

LATHROP ENGINEERING

Name: _____

UNIT 6: INDIVIDUAL MINI-PROJECTS

AP Computer Science A

Unit Due Date: **December 12, 2019**

Welcome to the sixth unit of AP Computer Science! In this unit, you're given the freedom to make your own awesome program. We've spent all semester learning the basics of programming: flow of control, class structures, and arrays. Now it's time to put that information into action! Here you'll get to design a program using this semester's knowledge, and then take some time to put it all together. In the end, the expectation is that you learn the following:

- How to plan out your own program from beginning to end
- How to create a complete design brief and GANTT chart
- How to use flow of control, class structures and/or arrays *as needed* to make a complete program
- How to evaluate your own work, get feedback from others, and share your work with your peers

As we move through this unit, you are responsible for making adequate progress through the assignments, and for being done by the Unit Due Date (**December 12, 2019**). You are also responsible for completing each part before moving on to the next. Our unit is broken up into three main parts:

Part 1: Define & Design (50 pts) Approx. 2 days	
The first part of the unit will be all about planning. We've spent a lot of time this semester talking about planning, and here you get to show off what you know. You'll make a complete design brief for what you want your program to do, and you'll make a detailed sketch of how you think it could work.	 Project Brainstorm
	 Design Brief
	 Diagram & Plan
	 Check-off From Mr. Benshoof
Part 2: Program (50 pts) Approx. 2 days	
The second part of this unit is where you get the freedom to actually make your own program! Follow your plan to complete your individual project. Be sure to take daily notes on your progress, including details about what is going well and what isn't, as well as what needs to be changed along the way!	 Program
	 Follow Your Plan
	 Daily Notes
	 Check-off from Mr. Benshoof
Part 3: Communicate (20 pts) Approx. 2 days	
Finally, we'll conclude our engineering design process by communicating our work with each other. This will take an entire class period and will happen on the last Monday of the semester – plan accordingly! Here, you'll write a full-page reflection on your process. You'll also draw a final picture or flow chart describing what you accomplished, and you'll even share your work with your fellow classmates.	 Project Reflection
	 Picture & Flow Chart
	 Communicate Your Work
	 Check-off from Mr. Benshoof



(50 pts) Approx. 2 days

The first part of our unit requires that you make a choice for what you want to work on as our semester wraps up, and that you create a good plan for making progress! It all starts by choosing a project. While some of your classmates in other courses might be building something, we need to stick with *making a program*. Some ideas of each are listed below to get you thinking:

Fun Programs		Helpful Programs	
Text-Based Adventure	4x4 Tic-Tac-Toe	Physics Calculator	Chemistry Calculator
Checkers	Connect 4	Favorite Music Catalog	Dictionary

- Brainstorming:** Brainstorm ten (10) ideas for possible project topics or things to learn about.
- Pick the idea you want to work on. If you think it's a pretty wild or big idea, double check with Mr. Benshoof to make sure we've covered the information you'll need to make that program!
- Design Brief:** Next, make complete design brief in your engineering notebook! Your design brief must outline what you're trying to accomplish and what will make it a success. Remember that a complete design brief has to include the following 5 ideas:
 - Problem Statement & Justification
 - Deadlines
 - Criteria
 - Constraints
 - Audience/Scope
- GANTT Chart:** Finally, you need to make a plan for completing your work. Start with a GANTT chart to plan out your work between now and the end of the semester!
- Diagram & Plan:** Next, make a plan for what you're going to do based on what you want to do:
 - For the program you want to build:** Create a diagram of the class organization you think would be best. Should you have classes for Pandas and Lions? For Caves and Beaches? Will you only need one class? What methods will be helpful? **Write down** your ideas in your engineering notebook.

Part 1: Tasks	10 points	9-5 points	4-0 points
 Project Brainstorm	+ You brainstormed 10 ideas for different projects	- You brainstormed between 5 and 9 ideas for different projects	- You brainstormed fewer than 5 ideas
	20-17 points	16-10 points	9-0 points
 Design Brief	+ Your design brief is complete, including all 5 of the necessary parts + Your design brief is specific to you in this project	- Your design brief is missing a component - Your design brief is generic and does not apply to you specifically	- Your design brief is missing more than one component - Your design brief is missing
 Diagram & Plan	+ Your plan includes a GANTT chart + Your plan includes a picture of how you'll organize classes and methods	- Your plan does not include a GANTT chart - Your plan does not include a picture	- Your plan is missing



(50 pts) Approx. 2 days

The second part of our unit is where you get to work on programming your awesome project! Whether you’ve chosen to make a program that’s some sort of text-based game, or something with super simple text-based graphics, or even something more utilitarian like a calculator or reference, the process will be the same:

1. **Program:** This is what you’ve been waiting for. You’ll use the appropriate techniques, and resources to accomplish your plan.
 - a. **For your program:** You’ll need to remember the proper programming practices to make your idea a reality. Starting with class structure is a good way to begin, and making your runner class start to talk to objects is a good second step.

Benshoof’s Pro-Tip: Make your program do something small first (and get it working successfully). Then add a little more and get it working. Then a little more. Then a little more. Many smaller baby steps that each work will get you to a finished product much faster than trying to do the big thing right away and then troubleshooting 99 problems all at once.

2. **Follow Your Plan:** You made a very detailed plan, drawing, or flow chart before starting this work. Make sure that you refer back to it and follow it! If you need to change your plan in any way, make sure that you make note of that in your engineering notebook!
3. **Daily Notes:** EVERY DAY as you work through this unit, you need to end the day by making some short notes about what you accomplished. You can write about what you did successfully that day, what didn’t work, or what needed to change as you continued working. This short ‘journaling’ of your programming and engineering process is an important habit to get in to, and we’ll remind ourselves about it every day!

Part 2: Tasks	20-17 points	16-10 points	9-0 points
 Program	+ You actually programmed the thing you wanted to program! (Mostly)	- You completed part of your plan, but many things unfinished	- You did not do anything in the time given
 Follow Your Plan	+ You clearly followed the plan you setup in your engineering notebook.	- You did not really follow your plan	- You did not follow your plan at all, and nothing is documented
	10 points	9-5 points	4-0 points
 Daily Notes	+ You kept daily notes on your progress through this unit. + Notes are easy to find in your engineering notebook + Where appropriate, your notes include some pictures or diagrams	- Your notes are lacking - Your notes do not cover every day of work	- Your notes cover less than half our work days - Your notes are missing all together



(20 pts) Approx. 2 days

The final part of our project is communication. Just as the engineering design process ends with communication, so will our last unit of the semester. It's important to communicate your work with others because it helps share ideas, it helps you get feedback on your work, and it helps us hold each other accountable for doing good work and being done on time! Here, we'll communicate our work using a written reflection, a picture, and by sharing with classmates.

1. **Project Reflection:** With your project/program complete (or near enough to completion that you can talk about it) it's time to think about the process. Take some time to write a full-page reflection in your notebook on what you did to complete your individual mini-project. As you write your reflection, answer the questions below:
 - a. What was your original idea?
 - b. How did that idea change as you worked through the project?
 - c. What was easy about your project? What was difficult or frustrating?
 - d. How might other programmers use the same ideas in their own work?
 - e. The next time you sit down to make your own program, how will you be able to do it better?
 - f. What do you know now that you wish you had known at the start of the project? Why would that be useful to have known earlier?
2. **Picture & Flow Chart:** Now you need to draw a picture.
 - a. **For your programming project:** Draw a diagram that shows how you put the program together. This could be a re-drawing of your class structure that lists in more detail the methods you chose to use, or it could be a more abstract representation of how the program works in your brain. Maybe you think about the program as a flow chart (if this, then that), in which case you could create that flow chart! Either way, you need some graphical way to share what you did with others (including your future self).
3. **Communicate:** The last Monday of our semester will be spent sharing project work as a class. You'll get a little bit of time to tell us about what you learned or what you made, and to give us all advice on doing the same. This will take a full class period all together, so be sure to plan that into your GANTT chart right from the beginning!

Part 3: Tasks	8 points	7-5 points	4-0 points
 Project Reflection	+ You wrote a full page reflecting on your programming process + You answered all the reflection questions posed above	- Your reflection is less than a full page - You did not answer all the reflection questions	- Your reflection is missing - Your reflection is off-topic
 Picture & Flow Chart	+ You drew a picture of your final project that represents the function of that project in some way + Your diagram is easy to understand and is complete	- Your diagram/flow chart is missing important parts - Your diagram/flow chart is difficult to understand	- Your diagram/flow chart is missing
	4 points	3 points	2-1-0 points
 Communicate Your Work	+ You share your work with the class during our Engineering Roundtable	- You share some of your work - You only share with a few people	- You do not share your work with the class

