Name:_____

Teacher:_____

App Design

Year 7 Digital Technologies
Term 3

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App Design

Year 7 Digital Technologies
Term 3

This term, we are investigating how information systems work, focusing primarily on mobile apps.

This booklet includes all the resources you need for classroom lessons leading up to the design of your own mobile app!

Contents

Name(s)_____ Period _____ Date _____

Activity Guide - Card Sorting

Objective
Develop steps to sort a row of cards, using the rules below

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Tips
● Start with only 3 or 4 cards and work up to 8.
● Switch roles frequently.
● Practice with the cards face up first
● Test your work and even try to "break" your solution.
● Stick with it! There are many possible solutions. The point is to find yours!

Rules

Sorter
1. Can pick up, put down, and swap cards in any order they wish.
2. Shows cards to pointer without looking at them.
3. Only one card in each hand at a time.
4. Cards go back into empty spots on the table.
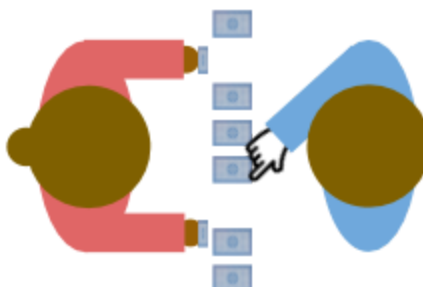
Pointer
1. When shown two cards can point to the bigger one.
2. For a tie point to either.
3. No other communication is allowed

Your Steps
Once you've developed your steps for processing cards, write the steps of your way of processing the cards in the space below. Feel free to draw pictures, number steps, or do anything else you think would be helpful.

Share and Test
Present your steps to another group. Make sure both groups get a chance to share and test their ideas. Here's some tests to consider.
● Use different numbers of cards
● Cards are in reverse order
● Cards are already in order
● Cards are nearly in order

Iterate

Based on your tests or ideas from another group, update your steps.

Processing Uses Algorithms

Processing is anything a computer does to turn input information into output information. Humans can process information, but usually they're making lots of assumptions or mental leaps to do it. When computers process information, they use **algorithms**, or sets of instructions, that will always turn an input into a desired output. The steps you just created are an algorithm to sort cards.

Reflection

1. What step of the problem-solving process did you think was most important in this activity? _____

2. Why?

_____

_____

3. Why would someone create an algorithm to process information if they already know how they would do it by hand?

_____

_____

_____

_____

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Activity Guide - Storage and Processing

Storage and Processing

Computers use **algorithms** to process information. Algorithms are steps or instructions the computer follows to turn input into output. Computers don't process information exactly like humans, and so their steps might look slightly different from a human's. Even still, the more steps an algorithm takes, the longer it'll take to run.

When designing an algorithm you don't just think about the steps of the algorithm. You need to think about the space it will take for a computer to process that information. This activity will help you think about the importance of storage in processing information a little more clearly.

Setup

1. Shuffle a deck of cards
2. Pick up about 10 cards and put them in a stack face down
3. Have a stack of post-its or similarly sized pieces of paper on hand

Rules

1. You can only use one hand through the entire challenge
2. Your hand can hold at most one card
3. You can pull a new card off the deck and look at it whenever you like
4. Once a card leaves your hand it is removed
5. You may not remember anything about cards removed from the game
6. At any time you may make a "safe spot" on the table by placing a post it
7. A safe spot can hold at most one card, face up, preventing it from being removed from play
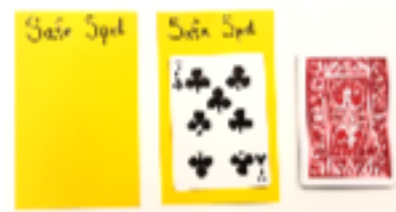
Challenge 1: Smallest Card

Create an algorithm that always finds the **smallest** card in your pile.

Input: _____   **Output:** _____   **Storage:** (How many safe spots did you use?) _____

Processing: Write your algorithm in the space below

Challenge 2: Largest Card

Create an algorithm that always finds the **largest** card in your pile.

Input: _____   **Output:** _____   **Storage:** (How many safe spots did you use?) _____

Processing: Write your algorithm in the space below

Challenge 3: Second Largest Card

Create an algorithm that always finds the **second largest** card in your pile.

Input: _____   **Output:** _____   **Storage:** (How many safe spots did you use?) _____

Processing: Write your algorithm in the space below
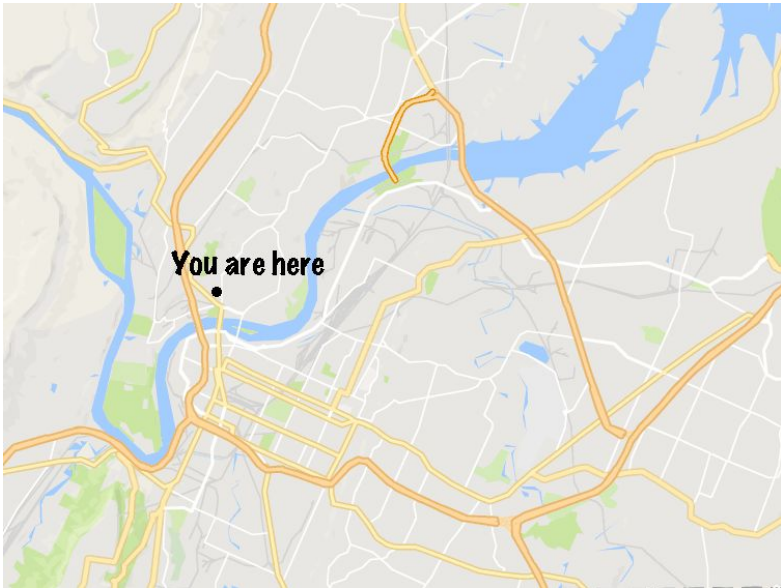
Challenge 4: Middle Card

Create an algorithm that always finds the **middle** or median card in your pile (the one that would be in the middle if you lined up all your cards in number order). You can assume you have an odd number of cards.
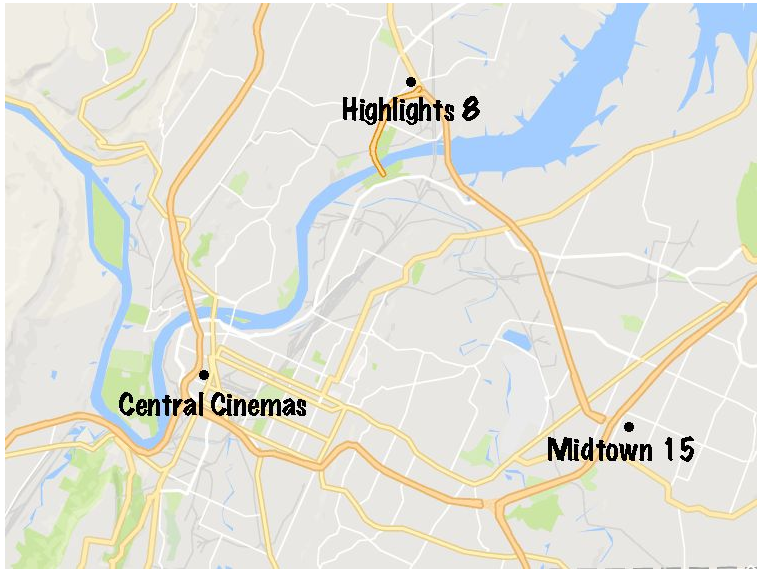
Input: _____   **Output:** _____   **Storage:** (How many safe spots did you use?) _____

Processing: Write your algorithm in the space below

Data Sheet

Use the information from this data sheet to try out your algorithm.

Type of Information	Information
Today's Date	September 5
Sound	There's a lot of sound in the environment
Movement	The phone is moving quickly
User's Location	
Locations of Area Schools	

Type of Information	Information
Weather Report	Today: Sunny, 45° F Tomorrow: Rainy, 42° F
Movie Reviews	Since Then: 4/5 "Hilarious!" Mills: 5/5 "Even better than the book!" The Wait: 2/5 "Boring and predictable." Cargo: 3/5 "Exciting, but not much more." The Watch 2: 3/5 "If you loved the first one, you'll want to see this."
Movie Showings	Central Cinemas: • *Since Then* (PG - Comedy) • *Mills* (R - Drama) • *The Wait* (PG - Mystery) • *Cargo* (Action) Midtown 5: • *The Watch 2* (PG - Action) • *Since Then* (PG - Comedy) • *Mills* (R - Drama) Highlights 8: • *The Wait* (PG - Mystery) • *Cargo* (Action) • *Since Then* (PG - Comedy) • *Mills* (R - Drama)
User's Favorite TV Shows	*The Secret Town* (Mystery) *100 Years* (Drama)
User's Favorite Books	*Whistler* (Mystery) *Mills* (Drama)
User's Favorite Movies	*The Watch* (Action) *Further* (Mystery) *The Last Night* (Drama)
Cinema Locations	

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Activity Guide - App Exploration

In this activity, you'll figure out what inputs a computer (in this case, a smartphone) would need in order to solve various problems, and what processing should be done on the information.

Ring Silencer App

Define
This app solves the problem of the user's phone ringing in class. It figures out when the phone is at a school and turns off the ringer. It turns the ringer back on when the user leaves school.

What type of output should the app produce? _____

Prepare
Fill out the following table with information that the app needs and whether you will find the information from a **phone sensor** or **the Internet**. Decide whether you want to store the information for later.

What type of information do you need?	Where will you find the information?	Store for later?
My location	Phone Sensor (GPS)	No

How will you process the information to get the output?

Try
Use the method you created above to process the information on the Data Sheet.

What is the output? _____.

Reflect
This app turns off the ringer even when the user is not in class. An advanced version would only turn off the ringer at school when the user is quiet and not moving. If the user is moving around or making a lot of noise, it would assume that it is not class time and keep the ringer on.

Fill out the table below with the new inputs you will need for this advanced version.

What do you need to know?	Where will you find the information?

Activity Guide - App I/O

Movie Recommendation Challenge

Define
This app addresses the problem of not knowing what movies to watch. Look through the information available to you, and decide what will help to choose a movie for the user.

What type of output should the app produce? _____

Prepare
Fill out the following table with information that the app needs and whether you will find the information from a **phone sensor**, **the Internet**, or **user input**. Decide whether you want to store the information for later.

What type of information do you need?	Where will you find the information?	Store for later?
Favorite movies	User input	Yes

How will you process the information to get the output?

How will you process the information to get the output?

Try
Use the method you created above to process the information on the Data Sheet.

What is the output? _____

Reflect
Compare your method, and the inputs it needed, to another group's method.

What is one advantage of the other group's method?

_____

_____

How might you combine your ideas to make a better app?

_____

_____

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Project Guide - Apps and Problem Solving

Overview

Computer science is an extremely powerful tool for solving real world problems. For this project you will combine what you've learned about the problem solving process and the way computers work in order to propose an app that could help solve a real world problem of your choosing.

You will...
- Work with a partner
- Define a real world problem
- Brainstorm ways an app could be used to help solve that problem
- Identify the inputs / outputs / storage / processing used by your app
- Share your ideas with another group for peer feedback
- Incorporate feedback to create a final version of the app
- Create a poster of your app to share with the class

You will submit...
- This completed Project Guide
- Completed Peer Review
- A poster of your app

Project Steps

Step 1: Find Your Partner
This project will be completed in pairs. List your partner's name here: _____

Step 2: Brainstorm Problems
Brainstorm interesting and personally relevant problems. Nothing is off limits, and don't worry yet about how computer science can help solve the problem. You might think about

- Things you'd like to improve in your school, neighborhood, or community
- A task in your everyday life that you wish could be completed more easily
- A cause that you feel strongly about
- Something that is currently inconvenient or annoying to do

Record your brainstorm of problems in the space below

Step 3: Choose Your Problem

Work with your partner to decide on which problem you would like to work on. As you discuss, make sure you consider the following criteria.

- **Interesting:** Both group members are interested in the problem
- **Well-Defined:** You can specify who specifically the problem affects, what needs to change, and how you'll be able to tell that the problem had been solved
- **CS is Relevant:** Some aspect of the problem could be addressed by computer science

Step 4: Define Your Problem

Large, complex, and poorly-defined problems are much harder to solve. Make sure you have defined your problem clearly by recording responses to the questions below.

1. **What is the problem?** Be as specific as possible. What needs to change or improve? Why does the problem exist? You may need to narrow your problem's focus. Making big changes begins with small steps!

   _____

   _____

   _____

   _____

2. **Who does the problem affect?** Be as specific as possible. Think about the age, location, life conditions, interests, background, etc. of your audience.

   _____

   _____

   _____

   _____

3. **How will you be able to tell that a solution to this problem has worked?** Be as specific as possible. What would you need to measure or observe to know the problem was solved?

   _____

   _____

   _____

   _____

Step 5: Your App

From a high level think about how an app could be used to solve a part of the problem you identified. What features would it need to have? How would someone use it? If you need to update your problem definition above then do so.
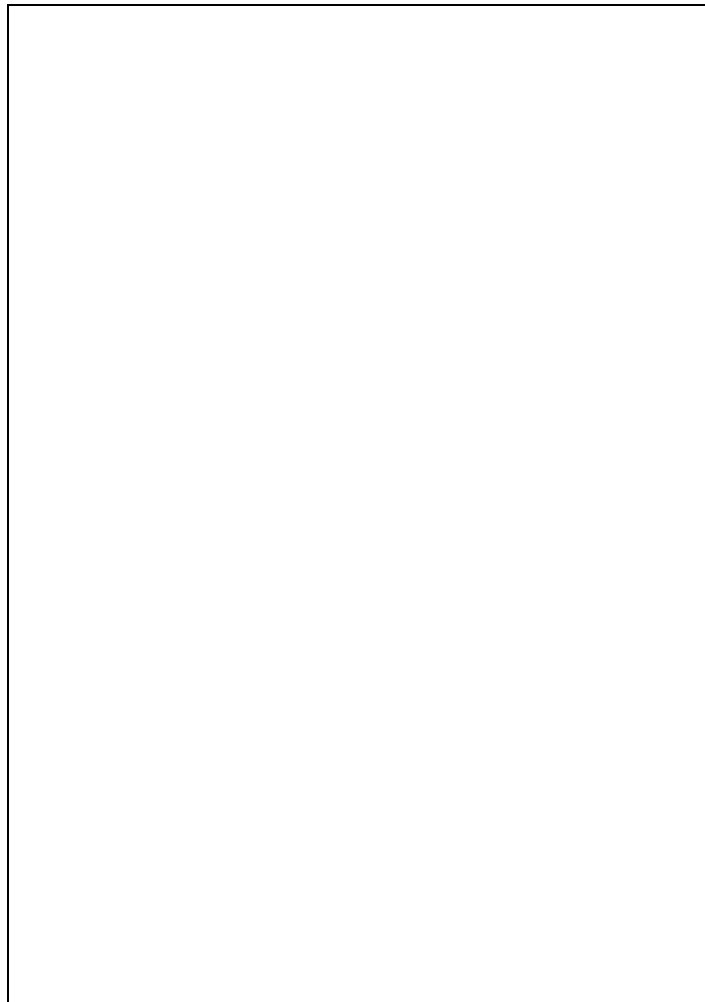
Name Your App: _____

What does your app do? Write a short description of your app as though you were describing it to someone you'd want to use it. What does it do? Why would someone want to use it? How does it help solve the problem?

_____

_____

_____

Step 6: Input, Output, Store, Process

You will sketch a version of your app and indicate what all the different outputs are. A classmate should be able to tell how the app works based on the sketch and labels.

App Sketch: Sketch what a screen of your app will look like based on your description above.

Output Information: Label the different outputs generated by your app by writing what they are and drawing an arrow to where they are located on the screen. (E.g. "List of nearby parks" or "Days until friends' birthdays")

Inputs: What kind of information does your app need as input to work? Will this input come from the user, phone sensors, or an external source (e.g. a database online)? List every piece of information your app will need to work. Your app may have more or less than 6 inputs. Feel free to add extra sheets of paper if you need them.

Type of Information *Example: User age*	Source *User / Sensor / External*	Example *Example: 13 years old*

Process: When computers process information they may do it differently from a human, but everything a computer can do, a human could do as well (just usually much slower!) If you were provided the inputs you've listed, how would YOU need to process it in order to create the outputs of your app.

Store: What information will your app store permanently? Think about information that will not change across multiple uses of the app, or information that it would be useful to have recorded and use again later.

Step 7: Peer Review

Your teacher will provide you with a Peer Review sheet. Trade projects with another group and complete the peer review. As part of this process you should develop new ideas for how you can improve your app.

Step 8: Finalize App and Make Poster

Based on the results of your peer feedback make any additions or changes you need to make to how you defined your problem or how you describe your app. Then make a poster that presents the final version of your app. Your poster needs to include the following information.

- The name of your app
- The target audience
- The problem the app is designed to solve
- The input information the app uses
- A drawing of the output the app produces
- A description of how the app processes and stores information

To create your poster you can and should use your work from this project guide.

Step 9: Present Your App

The last step of this process is to present your app to your classmates. This may be done as a gallery walk or a full-class presentation. As you present your app make sure you're ready to talk to your classmates the following points.

- How you defined the problem your app is designed to solve and why you decided on this specific set of people, problems, and ways of measuring success.
- How your app is designed to work and how it aims to solve the problem.
- An overview of the information your app uses as input and output.
- An overview of how information would need to be stored or processed by your app.
- One change you made to your project based on the feedback you received

Peer Review - App Design Project

Pre-Review

Creator's Name: _____

One thing I want feedback on is…_____

_____

Reviewer Section

Reviewer's Name: _____

Questions	Rating	Comments
The problem is well-defined. I can easily tell who the audience of this app is, what specific problem it is trying to solve, and how I would know if the problem had been solved.	✔ ✘	
The app addresses the problem. I can understand what the app does from the description and it could help solve the problem.	✔ ✘	
All necessary input / output is listed. The app could work as intended based on the input/output information listed.	✔ ✘	
Storage / Processing accounted for. The app could run by storing and processing information in the way described.	✔ ✘	

Free Response Feedback

I like… _____

_____

I wish… _____

_____

What if… _____

_____

Creator's Reflection

1. What piece of feedback was most helpful to you? Why?

2. What piece of feedback surprised you the most? Why?

3. Based on feedback, what changes will you make to your app proposal?

Creator's Reflection

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Rubric - App Design Project

Project-Specific Rubric

Criteria	Yes/No	Comments
The problem is well-defined, including a target audience, details of the problem, and how to tell it has been solved.		
The app is clearly described including what it does and why someone would use it.		
The outputs of the app are clearly described and could be used to address the problem.		
The inputs of the app could be used to produce the outputs.		
The way that the information is processed to produce the output is clearly described.		
Stored information is listed and is appropriate for the functionality of the app.		
The peer review provides useful and constructive feedback.		
Peer review feedback has clearly been incorporated into the final version of the project.		
The final presentation includes all information required by the project guide.		
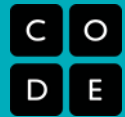
Practice	Things to Celebrate	Things to Work On
Problem Solving		
Persistence		
Creativity		
Collaboration		
Communication		