HSEarthSpace Unit Activity:

Studying Earth and Space Science

Rubric for the activity

Task 1

Data Analysis

In this task, you'll use spreadsheet software to analyze and graph the average temperatures measured on Earth for the past 136 years. You'll then use your data and graph to determine what's happening to the global temperature over time.

Part A

Begin by reflecting on what you already know about global temperature trends. What trends do you expect to see as you plot how temperatures have changed over time? What are your sources of prior knowledge, and would you consider them reliable?

I will be very surprised if you don't know anything about global temperature trends. Think about the strange weather patterns we've been having the last several years.

Part B

Go to this site

https://www.ncei.noaa.gov/access/monitoring/climate-at-a-glance/national/ti

me-series/110/tavg/1/12/1900-2022?base_prd=true&begbaseyear=1901&endbaseyear=2000 from the National Oceanic and Atmospheric Administration (NOAA) to analyze global temperature data from 1880 to 2016. The Time Series parameters are already set. Scroll past them to reach the data table.

The data you'll use is in the first two columns: Year and Anomaly. An anomaly describes a deviation from the standard or long-term average. The anomaly data in the table compares the global land and ocean temperature with the average temperature from 1901 to 2000, which was 13.9°C.

Question 1

Why do you think scientists often find value in looking at and comparing anomalies within data?

When you go online you are going to find, "Anomalies more accurately describe climate variability over larger areas than absolute temperatures do, and they give a frame of reference that allows more meaningful comparisons between locations and more accurate calculations of temperature trends." I have no clue what that is saying in common speech. You will not earn credit if you put that or something like it down as your answer unless you also include what it means to a person lacking a degree in climatology.

I hate to say it, but someone with Brainly did manage to put the passage you'll find online into common English. On the other hand, another answer at Brainly is still convoluted and uses too many words that are opaque. The answer I don't like seems to be the one the other answer farms are using. I don't like that answer either.
Please don't use: "Anomalies are important because they allow us to question if the experiment was carried out properly and if its method can also lead to other observations than the ones stated by the scientist. Anomalies are essential to learn more about a single experiment and improve the way investigation is done professionally." or something like it, unless you can explain it in common language.

You may want to look at these websites, but they are also full of important-sounding words. Be cautious with what you choose to use in your answer.

https://onlinelibrary.wiley.com/doi/pdf/10.1111/j.1756-8765.2009.01036.x It mentions how Copernicus paid attention to the oddball things that happened in the sky. Copernicus is one of the scientists who moved humans' belief in the sun revolving around the earth into the earth revolving around the sun. The anomalies are the strange things that stick out and make you wonder if you wrote down the data correctly.

https://towardsdatascience.com/a-note-about-finding-anomalies-f9cedee38f0b

Question 2

Describe how you could calculate the actual temperature from the anomaly.

You can write this down: actual temperature = 13.9 deg C + anomaly temperature
I don't know how you were supposed to figure that out. If you did figure it out, please tell me what told you to do that.

Part C

Download or import the text data from NOAA into a spreadsheet software program such as Microsoft Excel or Google Sheets. You can use one of several methods. One method is to locate the text format that best aligns with your spreadsheet software using the small download icons at the top left of the data table (note: CSV is used most often). Click the icon to open the data in text format. Copy the entire screen and paste it into your spreadsheet software. Depending on which software you're using, the data may automatically be separated into columns: Year and Anomaly (or Value). If it isn't, use the Text to Columns (Microsoft Excel) or Split Text to Columns (Google Sheets) tool in the Data tab of the menu to separate the text into separate columns, with the delimiter or separator set to "divided by a comma."

Create a third column in your spreadsheet labeled, “Actual Temperature.” Create a formula that will fill the third column with actual temperature data for each month. Double-check your formula and data analysis by completing the modified table in the answer space.

The data table you are provided in Courseware:

Year	Anomaly Value	Actual Temperature
1900	1.80	
	0.45	33.13
1940		
1960	-2.28	30.40
2000	-4.24	28.44

Go to the link in Part B to look up data points.
https://www.ncei.noaa.gov/access/monitoring/climate-at-a-glance/national/time-series/110/tavg/1/12/1900-2022?base_prd=true&begbaseyear=1901&endbaseyear=2000

Part D

Next, you’ll use your spreadsheet to create a graph. The graph will help you visualize how the actual temperature changed from 1880 to 2016.

Question 1

Which type of graph (bar graph, pie chart, scatter plot, for example) do you think would be best for this task? Explain your reasoning.

Question 2

The two variables in your spreadsheet are time (years) and temperature (degrees Celsius). Which is the independent variable, and which is the dependent variable? Which variable belongs on the *x*-axis, and which goes on the *y*-axis? Explain your reasoning.

The scientists choose the independent variables. These values are known before the lab starts.

The values for dependent variables show up after the experiment begins. We don't know the values for dependent variables until they can be measured or recorded. Their value depends on what was chosen for the independent variables.

These links may also help:
https://mathbench.umd.edu/modules/visualization_graph/page02.htm

https://www.statology.org/which-variable-x-axis-y-axis/

https://mlpp.pressbooks.pub/mathreviewforchemistry/chapter/graphing/

Part E

Create a graph to compare the actual temperature changes over time using your spreadsheet. The steps involved in creating your graph will be different depending on your software. For most platforms, it's necessary for the two columns you're correlating to be next to each other. Use the cut, copy, and paste features to relocate the anomaly values so that the actual temperatures are in column B next to the years in column A. Highlight columns A and B. From the menu, choose Insert and select the graph or chart type you decided on in part D. If needed, update the graph and axis labels so that it is easy to tell what the graph is displaying.

Capture and save an image of your graph. ~~Use the insert Image button to add the image to the answer space.~~

Please upload the image as a jpg document where you submit the assignment.

I won't be able to see the graph if you put it in the answer space.

How to attach a document to a submission.

If you need a place to graph, you can use Desmos, https://www.desmos.com/calculator. Take a screenshot and upload it when you turn in your work.

Part F

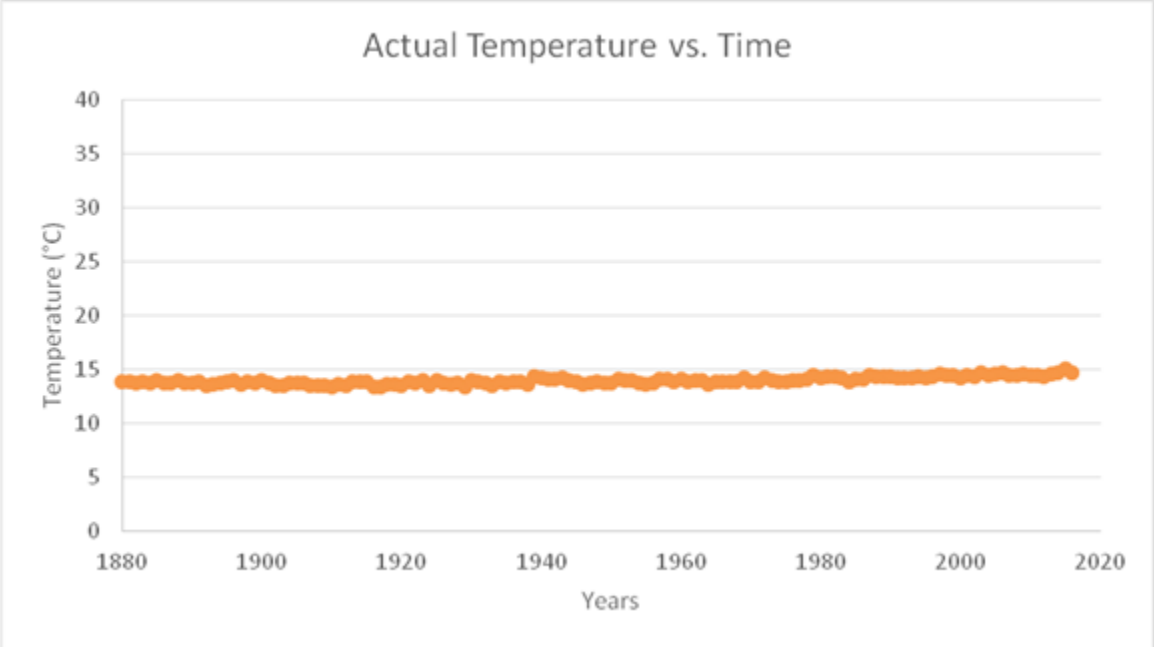
Do you think the overall trend of the data shows global temperature rising, falling, or staying the same? Does this conclusion coincide with your predictions in part A?

Hint: Add a trend line to your graph to visualize the correlation.

Keep scrolling

Part G

This graph displays the same data you used to create your graph, but the graph looks much different.



Question 1

If the data is the same, why does the graph look different? What might an indiscriminate viewer conclude about the temperature from looking at this graph?

Question 2

Why is it important to choose a relevant scale for analyzing data sets in science?

Task 2

Evaluating Scientific Claims and Forming a Conclusion

In this activity, you'll analyze multiple forms of scientific text to determine their validity. Then you'll draw your own conclusions about human involvement in climate change.

Part A

The first article that you'll analyze is from the National Oceanic and Atmospheric Administration (NOAA). Read the article and list three conclusions the author draws about human involvement in climate change. In two to three sentences, describe the evidence cited that explains each conclusion.

Part B

A professor at the University of Missouri wrote the second article. Read the article and list three conclusions the author drew about human involvement in climate change. Write two to three sentences describing the evidence the author cited to explain each of his conclusions.

The link to the article:
https://www.mynewstouse.com/stories/global-warming-is-natural-not-man-made,9685

Part C

Reflect on what you learned in the unit about credible, reliable sources. Evaluate and compare each source in terms of its credibility. Provide evidence for your reasoning.

Part D

The two articles you just read contain conflicting conclusions. What questions do you have about the information presented in the articles? Maybe there's something you would like to know more about before making your own conclusion. Or perhaps there's an item that was presented as a fact that you would like to investigate. Before you make your conclusion about human involvement in climate change, **list four to five questions that you would like answered.**

All you do here is write your four to five questions.. You don't have to answer them.

Part E

Find reputable websites and articles to help answer your questions from part D. For each question, write a short paragraph and cite the websites or texts you used to answer it.

I know they want you to find the websites, but I like doing this stuff. You may use any of these websites. You DO NOT have to use these websites if you have found some that you like.

https://scied.ucar.edu/learning-zone/climate-change-impacts/regional

https://climate.nasa.gov/

https://www.epa.gov/ghgemissions/overview-greenhouse-gases#carbon-dioxide

https://climatekids.nasa.gov/review/greenhouse-effect/

https://scied.ucar.edu/learning-zone/how-climate-works/greenhouse-effect

Part F

Using all of the information you've gathered, conclude whether or not you think humans have influenced climate change. Write 100 to 200 words and cite at least three pieces of evidence.