Name: _____

Date: _____

ACTIVITY 1
Data, Data, Data!

The ease with which data can be stored, cataloged, and searched in an ever more-connected society is an important point to understand. Data storage has both positive and negative implications, and being able to recognize these, as well as how your actions can contribute to the data being stored, are addressed in the following activity.

1. List two or three sites that you access on a regular basis. _____

_____

2. In your group, find the privacy policy for your given site and identify two or three pieces of information that are collected for users of the site.

_____

_____

_____

File Types

3. What does the word *delimited* mean? Why is this necessary when talking about data files?

_____

_____

_____

4. Given a data file, how can you determine the type of data that might be contained in a specific column?

_____

_____

_____

_____

Posing Questions

5. On your own, identify two broad areas of interest that you have. Examples include health, sports, etc.

_____

_____

6. For each of the two areas of interest you identified, determine one question to which you might want to know the answer. These should be questions that are not easily answered with an online search. Two examples of questions that are easy to answer with an online search are who won the 1998 Superbowl (The Denver Broncos), and what is the height of the world's tallest building (at the time of publication, Burj Khalifa, 2717 ft/828 m).

_____

_____

_____

_____

Discuss your two questions with your partner and refine your questions based on their feedback. Write your updated questions below.

_____

_____

Finding Data Sets

Your teacher will provide you with several sites that provide free access to data sets. Spend a few minutes looking at the sites.

7. Are there data sets that might apply to one of the two questions that you refined in question 6? Find two different data sets that might be used to answer one of your questions. List the site and any search criteria used to find the data sets. If not, consider revising one of your questions so that you can identify an applicable data set.

_____

_____

_____

8. How many records are in each of the data sets you identified? Describe one benefit of using a larger data set with more records.

_____

_____

_____

Check Your Understanding

9. With your partner, discuss one way that user data captured by a site (whether knowingly or unknowingly) has contributed to an improvement in the service provided. Have there been any positive impacts of this data outside of the service or website?

_____

_____

_____

10. Do you know how the data in the data set you identified was collected? If so, please describe. If not, describe one way that the data might have been collected.

11. In your opinion, are there situations where the benefit provided from the data collected is worth the risk to personal privacy? Why or why not?

ACTIVITY 2

Designing and Implementing a Custom Class

You have likely created a class from a given description or specification several times. This is an important skill, but equally important is the ability to determine essential information to include when creating a class. What is "essential" can vary based on perspective, or can be determined by a question that is being asked or a problem that is attempted to be solved. This activity will give you an opportunity to practice making this type of determination. Consider the following selection.

Name	Type	Calories	Protein	Fat	Sodium	Fiber	Carbohydrates	Sugar	Potassium	Vitamins	Shelf	Weight	Cups	Rating
100% Bran	C	70	4	1	130	10	5	6	280	25	3	1	0.33	68.402973
100% Natural Bran	C	120	3	5	15	2	8	8	135	0	3	1	1	33.983679
All-Bran	C	70	4	1	260	9	7	5	320	25	3	1	0.33	59.425505
All-Bran with Extra Fiber	C	50	4	0	140	14	8	0	330	25	3	1	0.5	93.704912
Almond Delight	C	110	2	2	200	1	14	8	-1	25	3	1	0.75	34.384843
Apple Cinnamon Cheerios	C	110	2	2	180	1.5	10.5	10	70	25	1	1	0.75	29.509541
Apple Jacks	C	110	2	0	125	1	11	14	30	25	2	1	1	33.174094
Basic 4	C	130	3	2	210	2	18	8	100	25	3	1.33	0.75	37.038562
Bran Chex	C	90	2	1	200	4	15	6	125	25	1	1	0.67	49.120253
Bran Flakes	C	90	3	0	210	5	13	5	190	25	3	1	0.67	53.313813
Cap'n'Crunch	C	120	1	2	220	0	12	12	35	25	2	1	0.75	18.042851
Cheerios	C	110	6	2	290	2	17	1	105	25	1	1	1.25	50.764999
Cinnamon Toast Crunch	C	120	1	3	210	0	13	9	45	25	2	1	0.75	19.823573
Clusters	C	110	3	2	140	2	13	7	105	25	3	1	0.5	40.400208
Cocoa Puffs	C	110	1	1	180	0	12	13	55	25	2	1	1	22.736446
Corn Chex	C	110	2	0	280	0	22	3	25	25	1	1	1	41.445019
Corn Flakes	C	100	2	0	290	1	21	2	35	25	1	1	1	45.863324
Corn Pops	C	110	1	0	90	1	13	12	20	25	2	1	1	35.782791
Count Chocula	C	110	1	1	180	0	12	13	65	25	2	1	1	22.396513
Cracklin' Oat Bran	C	110	3	3	140	4	10	7	160	25	3	1	0.5	40.448772
Cream of Wheat (Quick)	H	100	3	0	80	1	21	0	-1	0	2	1	1	64.533816

https://www.kaggle.com/crawford/80-cereals/version/2#cereal.csv

1. Each row of the table represents an instance of an object. What is the best name for that object?

2. Your teacher will provide you with a question to answer related to the above table. Write the question here:

3. You will now design a class to describe that object and answer your given question. Write the class header:

4. How many instance variables will you create?

5. List the data types and names you will use for the instance variables.

6. Create a new Java file named `Cereal.java` and implement the class described above. Your class should contain all necessary instance variables, constructors, accessors methods, and a `toString` method.

Tips

Constructors are not methods and so have no return type. They are special blocks of code that for the purposes of this class should be declared public and have the same name as the class.

When assigning values to instance variables the type of variable cannot be included. If the type is included before the variable name in the constructor, this creates a local variable of the same name that is initialized and the instance variables of the object are never initialized. Once the constructor is complete the local variables no longer exist, leaving only the uninitialized instance variables.

7. Write a `main` method to test your `Cereal` class by implementing multiple instances of `Cereal` objects. This program should include lines instantiating `Cereal` objects.

Check Your Understanding

8. Given your class design, determine one additional question that you can answer without making any changes to `Cereal.java`.

_____

_____

9. Identify one additional question that can be answered from the given data that you are not able to answer based on your implementation of `Cereal.java`.

_____

_____

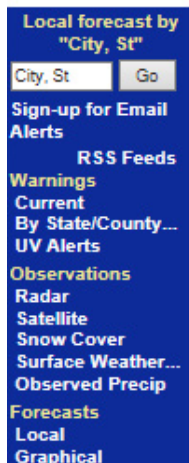**10.** What modification could you make in order to answer this question?

_____

_____

ACTIVITY 3
Putting It All Together

Existing code in the form of libraries is incredibly useful and a powerful aspect of object-oriented programming. Beyond the standard Java library, users around the world have created and published libraries to perform countless tasks. One such library, which you will be using in this activity and the one that follows, is the Sinbad library. This library allows you to create a Java program that can connect to a data source, read in data, and then process this data. The goal of this activity is to provide practice working with the Sinbad library. Before beginning, ensure that you have set up your IDE appropriately based on instructions from your teacher.

1. Run the main method in the `Welcome01` class and provide the location and temperature that are printed.

_____

_____

2. Go to the following link, **https://w1.weather.gov/xml/current_obs/**, and find the four-character code for an additional location. To find the code, you first must select the state or territory from the drop-down box shown here.

From the resulting list, choose a four-character code and modify the main method in `Welcome01` to pull information from this location instead. Provide the four-character code here. _____

Then write what is displayed when running your main method with this new code.

_____

_____

Share your results with a partner.

Once you have verified that the Sinbad library is installed correctly, you will work through the "Fetching Objects" tutorial found at **https://github.com/berry-cs/sinbad/ blob/master/tutorials/java/welcome02-obj.md**.

3. Using the location from the previous question, modify `Welcome02_Object.java` that you completed in the tutorial to create a third `Observation` object for your identified location, and then write the code to determine the coldest location between all three `Observation` objects.

Next, you will work through the "Arrays and Lists of Objects" tutorial found at **https://github.com/berry-cs/sinbad/blob/master/tutorials/java/welcome03-objs.md**.

4. How many weather station objects are in your state? _____

5. What is another way you could filter weather stations?

_____

_____

6. Modify `WeatherStation.java` and `Welcome03_List` to filter based on latitude, showing the weather station that is furthest south. Do not remove existing code that sorts weather stations based on state. What is the southernmost weather station you found?

_____

_____

Tips

In order to manage large amounts of data or complex relationships in data, it is helpful to group the data together in such a way using a single variable that refers to a location capable of storing multiple items rather than a single item. If the variable name holds multiple items, more information (an index) is needed to know which specific value is being accessed.

The iterative statement can be used to access every element starting at the beginning and moving to the last element. It has a specific structure and can be used to take the place of repetitive code, reducing the amount of code written and also the potential for errors. When elements are inserted or deleted from an `ArrayList`, the loop counter needs to be adjusted in order to prevent skipping an element or trying to access elements that no longer exist.

This structure can be modified to traverse the elements in different ways such as from the end moving to the beginning or skipping certain elements.

In addition to parameters and local variables declared in a method, a method always has access to any instance variables that are declared within the enclosing class. These instance variables are often required to complete the

goal of the method. If any of the available variables are objects (reference data), then those objects may have their own methods, variables, and constants that would be accessible within the given method as well.

Check Your Understanding

With a partner, answer and discuss the following questions.

7. What is an additional question that can be answered about weather stations or observations based on the code that you wrote?

_____

_____

8. How much additional code would it take to answer this question?

_____

ACTIVITY 4
Open-Ended Activity

This open-ended activity requires you to develop a program on a topic that interests you. As a class, spend a few minutes reviewing the requirements of the open-ended activity.

Requirements:

- Formulate a question you would like to answer
- Identify a data set that will help determine the answer to your question
- Create a class to model one entry of the identified data set
- Write a program with a `main` method to read the data from the identified data set into your program
- Utilize an array or `ArrayList` and the created class to store data that has been read
- Write code to process the data and determine an answer to the identified question

In addition, review the provided rubric/scoring guidelines so that you understand what you will be expected to explain once you are done completing your program.

It is strongly recommended that the implementation of the program involve collaboration with another student. Your selected program can be anything that you choose that meets the requirement and allows you to demonstrate your understanding.

Before beginning, make sure that you understand the expectations for the activity.

- Who will you be working with? Are you allowed to work with a partner? In a group of three or four?
- Among the members of your group (or with your partner), how will the implementation be completed?
- If you will be using pair programming, will your teacher be instructing you when to switch driver and navigator, or is this something that you need to keep track of?
- What should you do if your group/pair is stuck? Does your teacher want you to come straight to them? Are you allowed to ask another group?

Tip

For groups that choose to traverse multiple structures simultaneously:

When traversing multiple data structures simultaneously, structures might not be the same size and loop bounds must be adjusted to make sure that only locations that are valid in all structures are accessed.

Check Your Understanding

Once your program has been implemented and tested, you should answer the following questions on your own:

1. State the question you chose to answer and why you chose this question.

2. Describe the data set that you chose to help answer this question, and the process used to find the data set.

3. Describe the development process used in the completion of this project.

4. Describe the class used to represent entries in the identified data set, and why the specific instance variables were chosen.

5. Provide the code segment where data is being processed and describe how the data was processed in order to answer the identified question. Note that data must be stored in an array or `ArrayList` in order to earn full credit.