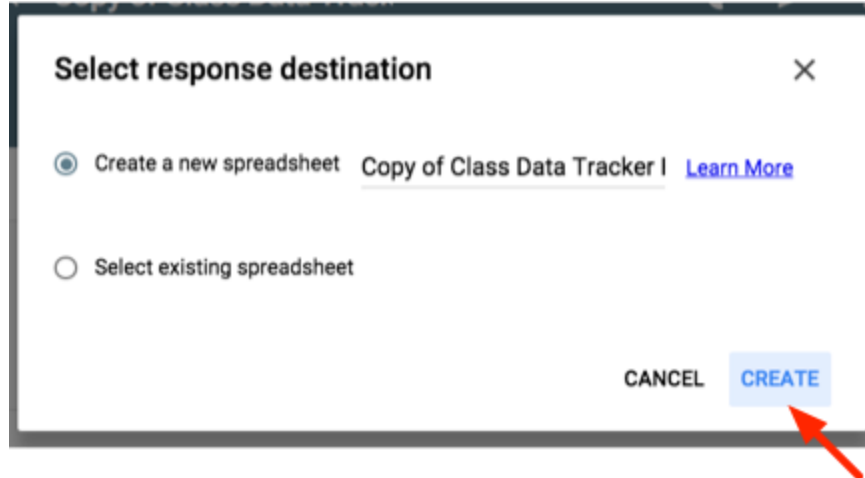
At the top of the survey click RESPONSES



Then click the green Icon



Then Click the CREATE button - use the default option to create a new spreadsheet



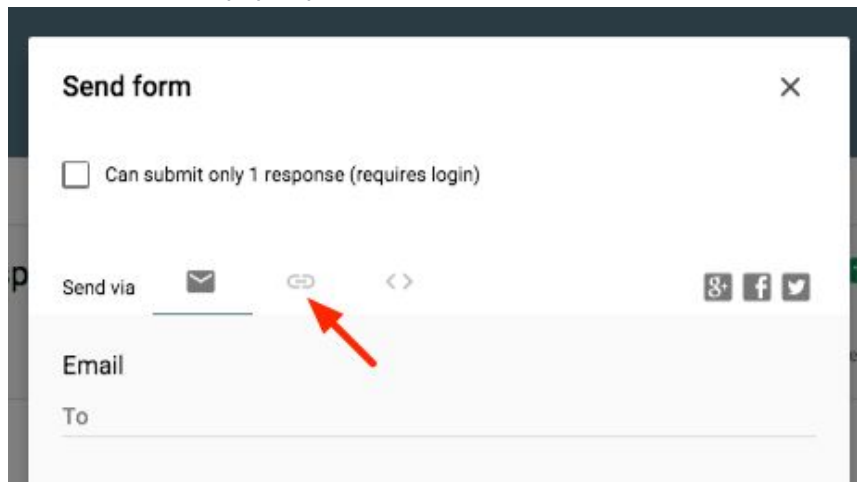
It will then open up a new empty spreadsheet where responses to the survey will be collected. You can close this spreadsheet for now. We'll get back to it later.

3. Share a link to the form with your students

- a. Go back to the page that was showing the form. At the top-right of the page click the button that says SEND.



- b. In the window that pops up, click the little Link Icon 



- c. The window then shows a direct link to a live version of the form that anyone can fill out. This is the link to share with students. It's probably easiest to choose the short URL version and to share that link with students.



You may alternatively want to share the link via the email option if you have a list of student email addresses you can use.

Place or post this link in a place where students have quick and easy access to it.

4. Whew, done!

You should now have:

- A copy of a Google form in your Google Drive
- A spreadsheet that will collect responses from the form in your Google Drive
- A link that students should use to fill out the survey

You will have students fill out this form EVERY DAY, or as frequently as possible over the next few weeks. We will look at the results more fully in Lesson 7 of this unit. You can place the form and spreadsheet documents wherever you like in your Google Drive. They are yours now.

NOTES:

For general help with Google Forms, go here:

https://support.google.com/docs/topic/6063584?hl=en&ref_topic=1360904

Alternatives to Google Forms/Sheets

You need some way for students to anonymously submit a survey every day and for the responses to be collected in a spreadsheet somewhere. There are other survey products out there, such as **Microsoft Excel Online** or **Survey Monkey**, or you may also wish to do it with your school's LMS, if that is an option for you.

Editing the Survey Questions...

The questions in this short survey have been chosen for certain properties they will have after students have filled out the survey repeatedly over a number of weeks. If you choose to remove or change questions on the survey, or make your own completely different survey, please keep the following in mind, so that the future lessons in the unit (specifically 7, 8 and 9) will hold up.

Question	Properties we need
How many hours of sleep? How many hours of work? How many hours did you relax?	A free-form text entry that's supposed to be a number. We want this data to be free-form so that it gets a little "dirty." We have tasks and strategies for cleaning up the data later on.
What did you do to relax?	Free-form text entry that could be anything, but a directed response to a question. As a later task, students will look at these responses and try to fit them into categories so that the data is computable.

How do you feel today?	A fixed scalar response. Something easy to plot.
Which describes you (only child, oldest, middle, youngest sibling)?	<p>A fixed response that will not change from day to day. This is in lieu of some other way to track responses over time, like asking for other personally identifiable info like eye/hair color, or even name or student ID. We want it to be anonymous but to be able to track *something* over time.</p> <p>If you are comfortable adding a question about gender to the survey, that can lead to interesting investigations later on.</p>

Unit 8 Lesson 2

Good and Bad Data Visualizations

Resources

Name(s) _____ Period _____ Date _____

Student Worksheet - Data Visualization Scorecard



Rate it: From Good to Hilariously Bad

Making good data visualizations is hard work, even for so-called experts. Today you and a partner are going to **collaboratively review a collection of data visualizations**. Some are strong data visualizations that create a deeper understanding of the underlying data. Others are difficult to interpret or even just hilariously bad. Your job is to rate the quality of the visualizations and keep a few notes about why they are good or bad.

Directions

You can find two collections of visualizations (“Collection A” and “Collection B”) on **Code Studio**. Choose either collection and go through each visualization. For each one:

- **Examine the visualization**, as well as any included text. What is it trying to communicate?
- **Discuss with a partner**: Is the visualization clear? Is it misleading? How could it be improved?
- **Rate the visualization** and make a short note about why you gave the rating you did.

Which collection are you looking at? (circle one)

Collection A

Collection B

Number	Your Rating				Comments / Notes
1	Great	Good	Bad	Horrible	
2	Great	Good	Bad	Horrible	
3	Great	Good	Bad	Horrible	
4	Great	Good	Bad	Horrible	
5	Great	Good	Bad	Horrible	
6	Great	Good	Bad	Horrible	
7	Great	Good	Bad	Horrible	
8	Great	Good	Bad	Horrible	
9	Great	Good	Bad	Horrible	
10	Great	Good	Bad	Horrible	
11	Great	Good	Bad	Horrible	
12	Great	Good	Bad	Horrible	
13	Great	Good	Bad	Horrible	
14	Great	Good	Bad	Horrible	
15	Great	Good	Bad	Horrible	

Best and Worst Visualizations

Choose the **best and worst** visualization from the list above.

The Best One

- Which visualization was the best?
- What story or idea does it successfully convey?
- What specific aspects of this visualization makes it particularly effective?

The Worst One

- Which visualization was the worst?
- What story or idea do you think it is trying to convey?
- Why specific aspects of this visualization makes it particularly ineffective? Is it wrong? Misleading? Nonsense?

Fix It (optional)

Sketch an outline of a better way to visualize the information from **the worst visualization**. **Briefly explain** why your suggestions would improve the visualization.

Unit 8 Lesson 3

Making Data Visualizations

Resources

Unit 8 Lesson 4

Discover a Data Story

Resources

Name(s) _____ Period _____ Date _____

Activity Guide - Discover a Data Story



Exploring a Dataset with Visualizations

We collect data in order to learn more about the world around us. It is usually hard to see patterns in a dataset when viewing it in its raw form. Computational tools like summary tables and visualizations make it easier to find interesting trends and relationships within the data.

Terminology

- **README:** a document providing background information about a dataset
- **CSV:** abbreviation of “comma-separated values,” this is a widely-used format for storing data
- **Raw data:** the original data as it was collected
- **Summary table:** a table of aggregate information about a dataset (e.g., the average, sum, count of some values)

Getting Started

Collaborate with a partner to **explore the datasets** and **choose one** you would like to explore further.

- For each of the 5 datasets...
 - **Read the README** to understand the **raw data** that was collected.
 - **Look at the rawData.csv file** - see if it makes sense, based on the README.
 - **Look at the other CSV files in the folder** - they are summary tables provided for your dataset.
- **Repeat these steps** with additional datasets.
- **Choose** one to explore more deeply.

Discover a Data Story

Now that you’ve chosen a dataset, you’ll want to use visualization to help find an interesting pattern in your dataset.

- **Open a summary table** from your dataset.
- **Experiment with different chart types** for visualizing that data.
- **Discuss with your partner** what you are seeing in each chart. Have any interesting patterns appeared?
- **Repeat these steps** with additional summary tables.
- **Choose** the summary table and visualization which was most interesting or insightful.

Present Your Findings

You should have found an interesting trend or relationship within your data. Now you’ll want to communicate your findings in a way that others can easily understand.

- **Use the [Data Visualization 101](http://content.visage.co/hs-fs/hub/424038/file-2094950163-pdf) guide** (<http://content.visage.co/hs-fs/hub/424038/file-2094950163-pdf>) to make sure you are making good choices for presenting the pattern or trend you have found.
- **On the next page**, you will find a template for presenting the pattern you found.

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Activity Guide - Present Your Data Story



Your Visualization

Paste your visualization in the space below.

Prompts

1. Provide a brief description of the dataset you chose to visualize.
(approximately 50 words)

2. **Describe the trend, pattern, or relationship** you found within your data. How is it shown with your visualization?
(approximately 100 words)

3. Come up with a **possible story or explanation** for the trend you described. Make sure to note any assumptions you are making in this interpretation of the data.
(approximately 100 words)

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Rubric - Present Your Data Story



Criteria	Yes	No	Comments
The visualization is clear and easy to read.			
An appropriate chart type was chosen for presenting the data being visualized. (See the Data Visualization 101 guide.)			
A clear explanation of the data on which the visualization is based is provided.			
A clear description of the trend, pattern, or relationship in the data is provided.			
A plausible interpretation, or possible explanation for why the the trend, pattern, or relationship exists is provided.			
The response includes an account of any assumptions made in interpreting the trend, pattern, or relationship in the data.			

Unit 8 Lesson 5

Cleaning Data

Resources

Unit 8 Lesson 6

Creating Summary Tables

Resources

Unit 8 Lesson 7

Tell a Data Story

Resources

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Practice PT Overview and Rubric - Tell a Data Story

Background

In this unit, you have collected data about you and your classmates and have learned analysis and visualization skills that should allow you to find interesting patterns within it. At this point, you will have worked with a partner to clean the data that was collected and have learned how to use computational tools to summarize this data. Now it's time to put all these skills together and tell a story with the data.



General Requirements

This task requires you to:

- Manipulate data that you have collected
- Create a computational artifact in the form of a data visualization
- Write about your artifact and its possible interpretations

Step 1: Make your own copy of the data

You will work individually for this project. You may have worked on this data with partner beforehand and you may still collaborate with them to share ideas and brainstorm. However, this project must be a reflection of your individual creativity and work. So make a separate copy of the data you cleaned with your partner so that you don't accidentally clobber each other's work.

Step 2: Find your data story

Dig into the data! Use your skills for data manipulation to find connections and trends. Remember the skills you have for doing discovery:

- Sort data
- Rearrange columns
- Filter
- Make summary (pivot) tables
- Use charts and visuals for discovery

Step 3: Visualize your data story

You will need to design a data visualization that clearly communicates the data story you found. Here are a few things to help you along the way:

- Use the Data Visualization 101 guide to help you pick good chart types.
- Make your visualization clear and easy to read.
- In some instances, **a simple table may be a better way to show your data than a chart.**
- Use text along with your visual to help explain your data story. If you need to use too much text, however, ask yourself if there's a better way to visualize it.

Step 4: Written responses

Respond to the written responses below. Note that a recommended word count is provided for each question.

1. Describe how you collected the data for your visualization including how it was collected, when it was collected, and over what period of time. Your description should be understandable by someone unfamiliar with this project.
(approximately 100 words)

2. Describe your development process, explicitly identifying the computing tools and techniques you used to create your artifact. Your description must be detailed enough so that a person unfamiliar with those tools and techniques will understand your process.

(approximately 100 words)

3. **Describe your findings:**

- **Describe the trend, pattern, or relationship** you found within your data. How is it shown with your visualization?
- Come up with a **possible story or explanation** for the trend you described. Make sure to note any assumptions you are making in this interpretation of the data.

(approximately 200 words)

4. **Make a recommendation based on the results of your analysis.**

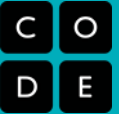
- Describe who you are making the recommendation to and what should they do.
- Explain how the recommendation will lead to some benefit or prevent some harmful effect.
- Explain how your recommendation is supported by your analysis of the data, or what else might need to be investigated in order to make a stronger recommendation.

(approximately 100 words)

Step 5: Submission

Copy your visualization and written responses into a single document. Ask for specific instructions on how to submit this single document.

Rubric - Tell a Data Story



Criteria	Low	Medium	High
Visualization			
The visualization demonstrates proficiency with the computational tools used to create it.			
The visualization follows good design principles.			
The visualization provides insight into a trend or pattern in the data.			
Reflection			
The response clearly describes the source of the data used to create the visualization.			
The response clearly describes the iterative development process used to create the visualization.			
The response clearly describes the relationship, trend, or pattern shown in the data and provides a possible explanation, while noting assumptions.			
The response makes a recommendation, indicates potential benefits of that recommendation, and explains how the recommendation is supported by the provided interpretation of the visualization.			